FINAL REMEDIAL INVESTIGATION REPORT ADDENDUM
AMCO Chemical Superfund Site
Oakland, California

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EXECUTIVE SUMMARY

This Remedial Investigation Report Addendum (RI Addendum) serves as an addendum to the Final Remedial Investigation Report (RI Report; CH2M Hill, 2011) for the AMCO Chemical Superfund site, located in Oakland, California (Site). The RI Addendum, prepared for the United States Environmental Protection Agency (US EPA or EPA), documents a series of supplemental investigations that were performed to fill data gaps regarding the nature and extent of chemical contamination at the Site. This RI Addendum also includes discussions addressing contaminant fate and transport, and concludes with a comprehensive summary of conditions at the Site.

In addition to describing the Site's background and environmental setting, the RI Report presented the findings from remedial investigations completed during the period September 2004 through November 2006, and included a baseline human health risk assessment. This RI Addendum presents the findings from supplemental investigations performed during the period June 2009 through November 2013. Groundwater monitoring data collected from fourth quarter 2006 through first quarter 2009 are also included in the RI Addendum.

Background

The former AMCO Chemical Corporation (AMCO) was a chemical handling, storage, and distribution facility that operated from the 1960s to 1989. Bulk chemicals were delivered to the facility by rail and truck, off-loaded, and stored in tanks and drums before being transferred to smaller containers for resale. The Site was added to the National Priorities List (NPL) of federal Superfund sites in 2003.

The objectives of the supplemental remedial investigations were consistent with those of the original RI activities as reported in the RI Report. The objectives of the supplemental remedial investigation focused on the following to address data gaps that remained following the original remedial investigations:

- Determination of the distribution and concentrations of the chemicals of concern (COCs) in soil and groundwater at the Site.
- Characterization of the extent of the non-aqueous phase liquids (NAPL) known to be present as light non-aqueous phase liquids (LNAPL) beneath the central portion of the former AMCO facility and evaluation for the potential presence of dense non-aqueous phase liquids (DNAPL) in soil and/or groundwater at the Site.
- Establishing the extent of volatile organic compounds (VOCs) in soil gas, crawl space air, indoor air, and outdoor air at the former AMCO facility (1414 3rd Street), nearby residential properties, and South Prescott Park.
- Evaluation of the fate and transport of the COCs based on their chemical and physical properties, naturally occurring biotic and abiotic transformations, and hydrogeologic conditions at the Site.

Geology/Hydrogeology

The geology at the Site consists of the following five units (starting at the ground surface): (1) Fill and, at some locations, Younger Bay Mud; (2) Merritt Sand; (3) Older Bay Mud; (4) the Alameda Formation; and (5) Bedrock. The supplemental investigations expanded on the characterization of three hydrogeologic features associated with the upper four geologic units.

- The upper, subsurface water bearing zone, referred to herein as the Upper Aquifer, is unconfined and associated with the fine sands of the Merritt Sand geologic unit, with the water table of the Upper Aquifer occurring in the Fill (and Younger Bay Mud, if present). At the former AMCO facility, the depth to the base of the Upper Aquifer, which is at the interface of the Merritt Sand and Older Bay Mud, is approximately 60 feet below ground surface (bgs), while at the downgradient edge of the Site, the Upper Aquifer extends to approximately 80 feet bgs.
- The Older Bay Mud that underlies the Merritt Sand is an aquitard dominated primarily by stiff clays. At the former AMCO facility, the Older Bay Mud unit occurs at depths ranging between approximately 60 and 138 feet bgs.
- The Lower Aquifer, associated with the Alameda Formation, is a confined aquifer. The supplemental investigations only extended into the upper portion of the Lower Aquifer (Alameda Formation), to a maximum drilling depth of 160 feet bgs. The lithology of this portion of the Alameda Formation consists predominantly of silt and clay interbedded with thin layers of sand.

With seasonal fluctuation, depth to water in the Upper Aquifer typically varies from about 3 to 6 feet bgs. The direction of groundwater flow in the Upper Aquifer generally is to the south or south-southwest at a relatively flat horizontal gradient. Vertical gradients in the Upper Aquifer at the Site were observed to vary locally, with some locations having a downward vertical gradient while others had an upward gradient.

Concentrations of total dissolved solids (TDS) in the Upper Aquifer vary both laterally and vertically. North of 3rd Street, TDS concentrations generally were below the state and federal criteria for drinking water of 3,000 milligrams per liter (mg/L) and 10,000 mg/L, respectively. South of 3rd Street, TDS concentrations generally exceeded the state criterion, and often exceeded the federal criterion. South of 3rd Street, TDS concentrations were greater in the deep zone of the Upper Aquifer than in the intermediate and shallow zones. For the only well installed in the Lower Aquifer, the TDS concentration in the groundwater was 1,120 mg/L. TDS concentrations in groundwater from Site monitoring wells screened in either the Upper Aquifer or the Lower Aquifer typically exceeded the California TDS recommended maximum concentration for drinking water of 500 mg/L (secondary maximum contaminant level).

Supplemental Investigations

The supplemental remedial investigations expanded the gas-phase monitoring activities to include indoor air sampling, while continuing the soil gas, crawl space air, outdoor air, and background (ambient) air sampling. To establish the nature and extent of contamination, screening levels (SLs) were established for chemicals of concern (COCs) in the gas-phase, soil, and groundwater. The SLs in this RI Addendum are for screening purposes only, and are not

assumed to be cleanup criteria for contaminated media. The basis for the SLs varied by medium, as follows:

- Gas-phase – Based primarily on EPA's May 2012 regional screening levels (RSLs) for residential air, with environmental screening levels (ESLs) developed by the San Francisco Bay Regional Water Quality Control Board (RWQCB) used for chemicals that do not have an established RSL.
- Soil – Also based primarily on EPA's May 2012 RSLs for soil with residential land use, with ESLs used for chemicals that did not have an established RSL. For metals with an identified background concentration, the SL was established as the background concentration if the RSL (or ESL if applicable) was less than the background concentration.
- Groundwater - When available, the lower of the California or federal primary maximum contaminant level (MCL) was used as the SL. For chemicals without established MCLs, EPA RSLs (May 2012) for drinking water were the basis of the SLs. If neither MCLs nor RSLs were established, ESLs were used.

Gas-Phase Investigations

The background (ambient) air quality in the South Prescott neighborhood is poor as a result of sources other than the Site. VOCs detected in the background (ambient) air include benzene, carbon tetrachloride, naphthalene, 1,4-dioxane, ethylbenzene, chloroform (trichloromethane), and tetrachloroethene, with benzene, carbon tetrachloride, and 1,4-dioxane concentrations above their respective SLs.

Crawl space and indoor air VOC concentrations were used to evaluate vapor intrusion as a potential human health exposure pathway for residential properties adjacent to the former AMCO facility. Based on the VOC concentrations in crawl space and/or indoor air samples collected in June 2009, EPA identified vapor intrusion as a possible human health risk for residents at four residences located adjacent to the former AMCO facility on the west and southwest. The operation by EPA of vapor mitigation systems installed at these four residential properties in October 2009 appears to have been effective in abating vapor intrusion, based on indoor air VOC concentrations reported for sampling events in 2010 and 2012. Indoor air concentrations in
2010 and 2012 at these four residential properties were representative of background (ambient) air or did not correlate with crawl space air concentrations, indicating source(s) other than vapor intrusion associated with subsurface contaminants attributable to AMCO.

VOC concentrations in the outdoor air at South Prescott Park were not attributable to groundwater contamination from the former AMCO facility. Outdoor air quality at South Prescott Park is a result of VOC concentrations in background (ambient) air, or due to another source.

Soil Characterization

In performing the supplemental remedial investigations, over 1,500 soil samples were collected and analyzed to further define the nature and extent of soil contamination at the Site. Most of the soil sampling was associated with the soil characterization at the former AMCO facility and

vacant neighboring properties (Large Vacant Lot, Small Vacant Lot, and Parking Lot). The soil characterization efforts established the nature and extent of soil contamination attributable to releases associated with the past AMCO operations. Soil contaminants detected include VOCs, semi-volatile organic compounds (SVOCs), metals, organochlorine pesticides, and polychlorinated biphenyls (PCBs). The most significant releases of chemicals to soils occurred in the area where bulk chemicals were transferred from rail cars or delivery trucks to storage tanks and drums (defined herein as the source area). The source area is located in the central-southern portion of the former AMCO facility and encompasses an area roughly 60 feet (east to west) by 130 feet (north-south). In the source area, LNAPL and elevated concentrations of many COCs are present in soil, with the soil contamination extending from near surface to depths of 30 feet bgs.

VOCs that exceeded their respective soil SLs within the source area include: tetrachloroethene (PCE); trichloroethene (TCE); cis-1,2-dichloroethene (cDCE); vinyl chloride (VC); 1,1-dichloroethane (11-DCA); 1,2-dichloroethane (12-DCA); benzene (BEN); ethylbenzene (EBZ); xylenes; 1,2,4-trimethylbenzene (124-TMB); and 1,4-dichlorobenzene (14-DCB).

For only one source area boring (SC-021), TCE was detected above its SL in a soil sample collected at the interface between the Merritt Sand and Older Bay Mud (at a depth of 60 feet bgs). To evaluate the possibility that soil is contaminated below this depth at this location, a Lower Aquifer monitoring well (RMW-02-131) was installed within three feet of boring SC 021. VOCs were not detected in soil samples collected from the RMW-02-131 boring within the Older Bay Mud (80, 100, and 125 feet bgs) and the Alameda Formation (150 feet bgs).

SVOCs present in soil at concentrations exceeding SLs are primarily polycyclic aromatic hydrocarbons (PAHs), such as benzo(a)pyrene. SVOC-contaminated soil has a widespread lateral footprint at both the former AMCO facility and the neighboring properties. The majority of SVOC concentrations exceeding soil SLs are present in shallow soils, generally to a depth of 5 feet or less.

Arsenic and lead were the most common inorganic COCs (i.e., metals) exceeding their SLs in soils across the former AMCO facility and the neighboring properties. Soil contamination associated with these metals typically was observed at shallow depths ranging from 1 to 5 feet bgs. However, the presence of lead is not attributable to operations at the former AMCO facility.

Pesticides (aldrin, dieldrin, DDT, DDD, and DDE) were detected above their soil SLs at the former AMCO facility and the Large Vacant Lot. Pesticide contamination extends to a maximum depth of 30 feet bgs in the source area, while the vertical extent of pesticide-contaminated soil at other areas of the former AMCO facility generally is shallow, extending to 5 feet bgs or less. At the Large Vacant Lot, pesticide contamination is present in shallow soils (to a depth of 8 feet bgs) from the center to the southern end of the property.

PCB contamination in soils is limited to small areas in the yard of the former AMCO facility and a couple of locations at the neighboring properties.

LNAPL (as free product) continues to be observed at measurable thicknesses in monitoring wells MW-13 and MW-14. LNAPL also was observed at times during the supplemental investigations

in monitoring well RMW-02-13. These three wells are all located in the source area of the former AMCO facility. The measured thicknesses of the LNAPL in wells MW-13, MW-14, and RMW-02-13 were greater during the recent supplemental investigations than during the original remedial investigations.

Groundwater Characterization

COCs present in the Upper Aquifer groundwater at concentrations exceeding their SLs consist of VOCs, SVOCs, metals, PCB-1260, pesticides, and dioxins/furans. Chlorinated VOCs (CVOCs), primarily TCE, cDCE, and VC, are the major VOC contaminants in groundwater, having a large lateral extent in both the shallow (5-15 feet bgs) and intermediate (25-35 feet bgs) zones of the Upper Aquifer. The highest VOC concentrations were detected in groundwater from monitoring wells screened in the shallow zone and located within or immediately adjacent to the source area at the former AMCO facility. CVOC concentrations in groundwater from the shallow-zone are more than an order of magnitude greater than those in intermediate-zone groundwater of the Upper Aquifer at the former AMCO facility. In the downgradient portion of the Upper Aquifer plume, CVOC concentrations are slightly higher in intermediate-zone than in shallow-zone groundwater.

TCE was detected above its SL during the August 2012 monitoring event in groundwater from two deep zone wells, RMW-14-50 and RMW-12-51. While the presence of TCE in groundwater from on-site well RMW-12-51 is attributed to former AMCO operations, the source of the TCE in groundwater from off-site well RMW-14-50 is not likely associated with the former AMCO facility.

Other VOCs in groundwater at concentrations above SLs are monocyclic aromatic hydrocarbons (notably toluene), methylated benzenes, and chlorinated benzenes. The lateral footprint of the plumes for these VOCs includes the RMW-02 and RMW-12 well clusters, with the vertical extent of these VOCs being primarily the shallow zone of the Upper Aquifer.

The COC with the largest lateral extent in groundwater is 1,4-dioxane, an SVOC. The shallow-zone plume for 1,4-dioxane extends from the northeastern corner of the former AMCO facility (well RMW-03-15) to beyond downgradient monitoring well BMW-08, located approximately 300 feet southwest of the former AMCO facility. In the intermediate-zone groundwater, the lateral extent of the 1,4-dioxane plume is less, but maximum 1,4-dioxane concentrations are greater than those in the shallow-zone groundwater. The extent of 1,4-dioxane-impacted groundwater is consistent with the fate and transport properties of this COC, which are: high solubility in water, low volatility, limited sorption to soil, and recalcitrant to abiotic and biotic transformations. The concentration trends for 1,4-dioxane do not indicate that natural attenuation processes are effective in limiting the migration of this COC. The lateral extent of other SVOCs in both the shallow and intermediate zones of the Upper Aquifer is limited to the former AMCO facility.

The extent of organochlorine pesticides, PCB, and dioxin/furan contamination in groundwater is limited to that portion of the source area where former chemical handling operations likely released these COCs to the environment. The presence of these COCs at off-site locations (e.g., south of 3rd Street) is not considered attributable to the former AMCO operations. High concentrations of arsenic and iron and, to a lesser degree, manganese, are present in groundwater

associated with the VOC plumes. The reducing conditions that have enhanced reductive dechlorination of VOCs have also resulted in the formation of the more soluble, reduced forms of arsenic, iron, and manganese in the shallow zone of the Upper Aquifer.

Fate and Transport

To evaluate if CVOCs had migrated vertically and impacted the water quality of the Lower Aquifer, monitoring well RMW-02-131 was installed with a screen interval set in the upper portion of the Alameda Formation. VOC concentrations in the groundwater from RMW-02-131 indicate that chemical releases at the former AMCO facility have not impacted the water quality of the Lower Aquifer groundwater.

The presence of LNAPL in the source area continues to contribute COC contamination to groundwater, especially in the shallow-zone of the Upper Aquifer. This contribution is attributable to dissolution from LNAPL, as well as desorption from the high COC concentrations in soil. Chemical releases in the source area during AMCO's operation are the source of the LNAPL, which is a complex mixture of organic compounds. In the source area, the vertical extent of COCs with low solubility in water (e.g., pesticides, PCBs, and many PAHs) is attributable to facilitated transport mechanisms. Co-solvent effects also occurred, resulting in chlorinated solvents accumulating in the LNAPL rather than forming a DNAPL.

Biodegradation of many of the COCs is occurring at the Site, with this natural attenuation process being the primary mechanism limiting the downgradient extent of the VOC plumes relative to the source of the COC releases at the former AMCO facility. Reductive dechlorination is actively transforming the CVOCs, resulting in cDCE being the COC with the highest concentration in groundwater. Chlorinated benzenes also are undergoing reductive dechlorination. Biodegradation of the non-chlorinated VOCs is occurring under anaerobic conditions associated with anaerobic respiration (ferric iron and sulfate reduction) and fermentation processes (methane production).

Chemical concentration trends with time, geochemical concentrations, and microbial parameter concentrations in groundwater are all consistent with the observed active reductive dechlorination. Dehalococcoides, the microorganism associated with complete chlorinated ethene biodegradation, and the bacteria's functional genes for encoding the reducing enzymes, are present at concentrations indicative of active reductive dechlorination in groundwater associated with TCE, cDCE, and VC plumes in the shallow and intermediate zones. Dissolved gases (methane, ethene, and ethane) associated with active biodegradation also are present in groundwater with elevated VOC concentrations.

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LIST OF ACONYMS AND ABBREVIATIONS

Chemical Abbreviations

ALDRN	Aldrin
An	antimony
As	arsenic
BEN	benzene
B(a)ANTRCN	benzo(a)anthracene
B(a)PYR	benzo(a)pyrene
B(b)FLURNTN	benzo(b)fluoranthene
B(k)FLURNTN	benzo(k)fluoranthene
BrM	bromomethane
CBen	chlorobenzene
CCl4	carbon tetrachloride (tetrachloromethane)
Cd	cadmium
CHRYSN	chrysene
Cl	chloride
Co	cobalt
CO_2	carbon dioxide
Cr	chromium
Cu	copper
DB(a,h)ANTRCN	dibenzo(a,h)anthracene
11-DCA	1,1-dichloroethane
12-DCA	1,2-dichloroethane
12-DCB	1,2-dichlorobenzene
13-DCB	1,3-dichlorobenzene
14-DCB	1,4-dichlorobenzene
11-DCE	1,1-dichloroethene
cDCE	cis-1,2-dichloroethene
tDCE	trans-1,2-dichloroethene
12-DCP	1,2-dichloropropane
DDD or p,p'-DDD	dichlorodiphenyldichloroethane
DDE or p,p'-DDE	dichlorodiphenyldichloroethene
DDT or p,p'-DDT	dichlorodiphenyltrichloroethane
DLDRN	Dieldrin
14-Dxn	1,4-dioxane
EBZ	ethylbenzene
EDB	1,2-dibromoethane (ethylene dibromide)
Fe^{2+}	ferrous iron
HCL	hydrochloric acid
Hg	mercury
H_2SO_4	sulfuric acid
I(1,2,3-c,d)PYR	Indeno(1,2,3-c,d)pyrene
MBK	2-hexanone (methyl butyl ketone)
MEK	2-butanone (methyl ethyl ketone)

Chemical Abbreviations (continued)

MIBK	4-methyl-2-pentanone (methyl isobutyl ketone)
MTBE	methyl tert-butyl ether
1-MNAPH	1-methylnaphthalene
2-MNAPH	2-methylnaphthalene
NAPH	naphthalene
NO_3	nitrate
NS-n-PPLAM	n-Nitrosodi-n-propylamine
PAH	polycyclic aromatic hydrocarbon
Pb	lead
PCB	polychlorinated biphenyl
PCB-1242	Arochlor 1242
PCB-1254	Arochlor 1254
PCB-1260	Arochlor 1260
PCDD	polychlorinated dibenzo-*p*-dioxin
PCDF	polychlorinated dibenzofurans
PCE	tetrachloroethene (perchloroethylene)
PCP	pentachlorophenol
PHEN	phenanthrene
SO_4	sulfate
TAME	tert-amyl methyl ether
TBA	tert-butyl alcohol
111-TCA	1,1,1-trichloroethane
112-TCA	1,1,2-trichloroethane
1122-TCA	1,1,2,2-tetrachloroethane
123-TCB	1,2,3-trichlorobenzene
124-TCB	1,2,4-trichlorobenzene
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TCE	trichloroethene
TCM	trichloromethane (chloroform)
Tl	thallium
124-TMB	1,2,4-trimethylbenzene
135-TMB	1,3,5-trimethylbenzene
TOL	toluene
TPH	total petroleum hydrocarbons
TPH-d	total petroleum hydrocarbons (diesel range)
TPH-e	total extractable petroleum hydrocarbons (diesel and motor oil range)
TPH-g	total petroleum hydrocarbons (gasoline range)
TPH-mo	total petroleum hydrocarbons (motor oil range)
VC	vinyl chloride
Xylenes or XYL	xylenes

Other Abbreviations and Acronyms

ºC	degrees Celsius
Accutest	Accutest Northern California Laboratory
AMCO	AMCO Chemical Corporation

Other Abbreviations and Acronyms (continued)

AMCO Property	1414 3rd Street, Oakland, California
Amtrak	National Railroad Passenger Corporation
AST	aboveground storage tank
ASTM	ASTM International (formerly American Society for Testing and Materials)
BART	Bay Area Rapid Transit
bgs	below ground surface
bvcA	gene encoding the VC to ethene reductive dehalogenase BvcA
Caltrans	California Department of Transportation
CCR	California Code of Regulation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLP	(US EPA) Contract Laboratory Program
CMOS	completely miscible organic solvent
CMS	chip measurement system
cm/s	centimeters per second
COC	chemical of concern; chain of custody
COD	chemical oxygen demand
CPT	cone penetrometer testing
CPVC	chlorinated polyvinyl chloride
CSM	Conceptual Site Model
CVOC	chlorinated volatile organic compound
DC Metals	DC Metals, Inc.
DHC	*Dehalococcoides* bacteria
DHS	[California] Department of Health Services
DNAPL	dense non-aqueous phase liquids
DO	dissolved oxygen
DOC	dissolved organic carbon
DPT	direct push technology
DTSC	[California] Department of Toxic Substances Control
EBMUD	East Bay Municipal Utility District
EC	electrical conductivity
ECD	electrolytic conductivity detector
EPA	see US EPA
ESL	Environmental Screening Level
FID	flame ionization detector
ft	feet
ft/day	feet per day
ft/ft	feet per foot
ft/year	feet per year
FS	feasibility study
GPS	global positioning system
HSA	hollow stem auger
HI	hazard index
HOC	hydrophobic organic compound
Hz	hertz

Other Abbreviations and Acronyms (continued)

I-880	Interstate 880 freeway
ID	identification
IDW	investigation-derived waste
ITRC	Interstate Technology & Regulatory Council
ITSI	Innovative Technical Solutions, Inc.
J	estimated result
LNAPL	light non-aqueous phase liquid
MCL	maximum contaminant level
mg/kg	milligram per kilogram
mg/L	milligram per liter
MIP	membrane interface probe
mL	milliliter
MS	matrix spike\
MSD	matrix spike duplicate
mS/cm	millisiemens per centimeter
msl	mean sea level
mV	millivolt
NAD83	North American Datum of 1983
NAPL	non-aqueous phase liquid
NAVD88	North American Vertical Datum of 1988
NE	not established
NELAP	National Environmental Laboratory Accreditation Program
ng/L	nanograms per liter
NPL	National Priorities List
ORP	oxidation-reduction potential
pceA	gene encoding the PCE to TCE reductive dehalogenase PceA
PG&E	Pacific Gas & Electric
PID	photo-ionization detector
PMOS	partially miscible organic solvent
PPE	personal protective equipment
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
RDase	reductive dehalogenase (enzyme)
RI	remedial investigation
RI Addendum	Remedial Investigation Report Addendum
RI Report	Remedial Investigation Report
RL	reporting limit
RPM	Remedial Project Manager
RSL	regional screening level, US EPA Region 9
RWQCB	[California] San Francisco Bay Regional Water Quality Control Board
SAP	Sampling and Analysis Plan
Sch	schedule
SHSP	Site-Specific Health & Safety Plan
SIM	selective ion monitoring

Other Abbreviations and Acronyms (continued)

Site	AMCO Chemical Superfund Site, Oakland, California
SL	screening level
SPRR	Southern Pacific Railroad
SPT	standard penetration test
SVOC	semi-volatile organic compound
tceA	gene encoding the TCE to VC reductive dehalogenase TceA
TDS	total dissolved solids
TEF	toxicity equivalence factor
TEQ	toxic equivalency quantity
TOC	total organic carbon
ug/kg	micrograms per kilogram
ug/L	micrograms per liter
ug/m^3	micrograms per cubic meter
UN	United Nations
UPRR	Union Pacific Railroad
USA	Underground Service Alert of Northern California
USCS	Unified Soil Classification System
US EPA or EPA	United States Environmental Protection Agency
UST	underground storage tank
UTL	upper tolerance limit
vcrA	gene encoding the TCE to ethene reductive dehalogenase VcrA
VFA	volatile fatty acid
VI	vapor intrusion
VOA	volatile organic analysis
VOC	volatile organic compound
yd^3	cubic yards

1.0 INTRODUCTION

1.1 PURPOSE OF THE REMEDIAL INVESTIGATION ADDENDUM

This Remedial Investigation Report Addendum (RI Addendum) presents the findings of the supplemental remedial investigations (RIs) completed by the United States Environmental Protection Agency (US EPA or EPA) at the AMCO Chemical Superfund site, located in Oakland, California (Site). The remedial investigation activities reported in this RI Addendum were supplemental to remedial investigation activities documented in the Remedial Investigation Report (RI Report, CH2M Hill, 2011). The RI Report presented the findings from remedial investigations completed from September 2004 through November 2006. The RI Report also included a risk assessment based on the remedial investigations through November 2006, as well as selected RI activities performed in 2009. The 2009 RI activities included soil gas and air monitoring along with characterization of soil samples collected during the installation of groundwater monitoring wells. This RI Addendum presents the findings from the remedial investigations performed since November 2006, including the 2009 remedial investigation results included in preparation of the risk assessment for the RI Report.

The results of the remedial investigations reported in the RI Report and RI Addendum will be used to support the development of remedial objectives and the evaluation of remedial technologies and alternatives in the feasibility study (FS). Ultimately, the remedial investigation results and the findings from the FS will be used to select remedial actions pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; also known as the Superfund law) and associated regulations.

1.2 ORGANIZATION OF REPORT

The RI Addendum is organized as follows:

- Section 1 – The remainder of this section identifies RI objectives and scope, describes the former AMCO Chemical Corporation (AMCO) facility and surrounding area, and discusses the environmental setting for the Site.
- Section 2 – Describes the supplemental remedial investigation activities conducted during the period June 2009 through November 2013.
- Section 3 – Presents an evaluation of the nature and extent of contamination in soil gas, crawl space air, indoor air, and outdoor air.
- Section 4 – Updates the interpretation of the geologic conditions at the Site.
- Section 5 – Details the nature and extent of soil contamination at the former AMCO facility and adjacent properties.
- Section 6 – Discusses the nature and extent of groundwater contamination.
- Section 7 – Describes the fate and transport of contaminants at the Site.
- Section 8 – Presents the conclusions from the supplemental remedial investigations, notably the nature and extent of air, soil, and groundwater contamination.

- Section 9 – Lists the documents referenced in this report.

The Appendices to the report provide supporting information and details related to the investigation results and interpretations presented in this RI Addendum. The appendices consist of historical information (Appendix A); the EPA Regional Screening Levels (RSLs) used to evaluate chemical concentrations (Appendix B); descriptions of field procedures (Appendix C); boring logs for the various intrusive investigations (Appendix D); field documentation from the RI activities (Appendix E); groundwater concentration data collected by CH2M Hill from late 2006 through 2009 (Appendix F); an assessment of data quality and usability (Appendix G); complete tabulation of the analytical data from the various supplemental investigations (Appendix H); technical reports and memoranda generated during the supplemental investigations (Appendix I); survey data and geotechnical laboratory data (Appendix J); and analytical laboratory reports (Appendix K).

1.3 OBJECTIVES OF REMEDIAL INVESTIGATIONS

The objectives of the remedial investigations identified in the RI Report, which are applicable to the RI Addendum, are as follows:

- Identify the specific chemicals of concern (COCs) for the Site.
- Determine the current distribution and concentrations of the COCs in soil, groundwater, soil gas, and indoor air within and/or outside the former AMCO property boundaries at 1414 3rd Street (AMCO Property), including nearby properties, South Prescott Park, and beyond.
- Characterize the extent of the non-aqueous phase liquids (NAPL) known to be present as light non-aqueous phase liquids (LNAPL) beneath the central portion of the AMCO Property and evaluate for the potential presence of dense non-aqueous phase liquids (DNAPL) in soil and/or groundwater at the Site.
- Establish the extent of volatile organic compounds (VOCs) in soil gas, crawl space air, indoor air, and outdoor air at the Site.
- Evaluate the fate and transport of the COCs based on their chemical and physical properties, naturally occurring microbial transformations, and the hydrogeologic conditions at the Site.

An additional objective specific to the RI Addendum was to assess whether the additional findings from the supplemental remedial investigations alter the basis for the conclusions from the previously completed baseline human health risk assessment.

The US EPA evaluated the analytical data and information presented in the RI Report (CH2M Hill, 2011) to satisfying the above objectives. While the RI Report established that concentrations of COCs at the AMCO Property and off-facility locations would pose an unacceptable risk to industrial and residential receptors, it was recognized that the nature and extent of COCs in indoor air, soil, and groundwater had not been characterized sufficiently. Therefore, the US EPA established the basis and scope for additional investigations to achieve the above objectives. This RI Addendum presents the results of the supplemental investigation activities and considers all of the RI-related activities performed to date in developing and presenting a refined understanding of the nature and extent of contamination at the Site.

1.4 FORMER AMCO FACILITY AND SURROUNDING AREA

1.4.1 Former AMCO Facility

The former AMCO Chemical Corporation (AMCO) facility was located at 1414 3rd Street in Oakland, California, at the northwestern corner of the intersection of Mandela Parkway (formerly Cypress Street) and 3rd Street (see Figure 1-1). AMCO owned the property, and operated a chemical handling, storage, and distribution facility from the 1960s to 1989. Bulk chemicals were delivered to the facility by rail and truck, off-loaded, and stored in tanks and drums before being transferred to smaller containers for resale (Ecology and Environment, 2001).

Chemical compounds known to have been delivered to and from the former AMCO operations are listed in Table 1 of the RI Report (CH2M Hill, 2011), and included chlorinated and non-chlorinated solvents, a number of semi-volatile organic compounds (SVOCs), organochlorine and organophosphate pesticides, petroleum-based products, and numerous other organic and inorganic chemical compounds. A site reconnaissance performed for AMCO by Engineering Science (1986) identified various chemical handling and storage facilities, including aboveground storage tanks (ASTs), underground storage tanks (USTs), drum storage areas, a warehouse, and a railroad spur line (see Figure 1-2). Further details on the chemical handling and storage operations conducted by AMCO are presented in the RI Report (CH2M Hill, 2011).

In response to a complaint in 1988 that chemicals had been spilled on the ground at AMCO, the toxic substances control division of the California Department of Health Services (DHS), the predecessor of the California Department of Toxic Substances Control (DTSC), conducted a site inspection and sampling to determine if hazardous waste violations had occurred (DHS, 1988). The inspection identified possible violations of California hazardous waste regulations as a result of hazardous materials being stored in deteriorating containers, leakage of suspected hazardous materials onto the ground, spilling of chemicals onto the ground, and other chemical handling and storage operations that were not in conformance with California hazardous material and waste management requirements. Photographs taken during this site inspection are included in Appendix A.

Upon the closure of AMCO's operations, the property was purchased in 1989 by the owners of DC Metals, Inc. (DC Metals) under a limited partnership, Cypress Street Investments. All drums and ASTs were removed from the property in 1989; however, there is no record of the removal of the USTs (Ecology and Environment, 2001). A review of aerial photographs (Mack, 2007) reveals that two structures formerly used by AMCO for drum storage (the shed located on the western portion of the property and the partially burned building located immediately north of the warehouse) were removed after 1989. Following removal of the tanks, drums, and drum storage structures, concrete pavement was installed over most of the yard at the AMCO Property, as well as the adjacent properties on Center Street, which were also owned by Cypress Street Investments (Cherry, 2012). The thickness of the concrete pavement varies at these properties. The elevation of the pavement surface at the former AMCO facility yard varies between approximately 10 to 12 feet above mean sea level (msl).

From 1989 to November 1998, DC Metals operated a scrap metal yard at the AMCO Property. Cable Moore, Inc. leased the property from November 1998 through December 2009, using it for

cable storage and fabrication operations. Since December 2009, the property at 1414 3rd Street has been vacant.

Further details regarding the former AMCO facility are presented in the RI Report (CH2M Hill, 2011). These details include facility layout and features of the former AMCO facility, as well as interim remedial actions conducted by the US EPA in the 1990s. The RI Report includes investigation results that identified a variety of chemicals contributing to the Site contamination, types of impacted media (e.g., groundwater, soil, locally grown produce, etc.), and potential chemical exposures and human health risk attributable to contaminated media resulting from chemical releases at the AMCO Property. The Site was added to the National Priorities List (NPL) of federal Superfund sites on September 29, 2003 (US EPA, 2003).

1.4.2 Surrounding Area Historical Land Use and Previous Remediation

The Site is located at the southeastern corner of the South Prescott neighborhood of West Oakland. The neighborhood land use is mixed, consisting of commercial, industrial, and residential land use. Details on the neighborhood, including zoning, demographics, and history, are presented in the RI Report (CH2M Hill, 2011). Figure 1-3 identifies the current land use for the AMCO Property and surrounding properties. Besides the AMCO Property, Cypress Street Investments owns the following properties on Center and 3rd Streets:

- Large Vacant Lot (332-346 Center Street) – Once occupied by three residential units, this lot is currently vacant and has been paved with concrete. While chemical handling and storage activities on the lot have not been documented, an access road across this lot from Center Street to the former AMCO facility existed from at least 1977 (Woods, 2003, and Mack, 2007). This access road is evident in the photographs taken in 1977 and the 1980s, and is discussed later in this section.
- Small Vacant Lot (324 Center Street) – A residence was located on this property during the period when AMCO was operational (CH2M Hill, 2011). This lot is currently vacant and has been paved with concrete.
- Warehouse and Parking Lot (1448 3rd Street) – While not used by AMCO, this property was used by DC Metals as part of its scrap metal business from the 1960s until 1998 (CH2M Hill, 2011). The warehouse and parking lot currently are not being used.

Besides the land use changes described above, land use has varied for properties located in the vicinity of the AMCO Property. The results of aerial photographic analyses performed for EPA (Woods, 2003; and Mack, 2007) are summarized below, highlighting conditions at the Site that have changed with time.

- **1959** (Woods, 2003): The existing residential units are present on 3rd Street and Center Street, and residential units also were present on the Small and Large Vacant Lots. Besides the Southern Pacific Railroad (SPRR, now the Union Pacific Railroad [UPRR]) rail yard south of the AMCO Property, a rail freight terminal was located on the east side of Cypress Street (now named Mandela Parkway). Northeast of the AMCO Property is the former Cypress Freeway, which opened to vehicular traffic in 1957. An industrial complex, reportedly a fertilizer factory and warehouse (Caltrans, 1998), is located southwest of the AMCO Property on the south side of 3rd Street in the area that is now the eastern portion of South Prescott Park.

- **1967** (Woods, 2003): Features of the AMCO facility are evident. East of the AMCO property, buildings and railroad spurs associated with the freight terminal present in 1959 have been removed. Industrial and residential buildings in the area between 5th, Cypress, Center, and 7th Streets are no longer present, removed to make way for the future West Oakland Bay Area Rapid Transit (BART) station. The industrial complex southwest of the AMCO Property on the south side of 3rd Street is still present.
- **1977** (Woods, 2003) and 1980 (Mack, 2007): The AMCO facility and the adjacent residential units are evident. An apparent access road to the AMCO Property from Center Street exists on land that currently is the Large Vacant Lot. A second railroad spur has been constructed on the east side of the AMCO warehouse building. Alexander's Ragtime Auto Wreckers operates a salvage yard on the property immediately north of the AMCO Property (CDM, 1999). East of the AMCO Property, a new commercial/industrial facility has been constructed on the east side of Cypress Street. The fertilizer factory and warehouse structures southwest of the AMCO Property on the south side of 3rd Street have been demolished. Beginning in 1976, the land on the south side of 3rd Street from approximately Henry Street to Mandela Parkway was leased by the railroad to a junkyard and auto dismantling business, Bobo's Junkyard (Caltrans, 1998).
- **1988** (Woods, 2003): The AMCO facility is evident. The junkyard property immediately north of the AMCO Property had been purchased in 1987 by BART and the debris had been removed (CDM, 1999). South of the AMCO Property, the junkyard and active rail yard are present.
- **1989** (Mack, 2007): The ASTs and several buildings had been removed, with the warehouse the primary remaining structure on the AMCO Property. While some drums are visible, most of the drums observed during the DTSC inspection (DHS, 1988) had been removed. The fire-damaged building immediately north of the warehouse still is present. The drum storage shed that was located on the west side of the AMCO Property in 1988 is visible as derelict sheds with partially collapsed roofs. A scrap metal salvage operation appears to have replaced the automobile junkyard south of 3rd Street. In an aerial dated December 12, 1989, a bulldozer is observed on the AMCO Property to the west of the warehouse. An AST pad present in October is not evident in December.

After 1989, the main changes in the area were the construction of the Interstate 880 freeway (I-880), which opened to traffic in 1997, and the establishment of South Prescott Park. In the vicinity of the Site, I-880 is an elevated structure with a portion of the freeway crossing overhead of the southeastern corner of the AMCO Property. The National Railroad Passenger Corporation (Amtrak) is using a portion of the land under the elevated I-880 freeway south of 3rd Street as an equipment and supply storage area for their maintenance facility. To construct I-880, Bobo's Junkyard was closed along with a portion of the northern railroad yard located south of 3rd Street. Following construction of the freeway, South Prescott Park was completed on the non-residential land between 3rd Street and I-880 from Peralta Street on the west to just east of Center Street. Land use for the three adjacent properties west of the AMCO Property on 3rd Street continues to be residential. East of the former AMCO facility, the property on the east side of Mandela Parkway (formerly Cypress Street) is currently being used as a parking lot.

In addition to contamination attributable to AMCO's operations, soil and groundwater contamination had resulted from some of the historical land uses at properties surrounding the former AMCO facility. A description of remedial actions completed to address contamination in the surrounding properties is presented below.

1.4.2.1 349 Mandela Parkway (formerly Alexander's Ragtime Auto Wreckers)

Following purchase of the property in 1987, BART removed surface debris from the lot. Investigations conducted for BART identified lead, cadmium (Cd), chromium (Cr), arsenic (As), and benzo(a)pyrene (B[a]PYR) at elevated concentrations. A removal action was completed at this site involving shallow soil excavation (3 to 6 inches) (CDM, 2000).

1.4.2.2 1401 3rd Street (formerly Bobo's Junkyard)

As part of the construction of the new I-880 freeway, investigations conducted in 1996 on behalf of Caltrans and Pacific Gas & Electric (PG&E) documented the presence of vinyl chloride (VC) and chlorinated solvents in soil and groundwater samples collected within 3rd Street, south of the former AMCO facility (Ecology and Environment, 2001). The presence of subsurface contamination identified in subsequent investigations along the proposed route of the new I-880 freeway resulted in modifications to the design of the elevated freeway in the vicinity of the Site. In addition, an asphalt cap and institutional controls were approved by DTSC for the contaminated soil present below the elevated I-880 freeway. Institutional controls include inspection and maintenance of the cap (DTSC and UPRR, 2009). Groundwater remediation was not implemented, as the groundwater was unsuitable as a drinking water supply due to elevated concentrations of total dissolved solids (TDS) (Geomatrix Consultants [Geomatrix], 1998).

1.4.2.3 South Prescott Park

As part of I-880 freeway construction, Caltrans constructed the approximately 4-acre South Prescott Park. Following remedial actions and park construction (which was completed in 2000), South Prescott Park was deeded from Caltrans to the City of Oakland. The following summarizes historical land use and remedial actions for the land associated with the park (Caltrans, 2001).

The eastern portion of the park site, approximately from Chester Street to Mandela Parkway, had an agricultural product manufacturing and warehouse operation from 1951 to 1976, with the land owned by Best Fertilizers from 1966 to 1973 and by Occidental Chemical from 1973 to 1976. Under a land lease from SPRR, which purchased the land in 1976, Bobo's Junkyard operated in the eastern portion of the park site until the early 1990s. The western portion of the park site had an auto wrecking operation (Smith's Wrecking Yard), railroad operations, and some residences. In 1999, approximately 17,000 cubic yards (yd^3) of contaminated soil were excavated and disposed of at an off-site facility. In the eastern portion of the park site, two USTs were removed. Lead and polycyclic aromatic hydrocarbons (PAHs) were site-wide contaminants in soil, with the pesticide chlordane (attributable to the former agricultural manufacturing operations) a significant soil contaminant in the eastern portion of the park site. Following the excavation of the contaminated soil and grading, a 3-foot thick cover of clean, imported soil was placed over the entire park site.

1.4.2.4 Vapor Intrusion Mitigation for Properties Adjacent to the AMCO Property

In consideration of VOCs detected in crawl space air samples, the US EPA implemented an interim remedial action in the fall of 2009 to mitigate possible VI for the residential buildings at 1428, 1432, and 1436 3rd Street and 320 Center Street (US EPA, 2009). The VI mitigation consisted of extracting crawl space air via piping installed below each building and connected to a blower. The blower exhaust air was vented through piping to the atmosphere at a height above the roof of each residential building.

1.4.2.5 Lead-Contaminated Soil Remediation

The US EPA has conducted two lead (Pb) remediation projects in the South Prescott neighborhood. The first project was a soil removal action conducted in 2007 as a result of the remedial investigations identifying lead at concentrations significantly above screening levels in surface soils at residential properties near or adjacent to the AMCO Property. The second project was performed in 2011 and 2012, and involved adding naturally occurring phosphates to lead-impacted soil to make the lead non-bioavailable. Details of each project are summarized below.

The 2007 soil removal action involved residential properties on 3rd Street (1428, 1432, and 1436) and Center Street (320, 326, 356, 360, and 366/368) (see Figure 1-3 for property locations). Shallow (less than 1 foot) soil excavations were conducted at six areas, and soil excavations extending to 3 feet depth were conducted in three areas. A total of 523 tons (approximately 387 yd^3) of lead-impacted soil were removed and shipped off site to a licensed hazardous waste disposal facility in Buttonwillow, California. Analyses of confirmation samples collected from the excavation footprints indicated that lead concentrations were below the removal action cleanup goal for lead of 390 milligrams per kilogram (mg/kg). Additional details of the removal action are provided in Appendix F of the RI Report (CH2M Hill, 2011).

In an effort distinct from the AMCO Chemical Site project, the US EPA began the South Prescott Lead Cleanup project in 2011 for residential properties located within the project boundaries: Peralta Street on the west, 7th Street on the north, Center Street on the east, and 3rd Street on the south. The objective of the lead cleanup project was to chemically transform lead in soils to a form that was non-bioavailable. This was accomplished by mixing ground fish bones, a source of naturally occurring phosphates, with the surface soil. Treatability studies conducted by EPA confirmed that the phosphates in the fish bones combine with the lead in the soil, making the lead non-bioavailable to humans. At completion, the lead cleanup of shallow soil was performed at 95 percent of the residential properties in the South Prescott neighborhood (US EPA, 2012b).

1.5 ENVIRONMENTAL SETTING

The environmental setting for the Site, as described in the RI Report (CH2M Hill, 2011), is summarized below for Site geology and hydrogeology. Information on physiography, climate, surface water and topography, and ecology for the Site is presented in the RI Report. An updated description of geology and hydrogeology at the Site based on observations and findings from the supplemental remedial investigations is presented in Section 4.

1.5.1 Geology

The geology at the Site consists of the following, starting at the ground surface: (1) fill material and at some locations Younger Bay Mud; (2) Merritt Sand; (3) Older Bay Mud, also referred to herein as Bay Mud; (4) the Alameda Formation; and (5) bedrock (CH2M Hill, 2011).

1.5.1.1 Fill and Younger Bay Mud

The uppermost soil at the Site typically is fill material of varying soil composition, including miscellaneous refuse. The depth of the fill is typically four to eight feet below ground surface (bgs), although the thickness is thinner and thicker in some areas. In some portions of the Site, Younger Bay Mud also overlies the Merritt Sand. The Younger Bay Mud consists of very soft, organic-rich clayey silt to silty clay with abundant plant debris and thin peat lenses. Locations where Younger Bay Mud is present are consistent with the locations of tidal channels that were mapped prior to landfilling and development of the area around the former AMCO facility (CH2M Hill, 2011).

1.5.1.2 Merritt Sand

Underlying the fill and Younger Bay Mud (where present) is the Merritt Sand unit. At the Site, the Merritt Sand unit is present to the depth of the Bay Mud, around 55 to 60 feet bgs at the AMCO Property and as deep as 70 feet bgs south of the former AMCO facility. The Merritt Sand is composed of fine- to medium-grained sands. The upper 45 feet of the Merritt Sand are loose, but become very dense below this depth.

1.5.1.3 Older Bay Mud (Bay Mud)

The Bay Mud is typically a firm, dark greenish-gray, low- to moderate-plasticity clay with varying amounts of sand and fine gravel. The well log for the former Red Star yeast well, located approximately 250 feet north of the former AMCO facility, indicated a thickness of approximately 70 feet for the Older Bay Mud (CH2M Hill, 2011). The thickness of the Older Bay Mud in the vicinity of the Site was reported in another study to range from 50 to 90 feet (Subsurface Consultants, Inc. and Todd Engineers, Inc. [SCI & Todd], 1999).

1.5.1.4 Alameda Formation

The Alameda Formation consists of interbedded layers of gravels, sands, silts, and clays. The former Red Star yeast well was screened in the Alameda Formation from a depth of 200 to 380 feet bgs (CH2M Hill, 2011). Previous RI investigations at the Site have not extended into the Alameda Formation (CH2M Hill, 2011).

1.5.1.5 Bedrock

Bedrock is composed of Jurassic-age Franciscan Formation sandstone and shale, which exists more than 400 feet bgs at the Site (CH2M Hill, 2011). Remedial investigations conducted at the Site have not extended to sufficient depth to encounter the bedrock formation.

1.5.2 Hydrogeology

The regional hydrogeology, including information on water supply wells within a 1-mile radius of the AMCO Property, is described in the RI Report (CH2M Hill, 2011). One well is a shallow, irrigation water supply well located in the back yard of a residence adjacent to the AMCO

Property. Two unconsolidated aquifers, the Upper Aquifer and Lower Aquifer, separated by an aquitard (Older Bay Mud), are present beneath the Site.

1.5.2.1 Upper Aquifer

The shallow aquifer generally is unconfined, and is associated primarily with the Merritt Sand, with a thin layer of fill and isolated occurrences of Younger Bay Mud at the very shallow depths of the aquifer. The following summarizes findings from the RI report (CH2M Hill, 2011) regarding the Upper Aquifer.

Some seasonal fluctuation of groundwater elevations was observed in the Upper Aquifer, with the depth to the water table varying from 2.5 to 6.5 feet bgs. The direction of groundwater flow in the Upper Aquifer generally is to the south in the rainy season and south-southwest during the dry season. Groundwater gradients for the Upper Aquifer varied, with the gradients north of 3rd Street typically being steeper and ranging from 0.006 to 0.008 feet per foot (ft/ft). South of 3rd Street, the hydraulic gradient was shallower and ranged from 0.001 to 0.003 ft/ft. The shallow portion of the Upper Aquifer (0 to 25 feet bgs) has a greater extent of fines in the Merritt Sand, and exhibited hydraulic conductivities ranging from 5.6×10^{-5} centimeters per second (cm/s) (0.16 feet per day [ft/day]) to 5.4×10^{-4} cm/s (1.5 ft/day). Below approximately 25 feet bgs, where the Merritt Sand contains fewer fines, the hydraulic conductivity is higher, and ranged from 1.4×10^{-3} cm/s (4.1 ft/day) to 2.5×10^{-3} cm/s (7.1 ft/day). The calculated ranges of groundwater flow velocities were 0.33 to 7.5 feet per year (ft/year) and 8.6 to 48 ft/year) in the shallower and deeper portions of the Upper Aquifer, respectively (CH2M Hill, 2011).

1.5.2.2 Lower Aquifer

The deeper aquifer, referred to herein as the Lower Aquifer and associated with the Alameda Formation, is confined, being separated from the Upper Aquifer by the Older Bay Mud aquitard. Previous investigations at the Site (CH2M Hill, 2011) did not extend into the Lower Aquifer. An industrial water production well was installed by Universal Foods Corporation in 1969 at the property located at 1384 5th Street, the former Red Star Yeast facility, which closed in 2003. This well, formerly located approximately 250 feet northeast of the AMCO Property, is referred to herein as the former Red Star Yeast well. From the log for the former Red Star Yeast well (see Appendix A), the Older Bay Mud aquitard was encountered from 59 to around 130 feet bgs. The Alameda Formation associated with the Lower Aquifer is characterized by thick, multiple interbedded layers of coarse-grained and fine-grained soils.

1.5.3 Water Quality

With regard to the suitability of groundwater as a drinking water source, in consideration of TDS concentrations, the Upper Aquifer varies from brackish to fresh water at the Site, while the Lower Aquifer reportedly is fresh water (CH2M Hill, 2011). Federal regulations establish 10,000 milligrams per liter (mg/L) of TDS as the criterion for determining a source of drinking water (Code of Federal Regulations [CFR], Title 40, Part 144.3 [40 CFR, Part 144.3], underground source of drinking water, paragraph [a][2][ii]). Sources of drinking water as established by the State of California must have a TDS concentration that does not exceed 3,000 mg/L (San Francisco Bay Regional Water Quality Control Board [RWQCB], 2011). In consideration of the esthetics of a drinking water (i.e., taste and odor), the recommended California secondary maximum contaminant level (MCL) for TDS in drinking water is

500 mg/L, with an upper secondary MCL of 1,000 mg/L (California Code of Regulations [CCR], Title 22, Division 4, Chapter 15, Article 16).

TDS concentrations in groundwater from monitoring wells at the Site are listed in Table 1-1, along with a comparison of the TDS concentrations to the above federal and state water quality criteria for TDS levels in drinking water. TDS concentrations in the Upper Aquifer groundwater at the Site vary both laterally and vertically. North of 3rd Street, TDS concentrations in the Upper Aquifer generally were below the state and federal criteria for drinking water. TDS concentrations generally were above the state criterion (and also often above the federal TDS criterion) in the Upper Aquifer groundwater south of 3rd Street. South of 3rd Street, TDS concentrations in deeper Upper Aquifer groundwater typically were greater than those in the shallow and intermediate depths. TDS concentrations at the Site typically exceed the California TDS objective for drinking water (500 mg/L), with some groundwater TDS concentrations being only slightly less.

The TDS concentration in groundwater from the Lower Aquifer monitoring well (RMW-02-131) was 1,120 mg/L. Sodium and chloride were the primary ions associated with the TDS. This TDS concentration is greater than the TDS level (890 mg/L) in the adjacent deep zone Upper Aquifer monitoring well (RMW-02-50).

1.6 FINDINGS FROM PREVIOUS REMEDIAL INVESTIGATION

The RI Report (CH2M Hill, 2011) presented results from investigations to characterize the contamination in soil, groundwater, soil gas, air, and produce at the Site, and the composition of the LNAPL in the form of free product present in monitoring wells MW-13 and MW-14 (see Figure 2-6 for well locations). The analytical results, along with investigation observations and test results were used to evaluate the nature and extent of contamination, and estimate the associated human health risk.

1.6.1 Chemicals of Concern and Impacted Media at the Site

The identified Site COCs include VOCs (chlorinated and petroleum hydrocarbons), SVOCs, organochlorine pesticides, polychlorinated biphenyls (PCBs), metals, and dioxins/furans (CH2M Hill, 2011). Of the COCs, VOCs had the highest concentrations in groundwater. The VOCs are undergoing significant biodegradation, including the reductive dechlorination of the chlorinated VOCs (CH2M Hill, 2011). The biodegradation byproducts of trichloroethene (TCE) and tetrachloroethene (PCE), dichloroethenes (primarily cis-1,2-dichloroethene [cDCE] and to a lesser degree trans-1,2-dichloroethene [tDCE] and 1,1-dichloroethene [11-DCE]) and VC have the highest concentrations in groundwater. Possible transformations of the chlorinated VOCs at the Site, including reductive dechlorination (biotic transformation), are shown on Figure 1-4.

SVOCs, organochlorine pesticides, PCBs, and metals were associated primarily with contaminated soil. In the central-southern portion of the former AMCO facility (i.e., the source area), LNAPL is present in two monitoring wells and the highest concentrations of COCs are present in soil, groundwater, and soil gas. The LNAPL is a complex mixture of organic compounds, consisting of fuel petroleum hydrocarbons and chlorinated hydrocarbons with significant concentrations of other hydrophobic organics dissolved in the LNAPL. The source area corresponds to the known locations of former chemical transfers from rail cars, former chemical storage units, and buried distribution piping. COC contamination in the source area,

including the LNAPL, is serving as the primary continuing source of contamination to groundwater and soil gas (CH2M Hill, 2011). COC concentrations in groundwater at the source area are highest at shallow depths, and significantly decrease with depth.

While other pesticides were present in soil, dichlorodiphenyltrichloroethane (DDT) and its daughter products, dichlorodiphenyldichloroethane (DDD) and dichlorodiphenyldichloroethene (DDE), were the primary pesticide COCs. The presence of lead in shallow soils is not attributable to chemical handling operations at the former AMCO facility, as lead is a shallow soil contaminant throughout the South Prescott neighborhood.

1.6.2 Human Health Risk Associated with the Contamination at the Site

Because the neighborhood surrounding the Site is a vulnerable community, EPA used an excess lifetime cancer risk of $1x10^{-6}$ and a non-carcinogenic compound hazard index (HI) of 1 as the criteria at which action will be required at the Site. Several contaminants in groundwater currently exceed these risk criteria for the ingestion pathway; however, groundwater is not currently used, nor likely to be used in the future, as a source of drinking water. Many contaminants in soil also exceed these risk criteria, with the source of soil contamination being less centralized at the Site (CH2M Hill, 2011).

The source of one soil contaminant, lead, is not attributable to AMCO. As discussed in Section 1.4.2, actions to abate the lead contamination in soil have been conducted at many areas of the Site and the surrounding community.

The risks and hazards associated with vapor intrusion may be as high as those associated with the potential risk if residential use of the groundwater was to occur. The cancer risks estimated for future residents using the groundwater as drinking water range from $1x10^{-4}$ to $7x10^{-2}$, significantly above the cancer risk criterion of $1x10^{-6}$. Hazard indices for groundwater are 628 and 262 for a child and an adult, respectively, also significantly above the non-cancer threshold of 1. Cancer risk estimates attributable to contamination in shallow soil at the former AMCO facility for scenarios of an industrial worker, construction worker, and future resident are $1x10^{-4}$, $1x10^{-5}$, and $3x10^{-4}$, respectively. The HI for shallow soil is 10 for a child, with the HI for deeper soil being 2 for an adult (CH2M Hill, 2011).

1.6.3 Ecological Risk Associated with the Contamination at the Site

An ecological risk assessment was not performed due to the residential and industrial land use at the Site (CH2M Hill, 2011). Previous evaluations determined that the Site did not have significant populations of ecological receptors or species of special status. In addition, this evaluation also found that contaminant transport from the Site would not extend to wildlife or sensitive habitats, including Oakland Harbor (US EPA, 2004). A similar finding of no ecological receptors, and therefore risk, resulted from the ecological risk evaluation for the South Prescott Park site (Tetra Tech, Inc., 1997).

1.6.4 Site Conceptual Model

A conceptual geologic model of the Site (was originally developed based on information from the RI Report (CH2M Hill, 2011). The figure has been updated based on the supplemental remedial investigations reported herein (Figure 1-5). This conceptual geologic model presents

surface features, the geology beneath the Site, and the two aquifers separated by the Bay Mud aquitard.

2.0 REMEDIAL INVESTIGATION ACTIVITIES

Based on their review of the remedial investigation results presented in the RI Report (CH2M Hill, 2011), the US EPA identified the need for additional remedial investigations at the Site to define the nature and extent of contamination in soil and groundwater sufficiently, and further monitoring to evaluate vapor intrusion. This section describes the supplemental remedial investigations that were performed. The results of these investigations are presented in subsequent sections.

The supplemental investigation activities included:

- Sampling and analysis of soil gas, crawl space air, outdoor air, and indoor air at the former AMCO facility and adjacent residential properties;
- Cone penetrometer testing (CPT) with membrane interface probe (MIP) testing to characterize the vertical extent of VOC contamination;
- Soil characterization involving extensive sampling and analysis of subsurface soil at the AMCO Property and selected adjacent properties;
- Installation of additional monitoring wells in the Upper Aquifer, and the installation of a monitoring well in the Lower Aquifer;
- Groundwater monitoring with an expansion of the groundwater analyses to provide further characterization of the microbial and chemical properties associated with the observed biotic transformations of the COCs; and
- Collection of grab groundwater samples adjacent to the East Bay Municipal Utility District (EBMUD) sewer interceptor along 3rd Street to assess the possibility that the interceptor's bedding provided a preferential pathway for contaminated groundwater movement.

For each of the supplemental investigations, the rationale for and a description of the field activities are presented in the following subsections. The descriptions include the different types of sampling activities, sampling locations, sampling frequency, and sample analyses for each sampled medium. Table 2-1 lists the analytes quantified for the various media sampled. Sampling methods and field procedures for the investigation activities are described in Appendix C, and the field documentation associated with the investigations is provided in Appendix E. The quality control (QC) and quality assurance (QA) activities performed to ensure the suitability of data presented in the RI Addendum are discussed in Appendix G.

2.1 SOIL GAS, INDOOR AIR, AND OUTDOOR AIR SAMPLING

Samples of soil gas, crawl space air, indoor air, and outdoor (including background or ambient) air were collected and analyzed to evaluate the extent that VOCs in soil and groundwater at the Site might be a risk to existing or future residents via the VI pathway. Samples of these various gas phase sources were collected at the AMCO Property, at residential properties in the vicinity of the former AMCO facility, at vacant properties adjacent to the AMCO Property, below the sidewalk on 3rd Street, below Center Street, and at South Prescott Park. The sampling also included outdoor ambient) air at an upwind location on Lewis Street. In the RI Addendum,

ambient air will be used to refer to the air quality in the area of the Site based on outdoor air samples collected on Lewis Street. This upwind sampling location was selected based on the prevailing westerly wind direction at the Site (CH2M Hill, 2011).

In addition to the gas-phase sampling and evaluation of the potential VI pathway at the Site described in the RI Report (CH2M Hill, 2011), the supplemental remedial investigations included three rounds of gas-phase sampling. Round 1 was conducted in June 2009, Round 2 in late September/early October 2010, and Round 3 in late January/early February 2012. The presence of VOCs in soil gas and crawl space air at and near the AMCO Property was established in the RI Report. Therefore, the three rounds of gas-phase sampling and analysis presented in this RI Addendum focus on establishing the extent to which the VOCs in soil gas and/or crawl space air, and attributable to AMCO, have affected indoor air quality via the VI pathway.

2.1.1 Rationale of Sampling

Samples of soil gas, crawl space air, indoor air, and outdoor (including ambient) air were collected and analyzed to (1) establish the completeness of the VI pathway and (2) differentiate between the possible sources of VOCs present in indoor air (i.e., contamination from the former AMCO operations or from ambient air). As the source of the VOCs associated with VI and attributable to AMCO is contaminated soil and groundwater, soil gas and outdoor air sampling were performed in the yards of residential units, and crawl space and indoor air samples were collected within the units. Sampling rounds 1 and 2 were conducted during the dry season, while Round 3 was conducted during the wet season.

These supplemental gas-phase sampling events were performed to address data gaps from previous gas-phase sampling activities as reported in the RI Report (CH2M Hill, 2011). The data gaps were due to insufficient indoor air sampling data to evaluate the VI pathway fully.

2.1.2 Details of Sampling

The gas-phase sampling performed for each of the three rounds is summarized below. Figure 2-1 depicts the soil gas sampling locations, which include permanent soil gas wells and temporary (or grab) soil gas sampling probes. Figure 2-2 depicts the air sampling locations, which includes the crawl space, indoor air, and outdoor air. Note that the VI mitigation systems were installed in 2009 (see Section 1.4.2.4) following Round 1 of the air sampling program. The VI mitigation systems were operating during Rounds 2 and 3 of the air sampling program.

- **Round 1** – From June 23 to June 25, 2009, 10 soil gas samples from temporary probes, 12 soil gas samples from permanent soil gas wells, 9 crawl space air samples, 53 indoor air samples, and 14 outdoor air samples (4 of which were considered ambient air samples) were collected and submitted for analysis by EPA Method TO-15, including selective ion monitoring (SIM) for detecting low VOC concentrations. Table 2-2 lists the details of the soil gas and air sampling for Round 1.
- **Round 2** – Twenty-three soil gas samples (11 from temporary probes and 12 from permanent soil gas wells), 9 crawl space air samples, 32 indoor air samples, 4 ambient air samples, and 7 outdoor air samples were collected from September 28 to October 4, 2010. Details of the soil gas and air sampling for Round 2 are provided in Table 2-3.

- **Round 3** – Between January 31 and February 7, 2012, gas-phase sampling included soil gas samples from 4 permanent probes, 4 crawl space air samples, 31 indoor air samples, 10 ambient air samples, and 10 outdoor air samples. Details of the Round 3 soil gas sampling are presented in Table 2-4.

All gas-phase samples were collected in specially prepared, 6 liter Summa canisters. Soil gas samples were collected after sufficient purging. Crawl space, indoor, and outdoor (including ambient) air samples were collected over a 24-hour sampling period. Details of the field methods and procedures followed for the gas-phase sampling are presented in Appendix C. Field quality control samples, including duplicates and trip blanks, were collected in accordance with QA/QC procedures established in the vapor intrusion sampling and analysis plan (SAP; ITSI, 2009) and the Field Request Change (ITSI, 2012a).

2.1.3 Laboratory Analysis of Gas-phase Samples

Soil gas and air samples collected during Rounds 1 through 3 were analyzed for VOCs by a commercial laboratory in accordance with EPA Methods TO-15 and TO-15 SIM to achieve the desired detection limits. Soil gas samples from Rounds 2 and 3 also were analyzed for helium and oxygen by ASTM International (ASTM) Method D1946 due to the change to helium for leak detection monitoring. Appendix G includes a detailed discussion of QA procedures and testing. Results from the gas-phase sampling are discussed in Section 3.

2.2 CPT-MIP INVESTIGATION

This investigation used a combination of cone penetrometer testing (CPT) and membrane interface probe (MIP) methods to characterize the vertical soil stratigraphy and distribution of VOC contamination. VOCs are the contaminants with the highest concentrations in groundwater at the Site, and elevated concentrations of VOCs previously were found in the source area of the former AMCO facility (CH2M Hill, 2011). The source area corresponds to known locations of former chemical transfer operations, chemical storage units, and buried distribution piping. Two wells in the source area (MW-13 and MW-14) historically have had measurable free product (i.e., LNAPL).

In the downgradient portion of the Site, groundwater contaminant concentrations typically are two to three orders of magnitude less than those observed in the source area. While some migration of contaminants associated with the former AMCO facility is occurring, data from the remedial investigation suggest a separate release of contaminants from a source located downgradient of the former AMCO facility (CH2M Hill, 2011).

2.2.1 Rationale for the CPT-MIP Investigation

The primary objectives of the CPT-MIP investigation were:

- Further characterize the nature and extent of VOC contamination within and adjacent to the primary source area at the former AMCO facility;
- Assess the vertical distribution of contamination, both on and off site; and
- Assess the potential for contaminants to have migrated into the Lower Aquifer.

Seventeen boring locations (MIP-1 through MIP-17) were selected, with CPT data used to develop detailed stratigraphic profiles and MIP data used to profile VOC contaminant

concentrations and concentration variation with depth semi-quantitatively. Eight of the CPT-MIP borings were located to collect data that would:

- Enable determination of the lateral extent of the on-site source area (and thus facilitate estimation of the boundaries of the source area) as a basis for the evaluation of remedial approaches; and
- Provide a vertical profile of contamination for the full depth of the Upper Aquifer in the vicinity of the source area where measurable LNAPL is present.

An evaluation of whether contamination has migrated through the Older Bay Mud aquitard and is present in the Lower Aquifer was performed at two off-site CPT-MIP boring locations (MIP-9 and MIP-10).

The rationale for each CPT-MIP boring location is provided below:

- MIP-1 and MIP-2: Better define the extent of contamination limits in the northern portion of the former AMCO facility and provide input on the estimated extent of the source area.
- MIP-3, MIP-4, and MIP-8: Further evaluate the extent of LNAPL or NAPL-like concentrations and the extent of the source area.
- MIP-5, MIP-6, and MIP-7: Evaluate the possible extent of impacts from NAPL and soil contamination under the warehouse.
- MIP-9 and MIP-10: Characterize the vertical distribution of contaminants and the potential that these contaminants are from one or more off-site sources.
- MIP-11, MIP-12, MIP-13, and MIP-14: Characterize the lateral and vertical distribution of chlorinated VOCs in consideration of cDCE and VC concentrations reported in soil gas (CH2M Hill, 2011).
- MIP-15, MIP-16, and MIP-17: Further evaluate the extent of LNAPL or NAPL-like concentrations in the suspected source area.

2.2.2 Details of the CPT-MIP Investigation

Details of the field procedures for the CPT-MIP investigation were presented in the work plan (ITSI, 2010b). These details also were presented, along with the CPT-MIP investigation results, in a technical memorandum included in Appendix I. A summary of the CPT-MIP investigation activities is provided below.

The locations of the 17 CPT-MIP borings are shown on Figure 2-3, with boring details listed in Table 2-5. The CPT-MIP borings were drilled with either a 14-ton limited-access CPT drill rig or a 30-ton CPT drill rig. The CPT-MIP boring logs are presented in Appendix D. The total depth of the CPT-MIP borings varied from 25.5 feet (MIP-5) to 162 feet bgs (MIP-10) (see Table 2-5).

Following the completion of the CPT-MIP borings, confirmation borings were completed and samples were collected and analyzed to verify the CPT-MIP results. [Note: The identification number for each confirmation boring was the same as the ID for the CPT boring.] The

confirmation borings for MIP-1 through MIP-8 and MIP-11 through MIP-17 were drilled using the hollow-stem auger (HSA) drilling technique. During the drilling of confirmation borings, soil cores were collected using a California modified split-spoon sampler. Confirmation sample depths were determined based on the CPT-MIP profiles. Horizontal coordinates (easting and northing) for the CPT-MIP boring locations were determined using a hand-held Trimble Geo XH global positioning system (GPS). The horizontal coordinates for the CPT-MIP borings (see Table 2-5) were determined in feet referenced to the California State Plane Grid System, Zone 3, based on North American Datum of 1983 (NAD83).

Confirmation borings at the two off-site CPT-MIP locations (MIP-9 and MIP-10) were completed using a combination of mud-rotary and CPT drilling techniques. Mud-rotary drilling was used to install the conductor casing to 70 feet bgs in boring MIP-9 and 80 feet bgs in MIP-10. The CPT rig was then used to extend the borings to full depth. During mud-rotary drilling, soil cores were collected at selected depths using a California modified split-spoon sampler. During CPT drilling, soil samples were collected using the piston-sampler technique.

Soil samples for VOC analysis were collected in accordance with EPA Method 5035 using an En Core® Sampler. Soil sampling within the unsaturated and saturated zones across the Site for other analytes was performed using disposable scoops to transfer soils from the split-spoon sampler to laboratory-certified clean jars. Soils generally were sampled at depths ranging from 5 to 7 feet bgs in the unsaturated zone. Shallower soil samples (at a depth of 2 feet bgs) were collected at the two off-site locations, MIP-9 and MIP-10, because of strong odors and staining in shallow soils.

Soil samples collected from the unsaturated zone were analyzed for metals, PCBs, pesticides, petroleum hydrocarbons (diesel and motor oil fractions), SVOCs, and VOCs. Soil samples from the saturated zone generally were collected in the upper, intermediate, and lower portions of the Merritt Sand, with the last sample collected in the upper portion of the Older Bay Mud. Soil sampling depths were determined primarily on the basis of the MIP profiling results. Soil samples collected from the saturated zone were analyzed for VOCs only. At the two off-site locations, MIP-9 and MIP-10, soil samples also were collected within the Alameda Formation, associated with the Lower Aquifer.

Groundwater sampling was performed using the Hydropunch™ method. This method consisted of driving a sampler rod ahead of the drill bit and into the undisturbed formation and retracting the sampler rod when the target depth was achieved to expose the screen and allow groundwater to enter. Grab groundwater samples subsequently were collected using a bailer and transferred to laboratory certified pre-cleaned bottles. The depths for collection of the groundwater samples within the Merritt Sand Unit were selected primarily on the basis of the results from the MIP profiling.

2.2.3 Laboratory Analysis of Samples from the CPT-MIP Investigation

Details of the soil and groundwater sampling and sample analyses associated with the confirmation borings for the CPT-MIP investigation are presented in Table 2-6. Sample analyses were performed under the US EPA's contract laboratory program (CLP) using the methods identified in Table 2-6.

2.3 SOIL CHARACTERIZATION

Additional soil characterization was performed based on recommendations from US EPA National Remedy Review Board's consultation on the Site in April, 2011. Based on their review of remediation approaches for contaminated soil at the former AMCO facility, the Review Board recommended that the entire soil column at the former AMCO facility (and associated properties) be characterized to define the horizontal and vertical extent of soil contamination. In consideration of the variety of contaminants previously identified in contaminated soil and/or groundwater at the Site, the Review Board also recommended that the soil characterization delineate each class of contaminant present in soil, groundwater, and/or LNAPL.

Historical information indicated that USTs existed at the former AMCO facility, but no records were found to document the removal of the USTs. In addition, the US EPA was informed that drums containing toxic wastes might have been buried by AMCO before the facility was closed in 1989. To determine whether USTs or drums were present at the former AMCO facility, a geophysical investigation was performed as part of the soil characterization.

2.3.1 Rationale for Soil Characterization

The objectives of the soil characterization were based on the recommendations of the US EPA's Remedy Review Board, with the overall goal of establishing the extent of soil contamination for use in developing and evaluating approaches to the remediation of contaminated soil. The objectives of the soil characterization were:

- Determine whether USTs or buried drums are present at the former AMCO facility.
- Define the nature and extent (lateral and vertical) of soil contamination in the source area of the Site.
- Characterize the lateral and vertical distribution of contamination at the former AMCO facility and adjacent off-facility properties (Large Vacant Lot, Small Vacant Lot, and Parking Lot associated with the property at 1448 3rd Street).
- Evaluate the extent to which contaminants have migrated vertically downward and the potential for contaminants to be present in the Lower Aquifer.

In consideration of these objectives, the soil characterization consisted of the following activities:

- Perform a geophysical investigation prior to the initiation of intrusive activities for the soil characterization.
- Establish a sampling grid layout with uniform lateral spacing between boring locations, and with a smaller grid spacing layout for areas with known or suspected soil contamination (i.e., the source area).
- Collect and analyze soil samples from the former AMCO facility (including under the warehouse), the Large Vacant Lot, the Small Vacant Lot, and the Parking Lot.
- Collect soil samples from near the ground (soil) surface to just below the Merritt Sand and Bay Mud interface.

- Analyze soil samples for VOCs, SVOCs, organochlorine pesticides, PCBs, and metals.

2.3.2 Details of the Soil Characterization

The soil characterization was performed in accordance with the work plan (ITSI, 2011b). The horizontal grids used for the soil characterization are shown on Figures 2-4 and 2-5 for the former AMCO facility and the adjacent lots, respectively. These figures also present the concrete pavement thickness at each boring. This investigation included the completion of 125 borings (one at each grid point), based on the rationale presented in Table 2-7.

Before intrusive activities began, a geophysical investigation was performed to check for potential subsurface utilities or underground objects, such as tanks or drums. The geophysical survey did not identify the presence of USTs or buried drums at the former AMCO facility. The geophysical investigation report is presented in Appendix I.

Sonic drilling was used for the soil characterization using a combination sonic drill-head coupled with a drill pipe to enable recovery of continuous soil cores for lithological review and description, and collection of depth-specific soil samples. The lithology encountered during drilling was classified and logged using the Unified Soil Classification System (USCS), in accordance with ASTM Standard D2488 (ASTM, 2000).

At each sampling grid point, the target soil sampling depths were 1, 3, 5, 8, 13, 20, 30, 40 50, 60, 65, and 70 feet bgs, with 65 feet bgs being the assumed depth to the top of the Bay Mud. The sampling depths were based on collecting soil samples at 10-foot intervals after 20 feet bgs, and collecting a soil sample at the interface of the Merritt Sand and Bay Mud, and also 5 feet below this interface. If Bay Mud was encountered prior to 65 feet bgs, then final soil samples were collected at the interface depth and at 5 feet below the top of the Bay Mud.

Horizontal coordinates (easting and northing) for the soil characterization boring locations were determined using a handheld GPS (Trimble Geo XH). The horizontal coordinates for the borings were determined in feet referenced to the California State Plane Grid System, Zone 3, based on NAD83.

Soil samples for VOC analysis were collected in accordance with EPA Method 5035 (Terra Core), with the soil sample transferred from the Terra Core sampler to a 40 milliliter (mL), volatile organic analysis (VOA) vial that did not contain a preservative. Soil samples for other analyses were collected in accordance with the SAP (CH2M Hill, 2004a) and SAP addenda (CH2M Hill, 2004b; ITSI, 2010a; and ITSI, 2011a). Field procedures for the soil characterization activities (drilling, sampling, boring abandonment, etc.) are described in Appendix C.

Air monitoring was performed during the soil characterization to satisfy the following objectives:

- Establish ambient air quality by collecting outdoor air samples prior to drilling.
- Quantify VOC levels resulting from the soil characterization field work, notably in the source area, at both the drilling location and the perimeter of the property where drilling is occurring.
- Assess potential residential exposure based on the results from this air monitoring.

To address these objectives, the air monitoring consisted of the determination of VOC levels using hand-held photoionization detectors (PIDs), fixed PIDs equipped with data loggers; monitoring of vinyl chloride air concentrations using a hand-held chip measurement system (CMS) device; and collection of air samples using Summa canisters. Details of the field methods for the gas-phase monitoring are presented in Appendix C. The results of the air monitoring for VOCs during the soil characterization are discussed in a technical memorandum presented in Appendix I.

2.3.3 Laboratory Analysis of Samples from the Soil Characterization

Details of the actual soil sampling depths and sample analyses for the soil characterization efforts are presented in Table 2-8. The soil samples were analyzed in accordance with the methods identified in Table 2-8 by a commercial laboratory, Accutest Northern California Laboratory (Accutest). Air monitoring samples collected in Summa canisters were analyzed by a commercial laboratory, Air Toxics, Ltd., in accordance with EPA Method TO-15/TO-15 SIM.

2.4 GROUNDWATER CHARACTERIZATION

To define the nature and extent of groundwater contamination, the supplemental investigations described herein included the installation of additional monitoring wells and an expanded groundwater monitoring program. Additional monitoring wells screened in the Upper Aquifer were installed to define the lateral and vertical extent of contamination. The groundwater monitoring program was expanded to include sampling of the new monitoring wells, and microbial parameter characterization for selected wells to confirm that the microbial population and activity factors associated with the reductive dechlorination of chlorinated VOCs are consistent with the VOC chemical concentrations in groundwater.

As part of the prior remedial investigations, 22 wells were installed at 14 locations with multiple wells typically at each location. Each monitoring well had a screen interval associated with one of the following zone depth intervals: shallow (typically 5 to 15 feet bgs), intermediate (25 to 35 feet bgs), and deep (40 to 50 feet bgs) (CH2M Hill, 2011). In addition to these 22 wells, the Upper Aquifer groundwater monitoring network described in the RI Report (CH2M Hill, 2011) included three wells previously installed by EPA at the former AMCO facility and six wells owned by UPRR.

2.4.1 Upper Aquifer Well Installation

2.4.1.1 Rationale

Additional groundwater monitoring wells were installed in 2009 by CH2M Hill (described in Appendix A of the RI Report) and 2012 by ITSI to meet the objective of defining the lateral and vertical extent of groundwater contamination in the Upper Aquifer. Wells were installed at upgradient, cross-gradient, downgradient, and in-plume locations. Table 2-9 presents the rationale for the well locations and the depths of the well screen intervals. For wells installed in 2009 and 2012 with a screen interval in the deep-zone of the Upper Aquifer, the bottom of the 10-foot screen interval was at the base of the Upper Aquifer, the interface of the Merritt Sand and Older Bay Mud aquitard. The Upper Aquifer groundwater monitoring well locations are shown on Figure 2-6.

2.4.1.2 Monitoring Well Installation

Due to site access issues, the additional Upper Aquifer groundwater monitoring wells were installed in two phases. During Phase 1, the following 12 wells were installed in the third quarter 2009:

- RMW-06-35 and RMW-06-61;
- RMW-09-70;
- RMW-15-15, RMW-15-35, and RMW-15-60;
- RMW-16W-15, RMW-16E-15, RMW-16-35, and RMW-16-60; and
- RMW-17-35 and RMW-17-70.

An additional 9 wells were installed in January 2012 as part of Phase 2, consisting of:

- RMW-05-35 and RMW-05-74;
- RMW-10-79;
- RMW-14-35;
- RMW-18-35 and RMW-18-79; and
- RMW-19-15, RMW-19-35, and RMW-19-80.

All of these monitoring wells were installed using an HSA drill rig, and developed in accordance with procedures in the SAP (CH2M Hill, 2004a) and the installation plan (CH2M Hill, 2009). Well construction details for all of the Upper Aquifer monitoring wells are provided in Table 2-10. Details of the field procedures for monitoring well installation and development performed in 2012 are provided in Appendix C, with the boring logs and well construction diagrams for the wells installed in 2012 included in Appendix D.

Horizontal coordinates and vertical elevations of the monitoring well casings were surveyed by a California-licensed surveyor, with the survey completed to a horizontal and vertical accuracy of ±0.01 foot. The horizontal datum was referenced to the California State Plane Grid System, Zone 3, based on NAD83. The vertical datum was referenced to the North American Vertical Datum of 1988 (NAVD88). The surveyor's report is provided in Appendix J.

2.4.2 Upper Aquifer Groundwater Monitoring

The lateral and vertical extents of groundwater contamination at the Site were not delineated fully by the previous remedial investigations (CH2M Hill, 2011). Groundwater characterization results presented in the RI Report established the following:

- The contaminants detected at concentrations above screening levels (i.e., groundwater COCs) consisted of VOCs (chlorinated and non-chlorinated hydrocarbons), SVOCs, organochlorine pesticides, PCBs, metals, and dioxins/furans.
- The highest concentrations of the COCs were observed in shallow groundwater in the source area.

- In addition to the presence of free product in two monitoring wells (MW-13 and MW-14), COC concentrations present in the shallow groundwater in the source area may be an indication of the presence of residual NAPL entrapped in the soil pore spaces of this shallow, saturated zone.
- COC concentrations beneath the source area decreased rapidly with increasing depth. The vertical concentration profiles within well groups at the source area did not indicate that DNAPL had migrated below the intermediate zone.

The Upper Aquifer groundwater monitoring conducted as part of the supplemental remedial investigations consisted of the following:

- Collecting and analyzing groundwater samples from existing and new monitoring wells to define the lateral and vertical extent of groundwater contamination in the Upper Aquifer.
- Quantifying parameters to establish geochemical and microbial conditions in the Upper Aquifer for use in evaluating the fate and transport of the COCs, and to provide input when preparing the FS for the development and evaluation of remedial alternatives.

Groundwater monitoring was performed in accordance with the SAP and addenda (CH2M Hill, 2004a; CH2M Hill, 2004b; ITSI, 2010a; and ITSI, 2011b).

2.4.2.1 Groundwater Sampling Locations

The current groundwater monitoring well network for the Upper Aquifer is shown on Figure 2-6. Screen interval depths and other details for the monitoring wells are listed in Table 2-10. A summary of the number of monitoring wells in the Upper Aquifer by screen interval is presented below:

- Shallow zone: 23 wells (16 owned by EPA and 6 by UPRR).
- Intermediate zone: 17 wells (all owned by EPA).
- Deep zone: 12 wells (all owned by EPA).

2.4.2.2 Groundwater Sampling Frequency and Analyses

Groundwater analyses performed during the monitoring events conducted in 2010 through 2012 are identified in Table 2-11. While sampling generally was conducted semi-annually, newly installed wells were sampled more frequently. Field quality control samples were collected in accordance with the SAP and addenda. A detailed discussion of quality assurance procedures and testing results is included in Appendix G.

The analyses included in the groundwater monitoring program varied slightly between events, as new information became available and/or new wells were installed. Beginning in 2010, chemical and microbial analyses were added to the groundwater monitoring program to establish the microbial and other conditions associated with the reductive dechlorination of PCE, TCE, cDCE, and VC. These chlorinated VOCs are major COCs in the Upper Aquifer groundwater. The additional chemical analyses associated with reductive dechlorination included volatile fatty acids (VFAs) and geochemical parameters. The monitoring of groundwater for carbon dioxide, a

field-measured parameter, was discontinued due to interferences with the field measurement method that resulted in unreliable results.

Table 2-11 summarizes the analyses completed during each monitoring event in 2010 through 2012. The groundwater analyses in 2010 through 2012 included the following:

- VOCs (including methyl tert-butyl ether [MTBE] and fuel oxygenates) – semi-annually or more frequently for the initial sampling of newly installed wells.
- SVOCs (including 1,4-dioxane [14-Dxn] by selective ion monitoring) – annually or more frequently for the initial sampling of newly installed wells.
- Organochlorine pesticides and PCBs – semi-annually for MW-12, RMW-02-13, and RMW-01-17; annually for other wells; or more frequently for the initial sampling of newly installed wells.
- Metals (total and dissolved) – annually or more frequently for the initial sampling of newly installed wells.
- Dioxin/furans – annually for selected wells and for the initial sampling of newly installed wells.
- Anions – annually or more frequently for the initial sampling of newly installed wells.
- Dissolved gases – semi-annually or more frequently for the initial sampling of newly installed wells.
- Field parameters (including pH, electrical conductivity, salinity, temperature, turbidity, dissolved oxygen, oxidation-reduction potential [ORP], alkalinity, and ferrous iron) – semi-annually or more frequently for the initial sampling of newly installed wells.
- Microbial parameters – annually or more frequently to assess selected wells, based on evaluating the extent or potential of reductive dechlorination activity.

A one-time sampling event was conducted to establish the TDS concentrations in the Upper Aquifer groundwater at the Site. The TDS results were used to evaluate the applicability of drinking water standards to the Upper Aquifer groundwater (see Section 1.5.3), and are a general water quality parameter for use in the evaluation of remedial alternatives.

A description of field procedures for groundwater sampling is provided in Appendix C.

2.4.3 Lower Aquifer Groundwater Investigation

Investigations to determine if the groundwater of the Lower Aquifer was impacted by COCs attributable to the former AMCO facility were not performed as part of the RI (CH2M Hill, 2011). The Site COCs include chlorinated VOCs (e.g., TCE and PCE), which may exist as DNAPL in the subsurface and migrate downward, including through fine-grained layers or an aquitard such as the Older Bay Mud (Interstate Technology & Regulatory Council [ITRC], 2003).

2.4.3.1 Rationale

A groundwater monitoring well (RMW-02-131) was installed in the transition zone between the aquitard soils of the Older Bay Mud and the Lower Aquifer soils of the Alameda Formation.

Sampling and analyses of groundwater from this Lower Aquifer monitoring well were performed to determine if chlorinated solvent releases at the former AMCO facility had migrated downward and impacted the water quality of the Lower Aquifer groundwater. In addition, analyses were completed to determine the inorganic composition (notably TDS) of the groundwater.

The Lower Aquifer monitoring well was installed approximately 3 feet west of boring SC-021, the soil characterization boring in which TCE was present in soil at the top of the Older Bay Mud (see Figure 2-7 for the well location). As TCE is more dense than water, the well installation and subsequent sampling and analysis of groundwater from well RMW-02-131 achieved the following:

- Established the vertical extent and geologic characteristics of the Older Bay Mud aquitard and the upper portion of the Alameda Formation.
- Determined if VOCs attributable to the former AMCO facility had migrated vertically through the Older Bay Mud and are present in the Lower Aquifer groundwater.

2.4.3.2 Monitoring Well Installation

Lower Aquifer groundwater monitoring well RMW-02-131 was installed into the transition zone between the Older Bay Mud and Alameda Formation soils in August 2013. A steel conductor casing was installed in the Upper Aquifer, and extended into the top 10 feet of the Older Bay Mud, which was encountered at 60 feet bgs, to prevent the potential migration of contaminants from the Upper Aquifer to the Lower Aquifer. An HSA drill rig was used to drill the borehole for the installation of the steel conductor casing. After the conductor casing was set, the drilling proceeded using the sonic drilling method inside the conductor casing. The borehole was advanced into the Older Bay Mud and the upper portion of the Alameda Formation soils. Soil samples were collected from the Older Bay Mud and Alameda Formation and analyzed for VOCs. The monitoring well was developed in accordance with procedures in the SAP (CH2M Hill, 2004a). Well construction details for the Lower Aquifer monitoring well are provided in Table 2-10. Details of the field procedures for the Lower Aquifer monitoring well installation and development are provided in Appendix C, with the boring log and well construction diagram included in Appendix D.

Horizontal coordinates and the vertical elevation of the monitoring well casing were surveyed by a California-licensed surveyor, with the survey completed to a horizontal and vertical accuracy of ±0.01 foot. The horizontal datum was referenced to the California State Plane Grid System, Zone 3, based on NAD83. The vertical datum was referenced to NAVD88. The surveyor's report is provided in Appendix J.

2.4.4 Sewer Interceptor as a Preferential Pathway for Contaminated Groundwater

2.4.4.1 Rationale

In the vicinity of the Site, the sewer interceptor is a 105-inch (inside diameter), monolithic, reinforced concrete pipe that was installed in the early 1950s. Installed below the water table and perpendicular to groundwater flow in the Upper Aquifer, the interceptor bedding, which may have been crushed rock or gravel, could potentially serve as a preferential pathway for the cross-gradient migration of contaminated groundwater originating from the former AMCO facility. The purpose of the 3rd Street sewer interceptor investigation was to determine if the

interceptor bedding was a preferential pathway for the migration of contaminated groundwater. The investigation was conducted along 3rd Street (see Figure 2-8) at locations outside of the known lateral extent of contaminated groundwater associated with the Site.

2.4.4.2 Drilling and Sampling

To avoid buried utilities, hand augering and direct-push technology were used to complete three boreholes to the estimated depth of the interceptor bedding, 21 feet bgs. Borings were located between the storm drain and the City of Oakland sewer at three locations on 3rd Street: (1) just west of the Center Street and 3rd Street intersection, (2) near the Chester Street and 3rd Street intersection, and (3) between Chester and Henry Streets.

The direct-push rig used a drill rod with a closed-screen sampler tip. When the grab groundwater sampling depth was reached, the outer drill rod casing was extracted to expose the screen to formation water and a grab groundwater sample was collected. Grab groundwater samples were collected at a depth of 20 to 21 feet bgs from all three borings. For the boring just west of the Center Street and 3rd Street intersection, collection of grab groundwater samples at depths of 10-11 feet bgs and 15-16 feet bgs was proposed. However, groundwater was not encountered at 10-11 feet bgs. The sampler was advanced to the target depth of 15-16 feet bgs, where groundwater recharge was insufficient for grab groundwater sampling. Therefore, the probe screen was retracted to expose a full 4 feet of screen, and a grab groundwater sample was collected at the intermediate depth interval of 12-16 feet bgs for this boring. All grab groundwater samples were analyzed for VOCs.

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3.0 NATURE AND EXTENT OF GAS-PHASE CONTAMINATION

This section presents the results from three rounds of gas-phase sampling to evaluate vapor intrusion (VI), prior to and after the installation of VI mitigation systems, at the Site. Details of the gas-phase sampling and laboratory analyses are presented in Section 2.1.

3.1 SCREENING LEVELS FOR GAS-PHASE SAMPLES

Screening levels (SLs) used to assess the VOC concentrations in gas-phase samples are listed in Table 3-1. The screening levels were based primarily on EPA's Residential Regional Screening Levels (RSLs) for residential air (US EPA, 2012a). For those VOCs for which RSLs were not available, Environmental Screening Levels (ESLs) developed by the San Francisco Bay Regional Water Quality Control Board (RWQCB, 2008) were used as the basis for the screening levels. These screening levels are chemical-specific concentrations for individual COCs in air that if exceeded may warrant further evaluation with regard to human risk. The screening levels are not cleanup standards; rather, an exceedance of a screening level identifies a COC for further evaluation with regard to potential human health risk.

The screening levels in Table 3-1 are based on a conservative risk level for residential (indoor) air (i.e., exposure pathway assumptions and the lower of a 10^{-6} cancer risk or hazard quotient of 1). Under most circumstances, the screening levels correspond to concentrations that are assumed to pose no human health risk. The screening levels were used to evaluate indoor and outdoor air, as well as crawl space air and soil gas concentrations (no attenuation assumed). For soil gas in general, the EPA has not established directly applicable screening levels. Screening levels for soil gas would be site- and building-specific, and could be estimated by developing a correlation between soil gas and indoor air concentrations using Equation 3.1. Appropriate attenuation factors based on the use of Equation 3.1 to predict indoor air quality from soil gas concentrations have not been developed for the Site.

$$\alpha = C_{indoor\ air} / C_{soil\ gas} \qquad \text{Equation 3-1}$$

where:

α = attenuation factor
$C_{indoor\ air}$ = indoor air concentration in micrograms per cubic meter (ug/m^3)
$C_{soil\ gas}$ = soil gas concentration (ug/m^3)

An attenuation factor of 0.1 was recommended by EPA (2002) as a conservative attenuation factor for shallow soil gas concentrations immediately beneath a building, and 0.05 was recommended by DTSC (2011) for sub-slab concentrations. For soil gas samples collected near an existing residential structure, 0.002 was the attenuation factor recommended for screening evaluation by DTSC (2011).

3.2 AMBIENT AIR CONCENTRATIONS

Outdoor air samples were collected upwind from the former AMCO facility to establish the ambient (i.e., background) air quality for the Site and surrounding neighborhood properties. These ambient air samples were collected from locations on Lewis Street, just north of

3rd Street. Previously reported VOCs in the ambient air at the Site included benzene (BEN), carbon tetrachloride (CCl4), trichloromethane (chloroform, TCM), ethylbenzene (EBZ), naphthalene (NAPH), and tetrachloroethene (PCE). The primary chemicals contributing to the potential cancer risk of $3x10^{-5}$ associated with ambient air were BEN (31%), CCl4 (29%), and NAPH (17%) (CH2M Hill, 2011). Additional VOCs detected during recent ambient air monitoring as part of the supplemental investigations include 1,4-dioxane (14-Dxn) and bromomethane (BrM).

Based on the range of detections, including non-detects, and applying the Kaplan-Meier analysis method, the 95% Upper Tolerance Limit (UTL) was determined for VOC constituent concentrations for those VOCs present in the ambient air samples collected during both the original and supplemental remedial investigations. Calculated using EPA protocols (US EPA, 2010c), VOC concentrations in ambient air (at the 95% UTL) are listed below. These concentration values were used in this RI Addendum as representative of ambient air quality in the evaluation of the gas-phase concentration results.

Chemicals	Ambient Air Concentration (ug/m^3)[2]	Residential Air Screening Level (ug/ m^3)[3]
Benzene (BEN)	1.3	0.31
Carbon tetrachloride (CCl4)	0.61	0.41
Naphthalene (NAPH)	0.72	0.072
1,4-Dioxane (14-Dxn)	0.83	0.32
Ethylbenzene (EBZ)	1.3	0.97
Trichloromethane[1] (TCM)	0.27	0.11
Tetrachloroethene (PCE)	0.59	9.4

[1] Commonly used chemical name is chloroform
[2] ug/m^3 = micrograms per cubic meter
[3] Screening level values from Table 3-1

For most of the COCs in ambient air identified in the above tabulation, the ambient air concentrations at the 95% UTL are greater than the residential air screening level, indicative of poor air quality. The ambient air concentrations in the South Prescott neighborhood are due to sources other than the Site.

VOC concentrations detected in the ambient air samples during Rounds 1, 2 and 3 are listed in Tables 3-2a, 3-2b, and 3-2c, respectively. VOCs detected in the ambient air samples collected at Lewis Street and concentrations above the applicable screening level are identified on Figure 3-1.

3.3 BACKGROUND INDOOR AIR CONCENTRACTIONS

Indoor air typically contains detectable levels of VOCs that are not attributable to vapor intrusion from VOC contamination of vadose zone soil and/or shallow groundwater. The sources of these indoor air VOCs are ambient air and indoor sources (chemical products present within the building). VOCs attributable to ambient air are present in indoor air as a result of indoor air exchanges with outdoor air that occur from several to dozens of times a day, depending upon the

building use and ventilation system (US EPA, 2011). VOCs present in ambient air at the Site were identified in Section 3.2.

Indoor sources that may emit VOCs include consumer products (e.g., cleaners, solvents, strippers, polish, adhesives, water repellants, lubricants, air fresheners, aerosols, mothballs, scented candles, insect repellants, plastic products, etc.); building materials (e.g., carpet, insulation, paint, wood-finishing products); fuels; dry-cleaned clothing or draperies; municipal tap water; or occupant activities (e.g., craft hobbies). The types and concentrations of VOCs in background indoor air typically vary between residential and commercial buildings. In addition, VOC concentrations in background indoor air also can vary both seasonally and over time.

Based on 15 indoor air studies conducted between 1990 and 2005, the VOCs most commonly present in background indoor air (including ambient air as a contributing source) include BEN, toluene (TOL), EBZ, xylenes (XYL), TCM, CCl4, PCE, TCE, and 1,1,1-trichloroethane (111-TCA). In contrast, VC, 11-DCE, cDCE, and 1,1-dichloroethane (11-DCA) rarely were detected in background indoor air (EPA, 2011). The 95th-percentile ranges for VOCs most commonly present in background indoor air are listed below.

Chemicals	Background Indoor Air Concentration Range (ug/m^3)[2]
Benzene (BEN)	9.9 – 29
Toluene (TOL)	79 – 144
Ethylbenzene (EBZ)	12 – 17
Xylenes (XYL)	21 – 63.5
Carbon tetrachloride (CCl4)	Less than Reporting Limit of 1.1
Tetrachloroethene (PCE)	4.1 – 9.5
Trichloromethane[1] (TCM)	4.1 – 7.5
1,1,1-Trichloroethane (111-TCA)	3.4 – 28

[1] Commonly used chemical name is chloroform
[2] Source: US EPA, 2011.
ug/m^3 = micrograms per cubic meter

3.4 GAS-PHASE VOLATILE ORGANIC COMPOUND CONCENTRATIONS AT THE SITE

VOCs detected above SLs in soil gas, crawl space, indoor, and/or outdoor air samples included PCE, TCE, 1,1,2-trichloroethane (112-TCA), cDCE, 11-DCA, ,1-2-dichloroethane (12-DCA), 1,2-dichloropropane (12-DCP), 1,2,4-trimethylbenzene (124-TMB), tDCE, VC, 14-Dxn, BEN, EBZ, 1,4-dichlorobenzene (14-DCB), TCM, BrM, and NAPH. Analytical results for soil gas, indoor air, outdoor air, and crawlspace air samples for Rounds 1, 2, and 3 are presented in Appendix H. The analytical reports for the gas-phase samples from the three rounds are included in Appendix K, with a description of the sampling details provided in Appendix C. The results from the three rounds at each property are discussed in the following sub-sections. The time frames of the sampling for Rounds 1 through 3 are identified in Section 2.1.2, with the year of each sampling Round listed below:

- Round 1 – 2009

- Round 2 – 2010
- Round 3 – 2012

3.4.1 Gas-Phase Concentrations at 1414 3rd Street Office Building

VOC concentrations exceeding the SLs in gas-phase samples collected at or near the office building located at 1414 3rd Street are identified on Figure 3-2. Crawlspace air and indoor air samples were collected at the former AMCO office building during Rounds 1 and 2. Crawlspace air samples were collected below the northwestern and eastern portions of the office. Indoor air samples were collected in the southeastern and northeastern rooms. Soil gas samples were collected from permanent probe RSP-07 for all three rounds.

Results of the gas-phase samples from this location are described below and shown on Figure 3-2.

- Permanent Soil Probe RSP-07 (sample identified as PSG07 on Figure 3-2): This permanent soil gas probe is located in the sidewalk, a few feet southwest of the office building. VOCs exceeding SLs, and their maximum concentrations, were: PCE at 10,000 ug/m^3, TCE at 11,000 ug/m^3, cDCE at 38,000 ug/m^3, tDCE at 820 ug/m^3, 11-DCA at 2,000 ug/m^3, and TCM at 39 ug/m^3. With the exception of TCM, these VOCs are consistent with the COCs present in shallow soil and groundwater in the vicinity of the office building.
- Crawl Space Air: Excluding COCs present at concentrations consistent with ambient air concentrations, VOCs exceeding SLs were PCE (14 ug/m^3), TCE (to a maximum concentration of 28 ug/m^3), cDCE (270 ug/m^3), VC (0.26 ug/m^3), 11-DCA (30 ug/m^3), 12-DCA (0.13 ug/m^3), TCM (0.52 ug/m^3), and 14-Dxm (1.6 ug/m^3). Similar to the soil gas samples from RSP-07, shallow soil and/or groundwater are the likely source of these VOCs. Benzene concentrations were representative of ambient air.
- Indoor Air: Excluding COCs present at concentrations consistent with ambient air concentrations, VOCs exceeding SLs were TCE (to 1.5 ug/m^3), cDCE (12 ug/m^3), 12-DCA (0.19 ug/m^3), and TCM (1.0 ug/m^3). Benzene and 14-Dxn concentrations were representative of ambient air.

The gas-phase concentrations indicate a vapor intrusion exposure pathway with indoor air quality impacts attributable to subsurface VOC contamination (in soil and/or shallow groundwater). Significant attenuation, on the order of 0.001 to 0.01, was observed for VOC concentrations in crawl space air relative to soil gas. For VOCs in indoor air relative to crawl space air, attenuation was also observed on the order of 0.05 for the primary COCs (the chlorinated ethenes). While the office is not currently being used, VOC concentrations detected during Rounds 1 and 2 indicate that the office building's indoor air would present a human health risk without VI mitigation actions.

3.4.2 Gas-Phase Concentrations at 1428/1430 3rd Street (Residential Units)

Figure 3-3 presents the VOC concentrations exceeding the SLs in gas-phase samples collected at or near the residential building located at 1428/1430 3rd Street. Indoor air, outdoor air, crawl space air, and soil gas samples were collected at or adjacent to the property occupied by this

two-level residential building, with 1428 and 1430 being the downstairs and upstairs units, respectively.

Results of the gas-phase samples for this property are presented below and shown on Figure 3-3. Because a VI mitigation system was installed following the Round 1 sampling, crawl space air and indoor air results from Round 1 are discussed separately from Rounds 2 and 3.

- Permanent Soil Probes RSP-04, RSP-05, RSP-06, and RSP-08:
  - RSP-04 (sample identified as PSG04 on Figure 3-3): This permanent soil gas probe is located on the AMCO Property, adjacent to the northern end of the property at 1428 3rd Street. Only BEN at a concentration similar to ambient air exceeded its SL for the Round 1 sampling. For Round 2, VOCs exceeding SLs and ambient air concentrations included of TCE at 3.4 ug/m^3, cDCE at 18 ug/m^3, VC at 22 ug/m^3, 11-DCA at 70 ug/m^3, and BEN at 18 ug/m^3. The EBZ concentration was representative of ambient air. Soil gas sampling was not conducted at RSP-04 during Round 3.
  - RSP-05 (sample identified as PSG05 on Figure 3-3): This permanent soil gas probe is located on the AMCO Property adjacent to the northern end of the residential building. For all three rounds, VOCs exceeding SLs and ambient air concentrations included PCE at 3,700–10,000 ug/m^3, TCE at 2,800–9,000 ug/m^3, cDCE at 54–230 ug/m^3, tDCE at 30–110 ug/m^3, and 11-DCA at 15–68 ug/m^3. TCM exceeded its SL and ambient air concentrations during Rounds 1 and 2 at 20 and 35 ug/m^3, respectively. The BEN concentration was representative of ambient air.
  - RSP-06 (sample identified as PSG06 on Figure 3-3): This permanent soil gas probe is located on the AMCO Property adjacent to the southern portion of the property at 1428 3rd Street. For Rounds 1 and 2, VOCs exceeding SLs and ambient air concentrations included PCE at 23–28 ug/m^3, TCE at 160–180 ug/m^3, 11-DCA at 63–67 ug/m^3, and TCM 34–66 ug/m^3. For Round 1 only, 112-TCA at 0.23 ug/m^3 exceeded its SL. For Round 2 only, BrM at 9.1 ug/m^3 exceeded its SL. The BEN concentration was representative of ambient air. Soil gas sampling was not conducted at RSP-06 during Round 3.
  - RSP-08 (sample identified as PSG08 on Figure 3-3): This permanent soil gas probe is located on the sidewalk near the southwestern corner of the property. TCM was the only VOC exceeding its SL for the three rounds, and also its ambient air concentration, at 4.2 - 34 ug/m^3. The BEN concentration was representative of ambient air.
- Temporary Soil Gas Probes: For Rounds 1 and 2, soil gas samples were collected from two portions of the property north of the residential building: (1) a short distance north of the building, and (2) near the northern boundary of the property.
  - **SG-01:** Soil gas sample collected just north of the building: For Rounds 1 and 2, VOCs exceeding SLs and ambient air concentrations of PCE at 22–60 ug/m^3, TCE at 36–91 ug/m^3, 11-DCA at 7.4–12 ug/m^3, and TCM at 6.9–23 ug/m^3. For Round 2

only, 14-Dxn at 0.93 ug/m^3 exceeded its SL and ambient air concentration. The BEN concentration was representative of ambient air for both rounds.

- **SG-02:** Soil gas sample collected near the northern boundary of the property: For Rounds 1 and 2, TCM was detected above its SL and ambient air concentration at 1.1–48 ug/m^3. PCE at 50 ug/m^3 exceeded its SL and ambient air concentration during Round 2 only. The BEN concentration was representative of ambient air for Round 1, while exceeding its SL and ambient air concentration during Round 2 only, at 2.4 ug/m^3.

- Crawl Space Air (sampled during Rounds 1 and 2 only):
  - Round 1: For the two crawl space air samples, VOCs exceeding SLs were TCE at 2.9 ug/m^3, EBZ at 4.0 ug/m^3, 124-TMB at 57 ug/m^3, 14-DCB at 0.35 ug/m^3, and TCM at 0.38 ug/m^3.
  - Round 2: 14-Dxn was the only VOC exceeding its SL and ambient air concentration at 8.0 ug/m^3. EBZ and BEN were at concentrations representative of ambient air.
- Indoor Air:
  - Round 1: VOCs exceeding SLs and ambient air concentrations were PCE (to a maximum concentration of 58 ug/m^3), 12-DCA (to 0.38 ug/m^3), TCM (to 2.7 ug/m^3), EBZ (to 3.2 ug/m^3), 14-DCB (to 0.34 ug/m^3), and NAPH (to 0.79 ug/m^3). Benzene concentrations were representative of ambient air.
  - Rounds 2 and 3: VOCs exceeding SLs and ambient air concentrations were PCE (Round 3 only), 12-DCA, TCM, BEN (Round 2 only), 14-DCB, and 14-Dxn (Round 2 only). The maximum concentrations were PCE at 26 ug/m^3, 12-DCA at 1.4 ug/m^3, TCM at 1.7 ug/m^3, BEN at 2.1 ug/m^3, 14-DCB at 27 ug/m^3, and 14-Dxn at 3.8 ug/m^3. BEN concentrations generally were representative of ambient air.
- Outdoor Air: For Round 1, VOC concentrations exceeding SLs and ambient air concentrations consisted of 12-DCA at 0.21 ug/m^3,NAPH at 0.76 ug/m^3, and CCL4 at 0.62 ug/m^3. BEN concentrations were representative of ambient air. For Rounds 2 and 3, VOC concentrations were representative of ambient air.

With the exception of 14-Dxn for Round 2, the source of VOCs in indoor air was not a result of vapor intrusion via crawl space air. For VOCs present in crawl space air, attenuation was observed relative to concentrations in indoor air. Based on VOC concentrations in soil gas from RSP-05, attenuation of several orders of magnitude was observed relative to crawl space air and indoor air.

3.4.3 Gas-Phase Concentrations at 1432/1434 3rd Street (Residential Units)

Figure 3-4 presents the VOC concentrations exceeding the SLs in gas-phase samples collected at or near the residential building located at 1432 3rd Street. Indoor air, outdoor air, crawl space air, and soil gas samples were collected at or adjacent to the property occupied by a two-level residential building, with 1432 and 1434 being the downstairs and upstairs units, respectively.

Results of the gas-phase samples for this property are presented below and shown on Figure 3-4. Because a VI mitigation system was installed following the Round 1 sampling, crawl space air and indoor air results from Round 1 are discussed separately from Rounds 2 and 3.

- Permanent Soil Probes RSP-03 and RSP-08:
  - RSP-03 (sample identified as PSG03 on Figure 3-4): This soil gas probe is located on the AMCO Property and north of the property at 1432 3rd Street (see Figure 2-1). TCM was the only VOC exceeding its SL and ambient air concentrations for the three rounds, with TCM concentrations varying from 1.7 to 10 ug/m^3.
  - RSP-08 (sample identified as PSG08 on Figure 3-4): This permanent soil gas probe is located on the sidewalk near the northeastern corner of the property. TCM was the only VOC exceeding its SL and also its ambient air concentration for the three rounds, at 4.2–34 ug/m^3. The BEN concentration was representative of ambient air.
- Temporary Soil Gas Probe: For Rounds 1 and 2 only, soil gas samples were collected from two areas of the backyard: (1) a short distance north of the building and (2) near the northern boundary of the property.
  - Soil gas sample collected just north of the building: TCM exceeded its SL and ambient air concentration for both rounds, with concentrations of 3.8 and 280 ug/m^3. For Round 1, BEN was present at a concentration representative of ambient air. VOCs exceeding SLs and ambient air concentrations for Round 2 consisted of TCE at 1.3 ug/m^3, BEN at 5.2 ug/m^3, and EBZ at 6.2 ug/m^3.
  - Soil gas sample collected near the northern boundary of the property: Due to leakage during sampling, the Round 1 sample results were rejected. For Round 2, VOCs exceeding SLs and ambient air concentrations were TCE at 1.8 ug/m^3 and EBZ at 13 ug/m^3. The BEN concentration was representative of ambient air for Round 2.
- Crawl Space Air:
  - Round 1: For the two crawl space air samples, VOCs exceeding SLs and ambient air concentrations consisted of TCE at 0.66 ug/m^{3}and 14-DCB at 0.29 ug/m^3. The BEN concentrations were representative of ambient air.
  - Rounds 2 and 3: VC at 0.21 ug/m^3 during Round 3 was the only VOC exceeding its SL. EBZ and BEN were at concentrations representative of ambient air.
- Indoor Air:
  - Round 1: VOCs exceeding SLs and ambient air concentrations consisted of 12-DCA at 0.12 ug/m^3, TCM at 2.7 ug/m^3, 14-DCB at 2.4 ug/m^3, and NAPH at 75 ug/m^3.
  - Rounds 2 and 3: VOCs exceeding SLs and ambient air concentrations consisted of 12-DCA, TCM, 14-DCB, NAPH, and 14-Dxn (Round 2 only). The maximum concentrations for these VOCs were 12-DCA at 0.23 ug/m^3, TCM at 3.2 ug/m^3, 14-DCB at 6.4 ug/m^3, NAPH at 380 ug/m^3, and 14-Dxn at 1.9 ug/m^3. BEN concentrations were representative of ambient air.
- Outdoor Air: For all three rounds, VOCs were not detected at concentrations exceeding the SLs, except for BEN and CCl4 at concentrations representative of ambient air.

These results indicate that the source of VOCs in indoor air was not vapor intrusion via crawl space air. For VOCs present in crawl space air (with the exception of 14-DCB), attenuation was observed with respect to concentrations in indoor air. Additionally, indoor air concentrations were either consistent with ambient air or the VOC concentration was below its screening level. Significant attenuation was observed for VOC concentrations in soil gas with respect to crawl space air and indoor air. For 14-DCB, which is contained in household disinfectants, the indoor air concentration was greater than the crawl space air concentration by a factor of 10.

3.4.4 Gas-Phase Concentrations at 1436/1438 3rd Street (Residential Units)

Figure 3-5 presents the VOC concentrations exceeding the SLs in gas-phase samples collected at or near the residential building located at 1436 3rd Street. Indoor air, outdoor air, and soil gas samples were collected at or adjacent to the property occupied by a two-level residential building, with 1436 and 1438 being the downstairs and upstairs units, respectively. As this building has a slab-on-grade foundation, a crawl space sample could not be collected. Sub-slab soil gas sampling was not performed.

Results of the gas-phase samples for this property are presented below and shown on Figure 3-5. Because a VI mitigation system was installed following the Round 1 sampling, indoor air results from Round 1 are discussed separately from those for Rounds 2 and 3.

- Permanent Soil Probe RSP-09 (sample identified as PSG09 on Figure 3-5): This permanent soil gas probe is located on the sidewalk near the southwestern corner of the property. PCE concentrations in soil gas for Rounds 1 and 2, at 11 and 15 ug/m^3, respectively, exceeded the SL and ambient air concentration. For Round 1, NAPH at 2.6 ug/m^3, 14-DCB at 0.23 ug/m^3 , and 1122-TCA at 0.5ug/m^3 exceeded SLs, and NAPH exceeded the ambient air concentration. The BEN, 14-Dxn, and TCM concentrations were representative of ambient air. In consideration of gas-phase results from Rounds 1 and 2 for this site, a soil gas sample was not collected from RSP-09 during Round 3.
- Temporary Soil Gas Probe: For both Rounds 1 and 2, a soil gas sample was collected from the backyard. TCM at 7.6 ug/m^3 and 2.4 ug/m^3 for Round 1 and Round 2, respectively, exceeded its SL and ambient air concentration. For Round 2, 14-Dxn at ug/m^3 exceeded its SL and ambient air concentration. For both rounds, BEN was present at concentrations representative of ambient air.
- Indoor Air:
  - Round 1: VOCs exceeding SLs and ambient air concentrations and their maximum concentrations, in the downstairs unit consisted of 12-DCA (1.1 ug/m^3), TCM (3.0 ug/m^3), 14-DCB (2.2 ug/m^3), NAPH (1.2 ug/m^3), and TCE (0.91 ug/m^3). BEN, EBZ, 14-Dxn, and CCl4 concentrations were representative of ambient air.

    For the upstairs unit, VOCs exceeding SLs and ambient air concentrations consisted of 12-DCA and TCM at maximum concentrations of 0.25 and 0.48 ug/m^3, respectively. BEN concentrations were representative of ambient air.
  - Rounds 2 and 3: For Round 2, VOCs exceeding SLs and ambient air concentrations in the downstairs unit consisted of 12-DCA and 14-DCB, as well as BEN and EBZ in one of the four indoor air samples. The maximum concentrations for these VOCs were 12-DCA at 3.2 ug/m^3, 14-DCB at 28 ug/m^3, EBZ at 5.1 ug/m^3, and BEN at

1.4 ug/m^3. EBZ, BEN (three of four samples for each Round), and 14-Dxn concentrations were representative of ambient air.

For the upstairs unit, VOCs exceeding SLs and ambient air concentrations consisted of 12-DCA, 14-Dxn, and CCL4 at concentrations of 0.14, 1.6, and 0.72ug/m^3, respectively. BEN concentrations were representative of ambient air.

- Outdoor Air: For all three rounds, VOCs were not detected above the SLs except for BEN and CCl4 at concentrations representative of ambient air.

Vapor intrusion may be the source of TCE and NAPH detected in indoor air in the downstairs unit during Round 1. As a result of installation of a vapor mitigation system following Round 1, the VOC concentrations in the indoor air indicate that vapor intrusion is not impacting indoor air. Attenuation was observed with respect to concentrations in indoor air relative to soil gas, or indoor air concentrations were consistent with ambient air. The VOCs present in indoor air for Rounds 2 and 3 (i.e., after installation of the vapor intrusion abatement systems) are attributable to household sources or ambient air.

3.4.5 Gas-Phase Concentrations at 320 Center Street (Residential Unit)

Figure 3-6 presents the VOC concentrations exceeding the SLs in gas-phase samples collected at or near the residential building located at 320 Center Street. Indoor air, outdoor air, crawl space air, and soil gas samples were collected at or adjacent to the property occupied by a single-story residential building.

Results of the gas-phase samples for this property are presented below and shown on Figure 3-6. Because a VI mitigation system was installed following the Round 1 sampling, crawl space air and indoor air results from Round 1 are discussed separately from Rounds 2 and 3. Indoor air samples were not collected during Round 2.

- Permanent Soil Probes RSP-03 and RSP-11:
  - RSP-03 (sample identified as PSG03 on Figure 3-6): This soil gas probe is located on AMCO Property approximately 60 feet east of the eastern end of the residential unit (see Figure 2-1). TCM was the only VOC exceeding its SL and/or ambient air concentration for the three rounds, with TCM concentrations varying from 1.7 to 10 ug/m^3.
  - RSP-11 (sample identified as PSG11 on Figure 3-6): This soil gas probe is located at the middle of Center Street, approximately 25 feet west of the western end of the residential unit. PCE concentrations in soil gas for Round 1 and Round 2, at 160 and 180 ug/m^3, respectively, exceeded the SL and ambient air concentration. Other VOCs exceeding SLs during Round 2 included 11-DCA at 3.2 ug/m^3, cDCE at 140 ug/m^3, TCE at 94 ug/m^3, and VC at 0.25 ug/m^3. Based on the location of RSP-11 and VOC concentrations in shallow soil and groundwater in the vicinity of RSP-11, contamination associated with the former AMCO facility is not considered the source of the VOCs in the soil gas. Rather, wastewater flow in the sewer located below Center Street or some other source is the likely source of the VOCs detected in soil gas from RSP-11. A soil gas sample was not collected from RSP-11 during Round 3.

- Temporary Soil Gas Probe: For Round 1, a soil gas sample was collected from the backyard. TCM at 0.81 ug/m^3 exceeded the SL and ambient air concentration. BEN was present at a concentration representative of ambient air.
- Crawl Space Air:
  - Round 1: For the two crawl space air samples, VOCs exceeding SLs and ambient air concentrations consisted of TCE, 14-DCB, and 12-DCA, with maximum concentrations of 0.99, 0.35, and 0.31 ug/m^3, respectively. The BEN concentrations were representative of ambient air.
  - Rounds 2 and 3 – EBZ (Round 2 only) at a maximum of 2.8 ug/m^3 and VC (Round 3 only) at 0.25 ug/m^3 were the only VOCs that exceeded SLs and ambient air concentrations. BEN and CCl4 were at concentrations representative of ambient air.
- Indoor Air:
  - Round 1: VOCs exceeding SLs and ambient air concentrations, and their maximum concentrations, were 12-DCA (2.0 ug/m^3), 14-DCB (7.6 ug/m^3), TCM (6.4 ug/m^3), NAPH (0.96 ug/m^3), and BEN (1.6 ug/m^3).
  - Round 2: Indoor air samples were not collected during Round 2.
  - Round 3: VOCs exceeding SLs and ambient air concentrations, and their maximum concentrations, were 12-DCA (1.6 ug/m^3, 14-DCB (2.5 ug/m^3), TCM (4.9 ug/m^3), CCl4 (0.65 ug/m^3), and BEN (2.2 ug/m^3).
- Outdoor Air (Rounds 1 and 3 only): Only NAPH (at 1.9 ug/m^3 during Round 1) exceeded its SL and ambient air concentration. CCl4 and BEN concentrations were representative of ambient air.

Due to the presence of TCE in crawl space air during Round 1, EPA installed a vapor mitigation system. Since Round 1, the VOC concentrations in the gas-phase samples indicate that vapor intrusion is not impacting indoor air. For VOCs present in crawl space air, attenuation was observed with respect to concentrations in indoor air. Significant attenuation was observed in comparing the concentrations of VOCs in soil gas at RSP-11 to the concentration for each VOC in crawl space air and indoor air. Attenuation was observed with respect to concentrations in indoor air relative to backyard soil gas. The VOCs present in indoor air for Rounds 2 and 3 (i.e., after installation of the vapor intrusion mitigation systems) are attributable to household or non-AMCO sources, including ambient air.

3.4.6 Gas-Phase Concentrations at 326 Center Street (Residential Unit)

Figure 3-7 presents the VOC concentrations exceeding the SLs in gas-phase samples collected at or near the residential building located at 326 Center Street. Indoor air, crawl space air, and soil gas samples were collected during Round 1 at or adjacent to the property occupied by a two-story residential building. The indoor air was sampled from the upstairs unit only. Only crawl space air and soil gas were collected during Round 2, and because site access could not be obtained, gas-phase sampling was not performed during Round 3.

- Permanent Soil Probes RSP-01, RSP-02, and RSP-12:

- RSP-01 (sample identified as PSG01 on Figure 3-7): This soil gas probe is located in the southeastern corner of the Large Vacant Lot, and approximately 50 feet east of the northeastern corner of the residential building at 326 Center Street (see Figure 2-1). For both Round 1 and Round 2, multiple VOCs exceeded SLs and ambient air concentrations. VOC concentrations were 190–210 ug/m^3 for 11-DCA, 36–41 ug/m^3 for BEN, 28 ug/m^3 for TCM (Round 1), 16,000 ug/m^3 for PCE (both rounds), 17,000 ug/m^3 for TCE (both rounds), 31,000–33,000 ug/m^3 for cDCE, 3,400–4,900 ug/m^3 for tDCE, and 640–680 ug/m^3 VC. These soil gas concentrations are not evident in either the crawl space or indoor air concentrations at 326 Center Street, attributable to the distance of RSP-01 from the residential building.
- RSP-02 (sample identified as PSG02 on Figure 3-7): This soil gas probe is located in the northeastern corner of the Small Vacant Lot, approximately 50 feet east of the southeastern corner of the residential building. VOCs exceeding SLs and ambient air concentrations during Rounds 1 and 2 were 11-DCA at 0.10 ug/m^3, TCM at 1.4–1.6 ug/m^3, PCE at150–180 ug/m^3, and TCE at 0.57 ug/m^3. Similar to soil gas from RSP-01, the VOCs present in soil gas from RSP-02 did not result in VI at the residential property.
- RSP-12 (sample identified as PSG12 on Figure 3-7): This soil gas probe is located in the middle of Center Street, approximately 30 feet west of the western end of the residential unit. PCE concentrations in soil gas for Round 1 and Round 2, at 130 and 72 ug/m^3, respectively, exceeded the SL and ambient air concentration. The only other VOC exceeding its SL (and ambient air concentration) was 14-Dxn at 1.3 ug/m^3 during Round 2. Based on the location of RSP-12 and VOC concentrations in shallow soil, along with VOC concentrations in groundwater in the vicinity of RSP-12, contamination associated with the former AMCO facility is not considered the source of these VOCs in the soil gas. A soil gas sample was not collected from RSP-12 during Round 3.

- Temporary Soil Gas Probe: For Round 1, a soil gas sample was collected from the northwestern corner (front yard) of the property. VOCs exceeding SLs and ambient air concentrations were 11-DCA at 2.7 ug/m^3, BEN at 1.9 ug/m^3, TCM at 21 ug/m^3, PCE at 730 ug/m^3, and TCE at 18 ug/m^3.
- Crawl Space Air: Samples were collected during Rounds 1 and 2 only. For the two crawl space air sampling events, VOCs exceeding SLs and ambient air concentrations included of 14-DCB at 0.27 ug/m^3 and EBZ at 2.1 ug/m^3.
- Indoor Air: Four indoor air samples were collected from the upstairs unit during Round 1 only. VOCs exceeding SLs and ambient air concentrations, and the maximum concentrations for these VOCs, were 12-DCA (to 0.16 ug/m^3), 14-DCB (to 0.57 ug/m^3), TCM (to 1.3 ug/m^3), and 1122-TCA (to 0.058 ug/m^3).

The source of VOCs in indoor air at this residential unit was not vapor intrusion via crawl space air and/or soil gas. While high VOC concentrations were present in soil gas probes (RSP-01 and RSP-02) located just east of the eastern edge of the property, as well as the VOCs in soil gas under Center Street, these VOCs were not associated with the VOCs detected in indoor air. For VOCs present in crawl space air, attenuation was observed with respect to concentrations in

indoor air, although this may have been influenced by having indoor air samples only from the upstairs area.

3.4.7 Gas-Phase Concentrations at 356 Center Street (Residential Unit)

Figure 3-8 presents the VOC concentrations exceeding the SLs in gas-phase samples collected at or near the residential building located at 356 Center Street. Indoor air and outdoor air samples were collected during the three rounds, with soil gas samples collected only during Round 2. The outdoor air and soil gas sampling occurred in the backyard of the property. The indoor air sampling included both e downstairs and upstairs locations.

- Temporary Soil Gas Probe (Round 2 only): BEN at 3.0 ug/m^3 was the only VOC exceeding its SL (as well as its ambient air concentration). The EBZ concentration was representative of ambient air.
- Indoor Air: Six indoor air samples were collected during each round. VOCs exceeding SLs and ambient air concentrations, and the maximum concentrations for these VOCs, were 12-DCA (1.4 ug/m^3), 124-TMB (35 ug/m^3), 14-Dxn (17 ug/m^3), TCM (3.1 ug/m^3), BEN (12 ug/m^3), EBZ (21 ug/m^3), and NAPH (3.0 ug/m^3).
- Outdoor Air: VOCs exceeding SLs and ambient air concentrations consisted of 14-DCB (0.62 ug/m^3 Round 1 only), 14-Dxn (Round 1 at 0.89 ug/m^3 and Round 2 at 19 ug/m^3), and NAPH (1.9 ug/m^3 Round 1 only). The BEN and CCl4 concentrations were representative of ambient air.

This property is located outside the extent of soil, soil gas, and groundwater contamination attributable to AMCO. The VOCs in indoor air are not a result of vapor intrusion attributable to the former AMCO facility.

3.4.8 Gas-Phase Concentrations at 360 Center Street (Residential Unit)

Figure 3-9 presents the VOC concentrations exceeding the SLs in gas-phase samples collected at or near the residential building located at 360 Center Street. Indoor air, outdoor air, and soil gas samples were collected during Round 1 only. The outdoor air and soil gas sampling occurred in the backyard of the property. The indoor air sampling included both downstairs and upstairs locations.

- Temporary Soil Gas Probe (Round 1 only): VOCs exceeding SLs and ambient air concentration consisted of TCM at 6.9 ug/m^3 and NAPH at 0.97 ug/m^3. The BEN and 14-Dxn concentrations were representative of ambient air.
- Indoor Air (Round 1 only): Nine indoor air samples (five downstairs and 4 upstairs) were collected, and VOCs exceeding SLs and ambient air concentrations, and the maximum concentrations for these VOCs, were 12-DCA (0.48 ug/m^3), 14-DCB (0.24 ug/m^3), TCM (1.4 ug/m^3), BEN (2.4 ug/m^3), and NAPH (2.2 ug/m^3). Eight of the nine indoor air samples had BEN concentrations representative of ambient air.
- Outdoor Air (Round 1 only): At a concentration of 0.15 ug/m^3, 12-DCA was the only VOC exceeding its SL. BEN, CCl4, and 14-Dxn concentrations were representative of ambient air.

This property is located outside the extent of soil, soil gas, and groundwater contamination attributable to AMCO. The former AMCO facility is not the source of the indoor air VOC concentrations.

3.4.9 Gas-Phase Concentrations at 366/368 Center Street (Residential Unit)

This property is located upgradient from shallow soil and groundwater contamination attributable to AMCO. Therefore, shallow soil and groundwater contamination associated with AMCO is not the source of VOCs present in indoor air. Indoor air, outdoor air, and/or soil gas samples were collected during the three rounds. For this residential unit, the indoor air sampling included both the downstairs unit (366 Center Street) and upstairs unit (368 Center Street).

Because indoor air quality is not associated with contaminated shallow soil and groundwater attributable to AMCO, only indoor air results are discussed below. Indoor air sampling at this residential building occurred downstairs (366 Center Street) only for Rounds 1 and 3, with upstairs (368 Center Street) indoor air sampling occurring only during Round 2.

- Indoor Air of Downstairs Unit (366 Center Street): Four indoor air samples were collected during both Round 1 and Round 3. VOCs exceeding SLs and ambient air concentrations, and the maximum concentrations for these VOCs were 12-DCA (0.20 ug/m^3), 14-DCB (0.88 ug/m^3), TCE (0.70 ug/m^3), TCM (4.3 ug/m^3), EBZ (8.0 ug/m^3), and NAPH (0.90 ug/m^3). BEN and 14-Dxn concentrations were representative of ambient air.
- Indoor Air of Upstairs Unit: Three indoor air samples were collected during Round 2. VOCs exceeding SLs and ambient air concentrations, and maximum concentrations for these VOCs, were 12-DCA (0.13 ug/m^3), 14-Dxn (9.1 ug/m^3), BEN (1.5 ug/m^3), and EBZ (2.1 ug/m^3). For two of the three indoor air samples, BEN and EBZ concentrations were representative of ambient air.

3.4.10 Gas-Phase Concentrations at 337/339 Center Street (Residential Unit)

This property is located on the west side of Center Street, some distance cross-gradient from shallow soil and groundwater contamination attributable to AMCO. Therefore, shallow soil and groundwater contamination associated with AMCO is not the source of VOCs present in indoor air. Indoor air, outdoor air, and/or soil gas samples were collected during the three rounds. For this residential unit, indoor air sampling included both the downstairs (337 Center Street) and upstairs (339 Center Street) units.

Only indoor air results are discussed below, because vapor intrusion due to contamination from shallow soil and groundwater attributable to AMCO is not a complete exposure pathway.

- Indoor Air of Downstairs (337 Center Street) Unit: Two indoor air samples were collected during each round. VOCs exceeding SLs and ambient air concentrations consisted of 12-DCA (Rounds 1 and 3), 12-DCP (Round 1 only), 14-DCB (Round 1 only), BEN (Round 3 only), TCM (Rounds 1 and 3), EBZ (Round 1 only), and NAPH (Round 1 only). The maximum concentrations for these VOCs were 12-DCA at 1.0 ug/m^3, 12-DCP at 0.81 ug/m^3, 14-DCB at 1.5 ug/m^3, BEN at 1.8 ug/m^3, TCM at 2.1 ug/m^3, EBZ at 1.9 ug/m^3, and NAPH at 5.2 ug/m^3. BEN (Rounds 1 and 2) and EBZ (Rounds 2 and 3) concentrations were representative of ambient air.

- Indoor Air of Upstairs (339 Center Street) Unit: Two indoor air samples were collected during each round. VOCs exceeding SLs and ambient air concentrations consisted of 12-DCA (Rounds 2 and 3), 14-DCB (Round 1 only), BEN (Round 3 only), TCM (Rounds 1 and 3), and NAPH (Round 1 only). The maximum concentrations for these VOCs were 12-DCA at 0.44 ug/m^3, 14-DCB at 0.26 ug/m^3, BEN at 1.5 ug/m^3, TCM at 1.2 ug/m^3, and NAPH at 7.0 ug/m^3. For Rounds 1 and 2, BEN concentrations were representative of ambient air.

3.4.11 Gas-Phase Concentrations at South Prescott Park

Figure 3-10 presents the VOC concentrations exceeding the SLs in gas-phase samples collected at the eastern portion of South Prescott Park. Outdoor air and soil gas samples were collected during Rounds 1 and 2; only outdoor air samples were collected during Round 3. The outdoor air and soil gas sampling occurred in the vicinity of the park's play structure.

- Temporary Soil Gas Probe: VOCs exceeding SLs and ambient air concentration, and their maximum concentrations, were BEN (3.4 ug/m^3), TCM (200 ug/m^3), PCE (41 ug/m^3), and TCE (0.50 ug/m^3). The BEN concentrations during Round 1 only were representative of ambient air. The EBZ concentrations during Rounds 1 and 2 were representative of ambient air.
- Outdoor Air: Outdoor air samples were collected at the eastern edge of the Park, with one outdoor air sample also collected at the play structure during Round 3. The only VOCs exceeding SLs and ambient air concentrations were 12-DCA at 0.29 ug/m^3 (Round 1) and 14-Dxn at 0.96 ug/m^3 (Round 2). The other outdoor air samples, including the sample collected at the play structure, had BEN, EBZ, 14-Dxn (Rounds 1 and 3), and CCl4 concentrations representative of ambient air.

The TCE present in one soil gas sample may be attributable to TCE contamination in shallow groundwater. VOCs detected in outdoor air samples collected at South Prescott Park are not attributable to AMCO. The only VOC detected in outdoor air at a concentration above its SL and not identified as a VOC associated with ambient air quality was 12-DCA. This VOC has not been detected in shallow groundwater from the monitoring well (RMW-09-15) located near the ambient or outdoor air sampling locations. As 14-Dxn was not detected in soil gas, volatilization from groundwater is not the likely source of this COC in outdoor air during the Round 2 sampling.

3.5 VAPOR INTRUSION PATHWAY EVALUATION

This VI pathway evaluation discussion incorporates the gas-phase concentration results from the sampling for Rounds 1, 2, and 3, conducted in 2009, 2010, and 2012, respectively. In addition, the evaluation considers the nature and extent of shallow soil and groundwater contamination at the Site attributable to the former AMCO operations, which are described in detail in Sections 5 and 6, respectively.

While limited VI impact on indoor air quality was observed during Round 1 of the indoor air sampling, the concentrations of COCs in crawl space air and/or soil gas indicated the potential for VI at these residential units. Therefore in the last quarter of 2009, EPA installed VI mitigation systems at four residential properties: 1428, 1432, and 1436 3rd Street, and

320 Center Street. A direct VI pathway and potential exposure was established for the office at 1414 3rd Street, but the building and property have been unoccupied since December 2009.

The data do not support VI as the primary source of VOCs detected in indoor air within the residential buildings near the former AMCO facility. Rather, VOCs present in the indoor air of these residential buildings are primarily due to (1) the quality of ambient air and (2) chemicals and/or building materials present inside the buildings. This is supported by indoor air monitoring data following installation and operation of the VI mitigation systems. The results from Rounds 2 and 3 indicate that VI is not a complete exposure pathway at the Site. Eventual remediation of contaminated soil and groundwater will eliminate VI as an exposure pathway at the Site.

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4.0 GEOLOGICAL CONDITIONS

Performing the supplemental RI activities described in Section 2.0 resulted in additional information and details on the subsurface stratigraphy at the Site. This section incorporates this new information with findings from the RI Report (CH2M Hill, 2011) to present an updated interpretation of the geological model for the Site.

4.1 GEOLOGICAL CONDITIONS AT THE SITE

As described in Section 1.5.1, the geologic model for the Site consists of five lithologic units. These units, starting at the ground surface, are: (1) Fill, and at some locations Younger Bay Mud; (2) Merritt Sand; (3) Older Bay Mud, also referred to herein as Bay Mud; (4) the Alameda Formation; and (5) Bedrock. The supplemental RI activities significantly expanded the understanding of the first two lithologic units at the former AMCO facility, neighboring properties, and the downgradient portion of the Site. In addition, the geologic properties and vertical extent of the Older Bay Mud were characterized, along with the very upper portion of the Alameda Formation. The supplemental RI activities did not extend below the upper portion of the Alameda Formation and, therefore, the geologic conditions were not characterized for the remaining portion of the Alameda Formation and Bedrock units.

The following subsections update the descriptions and interpretations of each of the lithologic units for which information was collected during the supplemental RI activities. Figures 4-1 through 4-6 present geologic cross-sections at various locations to provide spatial visualization of the subsurface geologic conditions across the Site. Soil boring logs are included in Appendix D.

4.1.1 Fill and Younger Bay Mud

Fill material generally is present as the surface soil across the Site, with a variable thickness ranging from non-existent to an average of 5 feet. Fill soils typically are characterized by a mixture of loose fine gravels, sands, silts, and clays in varying proportions. Often, miscellaneous refuse is present as fragments of bricks, pieces of glass, and wood chips mixed with the soils. Within the footprint of the warehouse building, the fill material was observed to be raised relative to the surface soil elevation in the adjacent yard at the former AMCO facility. Fill material underlying the warehouse is composed of a mixture of larger rock fragments, soils, and miscellaneous refuse (bottles, rags, tile, wood chips, etc.). The surface elevation of the raised warehouse foundation is approximately two feet higher than the average pavement level in the yard area of the former AMCO facility.

Younger Bay Mud, when observed, was identified to be unconsolidated sediments occurring at the ground surface or below the Fill. The Younger Bay Mud is primarily dark plastic clay and silty clay rich in organic material (roots and peat). The presence of Younger Bay Mud sediments was observed mainly in the northern and eastern (i.e., beneath the warehouse building) areas of the former AMCO facility. The thickness of the unit varies, ranging from non-existent to approximately 10 feet. The Younger Bay Mud unit is depicted on the cross sections included in Figures 4-1, 4-2, 4-3, and 4-5.

4.1.2 Merritt Sand

The Merritt Sand unit underlies the Younger Bay Mud and Fill. The base of this unit was found to be at approximately 55 to 60 feet bgs in the area of the former AMCO facility and neighboring properties (see Figures 4-1 through 4-5). The base of the Merritt Sand was found between 70 and 80 feet bgs in the downgradient portion of the Site located south of 3rd Street (see Figure 4-6). The Merritt Sand unit consisted primarily of fine-grained sands in the upper depths (above 30 to 35 feet bgs), grading to fine- to medium-grained sands at the base of the unit. Secondary precipitates such as iron oxides also are present in this unit, and were observed to occur more frequently within the shallower depths. The abundance of iron oxides varies locally, and contributes to the soils becoming more strongly cemented, which prevented the CPT-MIP drilling from advancing at several locations, especially when a smaller limited access rig with reduced weight had to be used. Refusal was encountered at an average depth of 30 feet bgs at all CPT-MIP drilling locations where the smaller rig was used.

Below 30 to 35 feet bgs, the soils of the Merritt Sand unit were more uniform, and consisted predominantly of fine to medium sands with amounts of silts and clays ranging from 5 to 20 percent, and grading frequently from a silty sand to fine-grained sand soil types. Drilling and sampling beyond 30 to 35 feet bgs also were challenging due to the less cohesive and more saturated nature of these soils, which under a higher hydrostatic pressure would cause the sands to heave and clog the augers when hollow-stem auger equipment was used.

The classification of the soils during the supplemental RI activities followed the USCS, with soil particle size determinations based mainly on field observations. To confirm these visual assessments, particle size analyses were performed during the soil characterization on soil samples collected at shallow, intermediate, and deep depths of the Merritt Sand unit from two soil borings: SC-011, located in the southern portion of the AMCO Property, and SC-114, located in the southwestern corner of the Large Vacant Lot. The visual interpretation of soil particle size for the Merritt Sand unit was consistent with the particle size distributions reported by the geotechnical laboratory (see Appendix J for the geotechnical analysis report).

4.1.3 Older Bay Mud (Aquitard)

The Older Bay Mud unit underlies the Merritt Sand. The contact between these two units is characterized by an abrupt change in lithology from sandy soils of the Merritt Sand unit to a greenish-gray stiff clay of low plasticity, a locally confining Bay Mud soil type (US Navy, 2010). The depth to the Older Bay Mud unit varies at the Site, ranging from 55 to 65 feet bgs at the former AMCO facility to as deep as 80 feet bgs at the southern edge of the Site (monitoring well RMW-19-80).

The uppermost portion of the Older Bay Mud unit was investigated through the 125 soil borings installed as part of the soil characterization and several soil borings from the CPT-MIP investigation work at the Site. With most of the soil characterization borings terminated at 5 feet into the Older Bay Mud unit and a few to 10 feet, the upper 5 to 10 feet of the Older Bay Mud unit soils were observed to be dominated by stiff clays. Sands and fine gravel lenses also were observed in a few soil borings ending deeper than 5 feet beyond the interface between the Merritt Sand and Older Bay Mud units. These findings from the soil characterization confirm a

stiff clay layer for the uppermost portion of the Older Bay Mud, with a thin sandy layer immediately underlying this stiff clay.

The Older Bay Mud unit also was characterized through CPT-MIP borings (MIP-9 and MIP-10) located approximately 150 feet south of the AMCO Property (see Figure 2-3 for the CPT-MIP boring locations). The CPT-MIP profiles at MIP-9 and MIP-10 indicated a lithology of relatively uniform fine-grained soils (silty sand and sandy/clayey silts) within the interval of 70 to 120 feet bgs. Below 120 feet bgs, to the maximum investigated depth of 165 feet bgs, the CPT profiles indicated thin layers of sand and other materials suggestive of a possible transition or interface between the Bay Mud and the Alameda Formation. However, without visual observation of soil types, the CPT data could not provide a definitive confirmation of the top and bottom depths of the Older Bay Mud unit.

An investigation to characterize the water quality of the Lower Aquifer included the installation of a monitoring well (RMW-02-131) that was screened in the very upper portion of the Lower Aquifer. The boring for the well installation was completed to a depth of 160 feet bgs within the source area of the former AMCO facility yard. The Older Bay Mud soils were observed to begin at 60 feet bgs with alternating layers of greenish-gray, stiff clay grading to clayey sands to approximately 80 feet bgs. Between the depths of 80 and 120 feet bgs, the soils were uniform, consisting mainly of greenish gray clays with a hard consistency and containing sea shells. The lower portion of the Older Bay Mud (from 120 to 138 feet bgs) also was observed to consist mainly of clay (with color tone changes in soils between greenish gray and pale brown), with iron oxides present. A two-foot confined layer of water-saturated clayey sand (70 percent sand and 30 percent clay) was observed between 123 and 125 feet bgs. Monitoring well RMW-02-131 was constructed with a 10-foot screen interval placed between 121 and 131 feet bgs to intercept the confined sandy layer.

4.1.4 Alameda Formation

For the one CPT boring (MIP-10) completed to 165 feet bgs, the lithology was profiled as predominantly fine-grained with some thin (less than 5 feet thick) layers of sand and silty/clayey sands. The six-foot-thick sand and gravel lens between 132 and 138 feet bgs observed in the Red Star Yeast well log (see Appendix A) was not indicated on the CPT profile. The screen interval for the Red Star Yeast well began at 180 feet bgs, at the depth of a five-foot-thick gravel layer. The Red Star Yeast well log indicates subsequent layers of coarse-grained and fine-grained soils of varying thickness to a depth of 405 feet bgs.

The drilling for the installation of the Lower Aquifer monitoring well, RMW-02-131, yielded observations of the soils in the upper portion of the Alameda Formation (see boring log for RMW-02-131 in Appendix D). At the depth of 138 feet bgs, a noticeable change in soil types from the uniform clays of the Old Bay Mud was observed, with the change consisting of a four-foot thick layer of yellowish-brown sand that was unsaturated and dense with cementation consistency. Below this layer of sand, clay was observed to persist fairly uniformly to the depth of 159 feet bgs, with a gradational transition to clayey sands at the maximum drilling depth of 160 feet bgs.

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5.0 NATURE AND EXTENT OF SOIL CONTAMINATION

Multiple supplemental investigations were performed to define the nature and extent of soil contamination. The primary investigation involved an extensive soil characterization effort that was conducted from late 2011 through April 2012. The soil characterization consisted of completing over 100 borings and collecting approximately 1,500 soil samples for chemical analysis to determine the nature and the extent (vertical and horizontal) of soil contamination at the former AMCO facility and neighboring properties. This section summarizes and discusses the soil contamination results from these supplemental RI activities.

5.1 DEVELOPMENT OF SOIL SCREENING LEVELS

Soil screening levels were established to provide a basis for evaluating the concentrations of COCs in soil. The initial step was the identification of background concentrations in soil. The soil screening levels incorporate background concentrations and other criteria established by EPA and/or the State of California.

5.1.1 Background Concentrations in Soil

Background soil concentrations are defined herein as chemical concentrations in soil at or in the vicinity of the Site that are present in soil and were not affected by activities at the former AMCO facility or other anthropogenic sources. Based on an extensive study of metal concentrations in soil at an East Bay site (Lawrence Berkeley National Laboratory [LBNL], 2009), certain metals, at relatively high concentrations at the Site, may not be considered COCs. Table 5-1 lists background metal concentrations applicable to the Site.

5.1.2 Soil Screening Levels

The soil screening levels (SLs) established to evaluate chemical concentrations in soil are based on residential land use. Regional Screening Levels (RSLs) established by EPA Region 9 (April/May 2012 version, see Appendix B) were the primary source used in establishing the SLs for soil, with the RWQCB Environmental Screening Levels (ESLs; RWQCB, 2008) used as default values when no RSLs had been established. For metals with an identified background concentration (Table 5-1), the screening level was established as the background concentration if the RSL or ESL was less than the background concentration.

The SLs used as the basis for assessing soil contamination results from the supplemental investigations are presented in Table 5-2. These SLs are intended for screening purposes only, and are not to be considered remediation criteria.

5.2 NATURE OF SOIL CONTAMINATION

As previously reported (CH2M Hill, 2011), the COCs associated with subsurface soil contamination at the Site consist of VOCs, SVOCs, metals, organochlorine pesticides, PCBs, and dioxins/furans. The presence of VOCs, SVOCs, organochlorine pesticides, PCBs, some metals, and dioxins/furans is attributable primarily to AMCO's past operations, as described in Section 1.4.1. While some metal concentrations above SLs are associated with the former AMCO facility operations, the presence of lead is due to anthropogenic sources other than

AMCO. A short discussion of the nature of the Site COCs is provided below, with subsequent subsections describing the extent of the soil contamination associated with the COCs.

5.2.1 Volatile Organic Compounds (VOCs)

VOCs are a group of organic compounds that have a high vapor pressure at normal room temperature and pressure, and low-to-medium solubility in water. VOCs detected in soils exceeding their SLs include chlorinated VOCs (PCE, TCE, cDCE, VC, 11-DCA, 12-DCA, and 14-DCB) and non-chlorinated VOCs (BEN, EBZ, XYL, and 124-TMB). The most significant concentrations of VOCs have been detected in the central-southern portion of the former AMCO facility (referred to herein as the source area) where the bulk transfer and storage of chemicals occurred during the period of AMCO's operations.

5.2.2 Semi-Volatile Organic Compounds (SVOCs)

SVOCs are a group of organic compounds that do not evaporate readily into air at normal room temperature and pressure, having boiling points greater than 200 degrees Celsius (ºC). The water solubility of SVOCs varies widely from very low to moderate. The SVOCs found in the soils at the former AMCO facility consist of polycyclic aromatic hydrocarbons (PAHs), chlorinated phenols, and phthalates. PAHs, also referred to as polynuclear aromatic hydrocarbons, are one of the most widespread organic contaminants, being present in fossil fuels and the end-products of incomplete combustion. Phthalates are used as plasticizers and associated with plastics. While some phenolic compounds occur naturally, phenols are used as components of many organic substances, including dyes, polymers, and drugs.

5.2.3 Metals

Metals occur naturally in soil (see Section 5.1.1), and also may be present in soil as a result of past site activities at or in the vicinity of the former AMCO facility, which included scrap metal operations, foundry operation, the use of lead-based paint, and non-point sources. Some metals were found at concentrations higher than background levels at the former AMCO facility and Neighboring Properties. The inorganic metals found above background levels during the supplemental investigations are arsenic (As), lead (Pb), cobalt (Co), copper (Cu), and mercury (Hg). The occurrence of elevated concentrations of metals such as arsenic and lead may be associated with the chemical products containing these chemicals, former foundry operations in the vicinity of the Site, and/or fuel emissions from the former Cyprus freeway, which was located a short distance northeast of the AMCO Property.

5.2.4 Organochlorine Pesticides

Organochlorine pesticides are chlorinated hydrocarbons that were used extensively from the 1940s through 1960s as insecticides in agriculture and for mosquito control. In the 1970s and 1980s, bans and use restrictions for organochlorine pesticides were established in most countries due to the pesticides' neurotoxic effects. Organochlorine pesticides generally are stable, not volatile, and have hydrophobic properties, resulting in these compounds being highly persistent in the environment. Organochlorine pesticide compounds present in soil at the Site include DDT (and its metabolites DDD and DDE), aldrin (ALDRN), and dieldrin (DLDRN).

5.2.5 Polychlorinated Biphenyls (PCBs)

PCBs have 1 to 10 chlorine atoms attached to biphenyl, and include 209 congeners. In the United States, PCB mixtures principally were sold under the trade name Aroclor, with the various PCB mixtures identified by their chlorine content. For example, Aroclor 1260 is a PCB mixture composed of approximately 60% chlorine. PCBs were used for various purposes by industry due to their dielectric and heat resistance properties. The predominant Aroclor present at the former AMCO facility is Aroclor 1260 (PCB-1260). PCBs have a very low solubility in water, a low volatility, and are hydrophobic (or lipophilic), resulting in a tendency to partition into oils, fats, and carbon-rich materials. In the environment, PCBs are relatively persistent, and are degraded only under certain conditions.

5.3 EXTENT OF SOIL CONTAMINATION

The extent of soil contamination described herein is based on the results from various supplemental remedial investigations, with the primary supplemental investigation being the soil characterization. These supplemental investigations are described in Section 2. The following subsections discuss Site soil contamination based on the extensive data from the supplemental investigations, with the former AMCO facility and neighboring properties grouped into areas with similar characteristics. The extent of soil contamination for each area is described by chemical group: VOCs, SVOCs, metals, pesticides, and PCBs.

For each area and chemical group, a figure has been prepared to illustrate the concentrations of COCs that exceeded SLs. A tabulation of COC concentrations exceeding the SLs also is identified for each area. The analytical results for metals and organic chemicals included many analytes that were not detected in any of the samples. A complete listing of the analytical results from the supplemental investigations to define soil contamination is included in Appendix H. Figures and tables presenting the COC concentrations exceeding the SLs are identified in the following tabulation.

Area	Chemical Group	Figure Number	Table Number
Warehouse portion of Former AMCO Facility	VOCs	5-1	5-3
	SVOCs	5-2	5-3
	Metals	5-3	5-3
	Pesticides	5-4	5-3
Source Area portion of Former AMCO Facility	VOCs	5-5	5-4
	SVOCs	5-6	5-4
	Metals	5-7	5-4
	Pesticides	5-8	5-4
	PCBs	5-8	5-4
Yard Area of Former AMCO Facility	VOCs	5-9	5-5
	SVOCs	5-10 and 5-11	5-5
	Metals	5-12	5-5
	Pesticides	5-13 and 5-14	5-5
	PCBs	5-13 and 5-14	5-5
Neighboring Properties	VOCs	5-15	5-6
	SVOCs	5-16 and 5-19	5-6
	Metals	5-17 and 5-20	5-6
	Pesticides	5-18	5-6
	PCBs	5-18	5-6

5.3.1 AMCO Property

The AMCO Property presently consists of a warehouse building attached to a small office structure and an open and vacant yard. Most of the yard is paved with concrete, with exposed soil present only in a small area to the north of the warehouse. The discussion of soil data in the following subsections is focused on three main areas of the AMCO Property: the warehouse area; the source area (central-southern portion of the yard area); and the remaining open yard area (subdivided into northern and southern portions). Figure 2-4 shows the sampling grid, boring locations, and the concrete thickness for the soil characterization investigations at the AMCO Property.

5.3.1.1 Warehouse Area

The warehouse structure consists of an elongated building (180 feet long) located in the eastern portion of the former AMCO facility. This building, once used for storage of drums, currently is empty. Nine borings (SC-001 through SC-009) were drilled inside the warehouse, with a total of 95 soil samples collected and analyzed. Table 5-3 summarizes the COC concentrations above SLs in soil samples from the nine soil borings. Figures 5-1 through 5-4 identify the COC and associated concentrations exceeding the SLs, as well as the sampling locations and depths.

VOCs

Four soil samples collected from three borings (SC-001, SC-003, and SC-005) contained 124-TMB, EBZ, TCE, and VC at concentrations exceeding their SLs at depths ranging from 1 to 8 feet bgs (see Figure 5-1). These soil borings were located in the southern half of the warehouse, an area adjacent to the source area.

SVOCs

Six soil samples collected from five borings (SC-001, SC-003, SC-005, SC-007, and SC-008) contained SVOCs at concentrations exceeding the applicable SLs at depths ranging from 1 to 5 feet bgs (see Figure 5-2). The SVOCs consisted of benzo(a)pyrene (B[a]PYR), 1-methylnaphthalene (1-MNAPH), benzo(a)anthracene (B[a]ANTRCN), benzo(b)fluoranthene (B[b]FLURNTN), indeno(1,2,3-cd)pyrene (I[123,c,d]PYR), naphthalene (NAPH), and dibenzo(a,h)anthracene (DB[a,h]ANTRCN).

Metals

One soil sample collected from boring SC-009 at a depth of 3 feet bgs contained cobalt at a concentration exceeding its SL (see Figure 5-3). Boring SC-009 was located at the north end of the warehouse building.

Pesticides and PCBs

Four soil samples collected from four borings (SC-002, SC-003, SC-005, and SC-007) at depths ranging from 1 to 5 feet bgs contained the pesticides dieldrin, DDD, and DDE at concentrations exceeding their SLs (see Figure 5-4). Three of the four borings were located in the western portion of the warehouse, nearest to the yard. No PCBs were detected at concentrations exceeding applicable SLs.

5.3.1.2 Source Area

The source area comprises an area of land adjacent to (west of) the warehouse and office building in the central-southern portion of the former AMCO facility. Historically, this area was associated with the former railroad spur line for bulk chemical delivery, chemical transfers, and chemical storage facilities (ASTs and USTs). At the source area, chemicals were transferred from loaded train cars to various storage tanks and drums during the period that AMCO operated. Before the initiation of field activities to establish the actual extent of contaminants in soil, the source area was assumed to extend approximately 130 feet north from the property's eastern entrance gate off 3rd Street (see Figure 2-4). As the result of the spills and leaks that occurred during the AMCO operations, measurable amounts of LNAPL are present in monitoring wells MW-13 and MW-14 (CH2M Hill, 2011). As discussed below, the source area also contains the highest concentrations of VOCs and SVOCs detected in soil at the former AMCO facility and neighboring properties.

The investigation to characterize the nature and extent of soil contamination at the assumed source area consisted of grid-based sampling that included the completion of seventeen soil borings (SC-010 through SC-022, SC-036, SC-037, SC-041, and SC-042) and collection of 187 soil samples across the soil column of the Merritt Sand formation (Upper Aquifer) and the surficial portions of the Older Bay Mud. Table 5-4 lists COC concentrations above SLs in soil

samples from these borings. Figures 5-5 through 5-8 identify the locations, depths, and magnitude of SL exceedances for VOCs, SVOCs, metals, and pesticides/PCBs, respectively.

VOCs

VOCs were detected at concentrations above SLs in fifteen of the seventeen soil borings in the source area, as shown on Figure 5-5. VOCs exceeding their SLs were PCE, TCE, cDCE, VC, 11-DCA, 12-DCA, EBZ, BEN, 124-TMB, 14-DCB, and XYL.

TCE and VC were reported at the highest levels relative to SLs, with maximum concentrations exceeding their respective SLs by a factor of one hundred. The VOCs 11-DCA, EBZ, and BEN were detected at maximum concentrations in excess of their SLs by a factor of ten. PCE, cDCE, 12-DCA, 124-TMB, 14-DCB, and XYL were detected at concentrations in the same order of magnitude as their respective SLs.

The highest concentrations of VOCs were reported in the central and northern portions of the source area, defined by soil borings SC-016, SC-017, SC-019, SC-020, SC-021, SC-037, and SC-042. This portion of the source area includes monitoring well MW-14, a well that has contained measurable LNAPL for many years. While most of the VOC exceedances were reported at depths from 1 to 13 feet bgs, TCE and VC exceedances in soils extended to an approximate depth of 30 feet bgs, with a single detection of TCE above its SL at 61 feet bgs in boring SC-021.

TCE, cDCE, and VC concentrations varied laterally in the source area. In the northern portion (borings SC-036, SC-037, SC-041, and SC-042), cDCE and VC were the predominant chlorinated ethenes. TCE was the predominant chlorinated ethene in the central portion (borings SC-016, SC-017, SC-019, and SC-021), while VC was predominant in the southern portion (borings SC-010, SC-012, SC-013, and SC-015). As the presence of cDCE and VC is attributable to reductive dechlorination (see Figure 1-4), this variation in chlorinated ethene concentrations indicates that factors influencing reductive dechlorination are not consistent across the source area. This is notable in the central portion, where TCE concentrations are high relative to cDCE and VC, indicating that conditions in this area are different and are not optimal for reductive dechlorination activity.

SVOCs

SVOCs were detected in soil samples from14 of the 17 soil borings completed within the source area (see Figure 5-6). SVOCs reported at concentrations exceeding their SLs were B(a)PYR, B(a)ANTRCN, DB(a,h)ANTRCN, I(123-c,d)PYR, B(b)FLURNTN, benzo(k)fluoranthene (B[k]FLURNTN), naphthalene (NAPH), 1-MNAPH, 2-methylnaphthalene (2-MNAPH), pentachlorophenol (PCP), phenanthrene (PHEN), and chrysene (CHRYSN).

B(a)PYR, B(a)ANTRCN, and DB(a,h)ANTRCN were reported at the highest concentrations, exceeding their SLs by a factor of one hundred. Maximum concentrations of I(123-c,d)PYR, B(b)FLURNTN, NAPH, 1-MNAPH, and PCP exceeded their SLs by a factor of ten, while B(k)FLURNTN, 2-MNAPH, PHEN, and CHRYSN were detected at concentrations in the same order of magnitude as their respective SLs.

High SVOC concentrations were detected in the central portion of the source area, defined by soil borings SC-018, SC-020, and SC-022. B(a)PYR, B(a)ANTRCN, DB(a,h)ANTRCN, and B(b)FLURNTN contamination in soils extended vertically to an approximate depth of 20 feet bgs within this area. In other portions of the source area, SVOCs were detected at depths ranging from 1 to 10 feet bgs.

Metals

Six soil samples collected from three borings (SC-012, SC-016, and SC-020) contained lead, antimony, and arsenic at concentrations exceeding their SLs. These soil samples were collected at depths ranging from 1 to 5 feet bgs. The locations of soil samples from the source area with metals concentrations exceeding SLs are shown on Figure 5-7.

Pesticides and PCBs

The lateral and vertical extent of soil samples from the source area containing pesticides and PCBs at concentrations above their SLs are shown on Figure 5-8. In the source area, 16 of the 17 borings had soil samples that contained the pesticides dieldrin, aldrin, DDE, and DDD at concentrations exceeding their SLs. These soil samples were collected at depths ranging from 1 to 30 feet bgs.

PCB-1260 concentrations exceeded the SL in soil samples from 4 of the 17 soil borings (SC-016, SC-018, SC-020, and SC-022). Soils with PCB-1260 above the SL were present at depths ranging from 1 to 20 feet bgs. All soil borings with PCB-1260 exceedances were located in the western portion of the source area.

5.3.1.3 Former AMCO Facility Yard

The remaining portion of the former AMCO facility is the AMCO yard, which for the soil characterization encompasses the open areas to the north and west of the warehouse building and source area (i.e., all areas of the former AMCO facility not identified as the warehouse or assumed source area on Figure 2-4). The majority of the AMCO yard currently is paved with concrete of varying thicknesses, as shown on Figure 2-4. While most of the ASTs and USTs associated with AMCO's operations were located in the assumed source area, some ASTs were located in the former AMCO facility yard: four ASTs were located west of the warehouse adjacent to the northern end of the building, and a dual-tank AST was located in the northwestern portion of the yard (see Figure 1-2 for the locations of these ASTs). A shed that previously occupied a portion of the AMCO yard along the western boundary was used for drum storage. Most of the former AMCO facility yard was paved with concrete or asphalt, as shown on Figure 1-2, and used for chemical storage, except for a narrow access roadway from the western entrance gate off 3rd Street (see Appendix A for photographs from 1988).

The investigation to characterize soil contamination for the AMCO yard included the completion of 56 borings (SC-023 through SC-035, SC-038, SC-039, SC-040, and SC-043 through SC-083), and the analysis of 638 soil samples collected at discrete depths across the Merritt Sand formation and the uppermost portion of the Older Bay Mud unit. Table 5-5 presents COC concentrations above SLs in soil samples collected from these soil borings.
Figures 5-9 through 5-14 show the boring locations, sampling depths, and magnitude of COC concentrations that exceeded SLs.

VOCs

VOCs at concentrations exceeding SLs were found mainly in soil samples collected at 30 feet bgs or less from borings located adjacent to the source area to the north and west (see Figure 5-9). VOC concentrations above SLs were not detected in borings near the perimeter of the AMCO yard. Soil samples from 18 soil borings contained VOCs at concentrations exceeding the applicable SLs. The VOCs detected above SLs were PCE, TCE, cDCE, VC, 1,3-dichlorobenzene (13-DCB), 14-DCB, 12-DCA, 11-DCA, BEN, EBZ, 124-TMB, and XYL.

The highest reported concentration of TCE exceeded its SL by a factor of over one hundred. Maximum concentrations of VC, 13-DCB, 14-DCB, 12-DCA, EBZ, PCE, and BEN exceeded their respective SLs by a factor of over ten. cDCE, 11-DCA, 124-TMB, and XYL were detected at maximum concentrations in the same order of magnitude as their SLs.

The highest concentrations of VOCs occurred primarily in the area just north of the source area, and to a lesser extent in the area just west of the source area. The borings with VOC concentrations exceeding SLs in the AMCO yard define the western and northern extent of VOC soil contamination at the former AMCO facility. Most of the VOC concentrations exceeding SLs were present in soil samples collected at depths ranging from 1 to 8 feet bgs; however, the VC contamination in soil extends vertically to a maximum depth of 30 feet bgs (borings SC-028, SC-032, SC-035, and SC-40).

SVOCs

SVOC concentrations exceeding applicable SLs were detected in soil samples collected from 50 of the 56 borings in the AMCO yard. SVOCs reported at concentrations exceeding their SLs were B(a)PYR, B(a)ANTRCN, DB(a,h)ANTRCN, I(1,2,3-c,d)PYR, B(b)FLURNTN, B(k)FLURNTN, NAPH, 1-MNAPH, 2-MNAPH, and PHEN.

The highest concentrations of B(a)PYR and DB(a,h)ANTRCN exceeded their SLs by a factor of over one hundred in soil samples from six borings. Maximum concentrations of B(a)ANTRCN, I(1,2,3-c,d)PYR, B(b)FLURNTN, NAPH, and 1-MNAPH exceeded their SLs by a factor of over ten. B(k)FLURNTN, 2-MNAPH, and PHEN concentrations were in the same order of magnitude as their SLs.

SVOCs in soils at concentrations above the SLs are widespread, as shown on Figures 5-10 and 5-11. Higher concentrations of B(a)PYR were reported in an area just north and west of the source area (see Figure 5-10). Most of the SVOC exceedances were at depths from 1 to 8 feet bgs. B(a)PYR, DB(a,h)ANTRCN, and 1-MNAPH exceedances extended to 20 feet bgs in some locations, and B(a)PYR and DB(a,h)ANTRCN were detected at 60 feet bgs in boring SC-028 (see Figure 5-11).

Metals

Metals in soils at concentrations exceeding their SLs are scattered across the AMCO yard, as shown on Figure 5-12. Soil samples collected from 19 borings contained arsenic, lead, antimony, copper, cobalt, and/or mercury at concentrations that exceeded their SLs. Metal exceedances occurred mainly at shallow depths (1 to 5 feet bgs), with lead and arsenic being the primary metals exceeding SLs. The cobalt concentration in a soil sample collected at 66 feet bgs in boring SC-064 slightly exceeded its SL.

Pesticides and PCBs

Soil samples collected from 32 borings contained aldrin, dieldrin, DDD, DDE, and/or DDT at concentrations exceeding their SLs, with these soil samples collected at depths ranging from 1 to 20 feet bgs, as shown on Figures 5-13 and 5-14. These pesticides are present generally at shallow depths (1 to 5 feet bgs) across the former AMCO yard. For six borings, pesticides were reported in soil samples at depths ranging from 8 to 20 feet bgs. The highest concentrations of dieldrin and aldrin (20,600 ug/kg and 30,100 ug/kg, respectively) were detected at shallow soil depths in the portion of the AMCO yard just north of the source area (see Figure 5-13). The highest concentration of DDT or its breakdown products (DDD or DDE) was DDD at 250,000 ug/kg in a soil sample collected at a depth of 1 foot bgs from boring SC-051 located in the northwest corner of the AMCO yard.

PCBs that were detected at concentrations above SLs in the AMCO yard were Aroclor 1242 (PCB-1242) and PCB-1260. These concentrations were detected at shallow depths (from 1 to 5 feet bgs), at boring locations to the west of the source area and also the northwestern portion of the AMCO yard (see Figures 5-13 and 5-14).

5.3.2 Neighboring Properties

As discussed in Section 2.3 and shown on Figure 2-5, the properties adjoining the AMCO Site consist of three separate lots (the Large Vacant Lot, Small Vacant Lot, and Parking Lot) located northwest and west of the former AMCO Property. All three lots currently are vacant and paved with concrete.

5.3.2.1 Large Vacant Lot

The Large Vacant Lot is located northwest of the former AMCO facility. The lot consists of three former residential properties (332, 336 and 338, and 340 through 346 Center Street). During the period of AMCO's operations, the residential units were demolished and subsequently the properties were purchased and used as an access route to the former AMCO facility. The investigation of the Large Vacant Lot during the soil characterization included the installation of 36 soil borings (SC-084 through SC 119) and collection of 392 soil samples. All of the collected soil samples were analyzed for VOCs, while analyses for SVOCs, metals, pesticides, and PCBs were performed on 317 soil samples. Table 5-6 lists the COCs that were detected at concentrations above SLs in soil samples collected from the borings at the Large Vacant Lot. Figures 5-15 through 5-18 display the boring locations, soil sample depths, and the concentrations of COCs that exceeded SLs.

VOCs

Vinyl chloride was the only VOC detected at a concentration above its SL. This detection was in one soil sample collected at 13 feet bgs from boring SC-107. Figure 5-15 shows the location of this boring.

SVOCs

SVOCs, mostly PAHs, were detected at concentrations exceeding the applicable SLs in 32 of the 36 soil borings installed in the Large Vacant Lot. SVOCs identified at concentrations exceeding their SLs are B(a)PYR, B(a)ANTRCN, DB(a,h)ANTRCN, I(1,2,3-c,d)PYR, B(b)FLURNTN, and n-nitrosodi-n-propylamine (NS-n-PPLAM).

Maximum concentrations of B(a)PYR and DB(a,h)ANTRCN exceeded their SLs by more than a factor of ten. B(a)ANTRCN, I(1,2,3-c,d)PYR, B(b)FLURNTN, and NS-n-PPLAM exceeded their SLs at concentrations within the same order of magnitude.

PAH-contaminated soils occur throughout nearly the entire footprint of the Large Vacant Lot, as shown on Figure 5-16. High concentrations of B(a)PYR are present in shallow soil across this lot. Most PAH exceedances were detected between 1 and 5 feet bgs. Three soil borings (SC-104, SC-110, and SC-117) contained PAHs at concentrations above SLs to a depth of 8 feet bgs.

Metals

Concentrations of metals exceeding SLs were present in soil samples collected across the Large Vacant Lot, as shown on Figure 5-17. Soil samples collected from 20 of the 36 borings contained arsenic, lead, antimony, and/or cobalt at concentrations above SLs at shallow depths (ranging from 1 to 5 feet bgs). Two soil borings (SC-104 and SC-110) located in the central portion of this lot contained arsenic, antimony, cobalt, and/or lead at 8 feet bgs. The maximum concentrations were arsenic at 354 mg/kg (boring SC-101 at 3 feet bgs), lead at 2,290 mg/kg (boring SC-101 at 3 feet bgs), cobalt at 43.4 mg/kg (boring SC-104 at 5 feet bgs), and antimony at 42.9 mg/kg (boring SC-104 at 8 feet bgs).

Pesticides and PCBs

Soil samples collected from ten of the 36 borings contained the pesticides DDD, DDE, and/or DDT at concentrations exceeding their SLs, as shown on Figure 5-18. These concentrations were detected at depths ranging from 1 to 8 feet bgs in borings drilled in the central to southern portion of the Large Vacant Lot. DDT concentrations exceeded the SL by a factor of over ten in soil samples from borings SC-102 and SC-110.

PCB-1260 and Aroclor 1254 (PCB-1254) were the two PCB compounds detected at concentrations above their SLs. Both PCBs were present in a single soil sample collected from soil boring SC-096 at 1 foot bgs.

5.3.2.2 Small Vacant Lot

The Small Vacant Lot is located west of the former AMCO facility. This lot (324 Center Street) was occupied by a residential unit until after AMCO ceased operations in 1989. Therefore the soil characterization results for the Small Vacant Lot are more representative of residential land use in the vicinity of the Site. The soil characterization at the Small Vacant Lot included the installation of three borings (SC-120 through SC-122) and collection of 33 soil samples. All of the collected soil samples were analyzed for VOCs, while 23 soil samples were analyzed for SVOCs, metals, pesticides, and PCBs. Table 5-6 identifies the COC concentrations above SLs in soil samples collected from the three borings. Figures 5-15, 5-18, 5-19 and 5-20 present the boring locations, soil sample depths, and COC concentrations exceeding SLs.

VOCs

No VOCs were detected at concentrations exceeding SLs in soil samples collected at the Small Vacant Lot (see Figure 5-15).

SVOCs

SVOCs were detected at concentrations exceeding applicable SLs at a depth of 1 foot bgs in one soil boring (SC-121) (see Figure 5-19). These SVOCs were PAHs and consisted of B(a)PYR, B(a)ANTRCN, DB(a,h)ANTRCN, I(1,2,3-c,d)PYR, and B(b)FLURNTN. B(a)PYR exceeded its SL by more than a factor of ten.

Metals

Only lead was detected at a concentration (552 mg/kg) exceeding its SL, and this exceedance was in one soil sample from boring SC-121, as shown on Figure 5-20. This soil sample was collected at a depth of 1 foot bgs.

Pesticides and PCBs

Pesticides and PCBs were not detected in soil samples from the Small Vacant Lot at concentrations that exceeded SLs.

5.3.2.3 Parking Lot

The Parking Lot is located west of the former AMCO facility. This lot (1448 3rd Street) is part of the property that includes a workshop that is not currently being used. The soil characterization at the Parking Lot included the completion of three (3) soil borings (SC-123 through SC-125) and collection of 33 soil samples. All of the collected soil samples were analyzed for VOCs, while 28 soil samples were analyzed for SVOCs, metals, pesticides, and PCBs. Table 5-6 lists the COC concentrations above SLs in soil samples collected from the three soil borings. Figures 5-15, 5-18, 5-19, and 5-20 display the boring locations, soil sample depths, COC concentrations exceeding SLs.

VOCs

VOC concentrations did not exceed SLs in soil samples collected at the Parking Lot.

SVOCs

SVOCs were detected at concentrations above SLs in two soil borings (SC-123 and SC-125), as shown on Figure 5-19. Soil concentrations of B(a)PYR and DB(a,h)ANTRCN exceeded their SLs in three soil samples collected at depths ranging from 1 to 5 feet bgs.

Metals

Only lead was detected at a concentration exceeding its SLs. Lead was detected in a soil sample collected at 5 feet bgs from boring SC-125 (see Figure 5-20).

Pesticides and PCBs

Pesticide concentrations did not exceed SLs in soil samples collected at the Parking Lot.

PCB-1254 was detected above its SL in a soil sample collected from soil boring SC-125 at 5 feet bgs (see Figure 5-18).

5.3.3 Air Monitoring During the Drilling and Sampling for the Soil Characterization

An air monitoring and sampling program was implemented to assess the potential impacts on air quality during the soil characterization field activities. Air quality was assessed through a

combination of field portable measurement equipment (i.e., PID and vinyl chloride measurement chip system) and collection of air samples with Summa canisters for laboratory analysis. Based on PID readings and analytical results from collected air samples, the intrusive activities associated with the soil characterization did not impact the health and safety of local residents or workers at nearby businesses.

The air monitoring data also were used, when appropriate, to upgrade the personal protective equipment (PPE) to Level C to protect the health of field personnel performing the soil characterization. This upgrade to Level C PPE was needed only during drilling at the source area, where the highest VOC concentrations were present in subsurface soils. The investigation of the source area lasted only nine days out of the more than three months required to perform the soil characterization field activities. When drilling was being conducted in the source area, VOC emissions were observed to dissipate with distance away from the drilling location. Air monitoring activities and results are presented and discussed in greater detail in a technical memorandum included in Appendix I.

5.3.4 Soil Contamination Identified from Upper Aquifer Well Installations

Additional Upper Aquifer groundwater monitoring wells were installed in 2009 and 2012. Details of the 2009 well installations are provided in Appendix A of the RI Report (CH2M Hill, 2011). The details of the Upper Aquifer well construction and remedial investigation activities in 2012 are provided in a technical memorandum included in Appendix I. During well installation activities since October 2009, 150 soil samples were collected for chemical analysis. Ninety-six soil samples were collected from the 12 borings completed between October 12 and November 3, 2009, and 54 soil samples were collected between January 3 and January 20, 2012, during drilling to install 9 monitoring wells. Soil sample analyses included VOCs, SVOCs, total petroleum hydrocarbons (gasoline range [TPH-g], diesel range (TPH-d), and motor oil range [TPH-mo]), metals, organochlorine pesticides, and PCBs.

Soil analytical results from the well installations were as follows:

- TPH-g was not detected above its SL in any of the analyzed soil samples.
- TPH-d was detected at concentrations exceeding its SL in 11 of 150 soil samples, with a maximum concentration of 1,440 mg/kg in a soil sample collected from RMW-05-74 at 5 feet bgs. [Note: Reported TPH-d detections of 1,200 mg/kg (J-flagged) and 2,300 mg/kg in soil samples from boring RMW-15-35 at 1 foot bgs and RMW-15-60 at 1 foot bgs, respectively, included TPH in both the diesel and motor oil ranges.]
- TPH-mo concentrations exceeding its SL were detected in 9 of 54 soil samples, with a maximum concentration of 921 mg/kg in a soil sample collected from RMW-18-79 at 5 feet bgs.
- No VOCs were detected above their respective soil screening criteria in any of the 150 soil samples that were analyzed.
- One or more of ten SVOCs were reported at concentrations exceeding their respective SLs in 23 of 150 analyzed soil samples. SVOCs at concentrations exceeding their SLs included dimethyl phthalate at a maximum concentration of 302 ug/kg (J-flagged) in a soil sample from RMW-19-15 at10 feet bgs; and a sample from RMW-19-35 collected at

5 feet bgs had B(a)ANTRCN at a maximum concentration of 2,520 ug/kg (J-flagged); B(a)PYR at a maximum concentration of 3,930 ug/kg (J-flagged); B(b)FLURNTH at a maximum concentration of 2,500 ug/kg (J-flagged); B(k)FLURNTN at a maximum concentration of 2,370 ug/kg (J-flagged); and I(1,2,3-cd)PYR at a maximum concentration of 5,220 ug/kg. The highest concentrations of SVOCs were present in the shallow (5 feet bgs) soil samples collected from the RMW-19 series wells (RMW-19-15, RMW-19-35, and RMW-19-80).

- Arsenic, copper, and lead were reported above the applicable SLs. Arsenic was reported above its screening criterion in 10 of 150 samples, with a maximum concentration of 56.3 mg/kg in RMW-15-60 at 1 foot bgs. Copper was reported above its screening criterion at 4,380 mg/kg in one soil sample collected at 5 feet bgs from boring RMW-19-80. Lead, not attributable to the former AMCO operations, also was reported above its screening criterion in one of 150 samples, at 1,830 mg/kg in RMW-19-35 at 5 feet bgs.

5.3.5 Soil Contamination Identified from CPT Investigation

The results of the cone penetrometer testing (CPT) and membrane interface probe (MIP) investigation are detailed in a technical memorandum included with Appendix I. COC concentrations in soil samples from this investigation that exceeded SLs are identified in Table 5-7. Figure 2-3 shows the CPT-MIP investigation locations. The CPT-MIP investigation consisted of collecting a minimum of one shallow soil sample (typically from a depth of 5 to 7 feet bgs) at each of the 17 CPT-MIP investigation locations.

Lead was the only metal with concentrations that exceeded its SL. These lead concentrations were reported in shallow soil samples from borings MIP-7 and MIP-9, completed in the warehouse and at the UPPR property, respectively. PCBs were not detected in any of the soil samples collected and analyzed. Concentrations of the pesticides aldrin and/or DDE exceeded their respective SLs in soil samples from borings MIP-15 and MIP-17. The highest concentrations of TPH-d and TPH-mo were detected in a confirmation soil sample from MIP-15. TPH-d concentrations above 100 mg/kg also were found in soil at six additional MIP locations: MIP-1, MIP-6, MIP-7, and MIP-17 in the former AMCO yard; MIP-8 in 3rd Street; and MIP-9 on the UPRR property. B(a)ANTRCN concentrations exceeded the SL at MIP-6, MIP-15, and MIP-17; B(a)PYR concentrations exceeded the SL at MIP-3, MIP-15, and MIP-17; and NAPH, 124TMB, 14DCB, and EBZ concentrations exceeded their screening levels at MIP-15.

Soil samples collected below the depth of 7 feet bgs were analyzed primarily for VOCs, with some samples analyzed for SVOCs in consideration of the MIP profiles. Concentrations of SVOC and VOC constituents in all soil samples collected in the saturated zone were below their respective SLs.

5.3.6 VOC Concentratons in Older Bay Mud and Alameda Formation

As part of the installation of the Lower Aquifer monitoring well (RMW-02-131), soil samples were collected from the Older Bay Mud and Alameda Formation and analyzed for VOCs. Soil samples were collected from the Older Bay Mud at depths of 80, 100, and 125 feet bgs, and from the Alameda Formation at a depth of 150 feet bgs. VOCs were not detected in these soil samples.

The boring for well RMW-02-131 was located approximately three feet west of soil characterization boring SC-021. TCE was detected at 1,170 ug/kg in the soil sample collected at 61 feet bgs from boring SC-021, and this concentration is not indicative of the presence of DNAPL. TCE, which acts as a DNAPL when the only solvent released to the environment, has been shown to migrate through low permeability geologic formations. However, based on the non-detect VOC concentrations in deeper soil samples from the boring for RMW-02-131, TCE does not appear to have migrated vertically through the Older Bay Mud and into the Alameda Formation.

5.4 SUMMARY OF THE NATURE AND EXTENT OF SOIL CONTAMINATION

The following summarizes the nature and extent of soil contamination based on the results from the supplemental investigations.

- The lateral extent of the source area is larger than was assumed in planning for the soil characterization, as shown on Figure 5-21. Based on the soil characterization results and the extent of LNAPL at the former AMCO facility, the approximate lateral extent of the source area is defined by the following:
  - East: West wall of the warehouse.
  - North: Borings SC-053 through SC-056.
  - West: Borings SC-029, SC-032, SC-035, and SC-040.
  - South: Boring SC-013.
- **VOCs**: TCE, cDCE, VC, PCE, BEN, EBZ, XYL, 124-TMB, 11-DCA, 14 DCB, and 12-DCA exceeded their respective SLs in the source area, as well as in portions of the AMCO yard and the warehouse at the former AMCO facility. Figure 5-21 presents the horizontal extent of VOCs at concentrations detected above SLs in soils within the AMCO Property. The area impacted by VOCs is approximately 13,700 square feet (of a total area of 40,500 square feet for the entire AMCO Property). The bulk of the VOC contamination extends vertically to a depth of 30 feet bgs within the source area. At a single soil boring location (SC-021), TCE was detected at a concentration above its SL at 61 feet bgs, indicating that at this location TCE had migrated downward within the source area. Chlorinated ethenes (TCE, cDCE, and VC) were the VOC compounds with the highest concentrations relative to their SLs.

  The extent of TCE, cDCE, and VC concentrations in soil is presented on Figures 5-22, 5-23, and 5-24, respectively, in plan and cross-sectional views. While cDCE, a product of the reductive dechlorination of TCE, is present at elevated concentrations throughout the source area (Figure 5-23), elevated TCE concentrations are primarily in the central portion of the source area (Figure 5-22). Including VC in the evaluation of the lateral distribution of chlorinated ethenes in the source area, reductive dechlorination is more active in the northern and southern portions of the source area. The lateral variation in TCE concentrations indicates that less favorable conditions for reductive dechlorination exist in the central portion of the source area. The remaining mass of chlorinated ethenes in the source area, notably TCE and cDCE, provides a continuing contaminant source to groundwater.

The extent of toluene concentrations is presented on Figure 5-25. While concentrations of toluene did not exceed the SL due to its relatively high screening value, the residual toluene in the source area is a source for groundwater contamination. Along with toluene, other non-chlorinated VOC contaminants (i.e., BEN, EBZ, XYL, 124-TMB) are present in the source area.

At the neighboring properties, VC was the only VOC detected at a concentration exceeding a SL, and this exceedance was only for one soil sample from 13 feet bgs collected in a boring located at the eastern end of the Large Vacant Lot.

TCE, while detected at the top depths of the Older Bay Mud in some source area borings (e.g., SC-021), was not found to migrate vertically to greater depths. VOCs were not detected in deeper soil samples collected from the Older Bay Mud and Alameda Formation during the Lower Aquifer monitoring well installation.

- **SVOCs**: SVOCs at concentrations exceeding SLs have a widespread lateral footprint on both the AMCO Property and the neighboring properties, with PAHs being the primary SVOC. Figure 5-21 shows the estimated horizontal extent of SVOC concentrations exceeding SLs in soils within the AMCO Property. The SVOCs exceeding SLs include B(a)PYR, B(a)ANTRCN, DB(a,h)ANTRCN, I(1,2,3-cd)PYR, B(b)FLURNTN, B(k)FLURNTN, NAPH, 1-MNAPH, 2-MNAPH, PCP, PHEN, CHRYSN, and NS-n-PPLAM. These compounds were detected in soils collected from approximately 90% of the soil borings completed at the AMCO Property and Neighboring Properties. Most of the SVOCs exceeding SLs were detected at shallow depths (ranging from 1 to 5 feet bgs, with some to depths of 13 feet bgs). For a few locations in the source area, SVOC concentrations exceeding SLs extended as deep as 20 feet bgs. One soil sample collected at a depth of 60 feet bgs from boring (SC-028), located in the southwestern portion of the AMCO yard, contained B(a)PYR and DB(a,h)ANTRCN at concentrations exceeding their SLs–the deepest downward migration of SVOCs observed during the soil characterization.
- **Metals**: Metals at concentrations greater than their SLs were detected in soils across the AMCO Property and the Neighboring Properties. Metals exceeding SLs include arsenic, antimony, cobalt, copper, and lead. Arsenic and lead were the metals exceeding their SLs most often, and these exceedances, while showing a lateral distribution, were primarily in soil samples collected at depths ranging from 1 to 5 feet bgs. The presence of lead in the soils is not considered attributable to the former AMCO operations.
- **Pesticides**: A significant portion of the AMCO Property has soils impacted by pesticides, as shown on Figure 5-21. The pesticides aldrin, dieldrin, DDT, DDD, and DDE were detected above their SLs at the AMCO Property and the Large Vacant Lot. For the AMCO Property, pesticide contamination in soils was found in the source area, the southwestern portion of the AMCO yard, portions of the northern AMCO yard, and the western portion of the warehouse building footprint. Outside of the source area, the vertical extent of pesticide-contaminated soils at the AMCO Property was a depth of 5 feet bgs. Within the source area, pesticide contamination extended to a maximum depth of 30 feet bgs in four soil borings. Pesticide contamination at the Large Vacant Lot was found in shallow soils (to a depth of 8 feet bgs) from the center to the southern end of the Lot.

- **PCBs**: The lateral extent of soils with PCBs (as PCB-1242, PCB-1254, and/or PCB-1260) at concentrations above their SLs was limited, consisting of small areas in the yard of the former AMCO facility. PCB-1260 was detected at a maximum depth of 20 feet bgs within the source area. The vertical extent of PCB contamination in soil outside the source area was a depth of 5 feet bgs. In the Neighboring Properties, PCB contamination in soil was found at two isolated locations: one boring near the center of the Large Vacant Lot and one boring in the southern portion of the Parking Lot.
- **Total Petroleum Hydrocarbons**: Petroleum hydrocarbons as diesel and/or motor oil were detected at significant concentrations in both on-site and off-site locations. The on-site locations were scattered and included areas beneath the warehouse and in various portions of the AMCO yard (central-north, northwest and south). The highest TPH concentrations were found in the central-north portion of the AMCO yard. Off-site locations included a boring at 3rd Street and the UPRR yard. However, the source of the petroleum hydrocarbons detected beneath 3rd Street and the UPRR yard is unrelated to the former AMCO facility activities.

6.0 NATURE AND EXTENT OF GROUNDWATER CONTAMINATION

The nature and extent of groundwater contamination presented in the RI Report (CH2M Hill, 2011) was based primarily on groundwater concentration data collected in September 2006. Groundwater monitoring has continued at the Site since 2006. During 2010 and 2011, the groundwater monitoring network consisted of a total of 43 wells: 31 wells installed prior to 2006 and 12 wells installed in October 2009. Nine additional wells were installed by Gilbane in January 2012 in the downgradient area of the Site to further delineate the lateral and vertical extent of groundwater contamination. Details of the wells in the groundwater monitoring network are presented in Table 2-10, and the well locations are shown on Figure 2-6.

The nature and extent of groundwater contamination described in this RI Addendum is based on the data from the annual groundwater monitoring event conducted in August 2012. Groundwater data from the August 2012 monitoring event included the COCs that were the basis for the groundwater contamination evaluation in the RI Report. In addition, the August 2012 monitoring event included analyses for microbial parameters to better characterize the microbial population and activity associated with reductive dechlorination of chlorinated VOCs.

The initial step in the determination of the nature and extent of groundwater contamination was the identification of screening levels for evaluating chemical concentrations in groundwater. COC concentrations relative to screening levels were used to establish the nature and extent of groundwater contamination. Besides the concentrations of COCs, data from microbial and non-COC chemical analyses established an understanding of the processes influencing the fate of COCs in groundwater. Besides supporting the assessment of the extent of groundwater contamination, the chemical and microbial data were used in the fate and transport evaluation presented in Section 7.

As discussed in Section 1.5 of this RI Addendum, the hydrogeology at the Site consists of two aquifers (the Upper Aquifer and the Lower Aquifer), which are separated by an aquitard (the Older Bay Mud). The depth to groundwater at the Site is shallow – 2.5 to 6.5 feet bgs (CH2M Hill, 2011). The vertical depth from the ground surface to the base of the Upper Aquifer varies slightly across the Site, ranging from a depth of approximately 55 to 60 feet bgs at the former AMCO facility to approximately 80 feet bgs at the farthest downgradient, deep-zone monitoring well (RMW-19-80). Other hydrogeological properties of the Upper Aquifer are described in Section 1.5.2.1.

6.1 GROUNDWATER SCREENING LEVELS

Groundwater screening levels (SLs) were used as a basis for the evaluation of chemical concentrations in groundwater. The groundwater SLs (see Table 6-1) are an update to Table 16a of the RI Report (CH2M Hill, 2011).

When available, the California or Federal MCL (whichever is lowest) was used as the SL. Where MCLs were not available, EPA Region 9 RSLs for drinking water (US EPA, 2012a, included as Appendix B) were the basis of the SLs. If neither MCLs nor RSLs were established, ESLs developed by the RWQCB (RWQCB, 2008) were used. The groundwater SLs presented in Table 6-1 are for screening purposes only. Groundwater cleanup (or remediation) criteria will be developed as part of the Feasibility Study to be prepared for the AMCO Superfund Site.

For dioxins and furans, the US EPA recommended Toxicity Equivalence Factor (TEF) methodology (US EPA, 2010d) was used to determine an equivalent 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) concentration. The TEF methodology consists of multiplying the concentration of each dioxin/furan congener by its respective consensus-estimated TEF and summing these results. The summed values are known as the Toxic Equivalency Quantity (TEQ), i.e., the equivalent TCDD concentration. The equivalent TCDD concentration was then compared to the TCDD screening level listed in Table 6-1. The TEF methodology, while not applicable to evaluating the toxicity of individual dioxin/furan congeners, enables the assessment of the dioxin and furan toxicity at the equivalent TCDD concentration.

6.2 DIRECTION OF GROUNDWATER FLOW IN THE UPPER AQUIFER

Groundwater potentiometric surface variations, based on groundwater elevations measured in the wet season (February 2012) and dry season (August 2012), are shown on Figures 6-1 and 6-2, respectively. The Upper Aquifer groundwater had a southwesterly flow direction during both the wet and dry seasons in 2012. The groundwater gradients were very shallow north of 3rd Street, being 0.005 and 0.004 feet/foot (ft/ft) in February 2012 and August 2012, respectively. South of 3rd Street, the groundwater gradient is even lower, ranging from 0.0008 to 0.0016 ft/ft. The ranges of groundwater gradients in the RI Report (CH2M Hill, 2011) were 0.006 to 0.008 ft/ft north of 3rd Street and 0.001 to 0.003 ft/ft south of 3rd Street.

Variations in groundwater elevation at locations with monitoring wells in close proximity and having screen intervals at different depths were used to evaluate the vertical hydraulic gradient in the Upper Aquifer. Figure 6-3 shows the vertical gradients in August 2012 based on groundwater elevations for each of the well screens within a well cluster. The vertical gradient for well clusters located north of 3rd Street ranged from -0.08 ft/ft (i.e., downward) to 0.03 ft/ft (i.e., upward), while south of 3rd Street the vertical gradient ranged from -0.04 ft/ft (downward) to 0.04 ft/ft (upward). In the source area (RMW-02 wells), the vertical gradient was downward in February 2012 and August 2012, at -0.02 ft/ft and -0.08 ft/ft, respectively. The vertical gradient variations from the RI Report (CH2M Hill, 2011) were -0.074 ft/ft to 0.062 ft/ft.

6.3 NATURE OF GROUNDWATER CONTAMINATION IN THE UPPER AQUIFER

6.3.1 Chemicals of Concern (COCs) in Groundwater

COCs impacting groundwater quality at the Site were reported to include a variety of VOCs, SVOCs, and metals, along with pesticides, PCBs, and dioxins/furans (CH2M Hill, 2011). COCs with concentrations exceeding SLs in samples collected for the August 2012 groundwater monitoring event are identified in Tables 6-2 through 6-5 for VOCs, SVOCs, metals, and pesticides and PCBs, respectively. A complete tabulation of the groundwater data from investigations performed by CH2M Hill from the fourth quarter of 2006 through 2009 is presented in Appendix F. Appendix H includes a complete tabulation of all groundwater monitoring data for sampling performed by ITSI Gilbane from 2010 through 2012.

6.3.1.1 Volatile Organic Compounds (VOCs)

Numerous VOCs are present in Upper Aquifer groundwater at concentrations exceeding SLs, as identified in Table 6-2. VOCs constitute the most significant COCs in Upper Aquifer groundwater at the Site. VOCs with the highest concentrations and/or extent in groundwater are

TCE, cDCE, VC, 11-DCA, and TOL. Other chlorinated VOCs (CVOCs) and non-chlorinated VOCs present in Upper Aquifer groundwater above SLs include PCE, 111-TCA, tDCE, 11-DCE, 12-DCA, 1,2-dibromo-3-chloropropane, 1,2,4-trichlorobenzene (124-TCB), 14-DCB, chlorobenzene (CBen), 124-TMB, 1,3,5-trimethylbenzene (135-TMB), BEN, and EBZ.

6.3.1.2 Semi-volatile Organic Compounds (SVOCs)

The primary SVOCs present in groundwater at concentrations exceeding SLs are 14-Dxn and NAPH. Other SVOCs reported at concentrations exceeding their SLs are 2,4-dimethylphenol, 2-MNAPH, biphenyl, and bis(2-ethylhexyl) phthalate (see Table 6-3).

6.3.1.3 Metals

Metals present in Upper Aquifer groundwater at concentrations exceeding their SLs are identified in Table 6-4. Some of the SL exceedances for metals, such as arsenic, iron, manganese, and selenium, likely are due to the reducing conditions present in the shallow and intermediate zones of the Upper Aquifer. Nickel and cobalt are present in groundwater at the source area. Selenium concentrations above SLs are associated with groundwater from monitoring wells located on UPRR property, and therefore are not likely attributable to the former AMCO facility operations.

6.3.1.4 Pesticides and Polychlorinated Biphenyls (PCBs)

As shown in Table 6-5, the primary pesticides and PCBs present in groundwater are DDT, DDD, DDE, and PCB-1260. The highest concentrations of these COCs are present in shallow groundwater from RMW-02-13, a monitoring well located in the source area where LNAPL (free product) sometimes is present. In consideration of the low solubility of organochlorine pesticides and former land uses in the area, concentrations of pesticides exceeding SLs at wells located south of 3rd Street (i.e., RMW-09-15 and RMW-10-35) likely are due to a source other than the former AMCO facility.

6.3.1.5 Dioxins and Furans

Consistent with EPA's approach to evaluating the human health risks from exposures to environmental media containing dioxins/furans, the TEF methodology (US EPA, 2010d) was used to establish the TCDD-equivalent concentrations in groundwater. The dioxin-like compounds detected in groundwater at the Site included tetra-, penta-, hexa-, hepta-, and octa-chloro dioxins and/or furans. Only groundwater from monitoring well RMW-02-32 had an equivalent TCDD concentration above the TCDD SL of 0.03 nanograms per liter (ng/L). Monitoring well RMW-02-32 is located in the source area, which has the highest level of COC concentrations in soil, as discussed in Section 5. In addition, LNAPL is present in wells MW-14 and sometimes RMW-02-13 located in the vicinity of RMW-02-32. The equivalent TCDD concentration in groundwater from RMW-02-32 was 0.034 ng/L.

6.3.2 Comparison of Groundwater Chemicals of Concern (COCs) – 2006 and 2012

A comparison of maximum COC concentrations in 2006 and 2012 is presented in Table 6-6. Data for both years indicate that numerous COCs are present in the Upper Aquifer groundwater at the Site, with the highest concentrations commonly present in monitoring wells located in or immediately downgradient of the source area (RMW-02-13, RMW-02-32, MW-12, and

RMW-12-32). The following subsections present evaluations of maximum groundwater COC concentrations for the various chemical groups in 2006 and 2012.

6.3.2.1 Volatile Organic Compounds (VOCs)

As will be discussed in more detail in Sections 6.4 and 6.5, biological transformations are occurring in groundwater and are the likely reason for changes in VOC concentrations in groundwater between 2006 and 2012. For readily biodegradable VOCs such as acetone, 2-hexanone, and 4-methyl-2-pentanone (MIBK), significant reductions in concentrations occurred during this six year period. Degradation of these compounds contributed to reducing conditions, which enabled reductive dechlorination (see Figure 1-4) to remain active, with cDCE and VC being the predominant chlorinated ethenes in groundwater at the Site.

Aromatic VOCs in groundwater include both chlorinated and non-chlorinated compounds. Chlorinated benzenes also are subject to reductive dechlorination, with benzene being the final product (Adrian and Görisch, 2002 and Fung et. al., 2009). The maximum concentrations of trichlorobenzenes and dichlorobenzenes decreased between 2006 and 2012, while the maximum chlorobenzene concentrations increased. Little change was observed in the maximum benzene concentration. For other aromatic hydrocarbons (ethylbenzene, toluene, trimethylbenzene, etc.), no significant changes in the maximum concentrations occurred between 2006 and 2012.

The LNAPL present in the source area provides a continuing source of VOCs to groundwater.

6.3.2.2 Semi-volatile Organic Compounds (SVOCs)

Varying changes were observed between 2006 and 2012 in the maximum concentrations of the SVOCs (see Table 6-6). For the SVOCs that showed some reduction in concentrations from 2006 to 2012, the reduction did indicate active biodegradation for some SVOCs (e.g., NAPH and 2-MNAPH), but not for 14-Dxn. The maximum concentrations typically were present in groundwater from wells within or adjacent to the source area. The primary SVOCs continue to be 14-Dxn, NAPH, and 2-MNAPH. Due to higher analytical laboratory reporting limits for the August 2012 monitoring event, PAHs were not detected in groundwater.

6.3.2.3 Other Chemicals of Concern

Maximum concentrations of organochlorine pesticides in groundwater showed little change from 2006 to 2012, with maximum concentrations primarily present at two locations: the source area at the former AMCO facility (monitoring well RMW-02-13) and an area south of 3rd Street (monitoring wells RMW-09-15 and RMW-10-35) that was associated with an agricultural product manufacturing facility, as described in Section 1.4.2.3.

Similar maximum concentrations for arsenic, iron, and manganese were observed in 2006 and 2012. Reducing conditions were present during both of these periods. Given that the reduced forms of these metals are more soluble, the high concentrations of these metals in groundwater can be attributed to the reducing conditions.

6.3.3 Free Product (Non-aqueous Phase Liquids) in Upper Aquifer Wells

The presence of measurable free product (LNAPL) was observed in monitoring wells MW-13 and MW-14 prior to and during the RI investigation (CH2M Hill, 2011). LNAPL continues to

be present in these wells, and Table 6-7 lists the LNAPL (free product) thickness measured in groundwater monitoring wells during the supplemental investigations. The recent LNAPL thicknesses in MW-13 and MW-14 are greater than those reported in the RI Report (CH2M Hill, 2011), as shown in the tabulation below.

Monitoring Well	Maximum LNAPL Thickness from RI Report (CH2M Hill, 2011) (feet)	Maximum LNAPL Thickness Observed During Supplemental Investigations (feet)
RMW-02-13	Not Present[1]	4.70
MW-13	0.2 (2002)[2]	0.81
MW-14	5.43 (2002) 3.68 (March 2005)	8.39

Notes:
[1] The presence of LNAPL was not reported (CH2M Hill, 2011).
[2] Measured prior to the beginning of the RI field investigations. MW-13 was not accessible during the RI field investigations (CH2M Hill, 2011).

6.3.4 Groundwater Concentrations for Other Chemical Parameters

Besides the COCs, the groundwater monitoring during the supplemental investigations included other chemical parameters associated with the water quality of the Upper Aquifer groundwater. Table 6-8 presents the concentrations for these other chemical parameters in the Upper Aquifer groundwater from the August 2012 monitoring event. The other chemical parameters provide a measure of the organic content in groundwater (dissolved organic carbon [DOC] and chemical oxygen demand [COD]), the capacity of the groundwater to neutralize an acid (alkalinity), geochemical conditions (ferrous iron and sulfide), and anion composition of the groundwater (chloride, sulfate, and nitrate). In general, these parameters suggest that conditions are suitable for reductive dechlorination to occur, thus limiting the lateral movement of chlorinated VOCs.

DOC concentrations are highest in the source area, lower in downgradient wells, and lowest in background wells, and decrease with depth overall, following the same pattern as VOC contamination in groundwater. As indicated by the alkalinity concentrations in the source area, the groundwater has sufficient buffering capacity to neutralize a pH change associated with the formation of volatile fatty acids (VFAs) and other acidic by-products from COC biodegradation.

Chloride and sulfate concentrations typically are higher with depth, and concentrations also were higher in groundwater from wells located south of 3rd Street. The lateral and vertical variation of chloride concentrations in groundwater is attributed to the movement of brackish water from San Francisco Bay to the Site. The vertical variation in chloride and sulfate concentrations is due to saltwater being heavier than fresh water. At the source area, sulfate was not detected in groundwater due to VOC biodegradation involving sulfate reduction, with the formation of sulfide as an end-product. Another pathway for VOC biodegradation is associated with iron reduction, where iron in the form of ferric oxides is reduced to ferrous iron. Ferrous iron is soluble in groundwater, and ferrous concentrations generally were higher in and near the source

area, where highly reducing conditions are associated with the shallow and intermediate zones of the Upper Aquifer. In conjunction with microbial parameters, sulfate, sulfide, and ferrous iron are indicators of the geochemical conditions in the groundwater; and these chemical parameters assist in assessing biological degradation processes occurring at the Site.

6.4 EXTENT OF UPPER AQUIFER GROUNDWATER CONTAMINATION

Groundwater concentrations from the August 2012 annual monitoring event were the basis for the following discussion of the extent of contamination in the Upper Aquifer. The lateral and vertical extent of COC-impacted groundwater in the Upper Aquifer is shown on Figures 6-4 through 6-23. Table 6-2 presents VOC groundwater concentrations that exceeded screening levels for the August 2012 monitoring event.

6.4.1 Volatile Organic Compounds (VOCs)

VOCs are widely distributed contaminants at the Site, having been detected above SLs in groundwater from monitoring wells located both at and downgradient of the former AMCO facility. As indicated by the contaminant concentration maps on Figures 6-4 through 6-21, the VOC plumes originate from two areas of the former AMCO facility: 1) the source area, which has LNAPL and high COC concentrations in soil (as described in Section 5) and 2) north of the RMW-15 well series, where an AST was located (see Figure 1-2). The VOC plumes have migrated from the former AMCO facility to the south/southwest, consistent with the general groundwater flow direction in the area. The lateral extent of the VOC plumes has been defined with the additional wells installed in 2012. Recent groundwater monitoring data also indicate that the VOC plumes are stable, and the lateral extent of the VOC plumes now is approximately 220 feet from the southern boundary of the former AMCO facility.

CVOCs such as PCE, TCE, cDCE, tDCE, VC, and 1,1-DCA are the most widespread COCs and are present in groundwater at concentrations significantly higher than the SLs identified in Table 6-1. CVOC-impacted groundwater is present in the shallow and intermediate zones of the Upper Aquifer, with only an isolated presence in the deep zone at monitoring well RMW-14-50. North of 3rd Street, CVOC concentrations are greater in the shallow zone, while south of 3rd Street concentrations are greater in the intermediate zone than in the shallow zone.

Groundwater impacted by non-chlorinated VOCs is present primarily in the shallow zone, with concentrations much lower in the intermediate zone and no impacts to groundwater in the deep zone of the Upper Aquifer. The lateral extent of the non-chlorinated VOCs is less than that of the CVOCs, extending only a short distance south of the former AMCO facility.

The VOCs at the highest concentrations in groundwater are VC, cDCE, TOL, and, to a lesser extent, TCE. The extent of key VOC contaminants detected above screening levels for the August 2012 monitoring event is discussed below.

6.4.1.1 Tetrachloroethene (PCE)

PCE was detected in 5 out of 50 groundwater samples, with detected concentrations ranging from 0.35 to 33 ug/L. PCE concentrations exceeding the SL of 5 ug/L were detected in groundwater from two wells screened in the intermediate zone: RMW-07-35 at 33 ug/L and RMW-16-35 at 18 ug/L (see Figure 6-4). Based on historical groundwater concentrations, the northwestern portion of the former AMCO facility (near the well series RMW-08 and RMW-15)

appears to be the source of the PCE in groundwater. Groundwater with PCE concentrations exceeding the SL are located downgradient from this apparent source area. PCE was not detected at concentrations exceeding the SL in groundwater from any of the shallow or deep groundwater monitoring wells. The PCE plume map for the intermediate groundwater zone is shown on Figure 6-4. The downgradient, lateral extent of the PCE plume is estimated to extend to the southern edge of 3rd Street.

6.4.1.2 Trichloroethene (TCE)

TCE was detected in 12 out of 50 groundwater samples, with detected concentrations ranging from 1.2 to 100 ug/L. TCE concentrations exceeding the SL of 5 ug/L were detected in groundwater from 10 monitoring wells, with the highest concentration of 100 ug/L in groundwater from well RMW-14-50. TCE exceedances occurred in all three groundwater zones of the Upper Aquifer, as shown on the plume maps for the shallow, intermediate, and deep zones (Figures 6-5, 6-6, and 6-7, respectively). The TCE plume (defined as concentrations above the SL) in the shallow zone is estimated to extend from the source area to just beyond off-site well RMW-10-15, located on UPRR property about 200 feet south of the former AMCO facility property boundary (see Figure 6-5). In the intermediate zone, there are two TCE plumes: 1) a plume that extends from the southern limits of the source area to beyond downgradient well RMW-10-35; and 2) a plume with an apparent source in the vicinity of well series RMW-08 and RMW-15 (located in the northwestern portion of the AMCO Property) and extending southwesterly to well RMW-14-35, located in the eastern portion of South Prescott Park (see Figure 6-6). Two wells in the deep zone have TCE concentrations above the SL: well RMW-12-51, located on just south of the source area on the northern edge of 3rd Street, and well RMW-14-50, located on UPRR property just south of South Prescott Park (see Figure 6-7).

The former AMCO facility is the source of TCE in groundwater from well RMW-12-51. The source of the TCE in groundwater from RMW-14-50 is not likely attributable to chemical distribution operations at the former AMCO facility. The basis for not attributing TCE-impacted groundwater from RMW-14-50 to former AMCO activities is discussed in Section 7.3.1.4.

6.4.1.3 cis-1,2-Dichloroethene (cDCE)

Of the COCs in groundwater, cDCE has the highest reported concentration. In addition, the cDCE plume has the largest lateral extent (as established by concentrations exceeding its SL of 6 ug/L). For the August 2012 monitoring event, cDCE was detected in 20 out of 50 groundwater samples, with detected concentrations ranging from 0.11 (J-flagged as estimated) to 66,000 ug/L. Thirteen groundwater samples had cDCE concentrations above the SL. All three zones of the Upper Aquifer had cDCE concentrations above the SL, with the more elevated concentrations present in groundwater from shallow zone wells. Figures 6-8 through 6-10 show the lateral extent of cDCE-impacted groundwater in the shallow, intermediate, and deep zones, respectively.

Shallow groundwater from wells RMW-02-13 and MW-12, located within and on the downgradient edge of the source area, respectively, had the highest cDCE concentrations. In the shallow zone, the cDCE plume extends from the source area at the former AMCO facility to the south past well RMW-10-15, which is located on UPRR property.

The cDCE plume in the intermediate zone has lower concentrations than those in the shallow zone groundwater at the source area by two orders of magnitude (see Figure 6-9). Similar to the TCE plume in the intermediate zone, cDCE-impacted groundwater originates from two different areas of the former AMCO facility: 1) the source area and 2) the northwestern portion of the former AMCO facility. The resulting intermediate zone cDCE plumes appear to comingle at the former AMCO facility and extend to the south, to the eastern portion of South Prescott Park and beyond monitoring well RMW-10-35, located on UPRR property, as shown on Figure 6-9. The highest cDCE concentrations in the intermediate zone were detected in groundwater from well RMW-01-35, located in the southwestern portion of the former AMCO facility.

For the deep zone, cDCE at concentrations above the SL are similar to the presence and source of TCE in the deep zone. While the former AMCO facility is the source of cDCE in groundwater from RMW-12-51, the source of the cDCE in groundwater from RMW-14-50 is not likely attributable to chemical distribution operations at the former AMCO facility. This is because, like TCE, cDCE was not detected in groundwater from deep zone wells RMW-09-70 and RMW-16-60, located between RMW-14-50 and the former AMCO facility.

6.4.1.4 trans-1,2-Dichloroethene (tDCE)

For the August 2012 monitoring event, tDCE, was detected in 13 of the 50 groundwater samples, with concentrations ranging from 0.23 (J-flagged as estimated) to 730 ug/L. This maximum concentration was in shallow groundwater from well MW-12, located on the downgradient edge of the source area. Five groundwater samples had tDCE concentrations that exceeded the screening level of 10 ug/L. Two samples were from shallow zone wells (RMW-02-13 and MW-12) and three were from intermediate zone wells (RMW-01-35, RMW-07-35, and RMW-10-35). The tDCE plume had lower concentrations than those of cDCE, and also had a smaller lateral footprint.

6.4.1.5 1,1-Dichloroethene (11-DCE)

11-DCE was detected in 4 of the 50 groundwater samples, with detected concentrations ranging from 0.33 (J-flagged as estimated) to 380 ug/L. This maximum concentration of 380 ug/L, in groundwater from MW-12, was the only exceedance of the SL of 6 ug/L for the August 2012 monitoring event.

6.4.1.6 Vinyl Chloride (VC)

VC was detected in 7 of the 50 groundwater samples, with all 7 detections exceeding the SL of 0.5 ug/L. Detected VC concentrations ranged from 4.9 to 7,300 ug/L. Groundwater from well MW-12, located immediately adjacent to the southern edge of the source area, had the maximum VC concentration of 7,300 ug/L. VC concentrations above the SL were detected in groundwater from the shallow and intermediate zones, as shown in the plume maps on Figures 6-11 and 6-12, respectively. The VC concentrations in the shallow zone groundwater are attributable to contaminant releases to the environment at the source area. The VC plume in the shallow zone extends from the source area at the former AMCO facility southward, ending before monitoring well RMW-10-15, located on UPRR property.

The highest VC concentration in groundwater from the intermediate zone was more than an order of magnitude lower than the maximum concentration in the shallow zone. While the

primary VC plume is attributable to CVOC contamination in the source area, groundwater from monitoring well RMW-07-35 also had VC concentrations above the SL. The presence of VC and cDCE in groundwater from RMW-07-35 indicates that some transformations attributable to reductive dechlorination (see Figure 1-4) are occurring in the CVOC plume that originated in the northwestern portion of the former AMCO facility. As will be discussed further in Section 7, the fate and transport of the CVOCs in groundwater varies at the Site, with much greater reductive dechlorination associated with CVOC plumes originating from the source area. VC was not detected above its SL in groundwater from the deep zone.

6.4.1.7 1,1,1-Trichloroethane (111-TCA)

111-TCA was detected in two groundwater samples, RMW-12-51 and MW-12, at 0.58 ug/L and 850 ug/L, respectively. Only 111-TCA in groundwater from MW-12 exceeded the SL of 200 ug/L. The extent of 111-TCA above the SL is limited to shallow groundwater in the vicinity of MW-12, as shown on Figure 6-13.

6.4.1.8 1,1-Dichloroethane (11-DCA)

1,1-DCA was detected in 17 of the 50 groundwater samples, with detected concentrations ranging from 0.10 (J-flagged as estimated) to 2,300 ug/L. The maximum 11-DCA concentration was detected in groundwater from well MW-12, located immediately adjacent to the southern edge of the source area. Groundwater from three shallow zone wells and four intermediate zone wells contained 1,1-DCA concentrations above the SL of 5 ug/L. 11-DCA was not detected above the SL in groundwater samples from the deep zone. The 1,1-DCA plumes in the shallow zone (Figure 6-14) and intermediate zone (Figure 6-15) have a shape and spatial distribution similar to those of the VC plumes originating from the source area at the former AMCO facility.

6.4.1.9 Benzene (BEN)

BEN was detected in 3 of the 50 groundwater samples, with all detected concentrations exceeding the SL of 1 ug/L. BEN was detected in groundwater at 17, 86, and 300 ug/L from RMW-12-32, RMW-02-32, and RMW-02-13, respectively. These wells are located within the source area (RMW-02-13 and RMW-02-32) or immediately adjacent to the southern edge of the source area (RMW-12-32). RMW-02-13 is a shallow zone well, with RMW-02-32 and RMW-12-32 screened in the intermediate zone.

6.4.1.10 Toluene (TOL)

TOL was detected in 5 out of 50 groundwater samples, with detected concentrations ranging from 2 to 24,000 ug/L. The SL for TOL (150 ug/L) was exceeded in three of these samples: 12,000 ug/L and 24,000 ug/L in shallow zone wells RMW-02-13 and MW-12, respectively; and 180 ug/L in intermediate zone well RMW-02-32. The TOL plume maps for the shallow zone and intermediate zone are shown on Figures 6-16 and 6-17, respectively. Toluene contamination in groundwater is primarily in the shallow zone, and is limited to the source area and a short distance downgradient. TOL was not detected in groundwater from the deep zone.

6.4.1.11 Ethylbenzene (EBZ)

EBZ was detected in 6 groundwater samples, at concentrations ranging from 0.59 to 470 ug/L. Groundwater from monitoring well RMW-02-13 had the maximum concentration, and was the only sample with an EBZ concentration exceeding the SL of 300 ug/L.

6.4.1.12 Methylated Benzenes

Groundwater impacted with methylated benzenes was observed in the source area and just downgradient. Groundwater from both the shallow and intermediate zones had methylated benzene concentrations that exceeded SLs. No exceedances were found in the deep zone.

1,3,5-Trimethylbenzene (135-TMB)

135-TMB was detected in four groundwater samples, at concentrations ranging from 1.4 to 800 ug/L. Groundwater samples having 135-TMB at concentrations exceeding the SL of 87 ug/L were from shallow zone wells RMW-02-13 and MW-12, at 380 and 530 ug/L, respectively, and intermediate source area well RMW-02-32, at 800 ug/L. The 135-TMB plumes in shallow and intermediate zone groundwater are shown on Figures 6-18 and 6-19, respectively.

1,2,4-Trimethylbenzene (124-TMB)

124-TMB was detected in four groundwater samples, at concentrations ranging from 0.43 ug/L (J-flagged as estimated) to 360 ug/L. Groundwater samples with concentrations that exceeded the SL of 15 ug/L were from shallow zone wells RMW-02-13 and MW-12, at 110 ug/L and 190 ug/L (J-flagged as estimated), respectively, and intermediate zone well RMW-02-32 at 360 ug/L. The extent of the 124-TMB plumes in shallow and intermediate zone groundwater are similar to those shown for 135-TMB on Figures 6-18 and 6-19.

6.4.1.13 Chlorinated Benzenes

Chlorinated benzene-impacted groundwater occurs primarily within the boundaries of the former AMCO facility. Chlorinated benzenes detected in groundwater at concentrations exceeding SLs consisted of 1,2,4-trichlorobenzene (124-TCB), 1,4-dichlorobenzene (14-DCB), and chlorobenzene (CBen). The SL exceedances for these chlorinated benzenes occurred in groundwater from the shallow and intermediate zones. Chlorinated benzene concentrations did not exceed SLs in groundwater from the deep zone. The extent of individual chlorinated benzene concentrations in groundwater at the Site is discussed below.

1,2,4-Trichlorobenzene (124-TCB)

124-TCB was detected in 2 of the 50 groundwater samples collected from Upper Aquifer wells in August 2012. Detected concentrations of 124-TCB were 0.25 ug/L and 26 ug/L (both J-flagged as estimated) in groundwater from RMW-05-15 and RMW-02-13, respectively. Only the 124-TCB concentration in groundwater from RMW-02-13 exceeded the SL of 5 ug/L.

1,2-Dichlorobenzene (12-DCB)

12-DCB was detected in six groundwater samples, with concentrations ranging from 5.6 to 200 ug/L. 12-DCB concentrations did not exceed its SL of 600 ug/L. The maximum 12-DCB concentration was in groundwater from intermediate-zone well RMW-01-35, located in the southwestern corner of the former AMCO facility. The extent of 12-DCB concentrations in groundwater is similar to that of chlorobenzene in both the shallow and intermediate zones. [Note: The extent of chlorobenzene in Upper Aquifer groundwater is discussed below.]

1,3-Dichlorobenzene (13-DCB)

13-DCB was detected in groundwater samples from three wells, RMW-16-35, RMW-02-13, and RMW-01-35, at concentrations of 0.37 ug/L (J-flagged as estimated), 5.8 ug/L (J-flagged as estimated), and 11 ug/L, respectively. Groundwater concentrations of 13-DCB did not exceed the SL of 65 ug/L.

1,4-Dichlorobenzene (14-DCB)

14-DCB was detected in five groundwater samples, with concentrations ranging from 2.5 ug/L (J-flagged as estimated) to 280 ug/L. In the shallow zone, 14-DCB was detected in groundwater samples from wells RMW-01-17 and RMW-08-15, at 5.4 ug/L and 3.9 ug/L (J-flagged as estimated), respectively. Detected concentrations of 14-DCB in intermediate-zone groundwater were 2.5 ug L (J-flagged as estimated), 240 ug/L, and 280 ug/L, in wells RMW-16-35, RMW-01-35, and RMW-02-32, respectively. Groundwater from RMW-01-17, RMW-01-35, and RMW-02-32 had 14-DCB concentrations above the SL of 5 ug/L.

Chlorobenzene (CBen)

CBen was detected in 9 out of 50 groundwater samples, at concentrations ranging from 1 to 1,400 ug/L. Groundwater from four wells had CBen concentrations above the SL of 70 ug/L: shallow zone wells RMW-01-17 at 470 ug/L and RMW-08-15 at 650 ug/L (J-flagged as estimated) and intermediate zone wells RMW-01-35 at 750 ug/L and RMW-02-32 at 1,400 ug/L. The extent of chlorobenzene in groundwater from the shallow and intermediate zones is limited to the former AMCO facility or slightly downgradient, as shown on Figures 6-20 and 6-21, respectively.

6.4.2 Semi-volatile Organic Compounds (SVOCs)

SVOCs present in groundwater at concentrations that exceeded their SLs in August 2012 are identified in Table 6-3. A discussion of the SVOCs at concentrations exceeding their SLs is presented below.

6.4.2.1 1,4-Dioxane (14-Dxn)

14-Dxn was detected in 18 of the 50 groundwater samples, with all detections exceeding the SL of 0.67 ug/L. Detected concentrations of 14-Dxn ranged from 3.6 to 490 ug/L. Groundwater from well RMW-02-32, located in the source area and screened in the intermediate zone, had the maximum 14-Dxn concentration of 490 ug/L. 14-Dxn concentrations above its SL were detected in groundwater from 11 shallow zone wells, 6 intermediate zone wells, and 1 deep zone well. The 14-Dxn plume maps for the shallow and intermediate zones are shown on Figures 6-22 and 6-23, respectively.

Similar to the CVOCs, the 14-Dxn concentrations in groundwater from the shallow and intermediate zones are attributable to contaminant releases to the environment at the former AMCO facility. The 14-Dxn concentration in groundwater from RMW-14-50, a deep zone well, was 8.2 ug/L (J-flagged as estimated). Similar to TCE and cDCE, the presence of 14-Dxn in groundwater from RMW-14-50 is not likely attributable to chemical distribution operations at the former AMCO facility. This is because, like TCE and cDCE, 14-Dxn was not detected in groundwater from deep zone wells RMW-09-70 and RMW-16-60 located between

RMW-14-50 and the former AMCO facility. In addition, 14-Dxn has not been detected in groundwater from RMW-02-50 and RMW-12-51, wells located in or immediately adjacent to the source area, since 2008.

6.4.2.2 Naphthalene (NAPH)

NAPH was detected in three groundwater samples, with concentrations varying from 73 to 120 ug/L. All detected concentrations exceeded the SL of 0.14 ug/L. The lateral extent of NAPH is limited, with NAPH present in groundwater from two shallow wells (RMW-02-13 at 74 ug/L and MW-12 at 74 ug/L) and one intermediate zone well (RMW-02-32 at 120 ug/L). The NAPH-impacted groundwater is attributable to chemical releases at the source area.

6.4.2.3 2-Methylnaphthalene (2-MNAPH)

Similar to NAPH, 2-MNAPH was detected only in groundwater from wells RMW-02-13 (at 230 ug/L), MW-12 (at 100 ug/L), and RMW-02-32 (at 500 ug/L). All detected 2-MNAPH concentrations exceeded the SL of 27 ug/L. The lateral extent and source of 2-MNAPH in groundwater are similar to those for NAPH.

Other SVOCs detected in groundwater included bis(2-ethylhexyl) phthalate, 2,4-dimethylphenol, and biphenyl. Concentrations of bis(2-ethylhexyl) phthalate ranged from 4.5 to 30 ug/L, above the SL of 4 ug/L. In consideration of the detected concentrations of bis(2-ethylhexyl) phthalate and associated well locations, the presence of this COC in groundwater likely is attributable to sources other than the former AMCO facility. 2,4-Dimethylphenol was detected at the same three wells as NAPH and 2-MNAPH (RMW-02-13, MW-12, and RMW-02-32), but only exceeded the SL of 270 ug/L in groundwater from RMW-02-32, with a concentration of 330 ug/L. Biphenyl concentrations in groundwater from MW-12 and RMW-02-13 were 2.3 ug/L and 2.6 ug/L (both J-flagged as estimated), respectively, exceeding the SL of 0.83 ug/L. Except for 1,4-dioxane, SVOCs impacting groundwater and attributable to the former AMCO facility have not migrated downgradient south of 3rd Street.

6.4.3 Metals

Metal concentrations that exceeded SLs in groundwater from the August 2012 sampling event are identified in Table 6-4. High concentrations of metals such as arsenic, iron, and manganese are associated with groundwater from wells within the CVOC plumes where reducing conditions exist, thereby resulting in the formation of the more soluble reduced ionic forms of arsenic, iron, and manganese. Cobalt, nickel, and selenium concentrations also exceeded their SLs in groundwater from a few wells.

6.4.3.1 Iron and Manganese

Iron concentrations greater than the SL of 11,000 ug/L were present in 5 of the 50 groundwater samples. High iron concentrations in groundwater are present in groundwater from shallow zone wells at and near the source area and downgradient to well BMW-08. Manganese exceeded the SL of 320 ug/L in groundwater from 22 wells located throughout the Site. The extent of manganese in groundwater includes wells that are cross-gradient and upgradient of the former AMCO facility, and screened in all zones of the Upper Aquifer. The highest manganese concentrations were in groundwater from wells located south of 3rd Street and screened primarily in the intermediate and deep zones. Soluble forms of iron and manganese are known

byproducts of the biodegradation of organic compounds, with iron and manganese oxides in soil being the electron acceptors. The natural biodegradation using iron or manganese as the electron acceptor results in iron or manganese being reduced. The reduced forms of iron and manganese are soluble. In addition, both iron and manganese were found at quite high concentrations in background well RMW-11-35 and other wells without COC-impacted groundwater attributable to chemical releases at the former AMCO facility. Therefore, some portion of the presence of iron and manganese in groundwater at the Site is not attributable to the former AMCO facility.

6.4.3.2 Arsenic

Arsenic exceeded its screening level of 10 ug/L in groundwater from 13 of the 50 wells, with the maximum concentration of 965 ug/L (J-flagged as estimated) in groundwater from downgradient well RMW-09-15. The higher arsenic concentrations were present in shallow groundwater from a well at the former AMCO facility (RMW-08-15) and in shallow groundwater from wells located south of 3rd Street (BMW-03, RMW-09-15, and RMW-10-15). Arsenic concentrations exceeding the SL also were present in groundwater from some of the intermediate wells located south of 3rd Street. Based on the background level of arsenic in soil, especially fill soil present at shallow depths, as discussed in Section 5, the presence of arsenic in groundwater may be enhanced as a result of reducing conditions that mobilize the arsenic naturally occurring in the soil.

6.4.3.3 Cobalt

Cobalt concentrations exceeded the SL of 4.7 ug/L in groundwater from 4 of the 50 wells. The maximum concentration of 150 ug/L was reported in groundwater from downgradient well RMW-10-35. SL exceedances for cobalt occurred in groundwater from shallow, intermediate, and deep zones, and from wells located both at the former AMCO facility and south of 3rd Street. Because the cobalt exceedances varied both laterally and vertically relative to the organic COCs, the source of the cobalt concentrations in groundwater is uncertain. This source uncertainty includes the aqueous chemistry of cobalt, and the possibility that cobalt may be naturally occurring in the Upper Aquifer.

6.4.3.4 Nickel

Nickel concentrations exceeded the SL of 100 ug/L in groundwater samples from 6 of the 50 wells. Similar to cobalt, nickel concentrations exceeding the SL were present in groundwater from shallow, intermediate, and deep zones, and from wells located at the former AMCO facility and south of 3rd Street. The source of nickel in groundwater at the Site is uncertain, and considering the complex aquatic chemistry of nickel, its presence may be naturally occurring and not attributable to the former AMCO facility.

6.4.3.5 Selenium

Groundwater from 8 out of 50 wells had selenium concentrations greater than the SL of 50 ug/L. The maximum concentration of selenium was 269 ug/L (J-flagged as estimated) in groundwater from well RMW-19-80, which is the farthest-downgradient well at the Site. As selenium concentrations above the SL were associated with groundwater from wells located south of 3rd Street and screened in all zones of the Upper Aquifer, the source of selenium in groundwater is not likely attributable to the former AMCO facility.

6.4.4 Polychlorinated Biphenyls (PCBs)

PCB-1260 was detected at 6.1 ug/L, above the SL of 0.034 ug/L, in groundwater from well RMW-02-13, a shallow-zone well located in the source area. This was the only groundwater sample with a PCB concentration exceeding the SL (see Table 6-5). In consideration of PCB concentrations in soil and the occasional presence of free product in RMW-02-13, the source of PCB-1260 is the chemical handling practices associated with the former AMCO facility. Consistent with the low solubility of PCBs, the extent of PCB-impacted groundwater is localized and migration is not occurring.

6.4.5 Organochlorine Pesticides

Pesticide concentrations that exceeded SLs for the August 2012 monitoring event are identified in Table 6-5. Organochlorine pesticides detected in groundwater at concentrations exceeding SLs consisted of aldrin, alpha-BHC, alpha-chlordane, dieldrin, heptachlor, heptachlor epoxide, DDT, DDE, and DDE. The lateral extent of groundwater with pesticide concentrations exceeding SLs indicates two sources: 1) the former AMCO facility and 2) an off-site release on UPRR property in the vicinity of wells RMW-09-15 and RMW-10-35. At the former AMCO facility, the extent of pesticides in groundwater is consistent with concentrations in soil, with numerous pesticides and the highest concentrations associated with groundwater from well RMW-02-13, located in the source area. The groundwater concentrations do not indicate lateral migration of the pesticides with groundwater flow, consistent with the very low solubility of organochlorine pesticides in water. The vertical extent of pesticides at the former AMCO facility includes groundwater from wells screened in the shallow and intermediate zones. The vertical extent of pesticides probably is due to co-solvent transport associated with other liquid organic compounds being released to the environment at locations with pesticide contamination. Co-solvent transport and the effect on the distribution of low-solubility organics in the source area is discussed further in Section 7.2.

6.4.6 Dioxins and Furans

As described in Section 6.3.1.5, only groundwater from RMW-02-32 had an equivalent TCDD concentration above the SL of 0.03 ng/L. In August 2011, the only equivalent TCDD concentration above the SL was 0.046 mg/L for groundwater from well BPZ-01 (ITSI, 2012b). While RMW-02-32 is located in the source area, well BPZ-01 is located at the downgradient edge of the Site, on UPRR property. As the dioxin/furan concentrations in groundwater do not indicate any lateral migration, consistent with the very low solubility properties of the dioxins/furans, only the dioxin/furan concentrations in groundwater from well RMW-02-32 are attributable to chemical releases at the former AMCO facility.

6.5 MICROBIAL PARAMETER CONCENTRATIONS IN UPPER AQUIFER GROUNDWATER

The groundwater monitoring conducted for the supplemental investigations included microbial parameters to evaluate the extent that biotic processes, notably biodegradation and reductive dechlorination, were occurring as a natural attenuation process at the Site. The microbial parameters quantified in Upper Aquifer groundwater consisted of dissolved gases (methane, ethane, and ethene), DOC, VFAs, the microorganisms capable of complete reductive dechlorination of chlorinated ethenes (Dehalococcoides [DHC] bacteria), and the functional bacterial genes of DHC (tceA, bvcA, and vcrA) that encode the reductive dehalogenase enzymes

(RDases) for TCE, DCE, and VC reduction. Analyses for VFAs, DHC, and DHC functional genes were added to the groundwater monitoring program for select wells during the 2010 through 2012 sampling events.

The purpose of analyzing for the microbial parameters was to characterize the microbial and chemical constituents in the groundwater and further evaluate the extent to which conditions in groundwater were conducive to reductive dechlorination of the CVOCs. Microbial parameter concentrations are presented on Figure 6-24, and tabulated data from the 2010 through 2012 groundwater monitoring events are included in Appendix H. The following discussion of the microbial parameters is based on results obtained from the August 2012 monitoring event, the monitoring event having the greatest extent of microbial parameter analyses for groundwater at the Site. DOC concentrations are listed in Table 6-8, with the other microbial parameter data presented in Table 6-9.

Methane, ethene, and ethane were analyzed because these gases are the final byproducts of microbial degradation of CVOC and non-chlorinated VOCs under highly reducing conditions. Thus, high concentrations of these gases compared to background concentrations provide evidence of microbial degradation attributable to reductive dechlorination and methane fermentation. Methane, ethane, and ethene concentrations during the August 2012 monitoring event were greatest in groundwater from wells located in the source area and downgradient of the source area within the extent of the previously discussed TCE, cDCE, and VC plumes.

DOC provides a measure of the total organic content in groundwater. While not a measure of COCs, DOC concentrations provide a basis for evaluating the amount of organic compounds potentially available for biodegradation. Sufficient DOC to enable active microbial activity can result in the depletion of available electron acceptors such as oxygen, nitrate, and sulfate, leading to reducing conditions associated with methane fermentation reactions and reductive dechlorination. The fermentation of dissolved organics is desirable for reductive dechlorination because DHC rely on acetic acid (in the ionic form or acetate), an intermediate product in methane fermentation, as their carbon source for growth (Löffler et al., 2013). In addition, groundwater south of 3rd Street has higher sulfate concentrations (see Table 6-8), and sulfate reduction will complete with methane fermentation for the biodegradation of DOC.

Volatile fatty acids (VFAs) are produced by the microbial degradation of organic compounds under reducing conditions associated with methane fermentation. Thus, the presence of VFAs provides evidence of microbial degradation activity, depletion of electron acceptors, and suitable conditions for reductive dechlorination. Not all groundwater samples were analyzed for VFAs, only groundwater from wells located within or adjacent to the CVOC plumes. The highest VFA concentrations were present in groundwater with the highest VOC concentrations, which includes the wells in the shallow and intermediate zones in the source area and immediately downgradient (RMW-02-13, RMW-02-32, MW-12, and RMW-12-32). Two VFAs – 2 hydroxypropanoic acid (lactic acid) and 2-ketopropionic acid (pyruvic acid) – also were detected in deep zone groundwater from wells RMW-02-50 and RMW-12-51. The lateral variability of VFA concentrations in groundwater south of the former AMCO facility indicates a possible local organic source not attributable to the former AMCO facility that is undergoing biodegradation. For the five VFA concentrations quantified in groundwater, 2-ketopropionic acid (pyruvic acid) had the highest concentrations.

DHC are the only known bacteria capable of the complete reductive dechlorination of PCE, TCE, cDCE, tDCE, and VC to ethene. In addition to their biotic transformation of the chlorinated ethenes, species of DHC have been identified with reductive dechlorination capability for PCBs, dioxins/furans, and chlorinated benzenes (Bedard et al., 2007). Therefore, active DHC species play the key role in the biodegradation of the chlorinated COCs at the Site, which is the major mechanism for natural attenuation of these COCs. Very high DHC concentrations were found in groundwater from the shallow and intermediate zones of the source area wells (RMW-02-13, RMW-02-32, and MW-12) and downgradient intermediate zone well RMW-10-35. The DHC concentrations in groundwater from these wells are indicative of highly active reductive dechlorination (Lu et al., 2006). DHC has the RDase enzymes that transform PCE, TCE, DCE, and VC to ethene by the biotic transformation pathway shown on Figure 6-25. The DHC functional genes tceA, bvcA, and vcrA are responsible for encoding the RDase enzymes TceA, BvcA, and VcrA, respectively; and these genes are an effective predictor of overall reductive dechlorination capacity (van der Zaan et al., 2010). In the groundwater from source area wells RMW-02-13 and RMW-02-32, tceA that codes for TCE RDase formation was the predominant DHC gene (see Figure 6-24 for gene concentrations). Downgradient of the source area, in the vicinity of the RMW-12 wells and RMW-10 wells where cDCE and VC are the predominant chlorinated ethenes–vcrA was the predominant DHC gene. This is consistent with the biomarker for the encoding of the RDase enzymes for DCE and VC reductive dechlorination.

Additional discussion of these microbial parameters relating to reductive dechlorination of the CVOCs is presented in Section 7.3.1.3.

6.6 WATER QUALITY OF LOWER AQUIFER GROUNDWATER

6.6.1 Volatile Organic Chemical Concentrations in Lower Aquifer Groundwater

Because chlorinated VOCs, such as PCE and TCE, are more dense than water, there has been a concern regarding the potential for downward migration of these chlorinated VOCs through the Older Bay Mud aquitard and impacts to the water quality of the Lower Aquifer. To address this concern, a groundwater monitoring well (RMW-02-131) was installed with a screen interval at the estimated upper extent of the Alameda Formation. Other than chloroform, VOCs were not detected in the primary groundwater sample from Lower Aquifer well RMW-02-131, while low VOC detections were reported in the duplicate groundwater sample (see Table 6-10). The detected VOCs were at concentrations below the groundwater screening levels. VOC concentrations detected in the groundwater samples from the Lower Aquifer well RMW-02-131 are shown on Figure 6-26, along with the concentrations for the same VOCs in groundwater samples collected from nearby deep-zone Upper Aquifer well RMW-02-50 during the most recent groundwater monitoring event (May 2013).

Based on the VOC results presented on Figure 6-26, the VOC constituent and concentration results for groundwater from RMW-02-50 (a deep-zone Upper Aquifer well in the source area) are not consistent with the non-detect or low VOC detections in the groundwater samples from Lower Aquifer well RMW-02-131. Leakage from the Upper Aquifer is not the source of the low-level VOC detections in the groundwater from the Lower Aquifer well for the following reasons:

- VOCs were not detected in soil samples collected during the installation of RMW-02-131 (see Section 5.3.6).
- VOCs detected and associated concentrations in groundwater from the deep-zone Upper Aquifer well RMW-02-50 are not similar to the VOCs detected in the Lower Aquifer groundwater.

The VOCs detected in the Lower Aquifer groundwater, and their concentrations, suggest that their source is not the former AMCO facility. In summary, chemical releases at the former AMCO facility have not impacted the water quality of the Lower Aquifer groundwater.

6.6.2 Inorganic Constituent Concentrations in Lower Aquifer Groundwater

The Lower Aquifer groundwater from well RMW-02-131 had a TDS concentration of 1,120 mg/L (see Table 1-1), above the California Secondary MCL recommended concentration of 500 mg/L. This TDS concentration also exceeds the California upper Secondary MCL for TDS of 1,000 mg/L, but is less than the short-term TDS Secondary MCL of 1,500 mg/L. The primary inorganic constituents in the groundwater from well RMW-02-131 were sodium and chloride, with other inorganic constituents (i.e., calcium, magnesium, potassium, and sulfate) being present at lower concentrations.

6.7 SUMMARY OF THE NATURE AND EXTENT OF GROUNDWATER CONTAMINATION

A summary of findings from the evaluation of the groundwater monitoring data obtained from the fourth quarter of 2006 through 2012 is presented below.

Upper Aquifer

- Key COCs present in upper aquifer groundwater consist of a wide range of contaminant classes including VOCs, SVOCs, metals, one PCB, pesticides, and dioxins/furans. VOCs, particularly chlorinated VOCs, were the primary contaminant class in groundwater based on COC concentrations relative to SLs.
- VOCs at concentrations in groundwater exceeding SLs include CVOCs, petroleum hydrocarbons, methylated benzenes, and chlorinated benzenes.
- The highest VOC concentrations were associated with groundwater from wells in or immediately adjacent to the source area at the former AMCO facility. Elevated VOC concentrations were present in groundwater from the shallow zone (wells RWM-02-13 and MW-12) and the intermediate zone (well RMW-02-32).
- TCE and cDCE were the only COCs with concentrations exceeding SLs in groundwater from the deep zone (wells RMW-12-51 and RMW-14-50). For groundwater from well RMW-12-51, the source of the CVOCs was the former AMCO facility. However, the concentrations of TCE and cDCE in groundwater from well RMW-14-50 are not considered attributable to the former AMCO facility. Well RMW-14-50 is located southwest of the former AMCO facility, and TCE and cDCE were not detected in groundwater from upgradient wells screened in the deep zone.
- Free product (LNAPL) and contaminated soil at the former AMCO facility continue to be sources of COCs impacting groundwater.

- Free product continues to be present in wells MW-13 and MW-14, and in recent years has sometimes been present in well RMW-02-13. The thickness of the free product in these source area wells has been greater in recent years than during the time frame reported in the RI (CH2M Hill, 2011).
- SVOCs attributable to the former AMCO facility also are impacting groundwater quality at the Site. In the shallow zone, 14-Dxn has a large plume extending to the extent of the downgradient monitoring wells. While 14-Dxn concentrations are greater in the intermediate zone, the lateral extent of the plume is smaller than the shallow zone. The extent of other SVOCs, such as NAPH and 2-MNAPH, is limited to groundwater within or immediately downgradient of the source area.
- Reducing conditions existing in groundwater within the lateral extent of the CVOC plume has contributed to the dissolved concentrations of arsenic, iron, and manganese. The formation of more soluble ionic forms of arsenic, iron, and manganese occurs under reducing conditions.
- Consistent with their low solubility, the extent of organochlorine pesticides, PCBs, and dioxins/furans in groundwater is limited to the vicinity of releases to the environment. One area of release for these COCs is the source area at the former AMCO facility. In addition, an off-site release not attributable to AMCO appears to be the source of pesticides in groundwater south of 3rd Street.
- With the addition of wells installed in early 2012, monitoring of the groundwater monitoring well network has delineated the lateral and vertical extent of VOC-impacted groundwater in the Upper Aquifer. The VOC-impacted groundwater plume extends 200 feet downgradient from the southern boundary of the former AMCO facility.
- The concentrations of the microbial parameters substantiate that active reductive dechlorination is occurring in groundwater. This naturally occurring biodegradation activity is the primary reason for the limited downgradient extent of the CVOC plumes relative to the source of the COC release to the environment, chemical handling operations at the former AMCO facility.

Lower Aquifer

- Chemical releases at the former AMCO facility have not impacted the water quality of the Lower Aquifer groundwater, based on VOC concentrations in groundwater from well RMW-02-131 and non-detect VOC concentrations in soil samples from the boring for this well.
- Groundwater in the upper portion of the Lower Aquifer had TDS concentrations above the California Secondary MCL recommended concentration of 500 mg/L.

7.0 CONTAMINANT FATE AND TRANSPORT

The findings from the soil characterization (Section 5) and expanded groundwater monitoring program (Section 6) established the nature and extent of contamination at the former AMCO facility, as well as the extent of the downgradient migration of contaminated groundwater. This section presents an updated description of the fate and transport of COCs based on the nature and extent of contamination in the gas phase, soil, and groundwater at the Site.

7.1 CHEMICAL RELEASES TO THE ENVIRONMENT AT THE SITE

The Conceptual Site (Exposure) Model (CSM) diagram presented in the RI Report (CH2M Hill, 2011) was updated as shown on Figure 7-1 to include results from the supplemental investigations. The CSM for the AMCO Chemical Superfund site identifies the potential exposure scenarios for human receptors in consideration of the sources and migration pathways for the COCs. EPA previously determined that contamination associated with the Site did not pose an ecological risk (US EPA, 2004). The primary contaminant sources are industrial operations conducted both at the former AMCO facility and at nearby properties. Section 6.1 of the RI Report (CH2M Hill, 2011) presents a description of the primary sources of and associated release mechanisms for contamination at the Site. While available information indicates that the former AMCO operations were a primary source of contaminant release to the environment, the data also indicate that off-facility releases of contaminants to the environment occurred that are not attributable to AMCO. As previously discussed in this RI Addendum, some of the soil and groundwater contamination detected in areas south of 3rd Street likely is attributable to sources other than the chemical handling operations at the former AMCO facility.

Groundwater plumes emanating from the former AMCO facility apparently resulted from releases in two separate areas. The source area (located in the central and south central portions of the former AMCO facility, just west of the warehouse), had the most significant releases. In the source area, bulk chemical were delivered by rail car and the chemicals were transferred to ASTs, USTs, and drums located to the north and west of the rail line (see Figure 1-2). Contamination in the source area is present as:

- LNAPL in wells RMW-02-13, MW-13, and MW-14;
- Soil contamination extending to depths of 20 to 30 feet; and
- High concentrations of COCs in groundwater.

The extent of impacted groundwater at the Site is shown on Figures 6-4 through 6-23, with the extent of soil contamination described in Section 5.

CVOC concentrations in groundwater indicate that chemical releases also occurred at a second area around the northwestern corner of the former AMCO facility, where an AST was located, as shown on Figure 1-2 (i.e., in the vicinity of the RMW-08 and RMW-15 well clusters). The presence of the second chemical release area is evident in groundwater plume maps (Figures 6-4, 6-6, 6-9, and 6-20). Besides these two areas, pesticides and PAH contamination have impacted shallow soil in other parts of the former AMCO facility and the neighboring properties (Figures 5-10, 5-11, 5-13, 5-14, 5-16, 5-18, and 5-19).

In addition to releases at the AMCO facility, other chemical releases occurred as a result of former land uses and associated activities at South Prescott Park and at the rail yard and UPRR property south of the former AMCO facility. Specific chemical handling activities and resulting releases on the properties south of 3rd Street are largely unknown, but are the likely sources of the groundwater contamination that did not originate from the former AMCO facility.

7.2 PROCESESS AFFECTING CONTAMINAT FATE AND TRANSPORT

This section discusses fate and transport processes for contaminants at the Site. Section 7.2.1 covers fate and transport processes under existing conditions, while Section 7.2.2 covers facilitated transport considerations when chemical handling operations, which resulted in chemical releases to the environment, were active at the former AMCO facility. The potential for the bedding of the large sewer interceptor piping under 3rd Street to act as a preferential migration pathway for contaminated groundwater is discussed in Section 7.4.

7.2.1 Contaminant Fate and Transport Processes Under Current Conditions

The following processes can affect the fate and transport of contaminants that have been released to the environment:

- Bulk product flow – Movement of NAPL in the environment, with this movement varying depending on whether the complex organic mixture comprising the non-aqueous phase liquids behaves as a LNAPL or DNAPL.
- Dissolution – Transfer of an organic chemical from soil or an organic chemical from, NAPL, to groundwater as a dissolved phase.
- Advection, Dispersion, and Diffusion – Processes that describe the movement of groundwater as follows:
    - Advection – Bulk movement of contaminants with groundwater.
    - Dispersion – Fluid mixing of contaminated groundwater due to groundwater movement and aquifer heterogeneities.
    - Diffusion – The movement of dissolved chemicals resulting from a concentration gradient with chemical migration from zones of higher concentrations to zones of lower concentrations. Chemical movement by diffusion typically is minor compared to dispersion.
- Sorption – Process by which chemicals partition between water (or air) and the surfaces of solid (soil) particles.
- Volatilization – Process by which a dissolved chemical vaporizes (transfers from groundwater to soil gas phase).
- Abiotic degradation – Process by which a chemical compound is converted to simpler chemical products by physical or chemical mechanisms.
- Biodegradation - Process by which a chemical compound is converted to simpler chemical products by biochemical reactions carried out by microorganisms.

These processes are described in detail in Section 6.3 of the RI Report (CH2M Hill, 2011). While available data indicate that all of these contaminant fate and transport processes are

occurring at the Site, insufficient data are available to quantify the contribution from each individual process.

7.2.2 Contaminant Transport at the Source Area during AMCO's Operation

During the period of active operations at AMCO, the primary area of chemical handling (delivery, transfer, and bulk storage) was the central-south central portion of the AMCO Property, an area immediately west of the warehouse. This area, referred to herein as the source area, has LNAPL, soil, and groundwater contamination. While past releases of chemicals to the environment occurred in the source area, the resulting localized contaminant transport cannot be described by the transport properties of a single COC (or class of COCs) in an aqueous medium such as groundwater due to the variety of chemicals released and the different properties of the released chemicals. The vertical extent of contamination in the source area is described in Section 5 (soil) and Section 6 (groundwater), and transport processes that likely contributed to this vertical extent are described below.

While chemical releases in the source area could be affected by the processes identified in Section 7.2.1, these processes are more applicable to water (a solvent) containing a single COC (a solute). Contaminants released in the source area included a variety of chemicals, and the resulting mixture of chemicals can be considered a complex mixture with regard to contaminant transport (Brusseau, 1993). Facilitated transport mechanisms are associated with a complex mixture of contaminants having variable physical and chemical properties related to chemical transport in the environment, notably for hydrophobic organic compounds (HOCs) such as PCBs, dioxins/furans, pesticides, and PAHs. Facilitated transport, defined as any process that speeds the transport of a COC beyond what is expected based solely on groundwater flow and equilibrium and sorptive interactions with soil, includes co-solvent effects and colloidal processes (Huling, 1989). Co-solvent effects occur when high concentrations of organic solvents are present in water, resulting in changes in organic chemical properties in the mixed organic compound co-solvent system. Colloidal processes that likely where previously applicable at the former AMCO facility result from organic concentrations in the few hundred milligrams per liter range moving as colloidal particles that have a high affinity for other hydrophobic organic contaminants. The presence of colloidal concentrations affects transport properties by changing the mobility of HOCs relative to conventional HOC transport based solely on groundwater flow and equilibrium sorptive interactions with the immobile solid (soil) phase.

Besides HOCs, complex mixtures resulting from chemical releases in the source area included completely miscible (dissolves in water) organic solvents (CMOSs) such as isopropyl alcohol and acetone, and partially miscible organic solvents (PMOSs) such as toluene and TCE. At high concentrations in water, CMOSs can behave as co-solvents to organic contaminants, such as HOCs, that partition into the mobile CMOS phase, resulting in the increased mobility of the HOC (Huling, 1989, and Pinal et. al, 1990). The presence of CMOSs and/or PMOSs can result in facilitated transport by a co-solvent effect or by colloidal processes. The facilitated transport effect depends on the extent to which the chemical mixture affects the sorptive capacity of the HOCs (Rao et al., 1990). Thus, the addition of water-miscible organic solvents to water tends to increase the amount of solute (contaminant) that can reside in solution (Brusseau, 1993).

In application of this co-solvency effect to the source area, the spillage of chemicals resulted in a complex mixture of water and organic solvents. The presence of the organic co-solvents

increased the amount of HOCs in solution, enabling the vertical movement of the HOCs by facilitated transport. This vertical movement of the co-solvent with HOCs in solution explains the vertical extent of the HOC contamination at the source area compared to other portions of the former AMCO facility.

DDT transport in groundwater is typically limited due to the chemical's properties in an aqueous environment: DDT has low solubility in water, and, due to its hydrophobic properties, is strongly sorbed to soil particles. Using DDT as the example HOC, spills or other liquid organic compound releases (e.g., isopropyl alcohol, acetone, toluene, and even TCE) such as occurred at the source area, create an organic mixture that acts as a co-solvent in groundwater, and results in the partitioning of the HOC (i.e., DDT) into the co-solvent phase. This HOC partitioning to the co-solvent phase likely facilitated the vertical migration of DDT to depths as great as 20 to 30 feet bgs at the source area. In comparison, the vertical extent of DDT impacts were limited to depths of five feet bgs or less in the other portions of the former AMCO facility where transport was associated with water as the only solvent.

HOCs include aromatic and aliphatic hydrocarbon compounds in fuels, chlorinated solvents, pesticides, PAHs, and other non-polar hydrocarbons. As the name implies, hydrophobic (water-repelling) organic compounds have a propensity to partition into organic phases. If CVOC releases to groundwater encounter a light non-aqueous phase liquid (LNAPL), the CVOCs have a tendency to accumulate in the LNAPL. As demonstrated by the groundwater monitoring and soil characterization analytical results for the source area, chlorinated solvents released to the environment where LNAPL is present typically mix with the LNAPL. Chlorinated solvents that behave as a DNAPL (i.e., 1,1,1-TCA, TCE, and PCE) in water will accumulate in an LNAPL up to approximately 33 percent (by volume) while still remaining an LNAPL (Petrisor and Wells, 2008). This tendency of CVOCs to mix with LNAPL explains why the release of chlorinated solvents, such as TCE, at the source area did not result in DNAPL formation and minimized deeper vertical migration. The bulk of the CVOC mass in the source area is present at shallow to intermediate depths in soil and groundwater, as discussed in Sections 5 and 6, respectively.

Only one of the 23 borings in the source area (boring SC-021) had TCE concentrations above the screening level in soil samples from the Merritt Sand and Older Bay Mud interface, at a depth of approximately 60 feet bgs. As shown on Figure 5-5, the TCE concentration in the soil sample collected at 61 feet bgs was 1,170 ug/kg. This concentration is significantly less than the TCE concentrations detected in soil samples collected at shallow depths from the same boring (845,000 ug/kg; 543,000 ug/kg; 678,000 ug/kg; and 31,000 J ug/kg at depths of 1, 3, 5, and 8 feet bgs, respectively). The presence of DNAPL is not indicated by the TCE concentration at the Merritt Sand and Older Bay Mud interface for boring SC-021.

7.3 FATE AND TRANSPORT OF SITE CONTAMINANTS

Chemical spills and leaks were the primary sources and release mechanisms of contaminants at the former AMCO facility, as described in the RI Report (CH2M Hill, 2011) and in Sections 7.1 and 7.2 of this RI Addendum. These primary sources and release mechanisms have resulted in secondary contaminant sources, even though the former AMCO facility has been closed for over 20 years. The secondary contaminant sources, consisting of LNAPL that is a complex mixture of organics and elevated soil and groundwater contamination at and in the

immediate vicinity of the source area, are continuing sources of contaminants to environmental media by the secondary release mechanisms identified on Figure 7-1. Except for the presence of complex mixtures of contaminants in the source area at shallow depths, the non-biotic mechanisms currently influencing the fate and transport of the contaminants at the Site are based primarily on the physical and chemical properties of the COCs. These primary fate and transport characteristics of the various chemical groups for the COCs are described below. Chemical and physical properties associated with the fate and transport of the key COCs with water as the solvent are presented in Appendix I.

7.3.1 Volatile Organic Compounds (VOCs)

The VOC contaminants at the Site include chlorinated and non-chlorinated organic compounds. Based on the supplemental RI investigations, the CVOCs consist of chlorinated ethenes (e.g., TCE, cDCE, and VC), chlorinated ethanes (e.g., 111-TCA), and chlorinated benzenes (e.g., CBen), while the non-chlorinated VOCs are primarily aromatic hydrocarbons (e.g., TOL and BEN) and methylated benzenes (e.g., 124-TMB). As VOCs are a primary contaminant class in the LNAPL present in the source area (CH2M Hill, 2011), three processes result in a continuing source of VOC releases to the environment:

1. Volatilization directly from the free product to the soil gas;
2. Dissolution from the LNAPL to groundwater; and
3. Desorption from soil contamination in the source area to groundwater.

VOCs also are the COCs associated with the greatest impact on groundwater quality at the Site. The majority of the remaining VOC contaminant mass at the Site is present in the source area as contaminated soil and LNAPL. In consideration of soil and groundwater concentrations in the source area, VOCs are likely present as NAPL in the soil pore space of the shallow saturated zone, separately from the LNAPL (free product) observed in several monitoring wells.

7.3.1.1 Transport

The transport of VOCs in groundwater is at a rate less than the bulk movement of groundwater due to VOCs having moderate to high sorption potential (i.e., the ability adsorb to the surface of soil particles), low to moderate solubility in water, and moderate to high volatility. Due to volatilization, VOC contamination in shallow groundwater and soil is a source of VOCs to soil gas and the potential vapor intrusion exposure pathway.

7.3.1.2 Abiotic Transformations

Some CVOCs, notably the chlorinated ethanes, are subject to abiotic transformations (see Figure 1-4). The abiotic transformations of chlorinated ethanes include hydrolysis and elimination reactions (Vogel et al., 1987). At ambient temperatures, the abiotic transformation of 111-TCA, a chlorinated ethane, occurs at a sufficient rate to influence the fate of this COC in groundwater at the Site. For the chlorinated ethenes and non-chlorinated VOCs, abiotic transformations are insignificant at ambient temperatures.

7.3.1.3 Biotic Transformations

Biotic transformations are occurring in groundwater at the Site in the form of reductive dechlorination for the CVOCs, and anaerobic respiration and fermentation transformations for

the non-chlorinated VOCs. These biotic transformations constitute the primary process that has limited the downgradient extent of VOC-contaminated groundwater at the Site. In addition to VOC concentration changes with time, other data from groundwater monitoring establish the microbial degradation of VOCs. These monitoring data include the presence of sufficient DOC for maintaining an active microbial community, changes in sulfate concentrations along the length of the contaminated groundwater plume, dissolved gases (methane, ethane, and ethene) as the final product from VOC biodegradation, and an abundant DHC population and functional genes for RDase encoding associated with reductive dechlorination. The extent of the DHC population is consistent with the extent of the chlorinated ethene plumes, indicating a sufficient microbial population at this time to enable biotic transformations to limit the migration of the CVOCs. As discussed in Section 5.3.1.2, CVOC concentrations in soil indicate that reductive dechlorination is occurring at a much slower rate in the central portion of the source area than in the surrounding areas. These soil data indicate that elevated concentrations of TCE and cDCE remain at depths associated with the saturated zone in the central portion of the source area.

Sulfate is the primary electron acceptor for the biotic transformation of the non-chlorinated VOCs, especially south of the source area. Due to the highly reducing conditions in the source area, sulfate concentrations are below the detection level, and fermentation or an alternative electron acceptor (e.g., ferric iron) would be the biotic transformation pathway for the non-chlorinated VOCs. Ferric iron appears to act as an electron acceptor in groundwater for biotic transformations, as indicated by the concentrations of ferrous iron in groundwater. Biogeochemical reactions that result in iron and sulfate reduction result in the formation of iron sulfides, which have the ability (similar to zero-valent iron) to reduce CVOCs chemically (Kennedy et. al., 2006).

In summary, while some volatilization of VOCs is occurring from shallow soil and groundwater, biotic transformations are the primary mechanisms affecting the fate and transport of the VOCs in the saturated zone.

7.3.1.4 Changes in VOC Concentrations in Groundwater with Time

As part of the remedial investigations conducted at the Site, groundwater monitoring began in 2005. In this section, the changes in concentrations with time are discussed for VOCs, the primary COCs with a lateral extent in groundwater beyond the source area. VOC concentration changes with time are discussed below for groundwater from wells screened in the shallow, intermediate, and deep zones of the Upper Aquifer. The location of each Upper Aquifer groundwater monitoring well is shown on Figure 2-6.

Shallow-Zone Groundwater

RMW-02-13: Figures 7-2 and 7-3 show VOC concentration trends with time for groundwater from monitoring well RMW-02-13. Overall trends for CVOCs such as cDCE, VC, and 11-DCA, which have the highest measured concentrations in groundwater, have remained relatively steady, as shown on Figure 7-2a. This relatively steady concentration of CVOCs in groundwater from a well located in the source area is attributable to ongoing dissolution of CVOCs from LNAPL and/or desorption from soil. The presence of a residual contaminant mass (LNAPL, possibly NAPL present in the soil pore space of the shallow saturated zone, and contaminants

sorbed to soil) results in dissolved concentrations not decreasing due to biodegradation (reductive dechlorination), volatilization, and/or other natural attenuation processes.

Biodegradation in the form of reductive dechlorination is active, as indicated by reduced forms of chlorinated ethenes (cDCE and VC) and chlorinated benzenes (14-DCB, 1,2-DCB, and CBen), as shown on Figures 7-2a and 7-2b, respectively. Active reductive dechlorination of the CVOCs is evidenced by the daughter products present in groundwater and the presence of a large DHC population and functional genes in groundwater from this well (see Figure 6-24). TCE concentrations are very low to non-detect, with high concentrations of its reductive dechlorination by-products (cDCE and VC). As shown by the concentration trends on Figure 7-2b, chlorinated benzenes also appear to be undergoing reductive dechlorination in consideration of the concentration trends for BEN and CBen in groundwater from this well. While reductive dechlorination of chlorinated benzenes may not account for all of the BEN concentration in groundwater, BEN is the end product of reductive dechlorination for the chlorinated benzenes (Adrian and Görisch, 2002). The concentration trends for the dichlorobenzenes and CBen are indicative of active reductive dechlorination.

Concentration trends for non-chlorinated VOCs other than BEN are depicted on Figure 7-3. While a slight decline with time is indicated, dissolution and desorption of these VOCs from the LNAPL and contaminated soil, respectively, in the source area are apparent by the concentration trends. Significant TOL concentrations have been present in groundwater from well RMW-02-13 since groundwater monitoring began in 2005. In addition, while many of the VOCs are known to be biodegradable, the biodegradation process likely would occur by fermentation due to the non-detect concentration of sulfate (as well as other primary electron acceptors such as oxygen and nitrate).

MW-12: VOC concentration trends for groundwater from this shallow-zone well, located slightly downgradient of the source area, are shown on Figure 7-4. Concentrations of cDCE and VC have remained relatively steady since 2005, although at very high concentrations relative to SLs (see Figure 7-4a). The cDCE and VC concentration trends indicate both dissolution and/or desorption of CVOCs from LNAPL and/contaminated soil, respectively, in the source area and active reductive dechlorination.

The soil characterization results identified the presence of high concentrations of TCE and cDCE in a portion of the source area just upgradient from MW-12 (see Figures 5-22 and 5-23). Concentrations of cDCE have been the highest of all COC concentrations in groundwater from this well, and have been about 4 to 7 times greater than that of VC. Compared to cDCE and VC, TCE concentrations have remained very low (lower than 100 ug/L) since groundwater monitoring began in 2005. Besides the CVOC concentrations, DHC and RDase encoding gene concentrations in the groundwater (see Figure 6-24) establish that reductive dechlorination is active. The prominent functional genes, tceA and vcrA, are associated with the reductive dechlorination of TCE, cDCE, and VC to ethene (van der Zaan et al., 2010). The relatively steady concentrations of cDCE and VC, along with the microbial indicator concentrations, suggest the following:

- Residual CVOC contamination in the source area, located upgradient of MW-12, is a continuing source of CVOCs.

- Reductive dechlorination is occurring and transforming TCE to cDCE, as well as cDCE to VC, resulting in the very low TCE concentrations in groundwater from MW-12.
- High ethene and vcrA concentrations in groundwater from MW-12 (Figure 6-24) provide evidence that reduction of VC to ethene is occurring.

Excluding the outlier from November 2008, toluene concentrations in groundwater from MW-12 have been relatively steady, with concentrations exceeding 15,000 ug/L since 2010 (see Figure 7-4b). This steady concentration of toluene likely is attributable to dissolution from LNAPL and/or desorption from contaminated soil in the source area (see Figure 5-25). Based on the concentration trends and fact that the lateral extent of the toluene plume extends only a short distance downgradient of MW-12 (see Figure 6-16), toluene and other non-chlorinated VOCs are actively being biodegraded in groundwater. Concentrations of other aromatic hydrocarbons (i.e., BEN, EBZ, and xylenes) are low compared to that of toluene in groundwater from MW-12.

BMW-03: Figure 7-5a presents CVOC concentration trends for groundwater from this shallow zone well that is located a short distance downgradient of MW-12, just south of 3rd Street. Similar overall-steady concentration trends have been observed for cDCE, VC, and 11-DCA since the initial groundwater monitoring event in 2005. Concentrations of cDCE, VC, and 11-DCA are significantly lower than the concentrations of these COCs in groundwater from upgradient well MW-12 (approximately three orders of magnitude lower). Reductive dechlorination of cDCE and VC is the likely reason for the lower concentrations, as other non-degradation fate and transport mechanisms would not cause a concentration decrease of this magnitude. BMW-03 also is located sufficiently downgradient from the former AMCO facility that dissolution from the source area is not directly influencing groundwater concentrations. While BMW-03 is located within the CVOC plume (see Figures 6-8 and 6-11), groundwater fate and transport processes influencing COC concentrations at MW-12 also appear to be active at this well.

RMW-10-15: This shallow-zone well is located at the downgradient portion of the CVOC plume (see Figures 6-5, 6-8, and 6-11). CVOC concentration trends for groundwater from RWM-10-15 are shown on Figure 7-5b. While the overall cDCE concentration trend has a very slight decrease, TCE, tDCE, and VC concentrations have been very low to non-detect. The DHC concentration is low, and the functional RDase encoding gene concentrations were non-detect in August 2012. These data suggest that other processes are likely removing the cDCE and VC. These processes could be biotic or abiotic. Mineralization to carbon dioxide of cDCE and VC has been reported under methanogenic and ferric iron reducing conditions (Bradley and Chapelle, 1997 and Bradley and Chapelle, 2000), as well as with very low (below 0.02 mg/L) dissolved oxygen concentrations (Gossett, 2010). Iron sulfides formed under the reducing conditions associated with the CVOC plume at the Site are active minerals in the abiotic reduction of chlorinated ethenes, including cDCE and VC (He et al., 2009 and Kennedy et. al., 2006).

Intermediate-Zone Groundwater

RMW-02-32: Well RMW-02-32 is located in the source area. Concentration trends with time for groundwater from intermediate-zone well RMW-02-32 are presented on Figure 7-6 for CVOCs, with trends for aromatic hydrocarbons and ketones on Figure 7-7. The concentrations

of chlorinated ethenes and ethanes have declined significantly since 2006 (see Figure 7-6a). VC concentrations have decreased significantly since 2007, likely due to reductive dechlorination. cDCE concentrations decreased from around 200 ug/L in 2007 to non-detect since 2011, and TCE concentrations have been very low or non-detect for the duration of groundwater monitoring. DHC and RDase-encoding genes tceA and vcrA concentrations (see Figure 6-24) indicate that reductive dechlorination is the transformation pathway for the chlorinated ethenes and ethanes in groundwater at this well.

The concentration trends shown on Figure 7-6b suggest that reductive dechlorination also is active for the chlorinated benzenes. The concentrations of 12-DCB have significantly decreased since 2005. CBen concentrations began increasing in 2009, with concentrations leveling off at below 2,000 ug/L and then decreasing in August 2012. This change in CBen concentrations starting in 2009 likely is due to the reductive dechlorination of 12-DCB to CBen, and the subsequent reduction of CBen. The concentrations of 14-DCB have remained relatively constant.

The concentration trends for the aromatic hydrocarbons toluene, 124-TMB, 135-TMB, and xylenes show a decreasing trend, although concentrations have leveled off since 2009 for the methylated benzenes (see Figure 7-7a). Figure 7-7b shows the significant decreases in concentrations observed for the ketones MIBK and acetone. Biodegradation is the likely mechanism causing these decreases, and also has contributed to the reducing conditions in the source area and reductive dechlorination of the CVOCs.

RMW-12-32: The concentrations of the chlorinated ethenes (TCE, cDCE, and VC) have shown a decreasing trend in groundwater from RMW-12-32, an intermediate-zone well, as shown on Figure 7-8a. Even though TCE is present in soils upgradient of this well, as described in Section 5, TCE concentrations have been much lower than those of cDCE and VC, indicating that reductive dechlorination is active. In addition, the chlorinated ethene concentrations in this well are lower than concentrations in shallow-zone groundwater (e.g., about 20 times lower than concentrations in groundwater from MW-12). The concentration trends for chlorinated ethenes in groundwater from RMW-12-32 suggest that dissolution and/or desorption from the upgradient source area are a continuing source of chlorinated ethenes to groundwater in this intermediate zone well. DHC and functional gene concentrations are low (see Figure 6-24), indicative of a low rate of reductive dechlorination, especially compared to the shallow-zone groundwater in this portion of the plume.

The decreasing concentration trends for the aromatic hydrocarbons (BEN, EBZ, xylenes, and TOL), as shown on Figure 7-8b, can be attributed to biological degradation. BEN and TOL are the non-chlorinated VOCs with the highest concentrations, and show the most significant concentration reductions with time.

RMW-09-35: Concentration trends for CVOCs in groundwater from this downgradient, intermediate-zone well are presented on Figure 7-9a. Since peaking in 2006, CVOC concentrations have declined, with concentrations being non-detect for the 2012 monitoring events.

RMW-10-35: This intermediate-zone well is located near the downgradient edge of the CVOC plumes (see Figures 6-6, 6-9, 6-12, and 6-15). TCE concentrations in groundwater from RMW 10-35 have trended slightly downward over time, as shown on Figure 7-9b. For cDCE and VC, the concentration changes with time indicate that reductive dechlorination is occurring. Active reductive dechlorination is supported by the DHC and functional gene concentrations in groundwater from RMW-10-35 (see Figure 6-24). The functional genes are associated with the reductive dechlorination of TCE, cDCE, and VC to ethene, as shown on Figure 6-25. Ethene concentrations in the groundwater from RMW-10-35 provide further evidence that complete reductive dechlorination of the chlorinated ethenes is occurring.

For the wells sampled for microbial characterization associated with reductive dechlorination, microbial populations of DHC and its corresponding functional genes were the highest in groundwater from RMW-10-35, providing strong evidence that biological degradation is currently taking place in groundwater in the vicinity of this well. The groundwater from RMW-10-35 and other wells south of 3rd Street also have elevated sulfate concentrations. As sulfate-reducing and other anaerobic bacteria compete with DHC for the hydrogen associated with reductive dechlorination (Gossett and Zinder, 1996), reductive dechlorination in the downgradient portion of the Site may not be sustained over time due to the sulfate concentration in groundwater and/or reduction in the dissolved organic carbon concentration in groundwater.

Deep-Zone Groundwater

RMW-14-50: The TCE concentration in groundwater from well RMW-14-50 increased from the time groundwater monitoring began in 2005 to a maximum concentration of approximately 150 ug/L in March 2009 (see Figure 7-10). Through 2012, TCE concentrations have remained around 100 ug/L, as shown on Figure 7-10. Concentrations of cDCE also showed an increase, although much smaller, with cDCE concentrations remaining around 20 to 30 ug/L since 2009.

The TCE and cDCE concentration trends in groundwater from RMW-14-50, in comparison with upgradient wells, suggest that TCE and cDCE contamination at RMW-14-50 is not likely attributable to the former AMCO facility. TCE concentrations in upgradient groundwater have been low or non-detect over time, which is very different from the TCE concentration trend in groundwater from RMW-14-50. An agricultural fertilizer and pesticide manufacturing facility and a junkyard previously occupied the property where RMW-14-50 is located. Previous operations by these former businesses at the site of well RMW-14-50 are the likely source of the CVOC-impacted groundwater at RMW-14-50. Since RMW-14-35 was not installed until 2012, insufficient historical information is available to determine if the TCE/cDCE source was released in the vicinity of RMW-14-50 and migrated downward (consistent with transport characteristics of a DNAPL). Low TCE and cDCE concentrations, approximately 10 ug/L and 5 ug/L, respectively, were detected in groundwater from RMW-14-35 during the three monitoring events conducted in 2012 since RMW-14-35 was installed.

RMW-12-51: From 2006 through February 2012, TCE concentrations ranged between non-detect (less than 0.5 ug/L) and 3.1 ug/L. In August 2012, the TCE concentration was 14 ug/L, exceeding the SL of 5 ug/L. Similar concentration trends were observed for cDCE, with an August 2012 concentration of 7.6 ug/L. VC generally has not been detected in groundwater

from RMW-12-51. Unlike CVOC concentrations in groundwater from RMW-14-50, CVOCs detected in groundwater from RMW-12-51 are attributable to the former AMCO facility.

7.3.2 SVOCs

Many SVOCs have been identified as COCs at the Site, and these SVOCs have a wide variation in physical and chemical properties. The key SVOCs include 1,4-dioxane (14-Dxn), naphthalene (NAPH), 2-methylnaphthalene (2-MNAPH), pentachlorophenol (PCP), and benzo(a)pyrene (B(a)PYR). Other PAHs identified as soil contaminants in Section 5 have fate and transport properties similar to those of B(a)PYR. B(a)PRY and other PAHs with three or more aromatic rings exhibit low to very low water solubility and low volatility, and are hydrophobic, thereby strongly partitioning onto soil surfaces and organic matter. PCP has low volatility, and its solubility and mobility in the environment are pH-dependent. At a neutral pH, PCP has moderate solubility in water and moderate sorption to soil surfaces. NAPH and 2-MNAPH have moderate water solubility and volatility, and sorb to soil and other organic matter. By comparison, 14-Dxn is miscible in water, has moderate volatility, and has low sorption to soil.

7.3.2.1 Transport

Consistent with their solubility in water, the transport of SVOCs in groundwater varies from being highly retarded (e.g., B[a]PYR) to a rate similar to the bulk movement of groundwater (14-Dxn). The SVOCs with highly retarded transport in groundwater are the PAHs, especially those with four or more fused aromatic rings, due to their sorption to soil particle surfaces and very low solubility. NAPH and 2-MNAPH have moderate solubility, as does PCP at a neutral pH. PAHs have a high soil sorption capacity, which retards these COCs' mobility in groundwater. NAPH and 14-Dxn can volatilize from shallow groundwater and be present in soil gas, and therefore can be a potential vapor intrusion risk.

The extent of SVOCs in soil and groundwater at the Site is consistent with these transport properties. The three-ring and greater PAHs with moderate to high sorptive capacity have partitioned onto soil in the subsurface environment. Sorption and other environmental properties have limited the migration of these SVOCs. While NAPH, 2-MNAPH, and PCP have moderate solubility and sorptive properties, biodegradation is another important factor influencing the fate and transport of these SVOCs. The COC with the largest lateral extent at the Site is 14-Dxn, influenced by its fate and transport properties. 14-Dxn is highly soluble in water, does not readily sorb to soil particle surfaces, and is resistant to transformations (abiotic and biotic) in groundwater.

7.3.2.2 Abiotic Transformations

The SVOCs are stable in soil and groundwater at ambient temperatures and neutral pH with respect to abiotic transformations.

7.3.2.3 Biotic Transformations

NAPH, 2-MNAPH, and PCP are biodegradable SVOCs under aerobic and anaerobic environments. PAHs also have been found to be degraded under aerobic conditions, with the rate and extent of biodegradation decreasing as the number of fused rings increases. In addition, enhancements to increase the bioavailability of the PAHs and establishment of environmental

conditions suitable for microbial activity may be required for effective biodegradation of PAHs under field conditions (Haritash and Kaushik, 2009).

The largest lateral extent of impacted groundwater at the Site is attributable to 14-Dxn (see Figures 6-22 and 6-23). While 14-Dxn has been reported to be biodegradable in laboratory studies (Mahendra et al., 2007), in-situ bioremediation has yet to be demonstrated (US EPA, 2013). Steffan (2007) reported that under anaerobic conditions (nitrate reducing, iron reducing, sulfate reducing, and methanogenic conditions), biotransformation of 14-Dxn was not observed.

7.3.2.4 1,4-Dioxane Concentrations with Time

Graphs showing variations in 14-Dxn concentrations over time in groundwater from shallow-zone wells are presented on Figure 7-11 (RMW-02-13 and MW-12) and Figure 7-12 (BMW-03 and BPZ-01), and from intermediate-zone wells on Figure 7-13 (RMW-02-32 and RMW-12-32) and Figure 7-14 (RMW-10-35). Although fluctuations in 14-Dxn concentrations have occurred in both shallow-zone and intermediate-zone groundwater, the concentration trend graphs do not indicate an overall downward trend that could be associated with the degradation of 14-Dxn. A discussion of the 14-Dxn concentration trends shown on Figures 7-11 through 7-14 is presented below.

- RMW-02-13 (Figure 7-11a) – Concentrations have fluctuated between 110 ug/L and non-detect. Since September 2007, 14-Dxn concentrations have varied without any indication of a declining trend.
- MW-12 (Figure 7-11b) – Although concentrations have decreased from a high of around 80 ug/L in 2006, 14-Dxn concentrations have remained constant at 20 ug/L since the latter part of 2008.
- BMW-03 (Figure 7-12-a) – With some fluctuations, 14-Dxn concentrations have been around 200 ug/L since groundwater monitoring started in 2005.
- BPZ-01 (Figure 7-12b) – 14-Dxn concentrations have fluctuated between 200 ug/L and non-detect since 2005, with concentrations around 130 ug/L in 2011 and 2012.
- RMW-02-32 (Figure 7-13a) – This well is located in the source area, and 14-Dxn concentrations have fluctuated from a maximum of approximately 2,700 ug/L to non-detect, with concentrations between 500 and 1,100 ug/L since 2008.
- RMW-12-32 (Figure 7-13b) – 14-Dxn concentrations have fluctuated between 200 and 1,800 ug/L since 2005. During 2011 and 2012, 14-Dxn concentrations varied from approximately 200 to 400 ug/L.
- RMW-10-35 (Figure 7-14) – 14-Dxn concentrations fluctuated between 380 ug/L and non-detect between 2005 and early 2008. Fairly constant 14-Dxn concentrations (between 270 and 330 ug/L) have been observed from 2008 through 2012.

In consideration of its transport properties in groundwater and without any apparent degradation occurring, 14-Dxn has the potential to continue migrating toward San Francisco Bay, with concentrations likely being diluted due to dispersion and diffusion.

7.3.3 Metals

The fate and transport of metals in the environment is complex due to (1) the diversity of the inorganic chemicals identified herein as metals, (2) the varying chemical properties of metals in environmental media, and (3) the effects of oxidation-reduction reactions, complex formations, and (4) other interactions affecting the equilibrium chemistry of metals. In water, some metals exist as cations and others as anions. Metals that exist as cations in water, and are sometimes referred to as heavy metals, include lead, mercury, cadmium, and cobalt. Other metals that exist as cations but commonly are associated with oxidation-reduction reactions affecting their fate and transport include iron and manganese. Metals that exist as anions include arsenic, chromium, and selenium. The solubility of a metal is dependent on the chemical environment (e.g., pH and/or redox potential) in the subsurface. As metal contamination was found both in soil and in groundwater, metals are present in both dissolved and solid phases at the Site.

7.3.3.1 Transport

Metal solubility in water is the primary factor associated with transport in the environment for this COC class. For many metals, notably the heavy metals, pH and coordination chemistry are the main factors affecting solubility. The reduced forms of iron and manganese, ferrous iron or Fe(II) and Mn(II), respectively, are soluble in water, while their oxidized forms, Fe(III) and Mn(IV), commonly are present as immobile oxides in the saturated zone. Reducing conditions also can increase the solubility and mobility of arsenic and selenium, metals that exist as anions in water.

7.3.3.2 Transformations

For metals, transformation processes affecting their fate and transport are associated with solubility. While some abiotic (chemical) transformations may occur, fate and transport of metals at the Site is associated primarily with biotic transformations. Oxidized forms of iron and manganese, Fe(III) and Mn(IV), respectively, naturally occur in soil as solids in the form of iron and manganese oxides. Microorganisms couple anaerobic respiration of the iron and manganese oxides for organic carbon oxidation (Nealson and Myers, 1992).

The reduced form of arsenic, arsenite or As(III), is more mobile in groundwater than the oxidized form, arsensate or As(V), at a neutral pH. As(V) adsorbs onto iron oxide particles in the environment. Therefore, reducing conditions that result in iron reduction typically also enhance arsenic solubility.

7.3.4 Polychlorinated Biphenyls (PCBs), Pesticides, Dioxins, and Furans

PCBs and organochlorine pesticides are synthetic organic chemicals, and do not occur naturally in the environment. While resulting from anthropogenic activities, dioxins/furans also can be released into the environment through forest fires and the burning of paper.

7.3.4.1 Transport

PCBs, organochlorine pesticides, and dioxins/furans have common properties with regard to environmental transport: (1) high sorptive capacity, (2) very low solubility in water, and (3) non-volatility. These properties result in PCBs, organochlorine pesticides, and dioxins/furans being immobile in typical environments with water as the only solvent. These properties are associated with the presence of PCBs, pesticides, and dioxin/furans in shallow soil outside of the source

area, along with the presence of these COCs in groundwater being limited and at very low concentrations. Being hydrophobic and having high solubility in hydrocarbons and organic liquids, these COCs will be subject to facilitated transport if released to the environment along with organic solvents, as described in Section 7.2.2.

7.3.4.2 Transformations

These COCs are resistant to transformations, and are classified as persistent organic pollutants by the US EPA. Biotic transformation of PCBs by reductive dehalogenation has been documented for PCB-contaminated sediment in rivers. A Dehalococcoides population and other microorganisms involved with reductive dechlorination of PCBs have been isolated (Bedard, 2008 and Hiraishi, 2008).

7.4 3RD STREET SEWER INTERCEPTOR AS A PREFERENTIAL PATHWAY FOR MIGRATION OF CONTAMINATED GROUNDWATER

Only low concentrations of some VOCs were detected in the grab groundwater samples from the three borings (SI-01, SI-02, and SI-03) completed in 3rd Street (see Figure 7-15). All VOC concentrations were below the associated screening levels. For the key VOCs detected in the grab groundwater samples, Figure 7-15 also includes concentrations for the same VOCs reported in groundwater samples collected in May 2013 from shallow-zone and intermediate-zone monitoring wells (RMW-07-15 and RMW-07-35, respectively) located nearest to interceptor investigation boring SI-01.

An evaluation of the VOC concentrations from the investigation with respect to the sewer interceptor's bedding providing a preferential pathway for contaminated groundwater migration is presented below, with detected concentrations of VOCs shown on Figure 7-15.

- **SI-01:** VOCs detected at the groundwater sampling interval of 12-16 feet bgs had higher concentrations than those in groundwater from the 20-21 feet bgs interval, with the exception of acetone, which had a slightly higher concentration at the deeper interval. For the chlorinated VOCs (cDCE, TCE, and PCE) detected in grab groundwater samples from this boring, the former AMCO facility is the probable source. Boring SI-01 is located on the likely fringe of the PCE, TCE, and cDCE plumes associated with the AMCO facility, based on the concentrations of these VOCs in recent groundwater samples from nearby monitoring wells RMW-07-15 and RMW-07-35 (see Figure 7-15). The presence of acetone and toluene in groundwater samples from SI-01 is considered attributable to other source(s), possibly the City of Oakland sewer.
- **SI-02 and SI-03:** Acetone was the only VOC detected in the grab groundwater samples.

The presence of PCE, TCE, and cDCE in groundwater from SI-01 can be attributed to plumes from the former AMCO facility. However, as PCE, TCE, and cDCE were not detected in groundwater samples from SI-02 or SI-03, the VOC concentration data indicate that the sewer interceptor's bedding is not a preferential pathway for the migration of contaminated groundwater attributable to the former AMCO facility.

7.5 SUMMARY OF CONTAMINANT FATE AND TRANSPORT IN GROUNDWATER

A summary of the results from the evaluation of contaminant fate and transport in groundwater at the Site is presented below.

- Dissolution from LNAPL and desorption from contaminated soil in the source area are continuing sources of contamination to groundwater, notably for VOCs.
- COCs, excluding VOCs and 14-Dxn, are not migrating, and remain primarily a soil contamination problem. Due to facilitated transport, some of these COCs are a groundwater problem, but only in the portion of the former AMCO facility identified herein as the source area.
- While some of the COCs are more dense than water, the release of multiple chemicals appears to have created a complex mixture that has resulted in co-solvent effects and facilitated transport of contaminants. These transport effects in the source area portion of the former AMCO facility have resulted in the following:
    - The greater vertical extent of pesticides, PCBs, PAHs, and other COCs that are HOCs with low solubility in water at the source area relative to other portions of the former AMCO facility.
    - Non-DNAPL behavior of the CVOCs as a result of the CVOCs partitioning into other organics, forming LNAPL that is a complex mixture of multiple organic compounds. The resulting complex mixture of organics has behaved more as a LNAPL than a DNAPL, and ththis limited the vertical movement and extent of the CVOCs.
- As chemical releases to the environment have discontinued at the former AMCO facility, these vertical transport mechanisms (i.e., DNAPL-like movement, co-solvency, and facilitated transport) do not appear to be affecting contaminant transport at this time.
- Reductive dechlorination and other biotic transformations are active in the saturated zone and have limited the migration of the VOCs, which include chlorinated ethenes, chlorinated benzenes, aromatic hydrocarbons, and methylated benzenes.
- 1,4-dioxane does not appear to be undergoing degradation, resulting in a large lateral extent for this COC, which is miscible in water. Thus, 1,4-dioxane can be expected to continue migrating in groundwater via advection, with dispersion and diffusion attenuation processes affecting downgradient concentrations.
- The concentrations of microbial parameters associated with reductive dechlorination (DHC and their functional genes) vary across the Site. High concentrations of DHC and functional genes are present in the CVOC groundwater plumes originating from the source area. Downgradient of the former AMCO facility, concentrations of these microbial parameters vary in both the shallow-zone and intermediate-zone groundwater. In addition, elevated sulfate concentrations are present in groundwater south of 3rd Street, and sulfate reducers and other anaerobic microorganisms may compete with DHC for the available hydrogen needed to sustain reductive dechlorination.

- The bedding of the 3rd Street sewer interceptor does not provide a preferential pathway for migration of contaminated groundwater attributable to the former AMCO facility.

8.0 CONCLUSIONS

The results from the supplemental investigations described in this RI Addendum addressed the remedial investigation objectives identified in Section 1.3. Major findings from the investigations establish the nature and extent of COCs in impacted media at the Site (i.e., soil, groundwater, soil gas, and air [crawl space and indoor air]) attributable to operations at the former AMCO facility. Conclusions presented below summarize the significant findings with respect to the nature and extent of contaminated media at the AMCO Chemical Superfund site, as well as the fate and transport properties of the COCs. The nature and extent of contamination described herein, along with the human health risk from the RI Report (CH2M Hill, 2011), establish the remediation requirements at the Site and provide the basis for the development and screening of remedial alternatives that will be addressed in the Feasibility Study (FS).

8.1 VOLATILE ORGANIC COMPOUND (VOC) CONCENTRATIONS IN AIR

Findings from the supplemental investigations characterizing VOC concentrations in soil gas and air at the Site are reported in Section 3, with conclusions presented below.

- The background, outdoor (ambient) air quality in the South Prescott neighborhood is poor as a result of sources other than the Site. VOCs detected in the ambient air include BEN, CCl4, NAPH, 14-Dxn, EBZ, TCM, and PCE. BEN, CCl4, and 14-Dxn were present in background (ambient) air at concentrations above the EPA regional screening levels for these COCs.
- A number of VOCs were detected in soil gas at concentrations above screening levels, with the source of the VOCs being soil and/or groundwater contamination at or near the former AMCO facility. Soil gas samples with concentrations above screening levels were collected from the former AMCO facility and the three residential properties on 3rd Street (1428/1430, 1432/1434, and 1436/1438) located immediately west or southwest of the AMCO Property.
- Based on the VOC concentrations in crawl space and/or indoor air samples collected in 2009 (Round 1), vapor intrusion was identified as a possible human health risk for residents in the residential buildings at 1428/1430, 1432/1434, and 1436/1438 3rd Street, and 320 Center Street. Although the office is not currently being used, indoor air quality in the office building at the former AMCO facility (1414 3rd Street) would present a human health risk for commercial/industrial land use.
- The implementation and operation of the vapor mitigation systems at four residential properties (1428/1430 3rd Street, 1432/1434 3rd Street, 1436/1438 3rd Street, and 320 Center Street) appear to be effective in abating vapor intrusion, based on indoor air VOC concentrations. Indoor air concentrations for Rounds 2 and 3, conducted after vapor mitigation was initiated at these four residential properties, were representative of background (ambient) air or did not correlate with crawl space air concentrations, indicating a likely source other than vapor intrusion.
- Indoor air in other residential units located on Center Street also had VOC concentrations above screening levels. The VOC concentrations in indoor air at these other

Center Street residential units were not due to a vapor intrusion pathway associated with soil and groundwater contamination at the Site.

- VOC concentrations in the outdoor air at South Prescott Park were not attributable to groundwater contamination from the former AMCO facility. Rather, the poor ambient air quality is due to another source(s).

8.2 CONTAMINANT CONCENTRATIONS IN SOIL

From the soil characterization and other investigations, the nature and extent of soil contamination was established for the former AMCO facility and some neighboring properties. Major findings on geologic conditions and soil contamination at the Site are presented below based on the results presented in Sections 4 and 5.

8.2.1 Geologic Conditions

- The supplemental investigations included characterization of the geologic conditions for five distinct lithological units at the former AMCO facility. These units, sequentially starting at the ground surface (i.e., from top to bottom), are: (1) Fill; (2) Younger Bay Mud, at some portions of the former AMCO facility; (3) Merritt Sand; (4) Older Bay Mud, also referred to as Bay Mud; and (5) the Alameda Formation. [Note: The investigations did not extend to the bedrock (Franciscan Formation) that underlies the Alameda Formation.]
- Fill is a mixture of loose fine gravels, sands, silts, and clays in varying proportions and often containing miscellaneous refuse. The Fill material generally is present in surface soil, with a variable thickness ranging from non-existent to an average of 5 feet.
- Younger Bay Mud consists primarily of dark plastic clay and silty clay rich in organic matter. Younger Bay Mud was observed primarily in the northern and eastern areas of the former AMCO facility, at the ground surface or below the Fill.
- The Merritt Sand unit is the predominant lithologic unit present in the uppermost water-bearing zone, referred to as the Upper Aquifer. The Merritt Sand unit consists primarily of fine-grained sands, with varying amounts of silts and clays. The upper 30 to 35 feet of the Merritt Sand unit at the former AMCO facility have a higher content of fine-grained soils (silts and clays) than the lower portion of this unit.
- The depth to the Older Bay Mud unit varies at the Site, from 55 to 65 feet bgs at the former AMCO facility to as deep as 80 feet bgs at the southern edge of the Site (monitoring well RMW-19-80).
- The upper portion of the Older Bay Mud formation is dominated by greenish-gray stiff clays with sand and gravel lenses. Between 80 and 120 feet bgs, the Older Bay Mud consists of greenish-gray clay of hard consistency that contains sea shells. The lower portion of the Older Bay Mud (120 to 138 feet bgs) consists of clay with color changes from greenish-gray to pale brown.
- Only the upper portion of the Alameda Formation was characterized by the supplemental RI investigations. Transitioning from the Older Bay Mud clays was observed at 138 feet bgs in boring RMW-02-131, with a four-foot-thick layer of yellowish brown sand that was unsaturated and dense with cementation consistency. Clay was observed

below this sand layer to 159 feet bgs, with a gradual transition to clayey sands at the maximum drilling depth of 160 feet bgs. Alameda Formation characteristics reported on the Red Star yeast well log were not observed in the continuous boring for monitoring well RMW-02-131.

8.2.2 Soil Contamination

- The COCs associated with subsurface soil contamination at the Site consist of VOCs, SVOCs, metals, organochlorine pesticides, PCBs, and dioxins/furans. The presence of VOCs, SVOCs, organochlorine pesticides, PCBs, some metals, and dioxins/furans is attributable primarily to AMCO's past operations.
- The source area at the former AMCO facility has soil contamination consisting of a complex mixture of organics that is present as a LNAPL, and elevated concentrations of many COCs to a deeper vertical extent than is observed elsewhere. The source area encompasses an area bounded on the east by the west wall of the warehouse, on the north by soil borings SC-053 through SC-056, on the west by soil borings SC-029, SC-032, SC-035, and SC-040, and to the south by soil boring SC-013.
- The VOCs that have exceeded their respective soil SLs within the source area consist of PCE, TCE, cDCE, VC, 11-DCA, 12-DCA, BEN, EBZ, xylenes, 124-TMB, and 14 DCB. In the source area, the bulk of VOC contamination in soil extends to an approximate depth of 30 feet bgs. TCE exceeded its SL in a soil sample collected at a depth of 61 feet bgs in one boring (SC-021) completed in the source area.
- SVOCs present at concentrations exceeding soil SLs are primarily PAHs, and SVOC soil contamination has a widespread lateral footprint at both the former AMCO facility and the neighboring properties. The list of SVOCs exceeding soil SLs include B(a)PYR, B(a)ANTRCN, DB(a,h)ANTRCN, I(1,2,3-c,d)PYR, B(b)FLURNTN, B(k)FLURNTN, NAPH, 1-MNAPH, 2-MNAPH, PCP, PHEN, CHRYSN, and NS-n-PPLAM. The majority of SVOC concentrations exceeding soil SLs are present in shallow soils, generally to 5 feet bgs or less. SVOC concentrations above soil SLs were found in soil from source area borings SC-020 and SC-022 to a depth of 20 feet bgs. Soil samples collected at a depth of 60 feet bgs from boring SC-028, located at the southwestern portion of the former AMCO yard, contained benzo(a)pyrene and dibenz(a,h)anthracene at concentrations exceeding their SLs. Based on the soil characterization results, the deepest vertical extent of SVOCs was associated with boring SC-028.
- Arsenic and lead were the most common inorganic COCs (i.e., metals) exceeding their SLs in soils across the AMCO Property and the neighboring properties. Soil contamination associated with these metals typically was observed at depths ranging from 1 to 5 feet bgs. The presence of lead in the soils is not considered attributable to the former AMCO operations, as lead contamination in shallow soil is widespread in the South Prescott area.
- The pesticides aldrin, dieldrin, DDT, DDD, and DDE were detected above their soil SLs at the AMCO Property and the Large Vacant Lot. At the AMCO Property, pesticide contamination occurs in the source area, the southwestern portion of the AMCO yard, portions of the northern AMCO yard, and the western portion of the warehouse building footprint. Pesticide contamination extended to a maximum depth of 30 feet bgs in the

source area. At the Large Vacant Lot, pesticide contamination was present in shallow soils (to a depth of 8 feet bgs) from the center to the southern end of the property.

- Soils contaminated with PCBs (as PCB-1242, PCB-1254, and PCB-1260) are limited to a number of small areas in the yard of the former AMCO facility and a couple of locations at the neighboring properties. PCB-1260 was detected to 20 feet bgs at the source area.
- The presence of petroleum hydrocarbons as diesel and motor oil in soil was scattered, with detections in various portions of the former AMCO yard (central-north, northwest, and south) and beneath the warehouse. The highest concentrations of petroleum hydrocarbons were found in soil from the central-north portion of the former AMCO yard.
- Diesel and motor oil soil contamination detected in off-site locations (3rd Street and the UPRR yard) is due to other sources, not to the former AMCO operations.
- VOCs were not detected in soil samples collected from the boring for monitoring well RMW-02-131 at depths associated with the Older Bay Mud (80, 100, and 125 feet bgs). Chlorinated VOCs were detected only in the upper portion (60 to 70 feet bgs) of the Older Bay Mud in boring SC-021, located about three feet east of the boring for RMW 02-131. The concentration of TCE in soil at the upper portion of the Older Bay Mud in boring SC-021, while exceeding the SL, is not indicative of the presence of DNAPL. VOCs were not detected in the soil sample from the boring for RMW 02 131 collected at 150 feet bgs, a depth associated with the Alameda Formation.

8.3 NATURE AND EXTENT OF GROUDWATER CONTAMINATION

Conclusions on the nature and extent of groundwater contamination (Section 6), and the interpretation of fate and transport for the COCs in groundwater (Section 7), are presented below.

Upper Aquifer Groundwater

- COCs present in the Upper Aquifer groundwater at concentrations exceeding their SLs consist of VOCs, SVOCs, metals, PCB-1260, pesticides, and dioxins/furans. Chlorinated VOCs are the major contaminants in groundwater, having a large lateral extent in both the shallow (5-15 feet bgs) and intermediate (25-35 feet bgs) zones of the Upper Aquifer.
- The highest VOC concentrations were detected in groundwater from monitoring wells screened in the shallow zone and located within or immediately adjacent to the source area in the former AMCO facility. CVOC concentrations in groundwater from the shallow-zone of the Upper Aquifer at the former AMCO facility are more than an order of magnitude greater than those in intermediate-zone groundwater.
- In the downgradient portion of the Upper Aquifer plume, CVOC concentrations are a little higher in the intermediate-zone groundwater than in the shallow-zone groundwater.
- TCE was detected above its SL during the August 2012 monitoring event in groundwater from two deep zone (40-60 feet bgs) wells, RMW-14-50 and RMW-12-51. TCE in groundwater from well RMW-12-51, located immediately downgradient of the source area, is attributed to former AMCO operations. In consideration of the historical TCE

concentrations in groundwater from well RMW-14-50, the well's location, and the absence of TCE in groundwater from upgradient deep-zone wells, the source of the TCE in groundwater from RMW-14-50 is not likely associated with the former AMCO facility.

- Other VOCs in groundwater at concentrations above SLs are monocyclic aromatic hydrocarbons (notably toluene), methylated benzenes, and chlorinated benzenes. The lateral footprint of the plumes for these VOCs includes the RMW-02 and RMW-12 well clusters, with the vertical extent of these VOCs being primarily the shallow zone and, to a lesser extent, the intermediate-zone.
- The COC with the largest lateral extent (i.e., plume) is 1,4-dioxane, an SVOC. The shallow-zone plume for 1,4-dioxane extends from the northeastern corner of the former AMCO facility (well RMW-03-15) to beyond downgradient monitoring well BMW-08, located approximately 300 feet southwest of the former AMCO facility. In the intermediate-zone groundwater, the lateral extent of the 1,4-dioxane plume is less, but maximum 1,4-dioxane concentrations are greater than those in the shallow-zone groundwater.
- The lateral extent of other SVOC plumes, in both the shallow and intermediate zones, is limited to the former AMCO facility.
- High concentrations of arsenic and iron and, to a lesser degree, manganese, are present in groundwater associated with the VOC plumes. The reducing conditions resulting from the biodegradation of the VOCs have resulted in the formation of the more soluble, reduced ionic forms of these inorganic chemicals.
- The extent of organochlorine pesticide, PCB, and dioxin/furan contamination in groundwater is limited to the portion of the source area where former chemical handling operations likely released these COCs to the environment. The presence of these COCs at off-site locations (i.e., south of 3rd Street) is not attributable to the former AMCO operations.
- The source area continues to contribute COC contamination to groundwater, especially in the shallow zone. This contribution is attributable to dissolution from LNAPL and desorption form the high COC concentrations in soil.
- Chemical releases in the source area during AMCO's operation resulted in a complex mixture of organic contaminants that is present as a LNAPL. At the source area, the vertical extent of COCs with low water solubility (e.g., pesticides, PCBs, and many PAHs) is attributable to facilitated transport mechanisms. Co-solvent effects also occurred, which resulted in the chlorinated solvents accumulating in the LNAPL and not forming a DNAPL.
- Biodegradation of many of the COCs is occurring at the Site. Reductive dechlorination is actively transforming the CVOCs, resulting in cDCE being the COC with the highest concentration in groundwater. The chlorinated benzenes also are undergoing reductive dechlorination. The biodegradation of the non-chlorinated VOCs is occurring under anaerobic conditions associated with anaerobic respiration (ferric iron and sulfate reduction) and fermentation processes.

- Microbial parameter concentrations are consistent with the observed active reductive dechlorination. Dehalococcoides and their functional genes associated with chlorinated ethene biodegradation are present at concentrations indicative of active reductive dechlorination in groundwater associated with TCE, cDCE, and/or VC plumes in the shallow and intermediate zones. Dissolved gases (methane, ethene, and ethane) associated with active biodegradation also are present in groundwater with elevated VOC concentrations.
- Natural attenuation processes, notably biodegradation, are the primary reasons for the limited downgradient extent of the VOC plumes relative to the source of the COC releases to the environment (i.e., chemical handling operations at the source area).
- The extent to which natural attenuation processes can continue to reduce the COC contaminant mass in groundwater at the Site is uncertain. This uncertainty is due to (1) whether sufficient biodegradable, residual COC mass remains in the source area (LNAPL and contaminated soil) and (2) the continuing presence of elevated concentrations in groundwater of cDCE and VC, by-products of the reductive dechlorination of TCE.
- The extent of 1,4-dioxane-impacted groundwater is consistent with the fate and transport properties of this COC: it is highly soluble in water, has low volatility and limited sorption to soil, and is recalcitrant to abiotic and biotic transformations. The concentration trends over time for 1,4-dioxane at the Site do not indicate that natural attenuation processes are effective in limiting the migration of this COC.

Lower Aquifer Groundwater

- The VOC analytical results for groundwater from the Lower Aquifer monitoring well (RMW-02-131) indicate that chemical releases at the former AMCO facility have not impacted the water quality of the Lower Aquifer groundwater.

Preferential Migration of Contaminated Groundwater along Sewer Interceptor Bedding

- The sewer interceptor's bedding does not serve as a preferential pathway for migration of contaminated groundwater attributable to the former AMCO facility.

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TABLES

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Table 1-1
Total Dissolved Solids Concentrations in Groundwater from the Site
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Well ID	Field Sample ID	Total Dissolved Solids (mg/L)	Exceeds RWQCB Criterion[3] (3,000 mg/L)	Exceeds US EPA Criterion[4] (10,000 mg/L)
Upper Aquifer Groundwater[1]				
North of 3rd Street				
BMW-06	BMW-06-1012	**5,100**	X	
RMW-01-17	RMW-01-17-1012	**600**		
RMW-01-35	RMW-01-35-1012	**1,400**		
RMW-02-13	RMW-02-13-1012	**1,600**		
RMW-02-32	RMW-02-32-1012	**2,800**		
RMW-02-50	RMW-02-50-1012	**890**		
RMW-03-15	RMW-03-15-1012	**2,100**		
RMW-04-15	RMW-04-15-1012	**1,100**		
RMW-06-15	RMW-06-15-1012	**1,100**		
RMW-06-35	RMW-06-35-1012	**1,200**		
RMW-06-61	RMW-06-61-1012	**7,800**	X	
RMW-07-15	RMW-07-15-1012	**690**		
RMW-07-35	RMW-07-35-1012	**1,300**		
RMW-08-15	RMW-08-15-1012	**710**		
RMW-08-35	RMW-08-35-1012	**1,200**		
RMW-11-35	RMW-11-35-1012	**1,400**		
MW-12	MW-12-1012	**1,200**		
RMW-12-32	RMW-12-32-1012	**1,100**		
RMW-12-51	RMW-12-51-1012	**520**		
RMW-15-15	RMW-15-15-1012	**420**		
RMW-15-35	RMW-15-35-1012	**1,500**		
RMW-15-60	RMW-15-60-1012	**520**		
RMW-16E-15	RMW-16E-15-1012	**490**		
RMW-16W-15	RMW-16W-15-1012	**450**		
RMW-16-35	RMW-16-35-1012	**1,300**		
RMW-16-60	RMW-16-60-1012	**4,400**	X	
South of 3rd Street				
BMW-01	BMW-01-1012	**6,200**	X	
BMW-03	BMW-03-1012	**5,800**	X	
RMW-05-15	RMW-05-15-1012	**1,400**		
RMW-05-35	RMW-05-35-1012	**1,300**		
RMW-05-74	RMW-05-74-1012	**62,000**	X	X
RMW-09-15	RMW-09-15-1012	**6,100**	X	
RMW-09-35	RMW-09-35-1012	**460**		
RMW-09-70	RMW-09-70-1012	**61,000**	X	X
RMW-10-15	RMW-10-15-1012	**2,900**		
RMW-10-35	RMW-10-35-1012	**20,000**	X	X

Table 1-1
Total Dissolved Solids Concentrations in Groundwater from the Site
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Well ID	Field Sample ID	Total Dissolved Solids (mg/L)	Exceeds RWQCB Criterion[3] (3,000 mg/L)	Exceeds US EPA Criterion[4] (10,000 mg/L)
Upper Aquifer Groundwater[1]				
RMW-10-79	RMW-10-79-1012	**69,000**	X	X
BPZ-01	BPZ-01-1012	**1,400**		
RMW-13-35	RMW-13-35-1012	**19,000**	X	X
BMW-07	BMW-07-1012	**1,700**		
RMW-14-35	RMW-14-35-1012	**8,300**	X	
RMW-14-50	RMW-14-50-1012	**6,700**	X	
RMW-17-35	RMW-17-35-1012	**15,000**	X	X
RMW-17-70	RMW-17-70-1012	**64,000**	X	X
BMW-08	BMW-08-1012	**37,000**	X	X
RMW-18-35	RMW-18-35-1012	**58,000**	X	X
RMW-18-79	RMW-18-79-1012	**70,000**	X	X
RMW-19-15	RMW-19-15-1012	**850**		
RMW-19-35	RMW-19-35-1012	**2,200**		
RMW-19-80	RMW-19-80-1012	**70,000**	X	X
Lower Aquifer[2]				
North of 3rd Street				
RMW-02-131	GW01-090413	**1,120**		

Notes:

[1] Upper Aquifer samples for TDS analysis collected between 10/22 and 10/31/2012.

[2] Lower Aquifer samples for TDS analysis collected on 9/4/2013.

[3] Source: RWQCB, 2011.

[4] Source: Underground source of drinking water as defined in Code of Federal Regulations (CFR), Title 40, Part 144, Section 144.3.

mg/L = milligrams per liter

ID = identification

Table 2-1
Analyses for Sampled Media
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Analytes	Groundwater (monitoring wells)	Groundwater (grab)	Soil	Soil Gas	Crawl Space Air	Ambient Air	Indoor Air
VOCs[1]	X	X	X	X[5]	X[5]	X[5]	X[5]
SVOCs[1]	X	X	X				
Organochlorine Pesticides	X		X				
Metals	X		X				
Dioxins/Furans	X		X				
PCBs[1]	X		X				
TPHg[1]	X		X				
TPH-d[1]	X		X				
Anions[2]	X						
Dissolved Gases	X						
TDS[1]	X						
Wet Chemistry[3]	X						
Ferrous Iron	X						
VFAs[1,4]	X						
Microbial Parameters[4]	X						

Notes:

[1] VOCs: volatile organic compounds; SVOCs: semi-volatile organic compounds; PCBs: polychlorinated biphenyls; TDS: total dissolved solids; VFAs: volatile fatty acids; TPH-g: total petroleum hydrocarbons (gasoline range); and TPH-d: total petroleum hydrocarbons (diesel range).

[2] Anion analytes consisted of chloride, sulfate, and nitrate.

[3] Wet chemistry analyses included alkalinity, dissolved organic carbon (DOC), sulfide, and chemical oxygen demand (COD).

[4] The microbial parameters consisted of the chemical analysis for VFAs and microbial analyses for *Dehalococcoides* and tceA, bvcA, and vcrA (the known genes encoding the reductases associated with reductive dechlorination).

[5] VOC analysis included naphthalene, 1-4-dioxane, and methyl tert-butyl ether (MTBE).

Table 2-2
Details of Soil Gas and Air Sampling during Round 1 in June 2009
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Address	Sampled Matrix[1]	Sample ID	Date	Comments[2]
1414 3rd St	CA	CMI-CA01-E1	6/24/09	NW portion of office crawl space
	CA	CMI-CA02-E1	6/24/09	East portion of office crawl space
	IA	CMI-IA01-E1	6/24/09	SE room of office
	IA	CMI-IA02-E1	6/24/09	NE room of office
1428 3rd St (downstairs unit)	OA	1428-OA01-E1	6/24/09	Center of backyard at height of 3 ft
	CA	1428-CA01-E1	6/24/09	Crawl space at front of unit (water in sample)
	CA	1428-CA02-E1	6/24/09	Crawl space at center of building
	CA	1428-CA03-E1-Dup	6/24/09	Duplicate of 1428-CA02-E1
	IA	1428-IA01-E1	6/24/09	Living room, NE corner
	IA	1428-IA02-E1	6/24/09	Duplicate of 1428-IA01-E1
	IA	1428-IA03-E1	6/24/09	Center of master bedroom
	IA	1428-IA04-E1	6/24/09	Back bedroom, NE corner
	IA	1428-IA05-E1	6/24/09	Kitchen, along west wall
	SG	1428-SG01-E1	6/24/09	Center of backyard at 2.5 ft bgs
	SG	1428-SG02-E1	6/24/09	North end of backyard at 2.5 ft bgs
1430 3rd St (upstairs unit)	OA	1430-OA01-E1	6/24/09	NE corner of back deck
	IA	1430-IA01-E1	6/24/09	NW corner of living room
	IA	1430-IA02-E1	6/24/09	W side of bedroom on SW portion of unit
	IA	1430-IA03-E1	6/24/09	E side of middle bedroom (W of kitchen)
	IA	1430-IA04-E1	6/24/09	SW corner of back bedroom
1432 3rd St (downstairs unit)	OA	1432-OA01-E1	6/25/09	Center of the backyard
	OA	1432-OA02-E1	6/25/09	N portion of the backyard
	CA	1432-CA01-E1	6/25/09	Crawl space at front portion of building
	CA	1432-CA02-E1	6/25/09	Crawl space at center of building
	IA	1432-IA01-E1	6/25/09	Living room
	IA	1432-IA02-E1	6/25/09	Duplicate of 1432-IA01-E1
	IA	1432-IA03-E1	6/25/09	Living area of backyard unit
	SG	1432-SG01-E1	6/24/09	Center of the backyard at 2.5 ft bgs
	SG	1432-SG02-E1	6/24/09	N portion of the backyard at 2.5 ft bgs
1434 3rd St (upstairs unit)	IA	1434-IA01-E1	6/25/09	Living room in center of unit
1436 3rd St (downstairs unit)	OA	1436-OA01-E1	6/24/09	Yard between front & rear units, 3 ft. high
	IA	1436-IA01-E1	6/24/09	1st floor, master bedroom on SE wall
	IA	1436-IA02-E1	6/24/09	Duplicate of 1436-IA01-E1
	IA	1436-IA03-E1	6/24/09	1st floor, living room/kitchen area
	IA	1436-IA04-E1	6/24/09	1st floor, back bedroom on SE wall
	IA	1436-IA05-E1	6/24/09	Rear house unit, main bedroom, N wall
	SG	1436-SG01-E1	6/24/09	Yard between front & rear units, 2.5 ft bgs
1438 3rd St (upstairs unit)	IA	1438-IA01-E1	6/24/09	Back bedroom, N side of building
	IA	1438-IA02-E1	6/24/09	Middle bedroom, west side of unit
	IA	1438-IA03-E1	6/24/09	Living room, NE corner
	IA	1438-IA04-E1	6/24/09	Master bedroom, eastern portion

Table 2-2
Details of Soil Gas and Air Sampling during Round 1 in June 2009
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Address	Sampled Matrix[1]	Sample ID	Date	Comments[2]
320 Center St	OA	320-OA01-E1	6/24/09	NE section of backyard, 3 ft height
	CA	320-CA01-E1	6/24/09	Crawl space at center of building
	CA	320-CA02-E1	6/24/09	Crawl space at NW corner of building
	IA	320-IA01-E1	6/24/09	Front storage room
	IA	320-IA02-E1	6/24/09	Front bedroom, across from kitchen
	IA	320-IA03-E1	6/24/09	Middle bedroom
	IA	320-IA04-E1	6/24/09	Living room area
	IA	320-IA05-E1	6/24/09	Back bedroom
	SG	320-SG01-E1	6/23/09	NE corner of backyard, 2.5 ft bgs
326 Center St (upstairs unit)	CA	326-CA01-E1	6/26/09	Crawl space in front portion of unit
	IA	326-IA01-E1	6/26/09	Center of living room
	IA	326-IA02-E1	6/26/09	Front bedroom, S side of unit
	IA	326-IA03-E1	6/26/09	Front bedroom, N side of unit
	IA	326-IA04-E1	6/26/09	Dining room, adjacent to kitchen
337 Center St (1st floor)	IA	337-IA01-E1	6/24/09	Storage room, south side of building
	IA	337-IA02-E1	6/24/09	Center area between kitchen & living room
339 Center St (2nd floor of 337 Center St)	OA	339-OA01-E1	6/24/09	Upper level front porch of building
	IA	339-IA01-E1	6/24/09	West wall of SE corner bedroom
	IA	339-IA02-E1	6/24/09	Living room (NE corner)
	SG	339-SG01-E1	6/23/09	NE corner of backyard, 2.5 ft bgs
356 Center St	OA	356-OA01-E1	6/24/09	Upper level front porch
	IA	356-IA01-E1	6/24/09	2nd floor front bedroom
	IA	356-IA02-E1	6/24/09	2nd floor living room
	IA	356-IA03-E1	6/24/09	2nd floor back bedroom
	IA	356-IA04-E1	6/24/09	1st floor entertainment room
	IA	356-IA05-E1	6/24/09	1st floor childs play room
	IA	356-IA06-E1	6/24/09	Backyard shed
	SG	356-SG01-E1	6/23/09	Center of backyard, 2.5 ft bgs
360 Center St	OA	360-OA01-E1	6/24/09	NE portion of backyard, height of 3 feet
	IA	360-IA01-E1	6/24/09	1st floor, second bedroom
	IA	360-IA02-E1	6/24/09	1st floor, back bedroom
	IA	360-IA03-E1	6/24/09	1st floor, left corner of front bedroom
	IA	360-IA04-E1	6/24/09	1st floor, living room area
	IA	360-IA05-E1	6/24/09	1st floor, back shed area
	IA	360-IA06-E1	6/24/09	2nd floor, center bedroom
	IA	360-IA07-E1	6/24/09	2nd floor, kitchen area
	IA	360-IA08-E1	6/24/09	2nd floor, back (NE) bedroom
	IA	360-IA09-E1	6/24/09	2nd floor, laundry room area
	SG	360-SG01-E1	6/23/09	NE corner of backyard, 2.5 ft bgs
366 Center St (downstairs unit)	OA	366-OA01-E1	6/25/09	Center of backyard
	IA	366-IA01-E1	6/25/09	Front bedroom
	IA	366-IA02-E1	6/25/09	Center of living room
	IA	366-IA03-E1	6/25/09	SE corner of middle bedroom
	IA	366-IA04-E1	6/25/09	S side of back bedroom
	SG	366-SG01-E1	6/25/09	NE corner of backyard, 2.5 ft bgs
	SG	366-SG02-E1	6/25/09	Duplicate of 366-SG02-E1
323 Lewis St	OA	LEWIS-BGA01-E1	6/24/09	Front fence of lot. Background air sample.
	OA	LEWIS-BGA02-E1	6/25/09	Front fence of lot. Background air sample.

Table 2-2
Details of Soil Gas and Air Sampling during Round 1 in June 2009
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Address	Sampled Matrix[1]	Sample ID	Date	Comments[2]
Park[3]	OA	PARK-BGA02-E1	6/24/09	East of playground structure
	OA	PARK-BGA03-E1	6/25/09	East of playground structure
	SG	PARK-SG01-E1	6/25/09	58 ft E of Center St entrance, 9 ft from fence
	SG	PARK-SG02-E1	6/25/09	32 ft W of Center St entrance, 6 ft from fence
Permanent Soil Gas Probes				
RSP-01	SG	PSG01-E1	6/24/09	See Figure 2-1 for probe location
RSP-02	SG	PSG02-E1	6/24/09	See Figure 2-1 for probe location
RSP-03	SG	PSG03-E1	6/24/09	See Figure 2-1 for probe location
RSP-04	SG	PSG04-E1	6/24/09	See Figure 2-1 for probe location
RSP-05	SG	PSG05-E1	6/24/09	See Figure 2-1 for probe location
RSP-06	SG	PSG06-E1	6/24/09	See Figure 2-1 for probe location
RSP-07	SG	PSG07-E1	6/24/09	See Figure 2-1 for probe location
RSP-08	SG	PSG08-E1	6/24/09	See Figure 2-1 for probe location
RSP-09	SG	PSG09-E1	6/24/09	See Figure 2-1 for probe location
RSP-10	SG	PSG10-E1	6/24/09	See Figure 2-1 for probe location
RSP-11	SG	PSG11-E1	6/24/09	See Figure 2-1 for probe location
RSP-12	SG	PSG12-E1	6/24/09	See Figure 2-1 for probe location

Notes:
[1] OA - Outdoor Air
CA - Crawl Space Air
IA - Indoor Air
SG - Soil Gas
[2] N - north
S - south
W - west
E - east
NE - northeast
NW - northwest
SE - southeast
SW - southwest
ft - feet
bgs - below ground surface
[3] Park - South Prescott Park, located to the south of 3rd Street, Oakland, California.
[4] Trip blanks (not listed) shipped along with samples to analytical laboratory as part of the QA/QC.

Table 2-3
Details of Soil Gas and Air Sampling during Round 2 in September/October 2010
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Address	Sampled Matrix[1]	Sample ID	Date	Comments[2]
1414 3rd St	CA	CMI-CA01-E2	9/30/10	NW portion of office crawl space
	CA	CMI-CA02-E2	9/30/10	East portion of office crawl space
	IA	CMI-IA01-E2	9/30/10	SE room of office
	IA	CMI-IA02-E2	9/30/10	SW room of office
1428 3rd St (downstairs unit)	OA	1428-OA01-E2	9/29/10	Backyard
	CA	1428-CA01-E2	9/30/10	Crawl space at SW portion of unit
	CA	1428-CA02-E2	9/30/10	Crawl space at NW portion of unit
	CA	1428-CA03-E2	9/30/10	Duplicate of 1428-CA02-E2
	IA	1428-IA01-E2	9/29/10	Living room
	IA	1428-IA02-E2	9/29/10	Duplicate of 1428-IA01-E2
	IA	1428-IA03-E2	9/29/10	Center of front bedroom
	IA	1428-IA04-E2	9/29/10	Back bedroom
	SG	1428-SG01-E2	9/29/10	Backyard just north of unit, 2.5 ft bgs
	SG	1428-SG02-E2	9/29/10	North end of backyard, 2.5 ft bgs
1430 3rd St (upstairs unit)	OA	1430-OA01-E2	9/29/10	Balcony
	IA	1430-IA01-E2	9/29/10	Living room
	IA	1430-IA02-E2	9/29/10	Middle bedroom
	IA	1430-IA03-E2	9/29/10	Back hallway
1432 3rd St (downstairs unit)	OA	1432-OA01-E2	9/29/10	Back portion of the backyard
	OA	1432-OA02-E2	9/29/10	Backyard
	CA	1432-CA01-E2	9/29/10	Crawl space, back portion of building
	CA	1432-CA02-E2	9/29/10	Crawl space, front portion of building
	IA	1432-IA01-E2	9/29/10	Living room
	IA	1432-IA02-E2	9/29/10	Duplicate of 1432-IA01-E2
	IA	1432-IA03-E2	9/29/10	Front room of back unit
	SG	1432-SG01-E2	9/28/10	SE portion of the backyard at 2.5 ft bgs
	SG	1432-SG02-E2	9/28/10	N portion of the backyard at 2.5 ft bgs
1434 3rd St (upstairs unit)	IA	1434-IA01-E2	9/29/10	Living room
1436 3rd St (downstairs unit)	OA	1436-OA01-E2	9/29/10	Back of front unit
	IA	1436-IA01-E2	9/29/10	Doorway to front bedroom
	IA	1436-IA02-E2	9/29/10	Duplicate of 1436-IA01-E2
	IA	1436-IA03-E2	9/29/10	Kitchen
	IA	1436-IA04-E2	9/29/10	Back bedroom
	IA	1436-IA05-E2	9/29/10	Rear house unit, bedroom
	SG	1436-SG01-E2	9/28/10	Yard between front & rear units, 2.5 ft bgs
1438 3rd St (upstairs unit)	IA	1438-IA01-E2	9/29/10	Back bedroom
	IA	1438-IA02-E2	9/29/10	Kitchen
	IA	1438-IA03-E2	9/29/10	Hallway
	IA	1438-IA04-E2	9/29/10	Front bedroom
320 Center St	CA	320-CA01-E2	9/30/10	Crawl space at front of unit
	CA	320-CA02-E2	9/30/10	Crawl space at SE corner of unit
326 Center St (upstairs unit)	CA	326-CA01-E2	9/30/10	Crawl space in front portion of unit
	SG	326-SG01-E2	9/29/10	NW corner of lot, 2.5 ft bgs
337 Center St (1st floor)	IA	337-IA01-E2	9/29/10	Back bedroom
	IA	337-IA02-E2	9/29/10	Hallway
339 Center St (2nd floor of 337 Center St)	OA	339-OA01-E2	9/29/10	Back porch
	IA	339-IA01-E2	9/29/10	SE corner bedroom
	IA	339-IA02-E2	9/29/10	Living room
	SG	339-SG01-E2	9/28/10	Center of backyard, 2.5 ft bgs

Table 2-3
Details of Soil Gas and Air Sampling during Round 2 in September/October 2010
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Address	Sampled Matrix[1]	Sample ID	Date	Comments[2]
356 Center St	OA	356-OA01-E2	9/29/10	Backyard, behind fenced area
	IA	356-IA01-E2	9/29/10	2nd floor, front bedroom
	IA	356-IA02-E2	9/29/10	2nd floor, front living room
	IA	356-IA03-E2	9/29/10	2nd floor, back bedroom
	IA	356-IA04-E2	9/29/10	2nd floor, playroom
	IA	356-IA05-E2	9/29/10	1st floor, entertainment room
	IA	356-IA06-E2	9/29/10	Backyard shed
	SG	356-SG01-E2	9/29/10	S edge of backyard, 2.5 ft bgs
366 Center St	SG	366-SG01-E2	9/29/10	Backyard
	SG	366-SG02-E2	9/29/10	Duplicate of 366-SG02-E2
368 Center St (upstairs unit)	IA	368-IA01-E2	9/29/10	Front bedroom
	IA	368-IA02-E2	9/29/10	Back bedroom
	IA	368-IA03-E2	9/29/10	Living room
323 Lewis St	OA	LEWIS-BGA01-E2	9/29/10	Front fence of lot. Background air sample.
	OA	LEWIS-BGA02-E2	9/30/10	Front fence of lot. Background air sample.
Park[3]	OA	PARK-BGA01-E2	9/29/10	East of playground structure
	OA	PARK-BGA02-E2	9/30/10	East of playground structure
	SG	PARK-SG01-E2	9/30/10	N of western portion of play structure, 2.5 ft bgs
	SG	PARK-SG02-E2	9/30/10	E of play structure, 2.5 ft bgs
Permanent Soil Gas Probes				
RSP-01	SG	PSG01-E2	9/29/10	See Figure 2-1 for probe location
RSP-02	SG	PSG02-E2	10/4/10	See Figure 2-1 for probe location
RSP-03	SG	PSG03-E2	10/1/10	See Figure 2-1 for probe location
RSP-04	SG	PSG04-E2	10/1/10	See Figure 2-1 for probe location
RSP-05	SG	PSG05-E2	10/1/10	See Figure 2-1 for probe location
RSP-06	SG	PSG06-E2	10/1/10	See Figure 2-1 for probe location
RSP-07	SG	PSG07-E2	10/4/10	See Figure 2-1 for probe location
RSP-08	SG	PSG08-E2	10/4/10	See Figure 2-1 for probe location
RSP-09	SG	PSG09-E2	10/4/10	See Figure 2-1 for probe location
RSP-10	SG	PSG10-E2	10/4/10	See Figure 2-1 for probe location
RSP-11	SG	PSG11-E2	10/4/10	See Figure 2-1 for probe location
RSP-12	SG	PSG12-E2	10/4/10	See Figure 2-1 for probe location

Notes:
[1] OA - Outdoor Air
CA - Crawl Space Air
IA - Indoor Air
SG - Soil Gas
[2] N - north
S - south
W - west
E - east
NE - northeast
NW - northwest
SE - southeast
SW - southwest
ft - feet
bgs - below ground surface
[3] Park - South Prescott Park, located to the south of 3rd Street, Oakland, California.
[4] Trip blanks (not listed) shipped along with samples to analytical laboratory as part of the QA/QC.

Table 2-4
Details of Soil Gas and Air Sampling during Round 3 in January/February 2012
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Address	Sampled Matrix[1]	Sample ID	Date	Comments[2]
1428 3rd St (downstairs unit)	OA	1428-OA01-E3	1/31/12	Center of backyard on block wall
	IA	1428-IA01-E3	1/31/12	Living room, NW wall
	IA	1428-IA02-E3	1/31/12	Duplicate of 1428-IA01-E3
	IA	1428-IA03-E3	1/31/12	SE wall of front bedroom
	IA	1428-IA04-E3	1/31/12	Back (north) bedroom
	IA	1428-IA05-E3	1/31/12	NW wall of kitchen
1430 3rd St (upstairs unit)	OA	1430-OA01-E3	2/1/12	NE corner of back balcony
	IA	1430-IA01-E3	2/1/12	Center of living room
	IA	1430-IA03-E3	2/1/12	Kitchen
	IA	1430-IA04-E3	2/1/12	Back bedroom (W side of building)
1432 3rd St (downstairs unit)	OA	1432-OA01-E3	1/31/12	Middle of backyard
	OA	1432-OA02-E3	1/31/12	N end of backyard
	CA	1432-CA01-E3	1/31/12	Crawl space, front portion of building
	CA	1432-CA02-E3	1/31/12	Crawl space, center portion of building
	IA	1432-IA01-E3	1/31/12	Living room
	IA	1432-IA02-E3	1/31/12	Duplicate of 1432-IA01-E3
	IA	1432-IA03-E3	1/31/12	Backyard unit (painted 10-11, faint odor)
1434 3rd St (upstairs unit)	IA	1434-IA01-E3	1/31/12	Center of Living room
1436A 3rd St (downstairs unit)	OA	1436-OA01-E3	2/3/12	Back of front unit
	IA	1436-IA01-E3	2/3/12	Back bedroom, south wall
	IA	1436-IA02-E3	2/3/12	Duplicate of 1436-IA01-E3
	IA	1436-IA03-E3	2/3/12	Living room
	IA	1436-IA04-E3	2/3/12	Front bedroom
1436B 3rd St (upstairs unit)	IA	1436-IA05-E3	2/3/12	Main Bedroom, north wall
320 Center St	OA	320-OA01-E3	1/31/12	Backyard, on block wall
	CA	320-CA01-E3	1/31/12	Crawl space, center of building
	CA	320-CA02-E3	1/31/12	Crawl space, NW corner of building
	IA	320-IA02-E3	1/31/12	Front bedroom, across from kitchen
	IA	320-IA03-E3	1/31/12	Middle bedroom
	IA	320-IA04-E3	1/31/12	Living room
337 Center St (1st floor)	IA	337-IA01-E3	2/2/12	Storage room (south side)
	IA	337-IA02-E3	2/2/12	Center living area (between kitchen and living room)
339 Center St (2nd floor of 337 Center St)	OA	339-OA01-E3	2/2/12	Front porch (upper level)
	IA	339-IA01-E3	2/2/12	Middle bedroom (off dining room)
	IA	339-IA02-E3	2/2/12	Living room (NE corner)
356 Center St	OA	356-OA01-E3	2/2/12	2nd floor front porch
	IA	356-IA01-E3	2/2/12	2nd floor, front bedroom
	IA	356-IA02-E3	2/2/12	2nd floor, living room
	IA	356-IA03-E3	2/2/12	2nd floor, back bedroom
	IA	356-IA04-E3	2/2/12	1st floor, entertainment room
	IA	356-IA05-E3	2/2/12	1st floor, child's play room
	IA	356-IA06-E3	2/2/12	Backyard shed
	IA	356-IA07-E3	2/2/12	Duplicate of 356-IA06-E3
366 Center St (downstairs unit)	OA	366-OA01-E3	2/3/12	Center of backyard
	IA	366-IA01-E3	2/3/12	Front bedroom
	IA	366-IA02-E3	2/3/12	Center living room area
	IA	366-IA03-E3	2/3/12	Middle bedroom (S side of building)
	IA	366-IA04-E3	2/3/12	Back bedroom (S side of building)
	IA	366-IA04-E3	2/3/12	Duplicate of 366-IA04-E3
323 Lewis St	OA	LEWIS-BGA05-E3	2/7/12	Front fence of lot. Background air sample.
329 Lewis St	OA	LEWIS-BGA01-E3	1/31/12	Chained to No Parking sign. Background air sample.
	OA	LEWIS-BGA02-E3	2/1/12	Chained to No Parking sign. Background air sample.
	OA	LEWIS-BGA03-E3	2/2/12	Chained to No Parking sign. Background air sample.
	OA	LEWIS-BGA04-E3	2/3/12	Chained to No Parking sign. Background air sample.

Table 2-4
Details of Soil Gas and Air Sampling during Round 3 in January/February 2012
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Address	Sampled Matrix[1]	Sample ID	Date	Comments[2]
Park[3]	OA	PARK-BGA01-E3	1/31/12	E of playground structure located at east end of the Park
	OA	PARK-BGA02-E3	2/1/12	E of playground structure located at east end of the Park
	OA	PARK-BGA03-E3	2/2/12	E of playground structure located at east end of the Park[5]
	OA	PARK-BGA04-E3	2/3/12	E of playground structure located at east end of the Park
	OA	PARK-BGA05-E3	2/7/12	E of playground structure located at east end of the Park
	OA	PARK-OA1-E3	2/1/12	Play structure
Permanent Soil Gas Probes				
RSP-03	SG	PSG03-E3	2/6/12	See Figure 2-1 for probe location
RSP-05	SG	PSG05-E3	2/6/12	See Figure 2-1 for probe location
RSP-05	SG	PSG05-E3 Dup	2/6/12	See Figure 2-1 for probe location
RSP-07	SG	PSG07-E3	2/6/12	See Figure 2-1 for probe location
RSP-08	SG	PSG08-E3	2/6/12	See Figure 2-1 for probe location

Notes:
[1] OA - Outdoor Air
CA - Crawl Space Air
IA - Indoor Air
SG - Soil Gas
[2] N - north
S - south
W - west
E - east
NE - northeast
NW - northwest
SE - southeast
SW - southwest
ft - feet
bgs - below ground surface
[3] Park - South Prescott Park, located to the south of 3rd Street, Oakland, California.
[4] Trip blanks (not listed) shipped along with samples to analytical laboratory as part of the QA/QC.
[5] Burned cardboard in trash can near sampling location, faint odor.

Table 2-5
CPT-MIP Boring Information
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Boring Identification	Coordinates[2]		CPT Depth (ft. bgs)[1]	MIP Depth (ft. bgs)[1]	Completion Date
	Easting	Northing			
MIP-1	6043088.27	2119837.17	56	53.15	11/30/2010
MIP 2	6043174.67	2119831.06	33.9	30.95	12/1/2010
MIP-3	6043075.71	2119769.09	54	51.5	11/30/2010
MIP-4	6043062.57	2119721.87	MIP only	47.25	12/1/2010
MIP-5	6043198.87	2119749.38	25.5	22.55	11/29/2010
MIP-6	6043187.15	2119710.06	26.7	23.6	12/9/2010
MIP-7	6043175.43	2119674.47	27	24.3	12/9/2010
MIP-8[3]	6043108.59	2119622.39	57.4	53.45	12/8/2010
MIP-9	6043039.58	2119497.82	30	27.5	1/27/2011
MIP-9D	6043039.58	2119497.82	75 to 136	75 to 133	2/4/2011
MIP-10	6042896.78	2119462.67	38	35	1/31/2011
MIP-10D	6042896.78	2119462.67	84 to162	84 to 159.55	2/8/2011
MIP-11	6043049.17	2119928.41	63	60.05	12/6/2010
MIP-12	6043010.07	2119966.52	48	45.15	12/6/2010
MIP-13	6042972.87	2119935.61	49	46.05	12/7/2010
MIP-14	6043008.62	2119848.87	65	62.1	11/30/2010
MIP-15	6043145.50	2119781.10	65	62.1	12/2/2010
MIP-16	6043116.34	2119660.43	47.7	44.65	12/10/2010
MIP-17	6043069.62	2119680.69	50	47.3	12/2/2010

Notes:
1 ft. bgs – feet below ground surface.
2 Coordinates were determined in feet based on the North American Datum of 1983 (NAD 83), California Coordinate System.
3 At MIP-8, the initial CPT-MIP boring referred to as MIP-8A hit refusal at 16.5 feet bgs. Moving a slight distance away, MIP-8B was completed and the details for MIP-8 in Table 1 pertain to MIP-8B.

Table 2-6
Details of Sampling and Analyses for CPT-MIP Confirmation Borings[1]
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Boring ID	Sample Identification	Sampling Depth Interval (ft. bgs)	Sampled Medium	Sampling Date	Analyses Completed[2]					
					Metals	PCBs	Pesticides	SVOCs	TPH-e	VOCs
MIP-1	MIP-1-6-7	6 to 7	Soil	1/3/2011	X	X	X	X	X	X
	MIP-1-22-23	22 to 23	Soil	1/3/2011						X
	MIP-1-55-56	55 to 56	Soil	1/3/2011						X
	MIP-1-64-65	64 to 65	Soil	1/3/2011						X
	MIP-1-GW-15-18	15 to 18	Groundwater	1/3/2011				X		X
	MIP-1-GW-57-60	57 to 60	Groundwater	1/3/2011						X
MIP-2	MIP-2-5-6	5 to 6	Soil	12/29/2010	X	X	X	X	X	X
	MIP-2-15-16	15 to 16	Soil	12/29/2010						X
	MIP-2-35-36	35 to 36	Soil	12/29/2010						X
	MIP-2-55-56	55 to 56	Soil	12/29/2010						X
	MIP-2-65-66	65 to 66	Soil	12/29/2010						X
	MIP-2-GW-14-18	14 to 18	Groundwater	12/29/2010				X		X
MIP-3	MIP-3-5-6	5 to 6	Soil	12/27/2010	X	X	X	X	X	X
	MIP-3-10-11.5	10 to 11.5	Soil	12/27/2010						X
	MIP-3-55-56	55 to 56	Soil	12/27/2010						X
	MIP-3-65-66	65 to 66	Soil	12/27/2010						X
	MIP-3-GW-14-18	14 to 18	Groundwater	12/27/2010				X		X
MIP-4	MIP-4-5-6	5 to 6	Soil	12/29/2010	X	X	X	X	X	X
	MIP-4-10-11	10 to 11	Soil	12/29/2010						X
	MIP-4-40-41	40 to 41	Soil	12/29/2010						X
	MIP-4-55-56	55 to 56	Soil	12/29/2010						X
	MIP-4-64-65	64 to 65	Soil	12/29/2010						X
	MIP-4-GW-15-19	15 to 19	Groundwater	12/29/2010				X		X
	MIP-4-GW-55-60	55 to 60	Groundwater	12/29/2010						X
MIP-5	MIP-5-6-7	6 to 7	Soil	1/17/2011	X	X	X	X	X	X
	MIP-5-19-20	19 to 20	Soil	1/17/2011						X
	MIP-5-39-40	39 to 40	Soil	1/17/2011						X
	MIP-5-55-56	55 to 56	Soil	1/17/2011						X
	MIP-5-65-66	65 to 66	Soil	1/17/2011						X
	MIP-5-GW-20.5-24	20.5-24	Groundwater	1/17/2011						X
MIP-6	MIP-6-6-7	6 to 7	Soil	1/19/2011	X	X	X	X	X	X
	MIP-6-39-40	39 to 40	Soil	1/19/2011						X
	MIP-6-55-56	55 to 56	Soil	1/19/2011						X
	MIP-6-64-65	64 to 65	Soil	1/19/2011						X
	MIP-6-GW-21-24	21 to 24	Groundwater	1/19/2011						X
MIP-7	MIP-7-6-7	6 to 7	Soil	1/18/2011	X	X	X	X	X	X
	MIP-7-11-12	11 to 12	Soil	1/18/2011						X
	MIP-7-39-40	39 to 40	Soil	1/18/2011						X
	MIP-7-55-56	55 to 56	Soil	1/18/2011						X
	MIP-7-64-65	64 to 65	Soil	1/18/2011						X
	MIP-7-GW-17-21	17 to 21	Groundwater	1/18/2011						X
MIP-8	MIP-8-5-6	5 to 6	Soil	12/28/2010	X	X	X	X	X	X
	MIP-8-9-10	9 to 10	Soil	12/28/2010						X
	MIP-8-39-40	39 to 40	Soil	12/28/2010						X
	MIP-8-56-57	56 to 57	Soil	12/28/2010						X
	MIP-8-64-65	64 to 65	Soil	12/28/2010						X
	MIP-8-GW-14-18	14 to 18	Groundwater	12/28/2010				X		X
	MIP-8-GW-35-39	35 to 39	Groundwater	12/28/2010						X
	MIP-8-GW-55-60	55 to 60	Groundwater	12/28/2010						X
MIP-9	MIP-9-2-3	2 to 3	Soil	1/27/2011					X	
	MIP-9-2.5-3.5	2.5 to 3.5	Soil	2/1/2011	X	X	X	X	X	X
	MIP-9-5-6	5 to 6	Soil	2/1/2011	X	X	X	X	X	X
	MIP-9-11-12	11 to 12	Soil	2/1/2011						X
	MIP-9-65-66	65 to 66	Soil	2/1/2011						X
	MIP-9-86-87	86 to 87	Soil	2/4/2011						X
	MIP-9-119-120	119 to 120	Soil	2/7/2011						X
	MIP-9-GW-137-138	137 to 138	Groundwater	2/7/2011						X
MIP-10	MIP-10-2.5-3.5	2.5 to 3.5	Soil	2/2/2011		X	X	X		X
	MIP-10-3.5-4.5	3.5 to 4.5	Soil	2/2/2011	X				X	
	MIP-10-5-6	5 to 6	Soil	2/3/2011	X	X	X	X	X	X
	MIP-10-11-12	11 to 12	Soil	2/3/2011						X
	MIP-10-64.5-65.5	64.5 to 65.5	Soil	2/3/2011						X
	MIP-10-96-97	96 to 97	Soil	2/10/2011						X
	MIP-10-119-120	119 to 120	Soil	2/10/2011						X
	MIP-10-GW-164-167	164 to 167	Groundwater	2/10/2011						X

Table 2-6
Details of Sampling and Analyses for CPT-MIP Confirmation Borings[1]
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Boring ID	Sample Identification	Sampling Depth Interval (ft. bgs)	Sampled Medium	Sampling Date	Analyses Completed[2]					
					Metals	PCBs	Pesticides	SVOCs	TPH-e	VOCs
MIP-11	MIP-11-5-6	5 to 6	Soil	12/15/2010	X	X	X	X	X	X
	MIP-11-22-23	22 to 23	Soil	12/15/2010						X
	MIP-11-52-53	52 to 53	Soil	12/15/2010						X
	MIP-11-GW-19-22	19 to 22	Groundwater	12/15/2010				X		X
MIP-12	MIP-12-5-6	5 to 6	Soil	12/16/2010	X	X	X	X	X	X
	MIP-12-56-57	56 to 57	Soil	12/16/2010						X
	MIP-12-64-65	64 to 65	Soil	12/16/2010						X
	MIP-12-GW-12-16	12 to 16	Groundwater	12/16/2010				X		X
MIP-13	MIP-13-5-6	5 to 6	Soil	12/27/2010	X	X	X	X	X	X
	MIP-13-18-19	18 to 19	Soil	12/27/2010						X
	MIP-13-43-44	43 to 44	Soil	12/27/2010						X
	MIP-13-56-57	56 to 57	Soil	12/27/2010						X
	MIP-13-64-65	64 to 65	Soil	12/27/2010						X
	MIP-13-GW-14-18	14 to 18	Groundwater	12/27/2010				X		X
MIP-14	MIP-14-5-6	5 to 6	Soil	12/28/2010	X	X	X	X	X	X
	MIP-14-22-23	22 to 23	Soil	12/28/2010						X
	MIP-14-55-56	55 to 56	Soil	12/28/2010						X
	MIP-14-64-65	64 to 65	Soil	12/28/2010						X
	MIP-14-GW-14-18	14 to 18	Groundwater	12/28/2010				X		X
	MIP-14-GW-55-60	55 to 60	Groundwater	12/28/2010						X
MIP-15	MIP-15-6-7	6 to 7	Soil	1/5/2011	X	X	X	X	X	X
	MIP-15-23-24	23 to 24	Soil	1/5/2011						X
	MIP-15-55-56	55 to 56	Soil	1/5/2011						X
	MIP-15-64-65	64 to 65	Soil	1/5/2011						X
MIP-16	MIP-16-5-6	5 to 6	Soil	1/6/2011	X	X	X	X	X	X
	MIP-16-19-20	19 to 20	Soil	1/6/2011						X
	MIP-16-41-42	41 to 42	Soil	1/6/2011						X
	MIP-16-55-56	55 to 56	Soil	1/6/2011						X
	MIP-16-65-66	65 to 66	Soil	1/6/2011						X
	MIP-16-GW-20-24	20 to 24	Groundwater	1/6/2011				X		X
MIP-17	MIP-17-5-6	5 to 6	Soil	1/4/2011	X	X	X	X	X	X
	MIP-17-10-11	10 to 11	Soil	1/4/2011						X
	MIP-17-55-56	55 to 56	Soil	1/4/2011						X
	MIP-17-64-65	64 to 65	Soil	1/4/2011						X
	MIP-17-GW-15-18	15 to 18	Groundwater	1/4/2011				X		X
	MIP-17-GW-58.5-60	58.5 to 60	Groundwater	1/4/2011						X

Notes:

[1] Abbreviations

ft. bgs - feet below ground surface
ID - Identification
PCBs - polychlorinated biphenyls
SVOCs - semivolatile organic compounds
TPH-e - total extractable petroleum hydrocarbons (diesel and motor oil range hydrocarbons)
VOCs - volatile organic compounds

[2] EPA Contract Laboratory Program (CLP) analytical methods:

Soil

Metals - Inductively-coupled plasma (ICP) atomic emission spectrometry by Method ISM01.2-ICP Metals (US EPA, 2010a and US EPA, 2010b)
PCBs - Gas chromatography by Method SOM01.2-Arochlors (US EPA, 2005 and 2007).
Pesticides - Gas chromatography by Method SOM01.2-Pesticides (US EPA, 2005 and 2007).
TPH-e - Gas chromatography by Method 8015B (US EPA, 1997).

Soil and Groundwater

SVOCs - Gas chromatography/mass spectrometry by Method SOM01.2-SVOCs (US EPA, 2005 and 2007).
VOCs - Gas chromatography/mass spectrometry by Method SOM01.2-VOCs (US EPA, 2005 and 2007).

Table 2-7
Investigation Areas and Sampling Rationale for Soil Characterization
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Investigation Area	Number of Borings	Soil Sampling Depth (feet below ground surface[1])	Rationale
Former AMCO Facility Yard	74	1, 3, 5, 8, 13, 20, every 10 feet until Bay Mud, top of Bay Mud, and 5 feet below the top of Bay Mud	Assess the extent of soil impacted by VOCs, SVOCs, metals, PCBs, and pesticides across the yard and further define the boundary of VOCs and other COCs, particularly within the source area (chemical delivery by rail)
Former AMCO Warehouse Building	9	1, 3, 5, 8, 13, 20, every 10 feet until Bay Mud, top of Bay Mud, and 5 feet below the top of Bay Mud	Assess the extent of soil impacted by VOCs, SVOCs, metals, PCBs, and pesticides under the warehouse
Large Vacant Lot	36	1, 3, 5, 8, 13, 20, every 10 feet until Bay Mud, top of Bay Mud, and 5 feet below the top of Bay Mud	Assess the extent of soil impacted by VOCs, SVOCs, metals, PCBs, and pesticides
Small Vacant Lot	3	1, 3, 5, 8, 13, 20, every 10 feet until Bay Mud, top of Bay Mud, and 5 feet below the top of Bay Mud	Assess the extent of soil impacted by VOCs, SVOCs, metals, PCBs, and pesticides from a possible secondary source (e.g., surface run-off)
Parking Lot	3	1, 3, 5, 8, 13, 20, every 10 feet until Bay Mud, top of Bay Mud, and 5 feet below the top of Bay Mud	Assess the extent of soil impacted by VOCs, SVOCs, metals, PCBs, and pesticides from a possible secondary source (e.g., previous site usage by DC Metals and others)

Notes:
[1] Soil sample collection depth relative to the top of the soil surface, which was commonly the bottom of concrete or asphalt pavement.
COCs = chemicals of concern
PCBs = polychlorinated biphenyls
SVOCs = semivolatile organic compounds
VOCs = volatile organic compounds

Table 2-8
Details of Soil Sampling and Analyses for Soil Characterization
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Soil Boring Location[1]	Soil Sampling Depth from Top of Soil Surface (feet)[2]	VOCs[3]	SVOCs[3]	Metals[3]	PCBs[3]	Pesticides[3]	Notes
Former AMCO Warehouse							
SC-001	5, 8, 15, 25, 35, 45	X	X	X	X	X	Merritt Sands Formation
SC-001	55 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-001	60 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-002	1, 3, 5, 8, 13, 18, 25, 35, 45, 55	X	X	X	X	X	Merritt Sands Formation
SC-002	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-002	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-003	3, 5, 9, 16, 27, 35, 45	X	X	X	X	X	Merritt Sands Formation
SC-003	55 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-003	60 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-004	1, 3, 5, 8, 13, 18, 25, 35, 45	X	X	X	X	X	Merritt Sands Formation
SC-004	55 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-004	61 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-005	1, 3, 5, 8, 13, 25, 35, 45	X	X	X	X	X	Merritt Sands Formation
SC-005	55 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-005	60 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-006	1, 3, 5, 8, 13, 18, 25, 35, 45	X	X	X	X	X	Merritt Sands Formation
SC-006	55 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-006	60 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-007	1, 3, 5, 8, 13, 18, 25, 35, 45	X	X	X	X	X	Merritt Sands Formation
SC-007	55 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-007	60 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-008	1, 3, 5, 8, 13, 18, 25, 35, 45	X	X	X	X	X	Merritt Sands Formation
SC-008	55 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-008	60 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-009	3, 5, 8, 10, 15, 22, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-009	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-009	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
Former AMCO Facility Yard							
SC-010	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-010	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-010	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-011	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-011	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-011	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-012	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-012	59 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-012	63 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-013	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-013	57 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-013	61 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-014	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-014	58 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-014	63 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-015	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-015	57 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-015	62 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-016	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-016	59 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-016	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-017	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-017	54 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-017	59 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation

Table 2-8
Details of Soil Sampling and Analyses for Soil Characterization
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Soil Boring Location[1]	Soil Sampling Depth from Top of Soil Surface (feet)[2]	VOCs[3]	SVOCs[3]	Metals[3]	PCBs[3]	Pesticides[3]	Notes
SC-018	3, 5, 8, 11, 16, 23, 28, 38, 48	X	X	X	X	X	Merritt Sands Formation
SC-018	58 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-018	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-019	3, 5, 8, 11, 16, 23, 28, 38, 48	X	X	X	X	X	Merritt Sands Formation
SC-019	58 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-019	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-020	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-020	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-020	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-021	1, 3, 5, 8, 13, 20, 25, 35, 45	X	X	X	X	X	Merritt Sands Formation
SC-021	55 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-021	61 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-022	1, 3, 5, 8, 13, 20, 25, 35, 45	X	X	X	X	X	Merritt Sands Formation
SC-022	55 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-022	61 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-023	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-023	63 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-023	68 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-024	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-024	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-024	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-025	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-025	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-025	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-026	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-026	62 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-026	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-027	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-027	62 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-027	67 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-028	1, 3, 5, 8, 13, 20, 30, 40, 50, 60	X	X	X	X	X	Merritt Sands Formation
SC-028	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-028	65, 70 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-029	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-029	61 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-029	67 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-030	1, 3, 5, 8, 13, 20, 30, 40, 50, 60	X	X	X	X	X	Merritt Sands Formation
SC-030	62 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-030	66 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-031	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-031	58 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-031	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-032	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-032	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-032	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-033	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-033	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-033	66 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-034	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-034	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-034	66 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-035	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-035	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-035	66 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation

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Soil Boring Location[1]	Soil Sampling Depth from Top of Soil Surface (feet)[2]	VOCs[3]	SVOCs[3]	Metals[3]	PCBs[3]	Pesticides[3]	Notes
SC-036	3, 5, 8, 11, 16, 23, 28, 38, 48	X	X	X	X	X	Merritt Sands Formation
SC-036	58 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-036	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-037	3, 5, 8, 11, 16, 23, 28, 38, 48	X	X	X	X	X	Merritt Sands Formation
SC-037	58 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-037	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-038	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-038	57 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-038	61 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-039	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-039	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-039	66 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-040	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-040	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-040	66 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-041	3, 5, 7, 10, 15, 22, 27, 37, 47	X	X	X	X	X	Merritt Sands Formation
SC-041	57 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-041	63 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-042	1, 3, 5, 8, 13, 20, 25, 35, 45	X	X	X	X	X	Merritt Sands Formation
SC-042	55 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-042	62 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-043	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-043	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-043	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-044	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-044	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-044	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-045	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-045	57 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-045	62 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-046	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-046	59 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-046	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-047	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-047	58 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-047	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-048	1, 3, 5, 8, 13, 20, 25, 35, 45, 55	X	X	X	X	X	Merritt Sands Formation
SC-048	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-048	70 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-049	3, 5, 8, 11, 16. 23, 28, 38, 48	X	X	X	X	X	Merritt Sands Formation
SC-049	58 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-049	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-050	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-050	64 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation.
SC-050	67 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-051	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-051	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-051	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-052	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-052	55 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-052	60 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-053	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-053	55 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-053	60 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation

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Soil Boring Location[1]	Soil Sampling Depth from Top of Soil Surface (feet)[2]	VOCs[3]	SVOCs[3]	Metals[3]	PCBs[3]	Pesticides[3]	Notes
SC-054	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-054	59 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-054	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-055	3, 5, 7, 10, 15, 22, 27, 37, 47	X	X	X	X	X	Merritt Sands Formation
SC-055	57 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-055	63 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-056	3, 5, 8, 11, 16, 22, 28, 38, 48	X	X	X	X	X	Merritt Sands Formation
SC-056	58 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-056	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-057	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-057	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-057	67 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-058	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-058	62 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-058	67 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-059	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-059	54 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-059	59 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-060	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-060	55 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-060	60 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-061	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-061	59 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-061	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-062	1, 3, 5, 8, 13, 20, 25, 35, 45	X	X	X	X	X	Merritt Sands Formation
SC-062	55 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-062	62 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-063	1, 3 5, 8, 9, 10, 18, 25, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-063	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-063	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-064	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-064	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-064	67 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-065	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-065	62 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-065	66 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-066	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-066	57 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-066	62 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-067	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-067	57 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-067	62 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-068	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-068	59 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-068	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-069	1, 3, 5, 8, 13, 20, 25, 35, 45	X	X	X	X	X	Merritt Sands Formation
SC-069	55 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-069	60 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-070	1, 3, 5, 8, 10, 13, 18, 22, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-070	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-070	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-071	1, 3, 5, 8, 10, 13, 18, 22, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-071	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-071	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation

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Soil Boring Location[1]	Soil Sampling Depth from Top of Soil Surface (feet)[2]	VOCs[3]	SVOCs[3]	Metals[3]	PCBs[3]	Pesticides[3]	Notes
SC-072	1, 3, 5, 8, 10, 13, 18, 22, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-072	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-072	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-073	1, 3, 5, 8, 10, 13, 20, 30, 45, 50	X	X	X	X	X	Merritt Sands Formation
SC-073	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-073	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-074	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-074	59 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-074	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-075	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-075	57 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-075	65 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-076	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-076	55 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-076	60 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-077	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-077	54 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-077	58 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-078	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-078	58 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-078	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-079	3, 5, 8, 15, 22, 28, 38, 48	X	X	X	X	X	Merritt Sands Formation
SC-079	58 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-079	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-080	3, 5, 7, 9, 15, 22, 27, 37, 47	X	X	X	X	X	Merritt Sands Formation
SC-080	57 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-080	63 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-081	3, 5, 7, 10, 15, 22, 27, 37, 47	X	X	X	X	X	Merritt Sands Formation
SC-081	57 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-081	63 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-082	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-082	59 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-082	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-083	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-083	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-083	67 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
Large Vacant Lot							
SC-084	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-084	59 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-084	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-085	13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-085	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-085	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-086	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-086	57 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-086	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-087	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-087	58 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-087	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-088	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-088	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-088	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-089	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-089	59 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-089	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation

Table 2-8
Details of Soil Sampling and Analyses for Soil Characterization
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Soil Boring Location[1]	Soil Sampling Depth from Top of Soil Surface (feet)[2]	VOCs[3]	SVOCs[3]	Metals[3]	PCBs[3]	Pesticides[3]	Notes
SC-090	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-090	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-090	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-091	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-091	58 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-091	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-092	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-092	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-092	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-093	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-093	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-093	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-094	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-094	63 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-094	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-095	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-095	60 (see Note 4)	X					Base of Merritt Sands Formation
SC-095	64 (see Note 5)	X					Older Bay Mud Formation
SC-096	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-096	60 (see Note 4)	X					Base of Merritt Sands Formation
SC-096	64 (see Note 5)	X					Older Bay Mud Formation
SC-097	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-097	60 (see Note 4)	X					Base of Merritt Sands Formation
SC-097	64 (see Note 5)	X					Older Bay Mud Formation
SC-098	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-098	60 (see Note 4)	X					Base of Merritt Sands Formation
SC-098	64 (see Note 5)	X					Older Bay Mud Formation
SC-099	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-099	60 (see Note 4)	X					Base of Merritt Sands Formation
SC-099	64 (see Note 5)	X					Older Bay Mud Formation
SC-100	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-100	60 (see Note 4)	X					Base of Merritt Sands Formation
SC-100	64 (see Note 5)	X					Older Bay Mud Formation
SC-101	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-101	61 (see Note 4)	X					Base of Merritt Sands Formation
SC-101	64 (see Note 5)	X					Older Bay Mud Formation
SC-102	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-102	60 (see Note 4)	X					Base of Merritt Sands Formation
SC-102	64 (see Note 5)	X					Older Bay Mud Formation
SC-103	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-103	60 (see Note 4)	X					Base of Merritt Sands Formation
SC-103	64 (see Note 5)	X					Older Bay Mud Formation
SC-104	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-104	61 (see Note 4)	X					Base of Merritt Sands Formation
SC-104	64 (see Note 5)	X					Older Bay Mud Formation
SC-105	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-105	57 (see Note 4)	X					Base of Merritt Sands Formation
SC-105	63 (see Note 5)	X					Older Bay Mud Formation
SC-106	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-106	60 (see Note 4)	X					Base of Merritt Sands Formation
SC-106	64 (see Note 5)	X					Older Bay Mud Formation
SC-107	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-107	59 (see Note 4)	X					Base of Merritt Sands Formation
SC-107	64 (see Note 5)	X					Older Bay Mud Formation

Table 2-8
Details of Soil Sampling and Analyses for Soil Characterization
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Soil Boring Location[1]	Soil Sampling Depth from Top of Soil Surface (feet)[2]	VOCs[3]	SVOCs[3]	Metals[3]	PCBs[3]	Pesticides[3]	Notes
SC-108	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-108	58 (see Note 4)	X					Base of Merritt Sands Formation
SC-108	63 (see Note 5)	X					Older Bay Mud Formation
SC-109	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-109	60 (see Note 4)	X					Base of Merritt Sands Formation
SC-109	64 (see Note 5)	X					Older Bay Mud Formation
SC-110	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-110	57 (see Note 4)	X					Base of Merritt Sands Formation
SC-110	63 (see Note 5)	X					Older Bay Mud Formation
SC-111	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-111	57 (see Note 4)	X					Base of Merritt Sands Formation
SC-111	63 (see Note 5)	X					Older Bay Mud Formation
SC-112	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-112	58 (see Note 4)	X					Base of Merritt Sands Formation
SC-112	63 (see Note 5)	X					Older Bay Mud Formation
SC-113	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-113	58 (see Note 4)	X					Base of Merritt Sands Formation
SC-113	63 (see Note 5)	X					Older Bay Mud Formation
SC-114	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-114	62 (see Note 4)	X					Base of Merritt Sands Formation
SC-114	65 (see Note 5)	X					Older Bay Mud Formation
SC-115	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-115	60 (see Note 4)	X					Base of Merritt Sands Formation
SC-115	65 (see Note 5)	X					Older Bay Mud Formation
SC-116	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-116	60 (see Note 4)	X					Base of Merritt Sands Formation
SC-116	64 (see Note 5)	X					Older Bay Mud Formation
SC-117	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-117	60 (see Note 4)	X					Base of Merritt Sands Formation
SC-117	64 (see Note 5)	X					Older Bay Mud Formation
SC-118	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-118	61 (see Note 4)	X					Base of Merritt Sands Formation
SC-118	64 (see Note 5)	X					Older Bay Mud Formation
SC-119	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-119	59 (see Note 4)	X					Base of Merritt Sands Formation
SC-119	64 (see Note 5)	X					Older Bay Mud Formation
Small Vacant Lot							
SC-120	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-120	61 (see Note 4)	X					Base of Merritt Sands Formation
SC-120	64 (see Note 5)	X					Older Bay Mud Formation
SC-121	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-121	61 (see Note 4)	X					Base of Merritt Sands Formation
SC-121	64 (see Note 5)	X					Older Bay Mud Formation
SC-122	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-122	61 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-122	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
Parking Lot							
SC-123	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-123	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-123	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation
SC-124	1, 3, 5, 8, 13, 20, 30, 40, 50 (see Note 6)	X	X	X	X	X	Merritt Sands Formation
SC-124	61 (see Note 4)	X					Base of Merritt Sands Formation
SC-124	64 (see Note 5)	X					Older Bay Mud Formation

Table 2-8
Details of Soil Sampling and Analyses for Soil Characterization
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Soil Boring Location[1]	Soil Sampling Depth from Top of Soil Surface (feet)[2]	VOCs[3]	SVOCs[3]	Metals[3]	PCBs[3]	Pesticides[3]	Notes
SC-125	1, 3, 5, 8, 13, 20, 30, 40, 50	X	X	X	X	X	Merritt Sands Formation
SC-125	60 (see Note 4)	X	X	X	X	X	Base of Merritt Sands Formation
SC-125	64 (see Note 5)	X	X	X	X	X	Older Bay Mud Formation

Notes:
[1] See Figures 2-4 and 2-5 for boring locations.
[2] Sampling depths adjusted based on visual field observation of soil cores.
[3] Analytes:
VOCs - Volatile organic compounds, analyzed by EPA Method 8260 B
SVOCs - Semivolatile organic compounds, analyzed by EPA Method 8270C
PCBs - Polychlorinated biphenyls, analyzed by EPA Method 8082
Metals - analyzed by EPA Method 6010B/7471A
Pesticides - analyzed by EPA Method 8081A
Percent Moisture - analyzed by ASTM D2216 (soil concentrations reported on dry weight basis)
[4] Depth to the base of the Merritt Sands.
[5] Depth from the ground surface to 5 feet below the top of the Older Bay Mud.
[6] SVOCs,PCBs, Metals, Pesticides analyses not performed for samples collected below 30 feet below ground surface.

Table 2-9
Rationale for Additional Upper Aquifer Monitoring Well Installations
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Well Identification	Location Basis[1]	Well Screen Interval[2]	Rationale
RMW-05-35	Downgradient	Intermediate	Complete well group and define intermediate plume boundary.
RMW-05-74	Downgradient	Deep	Complete well group and delineate deeper groundwater plume boundary.
RMW-06-35	Cross-gradient, northwest	Intermediate	Complete well group, define intermediate plume boundary, and confirm no deeper zone contamination; sentry monitoring.
RMW-06-61	Downgradient	Deep	Complete well group and delineate deeper groundwater upgradient of RMW-14 well group; sentry monitoring.
RMW-09-70	Downgradient	Deep	Complete well group and delineate deeper groundwater downgradient of RMW-01 well group.
RMW-10-79	Downgradient	Deep	Complete well group and delineate deeper groundwater cross-gradient of RMW-14 well group.
RMW-14-35	Downgradient	Intermediate	Complete well group and refine intermediate plume delineation.
RMW-15-15	In-plume, western edge	Shallow	Refine plume delineation west of the source area, vicinity of former aboveground storage tanks, and at/near the residential properties.
RMW-15-35	In-plume, western edge	Intermediate	Refine plume delineation west of the source area, vicinity of former aboveground storage tanks, and at/near the residential properties.
RMW-15-60	In-plume, western edge	Deep	Refine plume delineation west of the source area, vicinity of former aboveground storage tanks, and at/near the residential properties.
RMW-16W-15	In-plume, western edge	Shallow	Refine plume delineation cross-gradient and downgradient of the source area, and at/near the residential properties.

Table 2-9
Rationale for Additional Upper Aquifer Monitoring Well Installations
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Well Identification	Location Basis[1]	Well Screen Interval[2]	Rationale
RMW-16E-15	In-plume, western edge	Shallow	Refine plume delineation downgradient of the source area, and at/near the residential properties.
RMW-16-35	In-plume, western edge	Intermediate	Refine plume delineation cross-gradient and downgradient of the source area, and at/near the residential properties.
RMW-16-60	In-plume, western edge	Deep	Refine plume delineation cross-gradient and downgradient of the source area, and at/near the residential properties.
RMW-17-35	Downgradient	Intermediate	Refine the plume delineation at intermediate zone depth and a location cross-gradient and downgradient of the former AMCO facility.
RMW-17-70	Downgradient	Deep	Refine the plume delineation at deep zone depth and a location cross-gradient and downgradient of the former AMCO facility.
RMW-18-35	Downgradient	Intermediate	Complete well group and refine downgradient, intermediate zone plume delineation.
RMW-18-79	Downgradient	Deep	Complete well group and refine downgradient, deep zone plume delineation.
RMW-19-15	Downgradient	Shallow	Define downgradient plume boundary; sentry monitoring.
RMW-19-35	Downgradient	Intermediate	Define downgradient plume boundary; sentry monitoring.
RMW-19-80	Downgradient	Deep	Define downgradient plume boundary; sentry monitoring.

Notes:
[1] Location relative to plume understanding in 2008.
[2] Shallow - 5 to 15 feet below ground surface (bgs)
Intermediate - 25 to 35 feet bgs
Deep - 10 foot screen interval between 50 to 80 feet bgs with the bottom of the screen interval at the base of the Merritt Sand

Table 2-10
Groundwater Monitoring Well Construction Details
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Well Identification	Ground Surface (ft msl)[2]	Top of Casing (ft msl)[2]	Horizontal Coordinates[3] Northing	Horizontal Coordinates[3] Easting	Casing Diameter (inches)	Casing Material	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Borehead Total Depth (ft bgs)
EPA Owned Upper Aquifer Monitoring Wells Installed in 2005 as part of the RI Investigation									
RMW-01-17	11.22	13.64	2119692.69	6043062.76	2	PVC, Sch. 40	7	17	17
RMW-01-35	11.04	14.30	2119695.12	6043054.44	2	PVC, Sch. 40	25	35	40
RMW-02-13	10.74	10.50	2119728.98	6043136.09	2	PVC, Sch. 40	3	13	13
RMW-02-32	11.21	10.91	2119749.92	6043138.76	2	PVC, Sch. 40	22	32	32
RMW-02-50	11.07	10.67	2119738.81	6043138.41	2	PVC, Sch. 40	40	50	50
RMW-03-15	10.43	10.00	2119832.19	6043245.05	2	PVC, Sch. 40	5	15	15
RMW-04-15	10.09	12.82	2119603.90	6043231.73	2	PVC, Sch. 40	5	15	15
RMW-05-15	9.27	8.90	2119502.68	6043116.85	2	PVC, Sch. 40	5	15	15
RMW-06-15	10.68	10.47	2119932.56	6042961.31	2	PVC, Sch. 40	5	15	15
RMW-07-15	10.45	10.10	2119756.17	6042936.12	2	PVC, Sch. 40	5	15	15
RMW-07-35	10.42	10.08	2119746.02	6042933.47	2	PVC, Sch. 40	25	35	35
RMW-08-15	11.76	14.61	2119857.71	6043054.37	2	PVC, Sch. 40	5	15	15
RMW-08-35	11.73	14.60	2119849.49	6043052.90	2	PVC, Sch. 40	25	35	46.5
RMW-09-15	10.26	12.74	2119597.79	6042947.48	2	PVC, Sch. 40	5	15	15
RMW-09-35	10.33	13.22	2119597.79	6042939.14	2	PVC, Sch. 40	25	35	36
RMW-10-15	9.74	12.89	2119513.81	6042979.03	2	PVC, Sch. 40	5	15	15
RMW-10-35	9.77	12.75	2119526.34	6042980.61	2	PVC, Sch. 40	25	35	46.5
RMW-11-35	8.52	8.25	2119928.89	6043326.95	2	PVC, Sch. 40	25	35	35
RMW-12-32	9.44	9.04	2119625.72	6043111.43	2	PVC, Sch. 40	27	32	32
RMW-12-51	9.27	8.94	2119628.72	6043101.57	2	PVC, Sch. 40	41	51	53
RMW-13-35	10.38	13.08	2119397.02	6042992.94	2	PVC, Sch. 40	25	35	35
RMW-14-50	10.39	13.56	2119578.17	6042842.31	2	PVC, Sch. 40	40	50	50
EPA Owned Upper Aquifer Monitoring Wells Installed Prior to the Rl Investiqation									
MW-12	9.44	9.16	2119622.25	6043122.35	2	PVC, Sch. 40	5	19.5	20
MW-13	11.15	10.95	2119709.56	6043107.09	2	PVC, Sch. 40	5	18.5 [4]	NA
MW-14	10.82	10.56	2119728.90	6043152.75	2	PVC, Sch. 40	5	18.65 [4]	21

Table 2-10
Groundwater Monitoring Well Construction Details
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Well Identification	Ground Surface (ft msl)[2]	Top of Casing (ft msl)[2]	Horizontal Coordinates[3] Northing	Horizontal Coordinates[3] Easting	Casing Diameter (inches)	Casing Material	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Borehead Total Depth (ft bgs)
Union Pacific Railroad Owned Upper Aquifer Monitoring Wells									
BMW-01	9.12	11.50	2119493.12	6043239.56	4	PVC	5	22	22
BMW-03	10.25	13.54	2119584.64	6043032.70	4	PVC	7	22	22
BMW-06	8.87	8.40	2119704.12	6043318.26	4	PVC	9	29	29
BMW-07	10.41	13.14	2119577.93	6042830.73	2	PVC	10	20	20
BMW-08	10.19	13.16	2119461.92	6042863.79	2	PVC	9.5	19.5	20
BPZ-01	10.30	12.61	2119430.96	6043040.68	2	PVC	12	17	18
EPA Owned Upper Aquifer Monitoring Wells Installed in 2009									
RMW-06-35	11.05	10.80	2119931.07	6042971.94	6	CPVC, Sch. 40	25	35	35.5
RMW-06-61	10.83	10.56	2119945.09	6042963.96	6	CPVC, Sch. 40	51	61	61.2
RMW-09-70	10.56	12.64	2119598.78	6042959.31	6	CPVC, Sch. 40	60	70	72.0
RMW-15-15	11.56	13.98	2119806.05	6043039.59	6	Stainless Steel 316 L	5	15	15.0
RMW-15-35	11.42	13.90	2119803.23	6043048.75	6	Stainless Steel 316 L	25	35	35.0
RMW-15-60	11.33	13.92	2119800.29	6043058.61	6	Stainless Steel 316 L	50	60	61.5
RMW-16E-15	9.66	9.43	2119660.86	6043014.55	6	Stainless Steel 316 L	5	15	15.0
RMW-16W-15	9.42	9.16	2119677.76	6042965.67	6	Stainless Steel 316 L	5	15	16.5
RMW-16-35	9.52	9.19	2119673.02	6042986.17	6	Stainless Steel 316 L	25	35	37.0
RMW-16-61	9.66	9.24	2119668.35	6042996.19	6	Stainless Steel 316 L	50	60	61.5
RMW-17-35	9.81	9.53	2119652.87	6042735.77	6	CPVC, Sch. 40	25	35	35.0
RMW-17-70	10.04	9.68	2119655.14	6042725.26	6	CPVC, Sch. 40	60	70	70.0

Table 2-10
Groundwater Monitoring Well Construction Details
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Well Identification	Ground Surface (ft msl)[2]	Top of Casing (ft msl)[2]	Horizontal Coordinates[3] Northing	Easting	Casing Diameter (inches)	Casing Material	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Borehead Total Depth (ft bgs)
EPA Owned Upper Aquifer Monitoring Wells Installed in 2012									
RMW-05-35	9.24	8.59	2119493.75	6043093.93	6	CPVC, Sch. 40	25	35	36.5
RMW-05-74	9.30	8.70	2119492.25	6043082.44	6	CPVC, Sch. 40	64	74	75.0
RMW-10-79	9.91	12.13	2119482.96	6042987.91	6	CPVC, Sch. 40	69	79	80.0
RMW-14-35	10.84	13.26	2119578.90	6042861.73	6	CPVC, Sch. 40	25	35	36.0
RMW-18-35	10.46	12.77	2119470.24	6042855.83	6	CPVC, Sch. 40	25	35	36.0
RMW-18-79	10.36	12.87	2119470.43	6042866.65	6	CPVC, Sch. 40	69	79	80.0
RMW-19-15	10.79	13.53	2119355.57	6042686.79	4	PVC, Sch. 40	5	15	15.0
RMW-19-35	11.41	13.40	2119355.69	6042694.76	4	PVC, Sch. 40	25	35	35.0
RMW-19-80	11.63	13.61	2119355.15	6042704.17	4	PVC, Sch. 40	70	80	80.0
EPA Owned Lower Aquifer Monitoring Well Installed in 2013									
RMW-02-131	10.79	10.48	2119717.96	6043141.97	2	CPVC, Sch. 40	121	131	160.0

Notes:

[1] Abbreviations:

NAVD88 - North American Vertical Daturm of 1988
NAD83 - North American Daturm of 1983
CPVC - chlorinated polyvinyl chloride
Sch. - Schedule
ft msl - feet above mean sea level
ft bgs - feet below ground surface
PVC - polyvinyl chloride
NA - not available

[2] Elevations referenced to California State Plane Grid System, Zone 3, based on NAVD88.

[3] Horizontal coordinates referenced to California State Plane Grid System, Zone 3, based on NAD83.

[4] Bottom of well tagged on May 29, 2013

Table 2-11
Groundwater Analytes by Monitoring Event for 2010 through 2012
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

	Potential Chemicals of Concern						Natural Attenuation Parameters						Water Quality Indicators			Microbial Parameters	
Monitoring Event	**VOCs**	**SVOCs[8]**	**Organochlorine Pesticides & PCBs**	**Metals (Total)**	**Metals (Dissolved)[9]**	**Dioxins/ Furans**	**Anions (Cl, SO_4, and NO_3)**	**Ferrous Iron**	**Alkalinity**	**Sulfide**	**Dissolved Gases**	**Field Parameters[7]**	**Total Dissolved Solids (TDS)**	**Dissolved Organic Carbon**	**Chemical Oxygen Demand**	**Volatile** Fatty **Acids[10] (VFAs)**	**DHC and Genes[11]**
Analytical Lab[1]	**CLP**	**CLP**	**CLP**	**CLP**	**CLP**	**Accu**	**R 9**	**F**	**R 9**	**R 9**	**R 9**	**F**	**Accu**	**R 9**	**Accu**	**Accu**	**Micro**
August 2010	X	P[2]	P[3]	P[2]	P[2]	P[2]	P[4]	X	X	P[4]	X	X		P[4]	P[4]	P[4]	P[4]
June 2011	P[2]	P[2]	P[2]	P[2]	P[2]		P[2]	P[2]	P[2]	P[2]	P[2]	P[2]		P[4]	P[4]		
August 2011	X	X	X	X	X	P[4]	P[4]	X	X	P[4]	X	X		P[4]	P[4]	P[4]	P[4]
February 2012	X	P[5]	P[6]	P[5]	P[5]	P[5]	P[4]	X	X	P[4]	X	X		P[4]	P[4]	P[4]	P[4]
May 2012	P[5]	P[5]	P[5]	P[5]	P[5]			P[5]	P[5]		P[5]	P[5]					
August 2012	X	X	X	X	X	P[4]	X	X	X	X	X	X		P[4]	P[4]	P[4]	P[4]
October 2012													X				

Notes:

Abbreviations: VOC - volatile organic compound SVOC - semi-volatile organic compound PCBs - polychlorinated biphenyls Cl - chloride SO_4 - sulfate NO_3 - nitrate
DHC - *Dehalococcoides* bacteria

[1] Analytical Laboratory: CLP - EPA Contract Laboratory Program; R 9 - EPA Region 9 Laboratories; Accu - Accutest Laboratories; F - Field measurement; Micro - Microbial Insights
[2] Only groundwater samples from monitoring wells installed in 2009 were analyzed for analyte.
[3] Only groundwater samples from monitoring wells installed in 2009, MW-12, RMW-01-17, and RMW-02-13 were analyzed for analyte.
[4] Only groundwater samples from selected monitoring wells were analyzed for analyte.
[5] Only groundwater samples from monitoring wells installed in 2012 were analyzed for analyte.
[6] Only groundwater samples from monitoring wells installed in 2009, MW-12, RMW-01-17, and RMW-02-13 were analyzed for analyte.
[7] Field parameters (dissolved oxygen, oxidation-reduction potential, pH, temperature, conductivity, and turbidity) monitored to confirm stabilization within 2004 SAP criteria for purging the well.
[8] Semi-volatile organics (SVOCs) include 1,4 dioxane. CLP analytical method may be 8260 SIM instead of 8270 for 1,4 dioxane.
[9] Samples for dissolved metals were field filtered.
[10] Volatile fatty acids (VFAs) include acetic acid, butyric acid, pyruvic acid, propionic acid, and lactic acid.
[11] *Dehalococcoides* (DHC) and genes include analysis for DHC population count and associated genes *tceA* , *vcrA* , and *bvcA* .

Table 3-1
Screening Levels for Volatile Organic Compounds in Residential Air
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, Califiornia

Contaminant	Residential Air Screening Level (ug/m^3)	Source[1,2]
Acetone	32,000	RSL
Benzene	0.31	RSL
Bromomethane	5.2	RSL
2-Butanone (MEK)	5,200	RSL
tert-Butyl Alcohol (TBA)	NE	-
Carbon Disulfide	730	RSL
Carbon Tetrachloride (Tetrachloromethane)	0.41	RSL
Chlorobenzene	52	RSL
Chloroethane	10,000	RSL
Cyclohexane	6,300	RSL
Dibromochloromethane	0.09	RSL
1,2-Dibromoethane (EDB)	0.0041	RSL
1,2-Dichlorobenzene	210	RSL
1,3-Dichlorobenzene	22	ESL
1,4-Dichlorobenzene	0.22	RSL
Dichlorodifluoromethane (Freon 12)	100	RSL
1,1-Dichloroethane	1.5	RSL
1,1-Dichloroethene	210	RSL
1,2-Dichloroethane	0.094	RSL
1,2-Dichloro-tetrafluoroethane	NE	-
cis-1,2-Dichloroethene	7.3	ESL
trans-1,2-Dichloroethene	63	RSL
Dichloromethane (Methylene Chloride)	96	RSL
1,2-Dichloropropane	0.24	RSL
cis-1,3-Dichloropropene	0.61	RSL
trans-1,3-Dichloropropene	0.61	RSL
1,1-Difluroethane	42,000	RSL
1,4-Dioxane (p-Dioxane)	0.32	RSL
Ether, tert-Amyl Methyl (TAME)	NE	-
Ether, tert-Butyl Ethyl	NE	-
Ether, Methyl tert-Butyl (MTBE)	9.4	RSL
Ethylbenzene	0.97	RSL
Hexachlorobutadiene	0.11	RSL
2-Hexanone (Methyl butyl ketone, MBK)	31	RSL
Isopropylbenzene (Cumene)	420	RSL
Methyl Acetate	NE	-
Methylcyclohexane	NE	-
4-Methyl-2-pentanone (MIBK)	3,100	RSL
Naphthalene	0.072	RSL
Styrene	1,000	RSL

Table 3-1
Screening Levels for Volatile Organic Compounds in Residential Air
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, Califiornia

Contaminant	Residential Air Screening Level (ug/m^3)	Source[1,2]
1,1,2,2-Tetrachloroethane	0.042	ESL
Tetrachloroethene (PCE)	9.4	RSL
Toluene	5,200	RSL
1,2,3-Trichlorobenzene	NE	-
1,2,4-Trichlorobenzene	2.1	RSL
1,1,1-Trichloroethane	5,200	RSL
1,1,2-Trichloroethane	0.15	RSL
Trichloroethene (TCE)	0.43	RSL
Trichlorofluoromethane (Freon 11)	730	RSL
Trichloromethane (Chloroform)	0.11	RSL
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	31,000	RSL
1,2,4-Trimethylbenzene	7.3	RSL
1,3,5-Trimethylbenzene	NE	-
Vinyl Chloride	0.16	RSL
m,p-Xylene	100	RSL
o-Xylene	100	RSL
Xylenes	100	RSL

Notes:
[1] Residential Regional Screening Levels (RSLs):
Source: USEPA 2012 (April), obtained online at: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/pdf/master_sl_table_run_MAY2012

[2] Environmental Screening Levels (ESLs)
Source: SF RWQCB (May 2008) using Table E-3 (Ambient and Indoor Air) at:
http://www.swrcb.ca.gov/sanfranciscobay/water_issues/available_documents/ESL_May_2008.pdf
NE = not established;
ug/m^3 = micrograms per cubic meter.

Table 3-2a
Volatile Organic Compound Concentrations in Ambient Air - Round 1
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

	Location	Screening Level[1]	Lewis Street	
	Sample Date		Jun 23 2009	Jun 24 2009
	Sample ID		LEWIS-BGA01-E1	LEWIS-BGA02-E1
VOCs - (TO15/TO15SIM) - ug/m^3	1,1,1-Trichloroethane	5,200	**0.060 J**	**0.040 J**
	1,1,2,2-Tetrachloroethane	0.042	< 0.22	< 0.26
	1,1,2-Trichloro-1,2,2-trifluoroethane	31,000	**0.80 J**	**0.46 J**
	1,1,2-Trichloroethane	0.15	< 0.17	< 0.20
	1,1-Dichloroethane	1.5	< 0.13	< 0.15
	1,1-Dichloroethene	210	< 0.063	< 0.074
	1,1-Difluoroethane	42,000	< 2.1	< 2.5
	1,2,4-Trichlorobenzene	2.1	< 5.9 UJ	< 6.9
	1,2,4-Trimethylbenzene	7.3	**0.29 J**	**0.24 J**
	1,2-Dibromoethane (EDB)	0.0041	< 1.2	< 1.4
	1,2-Dichlorobenzene	210	< 0.95	< 1.1
	1,2-Dichloroethane	0.094	< 0.13	**0.061 J**
	1,2-Dichloropropane	0.24	< 0.73	< 0.86
	1,2-Dichlorotetrafluoroethane	NE	< 1.1	< 1.3
	1,3,5-Trimethylbenzene	NE	< 0.78	< 0.92
	1,3-Dichlorobenzene	22	< 0.95	< 1.1
	1,4-Dichlorobenzene	0.22	< 0.95	< 1.1
	1,4-Dioxane (p-Dioxane)	0.32	< 0.57	< 0.67
	Benzene	0.31	**0.31**	< 0.30
	Bromomethane	5.2	**0.39 J**	**1.8 J**
	Carbon Tetrachloride	0.41	**0.51**	**0.47**
	Chlorobenzene	52	< 0.73	< 0.86
	Chloroethane	10,000	< 0.42	< 0.49
	Chloroform	0.11	< 0.77	< 0.91
	Chloromethane	94	**1.0**	**0.56**
	cis-1,2-Dichloroethene	7.3	< 0.12	< 0.15
	cis-1,3-Dichloropropene	0.61	< 0.72	< 0.85
	Dichlorodifluoromethane	100	**2.4 J**	**2.0**
	Ethylbenzene	0.97	**0.15**	**0.12 J**
	Hexachlorobutadiene	0.11	< 8.4	< 10
	m,p-Xylene	100	**0.50**	**0.36**
	Methylene Chloride	96	**0.28 J**	**0.20 J**
	Naphthalene	0.072	< 4.1 UJ	< 4.9
	o-Xylene	100	**0.19**	**0.13 J**
	Styrene	1,000	< 0.67	< 0.80
	tert-Butyl Methyl Ether (MTBE)	9.4	< 0.57	< 0.67
	Tetrachloroethene (PCE)	9.4	**0.15 J**	**0.052 J**
	Toluene	5,200	**0.99**	**0.56**
	trans-1,2-Dichloroethene	63	< 0.63	< 0.74
	trans-1,3-Dichloropropene	0.61	< 0.72	< 0.85
	Trichloroethene (TCE)	0.43	**0.050 J**	< 0.20
	Trichlorofluoromethane	730	**1.4**	**1.0**
	Vinyl Chloride	0.16	< 0.040	< 0.048

Table 3-2a
Volatile Organic Compound Concentrations in Ambient Air - Round 1
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Notes:
[1]Screening levels (see Table 3-1) are EPA Region Residential RSLs (May 2012) supplemented by SF Bay RWQCB ESLs (May 2008) where a RSL is not available.
"<" indicates the result is not detected less than the associated reporting limit
background (ambient) air concentration is above the associated screening limit
bold indicates the result is detected
J = the result is estimated
UJ = the result is non-detected at an estimated reporting limit
ug/m^3 = micrograms per cubic meter
VOCs = volatile organic compounds

Table 3-2b
Volatile Organic Compound Concentrations in Ambient Air - Round 2
Remedial Investigation Addendum Report
AMCO Chemical Superfund Site, Oakland, California

	Location	Screening Level[1]	Lewis Street	
	Sample Date		Sep 29 2010	Sep 30 2010
	Sample ID		LEWIS-BGA01-E2	LEWIS-BGA02-E2
VOCs - (TO15) - ug/m^3	1,1,2-Trichloro-1,2,2-trifluoroethane	31,000	< 1.2	< 1.2
	1,2,4-Trichlorobenzene	2.1	< 5.9	< 5.8
	1,2,4-Trimethylbenzene	7.3	< 0.78	< 0.76
	1,2-Dibromoethane (EDB)	0.041	< 1.2	< 1.2
	1,2-Dichlorobenzene	210	< 0.95	< 0.93
	1,2-Dichloropropane	0.24	< 0.73	< 0.72
	1,2-Dichlorotetrafluoroethane	NE	< 1.1	< 1.1
	1,3,5-Trimethylbenzene	NE	< 0.78	< 0.76
	1,3-Dichlorobenzene	22	< 0.95	< 0.93
	1,4-Dichlorobenzene	0.22	< 0.95	< 0.93
	1,4-Dioxane (p-Dioxane)	0.32	**0.70**	< 0.56
	Bromomethane	5.2	**0.74 J**	< 0.60 UJ
	Chlorobenzene	52	< 0.73	< 0.71
	Chloroethane	10,000	< 2.1	< 2.0 UJ
	Chloroform	0.11	< 0.77	< 0.76
	Chloromethane	94	**1.3**	**1.5**
	cis-1,3-Dichloropropene	0.61	< 0.72	< 0.70
	Dichlorodifluoromethane	100	**2.3**	**2.5**
	Hexachlorobutadiene	0.11	< 8.4	< 8.3
	Methylene Chloride	96	< 1.1	< 1.1
	Naphthalene	0.072	< 4.1	< 4.1
	Styrene	1,000	< 0.67	< 0.66
	tert-Butyl Methyl Ether	9.4	< 0.57	< 0.56
	trans-1,3-Dichloropropene	0.61	< 0.72	< 0.70
	Trichlorofluoromethane	730	**1.1**	**1.3**
	1,1,1-Trichloroethane	5,200	< 0.17	< 0.17
	1,1,2,2-Tetrachloroethane	0.042	< 0.22	< 0.21
	1,1,2-Trichloroethane	0.15	< 0.17	< 0.17
VOCs - (TO15SIM) - ug/m^3	1,1-Dichloroethane	1.5	< 0.13	< 0.12
	1,1-Dichloroethene	210	< 0.063	< 0.061
	1,2-Dichloroethane	0.094	< 0.13	< 0.12
	Benzene	0.31	**0.47**	**0.38**
	Carbon Tetrachloride	0.41	**0.48 J**	**0.53 J**
	cis-1,2-Dichloroethene	7.3	< 0.12	< 0.12
	Ethylbenzene	0.97	**0.32**	< 0.13
	m,p-Xylene	100	**0.93**	< 0.27
	o-Xylene	100	**0.35**	< 0.13
	Tetrachloroethene (PCE)	9.4	**0.35**	**0.88**
	Toluene	5,200	**1.4 J**	**0.41**
	trans-1,2-Dichloroethene	63	< 0.63	< 0.61
	Trichloroethene (TCE)	0.43	< 0.17	< 0.17
	Vinyl Chloride	0.16	< 0.040	< 0.040

Table 3-2b
Volatile Organic Compound Concentrations in Ambient Air - Round 2
Remedial Investigation Addendum Report
AMCO Chemical Superfund Site, Oakland, California

Notes:
[1]Screening levels (see Table 3-1) are EPA Region Residential RSLs (May 2012) supplemented by SF Bay RWQCB ESLs (May 2008) where RSLs are not available.
< indicates the result is not detected less than the associated reporting limit
background (ambient) air concentration is above the associated screening limit
bold indicates the result is detected
J = the result is estimated
UJ = the result is non-detected at an estimated reporting limit
ug/m^3 = micrograms per cubic meter
VOC = volatile organic compounds

Table 3-2c
Volatile Organic Compound Concentrations in Ambient Air - Round 3
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

	Location	Screening Level[1]	Lewis Street				
	Sample Date		Jan 31 2012	Feb 1 2012	Feb 2 2012	Feb 3 2012	Feb 7 2012
	Sample ID		LEWIS-BGA01-E3	LEWIS-BGA02-E3	LEWIS-BGA03-E3	LEWIS-BGA04-E3	LEWIS-BGA05-E3
VOCs - (TO15) - ug/m^3	1,1,2-Trichloro-1,2,2-trifluoroethane	31,000	< 1.2	< 1.2	< 1.3	< 1.2	< 1.4
	1,2,4-Trichlorobenzene	2.1	< 6.0	< 5.9	< 6.2	< 5.6 UJ	< 6.8
	1,2,4-Trimethylbenzene	7.3	< 0.79	< 0.78	< 0.82	< 0.75	< 0.90
	1,2-Dibromoethane (EDB)	0.0041	< 1.2	< 1.2	< 1.3	< 1.2	< 1.4
	1,2-Dichlorobenzene	210	< 0.97	< 0.95	< 1.0	< 0.91	< 1.1
	1,2-Dichloropropane	0.24	< 0.74	< 0.73	< 0.78	< 0.70	< 0.84
	1,2-Dichlorotetrafluoroethane	NE	< 1.1	< 1.1	< 1.2	< 1.1	< 1.3
	1,3,5-Trimethylbenzene	NE	< 0.79	< 0.78	< 0.82	< 0.75	< 0.90
	1,3-Dichlorobenzene	22	< 0.97	< 0.95	< 1.0	< 0.91	< 1.1
	1,4-Dichlorobenzene	0.22	< 0.97	< 0.95	< 1.0	< 0.91	< 1.1
	1,4-Dioxane (p-Dioxane)	0.32	< 0.58	< 0.57	< 0.60	< 0.55	< 0.66
	Bromomethane	5.2	< 0.62 UJ	< 0.61	< 0.65	< 0.59	< 0.71 UJ
	Chlorobenzene	52	< 0.74	< 0.73	< 0.77	< 0.70	< 0.84
	Chloroethane	10,000	< 2.1	< 2.1	< 2.2	< 2.0	< 2.4
	Chloroform	0.11	< 0.79	< 0.77	< 0.82	< 0.74	< 0.89
	Chloromethane	94	**0.90 J**	**0.87**	< 1.7	**0.77 J**	**1.0 J**
	cis-1,3-Dichloropropene	0.61	< 0.73	< 0.72	< 0.76	< 0.69	< 0.83
	Dichlorodifluoromethane	100	**2.3**	**2.1**	**1.7**	**2.4**	**3.0**
	Hexachlorobutadiene	0.11	< 8.6	< 8.4	< 9.0	< 8.1	< 9.8
	Methylene Chloride	96	< 1.1	< 1.1	< 1.2 UJ	< 1.0	< 1.3
	Naphthalene	0.072	< 4.2	< 4.1	< 4.4	< 4.0	< 4.8
	Styrene	1,000	< 0.68	< 0.67	< 0.72	< 0.65	< 0.78
	tert-Butyl Methyl Ether (MTBE)	9.4	< 0.58	< 0.57	< 0.60	< 0.55	< 0.66
	trans-1,3-Dichloropropene	0.61	< 0.73	< 0.72	< 0.76	< 0.69	< 0.83
	Trichlorofluoromethane	730	**1.4**	**2.3**	**1.6**	**1.6**	**2.2**

Table 3-2c
Volatile Organic Compound Concentrations in Ambient Air - Round 3
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

	Location	Screening Level[1]	Lewis Street				
	Sample Date		Jan 31 2012	Feb 1 2012	Feb 2 2012	Feb 3 2012	Feb 7 2012
	Sample ID		LEWIS-BGA01-E3	LEWIS-BGA02-E3	LEWIS-BGA03-E3	LEWIS-BGA04-E3	LEWIS-BGA05-E3
VOCs - (TO15SIM) - ug/m^3	1,1,1-Trichloroethane	5,200	< 0.18	< 0.17	< 0.18	< 0.16	< 0.20
	1,1,2,2-Tetrachloroethane	0.042	< 0.22	< 0.22	< 0.23	< 0.21	< 0.25
	1,1,2-Trichloroethane	0.15	< 0.18	< 0.17	< 0.18	< 0.16	< 0.20
	1,1-Dichloroethane	1.5	< 0.13	< 0.13	< 0.14	< 0.12	< 0.15
	1,1-Dichloroethene	210	< 0.064	< 0.063	< 0.067	< 0.060	< 0.072
	1,2-Dichloroethane	0.094	< 0.13	< 0.13	< 0.14	< 0.12	< 0.15
	Benzene	0.31	**0.55**	**0.58**	**0.92**	**1.1**	**0.85 J**
	Carbon Tetrachloride	0.41	**0.47**	**0.38 J**	**0.32 J**	**0.50**	**0.48 J**
	cis-1,2-Dichloroethene	7.3	< 0.13	< 0.12	< 0.13	< 0.12	< 0.14
	Ethylbenzene	0.97	**0.30**	**0.32**	**0.65**	**0.58**	**0.39 J**
	m,p-Xylene	100	**0.68**	**1.0**	**2.2**	**2.0**	**1.1 J**
	o-Xylene	100	**0.32**	**0.38**	**0.82**	**0.65**	**0.46 J**
	Tetrachloroethene (PCE)	9.4	< 0.22	< 0.21	< 0.23	< 0.21	< 0.25
	Toluene	5,200	**0.94**	**1.4**	**3.0**	**3.3**	**1.5 J**
	trans-1,2-Dichloroethene	63	< 0.64	< 0.63	< 0.67	< 0.60	< 0.72
	Trichloroethene (TCE)	0.43	< 0.17	< 0.17	< 0.18	< 0.16	< 0.20
	Vinyl Chloride	0.16	< 0.041	< 0.040	< 0.043	< 0.039	< 0.047

Notes:
[1]Screening levels (see Table 3-1) are EPA Region Residential RSLs (May 2012) supplemented by SF Bay RWQCB ESLs (May 2008) where RSLs are not available.
< indicates the result is not detected less than the associated reporting limit
background (ambient) air concentration is above the associated screening limit
bold indicates the result is detected
J = the result is estimated
UJ = the result is non-detected at an estimated reporting limit
ug/m^3 = micrograms per cubic meter
VOC = volatile organic compounds

Table 5-1
Upper Estimates of Background Metal Concentrations in Soil[1]
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Metal	Background Soil Concentration (mg/kg)
Antimony	6
Arsenic	24
Barium	410
Beryllium	1.0
Cadmium	5.6
Chromium	120
Cobalt	25
Copper	63
Lead	43
Mercury	0.42
Molybdenum	4.8
Nickel	272
Selenium	4.9
Silver	2.9
Thallium	10
Vanadium	90
Zinc	140

Notes:
[1] Source: LBNL, 2009.
mg/kg = milligrams per kilogram

Table 5-2
Screening Levels for Chemicals of Concern in Soil
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Contaminants		Soil Screening Level (ug/kg)	Source[1, 2]
VOCs	Acetone	61,000,000	RSL[1]
	Benzene	1,100	RSL
	Bromomethane	7,300	RSL
	2-Butanone (MEK)	28,000,000	RSL
	tert-Butyl alcohol (TBA)	75	ESL[2]
	Carbon disulfide	820,000	RSL
	Chlorobenzene	290,000	RSL
	Chloroethane	15,000,000	RSL
	Chloroform	290	RSL
	Chloromethane	120,000	RSL
	Cyclohexane	7,000,000	RSL
	Dibromochloromethane	680	RSL
	1,2-Dichlorobenzene	1,900,000	RSL
	1,3-Dichlorobenzene	7,400	ESL
	1,4-Dichlorobenzene	2,400	RSL
	1,1-Dichloroethane	3,300	RSL
	1,1-Dichloroethene	240,000	RSL
	1,2-Dichloroethane	430	RSL
	cis-1,2-Dichloroethene	160,000	RSL
	trans-1,2-Dichloroethene	150,000	RSL
	Dichloromethane (methylene chloride)	56,000	RSL
	1,2-Dichloropropane	940	RSL
	cis-1,3-Dichloropropene	1,700	RSL
	trans-1,3-Dichloropropene	1,700	RSL
	Ether, tert-Amyl methyl (TAME)	NE	-
	Ether, tert-Butyl ethyl	NE	-
	Ether, Methyl tert-butyl (MTBE)	43,000	RSL
	Ethylbenzene	5,400	RSL
	2-Hexanone (Methyl butyl ketone, MBK)	210,000	RSL
	Isopropylbenzene (Cumene)	2,100,000	RSL
	Methyl Acetate	78,000,000	RSL
	Methylcyclohexane	NE	-
	4-Methyl-2-pentanone (MIBK)	5,300,000	RSL
	Styrene	6,300,000	RSL
	Tetrachloroethene (PCE)	22,000	RSL
	Toluene	5,000,000	RSL
	1,2,3-Trichlorobenzene	22,000	RSL
	1,1,1-Trichloroethane	8,700,000	RSL
	1,1,2-Trichloroethane	1,100	RSL
	Trichloroethene (TCE)	910	RSL
	Trichlorofluoromethane (Freon 11)	790,000	RSL
	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	43,000,000	RSL

Table 5-2
Screening Levels for Chemicals of Concern in Soil
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Contaminants		Soil Screening Level (ug/kg)	Source[1, 2]
VOCs cont'd	1,2,4-Trimethylbenzene	62,000	RSL
	1,3,5-Trimethylbenzene	780,000	RSL
	Vinyl Chloride	60	RSL
	m,p-Xylene	590,000	RSL
	o-Xylene	690,000	RSL
	Xylenes	630,000	RSL
TPH	Petroleum hydrocarbons (as gasoline)	83,000	ESL
	Petroleum hydrocarbons (as diesel)	83,000	ESL
	Petroleum hydrocarbons (as motor oil)	370,000	ESL
SVOCs	Acenaphthene	3,400,000	RSL
	Acetophenone	7,800,000	RSL
	Anthracene	17,000,000	RSL
	Benzo(a)anthracene	150	RSL
	Benzo(a)pyrene	15	RSL
	Benzo(b)fluoranthene	150	RSL
	Benzo(g,h,i)perylene	27,000	ESL
	Benzo(k)fluoranthene	1,500	RSL
	Benzyl butyl phthalate	260,000	RSL
	Biphenyl (Diphenyl)	51,000	RSL
	bis(2-Ethylhexyl) phthalate	35,000	RSL
	Caprolactam	31,000,000	RSL
	Carbazole	NE	-
	4-Chloro-3-methylphenol	NE	-
	2-Chlorophenol	390,000	RSL
	Chrysene	15,000	RSL
	Dibenz(a,h)anthracene	62	ESL
	Dibenzofuran	78,000	RSL
	Di-n-Butyl phthalate	6,100,000	RSL
	3,3'-Dichlorobenzidine	1,100	RSL
	Diethyl phthalate	49,000,000	RSL
	2,4-Dimethylphenol	1,200,000	RSL
	Dimethyl Phthalate	35	ESL
	4,6-Dinitro-2-methylphenol (Dinitro-o-cresol)	4,900	RSL
	2,4-Dinitrotoluene	1,600	RSL
	Di-n-Octylphthalate	NE	-
	1,4-Dioxane (p-Dioxane)	4,900	RSL
	Fluoranthene	2,300,000	RSL
	Fluorene	2,300,000	RSL
	Indeno(1,2,3-c,d)pyrene	150	RSL
	Isophorone	510,000	RSL
	1-Methylnaphthalene	16,000	RSL
	2-Methylnaphthalene	230,000	RSL

Table 5-2
Screening Levels for Chemicals of Concern in Soil
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Contaminants		Soil Screening Level (ug/kg)	Source[1, 2]
SVOCs cont'd	2-Methylphenol (o-Cresol)	3,100,000	RSL
	3-Methylphenol (m-Cresol)	3,100,000	RSL
	4-Methylphenol (p-Cresol)	6,100,000	RSL
	Naphthalene	3,600	RSL
	n-Nitrosodi-n-propylamine	69	RSL
	4-Nitrophenol	NE	-
	Pentachorophenol	890	RSL
	Phenanthrene	11,000	ESL
	Phenol	18,000,000	RSL
	Pyrene	1,700,000	RSL
Metals	Aluminum	77,000,000	RSL
	Antimony	31,000	RSL
	Arsenic	24,000	See Note 4
	Barium	15,000,000	RSL
	Beryllium	160,000	RSL
	Cadmium	70,000	RSL
	Chromium	120,000,000	RSL
	Cobalt	25,000	See Note 5
	Copper	3,100,000	RSL
	Iron	55,000,000	RSL
	Lead	400,000	RSL
	Manganese	1,800,000	RSL
	Mercury	10,000	RSL
	Molybdenum	390,000	RSL
	Nickel	1,500,000	RSL
	Selenium	390,000	RSL
	Silver	390,000	RSL
	Thallium	10,000	See Note 6
	Vanadium	390,000	RSL
	Zinc	23,000,000	RSL
Pesticides	Aldrin	29	RSL
	p,p'-DDT	1,700	RSL
	p,p'-DDD	2,000	RSL
	p,p'-DDE	1,400	RSL
	BHC, alpha- (alpha-Hexachlorocyclohexane)	77	RSL
	BHC, beta- (beta-Hexachlorocyclohexane)	270	RSL
	BHC, delta- (delta-Hexachlorocyclohexane)	NE	-
	Lindane (BHC, gamma-)	520	RSL
	Chlordane, alpha-	1,600	RSL
	Chlordane, gamma-	1,600	RSL
	Dieldrin	30	RSL
	Endosulfan, alpha-	370 000	RSL

Table 5-2
Screening Levels for Chemicals of Concern in Soil
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Contaminants		Soil Screening Level (ug/kg)	Source[1, 2]
Pesticides cont'd	Endosulfan, beta-	370 000	RSL
	Endosulfan	370,000	RSL
	Endosulfan sulfate	NE	-
	Endrin	18,000	RSL
	Endrin aldehyde	NE	-
	Endrin ketone	NE	-
	Heptachlor	110	RSL
	Heptachlor epoxide	53	RSL
PCBs	Aroclor-1016	3,900	RSL
	Aroclor-1242	220	RSL
	Aroclor-1248	220	RSL
	Aroclor-1254	220	RSL
	Aroclor-1260	220	RSL
	Aroclor-1262	220	RSL
Dioxins/ Furans	2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.0045	RSL
	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	See Note 3	-
	1,2,3,7,8-Pentachlorodibenzofuran	See Note 3	-
	2,3,4,7,8-Pentachlorodibenzofuran	See Note 3	-
	1,2,3,4,7,8-Hexachlorodibenzofuran	See Note 3	-
	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.094	RSL
	1,2,3,6,7,8-Hexachlorodibenzofuran	See Note 3	-
	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.094	RSL
	1,2,3,7,8,9-Hexachlorodibenzofuran	See Note 3	-
	2,3,4,6,7,8-Hexachlorodibenzofuran	See Note 3	-
	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	See Note 3	-
	1,2,3,4,6,7,8-Heptachlorodibenzofuran	See Note 3	-
	Octachlorodibenzo-p-dioxin	See Note 3	-
	Octachlorodibenzofuran	See Note 3	-

Table 5-2
Screening Levels for Chemicals of Concern in Soil
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Contaminants	Soil Screening Level (ug/kg)	Source[1, 2]

Notes:

[1] Residential Regional Screening Levels (RSLs):

Source: USEPA, 2012 (April), obtained online at: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/pdf/master_sl_table_run_MAY2012.

[2] Environmental Screening Levels (ESLs)

Source: SF RWQCB (May 2008) using Table A-1 (Shallow Soil, Residential Land Use, groundwater potential drinking water) obtained online at:

http://www.swrcb.ca.gov/sanfranciscobay/water_issues/available_documents/ESL_May_2008.pdf

[3] Screening level to be developed based on EPA guidance in *Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds,* EPA/100/R 10/005, December 2010.

[4] Background for arsenic in East Bay soils (see Table 5-1). RSL for arsenic in residential soil is 390 ug/kg.

[5] Background for cobalt in East Bay soils (see Table 5-1). RSL for cobalt in residential soil is 23,000 ug/kg.

[6] Background for thallium in East Bay soils (see Table 5-1). RSL for thallium in residential soil is 780 ug/kg.

NE = not established
PCB = polychlorinated biphenyl
SVOC = semivolatile organic compound
TPH = total petroleum hydrocarbons
ug/kg = micrograms per kilogram
VOC = volatile organic compound

Table 5-3
Chemical Concentrations in Soil Exceeding Screening Levels - Warehouse Area
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

	Boring Identification	Soil Screening Level[1]	SC-001	SC-001	SC-002	SC-003
	Sample Date		Dec. 21, 2011	Dec. 21, 2011	Dec. 22, 2011	Dec. 20, 2011
	Sample Depth (ft bgs)		5	8	1	3
VOCs - (8260B)[2] - ug/kg	1,2,4-Trimethylbenzene	62,000	**7,450**	< 4.4	**9,430**	< 4,400
	Ethylbenzene	5,400	**2,010 J**	< 4.4	< 3,300	< 4,400
	Trichloroethene (TCE)	910	< 2,600	< 4.4	< 3,300	**69,300**
	Vinyl chloride	60	< 2,600	**162**	< 3,300	< 4,400
SVOCs - (8270C/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	**521**	< 20.0	**1,550**	< 1,500
	Benzo(a)anthracene	150	**167**	< 3.9	**7.6**	**171**
	Benzo(a)pyrene	15	**183**	< 3.9	**3.9 J**	**206**
	Benzo(b)fluoranthene	150	**114**	< 3.9	**4.6**	**179**
	Dibenz(a,h)anthracene	15	**22.0**	< 3.9	< 4.1	< 150
	Indeno(1,2,3-c,d)pyrene	150	**100**	< 3.9	**3.7 J**	**145 J**
	Naphthalene	3,600	**299**	< 20.0	**19.8 J**	< 1,500
Metals (6010B)[2] mg/kg	Cobalt	25	**4.7**	**6.4**	**5.3**	**7.2**
Pesticides - (8081A)[2] - ug/kg	Dieldrin	30	< 43.0	< 3.9	**81.1**	< 180
	DDD	2,000	**112**	< 3.9	**1,080**	< 180
	DDE	1,400	**20.6 J**	< 3.9	**221**	**103 J**

Table 5-3
Chemical Concentrations in Soil Exceeding Screening Levels - Warehouse Area
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

	Boring Identification	Soil Screening Level[1]	SC-003	SC-005	SC-007	SC-008
	Sample Date		Dec. 20, 2011	Dec. 30, 2011	Jan. 4, 2012	Jan. 5, 2012
	Sample Depth (ft bgs)		5	1	1	1
VOCs - (8260B)[2] - ug/kg	1,2,4-Trimethylbenzene	62,000	**114,000**	**242,000**	**9.5 J**	**3.0 J**
	Ethylbenzene	5,400	**23,200**	**45,500**	**0.63 J**	< 4.4
	Trichloroethene (TCE)	910	< 14,000	< 16,000	< 5.2	< 4.4
	Vinyl chloride	60	< 14,000	< 16,000	< 5.2	< 4.4
SVOCs - (8270C/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	**50,500**	**107,000**	< 21.0	**85.3 J**
	Benzo(a)anthracene	150	**386 J**	**557**	**15.0**	**52.3**
	Benzo(a)pyrene	15	< 870	**204**	**21.1**	**72.9**
	Benzo(b)fluoranthene	150	< 870	**289**	**11.7**	**59.1**
	Dibenz(a,h)anthracene	15	< 870	< 200	**3.1 J**	< 20.0
	Indeno(1,2,3-c,d)pyrene	150	< 870	**158 J**	**12.8**	**44.3**
	Naphthalene	3,600	**9,390**	**32,300**	< 21.0	< 100
Metals (6010B)[2] mg/kg	Cobalt	25	**4.5**	**3.9**	**4.8**	**4.4**
Pesticides - (8081A)[2] - ug/kg	Dieldrin	30	< 170	**2,380**	**36.1**	< 4.1
	DDD	2,000	**8,910**	**21,900**	**582**	**29.4**
	DDE	1,400	**2,780**	**7,310**	**514**	**2.7 J**

Table 5-3
Chemical Concentrations in Soil Exceeding Screening Levels - Warehouse Area
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

	Boring Identification	Soil Screening Level[1]	SC-009
	Sample Date		Dec. 28, 2011
	Sample Depth (ft bgs)		3
VOCs - (8260B)[2] - ug/kg	1,2,4-Trimethylbenzene	62,000	< 5.1
	Ethylbenzene	5,400	< 5.1
	Trichloroethene (TCE)	910	< 5.1
	Vinyl chloride	60	< 5.1
SVOCs - (8270C/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	< 41.0
	Benzo(a)anthracene	150	**2.2 J**
	Benzo(a)pyrene	15	**1.2 J**
	Benzo(b)fluoranthene	150	**1.3 J**
	Dibenz(a,h)anthracene	15	< 4.1
	Indeno(1,2,3-c,d)pyrene	150	< 4.1
	Naphthalene	3,600	< 41.0
Metals (6010B)[2] mg/kg	Cobalt	25	**32.8**
Pesticides - (8081A)[2] - ug/kg	Dieldrin	30	**1.9 J**
	DDD	2,000	**15.5**
	DDE	1,400	**19.7**

Notes:

Some chemicals listed in the table were not detected, and these non-detects have been qualified as having estimated report limits. The qualifiers from data validation are present in the tables in Apppendix H.

[1] Source of Soil Screening Levels identified in Table 5-2.

[2] EPA analytical method.

< x = not detected at listed reporting limit

Concentration exceeded soil screening level

ft bgs = feet below ground surface

J = estimated value

mg/kg = milligrams per kilogram

SVOCs = semi-volatile organic compounds

ug/kg = micrograms per kilogram

UJ = not detected at estimated value that is biased low due to QC anomalies

VOCs = volatile organic compounds

Table 5-4
Chemical Concentrations in Soil Exceeding Screening Levels - Source Area
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

	Boring Identification	Soil Screening Level[1]	SC-010	SC-010	SC-010	SC-010	SC-011	SC-011	SC-011	SC-012	SC-012
	Sample Date		Apr 13 2012	Apr 13 2012	Apr 13 2012	Apr 13 2012	Apr 12 2012	Apr 12 2012	Apr 12 2012	Feb 2 2012	Feb 2 2012
	Sample ID		SC-010-SB01	SC-010-SB02	SC-010-SB03	SC-010-SB04	SC-011-SB01	SC-011-SB02	SC-011-SB03	SC-012-SB01	SC-012-SB02
	Sample Depth (ft bgs)		1	3	5	8	1	3	5	1	3
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	< 3,000	< 2,500	< 6,000	**35.9**	< 2,000	< 1,400	< 600	< 3,100	**789 J**
	1,2,4-Trimethylbenzene	62,000	**1,740 J**	**22,800**	**48,100**	**992**	**3,170**	**1,790**	**1,920**	**22,000**	**3,790**
	1,2-Dichloroethane	430	< 3,000	< 2,500	< 6,000	**0.53 J**	< 2,000	< 1,400	< 600	< 3,100	< 2,300
	1,4-Dichlorobenzene	2,400	< 3,000	< 2,500	< 6,000	< 4.7	< 2,000	< 1,400	< 600	< 3,100	< 2,300
	Benzene	1,100	< 3,000	< 2,500	< 6,000	**23.6**	< 2,000	< 1,400	< 600	< 3,100	**448 J**
	cis-1,2-Dichloroethylene	160,000	< 3,000	< 2,500	**4,580 J**	**127**	< 2,000	< 1,400	< 600	< 3,100	**3,230**
	Ethylbenzene	5,400	< 3,000	**2,320 J**	**3,830 J**	**35.7**	< 2,000	< 1,400	**74.1 J**	**8,030**	**426 J**
	Tetrachloroethene (PCE)	22,000	< 3,000	< 2,500	< 6,000	< 4.7	< 2,000	< 1,400	< 600	< 3,100	< 2,300
	Trichloroethene (TCE)	910	< 3,000	< 2,500	< 6,000	**0.92 J**	< 2,000	< 1,400	< 600	< 3,100	**492 J**
	Vinyl Chloride	60.0	< 3,000	< 2,500	< 6,000	**99.2**	< 2,000	< 1,400	< 600	< 3,100	< 2,300
	Xylenes, Total	630,000	< 6,000	**16,100**	**26,000**	**204**	**576 J**	**414 J**	**662 J**	**31,200**	**1,910 J**
SVOCs - (8270C/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	**5,540**	**4,850**	**185**	< 20.0	**474**	**578**	**1,120**	**6,210**	**266**
	2-Methylnaphthalene	230,000	**5,950**	**5,280**	**200**	< 20.0	**567**	**568**	**1,550**	**7,700**	**298**
	Benzo(a)anthracene	150	**52.6 J**	**66.2 J**	**9.8**	< 3.9	**19.4**	**27.4**	**8.7**	**580**	**91.6**
	Benzo(a)pyrene	15.0	**34.8 J**	< 190	**7.7**	< 3.9	**9.7**	**22.3**	**1.8 J**	**504**	**163**
	Benzo(b)fluoranthene	150	**59.4 J**	**58.5 J**	**11.0**	< 3.9	**25.2**	**32.9**	**4.0**	**700**	**18.3 J**
	Benzo(k)fluoranthene	1,500	**52.1 J**	**49.1 J**	**9.4**	< 3.9	**13.9**	**27.4**	**3.9**	**762**	**278**
	Chrysene	15,000	**62.4 J**	**71.8 J**	**14.3**	< 3.9	**32.4**	**44.0**	**10.4**	**961**	**168**
	Dibenz(a,h)anthracene	15.0	< 200	< 190	**2.1 J**	< 3.9	**2.5 J**	**4.0 J**	< 3.9	**92.1 J**	**40.5**
	Indeno(1,2,3-c,d)pyrene	150	< 200	**53.9 J**	**7.5**	< 3.9	**10.0**	**16.7**	**1.5 J**	**470**	**170**
	Naphthalene	3,600	**360 J**	**337 J**	**12.5 J**	< 20.0	**33.1**	**32.0**	**34.0**	**1,810**	**64.2 J**
	Pentachlorophenol	890	< 2,000	< 1,900	< 400	< 390	< 610	< 590	< 390	< 8,200	< 4,500
	Phenanthrene	11,000	**582 J**	**640 J**	**40.0**	**2.2 J**	**115**	**35.7**	**86.1**	**1,680**	**47.9 J**
Metals (6010B)[2] mg/kg	Antimony	31	**0.99**	**0.67**	**1.2**	**1.1**	**1.5**	**0.57**	**0.72**	**2.3**	**2.4**
	Arsenic	24	**3.0**	**3.0**	**3.4**	**4.1**	**3.5**	**2.3**	**2.8**	**9.5**	**10.9**
	Lead	400	**41.6**	**22.2**	**17.3**	**4.5**	**19.2**	**9.7**	**3.6**	**440**	**835**
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 20.0	< 19.0	< 20.0	< 3.9	< 150	< 300	< 3.9	< 410	< 180
	Dieldrin	30.0	**434 J**	**375 J**	**172 J**	< 3.9	**420**	**171 J**	**71.6**	**131 J**	**443**
	DDD	2,000	**9,170**	**9,860**	**5,640**	**10.2**	**7,330**	**11,100**	**983**	**5,640**	**3,430**
	DDE	1,400	**1,260**	**1,160**	**626**	**1.7 J**	**1,300**	**1,330**	**129**	**2,040**	**1,790**
	DDT	1,700	< 20.0	< 19.0	< 20.0	< 3.9	< 150	< 300	< 3.9	< 410	< 180
PCBs (8082)[2] ug/kg	PCB-1260 (Aroclor 1260)	220	< 39.0	< 38.0	< 40.0	< 39.0	< 61.0	< 59.0	< 39.0	< 410	< 450

Table 5-4
Chemical Concentrations in Soil Exceeding Screening Levels - Source Area
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	Boring Identification	Soil Screening Level[1]	SC-012	SC-012	SC-012	SC-012	SC-013	SC-013	SC-013	SC-013	SC-013
	Sample Date		Feb 2 2012	Feb 2 2012	Feb 2 2012	Feb 2 2012	Jan 31 2012	Jan 31 2012	Jan 31 2012	Jan 31 2012	Jan 31 2012
	Sample ID		SC-012-SB03	SC-012-SB04	SC-012-SB05	SC-012-SB07	SC-013-SB01	SC-013-SB02	SC-013-SB03	SC-013-SB04	SC-013-SB06
	Sample Depth (ft bgs)		5	8	13	30	1	3	5	8	20
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	< 240	**48.0 J**	**779**	**111 J**	< 9,000	**463 J**	**653**	**549**	**768**
	1,2,4-Trimethylbenzene	62,000	**1,410**	**253**	**268 J**	**59.1 J**	**64,800**	**382 J**	**135 J**	**544**	**163 J**
	1,2-Dichloroethane	430	< 240	< 240	< 460	< 260	< 9,000	< 570	< 580	< 460	< 250
	1,4-Dichlorobenzene	2,400	< 240	< 240	< 460	< 260	< 9,000	< 570	< 580	< 460	< 250
	Benzene	1,100	< 240	< 240	**103 J**	< 260	< 9,000	**87.7 J**	**94.1 J**	**113 J**	**40.0 J**
	cis-1,2-Dichloroethylene	160,000	< 240	< 240	**1,350**	**2,180**	< 9,000	**2,880**	**2,540**	**1,050**	**1,270**
	Ethylbenzene	5,400	**128 J**	**99.6 J**	**235 J**	< 260	**4,360 J**	**61.8 J**	< 580	**83.9 J**	**70.1 J**
	Tetrachloroethene (PCE)	22,000	< 240	< 240	< 460	< 260	< 9,000	< 570	< 580	< 460	< 250
	Trichloroethene (TCE)	910	< 240	< 240	< 460	< 260	< 9,000	< 570	< 580	< 460	< 250
	Vinyl Chloride	60.0	**51.7 J**	**384**	**2,040**	**383**	< 9,000	**269 J**	**977**	**772**	**1,620**
	Xylenes, Total	630,000	**1,130**	**354 J**	**916 J**	< 520	**34,100**	**425 J**	**266 J**	**496 J**	**235 J**
SVOCs - (8270C/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	**341**	< 19.0	< 20.0	< 20.0	**21,500**	**2,640**	**4.5 J**	**4.6 J**	**4.50 J**
	2-Methylnaphthalene	230,000	**362**	< 19.0	< 20.0	< 20.0	**26,600**	**4,420**	**6.6 J**	**6.6 J**	< 20.0
	Benzo(a)anthracene	150	**3.7 J**	< 3.9	< 4.0	< 3.9	**381**	**61.5**	< 4.0	< 4.0	< 4.0
	Benzo(a)pyrene	15.0	**1.8 J**	< 3.9	**0.99 J**	< 3.9	**95.4 J**	**38.9**	< 4.0	< 4.0	< 4.0
	Benzo(b)fluoranthene	150	**2.3 J**	< 3.9	< 4.0	< 3.9	**204**	**31.1**	< 4.0	< 4.0	< 4.0
	Benzo(k)fluoranthene	1,500	**2.3 J**	< 3.9	< 4.0	< 3.9	**233**	**29.0**	< 4.0	< 4.0	< 4.0
	Chrysene	15,000	**3.7 J**	< 3.9	< 4.0	< 3.9	**440**	**72.7**	< 4.0	< 4.0	< 4.0
	Dibenz(a,h)anthracene	15.0	< 4.0	< 3.9	**2.9 J**	< 3.9	< 190	**5.50**	< 4.0	< 4.0	< 4.0
	Indeno(1,2,3-c,d)pyrene	150	**1.4 J**	< 3.9	**2.8 J**	< 3.9	**120 J**	**19.0**	< 4.0	< 4.0	< 4.0
	Naphthalene	3,600	**19.5 J**	< 19.0	< 20.0	< 20.0	**9,260**	**1,490**	< 20.0	< 20.0	< 20.0
	Pentachlorophenol	890	< 400	< 390	< 400	< 390	< 7,700	< 400	< 390	< 400	< 390
	Phenanthrene	11,000	**16.6 J**	< 19.0	< 20.0	< 20.0	**3,970**	**598**	**2.9 J**	**3.7 J**	< 20.0
Metals (6010B)[2] mg/kg	Antimony	31	< 0.56	< 0.55	< 0.59	< 0.59	**0.11 J**	< 0.53	< 0.54	< 0.51	< 0.55
	Arsenic	24	**3.4**	**3.2**	**2.9**	**2.3**	**1.5**	**3.3**	**2.9**	**3.0**	**3.0**
	Lead	400	**4.2**	**3.3**	**3.5**	**2.3**	**2.7**	**3.3**	**3.7**	**3.4**	**2.8**
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 12.0	< 3.9	< 4.0	< 3.9	< 770	< 12.0	< 3.9	< 4.0	< 4.0
	Dieldrin	30.0	**44.7**	< 3.9	< 4.0	< 3.9	**1,420**	**16.2**	< 3.9	< 4.0	< 4.0
	DDD	2,000	**512**	**1.1 J**	< 4.0	**1.1 J**	**24,900**	**292**	**8.9**	**2.9 J**	< 4.0
	DDE	1,400	**26.2**	< 3.9	< 4.0	< 3.9	**4,010**	**44.9**	**1.4 J**	< 4.0	< 4.0
	DDT	1,700	< 12.0	< 3.9	< 4.0	< 3.9	< 770	< 12.0	< 3.9	< 4.0	< 4.0
PCBs (8082)[2] ug/kg	PCB-1260 (Aroclor 1260)	220	< 40.0	< 39.0	< 40.0	< 39.0	< 39.0	< 40.0	< 39.0	< 40.0	< 40.0

Table 5-4
Chemical Concentrations in Soil Exceeding Screening Levels - Source Area
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	Boring Identification	Soil Screening Level[1]	SC-013	SC-015	SC-015	SC-015	SC-015	SC-015	SC-015	SC-015	SC-016
	Sample Date		Jan 31 2012	Feb 1 2012	Feb 1 2012	Feb 1 2012	Feb 1 2012	Feb 1 2012	Feb 1 2012	Feb 1 2012	Jan 31 2012
	Sample ID		SC-013-SB07	SC-015-SB01	SC-015-SB02	SC-015-SB03	SC-015-SB04	SC-015-SB05	SC-015-SB06	SC-015-SB07	SC-016-SB01
	Sample Depth (ft bgs)		30	1	3	5	8	13	20	30	1
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	< 400	4.3 J	< 37,000	696 J	320 J	< 290	< 240	< 620	< 42,000
	1,2,4-Trimethylbenzene	62,000	88.5 J	68.7 J	69,600	8,500	6,440	58.7 J	234 J	< 620	154,000
	1,2-Dichloroethane	430	< 400	< 5.1	< 37,000	< 3,600	< 1,400	< 290	< 240	< 620	< 42,000
	1,4-Dichlorobenzene	2,400	< 400	0.69 J	< 37,000	< 3,600	< 1,400	< 290	< 240	< 620	< 42,000
	Benzene	1,100	< 400	2.5 J	< 37,000	< 3,600	< 1,400	< 290	< 240	< 620	< 42,000
	cis-1,2-Dichloroethylene	160,000	5,230	36.9 J	37,300	22,400	9,110	< 290	72.3 J	< 620	55,100
	Ethylbenzene	5,400	40.6 J	42.4 J	25,800 J	2,940 J	1,040 J	< 290	27.1 J	< 620	69,400
	Tetrachloroethene (PCE)	22,000	144 J	0.98 J	< 37,000	< 3,600	< 1,400	< 290	< 240	< 620	< 42,000
	Trichloroethene (TCE)	910	5,790	7.9 J	< 37,000	< 3,600	< 1,400	< 290	< 240	< 620	5,570 J
	Vinyl Chloride	60.0	< 400	38.0 J	< 37,000	803 J	373 J	< 290	< 240	< 620	< 42,000
	Xylenes, Total	630,000	115 J	152 J	123,000	14,200	5,520	122 J	62.9 J	< 1,200	299,000
SVOCs - (8270C/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	< 20.0	71.1	69,200	3,630	282	43.8	9.7 J	< 20.0	6,630
	2-Methylnaphthalene	230,000	< 20.0	84.9	105,000	5,290	356	63.3	9.8 J	< 20.0	9,590
	Benzo(a)anthracene	150	< 4.0	28.6	150 J	34.4	13.3	2.0 J	6.7	7.4	180
	Benzo(a)pyrene	15.0	< 4.0	32.1	< 200	8.5	3.0 J	< 4.0	2.6 J	2.8 J	113
	Benzo(b)fluoranthene	150	< 4.0	34.1	64.6 J	16.4	7.1	1.1 J	3.2 J	4.3	137
	Benzo(k)fluoranthene	1,500	< 4.0	30.7	63.1 J	17.1	7.1	1.1 J	3.5 J	4.8	139
	Chrysene	15,000	< 4.0	40.2	167 J	37.9	14.4	2.3 J	6.7	7.5	221
	Dibenz(a,h)anthracene	15.0	< 4.0	6.5 J	< 200	2.3 J	< 3.9	< 4.0	< 3.9	< 4.0	18.9 J
	Indeno(1,2,3-c,d)pyrene	150	< 4.0	26.1	< 200	6.9	3.1 J	< 4.0	1.4 J	2.0 J	79.4
	Naphthalene	3,600	< 20.0	13.1 J	9,790	203	10.3 J	6.1 J	< 20.0	< 20.0	1,690
	Pentachlorophenol	890	< 400	< 880	< 7,900	266 J	< 390	< 400	< 390	< 400	< 2,300
	Phenanthrene	11,000	< 20.0	35.4 J	1,790	233	57.2	4.6 J	10.4 J	< 20.0	756
Metals (6010B)[2] mg/kg	Antimony	31	< 0.51	0.54 J	< 0.56	< 0.58	< 0.52	< 0.57	< 0.53	< 0.56	1.1
	Arsenic	24	2.50	3.7	3.7	5.4	2.7	2.6	3.1	1.3	7.7
	Lead	400	2.20	94.7	4.2	5.5	3.3	2.9	3.4	2.1	401
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 4.0	< 220	< 2,000	< 200	< 39.0	< 20.0	< 20.0	< 40.0	57.8 J
	Dieldrin	30.0	< 4.0	246	1,560 J	407	86.7	35.6	36.7	204	1,120
	DDD	2,000	< 4.0	3,890	24,400	5,860	1,200	651	907	1,470	11,500
	DDE	1,400	< 4.0	771	2,940	696	135	68.4	107	240	2,770
	DDT	1,700	< 4.0	< 220	< 2,000	< 200	< 39.0	< 20.0	< 20.0	< 40.0	< 230
PCBs (8082)[2] ug/kg	PCB-1260 (Aroclor 1260)	220	< 40.0	< 44.0	< 790	< 400	< 39.0	< 40.0	< 39.0	< 40.0	583

Table 5-4
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	Boring Identification	Soil Screening Level[1]	SC-016	SC-016	SC-016	SC-016	SC-016	SC-017	SC-017	SC-017	SC-017
	Sample Date		Jan 31 2012	Jan 31 2012	Jan 31 2012	Jan 31 2012	Jan 31 2012	Feb 1 2012	Feb 1 2012	Feb 1 2012	Feb 1 2012
	Sample ID		SC-016-SB02	SC-016-SB03	SC-016-SB04	SC-016-SB05	SC-016-SB07	SC-017-SB01	SC-017-SB02	SC-017-SB03	SC-017-SB04
	Sample Depth (ft bgs)		3	5	8	13	30	1	3	5	8
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	**21,900 J**	**3,410 J**	**2,100 J**	**1,670 J**	**934**	< 92,000	< 97,000	< 290,000	< 220,000
	1,2,4-Trimethylbenzene	62,000	**236,000**	**14,700**	**4,460**	< 1,800	< 570	**339,000**	**42,800 J**	< 290,000	< 220,000
	1,2-Dichloroethane	430	< 130,000	< 9,000	< 2,900	< 1,800	< 570	< 92,000	< 97,000	< 290,000	< 220,000
	1,4-Dichlorobenzene	2,400	< 130,000	< 9,000	< 2,900	< 1,800	< 570	< 92,000	< 97,000	< 290,000	< 220,000
	Benzene	1,100	< 130,000	< 9,000	< 2,900	**221 J**	< 570	< 92,000	< 97,000	< 290,000	< 220,000
	cis-1,2-Dichloroethylene	160,000	**362,000**	**47,600**	**35,200**	**28,500**	**962**	**339,000**	**260,000**	**107,000 J**	**81,700 J**
	Ethylbenzene	5,400	**131,000**	**9,350**	**1,820 J**	**407 J**	**94.2 J**	**212,000**	**25,400 J**	< 290,000	< 220,000
	Tetrachloroethene (PCE)	22,000	**21,600 J**	**1,440 J**	< 2,900	< 1,800	< 570	< 92,000	**44,800 J**	**125,000 J**	**105,000 J**
	Trichloroethene (TCE)	910	**1,070,000**	**37,400**	**1,950 J**	**986 J**	< 570	< 92,000	**1,410,000**	**3,480,000**	**3,320,000**
	Vinyl Chloride	60.0	< 130,000	< 9,000	**937 J**	**1,570 J**	**5,180**	< 92,000	< 97,000	< 290,000	< 220,000
	Xylenes, Total	630,000	**545,000**	**37,700**	**7,920**	**1,580 J**	**223 J**	**951,000**	**104,000 J**	< 590,000	**45,300 J**
SVOCs - (8270C/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	**67,300**	**636**	**197 J**	**8.8 J**	< 20.0	**57,600**	**11,500**	**45,400**	**16,200**
	2-Methylnaphthalene	230,000	**111,000**	**848**	**271 J**	**10.4 J**	< 20.0	**100,000**	**18,200**	**69,000**	**23,400**
	Benzo(a)anthracene	150	**132 J**	**5.3**	**10.1**	< 4.0	< 4.0	**170 J**	**30.5 J**	**103 J**	**299 J**
	Benzo(a)pyrene	15.0	< 190	**1.3 J**	**5.9**	< 4.0	< 4.0	< 190	< 40.0	< 200	**172 J**
	Benzo(b)fluoranthene	150	**49.5 J**	**2.8 J**	**6.6**	< 4.0	< 4.0	**57.3 J**	**13.3 J**	**47.5 J**	**162 J**
	Benzo(k)fluoranthene	1,500	< 190	**2.8 J**	**7.1**	< 4.0	< 4.0	< 190	**10.4 J**	< 200	**150 J**
	Chrysene	15,000	**165 J**	**6.1**	**12.9**	< 4.0	< 4.0	**203**	**42.1**	**119 J**	**248 J**
	Dibenz(a,h)anthracene	15.0	< 190	< 3.9	< 4.0	< 4.0	< 4.0	< 190	< 40.0	< 200	< 390
	Indeno(1,2,3-c,d)pyrene	150	< 190	**1.1 J**	**3.7 J**	< 4.0	< 4.0	< 190	< 40.0	< 200	**99.8 J**
	Naphthalene	3,600	**18,400 J**	**55.4**	**45.3 J**	< 20.0	< 20.0	**40,100**	**4,500**	**8,450**	**2,020**
	Pentachlorophenol	890	< 7,700	**153 J**	< 400	< 400	< 400	< 7,800	< 400	< 7,900	< 390
	Phenanthrene	11,000	**1,820**	**40.3**	**35.0**	< 20.0	< 20.0	**3,410**	**564**	**1,460**	**873 J**
Metals (6010B)[2] mg/kg	Antimony	31	< 0.51	< 0.50	< 0.55	< 0.56	< 0.55	**0.150 J**	**0.24 J**	< 0.51	< 0.53
	Arsenic	24	**1.5**	**2.8**	**4.0**	**2.6**	**2.9**	**2.1**	**3.4**	**3.1**	**2.7**
	Lead	400	**2.8**	**3**	**7.1**	**3.2**	**2.0**	**3.7**	**3.8**	**3.6**	**3.1**
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 380	< 19.0	< 20.0	< 4.0	< 4.0	< 780	< 400	< 790	< 390
	Dieldrin	30.0	**1,950**	**52.1**	**26.8**	< 4.0	< 4.0	**2,070**	**893**	**1,770**	**696**
	DDD	2,000	**23,400**	**713**	**355**	**2.3 J**	**1.0 J**	**26,500**	**12,700**	**25,100**	**6,040**
	DDE	1,400	**2,810**	**76.2**	**42.0**	< 4.0	< 4.0	**3,790**	**1,640**	**3,250**	**799**
	DDT	1,700	< 380	< 19.0	< 20.0	< 4.0	< 4.0	< 780	< 400	< 790	**2,540**
PCBs (8082)[2] ug/kg	PCB-1260 (Aroclor 1260)	220	< 38.0	< 39.0	< 40.0	< 40.0	< 40.0	< 390	< 400	< 790	< 780

Table 5-4
Chemical Concentrations in Soil Exceeding Screening Levels - Source Area
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	Boring Identification	Soil Screening Level[1]	SC-017	SC-017	SC-017	SC-018	SC-018	SC-018	SC-018	SC-018	SC-019
	Sample Date		Feb 1 2012	Feb 1 2012	Feb 1 2012	Jan 27 2012	Jan 27 2012	Jan 27 2012	Jan 27 2012	Jan 27 2012	Jan 30 2012
	Sample ID		SC-017-SB05	SC-017-SB06	SC-017-SB07	SC-018-SB01	SC-018-SB02	SC-018-SB03	SC-018-SB04	SC-018-SB05	SC-019-SB01
	Sample Depth (ft bgs)		13	20	30	3	5	8	10	15	3
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	4,300 J	1,800	< 6,000	< 10,000	< 38,000	391 J	701 J	788	16,300 J
	1,2,4-Trimethylbenzene	62,000	39,700	1,440 J	< 6,000	44,300	276,000	776	397 J	< 280	120,000
	1,2-Dichloroethane	430	< 7,600	< 1,700	< 6,000	< 10,000	< 38,000	< 530	< 1,300	< 280	< 90,000
	1,4-Dichlorobenzene	2,400	< 7,600	< 1,700	< 6,000	< 10,000	< 38,000	< 530	< 1,300	< 280	< 90,000
	Benzene	1,100	1,340 J	< 1,700	< 6,000	< 10,000	< 38,000	< 530	< 1,300	145 J	< 90,000
	cis-1,2-Dichloroethylene	160,000	81,000	28,000	9,960	< 10,000	14,100 J	3,880	7,330	< 280	257,000
	Ethylbenzene	5,400	6,660 J	220 J	< 6,000	12,200	114,000	531	903 J	69.3 J	45,300 J
	Tetrachloroethene (PCE)	22,000	< 7,600	< 1,700	1,490 J	< 10,000	< 38,000	< 530	< 1,300	< 280	65,100 J
	Trichloroethene (TCE)	910	12,500	1,710	75,300	< 10,000	< 38,000	< 530	< 1,300	< 280	1,420,000
	Vinyl Chloride	60.0	< 7,600	975 J	< 6,000	< 10,000	< 38,000	657	2,010	598	< 90,000
	Xylenes, Total	630,000	36,100	929 J	< 12,000	47,800	455,000	2,130	3,680	325 J	261,000
SVOCs - (8270C/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	11,600	33.8	6,500	60,200	49,400	240	14,300	129	88,700
	2-Methylnaphthalene	230,000	15,800	46.5	9,000	78,400	72,200	358	22,300	142	138,000
	Benzo(a)anthracene	150	118	1.7 J	34.6	4,150	3,310	29.4	371	< 4.0	122 J
	Benzo(a)pyrene	15.0	45.5	0.84 J	11.5	2,530	1,950	19.9	250	< 4.0	< 200
	Benzo(b)fluoranthene	150	55.1	0.89 J	15.3	2,180	1,900	14.8	183	< 4.0	54.0 J
	Benzo(k)fluoranthene	1,500	61.3	0.91 J	16.4	2,720	2,070	18.0	218	< 4.0	50.8 J
	Chrysene	15,000	114	1.7 J	37.4	4,240	3,790	28.6	355	< 4.0	152 J
	Dibenz(a,h)anthracene	15.0	8.3 J	< 3.9	2.1 J	297	289	1.6 J	22.6	< 4.0	< 200
	Indeno(1,2,3-c,d)pyrene	150	26.4	< 3.9	7.0	1,070	1,090	6.7	83.4	< 4.0	< 200
	Naphthalene	3,600	1,330 J	< 20.0	299	8,820	16,900	12.1 J	572 J	14.7 J	12,300
	Pentachlorophenol	890	< 390	< 390	< 410	< 7,700	< 8,300	< 390	< 400	< 400	2,930 J
	Phenanthrene	11,000	474 J	7.70 J	241	10,900	10,900	38.2	788 J	4.0 J	1,540
Metals (6010B)[2] mg/kg	Antimony	31	< 0.54	< 0.54	0.16 J	2.4	4.0	0.51 J	0.29 J	0.23 J	0.20 J
	Arsenic	24	2.3	2.6	2.6	7.1	6.2	2.7	2.4	2.2	2.9
	Lead	400	3.1	2.3	2.6	329	333	3.4	2.9	2.8	3.5
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 390	< 3.9	< 410	220 J	< 210	< 3.9	< 3.9	< 4.0	< 39.0
	Dieldrin	30.0	1,420	7.4	521	4,000	1,310	1.0 J	8.3	< 4.0	1,560
	DDD	2,000	13,800	95.7	5,870	22,300	14,600	21.0	179	< 4.0	25,000
	DDE	1,400	1,200	8.2	677	3,290	2,070	2.0 J	15.9	< 4.0	2,280
	DDT	1,700	< 390	< 3.9	3,030	440	< 210	< 3.9	3.3 J	< 4.0	66.5
PCBs (8082)[2] ug/kg	PCB-1260 (Aroclor 1260)	220	< 790	< 39.0	< 830	4,680	361 J	< 39.0	< 39.0	< 40.0	< 39.0

Table 5-4
Chemical Concentrations in Soil Exceeding Screening Levels - Source Area
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	Boring Identification	Soil Screening Level[1]	SC-019	SC-019	SC-019	SC-019	SC-019	SC-020	SC-020	SC-020	SC-020
	Sample Date		Jan 30 2012	Jan 30 2012	Jan 30 2012	Jan 30 2012	Jan 30 2012	Jan 30 2012	Jan 30 2012	Jan 30 2012	Jan 30 2012
	Sample ID		SC-019-SB02	SC-019-SB03	SC-019-SB04	SC-019-SB06	SC-019-SB07	SC-020-SB01	SC-020-SB02	SC-020-SB03	SC-020-SB04
	Sample Depth (ft bgs)		5	8	10	23	28	1	3	5	8
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	< 220,000	< 97,000	< 500,000	< 1,300	< 1,200	< 630	< 35,000	1,800 J	40,100 J
	1,2,4-Trimethylbenzene	62,000	112,000 J	40,600 J	206,000 J	1,960	< 1,200	2,970	116,000	28,200	123,000
	1,2-Dichloroethane	430	< 220,000	< 97,000	< 500,000	< 1,300	< 1,200	< 630	< 35,000	< 14,000	< 70,000
	1,4-Dichlorobenzene	2,400	< 220,000	< 97,000	< 500,000	< 1,300	< 1,200	90.8 J	< 35,000	< 14,000	< 70,000
	Benzene	1,100	< 220,000	< 97,000	< 500,000	< 1,300	< 1,200	< 630	< 35,000	< 14,000	< 70,000
	cis-1,2-Dichloroethylene	160,000	202,000 J	32,900 J	< 500,000	< 1,300	< 1,200	6,920	312,000	222,000	225,000
	Ethylbenzene	5,400	37,000 J	11,000 J	< 500,000	257 J	< 1,200	651	35,900	20,600	90,500
	Tetrachloroethene (PCE)	22,000	105,000 J	35,900 J	135,000 J	< 1,300	< 1,200	< 630	< 35,000	< 14,000	< 70,000
	Trichloroethene (TCE)	910	3,260,000	1,380,000	5,570,000	151 J	< 1,200	106 J	< 35,000	< 14,000	< 70,000
	Vinyl Chloride	60.0	< 220,000	< 97,000	< 500,000	< 1,300	< 1,200	< 630	< 35,000	6,300 J	< 70,000
	Xylenes, Total	630,000	204,000 J	59,800 J	214,000 J	277 J	< 2,400	4,430	205,000	99,700	401,000
SVOCs - (8270C/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	153,000	84,900	165,000	181 J	< 20.0	1,860	56,500	16,900	84,500
	2-Methylnaphthalene	230,000	243,000	131,000	250,000	189 J	< 20.0	2,700	86,900	20,700	124,000
	Benzo(a)anthracene	150	112 J	92.8 J	173 J	1.80 J	8.8	63.8	469	701	14,000
	Benzo(a)pyrene	15.0	< 200	< 200	33.5 J	< 3.9	2.9 J	58.8	159 J	550	4,190
	Benzo(b)fluoranthene	150	57.0 J	< 200	72.1 J	< 3.9	4.7	51.0	219	574	10,200
	Benzo(k)fluoranthene	1,500	57.0 J	< 200	69.3 J	< 3.9	4.7	48.4	291	513	9,860
	Chrysene	15,000	143 J	90.5 J	188 J	1.70 J	9.7	88.8	600	1,010	23,000
	Dibenz(a,h)anthracene	15.0	< 200	< 200	< 190	< 3.9	1.4 J	8.5	< 200	84.9 J	1,610
	Indeno(1,2,3-c,d)pyrene	150	< 200	< 200	< 190	< 3.9	2.9 J	35.0	110 J	302	4,550
	Naphthalene	3,600	17,800	11,400	20,800 J	< 20.0	< 20.0	488	25,700	4,130	13,800
	Pentachlorophenol	890	8,860	3,750 J	7,320 J	< 390	< 400	< 1,200	< 20,000	< 8,400	< 31,000
	Phenanthrene	11,000	1,360	877 J	1,790	9.6 J	33.3	272	4,550	2,390	46,800
Metals (6010B)[2] mg/kg	Antimony	31	0.27 J	0.28 J	0.22 J	0.38 J	0.13 J	2.1	59.9	11.3	0.91
	Arsenic	24	3.8	3.3	2.8	2.5	4.0	5.9	8.5	30.2	5.5
	Lead	400	4.1	6.9	2.9	2.4	2.3	466	1,000	455	113
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 400	< 200	< 780	< 3.9	< 200	< 80.0	< 400	25.3 J	< 210
	Dieldrin	30.0	2,150	812	3,140	166 J	245	324	2,480	277	870
	DDD	2,000	30,500	9,840	25,500	3,060 J	4,730	2,270	18,200	2,100	7,240
	DDE	1,400	2,130	845	2,520	178 J	228	1,580	6,060	559	882
	DDT	1,700	2,170	3,790	22,400	< 3.9	< 200	< 80.0	< 400	55.2 J	83.1 J
PCBs (8082)[2] ug/kg	PCB-1260 (Aroclor 1260)	220	< 40.0	< 39.0	< 39.0	< 39.0	< 40.0	< 40.0	1,570	737	400

Table 5-4
Chemical Concentrations in Soil Exceeding Screening Levels - Source Area
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	Boring Identification	Soil Screening Level[1]	SC-020	SC-020	SC-021	SC-021	SC-021	SC-021	SC-021	SC-021	SC-021
	Sample Date		Jan 30 2012	Jan 30 2012	Jan 26 2012	Jan 26 2012	Jan 26 2012	Jan 26 2012	Jan 26 2012	Jan 26 2012	Jan 26 2012
	Sample ID		SC-020-SB05	SC-020-SB06	SC-021-SB01	SC-021-SB02	SC-021-SB03	SC-021-SB04	SC-021-SB05	SC-021-SB06	SC-021-SB07
	Sample Depth (ft bgs)		13	20	1	3	5	8	13	20	25
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	**9,650 J**	< 4.2	**37,500**	**49,400**	**11,900**	**1,820 J**	**1,460 J**	**2,210 J**	**2,300 J**
	1,2,4-Trimethylbenzene	62,000	**8,890 J**	**107 J**	**297,000**	**302,000**	**63,800**	**1,860 J**	**519 J**	< 1,400	< 1,400
	1,2-Dichloroethane	430	< 11,000	< 4.2	< 10,000	< 11,000	< 8,900	< 2,700	< 1,200	< 1,400	< 1,400
	1,4-Dichlorobenzene	2,400	< 11,000	**17.4**	< 10,000	< 11,000	< 8,900	< 2,700	< 1,200	< 1,400	< 1,400
	Benzene	1,100	**1,310 J**	**10.4**	**11,100**	**14,600**	**3,620 J**	< 2,700	< 1,200	< 1,400	< 1,400
	cis-1,2-Dichloroethylene	160,000	**25,100**	**0.94 J**	**1,380,000**	**1,280,000**	**76,000**	**11,400 J**	**41,400 J**	**21,100 J**	**38,100 J**
	Ethylbenzene	5,400	**2,820 J**	**72.4**	**169,000**	**116,000**	**13,800**	< 2,700	**237 J**	< 1,400	< 1,400
	Tetrachloroethene (PCE)	22,000	**1,690 J**	< 4.2	**43,400**	**56,600**	**14,800**	< 2,700	< 1,200	< 1,400	< 1,400
	Trichloroethene (TCE)	910	**159,000**	**1.4 J**	**845,000**	**543,000**	**678,000**	**31,000 J**	< 1,200	**347 J**	**466 J**
	Vinyl Chloride	60.0	< 11,000	< 4.2	< 10,000	< 11,000	< 8,900	**880 J**	**2,350 J**	**4,670 J**	**796 J**
	Xylenes, Total	630,000	**14,700 J**	**129**	**912,000**	**658,000**	**80,000**	**2,350 J**	**1,180 J**	< 2,800	< 2,800
SVOCs - (8270C/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	**22,400**	**77.5**	**302,000**	**125,000**	**738,000**	**1,970**	**146**	**12.2 J**	**14.9 J**
	2-Methylnaphthalene	230,000	**32,500**	**87.3**	**380,000**	**196,000**	**1,150,000**	**1,270**	**92.2**	**17.1 J**	**22.0**
	Benzo(a)anthracene	150	**283**	**343**	**440**	**82.4**	**470**	< 3.9	< 4.0	< 4.0	< 4.1
	Benzo(a)pyrene	15.0	**162**	**189**	**49.1**	**9.8 J**	**73.1 J**	< 3.9	< 4.0	< 4.0	< 4.1
	Benzo(b)fluoranthene	150	**134**	**176**	**179**	**44.1**	**230**	< 3.9	< 4.0	< 4.0	< 4.1
	Benzo(k)fluoranthene	1,500	**165**	**218**	**185**	**36.8 J**	**205**	< 3.9	< 4.0	< 4.0	< 4.1
	Chrysene	15,000	**268**	**330**	**556**	**107**	**493 J**	< 3.9	< 4.0	< 4.0	< 4.1
	Dibenz(a,h)anthracene	15.0	**17.9**	**26.9**	**26.2 J**	< 40.0	< 200	< 3.9	< 4.0	< 4.0	< 4.1
	Indeno(1,2,3-c,d)pyrene	150	**61.3**	**73.4**	**65.2**	**13.0 J**	**91.6 J**	< 3.9	< 4.0	< 4.0	< 4.1
	Naphthalene	3,600	**280**	< 20.0	**60,000**	**16,600 J**	**97,700 J**	**115**	**14.2 J**	< 20.0	< 21.0
	Pentachlorophenol	890	**444**	< 390	**4,170 J**	**7,020**	**17,900 J**	< 390	< 400	< 400	< 410
	Phenanthrene	11,000	**667 J**	**227**	**5,330 J**	**1,130**	**3,970**	**8.0 J**	< 20.0	**2.0 J**	< 21.0
Metals (6010B)[2] mg/kg	Antimony	31	< 0.55	< 0.54	< 0.54	< 0.51	**0.38 J**	< 0.55	**0.13 J**	**0.29 J**	< 0.56
	Arsenic	24	**2.8**	**3.4**	**1.7**	**3.7**	**3.2**	**2.6**	**1.6**	**2.9**	**2.6**
	Lead	400	**3.4**	**3.2**	**2.8**	**4.0**	**6.6**	**3.2**	**2.6**	**2.4**	**2.1**
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 40.0	< 7.9	< 990	< 390	< 390	< 3.9	< 4.0	< 4.0	< 4.1
	Dieldrin	30.0	**28.0 J**	**9.2**	**4,490**	**1,640**	**2,420**	**1.4 J**	< 4.0	< 4.0	< 4.1
	DDD	2,000	**139**	**190**	**130,000**	**59,100**	**70,300**	**20.8**	**2.5 J**	**13.9**	**1.6 J**
	DDE	1,400	**27.6 J**	**8.2**	**4,490**	**1,520**	**2,230**	**2.0 J**	< 4.0	< 4.0	< 4.1
	DDT	1,700	**641**	**1.7 J**	< 990	**599**	**15,200**	**31.4**	< 4.0	**0.70 J**	< 4.1
PCBs (8082)[2] ug/kg	PCB-1260 (Aroclor 1260)	220	< 40.0	< 39.0	< 40.0	< 39.0	< 39.0	< 39.0	< 40.0	< 40.0	< 41.0

Table 5-4
Chemical Concentrations in Soil Exceeding Screening Levels - Source Area
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	Boring Identification	Soil Screening Level[1]	SC-021	SC-022	SC-022	SC-022	SC-022	SC-022	SC-022	SC-022	SC-036
	Sample Date		Jan 26 2012	Jan 26 2012	Jan 26 2012	Jan 26 2012	Jan 26 2012	Jan 26 2012	Jan 26 2012	Jan 26 2012	Jan 25 2012
	Sample ID		SC-021-SB11	SC-022-SB01	SC-022-SB02	SC-022-SB03	SC-022-SB04	SC-022-SB05	SC-022-SB06	SC-022-SB07	SC-036-SB01
	Sample Depth (ft bgs)		61	1	3	5	8	13	20	25	3
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	57.9 J	< 3,300	1,830 J	2,360 J	3,780	499	163	80.5	258 J
	1,2,4-Trimethylbenzene	62,000	389	89,500	14,900	4,650	4,130	< 290	313	4.5	8,050
	1,2-Dichloroethane	430	< 250	< 3,300	< 5,900	< 2,600	< 2,700	< 290	< 4.2	< 4.2	< 260
	1,4-Dichlorobenzene	2,400	< 250	1,510 J	< 5,900	< 2,600	< 2,700	< 290	9.6	6.0	628
	Benzene	1,100	< 250	< 3,300	< 5,900	< 2,600	944 J	108 J	30.0	6.4	< 260
	cis-1,2-Dichloroethylene	160,000	1,130	4,040	31,600	28,200	36,700	3,660	131	< 4.2	1,470
	Ethylbenzene	5,400	144 J	24,100	9,950	5,470	10,000	289 J	194 J	6.1	1,680
	Tetrachloroethene (PCE)	22,000	< 250	< 3,300	< 5,900	< 2,600	< 2,700	< 290	3.2 J	< 4.2	< 260
	Trichloroethene (TCE)	910	1,170	< 3,300	1,550 J	3,540	3,520	< 290	13.5	< 4.2	< 260
	Vinyl Chloride	60.0	< 250	< 3,300	< 5,900	< 2,600	< 2,700	376	332	107	310
	Xylenes, Total	630,000	704	120,000	45,300	26,900	56,500	1,160	903	25.3	8,960
SVOCs - (8270C/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	17.6 J	69,900	438,000	211,000	340,000	609	4,750	238	6,900
	2-Methylnaphthalene	230,000	25.1	103,000	515,000	323,000	513,000	792	7,390	362	11,200
	Benzo(a)anthracene	150	< 3.9	7,460	15,800	2,470	1,300	< 4.0	67.6	< 4.0	8.0
	Benzo(a)pyrene	15.0	< 3.9	5,080	8,250	1,500	813	< 4.0	37.6	< 4.0	3.2 J
	Benzo(b)fluoranthene	150	< 3.9	3,610	8,800	1,200	652	< 4.0	32.2	< 4.0	4.0
	Benzo(k)fluoranthene	1,500	< 3.9	4,470	11,800	1,280	701	< 4.0	32.1	< 4.0	3.4 J
	Chrysene	15,000	1.1 J	9,260	16,700	2,440	1,290	< 4.0	72.1	< 4.0	8.4
	Dibenz(a,h)anthracene	15.0	< 3.9	709	1,130	178	100	< 4.0	7.5	< 4.0	< 4.0
	Indeno(1,2,3-c,d)pyrene	150	< 3.9	2,320	3,440	581	332	< 4.0	21.9	< 4.0	2.3 J
	Naphthalene	3,600	< 20.0	9,310	38,000 J	12,800 J	23,500 J	38.8	490	15.7 J	1,070
	Pentachlorophenol	890	< 400	< 31,000	< 20,000	< 20,000	< 20,000	< 400	380 J	< 400	< 400
	Phenanthrene	11,000	3.5 J	17,000	46,700	5,740 J	4,850 J	3.4 J	265	2.5 J	75.3
Metals (6010B)[2] mg/kg	Antimony	31	0.40 J	3.2	0.54 J	0.30 J	0.29 J	0.21 J	0.21 J	0.16 J	< 0.52
	Arsenic	24	1.8	11.0	3.7	2.6	2.9	2.0	2.7	2.5	2.0
	Lead	400	1.9	176	36.7	3.2	3.3	2.5	2.1	2.2	3.2
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 3.9	251	< 160	< 40.0	< 39.0	< 4.0	5.6	< 4.0	10.9 J
	Dieldrin	30.0	4.3	1,560	1,240	146 J	65.3	< 4.0	6,440	< 4.0	112
	DDD	2,000	109	9,950	19,000	1,910	1,280	< 4.0	91.7	< 4.0	1,130
	DDE	1,400	4.9	3,780	803	82.2	45.5	< 4.0	22,400	< 4.0	126
	DDT	1,700	8.6	151	< 160	14.8 J	8.9 J	< 4.0	21.1	< 4.0	< 40.0
PCBs (8082)[2] ug/kg	PCB-1260 (Aroclor 1260)	220	< 39.0	12,300	< 810	< 400	< 39.0	< 40.0	1,420 J	< 40.0	< 40.0

Table 5-4
Chemical Concentrations in Soil Exceeding Screening Levels - Source Area
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	Boring Identification	Soil Screening Level[1]	SC-036	SC-036	SC-036	SC-037	SC-037	SC-037	SC-037	SC-037	SC-037
	Sample Date		Jan 25 2012	Jan 25 2012	Jan 25 2012	Jan 25 2012	Jan 25 2012	Jan 25 2012	Jan 25 2012	Jan 25 2012	Jan 25 2012
	Sample ID		SC-036-SB03	SC-036-SB04	SC-036-SB05	SC-037-SB01	SC-037-SB02	SC-037-SB03	SC-037-SB04	SC-037-SB05	SC-037-SB06
	Sample Depth (ft bgs)		8	10	15	3	5	8	10	15	23
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	792 J	1,360 J	210 J	3,890	3,910	2,320	883 J	258	485
	1,2,4-Trimethylbenzene	62,000	3,270	3,350	< 300	1,210	1,730	1,080	6,050	362	132
	1,2-Dichloroethane	430	< 2,800	< 2,900	< 300	461 J	532 J	240 J	< 1,100	9.6	62.5
	1,4-Dichlorobenzene	2,400	< 2,800	< 2,900	< 300	< 1,100	< 1,300	< 280	< 1,100	< 4.6	< 4.4
	Benzene	1,100	< 2,800	< 2,900	< 300	< 1,100	< 1,300	< 280	< 1,100	16.7	15.9
	cis-1,2-Dichloroethylene	160,000	3,630	10,600	2,260	27,400	34,000	4,500	1,430	115 J	633
	Ethylbenzene	5,400	13,900	17,100	80.9 J	368 J	718 J	527	1,700	74.2 J	64.7
	Tetrachloroethene (PCE)	22,000	< 2,800	< 2,900	< 300	< 1,100	< 1,300	< 280	1,410	11.3	32.7
	Trichloroethene (TCE)	910	< 2,800	< 2,900	< 300	30,800	1,250 J	826	338 J	45.9	100 J
	Vinyl Chloride	60.0	< 2,800	< 2,900	96.4 J	1,250	5,520	6,070	1,090 J	179	594
	Xylenes, Total	630,000	79,100	88,100	361 J	2,160 J	4,370	3,140	9,070	354 J	245
SVOCs - (8270C/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	1,120,000	299,000	336 J	542	308	239	8,100	15.0 J	4.4 J
	2-Methylnaphthalene	230,000	1,730,000	465,000	519 J	811	456	359	12,300	24.2	7.3 J
	Benzo(a)anthracene	150	< 2,000	< 2,000	< 4.0	5.5	< 4.1	1.8 J	21.9	< 4.0	< 4.0
	Benzo(a)pyrene	15.0	< 2,000	< 2,000	< 4.0	< 3.9	< 4.1	< 4.0	1.5 J	< 4.0	< 4.0
	Benzo(b)fluoranthene	150	< 2,000	< 2,000	< 4.0	2.0 J	< 4.1	< 4.0	8.5	< 4.0	< 4.0
	Benzo(k)fluoranthene	1,500	< 2,000	< 2,000	< 4.0	2.0 J	< 4.1	< 4.0	8.2	< 4.0	< 4.0
	Chrysene	15,000	< 2,000	< 2,000	< 4.0	7.5	0.97 J	2.4 J	26.9	< 4.0	< 4.0
	Dibenz(a,h)anthracene	15.0	< 2,000	< 2,000	< 4.0	< 3.9	< 4.1	< 4.0	< 4.0	< 4.0	< 4.0
	Indeno(1,2,3-c,d)pyrene	150	< 2,000	< 2,000	< 4.0	< 3.9	< 4.1	< 4.0	2.8 J	< 4.0	< 4.0
	Naphthalene	3,600	60,100	12,900	26.3	83.0	98.3	87.6	659 J	< 20.0	< 20.0
	Pentachlorophenol	890	< 20,000	< 20,000	< 400	< 390	< 410	< 400	< 400	< 400	< 400
	Phenanthrene	11,000	1,360 J	< 10,000	< 20.0	116	23.8	28.3	300	< 20.0	< 20.0
Metals (6010B)[2] mg/kg	Antimony	31	< 0.54	0.22 J	0.51 J	0.38 J	< 0.53	0.12 J	0.31 J	0.14 J	0.14 J
	Arsenic	24	2.9	3.0	2.7	2.5	4.1	2.8	2.8	2.5	2.9
	Lead	400	3.9	3.8	3.3	4.1	6.3	4.3	3.2	3.1	3.2
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 20.0	< 4.0	< 4.0	< 3.9	< 4.1	< 4.0	117 J	0.62 J	1.8 J
	Dieldrin	30.0	11.7 J	< 4.0	< 4.0	44.4	1.9 J	8.1	2,530	0.83 J	1.8 J
	DDD	2,000	375	16.3	< 4.0	329	20.0	85.6	29,500	4.7	23.4
	DDE	1,400	109	3.3 J	< 4.0	56.8	3.5 J	18.4	2,200	< 4.0	1.5 J
	DDT	1,700	< 20.0	< 4.0	< 4.0	< 3.9	< 4.1	< 4.0	< 4.0	< 4.0	< 4.0
PCBs (8082)[2] ug/kg	PCB-1260 (Aroclor 1260)	220	< 40.0	< 40.0	< 40.0	< 39.0	< 41.0	< 40.0	< 400	< 40.0	< 40.0

Table 5-4
Chemical Concentrations in Soil Exceeding Screening Levels - Source Area
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

	Boring Identification	Soil Screening Level[1]	SC-041	SC-041	SC-041	SC-041	SC-042	SC-042	SC-042	SC-042	SC-042
	Sample Date		Jan 24 2012	Jan 24 2012	Jan 24 2012	Jan 24 2012	Jan 24 2012	Jan 24 2012	Jan 24 2012	Jan 24 2012	Jan 24 2012
	Sample ID		SC-041-SB01	SC-041-SB02	SC-041-SB04	SC-041-SB05	SC-042-SB01	SC-042-SB02	SC-042-SB03	SC-042-SB04	SC-042-SB05
	Sample Depth (ft bgs)		3	5	10	15	1	3	5	8	13
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	294 J	< 290	328	109 J	31,800	4,720 J	2,870 J	2,460	234 J
	1,2,4-Trimethylbenzene	62,000	11,700 J	2,800 J	8,430	4,010 J	318,000	28,500	952 J	551	572
	1,2-Dichloroethane	430	< 1,100	< 290	< 270	< 270	< 29,000	1,540 J	693 J	392 J	< 280
	1,4-Dichlorobenzene	2,400	5,420 J	1,680 J	3,550	1,920 J	< 29,000	< 5,500	< 3,000	< 540	< 280
	Benzene	1,100	< 1,100	< 290	< 270	< 270	< 29,000	< 5,500	< 3,000	< 540	< 280
	cis-1,2-Dichloroethylene	160,000	< 1,100	< 290	126 J	< 270	606,000	76,100	55,500	13,500	< 280
	Ethylbenzene	5,400	1,120 J	285 J	849	387 J	35,900	< 5,500	< 3,000	< 540	79.7 J
	Tetrachloroethene (PCE)	22,000	< 1,100	< 290	< 270	< 270	< 29,000	< 5,500	< 3,000	< 540	< 280
	Trichloroethene (TCE)	910	< 1,100	< 290	< 270	< 270	45,900	50,500	< 3,000	< 540	< 280
	Vinyl Chloride	60.0	< 1,100	< 290	< 270	< 270	< 29,000	2,240 J	3,340	15,800	267 J
	Xylenes, Total	630,000	6,600 J	1,670 J	5,110	2,140 J	220,000	6,600 J	< 6,000	413 J	411 J
SVOCs - (8270C/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	4,630	2,460	1,040	2,390	81,700	380	752	9.3 J	< 20.0
	2-Methylnaphthalene	230,000	8,640	4,620	2,060	4,430	147,000	382	1,310	16.7 J	6.5 J
	Benzo(a)anthracene	150	< 200	< 80.0	4.5	10.0	140	< 4.0	14.6	< 3.9	< 4.0
	Benzo(a)pyrene	15.0	< 200	< 80.0	1.9 J	4.0	15.1 J	< 4.0	12.4	< 3.9	< 4.0
	Benzo(b)fluoranthene	150	< 200	< 80.0	2.1 J	4.0	85.8	< 4.0	10.0	< 3.9	< 4.0
	Benzo(k)fluoranthene	1,500	< 200	< 80.0	1.9 J	3.8 J	56.0	< 4.0	8.8	< 3.9	< 4.0
	Chrysene	15,000	< 200	< 80.0	5.2	11.2	190	0.87 J	16.0	< 3.9	< 4.0
	Dibenz(a,h)anthracene	15.0	< 200	< 80.0	< 3.9	< 4.0	16.6 J	< 4.0	2.0 J	< 3.9	< 4.0
	Indeno(1,2,3-c,d)pyrene	150	< 200	< 80.0	1.1 J	2.7 J	40.8	< 4.0	10.2	< 3.9	< 4.0
	Naphthalene	3,600	1,080	501	218	506	19,200	16.9 J	198	< 20.0	< 20.0
	Pentachlorophenol	890	< 400	< 400	< 390	< 400	< 20,000	< 400	< 410	< 390	< 400
	Phenanthrene	11,000	183 J	95.4 J	44.2	93.7	1,590	4.5 J	57.8	< 20.0	< 20.0
Metals (6010B)[2] mg/kg	Antimony	31	0.25 J	0.34 J	0.22 J	0.31 J	< 0.51	0.40 J	0.36 J	0.30 J	0.35 J
	Arsenic	24	2.8	2.4	2.7	2.8	1.6	2.7	4.0	2.6	2.4
	Lead	400	5.0	3.0	3.8	4.7	3.3	4.2	5.9	3.5	3.2
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	8.4 J	8.2 J	3.5 J	5.7 J	157 J	8.1	0.83 J	< 3.9	< 4.0
	Dieldrin	30.0	100	97.9	34.8	53.9	20,900	63.7	1.9 J	< 3.9	6.9
	DDD	2,000	379	381	138	205	35,900	170	5.9	< 3.9	14.5
	DDE	1,400	167	162	55.5	85.3	6,070	54.4	1.2 J	< 3.9	2.1 J
	DDT	1,700	< 20.0	< 20.0	< 7.9	< 16.0	< 4.0	< 4.0	< 4.1	< 3.9	< 4.0
PCBs (8082)[2] ug/kg	PCB-1260 (Aroclor 1260)	220	< 39.0	< 40.0	< 39.0	< 40.0	< 400	< 40.0	< 41.0	< 39.0	< 40.0

Table 5-4
Chemical Concentrations in Soil Exceeding Screening Levels - Source Area
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AMCO Chemical Superfund Site, Oakland, California

	Boring Identification	Soil Screening Level[1]	SC-042
	Sample Date		Jan 24 2012
	Sample ID		SC-042-SB06
	Sample Depth (ft bgs)		20
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	**25.4**
	1,2,4-Trimethylbenzene	62,000	**71.0**
	1,2-Dichloroethane	430	**1.9 J**
	1,4-Dichlorobenzene	2,400	< 4.5
	Benzene	1,100	**1.7 J**
	cis-1,2-Dichloroethylene	160,000	**159**
	Ethylbenzene	5,400	**7.1**
	Tetrachloroethene (PCE)	22,000	< 4.5
	Trichloroethene (TCE)	910	**37.5**
	Vinyl Chloride	60.0	**69.1**
	Xylenes, Total	630,000	**39.0**
SVOCs - (8270C/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	< 20.0
	2-Methylnaphthalene	230,000	< 20.0
	Benzo(a)anthracene	150	< 4.0
	Benzo(a)pyrene	15.0	< 4.0
	Benzo(b)fluoranthene	150	< 4.0
	Benzo(k)fluoranthene	1,500	< 4.0
	Chrysene	15,000	< 4.0
	Dibenz(a,h)anthracene	15.0	< 4.0
	Indeno(1,2,3-c,d)pyrene	150	< 4.0
	Naphthalene	3,600	< 20.0
	Pentachlorophenol	890	< 400
	Phenanthrene	11,000	< 20.0
Metals (6010B)[2] mg/kg	Antimony	31	**0.30 J**
	Arsenic	24	**3.9**
	Lead	400	**44.3**
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 4.0
	Dieldrin	30.0	**4.1**
	DDD	2,000	**8.5**
	DDE	1,400	**1.4 J**
	DDT	1,700	< 4.0
PCBs (8082)[2] ug/kg	PCB-1260 (Aroclor 1260)	220	< 40.0

Notes:
Some chemicals listed in the table were not detected, and these non-detects have been qualified as having estimated report limits. The qualifiers from data validation are presented in the tables in Appendix H.

[1] Source of Soil Screening Levels identified in Table 5-2.
[2] EPA analytical method.

Concentration exceeded soil screening level
< x = not detected at listed reporting limit
ft bgs = feet below ground surface
SVOCs = semi-volatile organic compounds
VOCs = volatile organic compounds
J = estimated value
mg/kg = milligrams per kilogram
PCBs = polychlorinated biphenyls
ug/kg = micrograms per kilogram

Table 5-5
Chemical Concentrations in Soil Exceeding Screening Levels - Former AMCO Yard
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

	Boring Identification	Soil Screening Level[1]	SC-023	SC-024	SC-025	SC-025	SC-025	SC-026	SC-026	SC-026	SC-026
	Sample Date		Mar 2 2012	Mar 5 2012	Feb 9 2012	Feb 9 2012	Feb 9 2012	Mar 5 2012	Mar 5 2012	Mar 5 2012	Mar 5 2012
	Sample Depth (ft bgs)		1	1	1	3	5	1	3	5	13
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	**2.6 J**	**3.6 J**	**4.5 J**	**1.3 J**	< 9,600	< 14,000 UJ	< 9,200 UJ	< 270	**280 J**
	1,2,4-Trimethylbenzene	62,000	< 6.2	< 6.9	**3.4 J**	**1.8 J**	**12,600**	< 14,000 UJ	**38,300 J**	< 270	**1,950**
	1,2-Dichloroethane	430	< 6.2	< 6.9	< 5.7	< 4.5	< 9,600	< 14,000 UJ	< 9,200 UJ	< 270	< 1,200
	1,3-Dichlorobenzene	210	< 6.2	< 6.9	< 5.7	< 4.5	< 9,600	< 14,000 UJ	< 9,200 UJ	< 270	< 1,200
	1,4-Dichlorobenzene	2,400	< 6.2	< 6.9	< 5.7	< 4.5	< 9,600	< 14,000 UJ	< 9,200 UJ	< 270	< 1,200
	Benzene	1,100	**0.76 J**	< 6.9	**3.5 J**	**0.51 J**	< 9,600	< 14,000 UJ	< 9,200 UJ	**33.7 J**	**182 J**
	cis-1,2-Dichloroethene	160,000	< 6.2	< 6.9	**8.3**	**2.7 J**	< 9,600	< 14,000 UJ	< 9,200 UJ	< 270	**1,100 J**
	Ethylbenzene	5,400	< 6.2	< 6.9	**2.3 J**	< 4.5	< 9,600	**3,000 J**	**4,430 J**	**61.9 J**	**4,590**
	Tetrachloroethene (PCE)	22,000	< 6.2	< 6.9	< 5.7	< 4.5	< 9,600	< 14,000 UJ	< 9,200 UJ	< 270	< 1,200
	Trichloroethene (TCE)	910	< 6.2	< 6.9	**2.7 J**	**2.0 J**	< 9,600	< 14,000 UJ	< 9,200 UJ	< 270	< 1,200
	Vinyl Chloride	60.0	**2.8 J**	< 6.9	**3.8 J**	< 4.5	< 9,600	< 14,000 UJ	< 9,200 UJ	< 270	< 1,200
	Xylenes, Total	630,000	**2.2 J**	< 14.0	**5.5 J**	< 9.0	**3,820 J**	**3,830 J**	**20,400 J**	< 530	**18,500**
SVOCs - (8270/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	< 990	< 140	**27.5 J**	**21.1 J**	**77,300 J**	**104,000**	**83,300**	**3,350**	**51,300**
	2-Methylnaphthalene	230,000	< 990	< 140	**36.7 J**	**26.2 J**	**121,000 J**	**145,000**	**123,000**	**5,000**	**77,900**
	Benzo(a)anthracene	150	**338**	**54.9**	**60.4**	**105**	**617**	**1,160**	**378**	**125**	**27.0**
	Benzo(a)pyrene	15.0	**300**	**60.3**	**98.7**	**163**	**195 J**	**616**	**145 J**	**69.3**	**17.5**
	Benzo(b)fluoranthene	150	**257**	**64.5**	**63.5**	**104**	**275 J**	**702**	**165 J**	**65.7**	**12.8**
	Benzo(k)fluoranthene	1,500	**219**	**63.2**	**73.1**	**122**	**306**	**772**	**215**	**76.4**	**15.7**
	Dibenz(a,h)anthracene	15.0	**139 J**	**14.2 J**	**14.5**	**20.5**	< 200 J	**189 J**	< 200	**11.5**	**2.4 J**
	Indeno(1,2,3-c,d)pyrene	150	**225**	**70.1**	**66.7**	**103**	**95.9 J**	**463**	**98.9 J**	**34.9**	**7.3**
	Naphthalene	3,600	< 990	< 140	**22.1 J**	**10.5 J**	**1,520 J**	**2,270**	**5,350**	**4.8 J**	< 9,900
	Phenanthrene	11,000	**425 J**	**68.4 J**	**59.8**	**183**	**2,340 J**	**4,040**	**1,580**	**210**	**163**
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 79.0	< 27.0	< 7.4	< 3.8	< 410	**888**	**5.7 J**	< 3.9	< 3.9
	Dieldrin	30.0	< 79.0	< 27.0	**15.3**	< 3.8	**530**	**203**	**590**	**14.9**	**4.5**
	DDD	2,000	**74.1 J**	< 27.0	**236**	**9.5**	**12,400**	**12,800**	**5,050**	**273**	**225**
	DDE	1,400	**96.2**	< 27.0	**212**	**5.7**	**447**	**3620**	**516**	**14.2**	**7.1**
	DDT	1,700	< 79.0	< 27.0	< 7.4	< 3.8	< 410	< 81.0	< 39.0	< 3.9	< 3.9
PCBs - (8082)[2] ug/kg	PCB-1242 (Aroclor 1242)	220	< 400	< 54.0	< 37.0	< 38.0	< 41.0	< 400	< 390	< 39.0	< 39.0
	PCB-1260 (Aroclor 1260)	220	< 400	< 54.0	< 37.0	< 38.0	< 41.0	< 400	< 390	< 39.0	< 39.0
Metals - (6010B/7471A)[2] mg/kg	Antimony	31	**2.3**	**2.8**	**0.10 J**	**0.71**	**0.13 J**	**3.1**	**0.91**	**0.93**	**0.84**
	Arsenic	24	**5.8**	**7.2**	**1.6**	**3.8**	**1.5**	**5.2**	**2.5**	**1.9**	**2.0**
	Cobalt	25	**6.4**	**7.5**	**4.0**	**8.9**	**4.5**	**6.9**	**4.0**	**9.2**	**7.1**
	Copper	3,100	**92.1**	**390**	**9.6**	**28.8**	**7.6**	**96.5**	**13.1**	**10.1**	**9.8**
	Lead	400	**794**	**114**	**17.0**	**89.7**	**4.4**	**535**	**49.7**	**3.3**	**3.6**
	Mercury	10	**2.8**	**0.41**	**0.067**	**0.11**	**0.031**	**0.85**	**0.24**	**0.03**	**0.024**

Table 5-5
Chemical Concentrations in Soil Exceeding Screening Levels - Former AMCO Yard
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AMCO Chemical Superfund Site, Oakland, California

	Boring Identification	Soil Screening Level[1]	SC-026	SC-027	SC-028	SC-028	SC-028	SC-028	SC-028	SC-028	SC-029
	Sample Date		Mar 5 2012	Mar 1 2012	Feb 9 2012	Feb 9 2012	Feb 9 2012	Feb 9 2012	Feb 9 2012	Feb 9 2012	Feb 14 2012
	Sample Depth (ft bgs)		20	1	1	3	5	20	30	60	1
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	90.2 J	< 6.6	0.64 J	< 9.0	< 6,000	< 3,100	95.8	< 4.3	380 J
	1,2,4-Trimethylbenzene	62,000	88.3 J	3.6 J	< 4.5	< 9.0	< 6,000	< 3,100	< 4.3	< 4.3	1,750
	1,2-Dichloroethane	430	< 400	< 6.6	0.69 J	1.60 J	< 6,000	< 3,100	1.4 J	< 4.3	< 990
	1,3-Dichlorobenzene	210	< 400	< 6.6	< 4.5	< 9.0	< 6,000	< 3,100	< 4.3	< 4.3	< 990
	1,4-Dichlorobenzene	2,400	< 400	< 6.6	< 4.5	< 9.0	< 6,000	< 3,100	8.0	< 4.3	< 990
	Benzene	1,100	76.5 J	< 6.6	1.2 J	< 9.0	< 6,000	< 3,100	3.6 J	< 4.3	578 J
	cis-1,2-Dichloroethene	160,000	251 J	< 6.6	< 4.5	< 9.0	< 6,000	< 3,100	1,270	< 4.3	< 990
	Ethylbenzene	5,400	176 J	< 6.6	0.57 J	< 9.0	< 6,000	< 3,100	< 4.3	< 4.3	1,820
	Tetrachloroethene (PCE)	22,000	< 400	< 6.6	< 4.5	< 9.0	< 6,000	< 3,100	< 4.3	< 4.3	< 990
	Trichloroethene (TCE)	910	< 400	< 6.6	< 4.5	< 9.0	< 6,000	< 3,100	0.68 J	< 4.3	< 990
	Vinyl Chloride	60.0	189 J	< 6.6	< 4.5	< 9.0	< 6,000	< 3,100	126 J	< 4.3	< 990
	Xylenes, Total	630,000	717 J	< 13.0	< 9.1	< 18.0	< 12,000	< 6,200	< 8.5	< 8.6	5,130
SVOCs - (8270/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	16.7 J	75.2 J	157 J	25.1 J	13,100	5,050	12.1 J	13.9 J	1,350
	2-Methylnaphthalene	230,000	27.0	95.8 J	239 J	31.7 J	18,900	7,330	20.1	19.1 J	1,510
	Benzo(a)anthracene	150	< 3.9	319	432	147	410	131	< 4.0	54.6	418
	Benzo(a)pyrene	15.0	< 3.9	378	345	163	169	66.7	< 4.0	96.2	188 J
	Benzo(b)fluoranthene	150	< 3.9	259	472	340	185	66.9	< 4.0	85.3	315
	Benzo(k)fluoranthene	1,500	< 3.9	251	204	248	184	75.4	< 4.0	62.9	257
	Dibenz(a,h)anthracene	15.0	< 3.9	72.9	80.1	44.3	26.8	8.9	< 4.0	18.8	47.1 J
	Indeno(1,2,3-c,d)pyrene	150	< 3.9	274	314	304	72.2	31.2	< 4.0	106	150
	Naphthalene	3,600	< 20.0	55.1 J	< 370	< 45.0	< 21.0	11.6 J	< 20.0	< 40.0	340 J
	Phenanthrene	11,000	< 20.0	369	820	78.7	1,190 J	324 J	< 20.0	64.3	2,590
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 3.9	< 88.0	< 18.0	< 45.0	61.1	< 4.2	< 4.0	< 4.0	39.8 J
	Dieldrin	30.0	3.8 J	< 88.0	< 18.0	< 45.0	162	75.5	< 4.0	< 4.0	190
	DDD	2,000	41.4 J	< 88.0	14.7 J	< 45.0	2,090	640	< 4.0	< 4.0	2,960
	DDE	1,400	3.4 J	32.7 J	8.50 J	< 45.0	201	56.1	< 4.0	< 4.0	7,160
	DDT	1,700	< 3.9	< 88.0	< 18.0	< 45.0	16.4 J	6.5	< 4.0	< 4.0	< 83.0
PCBs - (8082)[2] ug/kg	PCB-1242 (Aroclor 1242)	220	< 39.0	< 440	< 370	< 450	< 420	< 42.0	< 40.0	< 40.0	< 830
	PCB-1260 (Aroclor 1260)	220	< 39.0	< 440	< 370	< 450	175 J	< 42.0	< 40.0	< 40.0	< 830
Metals - (6010B/7471A)[2] mg/kg	Antimony	31	0.87 J	1.2	1.6	0.66	< 0.59	< 0.54	< 0.51	0.45 J	1.9
	Arsenic	24	1.5	6.2	5.7	6.3	1.2	2.2	1.9	1.0	4.6
	Cobalt	25	4.9	10.2	8.1	4.7	4.5	6.1	8.2	6.4	8.4
	Copper	3,100	8.4	145	55.1	52.2	7.1	21.5	6.8	4.8	58.7
	Lead	400	2.5	582	444	494	3.4	3.1	2.0	1.6	323
	Mercury	10	0.0078 J	1.9	0.28	2.2	0.02	0.010 J	< 0.018	< 0.019	2.5

Table 5-5
Chemical Concentrations in Soil Exceeding Screening Levels - Former AMCO Yard
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AMCO Chemical Superfund Site, Oakland, California

	Boring Identification	Soil Screening Level[1]	SC-029	SC-029	SC-029	SC-029	SC-031	SC-031	SC-032	SC-032	SC-032
	Sample Date		Feb 14 2012	Feb 14 2012	Feb 14 2012	Feb 14 2012	Feb 10 2012	Feb 10 2012	Feb 13 2012	Feb 13 2012	Feb 13 2012
	Sample Depth (ft bgs)		3	5	13	20	3	5	1	3	5
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	< 13,000	< 44,000	569 J	187 J	< 390	< 8,900	3,400 J	< 14,000	< 6,900
	1,2,4-Trimethylbenzene	62,000	4,770 J	497,000	1,460 J	< 400	373 J	84,300	10,600	72,600	47,300
	1,2-Dichloroethane	430	< 13,000	< 44,000	< 3,400	< 400	< 390	< 8,900	< 4,700	< 14,000	< 6,900
	1,3-Dichlorobenzene	210	< 13,000	< 44,000	< 3,400	< 400	< 390	< 8,900	< 4,700	< 14,000	< 6,900
	1,4-Dichlorobenzene	2,400	< 13,000	< 44,000	< 3,400	< 400	< 390	< 8,900	< 4,700	< 14,000	< 6,900
	Benzene	1,100	< 13,000	< 44,000	< 3,400	180 J	< 390	< 8,900	14,300	2,500 J	1,130 J
	cis-1,2-Dichloroethene	160,000	< 13,000	< 44,000	< 3,400	< 400	< 390	< 8,900	1,820 J	< 14,000	< 6,900
	Ethylbenzene	5,400	4,300 J	259,000	3,610	98.5 J	342 J	< 8,900	35,900	44,100	24,700
	Tetrachloroethene (PCE)	22,000	< 13,000	< 44,000	< 3,400	< 400	< 390	< 8,900	< 4,700	< 14,000	< 6,900
	Trichloroethene (TCE)	910	< 13,000	< 44,000	< 3,400	< 400	< 390	< 8,900	< 4,700	< 14,000	< 6,900
	Vinyl Chloride	60.0	< 13,000	< 44,000	< 3,400	536 J	< 390	< 8,900	< 4,700	< 14,000	< 6,900
	Xylenes, Total	630,000	7,080 J	967,000	14,600	434 J	1,250	13,600 J	34,200	94,700	169,000
SVOCs - (8270/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	129,000	229,000	35,800	98.5	119	222,000	5,280	240,000	12,100
	2-Methylnaphthalene	230,000	178,000	330,000	51,500	147	187	328,000	5,900	346,000	17,500
	Benzo(a)anthracene	150	1,750	4,060	192	< 3.9	29.6	1,700	115	3,230	86.6
	Benzo(a)pyrene	15.0	816 J	1,920 J	122 J	< 3.9	43.7	772	90.8 J	1,730 J	44.5 J
	Benzo(b)fluoranthene	150	930	2,420	88.2	< 3.9	32.6	756	87.7	1,820	42.7
	Benzo(k)fluoranthene	1,500	977	2,530	106	< 3.9	32.8	1,020	72.0	1,640	47.1
	Dibenz(a,h)anthracene	15.0	151	345	14.3	< 3.9	7.8	75.1 J	28.8 J	272	7.5
	Indeno(1,2,3-c,d)pyrene	150	417	1,070	44.6	< 3.9	36.5	302	71.9	760	21.9
	Naphthalene	3,600	< 200	45,100	914 J	11.8 J	< 21.0	640 J	743	17,600 J	47.2
	Phenanthrene	11,000	5,320 J	11,000	447 J	< 20.0	24.6	5,510	425	8,950 J	234
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 40.0	10.3 J	< 3.9	< 3.9	< 42.0	< 40.0	< 22.0	878	16.4
	Dieldrin	30.0	1,030	2,700	6.0	< 3.9	< 42.0	836	13.5 J	1,190	171
	DDD	2,000	11,500	23,800	246	< 3.9	16.6 J	6,660	86.0	10,700	1,170
	DDE	1,400	1,210	2,140	11.1	< 3.9	< 42.0	663	35.3	2,010	119
	DDT	1,700	36.1 J	164	< 3.9	< 3.9	< 42.0	55.0	< 22.0	270	20.3
PCBs - (8082)[2] ug/kg	PCB-1242 (Aroclor 1242)	220	< 400	< 400	< 39.0	< 39.0	< 420	< 400	< 220	< 860	< 120
	PCB-1260 (Aroclor 1260)	220	351 J	1,130	< 39.0	< 39.0	< 420	420	< 220	3,200	244
Metals - (6010B/7471A)[2] mg/kg	Antimony	31	0.8	0.46 J	< 0.52	0.140 J	0.31 J	< 0.540	0.69	1.2	< 0.55
	Arsenic	24	5.4	0.87	1.9	1.7	2.5	1.4	8.4	1.6	0.75
	Cobalt	25	3.8	4.2	4.0	4.5	4.0	4.1	15.3	3.6	3.5
	Copper	3,100	61.7	7.7	7.3	6.9	19.5	6.5	76.4	10.7	7.0
	Lead	400	412	3.2	2.3	2.2	130	2.6	321	44.8	2.5
	Mercury	10	0.6	0.011 J	0.010 J	0.0099 J	0.46	0.0063 J	0.16	0.19	0.035

Table 5-5
Chemical Concentrations in Soil Exceeding Screening Levels - Former AMCO Yard
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	Boring Identification	Soil Screening Level[1]	SC-032	SC-033	SC-034	SC-034	SC-034	SC-035	SC-035	SC-035	SC-035
	Sample Date		Feb 13 2012	Feb 28 2012	Feb 14 2012	Feb 14 2012	Feb 14 2012	Feb 7 2012	Feb 7 2012	Feb 7 2012	Feb 7 2012
	Sample Depth (ft bgs)		30	1	1	3	5	1	3	5	8
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	205 J	< 5.2	0.71 J	< 9,700	< 1,400	< 6,800	< 3,400	< 18,000	< 2,700
	1,2,4-Trimethylbenzene	62,000	< 240	< 5.2	< 6.5	7,630 J	15,400	< 6,800	8,280	78,300	2,370 J
	1,2-Dichloroethane	430	< 240	< 5.2	< 6.5	< 9,700	< 1,400	< 6,800	< 3,400	< 18,000	< 2,700
	1,3-Dichlorobenzene	210	< 240	< 5.2	< 6.5	< 9,700	< 1,400	< 6,800	< 3,400	< 18,000	< 2,700
	1,4-Dichlorobenzene	2,400	26.4 J	< 5.2	< 6.5	3,080 J	960 J	< 6,800	< 3,400	1,820 J	< 2,700
	Benzene	1,100	38.9 J	< 5.2	1.00 J	< 9,700	< 1,400	< 6,800	2,970 J	< 18,000	< 2,700
	cis-1,2-Dichloroethene	160,000	2,910	< 5.2	5.00 J	< 9,700	< 1,400	< 6,800	< 3,400	< 18,000	1,890 J
	Ethylbenzene	5,400	25.4 J	< 5.2	0.950 J	2,950 J	1,780	3,770 J	2,900 J	46,200	3,020
	Tetrachloroethene (PCE)	22,000	< 240	< 5.2	< 6.5	< 9,700	< 1,400	< 6,800	< 3,400	< 18,000	< 2,700
	Trichloroethene (TCE)	910	< 240	< 5.2	< 6.5	< 9,700	< 1,400	< 6,800	< 3,400	< 18,000	< 2,700
	Vinyl Chloride	60.0	738	< 5.2	< 6.5	< 9,700	< 1,400	< 6,800	< 3,400	< 18,000	< 2,700
	Xylenes, Total	630,000	109 J	< 10.0	4.3 J	2,820 J	7,790	1,920 J	6,070 J	189,000	13,400
SVOCs - (8270/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	11.7 J	< 110	145	250,000	84,400	93,300	71,000	173,000	112,000
	2-Methylnaphthalene	230,000	19.3	< 110	203	388,000	133,000	< 5,000	75,600	251,000	170,000
	Benzo(a)anthracene	150	< 3.9	99.7	418	342	170 J	254 J	< 220	402	< 790
	Benzo(a)pyrene	15.0	< 3.9	138	399	171 J	95.3 J	184 J	40.1 J	203	< 790
	Benzo(b)fluoranthene	150	< 3.9	113	302	167 J	101 J	< 1,000	< 220	197 J	< 790
	Benzo(k)fluoranthene	1,500	< 3.9	93.2	328	186 J	92.1 J	< 1,000	< 220	254	< 790
	Dibenz(a,h)anthracene	15.0	< 3.9	21.7 J	58.0	< 190	< 210	< 1,000	< 220	< 200	< 790
	Indeno(1,2,3-c,d)pyrene	150	< 3.9	121	220	101 J	< 210	< 1,000	< 220	114 J	< 790
	Naphthalene	3,600	< 19.0	< 110	19.9 J	4,160	7,330	< 5,000	2,890	22,800	6,680
	Phenanthrene	11,000	< 19.0	121	722	1,640	653 J	2,000 J	210 J	1,680	< 4,000
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 3.9	< 22.0	< 75.0	< 230	< 81.0	< 400	< 860	< 400	< 4.0
	Dieldrin	30.0	< 3.9	< 22.0	< 75.0	1,090	182	214 J	328 J	1,400	3.9 J
	DDD	2,000	1.9 J	< 22.0	125	8,080	1,510	380 J	1,510	9,740	124
	DDE	1,400	< 3.9	< 22.0	125	1,110	167	4,550	620 J	1,100	17.8
	DDT	1,700	< 3.9	< 22.0	< 75.0	< 230	< 81.0	< 400	< 860	< 400	< 4.0
PCBs - (8082)[2] ug/kg	PCB-1242 (Aroclor 1242)	220	< 39.0	< 44.0	< 380	< 390	< 410	< 400	< 430	< 400	< 40.0
	PCB-1260 (Aroclor 1260)	220	< 39.0	< 44.0	< 380	632	171 J	218 J	870	1,050	< 40.0
Metals - (6010B/7471A)[2] mg/kg	Antimony	31	0.11 J	0.75	0.10 J	< 0.49	0.21 J	1.1	19.1	< 0.54	< 0.53
	Arsenic	24	2.2	3.0	2.1	1.1	1.4	3.7	18.3	1.5	3.3
	Cobalt	25	5.0	5.2	7.4	3.5	3.7	5.7	7.5	4.1	15.3
	Copper	3,100	4.7	28.1	14.4	6.4	6.2	38.1	59.0	6.1	8.9
	Lead	400	2.2	136	55.0	3.0	2.0	129	272	2.1	4.5
	Mercury	10	< 0.018	0.39	0.098	0.019	0.0064 J	0.55	0.19	< 0.020	0.018 J

Table 5-5
Chemical Concentrations in Soil Exceeding Screening Levels - Former AMCO Yard
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	Boring Identification	Soil Screening Level[1]	SC-035	SC-035	SC-035	SC-038	SC-039	SC-039	SC-039	SC-039	SC-040
	Sample Date		Feb 7 2012	Feb 7 2012	Feb 7 2012	Feb 28 2012	Feb 15 2012	Feb 15 2012	Feb 15 2012	Feb 15 2012	Feb 7 2012
	Sample Depth (ft bgs)		13	20	30	1	1	3	5	8	1
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	177 J	132 J	216 J	R	101 J	< 990	< 18,000	< 2,300	1,330 J
	1,2,4-Trimethylbenzene	62,000	373 J	< 270	< 270	7.9 J	1,870	5,370	150,000	15,100	29,400
	1,2-Dichloroethane	430	< 1,200	< 270	< 270	R	< 320	< 990	< 18,000	< 2,300	< 6,600
	1,3-Dichlorobenzene	210	< 1,200	< 270	< 270	R	< 320	< 990	< 18,000	< 2,300	< 6,600
	1,4-Dichlorobenzene	2,400	< 1,200	< 270	45.9 J	R	51.4 J	1,990	33,400	3,900	734 J
	Benzene	1,100	181 J	59.1 J	< 270	R	141 J	< 990	< 18,000	< 2,300	< 6,600
	cis-1,2-Dichloroethene	160,000	3,320	3,980	450	2.4 J	289 J	< 990	< 18,000	< 2,300	10,600
	Ethylbenzene	5,400	1,020 J	43.8 J	< 270	0.85 J	362	1,090	37,300	4,570	8,200
	Tetrachloroethene (PCE)	22,000	< 1,200	< 270	< 270	R	< 320	< 990	< 18,000	< 2,300	< 6,600
	Trichloroethene (TCE)	910	< 1,200	< 270	< 270	21.2 J	34.9 J	< 990	< 18,000	< 2,300	< 6,600
	Vinyl Chloride	60.0	< 1,200	298	1,100 J	R	< 320	< 990	< 18,000	< 2,300	1,460 J
	Xylenes, Total	630,000	4,570	172 J	< 550	3.4 J	1,860	3,120	187,000	21,900	39,500
SVOCs - (8270/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	28,900 J	100	< 19.0	2,340	125	4,600	885,000	64,200	43,400
	2-Methylnaphthalene	230,000	54,000 J	113	< 19.0	3,760	187	7,040	1,360,000	96,200	63,300
	Benzo(a)anthracene	150	6.0	< 4.0	< 3.9	2,420	52.3	57.6 J	659	82.4 J	205
	Benzo(a)pyrene	15.0	5.4	< 4.0	< 3.9	603	95.4	65.8 J	477	53.6 J	127 J
	Benzo(b)fluoranthene	150	3.4 J	< 4.0	< 3.9	845	41.5	47.8 J	390	47.5 J	125 J
	Benzo(k)fluoranthene	1,500	4.3	< 4.0	< 3.9	957	55.5	63.0 J	430	< 200	86.7 J
	Dibenz(a,h)anthracene	15.0	< 4.0	< 4.0	< 3.9	75.8 J	12.6 J	< 110	58.2 J	< 200	< 190
	Indeno(1,2,3-c,d)pyrene	150	3.0 J	< 4.0	< 3.9	241	50.8	47.9 J	277	< 200	132 J
	Naphthalene	3,600	1,100 J	8.1 J	< 19.0	198 J	48.7 J	281 J	115,000	4,030	6,740
	Phenanthrene	11,000	93.1 J	< 20.0	< 19.0	29,600	130	55.0 J	3,460	445 J	1,800
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 4.0	< 4.0	< 3.9	< 78.0	< 75.0	< 21.0	< 790	< 39.0	< 38.0
	Dieldrin	30.0	1.5 J	< 4.0	< 3.9	88.3	< 75.0	34.3	2,380	158	20.2 J
	DDD	2,000	88.9 J	< 4.0	< 3.9	834	< 75.0	549	20,300	1,410	916
	DDE	1,400	6.6	< 4.0	< 3.9	2,700	< 75.0	347	2,990	198	273
	DDT	1,700	< 4.0	< 4.0	< 3.9	24.8 J	< 75.0	< 21.0	< 790	< 39.0	< 38.0
PCBs - (8082)[2] ug/kg	PCB-1242 (Aroclor 1242)	220	< 40.0	< 40.0	< 39.0	< 39.0	< 380	< 420	< 400	< 390	< 380
	PCB-1260 (Aroclor 1260)	220	< 40.0	< 40.0	< 39.0	< 39.0	< 380	< 420	613	< 390	< 380
Metals - (6010B/7471A)[2] mg/kg	Antimony	31	< 0.55 UJ	< 0.52	< 0.54	0.89	0.76	9.6	0.20 J	0.37 J	0.29 J
	Arsenic	24	2.5	0.90	2.1	4.0	3.0	9.5	1.2	2.2	6.2
	Cobalt	25	6.0	6.3	5.7	9.7	3.7	8.5	3.6	4.2	8.8
	Copper	3,100	8.5	10.1	5.3	50.6	44.1	287	5.9	6.4	57.1
	Lead	400	3.0	3.0	1.9	19.4	140	2,790	2.0	2.9	362
	Mercury	10	0.0061 J	< 0.020	< 0.019	0.11	0.3	0.31	0.010 J	0.023	0.4

Table 5-5
Chemical Concentrations in Soil Exceeding Screening Levels - Former AMCO Yard
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	Boring Identification	Soil Screening Level[1]	SC-040	SC-040	SC-040	SC-040	SC-040	SC-044	SC-045	SC-046	SC-046
	Sample Date		Feb 7 2012	Feb 7 2012	Feb 7 2012	Feb 7 2012	Feb 7 2012	Mar 8 2012	Feb 27 2012	Feb 15 2012	Feb 15 2012
	Sample Depth (ft bgs)		3	5	8	13	30	1	1	1	3
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	477 J	1,480 J	2,990 J	692 J	689	< 600	269 J	< 240	2.9 J
	1,2,4-Trimethylbenzene	62,000	14,600	45,600	54,800	< 910	808	< 600	2,090	169 J	3.3 J
	1,2-Dichloroethane	430	< 1,500	< 8,800	< 18,000	< 910	< 590	< 600	< 630	< 240	< 7.6
	1,3-Dichlorobenzene	210	< 1,500	< 8,800	< 18,000	< 910	< 590	< 600	< 630	< 240	< 7.6
	1,4-Dichlorobenzene	2,400	1,790	11,100	45,500	128 J	310 J	< 600	< 630	80.5 J	< 7.6
	Benzene	1,100	160 J	< 8,800	< 18,000	< 910	< 590	< 600	133 J	< 240	7.20 J
	cis-1,2-Dichloroethene	160,000	4,400	16,900	52,300	13,200	10,100	< 600	< 630	< 240	< 7.6
	Ethylbenzene	5,400	3,290	5,700 J	8,000 J	< 910	< 590	< 600	391 J	32.4 J	1.7 J
	Tetrachloroethene (PCE)	22,000	< 1,500	< 8,800	< 18,000	< 910	< 590	< 600	< 630	< 240	< 7.6
	Trichloroethene (TCE)	910	< 1,500	< 8,800	< 18,000	< 910	324 J	< 600	< 630	< 240	< 7.6
	Vinyl Chloride	60.0	497 J	< 8,800	< 18,000	2,130	403 J	< 600	< 630	< 240	< 7.6
	Xylenes, Total	630,000	15,800	29,500	45,600	224 J	476 J	< 1,200	1,050 J	88.6 J	6.4 J
SVOCs - (8270/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	69,000	77,500	176,000	43.0	1,790	863	322	4,380	143
	2-Methylnaphthalene	230,000	96,100	131,000	273,000	64.9	2,820	1,380	326	4,970	165
	Benzo(a)anthracene	150	162 J	168 J	109 J	< 4.0	5.9	23.7 J	4,450	123	32.0
	Benzo(a)pyrene	15.0	114 J	108 J	73.7 J	< 4.0	3.9	28.5 J	3,890	36.2 J	32.8
	Benzo(b)fluoranthene	150	96.7 J	95.2 J	58.7 J	< 4.0	2.9 J	36.1 J	2,300	56.7 J	23.1
	Benzo(k)fluoranthene	1,500	98.6 J	78.8 J	74.6 J	< 4.0	3.0 J	30.7 J	1,130	61.2 J	20.3
	Dibenz(a,h)anthracene	15.0	< 190	< 200	< 200	< 4.0	< 3.9	< 38.0	880	< 74.0	6.5
	Indeno(1,2,3-c,d)pyrene	150	117 J	60.0 J	< 200	< 4.0	2.2 J	39.9	1,340	20.9 J	16.4
	Naphthalene	3,600	7,060	17,700	19,200	7.4 J	215	< 190	155 J	922	31.8
	Phenanthrene	11,000	849 J	1,130	698 J	< 20.0	38.9	44.8 J	1,450	1,160	76.2
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 77.0	97.1 J	< 40.0	< 4.0	< 3.9	< 3.8	< 110	44.9 J	< 89.0
	Dieldrin	30.0	606	1,320	451	< 4.0	29.9	< 3.8	< 110	129	23.8 J
	DDD	2,000	4,310	5,390	2,490	< 4.0	135	2,770	1,160	296	63.8 J
	DDE	1,400	1,370	1,390	559	< 4.0	41.8	714	83.1 J	1,880	258
	DDT	1,700	< 77.0	< 78.0	< 40.0	< 4.0	< 3.9	< 3.8	< 110	< 74.0	< 89.0
PCBs - (8082)[2] ug/kg	PCB-1242 (Aroclor 1242)	220	< 380	< 390	< 400	< 40.0	< 39.0	< 38.0	< 1,100	< 370	< 450
	PCB-1260 (Aroclor 1260)	220	453	159 J	< 400	< 40.0	< 39.0	< 38.0	< 1,100	< 370	< 450
Metals - (6010B/7471A)[2] mg/kg	Antimony	31	2.5	< 0.57	< 0.57	< 0.57	< 0.55	1.1	2.5	1.9	0.53 J
	Arsenic	24	3.3	1.7	3.5	2.5	3.2	6.00	12.1	55.6	2.5
	Cobalt	25	4.8	5.6	10.1	6.1	6.6	7.9	8.9	11.6	3.9
	Copper	3,100	31.0	7.9	10.9	8.1	6.8	42.0	214	41.5	19.6
	Lead	400	111	2.5	4.3	2.9	1.9	110	1,160	135	172
	Mercury	10	0.3	0.013 J	< 0.02	0.039	< 0.019	0.28	13.6	1.1	0.45

Table 5-5
Chemical Concentrations in Soil Exceeding Screening Levels - Former AMCO Yard
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	Boring Identification	Soil Screening Level[1]	SC-046	SC-046	SC-047	SC-047	SC-047	SC-047	SC-047	SC-048	SC-048
	Sample Date		Feb 15 2012	Feb 15 2012	Feb 13 2012	Feb 13 2012	Feb 13 2012	Feb 13 2012	Feb 13 2012	Jan 17 2012	Jan 17 2012
	Sample Depth (ft bgs)		13	20	1	3	5	8	20	1	3
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	39.4	206 J	951 J	419 J	9.4	11,800 J	533	8,200 J	6,200 J
	1,2,4-Trimethylbenzene	62,000	9.8	206 J	4,640	6,810	286 J	387,000	797	367,000	309,000
	1,2-Dichloroethane	430	1.0 J	< 260	< 2,000	< 1,600	3.0 J	< 27,000	< 500	< 30,000	< 42,000
	1,3-Dichlorobenzene	210	< 4.4	< 260	1,440 J	1,190 J	< 4.5	< 27,000	< 500	< 30,000	< 42,000
	1,4-Dichlorobenzene	2,400	1.7 J	26.2 J	10,000	8,510	4.1 J	7,950 J	189 J	12,000 J	6,850 J
	Benzene	1,100	2.2 J	< 260	< 2,000	< 1,600	22.9	< 27,000	< 500	< 30,000	< 42,000
	cis-1,2-Dichloroethene	160,000	43.6	< 260	15,100	3,920	< 4.5	49,300	8,940	50,300	46,700
	Ethylbenzene	5,400	3.8 J	58.0 J	595 J	418 J	46.4	21,500 J	< 500	34,200	25,900 J
	Tetrachloroethene (PCE)	22,000	< 4.4	< 260	1,490 J	< 1,600	< 4.5	< 27,000	< 500	< 30,000	< 42,000
	Trichloroethene (TCE)	910	0.52 J	< 260	769 J	< 1,600	< 4.5	< 27,000	< 500	< 30,000	< 42,000
	Vinyl Chloride	60.0	140	101 J	< 2,000	< 1,600	2.0 J	< 27,000	228 J	< 30,000	< 42,000
	Xylenes, Total	630,000	21.4	291 J	3,590 J	2,700 J	100	120,000	418 J	196,000	148,000
SVOCs - (8270/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	< 20.0	< 19.0	1,720	2,230	102,000	5.5 J	< 19.0	285,000	205,000
	2-Methylnaphthalene	230,000	< 20.0	10.8 J	2,640	3,600	165,000	8.9 J	< 19.0	468,000	336,000
	Benzo(a)anthracene	150	< 4.0	< 3.9	86.7	175	261	< 3.9	< 3.9	862	781
	Benzo(a)pyrene	15.0	< 4.0	< 3.9	33.4 J	25.3 J	121 J	< 3.9	< 3.9	< 560	< 440
	Benzo(b)fluoranthene	150	< 4.0	< 3.9	37.2 J	36.3 J	210	< 3.9	< 3.9	686	663
	Benzo(k)fluoranthene	1,500	< 4.0	< 3.9	20.6 J	< 74.0	178 J	< 3.9	< 3.9	< 560	< 440
	Dibenz(a,h)anthracene	15.0	< 4.0	< 3.9	12.5 J	< 74.0	< 200	< 3.9	< 3.9	< 560	< 440
	Indeno(1,2,3-c,d)pyrene	150	< 4.0	< 3.9	111	94.0	258	< 3.9	< 3.9	416 J	418 J
	Naphthalene	3,600	< 20.0	< 19.0	329	164 J	10,300	< 20.0	< 19.0	57,200	38,700
	Phenanthrene	11,000	< 20.0	< 19.0	3,150	3,890	2,220	< 20.0	< 19.0	10,400	7,270
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 4.0	< 3.8	< 77.0	< 73.0	4,000	0.82 J	< 3.9	600	128
	Dieldrin	30.0	< 4.0	< 3.8	64.9 J	33.6 J	6,060	< 3.9	< 3.9	20,600	16,000
	DDD	2,000	< 4.0	< 3.8	614	416	45,400	4.0	3.0 J	120,000	93,600
	DDE	1,400	< 4.0	1.9 J	1,900	891	20,400	1.80 J	1.6 J	67,500	52,600
	DDT	1,700	< 4.0	< 3.8	< 77.0	< 73.0	< 810	< 3.9	< 3.9	< 56.0	< 44.0
PCBs - (8082)[2] ug/kg	PCB-1242 (Aroclor 1242)	220	< 40.0	< 38.0	< 38.0 UJ	< 180	< 200	< 39.0	< 39.0	< 2,800	< 2,200
	PCB-1260 (Aroclor 1260)	220	< 40.0	< 38.0	< 38.0 UJ	< 180	< 200	< 39.0	< 39.0	< 2,800	< 2,200
Metals - (6010B/7471A)[2] mg/kg	Antimony	31	0.56	0.55	1.0	0.89	< 0.56	0.14 J	< 0.52	2.8	2.2
	Arsenic	24	1.4	0.62	39.4	3.9	4.2	2.5	0.6	51.3	28.1
	Cobalt	25	4.6	5.4	16.5	22.5	7.2	6.1	5.3	8.6	3.9
	Copper	3,100	6.8	8.9	17.0	20.9	61.4	7.4	8.7	212	96.7
	Lead	400	2.4	2.9	73.8	33.0	305	2.7	3.0	638	262
	Mercury	10	< 0.020	0.039	1.2	2.5	1.1	0.026	0.0086 J	6.1	0.73

Table 5-5
Chemical Concentrations in Soil Exceeding Screening Levels - Former AMCO Yard
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	Boring Identification	Soil Screening Level[1]	SC-048	SC-049	SC-049	SC-049	SC-049	SC-050	SC-050	SC-051	SC-051
	Sample Date		Jan 17 2012	Jan 17 2012	Jan 17 2012	Jan 17 2012	Jan 17 2012	Mar 12 2012	Mar 12 2012	Mar 7 2012	Mar 7 2012
	Sample Depth (ft bgs)		5	3	5	8	15	1	3	1	3
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	1,710 J	7,850 J	12,300 J	23,500 J	695	< 5.7 UJ	< 6.3 UJ	< 1,500	< 610
	1,2,4-Trimethylbenzene	62,000	226,000	83,500	126,000	304,000	598	7.80 J	5.3 J	1,370 J	1,120
	1,2-Dichloroethane	430	< 14,000	< 28,000	< 38,000	< 42,000	< 300	< 5.7 UJ	< 6.3 UJ	< 1,500	< 610
	1,3-Dichlorobenzene	210	< 14,000	< 28,000	< 38,000	< 42,000	< 300	< 5.7 UJ	< 6.3 UJ	< 1,500	< 610
	1,4-Dichlorobenzene	2,400	3,000 J	7,220 J	7,720 J	6,120 J	< 300	< 5.7 UJ	< 6.3 UJ	< 1,500	< 610
	Benzene	1,100	< 14,000	< 28,000	< 38,000	< 42,000	38.7 J	< 5.7 UJ	0.63 J	< 1,500	< 610
	cis-1,2-Dichloroethene	160,000	14,100	158,000	358,000	814,000	484	< 5.7 UJ	< 6.3 UJ	1,100 J	710
	Ethylbenzene	5,400	18,700	95,800	74,700	60,200	143 J	0.730 J	0.67 J	< 1,500	108 J
	Tetrachloroethene (PCE)	22,000	< 14,000	< 28,000	< 38,000	< 42,000	< 300	< 5.7 UJ	< 6.3 UJ	< 1,500	< 610
	Trichloroethene (TCE)	910	< 14,000	< 28,000	< 38,000	144,000	< 300	< 5.7 UJ	< 6.3 UJ	615 J	475 J
	Vinyl Chloride	60.0	< 14,000	< 28,000	< 38,000	< 42,000	321	< 5.7 UJ	< 6.3 UJ	< 1,500	< 610
	Xylenes, Total	630,000	103,000	488,000	384,000	322,000	542 J	4.0 J	3.3 J	589 J	684 J
SVOCs - (8270/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	148,000	238,000	166,000	306,000	81.1	64.6 J	59.0 J	64,600	48,300
	2-Methylnaphthalene	230,000	252,000	394,000	279,000	562,000	146	99.3 J	93.7 J	104,000	77,000
	Benzo(a)anthracene	150	416	< 5,800	< 3,900	< 4,200	< 4.0	30.5	34.3	254	250
	Benzo(a)pyrene	15.0	< 400	1,660 J	< 3,900	< 4,200	< 4.0	32.5	36.6	196 J	203 J
	Benzo(b)fluoranthene	150	174 J	< 5,800	< 3,900	< 4,200	< 4.0	34.3	30.9	336	349
	Benzo(k)fluoranthene	1,500	< 400	< 5,800	< 3,900	< 4,200	< 4.0	24.5	27.8	246	274
	Dibenz(a,h)anthracene	15.0	< 400	3,870 J	1,330 J	< 4,200	< 4.0	< 21.0	< 21.0	< 200	< 210
	Indeno(1,2,3-c,d)pyrene	150	156 J	4,230 J	1,570 J	< 4,200	< 4.0	29.4	22.5	162 J	183 J
	Naphthalene	3,600	21,800	56,600	41,100	76,600	34.8	< 110	< 100	1,930	1,770
	Phenanthrene	11,000	4,230	20,000 J	11,100 J	14,800 J	< 20.0	65.4 J	58.1 J	465 J	398 J
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	7,040	< 38.0	74.5 J	64.5 J	< 4.0	< 85.0	< 41.0	< 40.0	< 42.0
	Dieldrin	30.0	6,590	1,310	2,930	6,860	< 4.0	22.7 J	15.2 J	< 40.0	174
	DDD	2,000	28,000	6,500	12,700	32,900	< 4.0	3,460	1,810	250,000	100,000
	DDE	1,400	11,100	4,570	9,510	17,500	< 4.0	1,380	1,360	47,800	31,800
	DDT	1,700	< 20.0	< 38.0	< 78.0	< 85.0	< 4.0	1,370	1,230	1,790	1,800
PCBs - (8082)[2] ug/kg	PCB-1242 (Aroclor 1242)	220	< 2,000	< 770	< 780	< 850	< 40.0	660	373 J	< 400	< 420
	PCB-1260 (Aroclor 1260)	220	< 2,000	< 770	< 780	< 850	< 40.0	< 420	< 410	< 400	< 420
Metals - (6010B/7471A)[2] mg/kg	Antimony	31	< 0.52	1.1	1.2	< 0.61	< 0.55	7.5	2.4	3.2	2.8
	Arsenic	24	1.7	3.2	5.2	2.0	1.6	17.6	22.5	112	112
	Cobalt	25	5.0	5.0	4.9	5.1	4.8	9.8	10.7	12.2	11.1
	Copper	3,100	7.5	104	68.2	8.7	7.0	5,160	97.3	133	73.1
	Lead	400	2.7	128	387	5.2	2.8	416	91.0	196	188
	Mercury	10	0.021	0.28	0.51	0.051	0.047	0.25	0.17	0.29	0.34

Table 5-5
Chemical Concentrations in Soil Exceeding Screening Levels - Former AMCO Yard
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	Boring Identification	Soil Screening Level[1]	SC-051	SC-052	SC-053	SC-053	SC-053	SC-053	SC-054	SC-054	SC-054
	Sample Date		Mar 7 2012	Feb 27 2012	Feb 16 2012	Feb 16 2012	Feb 16 2012	Feb 16 2012	Feb 8 2012	Feb 8 2012	Feb 8 2012
	Sample Depth (ft bgs)		5	1	1	3	5	8	1	3	5
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	< 4.7	< 270	191 J	17,000 J	28,200 J	2,110	330	2,300 J	548 J
	1,2,4-Trimethylbenzene	62,000	1.8 J	2,150	2,650	362,000	477,000	886	1,520	43,200	52,300
	1,2-Dichloroethane	430	< 4.7	< 270	< 1,300	11,200 J	19,800 J	< 540	< 280	< 7,800	< 3,200
	1,3-Dichlorobenzene	210	< 4.7	< 270	< 1,300	< 28,000	< 85,000	< 540	190 J	4,480 J	1,670 J
	1,4-Dichlorobenzene	2,400	< 4.7	< 270	352 J	4,690 J	21,800 J	< 540	777	31,100	11,900
	Benzene	1,100	2.8 J	< 270	< 1,300	< 28,000	< 85,000	< 540	< 280	< 7,800	< 3,200
	cis-1,2-Dichloroethene	160,000	< 4.7	66.7 J	857 J	330,000	525,000	8,430	593	22,900	9,530
	Ethylbenzene	5,400	< 4.7	< 270	1,080 J	77,500	94,700	277 J	373	7,210 J	2,250 J
	Tetrachloroethene (PCE)	22,000	< 4.7	< 270	1,300 J	3,930 J	737,000	443 J	131 J	< 7,800	< 3,200
	Trichloroethene (TCE)	910	< 4.7	< 270	333 J	16,400 J	874,000	524 J	34.9 J	< 7,800	< 3,200
	Vinyl Chloride	60.0	< 4.7	< 270	< 1,300	< 28,000	< 85,000	4,700	< 280	< 7,800	< 3,200
	Xylenes, Total	630,000	< 9.5	172 J	4,110	472,000	569,000	1,660	2,620	46,000	18,500
SVOCs - (8270/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	49,900 J	6,710	3,870	126,000	231,000	46.4	8,090	2,080	5,360
	2-Methylnaphthalene	230,000	79,700 J	10,100	6,390	253,000	441,000	96.2	11,100	2,730	8,480
	Benzo(a)anthracene	150	86.3	22.2	72.2 J	113 J	165 J	< 4.0	120 J	32.7 J	< 160
	Benzo(a)pyrene	15.0	29.0	31.1	37.3 J	< 200	< 190	< 4.0	< 180	12.7 J	< 160
	Benzo(b)fluoranthene	150	90.2	33.6	47.5 J	< 200	69.5 J	< 4.0	< 180	< 39.0	< 160
	Benzo(k)fluoranthene	1,500	44.4	20.3	49.4 J	< 200	62.1 J	< 4.0	< 180	< 39.0	< 160
	Dibenz(a,h)anthracene	15.0	11.5 J	5.5	< 210	< 200	< 190	< 4.0	< 180	< 39.0	< 160
	Indeno(1,2,3-c,d)pyrene	150	42.6	15.7	< 210	< 200	< 190	< 4.0	< 180	< 39.0	< 160
	Naphthalene	3,600	1,250 J	260	1,240	41,000	55,100	14.9 J	1,370	364	557 J
	Phenanthrene	11,000	433	107	482 J	2,010	2,790	< 20.0	2,110	468	497 J
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 3.7	< 4.0	< 85.0	110	247	< 4.0	52.0 J	< 77.0	232 J
	Dieldrin	30.0	< 3.7	73.3	199	8,290	20,100	< 4.0	807	259	1,280
	DDD	2,000	1,120	12,700	53.6 J	26,100	46,000	< 4.0	1,890	827	7,570
	DDE	1,400	23.0 J	1,420	2,640	4,710	6,770	< 4.0	5,610	1,590	2,470
	DDT	1,700	< 3.7	4.2	< 85.0	< 79.0	< 78.0	< 4.0	< 360	< 77.0	< 790
PCBs - (8082)[2] ug/kg	PCB-1242 (Aroclor 1242)	220	< 37.0	< 40.0	< 420	< 390	< 390	< 40.0	< 36.0	< 39.0	< 40.0
	PCB-1260 (Aroclor 1260)	220	< 37.0	< 40.0	< 420	< 390	< 390	< 40.0	< 36.0	< 39.0	< 40.0
Metals - (6010B/7471A)[2] mg/kg	Antimony	31	0.31 J	0.42 J	0.45 J	0.33 J	0.17 J	0.20 J	0.43 J	0.33 J	0.38 J
	Arsenic	24	2.8	4.3	3.4	1.8	2.1	2.4	3.2	3.1	3.7
	Cobalt	25	3.4	6.5	6.0	3.8	4.2	5.0	6.4	20.9	7.2
	Copper	3,100	6.3	33.2	50.7	7.1	6.6	7.6	51.4 J	46.8	26.6
	Lead	400	5.8	40.2	46.9	4.6	2.4	2.7	65.3	64.0	27.1
	Mercury	10	0.027	0.56	1.6	0.018 J	0.025 J	0.024	0.27 J	0.29	0.47

Table 5-5
Chemical Concentrations in Soil Exceeding Screening Levels - Former AMCO Yard
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	Boring Identification	Soil Screening Level[1]	SC-054	SC-054	SC-055	SC-055	SC-055	SC-056	SC-056	SC-056	SC-057
	Sample Date		Feb 8 2012	Feb 8 2012	Jan 16 2012	Jan 16 2012	Jan 16 2012	Jan 16 2012	Jan 16 2012	Jan 16 2012	Mar 12 2012
	Sample Depth (ft bgs)		8	13	3	5	7	3	5	7	1
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	1,930 J	618 J	< 34,000	220 J	138 J	11,000	4,650	4,960	R
	1,2,4-Trimethylbenzene	62,000	76,200	1,940	598,000	36,100	4,960	68,100	7,540	2,100	18.0 J
	1,2-Dichloroethane	430	< 5,800	< 1,400	< 34,000	< 1,800	< 310	< 9,300	< 1,100	< 360	R
	1,3-Dichlorobenzene	210	1,760 J	< 1,400	4,580 J	< 1,800	138 J	1,450 J	< 1,100	< 360	R
	1,4-Dichlorobenzene	2,400	13,300	339 J	32,100 J	1,240 J	824	13,400	< 1,100	< 360	R
	Benzene	1,100	< 5,800	< 1,400	< 34,000	< 1,800	< 310	< 9,300	< 1,100	59.8 J	0.99 J
	cis-1,2-Dichloroethene	160,000	26,700	21,700	10,400 J	1,060 J	730	49,500	17,500	422	R
	Ethylbenzene	5,400	2,560 J	< 1,400	21,900 J	788 J	121 J	20,100	3,040	1,290	4.7 J
	Tetrachloroethene (PCE)	22,000	< 5,800	< 1,400	< 34,000	< 1,800	< 310	< 9,300	< 1,100	< 360	R
	Trichloroethene (TCE)	910	< 5,800	< 1,400	< 34,000	< 1,800	< 310	< 9,300	< 1,100	< 360	R
	Vinyl Chloride	60.0	< 5,800	716 J	< 34,000	< 1,800	70.9 J	< 9,300	900 J	211 J	R
	Xylenes, Total	630,000	22,700	543 J	173,000	7,430	1,530	101,000	10,000	4,180	32.4 J
SVOCs - (8270/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	26,900	733	308,000	1,430	2,060	210,000	364 J	141	76.1
	2-Methylnaphthalene	230,000	47,700	1,630	551,000	2,420	3,290	361,000	522	237	114
	Benzo(a)anthracene	150	57.4 J	1.6 J	403	4.1	3.6 J	1,570 J	2.3 J	1.6 J	114
	Benzo(a)pyrene	15.0	< 190	< 3.9	188 J	1.2 J	0.89 J	825 J	1.2 J	0.81 J	101
	Benzo(b)fluoranthene	150	40.4 J	0.87 J	237 J	2.7 J	2.5 J	< 4,100	1.5 J	0.92 J	87.2
	Benzo(k)fluoranthene	1,500	< 190	< 3.9	155 J	3.0 J	2.5 J	< 4,100	1.5 J	< 4.1	86.0
	Dibenz(a,h)anthracene	15.0	< 190	< 3.9	< 400	< 4.0	< 4.0	< 4,100	< 3.9	< 4.1	12.1
	Indeno(1,2,3-c,d)pyrene	150	< 190	< 3.9	137 J	1.9 J	2.0 J	< 4,100	1.2 J	< 4.1	54.8
	Naphthalene	3,600	2,220	58.5	28,000	35.7	39.5	45,800	76.2	22.4	29.7 J
	Phenanthrene	11,000	532 J	9.1 J	3,580	32.4	13.5 J	13,400 J	16.4 J	15.2 J	281
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	1,870	< 12.0	30,100	322	149	8,720	7.7	6.2	< 41.0
	Dieldrin	30.0	3,500	259	6,260	167	187	4,900	40.4	4.3	71.4
	DDD	2,000	20,800	542	85,000	970	728	13,900	382	23.4	4,150
	DDE	1,400	3,590	94.9	16,400	104	68.2	10,800	182	13.0	3,270
	DDT	1,700	< 780	< 12.0	< 4,000	< 4.0	< 4.0	< 420	< 4.0	< 4.10	365
PCBs - (8082)[2] ug/kg	PCB-1242 (Aroclor 1242)	220	< 39.0	< 39.0	< 8,100	< 200	< 200	< 2,100	< 200	< 41.0	1,830
	PCB-1260 (Aroclor 1260)	220	< 39.0	< 39.0	< 8,100	< 200	< 200	< 2,100	< 200	< 41.0	< 410
Metals - (6010B/7471A)[2] mg/kg	Antimony	31	< 0.58	< 0.57	0.11 J	< 0.59	0.15 J	0.25 J	0.13 J	0.36 J	5.6
	Arsenic	24	2.4	2.6	1.6	2.9	2.7	2.7	2.3	2.4	9.2
	Cobalt	25	4.0	5.1	5.0	7.7	7.4	4.2	7.0	6.7	6.9
	Copper	3,100	39.4	7.0	8.3	8.5	10.0	76.9	8.0	12.1	185
	Lead	400	65.7	3.0	2.7	4.0	3.5	110	3.1	5.4	113
	Mercury	10	0.36	0.0065 J	0.0099 J	0.016 J	0.084	0.59	0.018 J	0.037	0.050

Table 5-5
Chemical Concentrations in Soil Exceeding Screening Levels - Former AMCO Yard
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	Boring Identification	Soil Screening Level[1]	SC-057	SC-057	SC-057	SC-058	SC-058	SC-058	SC-060	SC-061	SC-061
	Sample Date		Mar 12 2012	Mar 12 2012	Mar 12 2012	Mar 7 2012	Mar 7 2012	Mar 7 2012	Feb 16 2012	Feb 6 2012	Feb 6 2012
	Sample Depth (ft bgs)		3	5	8	1	3	5	1	3	5
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	< 3.5 UJ	< 5.1	< 3,100	2.2 J	< 1,500	0.61 J	< 820	< 17,000	86.5 J
	1,2,4-Trimethylbenzene	62,000	88.5 J	10.0	3,650	11.4 J	< 1,500	3.0 J	304 J	13,000 J	1,240
	1,2-Dichloroethane	430	< 3.5 UJ	< 5.1	< 3,100	< 6.2 UJ	< 1,500	< 5.4	< 820	< 17,000	< 280
	1,3-Dichlorobenzene	210	< 3.5 UJ	< 5.1	< 3,100	< 6.2 UJ	< 1,500	< 5.4	117 J	11,100 J	355
	1,4-Dichlorobenzene	2,400	0.88 J	3.9 J	2,070 J	< 6.2 UJ	< 1,500	< 5.4	608 J	137,000	1,560
	Benzene	1,100	1.8 J	0.57 J	< 3,100	3.00 J	< 1,500	0.97 J	< 820	< 17,000	48.1 J
	cis-1,2-Dichloroethene	160,000	< 3.5 UJ	< 5.1	< 3,100	9.50 J	< 1,500	1.3 J	< 820	< 17,000	< 280
	Ethylbenzene	5,400	13.6 J	< 5.1	< 3,100	3.40 J	< 1,500	0.70 J	146 J	< 17,000	624
	Tetrachloroethene (PCE)	22,000	0.52 J	< 5.1	< 3,100	< 6.2 UJ	< 1,500	< 5.4	< 820	< 17,000	< 280
	Trichloroethene (TCE)	910	0.46 J	< 5.1	< 3,100	4.0 J	< 1,500	< 5.4	< 820	< 17,000	< 280
	Vinyl Chloride	60.0	< 3.5 UJ	< 5.1	< 3,100	< 6.2 UJ	< 1,500	< 5.4	< 820	< 17,000	< 280
	Xylenes, Total	630,000	106 J	2.8 J	< 6,300	24.5 J	< 3,000	3.0 J	362 J	4,490 J	2,090
SVOCs - (8270/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	77.0	152	1,580	323	81.1	59.3	352	8,410	4,960
	2-Methylnaphthalene	230,000	140	137	1,500	397	63.5	51.8	561	9,560	5,380
	Benzo(a)anthracene	150	159	44.3	53.7	113	23.2	46.7	77.2	100 J	36.0 J
	Benzo(a)pyrene	15.0	126	61.4	50.7	161	24.8	50.8	42.3	61.9 J	16.0 J
	Benzo(b)fluoranthene	150	149	52.3	70.2	160	27.2	41.6	45.9	49.6 J	32.0 J
	Benzo(k)fluoranthene	1,500	125	43.5	55.7	118	25.3	41.8	44.0	56.0 J	23.9 J
	Dibenz(a,h)anthracene	15.0	18.0	7.3	6.8 J	19.1 J	5.3	6.7	< 42.0	< 200	< 87.0
	Indeno(1,2,3-c,d)pyrene	150	75.3	49.3	33.1	83.7	24.4	36.1	31.0 J	80.4 J	< 87.0
	Naphthalene	3,600	87.1	38.3	351	45.7 J	13.4 J	14.5 J	178 J	1,140	751
	Phenanthrene	11,000	401	63.2	468	335	49.0	34.9	350	2,000	1,430
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 43.0	< 38.0	< 41.0	< 42.0	< 40.0	< 4.2	8.6 J	< 40.0	< 44.0
	Dieldrin	30.0	119	< 38.0	< 41.0	< 42.0	< 40.0	< 4.2	25.5 J	16.1 J	21.9 J
	DDD	2,000	7,430	446	8,350	11,800	107	48.2	701	109	88.9
	DDE	1,400	5,620	166	10,500	12,300	518	53.2	1,420	550	791
	DDT	1,700	295	< 38.0	< 41.0	253	< 40.0	< 4.2	< 42.0	< 40.0	< 44.0
PCBs - (8082)[2] ug/kg	PCB-1242 (Aroclor 1242)	220	819	< 380	< 410	1,390	< 400	< 420	< 420	< 400	< 440
	PCB-1260 (Aroclor 1260)	220	< 430	< 380	< 410	< 420	< 400	< 420	< 420	< 400	< 440
Metals - (6010B/7471A)[2] mg/kg	Antimony	31	3.8	0.30 J	0.90	1.6	1.3	0.29 J	1.3	0.77	0.17 J
	Arsenic	24	12.6	3.1	6.5	9.3	4.9	3.4	1.8	22.4	3.7
	Cobalt	25	7.0	3.0	3.5	9.2	4.4	5.3	2.9	8.3	8.4
	Copper	3,100	76.2	13.1	24.0	366	70.9	9.0	9.9	149	53.0
	Lead	400	76.3	63.8	258	44.2	330	10.2	68.7	3,460	78.3
	Mercury	10	0.15	0.50	0.78	0.19	0.83	0.16	0.28	0.3	0.44

Table 5-5
Chemical Concentrations in Soil Exceeding Screening Levels - Former AMCO Yard
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	Boring Identification	Soil Screening Level[1]	SC-062	SC-063	SC-063	SC-064	SC-064	SC-064	SC-064	SC-064	SC-065
	Sample Date		Jan 18 2012	Feb 16 2012	Feb 16 2012	Mar 13 2012	Mar 13 2012	Mar 13 2012	Mar 13 2012	Mar 13 2012	Mar 6 2012
	Sample Depth (ft bgs)		1	1	3	1	3	5	8	66	1
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	< 1,400	< 5.0	< 4.3	< 5.3 UJ	< 5.3 UJ	< 3.9 UJ	< 5.1	< 5.0	< 5.9 UJ
	1,2,4-Trimethylbenzene	62,000	< 1,400	< 5.0	< 4.3	**5.2 J**	**20.3 J**	**1.8 J**	< 5.1	< 5.0	**2.4 J**
	1,2-Dichloroethane	430	< 1,400	< 5.0	< 4.3	< 5.3 UJ	< 5.3 UJ	< 3.9 UJ	< 5.1	< 5.0	< 5.9 UJ
	1,3-Dichlorobenzene	210	**176 J**	< 5.0	< 4.3	< 5.3 UJ	< 5.3 UJ	< 3.9 UJ	< 5.1	< 5.0	< 5.9 UJ
	1,4-Dichlorobenzene	2,400	**176 J**	< 5.0	< 4.3	**2.3 J**	**11.8 J**	**2.6 J**	**1.2 J**	< 5.0	**61.1 J**
	Benzene	1,100	< 1,400	< 5.0	< 4.3	**1.6 J**	**6.2 J**	**2.1 J**	**1.1 J**	< 5.0	**3.5 J**
	cis-1,2-Dichloroethene	160,000	< 1,400	< 5.0	< 4.3	**1.5 J**	**7.1 J**	**1.1 J**	< 5.1	< 5.0	< 5.9 UJ
	Ethylbenzene	5,400	< 1,400	< 5.0	< 4.3	**1.7 J**	**5.6 J**	**1.0 J**	< 5.1	< 5.0	**1.7 J**
	Tetrachloroethene (PCE)	22,000	< 1,400	< 5.0	< 4.3	**2.4 J**	**7.0 J**	**1.6 J**	< 5.1	< 5.0	< 5.9 UJ
	Trichloroethene (TCE)	910	< 1,400	< 5.0	< 4.3	**1.1 J**	**5.7 J**	**1.2 J**	< 5.1	< 5.0	< 5.9 UJ
	Vinyl Chloride	60.0	< 1,400	< 5.0	< 4.3	< 5.3 UJ	**2.2 J**	< 3.9 UJ	< 5.1	< 5.0	< 5.9 UJ
	Xylenes, Total	630,000	< 2,900	< 9.9	< 8.6	**13.6 J**	**47.1 J**	**6.3 J**	< 10.0	< 10.0	**9.5 J**
SVOCs - (8270/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	< 2,100	< 190	< 38.0	**37.6 J**	**841 J**	**148 J**	< 18.0	< 20.0	**16.9 J**
	2-Methylnaphthalene	230,000	< 2,100	< 190	< 38.0	**46.9**	**1,000 J**	**143 J**	< 18.0	< 20.0	**24.4 J**
	Benzo(a)anthracene	150	< 420	**185**	**38.6**	**219**	**6,750**	**971**	**15.7**	< 4.0	**37.3**
	Benzo(a)pyrene	15.0	< 420	**195**	**53.6**	**148**	**5,950**	**555**	**17.7**	< 4.0	**36.5**
	Benzo(b)fluoranthene	150	< 420	**170**	**41.7**	**133**	**4,280**	**669**	**19.8**	< 4.0	**39.8**
	Benzo(k)fluoranthene	1,500	< 420	**64.8**	**31.1**	**179**	**4,520**	**640**	**16.2**	< 4.0	**31.9**
	Dibenz(a,h)anthracene	15.0	< 420	**55.5**	**6.0 J**	< 8.6	**862**	**122**	**4.0**	< 4.0	< 4.9
	Indeno(1,2,3-c,d)pyrene	150	< 420	**74.7**	**37.1**	**125**	**3,640**	**535**	**14.6**	< 4.0	**28.5**
	Naphthalene	3,600	**609 J**	< 190	< 38.0	**46.3**	**1,240 J**	**140 J**	< 18.0	< 20.0	**14.0 J**
	Phenanthrene	11,000	**669 J**	**62.5 J**	**25.4 J**	**610**	**20,300**	**3,180**	**26.2**	< 20.0	**115**
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 4.2	< 19.0	< 11.0	< 43.0	< 210	< 41.0	< 3.7	< 4.0	< 4.9
	Dieldrin	30.0	**33.0**	**25.9**	**7.7 J**	< 43.0	**75.4 J**	**8.8 J**	< 3.7	< 4.0	**4.6 J**
	DDD	2,000	**1,380**	**73.0**	**81.9**	**165**	**5,450**	**431**	**3.3 J**	< 4.0	**18.8**
	DDE	1,400	**1,260**	**358**	**170**	**445**	**7,570**	**875**	**5.0**	< 4.0	**323**
	DDT	1,700	< 4.2	**92.5**	**11.1**	**17.2 J**	**333**	**29.0 J**	< 3.7	< 4.0	**5.4**
PCBs - (8082)[2] ug/kg	PCB-1242 (Aroclor 1242)	220	< 420	< 370	< 380	**196**	< 840	**183**	< 37.0	< 40.0	< 49.0
	PCB-1260 (Aroclor 1260)	220	< 420	< 370	< 380	< 43.0	**263 J**	< 41.0	< 37.0	< 40.0	**12.4 J**
Metals - (6010B/7471A)[2] mg/kg	Antimony	31	**0.067**	**0.44**	**0.21**	**0.60**	**0.52**	**0.40**	**0.13**	**0.28 J**	**0.42**
	Arsenic	24	< 0.62	< 0.52	< 0.49	**1.8**	**0.65**	**0.71**	**0.13 J**	**8.6**	**0.38 J**
	Cobalt	25	**1.6**	**3.7**	**3.4**	**9.6**	**27.5**	**5.3**	**1.9**	**37.0**	**5.2**
	Copper	3,100	**4.2**	**6.0**	**6.5**	**6.8**	**9.0**	**8.3**	**3.3**	**24.1**	**10.9**
	Lead	400	**9.0**	**32.5**	**20.6**	**587**	**45.8**	**35.0**	**11.7**	**9.6**	**31.6**
	Mercury	10	**9.9**	**131**	**56.5**	**40.0**	**37.9**	**21.8**	**59.1**	**0.12**	**13.4**

Table 5-5
Chemical Concentrations in Soil Exceeding Screening Levels - Former AMCO Yard
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	Boring Identification	Soil Screening Level[1]	SC-065	SC-066	SC-066	SC-067	SC-067	SC-067	SC-068	SC-068	SC-070
	Sample Date		Mar 6 2012	Feb 23 2012	Feb 23 2012	Feb 17 2012	Feb 17 2012	Feb 17 2012	Feb 3 2012	Feb 3 2012	Feb 16 2012
	Sample Depth (ft bgs)		3	1	3	1	3	5	1	5	1
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	< 5.9	< 5.5	< 6.1	< 5.7 UJ	< 7.9 UJ	< 5.2	< 4.3	< 4.7	< 4.7
	1,2,4-Trimethylbenzene	62,000	**1.3 J**	**1.2 J**	< 6.1	**24.9 J**	**34.5 J**	**5.4**	< 4.3	< 4.7	< 4.7
	1,2-Dichloroethane	430	< 5.9	< 5.5	< 6.1	< 5.7 UJ	< 7.9 UJ	< 5.2	< 4.3	< 4.7	< 4.7
	1,3-Dichlorobenzene	210	< 5.9	< 5.5	< 6.1	< 5.7 UJ	< 7.9 UJ	< 5.2	< 4.3	< 4.7	< 4.7
	1,4-Dichlorobenzene	2,400	**14.5**	< 5.5	< 6.1	< 5.7 UJ	< 7.9 UJ	< 5.2	< 4.3	< 4.7	< 4.7
	Benzene	1,100	**4.4 J**	**3.3 J**	< 6.1	**2.9 J**	**8.5 J**	**2.3 J**	< 4.3	**0.71 J**	< 4.7
	cis-1,2-Dichloroethene	160,000	< 5.9	< 5.5	< 6.1	**5.8 J**	**9.4 J**	< 5.2	< 4.3	< 4.7	< 4.7
	Ethylbenzene	5,400	**0.96 J**	< 5.5	< 6.1	**5.6 J**	**5.9 J**	**0.83 J**	< 4.3	< 4.7	< 4.7
	Tetrachloroethene (PCE)	22,000	< 5.9	< 5.5	< 6.1	**2.7 J**	**5.7 J**	< 5.2	< 4.3	< 4.7	< 4.7
	Trichloroethene (TCE)	910	< 5.9	< 5.5	< 6.1	**1.0 J**	**1.4 J**	< 5.2	< 4.3	**0.89 J**	< 4.7
	Vinyl Chloride	60.0	< 5.9	< 5.5	< 6.1	< 5.7 UJ	< 7.9 UJ	< 5.2	< 4.3	< 4.7	< 4.7
	Xylenes, Total	630,000	**13.5**	< 11.0	< 12.0	**30.8 J**	**31.9 J**	**4.0 J**	< 8.7	< 9.3	< 9.4
SVOCs - (8270/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	**71.3 J**	**107**	**106**	**233**	**145**	**12.1 J**	**6.4 J**	< 19.0	< 94.0
	2-Methylnaphthalene	230,000	**102 J**	**170**	**188**	**338**	**202**	**14.9 J**	**8.0 J**	< 19.0	< 94.0
	Benzo(a)anthracene	150	**62.0**	**414**	< 4.3	**77.4**	**39.5**	**33.9**	**25.6**	**16.5**	**67.8**
	Benzo(a)pyrene	15.0	**91.1**	**490**	**33.8**	**45.7**	**28.1**	**59.8**	**19.7**	**25.5**	**69.8**
	Benzo(b)fluoranthene	150	**87.9**	**408**	< 4.3	**46.0**	**31.8**	**45.6**	**16.5**	**19.5**	**57.8**
	Benzo(k)fluoranthene	1,500	**82.6**	**360**	< 4.3	**43.0**	**25.5**	**39.0**	**8.2**	**13.9**	**54.5**
	Dibenz(a,h)anthracene	15.0	**12.9 J**	**74.2**	< 4.3	**5.8**	**4.7 J**	**10.3**	< 4.2	**4.3**	**11.1 J**
	Indeno(1,2,3-c,d)pyrene	150	**85.8**	**335**	< 4.3	**26.7**	**17.6**	**47.0**	**7.0**	**20.3**	**45.3**
	Naphthalene	3,600	**92.4 J**	**47.4 J**	**51.1**	**57.2**	**45.2**	**13.2 J**	< 21.0	**5.4 J**	< 94.0
	Phenanthrene	11,000	**192**	**343**	< 21.0	**544**	**273**	**62.3**	**35.2**	**38.0**	**60.8 J**
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 43.0	< 16.0	< 4.2	< 4.3	< 4.7	< 3.8	< 42.0	< 3.8	< 19.0
	Dieldrin	30.0	< 43.0	< 16.0	< 4.2	**13.1**	**11.8**	< 3.8	< 42.0	< 3.8	**11.9 J**
	DDD	2,000	< 43.0	< 16.0	< 4.2	**143**	**66.5**	< 3.8	**16.5 J**	< 3.8	**132**
	DDE	1,400	**29.8 J**	< 16.0	< 4.2	**783**	**1,030**	**19.9**	**1,240**	< 3.8	**278**
	DDT	1,700	< 43.0	< 16.0	< 4.2	**2.4 J**	**1.4 J**	< 3.8	< 42.0	< 3.8	**29.9**
PCBs - (8082)[2] ug/kg	PCB-1242 (Aroclor 1242)	220	< 430	< 41.0	< 42.0	< 430	< 470	< 38.0	< 420	< 38.0	< 380
	PCB-1260 (Aroclor 1260)	220	< 430	< 41.0	< 42.0	< 430	< 470	< 38.0	< 420	< 38.0	< 380
Metals - (6010B/7471A)[2] mg/kg	Antimony	31	**0.54**	**5.5**	**0.037**	**2.6**	**1.0**	**0.49**	**0.29**	**0.15**	**0.23**
	Arsenic	24	**0.70**	**5.4**	**0.48 J**	< 0.58	< 0.66	< 0.53	< 0.59	< 0.51	**2.0**
	Cobalt	25	**6.6**	**6.2**	**1.8**	**5.2**	**4.5**	**3.1**	**2.1**	**2.0**	**3.9**
	Copper	3,100	**11.7**	**5.1**	**3.5**	**9.1**	**10.2**	**6.5**	**7.0**	**3.7**	**5.9**
	Lead	400	**84.5**	**76.0**	**6.9**	**27.2**	**29.8**	**55.4**	**19.6**	**9.5**	**31.4**
	Mercury	10	**395**	**903**	**2.4**	**17.6**	**21.2**	**110**	**17.2**	**41.0**	**293**

Table 5-5
Chemical Concentrations in Soil Exceeding Screening Levels - Former AMCO Yard
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	Boring Identification	Soil Screening Level[1]	SC-070	SC-071	SC-072	SC-072	SC-072	SC-072	SC-073	SC-073	SC-073
	Sample Date		Feb 16 2012	Jan 9 2012	Feb 16 2012	Feb 16 2012	Jan 6 2012	Jan 6 2012	Nov 28 2011	Nov 28 2011	Nov 28 2011
	Sample Depth (ft bgs)		3	5	1	3	5	8	1	3	5
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	< 4.6	< 13.0	< 4.4	< 4.8	< 6.1	< 4.6	< 6.9	< 4.4	< 3.6
	1,2,4-Trimethylbenzene	62,000	< 4.6	< 13.0	< 4.4	< 4.8	< 6.1	< 4.6	< 6.9	< 4.4	< 3.6
	1,2-Dichloroethane	430	< 4.6	< 13.0	< 4.4	< 4.8	< 6.1	< 4.6	< 6.9	< 4.4	< 3.6
	1,3-Dichlorobenzene	210	< 4.6	< 13.0	< 4.4	< 4.8	< 6.1	< 4.6	< 6.9	< 4.4	< 3.6
	1,4-Dichlorobenzene	2,400	< 4.6	< 13.0	< 4.4	< 4.8	< 6.1	< 4.6	< 6.9	< 4.4	< 3.6
	Benzene	1,100	< 4.6	< 13.0	< 4.4	< 4.8	< 6.1	< 4.6	< 6.9	< 4.4	< 3.6
	cis-1,2-Dichloroethene	160,000	< 4.6	< 13.0	< 4.4	< 4.8	< 6.1	< 4.6	< 6.9	< 4.4	< 3.6
	Ethylbenzene	5,400	< 4.6	< 13.0	< 4.4	< 4.8	< 6.1	< 4.6	< 6.9	< 4.4	< 3.6
	Tetrachloroethene (PCE)	22,000	< 4.6	< 13.0	< 4.4	< 4.8	< 6.1	< 4.6	< 6.9	< 4.4	< 3.6
	Trichloroethene (TCE)	910	< 4.6	< 13.0	< 4.4	< 4.8	< 6.1	< 4.6	< 6.9	< 4.4	< 3.6
	Vinyl Chloride	60.0	< 4.6	< 13.0	< 4.4	< 4.8	< 6.1	< 4.6	< 6.9	< 4.4	< 3.6
	Xylenes, Total	630,000	< 9.2	< 25.0	< 8.7	< 9.6	< 12.0	< 9.2	< 14.0	< 8.7	< 7.3
SVOCs - (8270/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	**13.7 J**	< 44.0	< 92.0	< 19.0	< 24.0 UJ	< 21.0	< 950	< 990	< 810
	2-Methylnaphthalene	230,000	**16.9 J**	< 44.0	< 92.0	< 19.0	< 24.0 UJ	< 21.0	< 950	< 990	< 810
	Benzo(a)anthracene	150	**129**	**30.8 J**	**70.9**	**53.1**	**82.2 J**	**20.5**	**98.5 J**	**2,990 J**	**85.8 J**
	Benzo(a)pyrene	15.0	**143**	**45.1 J**	**89.1**	**63.5**	**89.6 J**	**21.7**	**122 J**	**2,510 J**	**88.1 J**
	Benzo(b)fluoranthene	150	**93.0**	**30.4 J**	**87.2**	**53.8**	**66.7 J**	**16.0**	**97.6 J**	**1,960 J**	**71.5 J**
	Benzo(k)fluoranthene	1,500	**104**	**30.3 J**	**55.6**	**46.6**	**68.9 J**	**17.0**	**87.0 J**	**1,830 J**	**65.6 J**
	Dibenz(a,h)anthracene	15.0	**17.3**	**11.5 J**	**17.9 J**	**9.3**	**11.9 J**	< 4.2	**19.1 J**	**392 J**	**17.6 J**
	Indeno(1,2,3-c,d)pyrene	150	**99.1**	**29.6 J**	**63.9**	**53.1**	**53.6 J**	**12.9**	**85.0 J**	**1,250 J**	**58.3 J**
	Naphthalene	3,600	**103**	< 44.0	< 92.0	**4.8 J**	< 24.0 UJ	< 21.0	< 950	**169 J**	< 810
	Phenanthrene	11,000	**318**	**30.7 J**	**50.5 J**	**67.7**	**93.3 J**	**9.1 J**	**59.2 J**	**3,380 J**	**82.4 J**
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 3.7	< 8.8	< 37.0	< 190	< 4.9	< 4.2	< 19.0	< 20.0	< 20.0
	Dieldrin	30.0	< 3.7	< 8.8	**67.2**	< 190	**3.4 J**	< 4.2	**24.7**	**30.4**	**166**
	DDD	2,000	**2.6 J**	< 8.8	**219**	< 190	**28.6**	**21.7**	**40.0**	**277**	**282**
	DDE	1,400	**6.2**	< 8.8	**870**	< 190	**34.3**	< 4.2	**329**	**845**	**1,750**
	DDT	1,700	**0.86 J**	< 8.8	**478**	< 190	**3.2 J**	< 4.2	**169**	**677**	**131**
PCBs - (8082)[2] ug/kg	PCB-1242 (Aroclor 1242)	220	< 370	< 88.0	< 370	< 1,900	< 49.0	< 42.0	< 38.0	< 40.0	< 40.0
	PCB-1260 (Aroclor 1260)	220	< 370	< 88.0	< 370	< 1,900	< 49.0	< 42.0	< 38.0	< 40.0	< 40.0
Metals - (6010B/7471A)[2] mg/kg	Antimony	31	**0.24**	< 1.2	**0.55**	< 0.48	**2.4**	< 0.55	**2.0**	**13.0**	**23.1**
	Arsenic	24	< 0.51	**10.6**	**7.0**	**5.2**	**4.4**	**1.8**	**5.6**	**12.1**	**4.5**
	Cobalt	25	**2.6**	**9.0**	**7.8**	**4.5**	**4.5**	**3.2**	**6.7**	**7.9**	**7.0**
	Copper	3,100	**3.8**	**23.8**	**64.1**	**32.7**	**37.9**	**6.6**	**60.1**	**73.8**	**37.1**
	Lead	400	**18.5**	**22.1**	**412**	**224**	**417**	**16.4**	**325**	**417**	**442**
	Mercury	10	**76.9**	**0.14**	**0.42**	**0.26**	**0.45**	**0.061**	**0.60**	**0.56**	**0.30**

Table 5-5
Chemical Concentrations in Soil Exceeding Screening Levels - Former AMCO Yard
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	Boring Identification	Soil Screening Level[1]	SC-074	SC-075	SC-076	SC-076	SC-078	SC-078	SC-079	SC-081	SC-081
	Sample Date		Mar 16 2012	Mar 6 2012	Feb 23 2012	Feb 23 2012	Feb 2 2012	Feb 2 2012	Jan 20 2012	Jan 23 2012	Jan 23 2012
	Sample Depth (ft bgs)		1	1	1	3	1	3	3	3	5
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	< 5.1	< 5.8 UJ	R	< 6.2	< 5.0	< 240	< 5.1	< 4.9 UJ	< 4.1
	1,2,4-Trimethylbenzene	62,000	< 5.1	< 5.8 UJ	R	< 6.2	< 5.0	< 240	< 5.1	< 4.9 UJ	< 4.1
	1,2-Dichloroethane	430	< 5.1	< 5.8 UJ	R	< 6.2	< 5.0	< 240	< 5.1	< 4.9 UJ	< 4.1
	1,3-Dichlorobenzene	210	< 5.1	< 5.8 UJ	R	< 6.2	< 5.0	< 240	< 5.1	< 4.9 UJ	< 4.1
	1,4-Dichlorobenzene	2,400	< 5.1	< 5.8 UJ	R	< 6.2	< 5.0	< 240	< 5.1	< 4.9 UJ	< 4.1
	Benzene	1,100	< 5.1	**0.83 J**	**2.4 J**	**0.80 J**	< 5.0	< 240	< 5.1	< 4.9 UJ	< 4.1
	cis-1,2-Dichloroethene	160,000	**1.8 J**	< 5.8 UJ	R	< 6.2	< 5.0	< 240	< 5.1	< 4.9 UJ	< 4.1
	Ethylbenzene	5,400	< 5.1	< 5.8 UJ	R	< 6.2	< 5.0	**165 J**	< 5.1	< 4.9 UJ	< 4.1
	Tetrachloroethene (PCE)	22,000	< 5.1	< 5.8 UJ	R	< 6.2	< 5.0	< 240	< 5.1	< 4.9 UJ	< 4.1
	Trichloroethene (TCE)	910	< 5.1	< 5.8 UJ	R	< 6.2	**0.58 J**	< 240	< 5.1	< 4.9 UJ	< 4.1
	Vinyl Chloride	60.0	< 5.1	< 5.8 UJ	R	< 6.2	< 5.0	< 240	< 5.1	< 4.9 UJ	< 4.1
	Xylenes, Total	630,000	< 10.0	< 12.0 UJ	**2.0 J**	< 12.0	**4.3 J**	**984**	< 10.0	< 9.90 UJ	< 8.3
SVOCs - (8270/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	**7.3 J**	< 110	< 100	< 21.0	< 19.0	< 99.0	**6.2 J**	< 21.0	**7.9 J**
	2-Methylnaphthalene	230,000	**12.1 J**	< 110	< 100	< 21.0	< 19.0	< 99.0	**6.0 J**	< 21.0	**10.7 J**
	Benzo(a)anthracene	150	**17.3**	**43.6**	**30.6**	**20.2**	**4.7**	**295**	**100**	**13.4**	**115**
	Benzo(a)pyrene	15.0	**20.7**	**32.9**	**24.7**	**24.7**	**5.6**	**267**	**139**	**15.4**	**136**
	Benzo(b)fluoranthene	150	**15.6**	**37.1**	**25.6**	**23.3**	**4.8**	**275**	**90.3**	**10.8**	**109**
	Benzo(k)fluoranthene	1,500	**16.5**	**32.8**	**20.5 J**	**22.2**	**4.2**	**228**	**91.5**	**11.5**	**104**
	Dibenz(a,h)anthracene	15.0	**2.0 J**	< 22.0	< 21.0	**4.1**	< 3.7	**53.0**	**17.3**	**2.5 J**	**18.5**
	Indeno(1,2,3-c,d)pyrene	150	**19.5**	**24.1**	**17.3 J**	**19.8**	**4.5**	**205**	**79.4**	**10.5**	**84.8**
	Naphthalene	3,600	< 20.0	< 110	< 100	< 21.0	< 19.0	< 99.0	**8.7 J**	< 21.0	**10.7 J**
	Phenanthrene	11,000	**22.5**	**63.4 J**	**72.3 J**	**24.7**	**3.5 J**	**365**	**202**	**18.1 J**	**98.0**
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 39.0	< 4.4	< 41.0	< 4.1	< 150	< 400	< 39.0	< 4.1	< 21.0
	Dieldrin	30.0	< 39.0	**2.7 J**	< 41.0	< 4.1	< 150	< 400	< 39.0	**0.75 J**	< 21.0
	DDD	2,000	< 39.0	**3.1 J**	**9.9 J**	< 4.1	**39.4 J**	< 400	< 39.0	**1.4 J**	**36.4**
	DDE	1,400	< 39.0	**301**	**529**	**37.1**	**2,310**	< 400	< 39.0	**21.7**	**240**
	DDT	1,700	< 39.0	**1.4 J**	< 41.0	< 4.1	< 150	< 400	< 39.0	**0.89 J**	**3.8 J**
PCBs - (8082)[2] ug/kg	PCB-1242 (Aroclor 1242)	220	< 390	< 44.0	< 210	< 41.0	< 370	< 400	< 39.0	< 41.0	< 42.0
	PCB-1260 (Aroclor 1260)	220	< 390	**11.0 J**	< 210	< 41.0	< 370	< 400	< 39.0	< 41.0	< 42.0
Metals - (6010B/7471A)[2] mg/kg	Antimony	31	**0.26 J**	**1.2**	**0.30 J**	**0.37 J**	**0.12 J**	**35.8**	**0.38 J**	**0.66 J**	**21.1**
	Arsenic	24	**1.7**	**8.9**	**3.2**	**2.4**	**2.4**	**6.2**	**1.9**	**4.2**	**4.7**
	Cobalt	25	**4.2**	**12.1**	**11.0**	**6.1**	**3.3**	**4.0**	**5.5**	**8.8**	**6.0**
	Copper	3,100	**8.5**	**36.1**	**25.2**	**39.8**	**8.9**	**271**	**7.1**	**28.8 J**	**38.1**
	Lead	400	**43.3**	**41.5**	**41.5**	**95.1**	**8.0**	**1,340**	**7.3**	**13.8**	**983**
	Mercury	10	**0.74**	**0.081**	**0.11**	**0.29**	**0.090**	**270**	**0.075**	**0.037**	**0.28**

Table 5-5
Chemical Concentrations in Soil Exceeding Screening Levels - Former AMCO Yard
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	Boring Identification	Soil Screening Level[1]	SC-082	SC-082	SC-082	SC-082	SC-083	SC-083	SC-083
	Sample Date		Feb 6 2012	Feb 6 2012	Feb 6 2012	Feb 6 2012	Mar 9 2012	Mar 9 2012	Mar 9 2012
	Sample Depth (ft bgs)		1	3	5	8	1	3	5
VOCs - (8260B)[2] - ug/kg	1,1-Dichloroethane	3,300	**0.73 J**	**0.45 J**	< 5.2	< 5.5	< 5.3 UJ	**0.62 J**	**0.50 J**
	1,2,4-Trimethylbenzene	62,000	< 4.4	< 3.9	< 5.2	< 5.5	< 5.3 UJ	**2.7 J**	< 4.6
	1,2-Dichloroethane	430	< 4.4	< 3.9	< 5.2	< 5.5	< 5.3 UJ	< 4.8	< 4.6
	1,3-Dichlorobenzene	210	< 4.4	< 3.9	< 5.2	< 5.5	< 5.3 UJ	< 4.8	< 4.6
	1,4-Dichlorobenzene	2,400	< 4.4	< 3.9	< 5.2	< 5.5	< 5.3 UJ	< 4.8	< 4.6
	Benzene	1,100	< 4.4	< 3.9	< 5.2	< 5.5	< 5.3 UJ	< 4.8	< 4.6
	cis-1,2-Dichloroethene	160,000	< 4.4	< 3.9	< 5.2	< 5.5	< 5.3 UJ	< 4.8	< 4.6
	Ethylbenzene	5,400	< 4.4	< 3.9	< 5.2	< 5.5	< 5.3 UJ	**0.57 J**	< 4.6
	Tetrachloroethene (PCE)	22,000	< 4.4	< 3.9	< 5.2	< 5.5	< 5.3 UJ	< 4.8	< 4.6
	Trichloroethene (TCE)	910	< 4.4	< 3.9	< 5.2	< 5.5	< 5.3 UJ	< 4.8	< 4.6
	Vinyl Chloride	60.0	< 4.4	< 3.9	< 5.2	< 5.5	< 5.3 UJ	< 4.8	< 4.6
	Xylenes, Total	630,000	< 8.8	< 7.80	< 10.0	< 11.0	< 11.0 UJ	**1.4 J**	< 9.3
SVOCs - (8270/SIM)[2] - ug/kg	1-Methylnaphthalene	16,000	**11.8 J**	< 97.0	< 22.0	**5.9 J**	< 110	< 100	< 97.0
	2-Methylnaphthalene	230,000	**13.2 J**	< 97.0	< 22.0	**5.7 J**	< 110	< 100	**20.7 J**
	Benzo(a)anthracene	150	**61.1**	**42.9**	**17.5**	**64.8**	**96.0**	**56.7**	**70.6**
	Benzo(a)pyrene	15.0	**71.1**	**48.6**	**22.6**	**77.9**	**93.5**	**64.1**	**91.3**
	Benzo(b)fluoranthene	150	**65.1**	**50.0**	**17.9**	**80.7**	**81.5**	**66.4**	**80.5**
	Benzo(k)fluoranthene	1,500	**37.1**	**30.3**	**18.2**	**57.6**	**64.1**	**43.9**	**66.1**
	Dibenz(a,h)anthracene	15.0	**12.0**	**12.4 J**	**4.0 J**	**10.4**	**14.4 J**	**14.9 J**	**16.4 J**
	Indeno(1,2,3-c,d)pyrene	150	**48.1**	**39.9**	**19.8**	**55.1**	**54.4**	**48.6**	**69.0**
	Naphthalene	3,600	**12.2 J**	**19.9 J**	< 22.0	**6.7 J**	< 110	< 100	< 97.0
	Phenanthrene	11,000	**104**	**83.0 J**	**31.0**	**82.2**	**143**	**74.3 J**	**79.6 J**
Pesticides (8081A)[2] ug/kg	Aldrin	29.0	< 39.0	< 39.0	< 44.0	< 40.0	< 43.0	< 80.0	< 77.0
	Dieldrin	30.0	**9.9 J**	**25.9 J**	< 44.0	**16.5 J**	**10.7 J**	**24.5 J**	< 77.0
	DDD	2,000	**111**	**216**	< 44.0	**159**	**77.5**	**378**	**186**
	DDE	1,400	**526**	**746**	< 44.0	**672**	**225**	**944**	**521**
	DDT	1,700	**8.6 J**	**45.6**	< 44.0	**12.1 J**	**29.8 J**	**273**	**2,720**
PCBs - (8082)[2] ug/kg	PCB-1242 (Aroclor 1242)	220	< 390	< 390	< 440	< 400	< 430	< 400	< 380
	PCB-1260 (Aroclor 1260)	220	< 390	< 390	< 440	< 400	< 430	< 400	< 380
Metals - (6010B/7471A)[2] mg/kg	Antimony	31	**0.35 J**	< 0.50	**0.14 J**	**0.24 J**	**0.90**	**0.40 J**	**0.51 J**
	Arsenic	24	**3.9**	**3.0**	**2.8**	**4.1**	**6.0**	**4.8**	**4.6**
	Cobalt	25	**6.7**	**6.5**	**2.8**	**6.1**	**7.0**	**5.7**	**6.5**
	Copper	3,100	**23.2**	**21.0**	**7.9**	**25.4**	**38.4**	**32.4**	**57.2**
	Lead	400	**111**	**66.1**	**48.5**	**133**	**139**	**131**	**109**
	Mercury	10	**0.26**	**0.14**	**0.34**	**0.39**	**0.29**	**0.32**	**0.21**

Notes:
[1] Source of Soil Screening Levels identified in Table 5-2,
[2] EPA analytical method.
Concentration exceeded screening level
< x = not detected at listed reporting limit
J = estimated value
ft bgs = feet below ground surface
mg/kg = milligrams per kilogram
PCBs = polychlorinated biphenyls
SVOCs = semi-volatile organic compounds
ug/kg = micrograms per kilogram
VOCs = volatile organic compounds

Table 5-6
Chemical Concentrations in Soil Exceeding Screening Levels - Large, Small, and Parking Lots
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	Boring Identification	Soil Screening Level[1]	SC-084	SC-084	SC-087	SC-087	SC-088	SC-090	SC-090	SC-091	SC-091	SC-092
	Sample Date		Mar 13 2012	Mar 13 2012	Mar 19 2012	Mar 19 2012	Mar 19 2012	Mar 20 2012	Mar 20 2012	Mar 21 2012	Mar 21 2012	Mar 22 2012
	Sample Depth (ft bgs)		1	3	1	3	1	1	3	1	5	1
SVOCs (8270C/SIM)[2] ug/kg	n-Nitrosodi-n-propylamine	69	< 1,600	< 940	R	< 430	< 200	< 190	< 880	< 970	< 200	< 380
	Benzo(a)anthracene	150	**50.9**	**79.6**	**15.0**	**167**	**16.6**	**9.3**	**94.6 J**	**477**	**10.5**	**43.6**
	Benzo(a)pyrene	15	**77.0**	**119**	**26.1**	**322**	**31.3**	**15.4**	**171 J**	**1,240**	**31.0**	**65.7**
	Benzo(b)fluoranthene	150	**59.1**	**85.8**	**30.5**	**278**	**34.5**	**16.9**	**197**	**1,340**	**25.8**	**53.0**
	Dibenz(a,h)anthracene	15	**8.1 J**	**25.4**	**7.3**	**44.4**	**8.4**	**4.3**	**62.3 J**	**321**	**10.9**	**11.5 J**
	Indeno(1,2,3-c,d)pyrene	150	**67.8**	**106**	**29.8**	**292**	**30.5**	**17.4**	**216**	**1,230**	**31.8**	**55.7**
Pesticides (8081A)[2] ug/kg	Dieldrin	30	< 63.0	< 3.8	< 4.2	< 43.0	< 3.9	< 3.8	< 35.0	< 3.9	< 4.0	< 39.0
	DDD	2,000	**15.3 J**	< 3.8	**0.98 J**	< 43.0	**1.4 J**	**1.8 J**	**20.2 J**	< 3.9	< 4.0	< 39.0
	DDE	1,400	**187**	< 3.8	**1.0 J**	< 43.0	**7.2**	**0.76 J**	**6.9 J**	**0.70 J**	< 4.0	**10.4 J**
	DDT	1,700	**288**	< 3.8	**1.9 J**	**6.5 J**	**4.3**	**4.4**	**6.4 J**	**1.2 J**	< 4.0	**33.4 J**
PCBs (8082)[2] ug/kg	PCB-1254 (Aroclor 1254)	220	< 63.0	< 38.0	< 42.0	< 43.0	< 39.0	< 38.0	**109**	< 39.0	< 40.0	< 39.0
	PCB-1260 (Aroclor 1260)	220	< 63.0	< 38.0	**14.9 J**	**61.8**	**10.6 J**	**50.9**	< 35.0	< 39.0	< 40.0	**17.5 J**
Metals (6010B)[2] mg/kg	Antimony	31	**0.38 J**	**0.090 J**	**0.45 J**	**3.0**	**1.2**	**0.47 J**	**0.96**	**3.3**	**0.59**	< 0.58
	Arsenic	24	**3.9**	**3.7**	**5.1**	**12.8**	**4.3**	**3.9**	**4.3**	**9.8**	**2.1**	**4.0**
	Cobalt	25	**5.4**	**4.8**	**5.5**	**5.7**	**6.1**	**7.0**	**7.6**	**5.2**	**7.1**	**6.3**
	Lead	400	**101**	**282**	**24.5**	**2,090**	**279**	**26.5**	**149**	**323**	**7.9**	**85.3**
VOCs (8260B)[2] ug/kg	Vinyl chloride	60	< 2.7	< 4.6	R	< 6.7	< 4.6	< 6.6	< 220	< 4.6	< 4.5	< 5.0

Table 5-6
Chemical Concentrations in Soil Exceeding Screening Levels - Large, Small, and Parking Lots
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	Boring Identification	Soil Screening Level[1]	SC-092	SC-092	SC-093	SC-093	SC-094	SC-094	SC-094	SC-095	SC-095	SC-096
	Sample Date		Mar 22 2012	Mar 22 2012	Mar 22 2012	Mar 22 2012	Mar 23 2012	Mar 23 2012	Mar 23 2012	Mar 23 2012	Mar 23 2012	Mar 26 2012
	Sample Depth (ft bgs)		3	5	1	3	1	3	5	3	5	1
SVOCs (8270C/SIM)[2] ug/kg	n-Nitrosodi-n-propylamine	69	< 970	< 190	< 200	< 1,100	**120 J**	< 990	< 190	< 400	< 430	< 440
	Benzo(a)anthracene	150	**37.8**	**14.0**	**14.6**	**488**	**11.6**	**125**	**25.3**	**33.5**	**99.9**	**49.6**
	Benzo(a)pyrene	15	**71.1**	**25.4**	**16.2**	**432**	**12.2**	**184**	**32.5**	**66.9**	**148**	**101**
	Benzo(b)fluoranthene	150	**57.2**	**20.3**	**20.2**	**572**	**12.5**	**173**	**30.7**	**53.8**	**123**	**85.9**
	Dibenz(a,h)anthracene	15	**10.2 J**	**2.50 J**	**3.0 J**	**56.0**	**2.0 J**	**22.8 J**	**3.8**	**8.2**	**46.3**	**12.6 J**
	Indeno(1,2,3-c,d)pyrene	150	**61.1**	**24.4**	**11.4**	**390**	**7.4**	**163**	**21.7**	**47.7**	**107**	**62.5**
Pesticides (8081A)[2] ug/kg	Dieldrin	30	< 39.0	< 3.9	**0.92 J**	**15.7 J**	< 3.9	< 200	< 37.0	< 80.0	< 43.0	< 130
	DDD	2,000	**27.2 J**	**14.5**	**3.1 J**	**190**	**5.5**	**256**	**27.9 J**	**54.9 J**	**25.3 J**	< 130
	DDE	1,400	**19.4 J**	**6.1**	**8.1**	**66.5**	**3.8 J**	**109 J**	**7.1 J**	**27.7 J**	**15.2 J**	< 130
	DDT	1,700	< 39.0	**0.93 J**	**3.0 J**	< 42.0	**1.0 J**	< 200	< 37.0	**15.3 J**	< 43.0	< 130
PCBs (8082)[2] ug/kg	PCB-1254 (Aroclor 1254)	220	< 39.0	< 39.0	< 41.0	< 420	< 39.0	< 790	< 37.0	< 400	< 430	**413 J**
	PCB-1260 (Aroclor 1260)	220	< 39.0	< 39.0	**23.2 J**	< 420	< 39.0	< 790	< 37.0	**194 J**	< 430	**260 J**
Metals (6010B)[2] mg/kg	Antimony	31	**0.24 J**	< 0.58	< 0.58	**1.1**	**0.68**	**1.0**	**1.1**	**0.35 J**	**1.3**	**0.41 J**
	Arsenic	24	**5.1**	**4.7**	**5.3**	**13.9**	**2.0**	**9.5**	**10.0**	**5.3**	**10.2**	**4.3**
	Cobalt	25	**4.3**	**6.4**	**5.8**	**4.7**	**4.1**	**5.3**	**4.1**	**5.3**	**6.2**	**8.2**
	Lead	400	**295**	**255**	**47.1**	**682**	**54.4**	**801**	**526**	**350**	**1,250**	**1,440**
VOCs (8260B)[2] ug/kg	Vinyl chloride	60	< 4.1	< 4.3	R	< 6.7	R	< 5.1	< 4.2	< 5.0	< 5.2	R

Table 5-6
Chemical Concentrations in Soil Exceeding Screening Levels - Large, Small, and Parking Lots
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AMCO Chemical Superfund Site, Oakland, California

	Boring Identification	Soil Screening Level[1]	SC-096	SC-097	SC-097	SC-098	SC-099	SC-100	SC-101	SC-101	SC-101	SC-102
	Sample Date		Mar 26 2012	Mar 26 2012	Mar 26 2012	Mar 29 2012	Mar 27 2012	Mar 27 2012	Mar 28 2012	Mar 28 2012	Mar 28 2012	Mar 28 2012
	Sample Depth (ft bgs)		3	1	3	1	1	1	1	3	5	1
SVOCs (8270C/SIM)[2] ug/kg	n-Nitrosodi-n-propylamine	69	< 400	< 190	< 410	< 760	< 400	< 200	< 200	< 200	< 190	< 340
	Benzo(a)anthracene	150	**47.2**	**34.5**	**72.2**	**52.6**	**45.5**	**18.2**	**8.4**	**7.3**	**26.0**	**51.5**
	Benzo(a)pyrene	15	**85.3**	**82.0**	**115**	**88.3**	**90.8**	**25.4**	**12.5**	**7.5**	**36.8**	**85.5**
	Benzo(b)fluoranthene	150	**74.2**	**82.4**	**90.5**	**78.3**	**70.9**	**15.6**	**11.4**	**8.3**	**23.1**	**75.7**
	Dibenz(a,h)anthracene	15	**11.9**	**20.7**	**17.3**	**19.8 J**	**14.5**	**3.4 J**	**2.4 J**	---	**4.9**	**13.4**
	Indeno(1,2,3-c,d)pyrene	150	**76.4**	**93.4**	**95.1**	**59.6**	**73.7**	**15.6**	**10.7**	**6.8**	**22.9**	**82.8**
Pesticides (8081A)[2] ug/kg	Dieldrin	30	< 4.0	< 3.9	< 4.1	< 3.8	< 20.0	< 4.0	< 79.0	< 200	< 3.8	< 6,800
	DDD	2,000	**3.3 J**	**2.2 J**	< 4.1	< 3.8	< 20.0	< 4.0	**204**	**749**	**1.5 J**	**14,700**
	DDE	1,400	**2.6 J**	**1.2 J**	< 4.1	< 3.8	< 20.0	**2.2 J**	**246**	**1,390**	**3.2 J**	**6,470 J**
	DDT	1,700	**0.92 J**	**3.4 J**	< 4.1	< 3.8	< 20.0	**4.1**	**7,410**	**17,000**	**29.6**	**157,000**
PCBs (8082)[2] ug/kg	PCB-1254 (Aroclor 1254)	220	< 40.0	< 39.0	< 41.0	< 38.0	< 400	< 40.0	< 40.0	< 40.0	< 38.0	< 68.0
	PCB-1260 (Aroclor 1260)	220	< 40.0	< 39.0	< 41.0	< 38.0	< 400	< 40.0	< 40.0	< 40.0	< 38.0	< 68.0
Metals (6010B)[2] mg/kg	Antimony	31	**0.80**	**0.21 J**	**0.71**	**1.9**	**2.1**	**0.56 J**	**0.12 J**	**14.7**	< 0.53	**0.15 J**
	Arsenic	24	**7.5**	**2.0**	**4.3**	**3.3**	**5.0**	**10.9**	**5.4**	**354**	**9.1**	**26.0**
	Cobalt	25	**4.1**	**5.8**	**4.2**	**6.9**	**9.1**	**22.4**	**6.0**	**24.8**	**4.2**	**9.1**
	Lead	400	**888**	**42.3**	**465**	**236**	**230**	**1,700**	**27.4**	**2,290**	**124**	**207 J**
VOCs (8260B)[2] ug/kg	Vinyl chloride	60	< 4.9	< 4.7	< 4.4	**0.92 J**	< 4.7	< 6.0	< 4.4	< 4.6	< 4.6	< 2.7

Table 5-6
Chemical Concentrations in Soil Exceeding Screening Levels - Large, Small, and Parking Lots
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	Boring Identification	Soil Screening Level[1]	SC-102	SC-102	SC-103	SC-103	SC-104	SC-104	SC-104	SC-105	SC-105	SC-105
	Sample Date		Mar 28 2012	Mar 28 2012	Mar 30 2012	Mar 30 2012	Apr 2 2012	Apr 2 2012	Apr 2 2012	Apr 2 2012	Apr 2 2012	Apr 2 2012
	Sample Depth (ft bgs)		3	5	3	5	3	5	8	1	3	5
SVOCs (8270C/SIM)[2] ug/kg	n-Nitrosodi-n-propylamine	69	< 200	< 300	< 430	< 310	< 380	< 850	< 310	< 190	< 410	< 200
	Benzo(a)anthracene	150	**10.9**	**1.7 J**	**304**	**28.6**	**23.2**	**54.2**	**239**	**14.7**	**98.8**	**35.5**
	Benzo(a)pyrene	15	**12.7**	**2.4 J**	**444**	**31.3**	**37.2**	**83.4**	**285**	**15.1**	**169**	**47.6**
	Benzo(b)fluoranthene	150	**10.9**	**1.8 J**	**437**	**27.3**	**34.5**	**74.4**	**169**	**12.0**	**173**	**40.9**
	Dibenz(a,h)anthracene	15	**2.60 J**	**6.50 J**	**120**	---	**4.8**	**11.3**	**23.0**	< 3.8	**29.4**	**7.3**
	Indeno(1,2,3-c,d)pyrene	150	**11.9**	**2.0 J**	**328**	**23.5**	**31.6**	**73.8**	**151**	**8.9**	**126**	**33.4**
Pesticides (8081A)[2] ug/kg	Dieldrin	30	< 400	< 590	< 43.0	< 6.1	< 76.0	< 42.0	**8.1 J**	< 3.8	**8.8 J**	**1.8 J**
	DDD	2,000	**5,520**	**3,330**	**5,110**	**232**	**1,180**	**1,490**	**431**	**11.9**	**24.2**	**34.0**
	DDE	1,400	**1,200**	**376 J**	**1,070**	**74.3**	**582**	**484**	**152**	**89.1**	**278**	**10.5**
	DDT	1,700	**18,300**	**6,550**	**11,400**	**34.7**	**3,520**	**58.1**	**12.2 J**	**11.7**	**35.3**	**2.10 J**
PCBs (8082)[2] ug/kg	PCB-1254 (Aroclor 1254)	220	< 40.0	< 59.0	< 43.0	< 61.0	< 380	< 850	< 62.0	< 380	< 410	< 400
	PCB-1260 (Aroclor 1260)	220	< 40.0	< 59.0	< 43.0	< 61.0	< 380	< 850	< 62.0	< 380	< 410	< 400
Metals (6010B)[2] mg/kg	Antimony	31	< 0.55	< 0.52	**5.1**	**1.7**	**1.2**	**34.5**	**42.9**	**0.65**	**1.4**	**0.87**
	Arsenic	24	**5.6**	**3.8**	**72.1**	**19.5**	**7.8**	**147**	**187**	**3.1**	**9.8**	**11.7**
	Cobalt	25	**8.4**	**4.1**	**16.8**	**15.2**	**6.5**	**43.4**	**35.4**	**6.4**	**7.8**	**5.1**
	Lead	400	**24.7**	**14.0**	**1,420**	**55.7**	**284**	**196**	**423**	**15.5**	**1,440**	**366**
VOCs (8260B)[2] ug/kg	Vinyl chloride	60	R	< 5.1	< 5.4	< 4.2	< 5.2	< 12.0	< 9.9	< 4.6	< 4.8	< 4.6

Table 5-6
Chemical Concentrations in Soil Exceeding Screening Levels - Large, Small, and Parking Lots
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	Boring Identification	Soil Screening Level[1]	SC-106	SC-107	SC-107	SC-108	SC-108	SC-108	SC-109	SC-110	SC-110	SC-110
	Sample Date		Apr 3 2012	Apr 3 2012	Apr 3 2012	Apr 4 2012	Apr 4 2012	Apr 4 2012	Apr 4 2012	Apr 5 2012	Apr 5 2012	Apr 5 2012
	Sample Depth (ft bgs)		1	1	13	1	3	5	1	3	5	8
SVOCs (8270C/SIM)[2] ug/kg	n-Nitrosodi-n-propylamine	69	< 1,000	< 400	< 200	< 380	< 360	< 180	< 200	< 6,000	< 410	< 210
	Benzo(a)anthracene	150	**122**	**50.6**	< 3.9	**25.0**	**30.9**	**15.5**	**62.7**	**38.1 J**	**352**	**49.5**
	Benzo(a)pyrene	15	**193**	**73.0**	< 3.9	**26.7**	**43.0**	**108**	**78.8**	**78.4**	**614**	**70.6**
	Benzo(b)fluoranthene	150	**211**	**71.1**	< 3.9	**20.6**	**42.3**	**69.1**	**64.0**	**64.1**	**412**	**55.5**
	Dibenz(a,h)anthracene	15	**35.0**	**11.7**	< 3.8	**3.5 J**	**8.2**	**7.2**	**15.2**	**24.0 J**	**58.8**	**9.6**
	Indeno(1,2,3-c,d)pyrene	150	**174**	**65.3**	< 3.9	**19.1**	**36.3**	**84.6**	**64.4**	**93.9**	**521**	**58.0**
Pesticides (8081A)[2] ug/kg	Dieldrin	30	**65.5**	< 4.0	< 3.9	< 19.0	< 18.0	**18.5**	< 20.0	< 80.0	< 410	< 4.1
	DDD	2,000	**109**	**2.5 J**	< 3.9	< 19.0	< 18.0	**3,440**	**19.8 J**	**1,570**	**5,670**	**68.1**
	DDE	1,400	**116**	< 4.0	< 3.9	**19.6**	**31.2**	**1,750**	**79.0**	**749**	**1,080**	**8.8**
	DDT	1,700	**31.9**	< 4.0	< 3.9	**6.3 J**	**31.0**	**93.6**	**12.0 J**	**5,300**	**38,800**	**11.1**
PCBs (8082)[2] ug/kg	PCB-1254 (Aroclor 1254)	220	**214 J**	< 400	< 39.0	< 38.0	< 36.0	< 37.0	< 41.0	< 400	< 41.0	< 41.0
	PCB-1260 (Aroclor 1260)	220	**118 J**	< 400	< 39.0	< 38.0	< 36.0	< 37.0	< 41.0	< 400	< 41.0	< 41.0
Metals (6010B)[2] mg/kg	Antimony	31	**0.57**	**0.42 J**	**0.45 J**	< 0.50	**1.7**	**8.0**	**10.7**	**1.1 J**	**5.4**	**5.0**
	Arsenic	24	**18.0**	**4.3**	**2.5**	**4.0**	**24.0**	**21.2**	**4.9**	**14.4**	**52.2**	**18.5**
	Cobalt	25	**6.1**	**5.3**	**6.0**	**5.3**	**5.60**	**1.40**	**6.1**	**20.3**	**12.7**	**6.5**
	Lead	400	**1,380**	**335**	**3.5**	**19.9**	**399**	**91.6**	**294**	**125**	**808**	**1,220**
VOCs (8260B)[2] ug/kg	Vinyl chloride	60	< 5.5	< 6.4	**64.4**	< 4.9	< 4.6	< 4.9	< 4.5	< 4.5	< 5.1	< 5.2

Table 5-6
Chemical Concentrations in Soil Exceeding Screening Levels - Large, Small, and Parking Lots
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	Boring Identification	Soil Screening Level[1]	SC-111	SC-113	SC-113	SC-114	SC-115	SC-116	SC-116	SC-117	SC-117	SC-117
	Sample Date		Apr 5 2012	Apr 9 2012	Apr 9 2012	Apr 12 2012	Apr 11 2012	Apr 11 2012	Apr 11 2012	Apr 10 2012	Apr 10 2012	Apr 10 2012
	Sample Depth (ft bgs)		5	1	3	1	3	1	3	3	5	8
SVOCs (8270C/SIM)[2] ug/kg	n-Nitrosodi-n-propylamine	69	< 400	< 2,000	< 430	< 1,000	< 1,000	< 940	< 370	< 360	< 950	< 380
	Benzo(a)anthracene	150	**99.1**	**24.4**	**759**	**54.9**	**32.3**	**29.5**	**43.2**	**4.5**	**186**	**222**
	Benzo(a)pyrene	15	**173**	**33.7**	**1,020**	**84.0**	**49.4**	**37.9**	**51.0**	**3.9**	**251**	**301**
	Benzo(b)fluoranthene	150	**148**	**27.6**	**514**	**67.0**	**38.4**	**44.8**	**45.5**	**4.1**	**175**	**187**
	Dibenz(a,h)anthracene	15	**19.5**	**6.5 J**	**19.5**	**20.4**	**1.5 J**	**12.3 J**	**9.3**	**1.2 J**	**37.8**	**35.8**
	Indeno(1,2,3-c,d)pyrene	150	**130**	**27.3**	**558**	**78.3**	**41.9**	**31.7**	**37.3**	**4.1**	**164**	**182**
Pesticides (8081A)[2] ug/kg	Dieldrin	30	< 40.0	< 78.0	< 86.0	**14.4 J**	< 40.0	< 38.0	< 19.0	**11.7 J**	< 19.0	< 19.0
	DDD	2,000	**182**	**18.5 J**	**219**	**21.4 J**	**330**	**3,060**	**290**	**57.3**	**2,860**	**3,050**
	DDE	1,400	**21.7 J**	< 78.0	**19.4 J**	**42.5 J**	**465**	**5,970**	**131**	**809**	**2,200**	**2,330**
	DDT	1,700	**262**	**20.2 J**	< 86.0	**119**	**1,100**	**4,930 J**	**487**	**994**	**3,930**	**6,000**
PCBs (8082)[2] ug/kg	PCB-1254 (Aroclor 1254)	220	< 40.0	< 190	< 220	< 40.0	< 200	< 190	< 37.0	< 36.0	< 38.0	< 38.0
	PCB-1260 (Aroclor 1260)	220	< 40.0	< 190	< 220	**191**	< 200	< 190	< 37.0	< 36.0	< 38.0	< 38.0
Metals (6010B)[2] mg/kg	Antimony	31	**2.0**	**0.78 J**	**2.3**	**1.1**	**1.2**	**1.4 J**	**1.3**	**5.9**	**1.3**	**0.58**
	Arsenic	24	**16.5**	**6.3**	**5.7**	**14.9**	**9.4**	**5.9**	**5.8**	**33.6**	**8.7**	**4.0**
	Cobalt	25	**5.6**	**9.0**	**5.7**	**8.9**	**10.1**	**8.3**	**6.1**	**4.1**	**6.5**	**5.3**
	Lead	400	**1420**	**9.3**	**209**	**1,190**	**659**	**84.0 J**	**359**	**68.3**	**795**	**164**
VOCs (8260B)[2] ug/kg	Vinyl chloride	60	< 4.2	< 5.5	< 4.8	< 5.0	< 4.0	< 4.7	< 4.3	< 4.6	< 4.3	< 4.5

Table 5-6
Chemical Concentrations in Soil Exceeding Screening Levels - Large, Small, and Parking Lots
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	Boring Identification	Soil Screening Level[1]	SC-118	SC-118	SC-119	SC-119	SC-119	SC-121	SC-123	SC-125	SC-125
	Sample Date		Apr 10 2012	Apr 10 2012	Apr 9 2012	Apr 9 2012	Apr 9 2012	Apr 19 2012	Apr 17 2012	Mar 21 2012	Mar 21 2012
	Sample Depth (ft bgs)		1	5	1	3	5	1	1	3	5
SVOCs (8270C/SIM)[2] ug/kg	n-Nitrosodi-n-propylamine	69	< 380	< 420	< 390	< 180	< 200	< 970	< 390	< 190	< 940
	Benzo(a)anthracene	150	**11.8**	**39.0**	**23.4**	**4.0**	**21.9**	**197**	**18.4**	**15.5**	**75.5**
	Benzo(a)pyrene	15	**14.2**	**38.7**	**18.8**	**4.6**	**25.8**	**258**	**27.5**	**19.1**	**126**
	Benzo(b)fluoranthene	150	**14.2**	**27.7**	**15.8**	**4.3**	**20.3**	**201**	**23.2**	**16.5**	**92.2**
	Dibenz(a,h)anthracene	15	**3.6 J**	**5.9**	**2.4 J**	---	**4.5**	**38.7**	**6.1 J**	**2.7 J**	**15.4 J**
	Indeno(1,2,3-c,d)pyrene	150	**14.0**	**25.0**	**13.8**	**4.2**	**17.0**	**218**	**25.5**	**15.0**	**104**
Pesticides (8081A)[2] ug/kg	Dieldrin	30	< 19.0	< 4.2	< 79.0	< 3.7	< 20.0	< 77.0	**1.2 J**	< 3.8	< 38.0
	DDD	2,000	**33.8**	**13.3 J**	**18.8 J**	**178**	**681**	< 77.0	**4.1**	**1.7 J**	< 38.0
	DDE	1,400	**49.7**	**8.5 J**	**24.4 J**	**126**	**129**	< 77.0	**3.6 J**	**1.4 J**	< 38.0
	DDT	1,700	**9.40 J**	**40.5 J**	< 79.0	**109**	**201**	< 77.0	**3.2 J**	**3.4 J**	**12.5 J**
PCBs (8082)[2] ug/kg	PCB-1254 (Aroclor 1254)	220	< 38.0	< 42.0	< 200	< 37.0	< 40.0	< 390	**25.4 J**	**47.4**	**350**
	PCB-1260 (Aroclor 1260)	220	< 38.0	< 42.0	< 200	< 37.0	< 40.0	< 390	**26.4 J**	< 38.0	< 190
Metals (6010B)[2] mg/kg	Antimony	31	**2.2**	**2.7 J**	**2.2**	**3.6**	**1.1**	**1.7**	**1.8**	**0.16 J**	**20.3**
	Arsenic	24	**31.6**	**2.4**	**21.6**	**26.0**	**2.4**	**9.7**	**4.6**	**3.6**	**17.1**
	Cobalt	25	**8.1**	**4.9**	**7.1**	**28.4**	**4.2**	**5.7**	**6.4**	**5.9**	**9.3**
	Lead	400	**277**	**11.9 J**	**365**	**6.7**	**27.8**	**552**	**242**	**89.5**	**530**
VOCs (8260B)[2] ug/kg	Vinyl chloride	60	< 4.8	< 7.4	< 7.4	< 5.2	**< 5.3**	< 4.9	< 4.2	< 4.7	< 4.7

Notes:
Some chemicals listed in the table were not detected, and these non-detects have been qualified as having estimated report limits. The qualifiers from data validation are presented in the tables in Appendix H.
[1] Source of Soil Screening Levels identified in Table 5-2.
[2] EPA Concentration exceeded soil screening level
< x = not detected at listed reporting limit
Concentration exceeded soil screening level
ft bgs = feet below ground surface
J = estimated value
mg/kg = milligrams per kilogram
SVOCs = semi-volatile organic compounds
ug/kg = micrograms per kilogram
UJ =not detected at estimated value that is biased low due to QC anomalies
VOCs = volatile organic compounds

Table 5-7
Chemical Concentrations in Soil Exceeding Screening Levels - CPT-MIP Investigation
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	Boring Location	Soil Screening Level[1]	MIP-1	MIP-3	MIP-6	MIP-7	MIP-8	MIP-9	MIP-9	MIP-15	MIP-16	MIP-17
	Sample Date		Jan 3 2011	Dec 27 2010	Jan 19 2011	Jan 18 2011	Dec 28 2010	Feb 1 2011	Jan 27 2011	Jan 5 2011	Jan 6 2011	Jan 4 2011
	Sample Depth (ft bgs)		6 - 7	5 - 6	6 - 7	6 - 7	5 - 6	2.5 - 3.5	2 - 3	6 - 7	5 - 6	5 - 6
Metals - (C200.7) [2] mg/kg	Lead	400	**68.8 J**	**5.0**	**66.1**	**1,340 J**	**4.5**	**489 J**	---	**2.70 J**	**70.7 J**	**178 J**
Pesticides (CPEST)[2] ug/kg	Aldrin	29	< 2.0	< 1.0	**20.0**	< 2.0	< 2.0	< 2.1	---	**2,900**	**3.0 NJ**	**34.0**
	p,p'-DDE	1,400	**320**	**11.0**	**520**	**8.1**	**66.0**	< 4.0	---	**2,800**	**45.0**	**65.0**
SVOCS - (CSVOL12)[2] ug/kg	Benzo(a)anthracene	150	<210	**100 J**	**160 J**	< 200	< 200	**110 J**	---	**250**	< 200	**230**
	Benzo(a)pyrene	15	<210	**110 J**	< 230	< 200	< 200	< 200	---	**130 J**	< 200	**85.0 J**
	Naphthalene	3,600	<210	< 190	< 230	< 200	**450**	< 200	---	**16,000**	< 200	< 200
VOCs - (CVOL12)[2] - ug/kg	1,2,4-Trimethylbenzene	62,000	**75,000**	R	**1,400**	**340**	**22.0**	< 7.5	---	**98,000**	**510 J**	< 5.0
	1,4-Dichlorobenzene	2,400	< 1,600	R	< 68.0	< 6.3	< 4.4	< 7.5	---	**4,000 J**	< 6.7	< 5.0
	Ethylbenzene	5,400	< 1,600	R	**85.0**	**110**	**9.5**	< 7.5	---	**14,000**	**79.0**	< 5.0
TPH - (8015B) [2] mg/kg	Petroleum Hydrocarbons (as Diesel)	83	**140 J**	< 140	**1,400 J**	**11.0 J**	**890**	**540 J**	**230 J**	**5,700 J**	**580 J**	**470 J**
	Petroleum Hydrocarbons (as Motor Oil)	410	**56 J**	**350**	**230**	< 31.0	**200**	**280**	**62.0**	**870 J**	**200 J**	**94.0 J**

Notes:
[1] Source of Soil Screening Levels identified in Table 5-2.
[2] EPA Region 9 Laboratory or Contract Laboratory analytical method.
Concentration exceeded screening level
< x = not detected at listed reporting limit
J = estimated value
NJ = tentatively identified estimated value
ft bgs = feet below ground surface
mg/kg = milligrams per kilogram
SVOCs = semi-volatile organic compounds
TPH = total petroleum hydrocarbons
ug/kg = micrograms per kilogram
VOCs = volatile organic compounds
--- = not analyzed

Table 6-1
Groundwater Screening Levels
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	Chemical	GW Screening Level (ug/L)	Source[1, 2]
Metals and Other Inorganics	Aluminum	16,000	RSL
	Antimony	6	CA/EPA MCL
	Arsenic	10	CA/EPA MCL
	Barium	1,000	CA MCL
	Beryllium	4	CA/EPA MCL
	Cadmium	5	CA/EPA MCL
	Chromium	50	CA MCL
	Cobalt	4.7	RSL
	Copper	1,300	CA/EPA MCL
	Iron	11,000	RSL
	Lead	15	CA/EPA MCL
	Manganese	320	RSL
	Mercury	2	CA/EPA MCL
	Molybdenum	78	RSL
	Nickel	100	CA MCL
	Nitrate (as N)	10,000	CA/EPA MCL
	Selenium	50	CA/EPA MCL
	Silver	71	RSL
	Thallium	2	CA/EPA MCL
	Vanadium	78	RSL
	Zinc	4,700	RSL
Pesticides	Aldrin	0.00021	RSL
	p,p'-DDT	0.2	RSL
	p,p'-DDD	0.28	RSL
	p,p'-DDE	0.2	RSL
	BHC, alpha- (alpha-Hexachlorocyclohexane)	0.0062	RSL
	BHC, beta- (beta-Hexachlorocyclohexane)	0.022	RSL
	BHC, delta- (delta-Hexachlorocyclohexane)	Not Established	-
	Lindane (BHC, gamma-)	0.2	CA/EPA MCL
	Chlordane, alpha-	0.1	CA MCL
	Chlordane, gamma-	0.1	CA MCL
	Dieldrin	0.0015	RSL
	Endosulfan, alpha-	78	RSL
	Endosulfan, beta-	78	RSL
	Endosulfan	78	RSL
	Endosulfan Sulfate	Not Established	-
	Endrin	2	CA/EPA MCL
	Endrin Aldehyde	Not Established	-
	Endrin Ketone	Not Established	-
	Heptachlor	0.01	CA MCL
	Heptachlor Epoxide	0.01	CA MCL

Table 6-1
Groundwater Screening Levels
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AMCO Chemical Superfund Site, Oakland, California

	Chemical	GW Screening Level (ug/L)	Source[1, 2]
PCBs	Aroclor-1016	0.5	CA/EPA MCL
	Aroclor-1242	0.5	CA/EPA MCL
	Aroclor-1248	0.5	CA/EPA MCL
	Aroclor-1254	0.5	CA/EPA MCL
	Aroclor-1260	0.5	CA/EPA MCL
	Aroclor-1262	0.5	CA/EPA MCL
SVOCs	Acenaphthene	400	RSL
	Acetophenone	1,500	RSL
	Anthracene	1,300	RSL
	Benzo(a)anthracene	0.029	RSL
	Benzo(a)pyrene	0.2	CA/EPA MCL
	Benzo(b)fluoranthene	0.029	RSL
	Benzo(g,h,i)perylene	0.1	ESL
	Benzo(k)fluoranthene	0.29	RSL
	Benzyl butyl phthalate	14	RSL
	Biphenyl (Diphenyl)	0.83	RSL
	bis(2-Chloroethoxy)methane	47	RSL
	bis(2-Chloroethyl)ether	0.012	RSL
	bis(2-Ethylhexyl) Phthalate	4	CA MCL
	Caprolactam	7,700	RSL
	Carbazole	Not Established	-
	4-Chloro-3-Methylphenol	Not Established	-
	2-Chlorophenol	71	RSL
	Chrysene	2.9	RSL
	Dibenz(a,h)anthracene	0.0048	ESL
	Dibenzofuran	5.8	RSL
	Di-n-Butyl Phthalate	670	RSL
	1,2-Dibromoethane (Ethylene dibromide)	0.05	CA/EPA MCL
	3,3'-Dichlorobenzidine	0.11	RSL
	Diethyl Phthalate	11,000	RSL
	2,4-Dimethylphenol	270	RSL
	Dimethyl Phthalate	1.5	ESL
	4,6-Dinitro-2-Methylphenol (Dinitro-o-cresol)	1.2	RSL
	2,4-Dinitrotoluene	0	RSL
	Di-n-Octylphthalate	Not Established	-
	1,4-Dioxane (p-Dioxane)	0.67	RSL
	1,2-Dibromo-3-chloropropane	0.2	CA/EPA MCL
	Fluoranthene	630	RSL
	Fluorene	220	RSL
	Indeno(1,2,3-c,d)pyrene	0.029	RSL
	Isophorone	67	RSL
	1-Methylnaphthalene	0.97	RSL
	2-Methylnaphthalene	27	RSL

Table 6-1
Groundwater Screening Levels
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

	Chemical	GW Screening Level (ug/L)	Source[1, 2]
SVOCs cont'd	2-Methylphenol (o-Cresol)	720	RSL
	3-Methylphenol (m-Cresol)	720	RSL
	4-Methylphenol (p-Cresol)	1,400	RSL
	Naphthalene	0.14	RSL
	Nitrobenzene	0.12	RSL
	n-Nitrosodi-n-propylamine	0.0093	RSL
	4-Nitrophenol	Not Established	-
	Pentachorophenol	1	CA/EPA MCL
	Phenanthrene	4.6	ESL
	Phenol	4,500	RSL
	Pyrene	87	RSL
	2,4,6-Trichlorophenol	3.5	RSL
VOCs	Acetone	12,000	RSL
	Benzene	1	CA MCL
	Bromomethane	7	RSL
	2-Butanone (MEK)	4,900	RSL
	tert-Butyl Alcohol (TBA)	12	ESL
	Carbon Disulfide	720	RSL
	Chlorobenzene	70	CA MCL
	Chloroethane	21,000	RSL
	Chloroform (Trichloromethane)	80	CA/EPA MCL
	Chloromethane	190	RSL
	Cyclohexane	13,000	RSL
	Dibromochloromethane	80	CA/EPA MCL
	1,2-Dichlorobenzene	600	CA/EPA MCL
	1,3-Dichlorobenzene	65	ESL
	1,4-Dichlorobenzene	5	CA MCL
	1,1-Dichloroethane	5	CA MCL
	1,1-Dichloroethene	6	CA MCL
	1,2-Dichloroethane	0.5	CA MCL
	cis-1,2-Dichloroethene	6	CA MCL
	trans-1,2-Dichloroethene	10	CA MCL
	Dichloromethane (Methylene Chloride)	5	CA/EPA MCL
	1,2-Dichloropropane	5	CA/EPA MCL
	cis-1,3-Dichloropropene	0.5	CA MCL
	trans-1,3-Dichloropropene	0.5	CA MCL
	Ether, tert-Amyl Methyl (TAME)	Not Established	-
	Ether, tert-Butyl Ethyl	Not Established	-
	Ether, Methyl tert-Butyl (MTBE)	13	CA MCL
	Ether, Isopropyl (Diisopropyl ether)	1,500	RSL
	Ethylbenzene	300	CA MCL
	2-Hexanone (Methyl butyl ketone, MBK)	34	RSL
	Isopropylbenzene (Cumene)	390	RSL

Table 6-1
Groundwater Screening Levels
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AMCO Chemical Superfund Site, Oakland, California

	Chemical	GW Screening Level (ug/L)	Source[1, 2]
VOCs cont'd	Methyl Acetate	16,000	RSL
	Methylcyclohexane	Not Established	-
	4-Methyl-2-pentanone (MIBK)	1,000	RSL
	Styrene	100	CA/EPA MCL
	1,1,2,2-Tetrachloroethane	1	CA MCL
	Tetrachloroethene (PCE)	5	CA/EPA MCL
	Toluene	150	CA MCL
	1,2,3-Trichlorobenzene	5.2	RSL
	1,2,4-Trichlorobenzene	5	CA MCL
	1,1,1-Trichloroethane	200	CA/EPA MCL
	1,1,2-Trichloroethane	5	CA MCL
	Trichloroethene (TCE)	5	CA/EPA MCL
	Trichlorofluoromethane (Freon 11)	150	CA MCL
	1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	53,000	RSL
	1,2,4-Trimethylbenzene	15	RSL
	1,3,5-Trimethylbenzene	87	RSL
	Vinyl Chloride	0.5	CA MCL
	m,p-Xylene	1,750	CA MCL
	o-Xylene	1,750	CA MCL
	Xylenes	1,750	CA MCL
TPH	Petroleum Hydrocarbons (as Gasoline)	100	ESL
	Petroleum Hydrocarbons (as Diesel)	100	ESL
	Petroleum Hydrocarbons (as Motor Oil)	100	ESL
Dioxins/ Furans	2,3,7,8-Tetrachlorodibenzo-p-dioxin	0.00003	CA/EPA MCL
	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	See Note 3	-
	1,2,3,7,8-Pentachlorodibenzofuran	See Note 3	-
	2,3,4,7,8-Pentachlorodibenzofuran	See Note 3	-
	1,2,3,4,7,8-Hexachlorodibenzofuran	See Note 3	-
	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	0.000011	RSL
	1,2,3,6,7,8-Hexachlorodibenzofuran	See Note 3	-
	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	0.000011	RSL
	1,2,3,7,8,9-Hexachlorodibenzofuran	See Note 3	-
	2,3,4,6,7,8-Hexachlorodibenzofuran	See Note 3	-
	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	See Note 3	-
	1,2,3,4,6,7,8-Heptachlorodibenzofuran	See Note 3	-
	Octachlorodibenzo-p-dioxin	See Note 3	-
	Octachlorodibenzofuran	See Note 3	-

Table 6-1
Groundwater Screening Levels
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AMCO Chemical Superfund Site, Oakland, California

Chemical	GW Screening Level (ug/L)	Source[1, 2]

Notes:

[1] Residential Regional Screening Levels (RSLs):

Source: USEPA 2012 (April), obtained online at: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/pdf/master_sl_table_run_MAY2012

Environmental Screening Levels (ESLs)

Source: SF RWQCB (May 2008) using Table A-1 (Shallow Soil, Residential Land Use, groundwater potential drinking water) obtained online at:

http://www.swrcb.ca.gov/sanfranciscobay/water_issues/available_documents/ESL_May_2008.pdf

[2] Source for Maximum contaminant Levels (MCLs):

http://www.cdph.ca.gov/certlic/drinkingwater/Documents/DWdocuments/EPAandCDPH-11-28-2008.pdf

[3] Screening criteria to be developed based on EPA guidance in *Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodipenzo-p-dioxin and Dioxin-Like Compounds*. EPA/100/R 10/005, December 2010.

CA = California

EPA = US Environmental Protection Agency

MCL = maximum contaminant level

ug/L = micrograms per liter

Table 6-2
Volatile Organic Compound (VOC) Concentrations (ug/L) in Groundwater Exceeding Screening Levels - August 2012
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Location	Groundwater Screening Level[1]	BMW-03	MW-12	RMW-01-17	RMW-01-35	RMW-02-13	RMW-02-32	RMW-05-15
Sample Date		Aug 6 2012	Aug 20 2012	Aug 16 2012	Aug 16 2012	Aug 21 2012	Aug 21 2012	Aug 2 2012
Sample ID		BMW-03-0812	MW-12-0812	RMW-01-17-0812	RMW-01-35-0812	RMW-02-13-0812	RMW-02-32-0812	RMW-05-15-0812
1,1,1-Trichloroethane	200	< 0.50	**850**	< 2.5	< 10.0	< 50.0	< 10.0	< 0.50
1,1-Dichloroethane	5.0	**32.0**	**2,300 J**	**0.61 J**	**150**	**1,200**	< 10.0	**0.56**
1,1-Dichloroethene	6.0	< 0.50	**380**	< 2.5	< 10.0	< 50.0	< 10.0	< 0.50
1,2,4-Trichlorobenzene	5.0	< 0.50	< 200	< 2.5	< 10.0	**26.0 J**	< 10.0	**0.25 J**
1,2,4-Trimethylbenzene	15	< 5.0	**190 J**	< 2.5	< 10.0	**110**	**360**	< 5.0
1,2-Dibromo-3-chloropropane	0.20	< 0.50	< 200	< 2.5	< 10.0	< 50.0	< 10.0	**0.59**
1,2-Dichloroethane	0.50	< 0.50	< 200	< 2.5	< 10.0	< 50.0	< 10.0	< 0.50
1,3,5-Trimethylbenzene	87	< 5.0	**530**	< 2.5	**23.0**	**380**	**800**	< 5.0
1,4-Dichlorobenzene	5.0	< 0.50	< 200	**5.4**	**240**	< 50.0	**280**	< 0.50
Benzene	1.0	< 0.50	< 200	< 2.5	< 10.0	**300**	**86.0**	< 0.50
Chlorobenzene	70	< 0.50	< 200	**470**	**750**	< 50.0	**1,400**	< 0.50
cis-1,2-Dichloroethene	6.0	**41.0**	**66,000**	**0.50 J**	**990**	**12,000**	< 10.0	**3.6**
Ethylbenzene	300	< 0.50	**180 J**	< 2.5	**4.4 J**	**470**	**140**	< 0.50
Tetrachloroethene (PCE)	5.0	< 0.50	< 200	< 2.5	< 10.0	< 50.0	< 10.0	< 0.50
Toluene	150	< 0.50	**24,000**	< 2.5	< 10.0	**12,000**	**180**	< 0.50
trans-1,2-Dichloroethene	10.0	**0.76**	**730**	< 2.5	**31.0**	**58.0**	< 10.0	< 0.50
Trichloroethene (TCE)	5.0	**1.2**	< 200	< 2.5	< 10.0	< 50.0	< 10.0	< 0.50
Vinyl Chloride	0.50	**16.0 J**	**7,300**	< 2.5	**380**	**3,300**	< 10.0	< 0.50

Table 6-2
Volatile Organic Compound (VOC) Concentrations (ug/L) in Groundwater Exceeding Screening Levels - August 2012
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Location	Groundwater Screening Level[1]	RMW-07-35	RMW-08-15	RMW-08-35	RMW-10-15	RMW-10-35	RMW-12-32	RMW-12-51
Sample Date		Aug 9 2012	Aug 14 2012	Aug 14 2012	Aug 6 2012	Aug 1 2012	Aug 20 2012	Aug 20 2012
Sample ID		RMW-07-35-0812	RMW-08-15-0812	RMW-08-35-0812	RMW-10-15-0812	RMW-10-35-0812	RMW-12-32-0812	RMW-12-51-0812
1,1,1-Trichloroethane	200	< 0.50	< 5.0	< 0.50	< 5.0	< 4.0	< 0.50	**0.58**
1,1-Dichloroethane	5.0	**0.32 J**	< 5.0	**0.37 J**	< 5.0	**110**	**8.4**	**0.34 J**
1,1-Dichloroethene	6.0	< 0.50	< 5.0	< 0.50	< 5.0	< 4.0	**4.4**	**1.5**
1,2,4-Trichlorobenzene	5.0	< 0.50	< 5.0	< 0.50	< 5.0	< 4.0	< 0.50	< 0.50
1,2,4-Trimethylbenzene	15	< 5.0	< 50.0	< 5.0	< 50.0	< 40.0	**0.43 J**	< 0.50
1,2-Dibromo-3-chloropropane	0.20	< 0.50	< 5.0	< 0.50	< 5.0	< 4.0	< 0.50	< 0.50
1,2-Dichloroethane	0.50	< 0.50	< 5.0	< 0.50	< 5.0	< 4.0	< 0.50	< 0.50
1,3,5-Trimethylbenzene	87	< 5.0	< 50.0	< 5.0	< 50.0	< 40.0	**1.4**	< 0.50
1,4-Dichlorobenzene	5.0	< 0.50	**3.9 J**	< 0.50	< 5.0	< 4.0	< 0.50	< 0.50
Benzene	1.0	< 0.50	< 5.0	< 0.50	< 5.0	< 4.0	**17.0**	< 0.50
Chlorobenzene	70	**1.1**	**650 J**	**49.0**	< 5.0	< 4.0	**1.0**	< 0.50
cis-1,2-Dichloroethene	6.0	**50.0**	**1.5 J**	**33.0**	**290**	**280**	**410**	**7.6**
Ethylbenzene	300	< 0.50	< 5.0	< 0.50	< 5.0	**3.3 J**	**0.59**	< 0.50
Tetrachloroethene (PCE)	5.0	**33.0**	< 5.0	**3.0**	< 5.0	< 4.0	< 0.50	**0.35 J**
Toluene	150	< 0.50	< 5.0	< 0.50	< 5.0	**2.0 J**	**2.6**	< 0.50
trans-1,2-Dichloroethene	10.0	**29.0**	< 5.0	**6.4**	**4.8 J**	**11.0**	**8.6**	**0.23 J**
Trichloroethene (TCE)	5.0	**25.0**	< 5.0	**9.9**	**6.7**	**50.0 J**	**5.4**	**14.0**
Vinyl Chloride	0.50	**4.9**	< 5.0	< 0.50	< 5.0	**400**	**150 J**	< 0.50

Table 6-2
Volatile Organic Compound (VOC) Concentrations (ug/L) in Groundwater Exceeding Screening Levels - August 2012
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Location	**Groundwater Screening Level[1]**	**RMW-14-35**	**RMW-14-50**	**RMW-15-35**	**RMW-16-35**
Sample Date		**Jul 31 2012**	**Aug 1 2012**	**Aug 15 2012**	**Aug 13 2012**
Sample ID		**RMW-14-35-0812**	**RMW-14-50-0812**	**RMW-15-35-0812**	**RMW-16-35-0812**
1,1,1-Trichloroethane	200	< 0.50	< 2.0	< 1.0	< 0.50
1,1-Dichloroethane	5.0	**2.1**	**1.8 J**	**0.71 J**	**8.8 J**
1,1-Dichloroethene	6.0	**0.40 J**	< 2.0	< 1.0	< 0.50
1,2,4-Trichlorobenzene	5.0	< 0.50	< 2.0	< 1.0	< 0.50
1,2,4-Trimethylbenzene	15	< 5.0	< 20.0	< 10.0	< 5.0
1,2-Dibromo-3-chloropropane	0.20	< 0.50	< 2.0	< 1.0	< 0.50
1,2-Dichloroethane	0.50	< 0.50	< 2.0	< 1.0	**0.60**
1,3,5-Trimethylbenzene	87	< 5.0	< 20.0	< 10.0	< 5.0
1,4-Dichlorobenzene	5.0	< 0.50	< 2.0	< 1.0	**2.5 J**
Benzene	1.0	< 0.50	< 2.0	< 1.0	< 0.50
Chlorobenzene	70	< 0.50	< 2.0	**1.8**	**24.0 J**
cis-1,2-Dichloroethene	6.0	**2.3**	**28.0**	**69.0**	**15.0**
Ethylbenzene	300	< 0.50	< 2.0	< 1.0	< 0.50
Tetrachloroethene (PCE)	5.0	< 0.50	< 2.0	**1.6**	**18.0**
Toluene	150	< 0.50	< 2.0	< 1.0	< 0.50
trans-1,2-Dichloroethene	10.0	< 0.50	< 2.0	**6.4**	**0.70**
Trichloroethene (TCE)	5.0	**5.4**	**100**	**18.0**	**8.9 J**
Vinyl Chloride	0.50	< 0.50	< 2.0	< 1.0	< 0.50

Notes:
Some chemicals listed in the table were not detected, and these non-detects have been qualified as having estimated report limits. The qualifiers from data validation are presented in the tables in Appendix H.
bold font indicates result above screening level

[1] Screening levels are presented in Table 6-1.
indicates concentration above screening level
ug/L = microgram per liter
J = estimated result
< = not detected at the listed reporting limit

Table 6-3
Semi-volatile Organic Compound (SVOC) Concentrations (ug/L) in Groundwater Exceeding Screening Levels - August 2012
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Location	Groundwater Screening Level[1] (ug/L)	BMW-01	BMW-03	BMW-06	BMW-07	BMW-08	BPZ-01	RMW-01-35
Sample Date		Aug 7 2012	Aug 6 2012	Aug 8 2012	Aug 1 2012	Aug 6 2012	Aug 7 2012	Aug 16 2012
Sample ID		BMW-01-0812	BMW-03-0812	BMW-06-0812	BMW-07-0812	BMW-08-0812	BPZ-01-0812	RMW-01-35-0812
1,4-Dioxane	0.67	< 2.0	**150**	< 2.0	**6.4**	**6.8**	**64.0**	**130**
2,4-Dimethylphenol	270	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
2-Methylnaphthalene	27.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Biphenyl (Diphenyl)	0.83	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
bis(2-Ethylhexyl) Phthalate	4.0	**6.1**	< 5.0	**14.0**	**2.2 J**	< 5.0	**2.9 J**	**2.7 J**
Naphthalene	0.14	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Location	Groundwater Screening Level[1] (ug/L)	RMW-02-13	RMW-02-32	RMW-03-15	RMW-04-15	RMW-05-15	RMW-07-15	RMW-09-15
Sample Date		Aug 22 2012	Aug 21 2012	Aug 15 2012	Aug 7 2012	Aug 2 2012	Aug 14 2012	Aug 8 2012
Sample ID		RMW-02-13-0812	RMW-02-32-0812	RMW-03-15-0812	RMW-04-15-0812	RMW-05-15-0812	RMW-07-15-0812	RMW-09-15-0812
1,4-Dioxane	0.67	**29.0**	**490**	**37.0**	**3.6**	**18.0**	< 2.0	**45.0**
2,4-Dimethylphenol	270	**180**	**330**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
2-Methylnaphthalene	27.0	**230**	**500**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Biphenyl (Diphenyl)	0.83	**2.6 J**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
bis(2-Ethylhexyl) Phthalate	4.0	< 5.0	< 5.0	< 5.0	**8.3**	< 5.0	**5.7**	**6.4**
Naphthalene	0.14	**74.0**	**120**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Location	Groundwater Screening Level[1] (ug/L)	RMW-10-15	RMW-10-35	MW-12	RMW-12-32	RMW-14-35	RMW-14-50	RMW-15-60
Sample Date		Aug 6 2012	Aug 1 2012	Aug 20 2012	Aug 20 2012	Jul 31 2012	Aug 1 2012	Aug 16 2012
Sample ID		RMW-10-15-0812	RMW-10-35-0812	MW-12-0812	RMW-12-32-0812	RMW-14-35-0812	RMW-14-50-0812	RMW-15-60-0812
1,4-Dioxane	0.67	**23.0**	**270**	**20.0**	**240**	**21.0**	**8.2 J**	< 2.0
2,4-Dimethylphenol	270	< 5.0	< 5.0	**170**	< 5.0	< 5.0	< 5.0	< 5.0
2-Methylnaphthalene	27.0	< 5.0	< 5.0	**100**	< 5.0	< 5.0	< 5.0	< 5.0
Biphenyl (Diphenyl)	0.83	< 5.0	< 5.0	**2.3 J**	< 5.0	< 5.0	< 5.0	< 5.0
bis(2-Ethylhexyl) Phthalate	4.0	< 5.0	**2.1 J**	< 5.0	< 5.0	< 5.0	< 5.0	**13.0**
Naphthalene	0.14	< 5.0	< 5.0	**73.0**	< 5.0	< 5.0	< 5.0	< 5.0

Table 6-3
Semi-volatile Organic Compound (SVOC) Concentrations (ug/L) in Groundwater Exceeding Screening Levels - August 2012
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AMCO Chemical Superfund Site, Oakland, California

Location	**Groundwater Screening Level[1] (ug/L)**	**RMW-16W-15**	**RMW-16-35**	**RMW-19-15**
Sample Date		**Aug 7 2012**	**Aug 13 2012**	**Jul 30 2012**
Sample ID		**RMW-16W-15-0812**	**RMW-16-35-0812**	**RMW-19-15-0812**
1,4-Dioxane	0.67	< 2.0	**64.0**	< 2.0
2,4-Dimethylphenol	270	< 5.0	< 5.0	< 5.0
2-Methylnaphthalene	27.0	< 5.0	< 5.0	< 5.0
Biphenyl (Diphenyl)	0.83	< 5.0	< 5.0	< 5.0
bis(2-Ethylhexyl) Phthalate	4.0	**4.5 J**	**18.0**	**5.5**
Naphthalene	0.14	< 5.0	< 5.0	< 5.0

Notes:
Detects are displayed in **bold** font
[1] Screening levels are presented in Table 6-1.
indicates concentration above screening level
ug/L = microgram per liter
J = estimated result
< = not detected / less than the associated reporting limit

Table 6-4
Metal Concentrations (ug/L) in Groundwater Exceeding Screening Levels - August 2012
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

	Location	Groundwater Screening Level[1] (ug/L)	BMW-01	BMW-03	BMW-06	BMW-07	BMW-08	MW-12	RMW-01-17
	Sample Date		Aug 7 2012	Aug 6 2012	Aug 8 2012	Aug 1 2012	Aug 6 2012	Aug 20 2012	Aug 16 2012
	Sample ID		BMW-01-0812	BMW-03-0812	BMW-06-0812	BMW-07-0812	BMW-08-0812	MW-12-0812	RMW-01-17-0812
Total Metals	Iron	11,000	1,750	< 100	< 100	286 J	22,500 J	76,100	18,200
	Arsenic	10.0	< 100	169	< 100	< 100	< 100	43.0	9.3
	Cobalt	4.7	< 100	< 100	< 100	< 100	< 100	< 1.0	< 1.0
	Manganese	320	1,470 J	6,540	569 J	831	222	5,680	4,370 J
	Nickel	100	< 100	< 100	< 100	< 100	< 100	17.1	3.7
	Selenium	50.0	< 500	R	< 500	R	164 J	2.9 J	< 5.0
Dissolved	Iron	11,000	1,380	< 100	< 100	204	20,100	70,200	16,500
	Arsenic	10.0	< 100	170	< 100	< 100	< 100	41.9	9.3
	Cobalt	4.7	< 100	< 100	< 100	< 100	< 100	< 1.0	< 1.0
	Manganese	320	1,560	6,280	584	813	212	5,350	4,900
	Nickel	100	< 100	< 100	< 100	< 100	< 100	14.2	3.9
	Selenium	50.0	< 500	< 500	< 500	< 500	129 J	2.5 J	< 5.0

	Location	Groundwater Screening Level[1] (ug/L)	RMW-01-35	RMW-02-13	RMW-02-32	RMW-02-50	RMW-03-15	RMW-04-15	RMW-05-15
	Sample Date		Aug 16 2012	Aug 21 2012	Aug 21 2012	Aug 20 2012	Aug 15 2012	Aug 7 2012	Aug 2 2012
	Sample ID		RMW-01-35-0812	RMW-02-13-0812	RMW-02-32-0812	RMW-02-50-0812	RMW-03-15-0812	RMW-04-15-0812	RMW-05-15-0812
Total Metals	Iron	11,000	2,650	31,200	4,210	< 100	7,500	855	6,910 J
	Arsenic	10.0	14.9	33.0	34.5	1.4	15.5	< 100	< 100
	Cobalt	4.7	2.1	6.4	2.8	31.9	1.2	< 100	< 100
	Manganese	320	3,110 J	5,630	43.9	727	905 J	933 J	1,020
	Nickel	100	102	36.1	231	125	6.9	< 100	< 100
	Selenium	50.0	< 5.0	1.8 J	2.4 J	1.7 J	6.2	< 500	R
Dissolved	Iron	11,000	2,510	30,200	4,200	< 100	6,170	577	6,760
	Arsenic	10.0	14.1	32.8	35.0	1.1	16.8	< 100	< 100
	Cobalt	4.7	2.1	6.3	2.6	31.5	1.3	< 100	< 100
	Manganese	320	2,830	5,710	43.8	718	1,070	971	1,010
	Nickel	100	97.8	36.3	231	122	7.0	< 100	< 100
	Selenium	50.0	< 5.0	1.6 J	2.5 J	< 5.0	6.9	< 500	< 500

Table 6-4
Metal Concentrations (ug/L) in Groundwater Exceeding Screening Levels - August 2012
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	Location	Groundwater Screening Level[1] (ug/L)	RMW-05-74	RMW-06-15	RMW-06-35	RMW-06-61	RMW-07-15	RMW-07-35	RMW-08-15
	Sample Date		Aug 2 2012	Aug 9 2012	Aug 9 2012	Aug 9 2012	Aug 14 2012	Aug 9 2012	Aug 14 2012
	Sample ID		RMW-05-74-0812	RMW-06-15-0812	RMW-06-35-0812	RMW-06-61-0812	RMW-07-15-0812	RMW-07-35-0812	RMW-08-15-0812
Total Metals	Iron	11,000	**130 J**	**421**	< 100	< 100	< 100	< 100	**11,200**
	Arsenic	10.0	< 100	< 100	< 100	< 100	< 1.0	< 100	**223**
	Cobalt	4.7	< 100	< 100	< 100	< 100	**2.9**	< 100	< 1.0
	Manganese	320	**25,700**	**5,420 J**	**386 J**	**2,080 J**	**2,920 J**	**617 J**	**2,780 J**
	Nickel	100	< 100	< 100	< 100	< 100	**20.6**	< 100	**4.8**
	Selenium	50.0	**228 J**	< 500	< 500	< 500	< 5.0	< 500	< 5.0
Dissolved	Iron	11,000	**59.5 J**	**218**	< 100	< 100	< 100	< 100	**9,350**
	Arsenic	10.0	< 100	< 100	< 100	< 100	< 1.0	< 100	**210**
	Cobalt	4.7	< 100	< 100	< 100	< 100	**3.0**	< 100	< 1.0
	Manganese	320	**26,200**	**5,370**	**376**	**1,690**	**2,780**	**622**	**2,660**
	Nickel	100	< 100	< 100	< 100	< 100	**11.8**	< 100	**4.3**
	Selenium	50.0	**204 J**	< 500	< 500	< 500	< 5.0	< 500	< 5.0

	Location	Groundwater Screening Level[1] (ug/L)	RMW-08-35	RMW-09-15	RMW-09-70	RMW-10-15	RMW-10-35	RMW-10-79	RMW-11-35
	Sample Date		Aug 14 2012	Aug 8 2012	Aug 8 2012	Aug 6 2012	Aug 1 2012	Aug 1 2012	Aug 13 2012
	Sample ID		RMW-08-35-0812	RMW-09-15-0812	RMW-09-70-0812	RMW-10-15-0812	RMW-10-35-0812	RMW-10-79-0812	RMW-11-35-0812
Total Metals	Iron	11,000	< 100	**302**	< 100	**271 J**	**5,150 J**	**1,130 J**	**1,030**
	Arsenic	10.0	**1.4**	**965 J**	< 100	**698**	**916**	< 100	**2.7**
	Cobalt	4.7	**2.4**	< 100	< 100	< 100	**148**	< 100	< 1.0
	Manganese	320	**523 J**	**14,000 J**	**41,000 J**	**3,270**	**17,400**	**23,200**	**562 J**
	Nickel	100	**19.6**	< 100	< 100	**112**	**394**	< 100	**7.0**
	Selenium	50.0	< 5.0	< 500	**209 J**	R	R	**242 J**	< 5.0
Dissolved	Iron	11,000	< 100	**285**	< 100	**106**	**5,100**	**1,090**	**1,070**
	Arsenic	10.0	**1.4**	**905**	< 100	**673**	**942**	< 100	**1.9**
	Cobalt	4.7	**2.7**	< 100	< 100	< 100	**150**	< 100	< 1.0
	Manganese	320	**576**	**13,600**	**40,800**	**3,020**	**17,600**	**22,600**	**528**
	Nickel	100	**22.2**	< 100	< 100	**114**	**405**	< 100	**5**
	Selenium	50.0	< 5.0	< 500	**202 J**	< 500	< 500	**209 J**	< 5.0

Table 6-4
Metal Concentrations (ug/L) in Groundwater Exceeding Screening Levels - August 2012
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	Location	Groundwater Screening Level[1] (ug/L)	RMW-12-32	RMW-12-51	RMW-13-35	RMW-14-35	RMW-14-50	RMW-15-35	RMW-15-60
	Sample Date		Aug 20 2012	Aug 20 2012	Aug 2 2012	Jul 31 2012	Aug 1 2012	Aug 15 2012	Aug 16 2012
	Sample ID		RMW-12-32-0812	RMW-12-51-0812	RMW-13-35-0812	RMW-14-35-0812	RMW-14-50-0812	RMW-15-35-0812	RMW-15-60-0812
Total Metals	Iron	11,000	< 100	< 100	**4,380 J**	< 100	**3,580 J**	< 100	< 100
	Arsenic	10.0	**12.8**	**2.0**	< 100	**294**	< 100	**1.6**	**1.6**
	Cobalt	4.7	< 1.0	**4.9**	< 100	< 100	< 100	**4.1**	< 1.0
	Manganese	320	**1.5**	**414**	**1,880**	**9,420**	**14,000**	**1,370 J**	**616 J**
	Nickel	100	**13.3**	**32.6**	**265**	< 100	< 100	**77.3**	**2.2**
	Selenium	50.0	**1.8 J**	< 5.0	R	R	R	< 5.0	< 5.0
Dissolved	Iron	11,000	< 100	< 100	**3,050**	< 100	**3,530**	**1,070**	< 100
	Arsenic	10.0	**12.5**	**2.0**	< 100	**288**	< 100	**2.0**	**2.0**
	Cobalt	4.7	< 1.0	**5.1**	< 100	< 100	< 100	**4.1**	< 1.0
	Manganese	320	**1.2**	**422**	**1,550**	**9,180**	**13,700**	**1,430**	**588**
	Nickel	100	**12.4**	**33.3**	< 100	< 100	< 100	**83.6**	**1.8**
	Selenium	50.0	**2.0 J**	< 5.0	< 500	< 500	< 500	< 5.0	< 5.0

	Location	Groundwater Screening Level[1] (ug/L)	RMW-16E-15	RMW-16W-15	RMW-16-35	RMW-16-60	RMW-17-35	RMW-17-70	RMW-18-35
	Sample Date		Aug 15 2012	Aug 7 2012	Aug 13 2012	Aug 13 2012	Aug 7 2012	Aug 7 2012	Jul 31 2012
	Sample ID		RMW-16E-15-0812	RMW-16W-15-0812	RMW-16-35-0812	RMW-16-60-0812	RMW-17-35-0812	RMW-17-70-0812	RMW-18-35-0812
Total Metals	Iron	11,000	< 100	< 100	< 100	< 100	< 100	**104**	**2,860 J**
	Arsenic	10.0	< 1.0	< 100	**1.6 J**	**11.6**	< 100	< 100	< 100
	Cobalt	4.7	< 1.0	< 100	**3.4**	< 1.0	< 100	< 100	< 100
	Manganese	320	**2,850 J**	**1,590 J**	**1,130 J**	**1,190 J**	**6,950 J**	**35,500 J**	**4,190**
	Nickel	100	**17.3**	< 100	**44.6**	**6.9 J**	< 100	< 100	< 100
	Selenium	50.0	< 5.0	< 500	< 5.0	**11.8**	< 500	**221 J**	**244 J**
Dissolved	Iron	11,000	< 100	< 100	< 100	< 100	< 100	< 100	**2,860**
	Arsenic	10.0	< 1.0	< 100	**1.4**	**10.9**	< 100	< 100	< 100
	Cobalt	4.7	< 1.0	< 100	**3.3**	< 1.0	< 100	< 100	< 100
	Manganese	320	**2,790**	**1,580**	**1,130**	**1,170**	**8,390**	**36,100**	**4,200**
	Nickel	100	**16.6**	< 100	**46.8**	**7.1**	< 100	< 100	< 100
	Selenium	50.0	< 5.0	< 500	< 5.0	**10.4**	< 500	**237 J**	**228 J**

Table 6-4
Metal Concentrations (ug/L) in Groundwater Exceeding Screening Levels - August 2012
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	Location	Groundwater Screening Level[1] (ug/L)	RMW-18-79	RMW-19-80
	Sample Date		Jul 31 2012	Jul 30 2012
	Sample ID		RMW-18-79-0812	RMW-19-80-0812
Total Metals	Iron	11,000	**995 J**	**369 J**
	Arsenic	10.0	< 100	< 100
	Cobalt	4.7	< 100	< 100
	Manganese	320	**41,500**	**17,900**
	Nickel	100	< 100	< 100
	Selenium	50.0	**256 J**	**269 J**
Dissolved	Iron	11,000	**1,010**	**400**
	Arsenic	10.0	< 100	< 100
	Cobalt	4.7	< 100	< 100
	Manganese	320	**40,700**	**18,200**
	Nickel	100	< 100	< 100
	Selenium	50.0	**269 J**	**243 J**

Notes:
Metal concentrations detected are displayed in **bold** font
[1] Screening Levels are presented in Table 6-1.
Some chemicals listed in the table were not detected, and these non-detects have been qualified as having estimated report limits. The qualifiers from data validation are presented in the tables in Appendix H.
indicates result above screening Level
J = estimated result
ug/L = microgram per liter
R = rejected result (as determined based on data validation)
< = not detected at the listed reporting limit

Table 6-5
Pesticide and Polychlorinated Biphenyl (PCB) Concentrations (ug/L) in Grounwater Exceeding Screening Levels - August 2012
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Location	**Groundwater Screening Level[1]**	**RMW-01-17**	**RMW-01-35**	**RMW-02-13**	**RMW-08-35**	**RMW-09-15**	**RMW-10-35**	**RMW-16E-15**
Sample Date		**Aug 16 2012**	**Aug 16 2012**	**Aug 22 2012**	**Aug 14 2012**	**Aug 8 2012**	**Aug 1 2012**	**Aug 15 2012**
Sample ID		**RMW-01-17-0812**	**RMW-01-35-0812**	**RMW-02-13-0812**	**RMW-08-35-0812**	**RMW-09-15-0812**	**RMW-10-35-0812**	**RMW-16E-15-0812**
Aldrin	0.00021	< 0.050	**0.40 J**	**1.6**	< 0.050	< 0.050	**0.058 J**	< 0.050
alpha-BHC (alpha-	0.0062	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	**0.080**	< 0.050
alpha-Chlordane	0.10	< 0.050	< 0.050	< 0.050	< 0.050	**0.32 J**	**0.30 J**	< 0.050
Dieldrin	0.0015	< 0.10	< 0.10	**2.0**	< 0.10	< 0.10	< 0.10	< 0.10
Heptachlor	0.010	**0.40 J**	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Heptachlor Epoxide	0.010	< 0.050	< 0.050	**0.11**	< 0.050	< 0.050	< 0.050	< 0.050
p,p'-DDD	0.28	**0.66**	< 0.10	**16.0**	< 0.10	< 0.10	< 0.10	< 0.10
p,p'-DDE	0.20	< 0.10	< 0.10	**2.4**	< 0.10	< 0.10	**0.088 J**	< 0.10
p,p'-DDT	0.20	< 0.10	< 0.10	**0.60**	**0.98**	< 0.10	< 0.10	**0.57 J**
PCB-1260 (Arochlor 1260)	0.034	< 1.0	< 1.0	**6.1**	< 1.0	< 1.0	< 1.0	< 1.0

Notes:

PCB/pesticide concentrations detected are displayed in **bold** font

[1] Screening Levels are presented in Table 6-1.

indicates the result exceeded screening Level

J = estimated result

< = not detected / less than the listed reporting limit

Table 6-6
Comparison of Chemical of Concern Concentrations in Groundwater for 2006 and 2012
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

	Chemical	2012 Screening Level[1]	September 2006 Maximum Concentrations		August 2012 Maximum Concentrations	
			Concentration	Well	Concentration	Well
Volatile Organic Compounds (VOCs) - ug/L	Acetone	12,000	9,700	MW-12	450	RMW-02-13
	Benzene	1	340	RMW-02-13	300	RMW-02-13
	Chlorobenzene	70	630	RMW-01-17	1,400	RMW-02-32
	Chloroethane	21,000	340	RMW-02-32	390	RMW-02-32
	1,2-Dibromo-3-chloropropane	0.2	< 0.15	All Locations	0.59	RMW-05-15
	1,2-Dichlorobenzene	600	5,700	RMW-02-32	200	RMW-1-35
	1,4-Dichlorobenzene	5	990	RMW-02-32	280	RMW-02-32
	1,1-Dichloroethane	5	1,300	RMW-02-32	2,300	MW-12
	1,2-Dichloroethane	0.5	38.0	RMW-02-13	0.6	RMW-16-35
	1,1-Dichloroethene	6	19.0	RMW-12-32	380	MW-12
	cis-1,2-Dichloroethene	6	25,000	MW-12	66,000	MW-12
	trans-1,2-Dichloroethene	10	220	MW-12	730	MW-12
	Dichloromethane	5	140	RMW-02-32	< 0.25	All Locations
	1,2-Dichloropropane	5	5.1	MW-12	< 0.25	All Locations
	trans-1,3-Dichloropropene	0.5	1.9	RMW-14-50	< 0.25	All Locations
	Ethylbenzene	300	670	RMW-02-13	470	RMW-02-13
	2-Hexanone	34	190	RMW-02-13	< 2.5	All Locations
	4-Methyl-2-pentanone (MIBK)	1,000	49,000	RMW-02-32	< 2.5	All Locations
	tert-Butyl Alcohol	12	240	BPZ-01 & RMW-12-32	820	RMW-10-35
	Methyl tert-Butyl Ether (MTBE)	13	32.0	RMW-02-13	9.5	RMW-15-35
	Methylene Chloride	5	140	RMW-02-32	< 0.25	All Locations
	Isopropylbenzene (Cumene)	390	450	RMW-02-32	140	RMW-02-32
	Tetrachloroethene (PCE)	5	24.0	RMW-07-35	33	RMW-07-35
	Toluene	150	12,000	RMW-02-13	24,000	MW-12
	1,2,3-Trichlorobenzene	5	9.2	RMW-02-13	0.23	RMW-05-15
	1,2,4-Trichlorobenzene	5	48.0	RMW-02-32	26	RMW-02-13
	1,1,1-Trichloroethane	200	240	MW-12	850	MW-12
	1,1,2-Trichloroethane	5	13.0	RMW-02-13	< 0.25	All Locations
	1,1,2,2-Tetrachloroethane	1	18.0	RMW-02-13	< 0.25	All Locations
	Trichloroethene (TCE)	5	140	RMW-10-35	100	RMW-14-50 & RMW-94-50
	1,2,4-Trimethylbenzene	15	990	RMW-02-32	360	RMW-02-32
	1,3,5-Trimethylbenzene	87	2,500	RMW-02-32	800	RMW-02-32
	Vinyl Chloride	0.5	15,000	RMW-02-32	7,300	MW-12
	Xylenes, Total	1,750	3,200	RMW-02-13	2020	RMW-02-13

Table 6-6
Comparison of Chemical of Concern Concentrations in Groundwater for 2006 and 2012
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

	Chemical	2012 Screening Level[1]	September 2006 Maximum Concentrations		August 2012 Maximum Concentrations	
			Concentration	Well	Concentration	Well
Semi-volatile Organic Compounds (SVOCs) - ug/L	Benzo(a)anthracene	0.029	0.89	RMW-02-13	< 1.4	All Locations
	Benzo(a)pyrene	0.2	0.50	RMW-02-13	< 1.3	All Locations
	Benzo(b)fluoranthene	0.029	0.76	RMW-02-13	< 1.6	All Locations
	Benzo(k)fluoranthene	0.29	0.46	RMW-02-13	< 1.6	All Locations
	Biphenyl (Diphenyl)	0.83	0.76	RMW-10-35	2.6	RMW-02-13
	bis(2-Ethylhexyl) Phthalate	4	0.83	RMW-99-35	18	RMW-16-35
	Chrysene	2.9	1.1	RMW-02-13	< 1.5	All Locations
	Dibenz(a,h)anthracene	0.0048	0.21	RMW-14-50	< 1.9	All Locations
	2,4-Dimethylphenol	270	290	RMW-02-13	330	RMW-02-32
	1,4-Dioxane (p-Dioxane)	0.67	1,600	RMW-02-32	490	RMW-02-32
	Indeno(1,2,3-c,d)pyrene	0.029	0.13	BPZ-01	< 1.9	All Locations
	2-Methylnaphthalene	27	290	RMW-02-13	500	RMW-02-32
	2-Methylphenol (o-Cresol)	720	2,000	RMW-02-32	400	MW-12
	4-Methylphenol (p-Cresol)	1,400	7,300	RMW-02-32	560	MW-12
	Naphthalene	0.14	220	MW-12	120	RMW-02-32
	N-Nitrosodi-n-propylamine	0.0093	1.2	RMW-02-13	< 1.5	All Locations
	Pentachlorophenol	1	13.0	MW-12	< 2.5	All Locations
Organochlorine Pesticides/PCBs - ug/L	Aldrin	0.00021	0.15	RMW-10-15	1.6	RMW-02-13
	alpha-BHC	0.0062	0.061	RMW-10-35	0.080	RMW-10-35
	alpha-Chlordane	0.1	0.22	MW-12	0.32	RMW-09-15
	beta-BHC	0.022	0.57	RMW-10-35	< 0.040	All Locations
	delta-BHC	NE	0.14	RMW-07-35	0.11	RMW-01-17 & RMW-10-35
	Dieldrin	0.0015	0.81	RMW-02-13	2.0	RMW-02-13
	gamma-BHC (Lindane)	0.2	0.45	RMW-10-35	0.18	RMW-10-35
	gamma-Chlordane	0.1	0.23	RMW-10-15	< 0.030	MW-12
	Heptachlor	0.01	0.76	BPZ-01	0.40	RMW-01-17
	Heptachlor Epoxide	0.01	0.11	MW-12	0.11	RMW-02-13
	PCB-1260 (Arochlor 1260)	0.5	6.3	RMW-02-13	6.1	RMW-02-13
	p,p'-DDD	0.28	2.6	RMW-02-13	16	RMW-02-13
	p,p'-DDE	0.2	0.4	RMW-02-13	2.4	RMW-02-13
	p,p'-DDT	0.2	0.065	MW-12	0.98	RMW-08-35
Total Metals - ug/L	Arsenic	10	2,020	RMW-09-15	965	RMW-09-15
	Cadmium	5	5.8	BPZ-01	< 6.3	All Locations
	Chromium	50	187	BPZ-01	9.9	RMW-16-60
	Cobalt	4.7	213	RMW-1035	148	RMW-10-35
	Copper	1,300	489	RMW-12-32	437	RMW-09-70
	Iron	11,000	69,800	MW-12	76,100	MW-12
	Lead	15	20.1	RMW-03-15	21.6	RMW-06-35
	Manganese	320	45,700	RMW-14-50	41,500	RMW-18-79
	Nickel	100	510	RMW-10-35	394	RMW-10-35
	Selenium	50	30.5	RMW-10-35	269	RMW-18-79
	Vanadium	78	75.4	RMW-12-32	105	RMW-12-32

Table 6-6
Comparison of Chemical of Concern Concentrations in Groundwater for 2006 and 2012
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

	Chemical	2012 Screening Level[1]	September 2006 Maximum Concentrations		August 2012 Maximum Concentrations	
			Concentration	Well	Concentration	Well
Dissolved Metals - ug/L	Aluminum	16,000	62,700	BPZ-01	522	RMW-12-32
	Antimony	6	10.6	RMW-12-32	< 8.4	All Locations
	Arsenic	10	1,730	RMW-9-15	942	RMW-10-35
	Cobalt	4.7	237	RMW-10-35	150	RMW-10-35
	Iron	11,000	66,100	MW-12	70,200	MW-12
	Lead	15	1,230	RMW-12-32	4.0	RMW-15-15
	Manganese	320	44,600	RMW-14-50	40,800	RMW-09-70
	Nickel	100	552	RMW-10-35	405	RMW-10-35
	Selenium	50	25.7	RMW-10-35	269	RMW-19-80
	Vanadium	78	68.8	RMW-12-32	102	RMW-12-32
	Zinc	4,700	5,000	RMW-10-15	1,360	RMW-10-15

Note:
[1] 2012 Groundwater Screening Levels are presented in Table 6-1
ug/L = micrograms per liter
< = not detected at the listed reporting limit

Table 6-7
Thickness of Free Product in Upper Aquifer Groundwater Monitoring Wells - 2010 to 2012
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Monitoring Event	Groundwater Monitoring Well		
	MW-02-13	MW-13	MW-14
	Free Product Thickness (feet)	Free Product Thickness (feet)	Free Product Thickness (feet)
August 2010	4.70	0.45	1.25
June 2011	0.00	0.81	8.39
August 2011	0.03	0.78	8.07
February 2012	0.00	0.42	6.79
May 2012	4.53	0.77	7.43
August 2012	3.02	0.57	6.58

Table 6-8
Concentration (mg/L) of Other Chemical Parameters in Groundwater - August 2012
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Location	MW-12	BMW-01	BMW-03	BMW-06	BMW-07	BMW-08	BPZ-01	RMW-01-17	RMW-01-35
Sample Date	Aug 20 2012	Aug 7 2012	Aug 6 2012	Aug 8 2012	Aug 1 2012	Aug 6 2012	Aug 7 2012	Aug 16 2012	Aug 16 2012
Dissolved Organic Carbon (DOC)	200	---	42	---	---	53	---	---	---
Chemical Oxygen Demand (COD)	880	---	130	---	---	---	---	---	---
Alkalinity, Bicarbonate (as $CaCO_3$)	400	1,100	790	620	510	3,500	4,500	540	970
Alkalinity, Carbonate (as $CaCO_3$)	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	33
Alkalinity, Hydroxide (as $CaCO_3$)	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Alkalinity, Total (as $CaCO_3$)	400	1,100	790	620	510	3,500	4,500	540	1,000
Chloride	210	2,400	280	2,700	320	18,000	5,100	14	210
Nitrate (as N)	<0.10	<0.10	93	2.4	<0.10	<1.0	0.080 J	<0.10	<0.10
Sulfate (as S)[1]	<0.17	94	1,400	44	250	1,300	110	0.18	13
Sulfide (as S)	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	1.1	<1.0	<1.0
Ferrous Iron	4.3	0.20	<10.0	<10.0	0.75	3.0	<10.0	2.4	2.2

Location	RMW-02-13	RMW-02-32	RMW-02-50	RMW-03-15	RMW-04-15	RMW-05-15	RMW-05-35	RMW-05-74	RMW-06-15
Sample Date	Aug 21 2012	Aug 21 2012	Aug 20 2012	Aug 15 2012	Aug 7 2012	Aug 2 2012	Aug 2 2012	Aug 2 2012	Aug 9 2012
Dissolved Organic Carbon (DOC)	200	140	2.2	52	---	29	---	---	---
Chemical Oxygen Demand (COD)	680	310	13	180	---	---	---	---	---
Alkalinity, Bicarbonate (as $CaCO_3$)	1,200	1,900	440	1,100	510	1,100	260	270	1,100
Alkalinity, Carbonate (as $CaCO_3$)	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	16 J	<10.0	<10.0
Alkalinity, Hydroxide (as $CaCO_3$)	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Alkalinity, Total (as $CaCO_3$)	1,200	1,900	440	1,100	510	1,100	280	270	1,100
Chloride	350	410	57	380	200	72	---	---	13
Nitrate (as N)	<0.10	<0.10	7.9	<0.10	0.55	<0.10	---	---	<0.10
Sulfate (as S)[1]	<0.17	<0.17	60	0.18	63	0.43	---	---	11
Sulfide (as S)	<1.0	<1.0	<1.0	<1.0	0.70 J	1.8	---	---	0.87 J
Ferrous Iron	4.0	3.6	<10.0	3.0	<10.0	3.2	<10.0	0.02	1.0

Location	RMW-06-35	RMW-06-61	RMW-07-15	RMW-07-35	RMW-08-15	RMW-08-35	RMW-09-15	RMW-09-35	RMW-09-70
Sample Date	Aug 9 2012	Aug 9 2012	Aug 14 2012	Aug 9 2012	Aug 14 2012	Aug 14 2012	Aug 8 2012	Aug 8 2012	Aug 8 2012
Dissolved Organic Carbon (DOC)	5.1	---	---	---	24	---	86	12	0.69 J
Chemical Oxygen Demand (COD)	---	36	---	---	---	---	---	9.0 J	300
Alkalinity, Bicarbonate (as $CaCO_3$)	460	250	590	610	600	1,000	730	270	310
Alkalinity, Carbonate (as $CaCO_3$)	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Alkalinity, Hydroxide (as $CaCO_3$)	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Alkalinity, Total (as $CaCO_3$)	460	250	590	610	600	1,000	730	270	310
Chloride	110	4,300	19	100	18	66	340	52	32,000
Nitrate (as N)	14	1.1	0.33	5.6	0.12	0.62	<0.10	4.3	< 1.0
Sulfate (as S)[1]	130	220	16	120	4.0	60	1500	28	1700
Sulfide (as S)	0.70 J	0.94 J	<1.0	0.94 J	3.3	<1.0	0.79 J	1.2	2.0
Ferrous Iron	<10.0	<10.0	<10.0	<10.0	2.2	<10.0	<10.0	<10.0	<10.0

Table 6-8
Concentration (mg/L) of Other Chemical Parameters in Groundwater - August 2012
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Location	**RMW-10-15**	**RMW-10-35**	**RMW-10-79**	**RMW-11-35**	**RMW-12-32**	**RMW-12-51**	**RMW-13-35**	**RMW-14-35**	**RMW-14-50**
Sample Date	**Aug 6 2012**	**Aug 1 2012**	**Aug 1 2012**	**Aug 13 2012**	**Aug 20 2012**	**Aug 20 2012**	**Aug 2 2012**	**Jul 31 2012**	**Aug 1 2012**
Dissolved Organic Carbon (DOC)	**77**	**150**	---	---	**16**	**1.5**	**3.8**	---	**8.8**
Chemical Oxygen Demand (COD)	**290**	**460**	---	---	**59**	<10.0	---	---	**59**
Alkalinity, Bicarbonate (as $CaCO_3$)	**530**	**880**	**210**	**350**	**16**	**280**	**1,100**	**370**	**310**
Alkalinity, Carbonate (as $CaCO_3$)	<10.0	<10.0	<10.0	<10.0	**160**	<10.0	<10.0	<10.0	<10.0
Alkalinity, Hydroxide (as $CaCO_3$)	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Alkalinity, Total (as $CaCO_3$)	**530**	**880**	**210**	**350**	**180**	**280**	**1,100**	**370**	**310**
Chloride	**88**	**2,300**	---	**370**	**220**	**33**	**9,300**	---	**2,600**
Nitrate (as N)	**1.6**	<1.0	---	**0.25**	<0.10	**7.7**	**0.86**	---	**2.0**
Sulfate (as S)[1]	**730**	**5,300**	---	**31**	**23**	**29**	**530**	---	**970**
Sulfide (as S)	<1.0	**0.94 J**	---	<1.0	<1.0	<1.0	<1.0	---	<1.0
Ferrous Iron	<10.0	**3.5**	**2.0**	**2.0**	<10.0	<10.0	**3.75**	<10.0	**3.8**

Location	**RMW-15-15**	**RMW-15-35**	**RMW-15-60**	**RMW-16E-15**	**RMW-16W-15**	**RMW-16-35**	**RMW-16-60**	**RMW-17-35**	**RMW-17-70**
Sample Date	**Aug 15 2012**	**Aug 15 2012**	**Aug 16 2012**	**Aug 15 2012**	**Aug 7 2012**	**Aug 13 2012**	**Aug 13 2012**	**Aug 7 2012**	**Aug 7 2012**
Dissolved Organic Carbon (DOC)	**5.4**	**31**	---	**4.2**	**2.6**	**25**	**1.3**	---	---
Chemical Oxygen Demand (COD)	---	---	---	<10.0	---	**40**	**19**	---	---
Alkalinity, Bicarbonate (as $CaCO_3$)	**270**	**910**	**220**	**370**	**130**	**820**	**260**	**650**	**310**
Alkalinity, Carbonate (as $CaCO_3$)	<10.0	**110**	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Alkalinity, Hydroxide (as $CaCO_3$)	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Alkalinity, Total (as $CaCO_3$)	**270**	**1,000**	**220**	**370**	**130**	**820**	**260**	**650**	**310**
Chloride	**11**	**150**	**72**	**13**	**17**	**170**	**2,000**	**7,100**	**34,000**
Nitrate (as N)	**3.9**	**0.78**	**4.3**	<0.10	**26**	**3.4**	**3.8**	<0.10	<1.0
Sulfate (as S)[1]	**15**	**44**	**22**	**20**	**14**	**33**	**130**	**600**	**1800**
Sulfide (as S)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.9**	**0.53 J**
Ferrous Iron	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0

Location	**RMW-18-35**	**RMW-18-79**	**RMW-19-15**	**RMW-19-35**	**RMW-19-80**
Sample Date	**Jul 31 2012**	**Jul 31 2012**	**Jul 30 2012**	**Jul 30 2012**	**Jul 30 2012**
Dissolved Organic Carbon (DOC)	---	---	---	---	---
Chemical Oxygen Demand (COD)	---	---	---	---	---
Alkalinity, Bicarbonate (as $CaCO_3$)	**1,300**	**270**	**520**	**890**	**170**
Alkalinity, Carbonate (as $CaCO_3$)	<10.0	<10.0	**41 J**	**110**	<10.0
Alkalinity, Hydroxide (as $CaCO_3$)	<10.0	<10.0	<10.0	<10.0	<10.0
Alkalinity, Total (as $CaCO_3$)	**1,300**	**270**	**560**	**1,000**	**170**
Chloride	---	---	---	---	---
Nitrate (as N)	---	---	---	---	---
Sulfate (as S)[1]	---	---	---	---	---
Sulfide (as S)	---	---	---	---	---
Ferrous Iron	**5.0**	**1.5**	<10.0	<10.0	**0.75**

Notes:
Detected concentrations are displayed in **bold** font
< = not detected at listed reporting limit
J = estimated result
-- = Not Analyzed
$CaCO_3$ = calcium carbonate
mg/L = milligrams per liter
N = nitrogen
S - sulfur
[1] Analytical laboratory results, reported as SO_4, were converted based on 0.3338 molecular mass ratio.

Table 6-9
Concentration of Dehalococcoides and Volatile Fatty Acids in Groundwater - August 2012
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AMCO Chemical Superfund Site, Oakland, California

	Location	MW-12	BMW-01	BMW-03	BMW-06	BMW-07	BMW-08	BPZ-01	RMW-01-17	RMW-01-35	RMW-02-13	RMW-02-32	RMW-02-50	RMW-03-15	RMW-04-15
	Sample Date	Aug 20 2012	Aug 7 2012	Aug 6 2012	Aug 8 2012	Aug 1 2012	Aug 6 2012	Aug 7 2012	Aug 16 2012	Aug 16 2012	Aug 21 2012	Aug 21 2012	Aug 20 2012	Aug 15 2012	Aug 7 2012
Dissolved Gases (ug/L)	Ethane	**820**	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2 UJ	< 1.2 UJ	**4.1**	**630**	**58 J**	**410**	**1.0 J**	< 1.2	< 1.2
	Ethene	**3,800**	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1 UJ	< 1.1 UJ	< 1.1	**60**	**440 J**	**5.1 J**	**2.0**	< 1.1	< 1.1
	Methane	**15,000**	**3.1**	**48 J**	**94**	**51**	**37 J**	**3,100**	**3,700**	**8,900**	**13,000**	**24,000**	**12**	**7,100**	**2.4**
Volatile Fatty Acids (mg/L)	2-Hydroxypropanoic acid (Lactic acid)	**3.9 J**	---	**16.2 J**	---	---	---	---	---	---	**15.7 J**	**7.9 J**	**17.8 J**	---	---
	2-Ketopropionic acid (Pyruvic acid)	**47.3 J**	---	< 100	---	---	---	---	---	---	**51.2 J**	**52.2 J**	**53.4 J**	---	---
	Acetic Acid	**311**	---	< 0.10	---	---	---	---	---	---	**5.2**	**6.9**	< 0.10	---	---
	Butyric Acid	**31.0 J**	---	< 0.10	---	---	---	---	---	---	< 4.0	< 10.0	< 2.0	---	---
	Propionic acid	**13.2 J**	---	< 0.10	---	---	---	---	---	---	**0.24**	**0.083 J**	< 0.10	---	---
Bacteria & Genes (cells/mL)	DHC	**560,000**	---	**1.6**	---	---	< 0.5	**149**	**9.6**	**43,400**	**40,400**	**82,800**	**1.8**	**37**	---
	tceA	**60,700**	---	< 0.5	---	---	< 0.5	< 2	< 0.5	**4,730**	**161,000**	**121,000**	**0.3 J**	< 0.5	---
	bvcA	**864**	---	< 0.5	---	---	< 0.5	**1.5 J**	< 0.5	**349**	**16.5**	**5,870**	< 0.5	< 0.5	---
	vcrA	**78,300**	---	< 0.5	---	---	< 0.5	< 2	< 0.5	**2,520**	**6,720**	**34,700**	< 0.5	< 0.5	---

	Location	RMW-05-15	RMW-05-35	RMW-05-74	RMW-06-15	RMW-06-35	RMW-06-61	RMW-07-15	RMW-07-35	RMW-08-15	RMW-08-35	RMW-09-15	RMW-09-35	RMW-09-70	RMW-10-15
	Sample Date	Aug 2 2012	Aug 2 2012	Aug 2 2012	Aug 9 2012	Aug 9 2012	Aug 9 2012	Aug 14 2012	Aug 9 2012	Aug 14 2012	Aug 14 2012	Aug 8 2012	Aug 8 2012	Aug 8 2012	Aug 6 2012
Dissolved Gases (ug/L)	Ethane	**3.3**	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	**2.0**	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
	Ethene	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1
	Methane	**3,000**	**390**	**12**	**88**	**15 J**	**47**	**3.8**	**5.5**	**1,900**	**50**	**9.6**	**38**	**16**	**550 J**
Volatile Fatty Acids (mg/L)	2-Hydroxypropanoic acid (Lactic acid)	---	**9.6 J**	---	---	---	---	---	---	---	---	---	---	---	---
	2-Ketopropionic acid (Pyruvic acid)	---	< 100	---	---	---	---	---	---	---	---	---	---	---	---
	Acetic Acid	---	< 0.10	---	---	---	---	---	---	---	---	---	---	---	---
	Butyric Acid	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	Propionic acid	---	< 0.10	---	---	---	---	---	---	---	---	---	---	---	---
Bacteria & Genes (cells/mL)	DHC	**19.3**	**3.4**	---	---	---	---	---	**7.8**	**8.2**	**0.4 J**	**4.5**	**5.5**	---	**15.1**
	tceA	< 0.5	< 0.5	---	---	---	---	---	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	< 0.5
	bvcA	**0.2 J**	< 0.5	---	---	---	---	---	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	< 0.5
	vcrA	**2.7**	< 0.5	---	---	---	---	---	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	---	< 0.5

Table 6-9
Concentration of Dehalococcoides and Volatile Fatty Acids in Groundwater - August 2012
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	Location	RMW-10-35	RMW-10-79	RMW-11-35	RMW-12-32	RMW-12-51	RMW-13-35	RMW-14-35	RMW-14-50	RMW-15-15	RMW-15-35	RMW-15-60
	Sample Date	Aug 1 2012	Aug 1 2012	Aug 13 2012	Aug 20 2012	Aug 20 2012	Aug 2 2012	Jul 31 2012	Aug 1 2012	Aug 15 2012	Aug 15 2012	Aug 16 2012
Dissolved Gases (ug/L)	Ethane	**0.90 J**	< 1.2	< 1.2	**460**	**0.70 J**	< 1.2 UJ	< 1.2	< 1.2	< 1.2	**3.3**	**1.0 J**
	Ethene	**46**	< 1.1	< 1.1	**42**	< 1.1	< 1.1 UJ	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1
	Methane	**210**	**4.8**	**15**	**3,300**	**5.4**	**21 J**	**17**	**24**	**4.6 J**	**150**	**9.4**
Volatile Fatty Acids (mg/L)	2-Hydroxypropanoic acid (Lactic acid)	---	---	---	**0.70 J**	**6.5 J**	---	**6.3 J**	---	---	---	---
	2-Ketopropionic acid (Pyruvic acid)	---	---	---	**45 J**	**46.9 J**	---	< 100	---	---	---	---
	Acetic Acid	---	---	---	< 0.10	< 0.10	---	< 0.10	---	---	---	---
	Butyric Acid	---	---	---	< 0.40	< 1.0	---	R	---	---	---	---
	Propionic acid	---	---	---	< 0.10	< 0.10	---	< 0.10 UJ	---	---	---	---
Bacteria & Genes (cells/mL)	DHC	**1,620,000**	---	---	**9.1**	**21.3**	---	< 0.5	**0.7**	---	**0.6**	---
	tceA	**107,000**	---	---	**0.7**	**0.9**	---	< 0.5	**0.3 J**	---	< 0.5	---
	bvcA	**0.4 J**	---	---	**0.7**	< 0.5	---	< 0.5	< 0.5	---	< 0.5	---
	vcrA	**404,000**	---	---	**18.1**	< 0.5	---	< 0.5	< 0.5	---	< 0.5	---

	Location	RMW-16E-15	RMW-16W-15	RMW-16-35	RMW-16-60	RMW-17-35	RMW-17-70	RMW-18-35	RMW-18-79	RMW-19-15	RMW-19-35	RMW-19-80
	Sample Date	Aug 15 2012	Aug 7 2012	Aug 13 2012	Aug 13 2012	Aug 7 2012	Aug 7 2012	Jul 31 2012	Jul 31 2012	Jul 30 2012	Jul 30 2012	Jul 30 2012
Dissolved Gases (ug/L)	Ethane	< 1.2	< 1.2	**57**	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
	Ethene	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1	< 1.1
	Methane	**55**	**1.9**	**26**	**0.80 J**	**28**	**5.4**	**310**	**14 J**	**210**	**23**	**8.9**
Volatile Fatty Acids (mg/L)	2-Hydroxypropanoic acid (Lactic acid)	**1.9 J**	---	**9.9 J**	---	---	---	**40.8 J**	**26.1 J**	---	---	---
	2-Ketopropionic acid (Pyruvic acid)	**40.0**	---	**52.1 J**	---	---	---	< 100	< 100	---	---	---
	Acetic Acid	< 0.10	---	< 0.10	---	---	---	< 0.10	< 0.10	---	---	---
	Butyric Acid	< 2.0	---	< 2.5	---	---	---	R	R	---	---	---
	Propionic acid	< 0.10	---	< 0.10 UJ	---	---	---	< 0.10 UJ	< 0.10 UJ	---	---	---
Bacteria & Genes (cells/mL)	DHC	**8.9**	---	**6.4**	---	**2.4**	---	< 0.5	**3.1**	---	---	---
	tceA	< 0.5	---	< 0.5	---	< 0.5	---	< 0.5	< 0.3	---	---	---
	bvcA	< 0.5	---	< 0.5	---	< 0.5	---	< 0.5	< 0.3	---	---	---
	vcrA	< 0.5	---	< 0.5	---	< 0.5	---	< 0.5	< 0.3	---	---	---

Notes:

--- = not analyzed
Detects are displayed in **bold** font
< = not detected at listed reporting limit
cells/mL = cells per milliliter
J = estimated result
mg/L= milligram per liter
ug/L = microgram per liter
UJ = non-detect result at estimated reporting limit
R = rejected result

DHC = *Dehalococcoides*
tceA = functional gene encoding dehalogenase (enzyme) TceA
bvcA = functional gene encoding dehalogenase (enzyme) BvcA

Table 6-10
Analytical Results for Lower Aquifer Groundwater from Well RMW-02-131
Remedial Investigation Report Addendum
AMCO Chemical Superfund Site, Oakland, California

Chemical	Groundwater Screening Level[1]	Concentration
Volatile Organic Compounds (VOCs)[2, 3]		**(ug/L)**
Benzene	1	< 0.5 (0.66)
Chloroform	80	0.31 J (0.40 J)
Toluene	150	< 0.5 (0.33 J)
Trichloroethene (TCE)	5	< 0.5 (0.24 J)
Inorganic Constituents[2]		**(mg/L)**
Calcium	Not applicable (NA)	68.4
Iron	11	1.42
Magnesium	NA	52.5
Potassium	NA	16.2
Sodium	NA	293
Chloride	NA	579
Sulfate (as S)[4]	NA	19.3
Nitrate (as N)	10	< 0.25

Notes:

[1] Screening levels for VOCs are reported in micrograms per liter (ug/L), and screening levels for inorganic constituents are reported in milligrams per liter (mg/L). Screening levels for the VOCs and nitrate are the lower of the federal or California primary Maximum Contaminant Levels (MCLs), while the iron screening level is based on the EPA Regional Screening for drinking water.

[2] VOC concentrations are listed for the primary sample (GW01-090413) followed by the duplicate sample (GW91-090413) in parentheses. Inorganic constituent concentrations are for the primary sample (GW01-090413). The primary and duplicate samples were collected on 9/4/13.

[3] Other VOCs were not detected in the primary or duplicate groundwater samples.

[4] The sulfate concentration was reported as sulfate, and converted to sulfate as sulfur (S).

J = estimated result
mg/L = milligrams per liter
ug/L = micrograms per liter
< x = not detected at the indicated reporting limit

FIGURES

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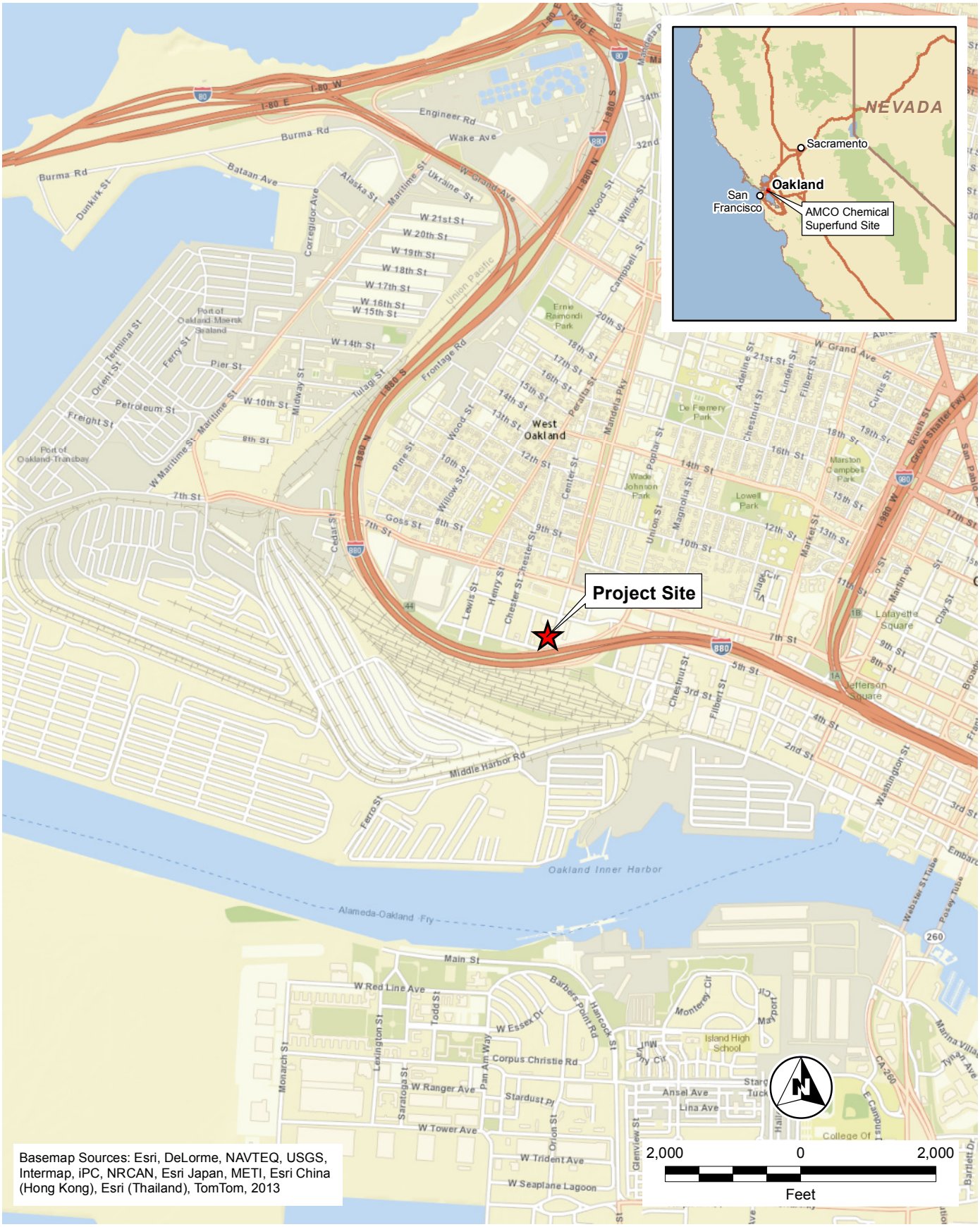

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FIGURE 1-1
Site Location Map

G:\ArcGIS\EPA\AMCO_Chemical\PROJECTS\Indoor_Air\Figure_1.mxd 8/31/2010 ITSI-WC Eloise Anderson

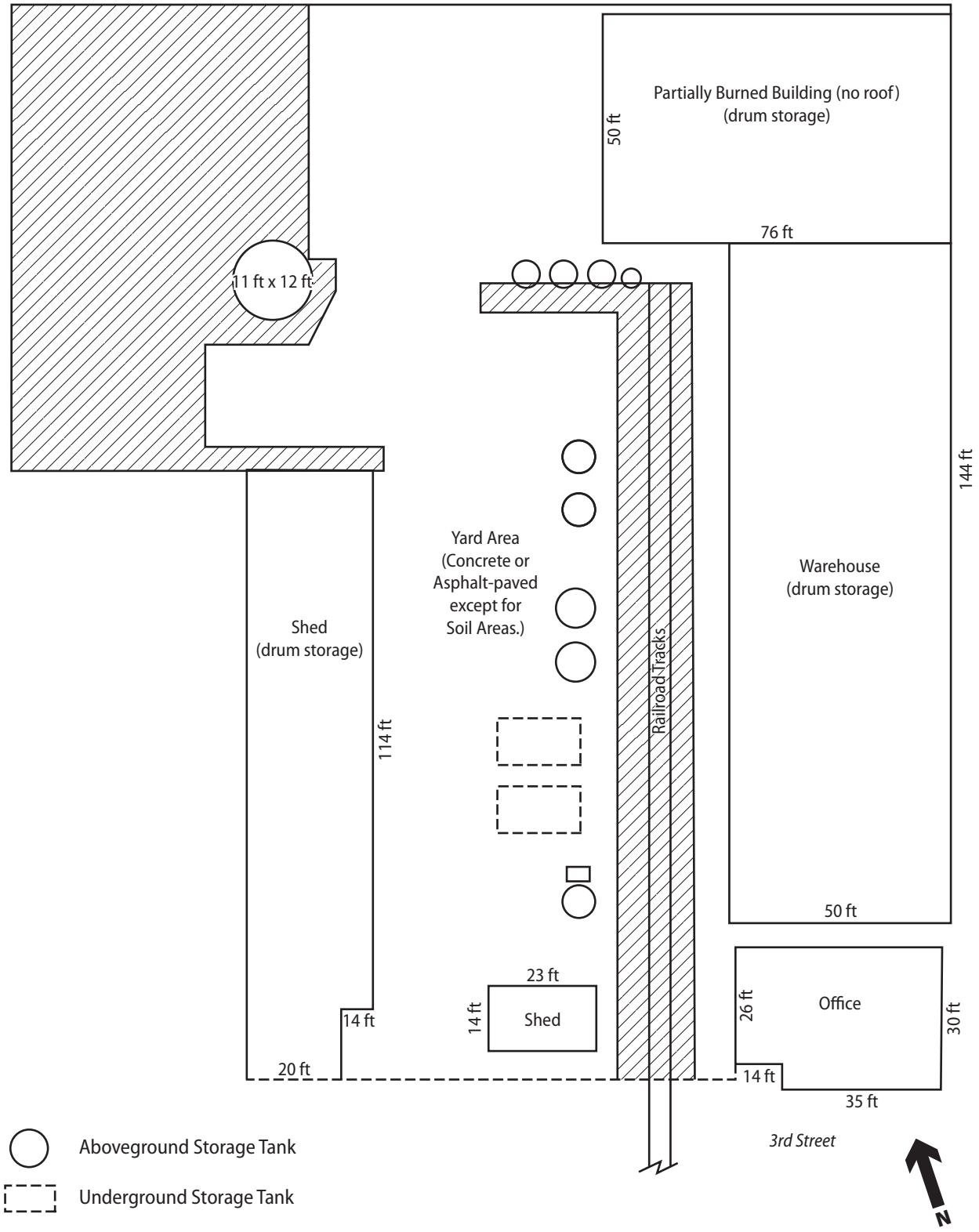

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FIGURE 1-2
Layout of Former AMCO Facility in 1986

\\Engineering\projects\07163.0000 EPA Region 9\0019 TO 18 FS AMCO Chemical\15.0 Graphics\Former_AMCO_Layout.ai

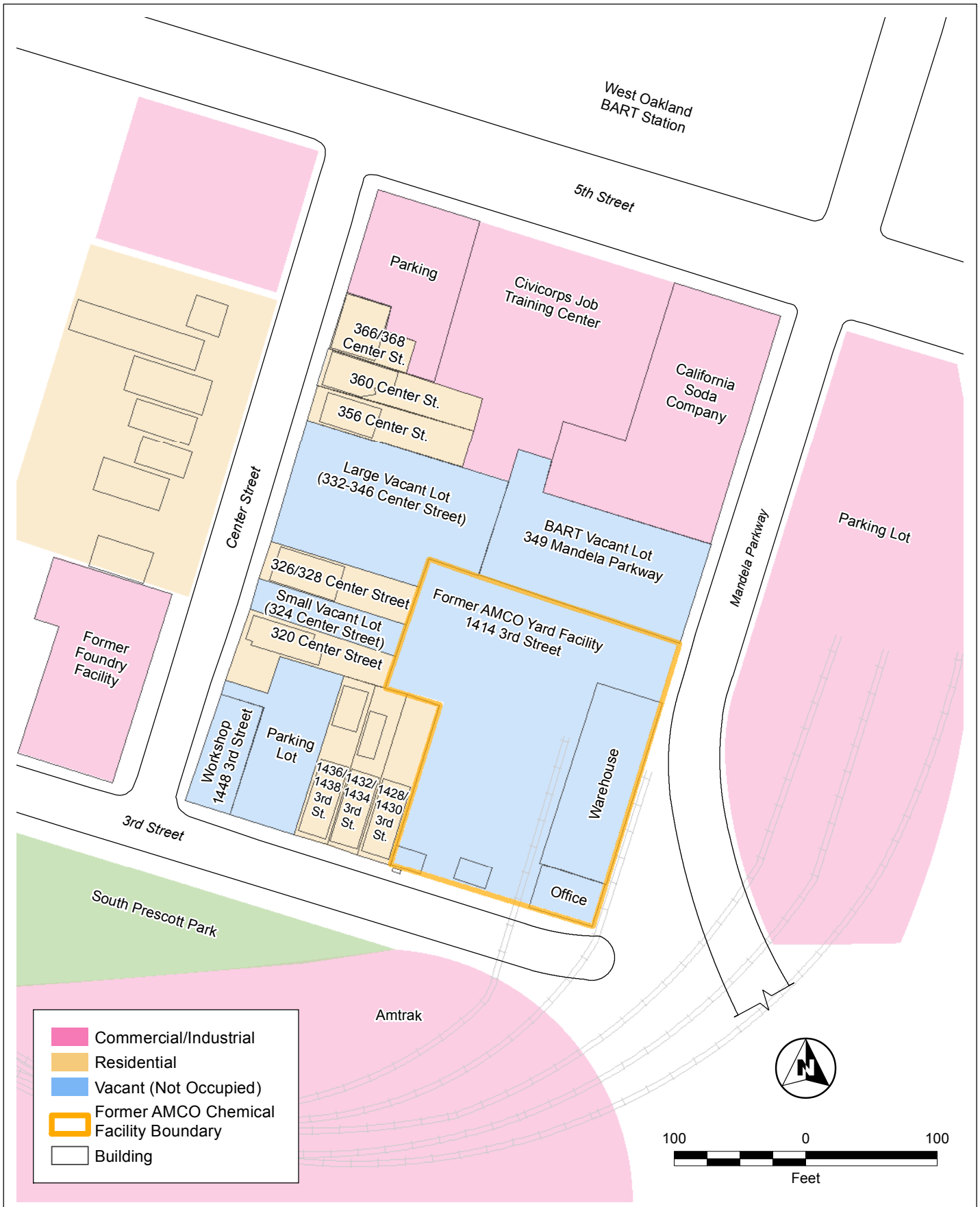

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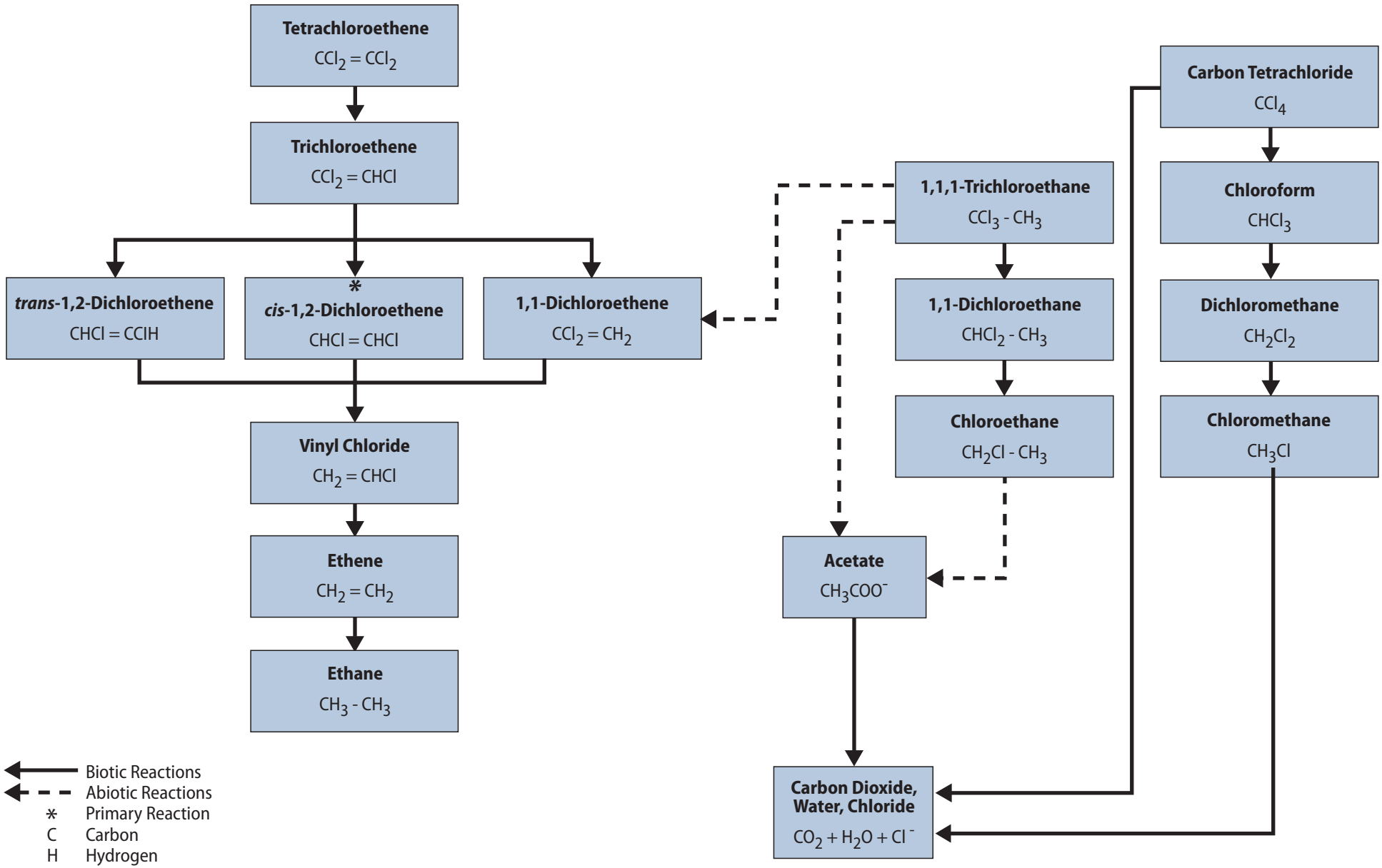
FIGURE 1-3
Land Use of Neighboring Parcels

G:\ArcGIS\EPA\AMCO_Chemical\PROJECTS\GW\Land_Use_Map.mxd 8/11/2014 [15:59 PM] EANDERSON, ITSI



Adapted from McCarty 1996; McCarty and Semprini 1994; and Vogel et al. 1987

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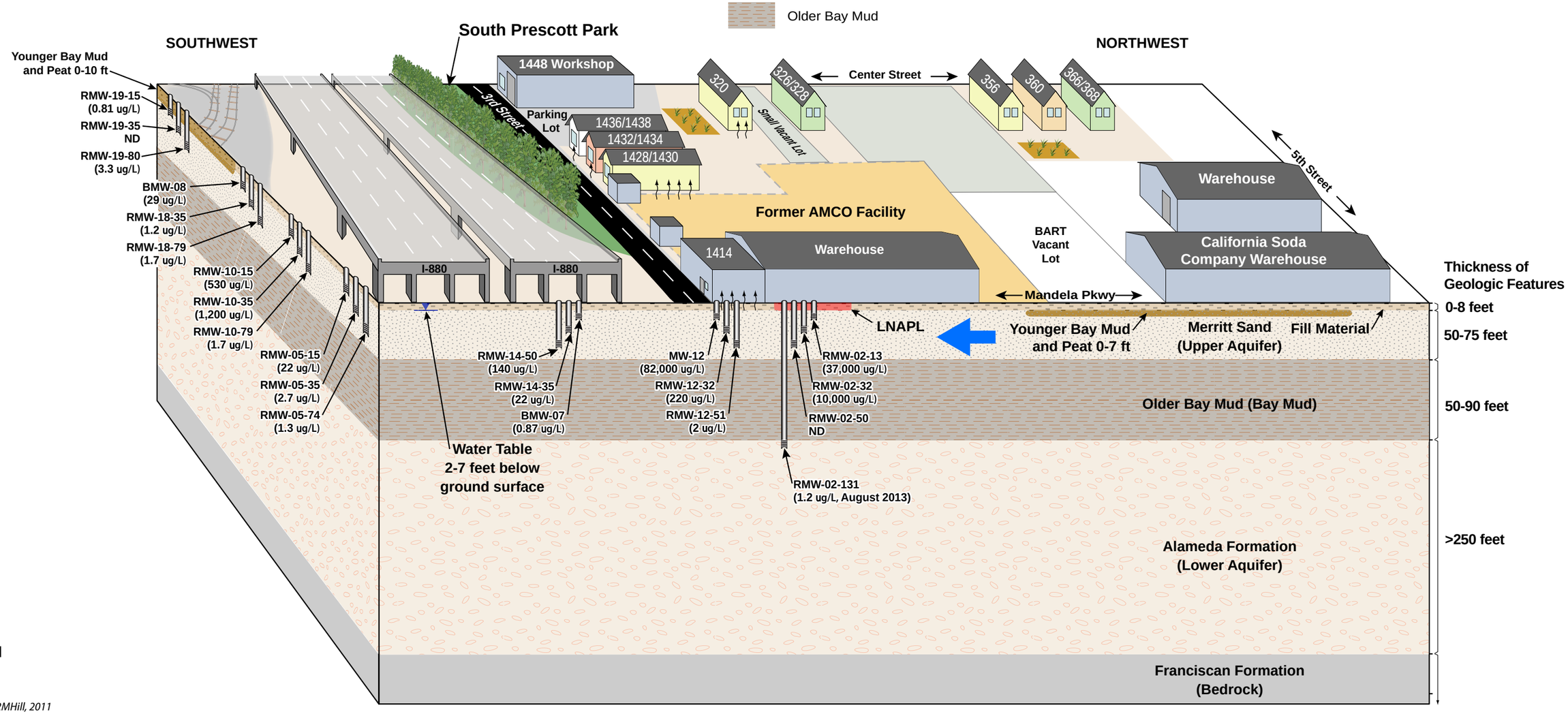
FIGURE 1-4
Transformation Pathways for
Select Chlorinated Volatile Organic Compounds

NOTES:

1. Not to scale.
2. San Francsico Bay is located approximately 1.65 miles west of the Site. Oakland Inner Harbor is located approximately 0.6 miles south of the Site.
3. Groundwater VOC concentrations are from the February 2012 groundwater monitoring event.
4. Groundwater monitoring wells and location of NAPL are projected onto the site cross-section from actual locations.
5. Typical range of concrete thickness on the yard portion of the former AMCO facility is 12 to 48 inches.

LEGEND:

- Former Facility (mostly concrete pavement)
- Residential Property
- Concrete
- Fill Material
- Younger Bay Mud and Peat
- Merritt Sand
- Older Bay Mud
- Alameda Formation
- Franciscan Formation
- Groundwater Table
- Groundwater Flow Direction
- Produce
- Commercial Building
- Shallow, Intermediate, and Deep-Interval Groundwater Monitoring Well
- RMW-02-13 — Groundwater Monitoring Well Identification
- (39,014.7) — Total volatile organic compound (VOC) concentration in micrograms per liter (ug/L) (February 2012)
- Light Non-Aqueous Phase Liquid (LNAPL)
- Potential Vapor Intrusion



Revised from CH2MHill, 2011

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FIGURE 1-5
Conceptual Site Geologic Model

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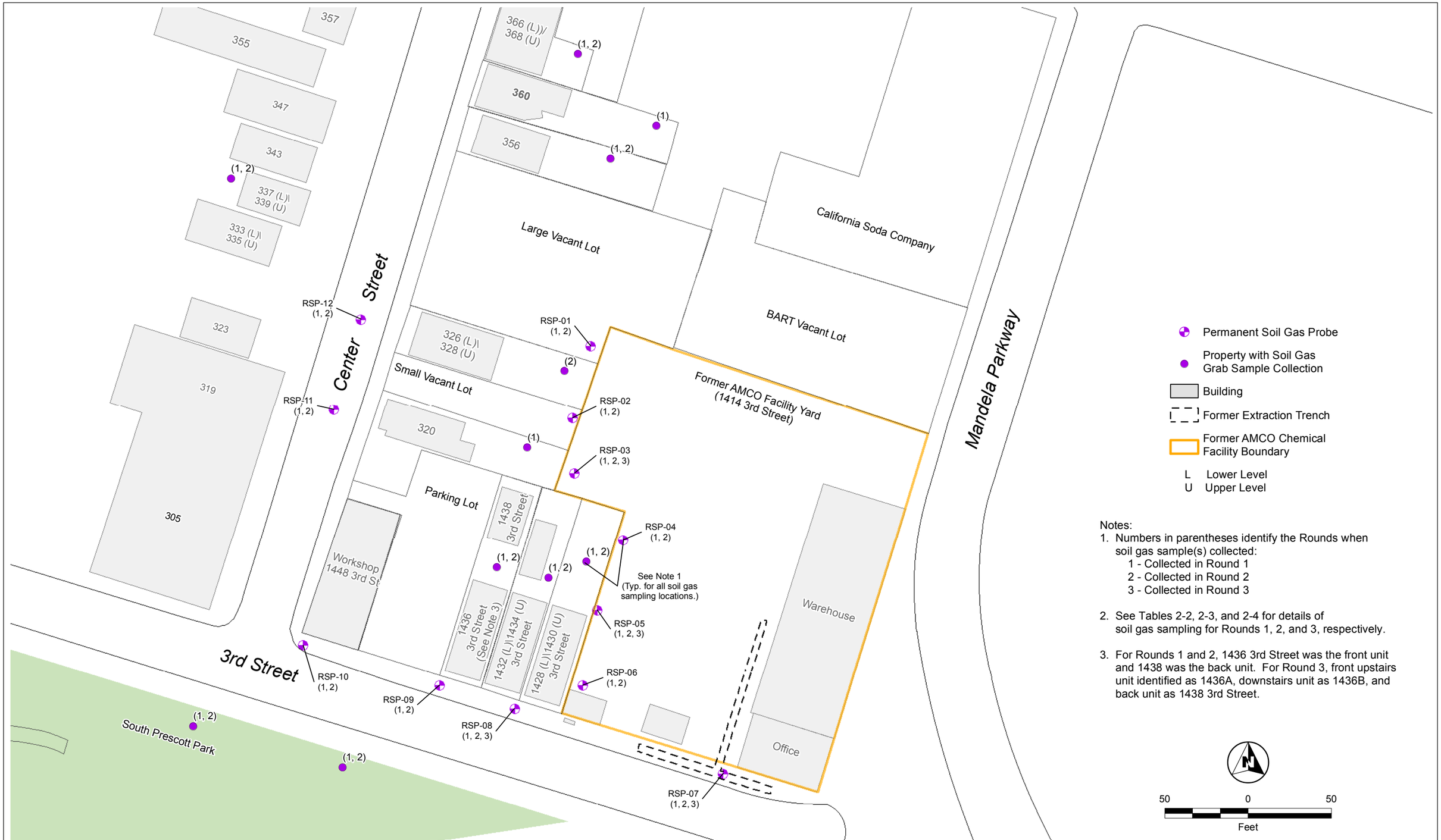

Notes:

1. Numbers in parentheses identify the Rounds when soil gas sample(s) collected:
   1 - Collected in Round 1
   2 - Collected in Round 2
   3 - Collected in Round 3
2. See Tables 2-2, 2-3, and 2-4 for details of soil gas sampling for Rounds 1, 2, and 3, respectively.
3. For Rounds 1 and 2, 1436 3rd Street was the front unit and 1438 was the back unit. For Round 3, front upstairs unit identified as 1436A, downstairs unit as 1436B, and back unit as 1438 3rd Street.

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FIGURE 2-1
Soil Gas Sampling Locations

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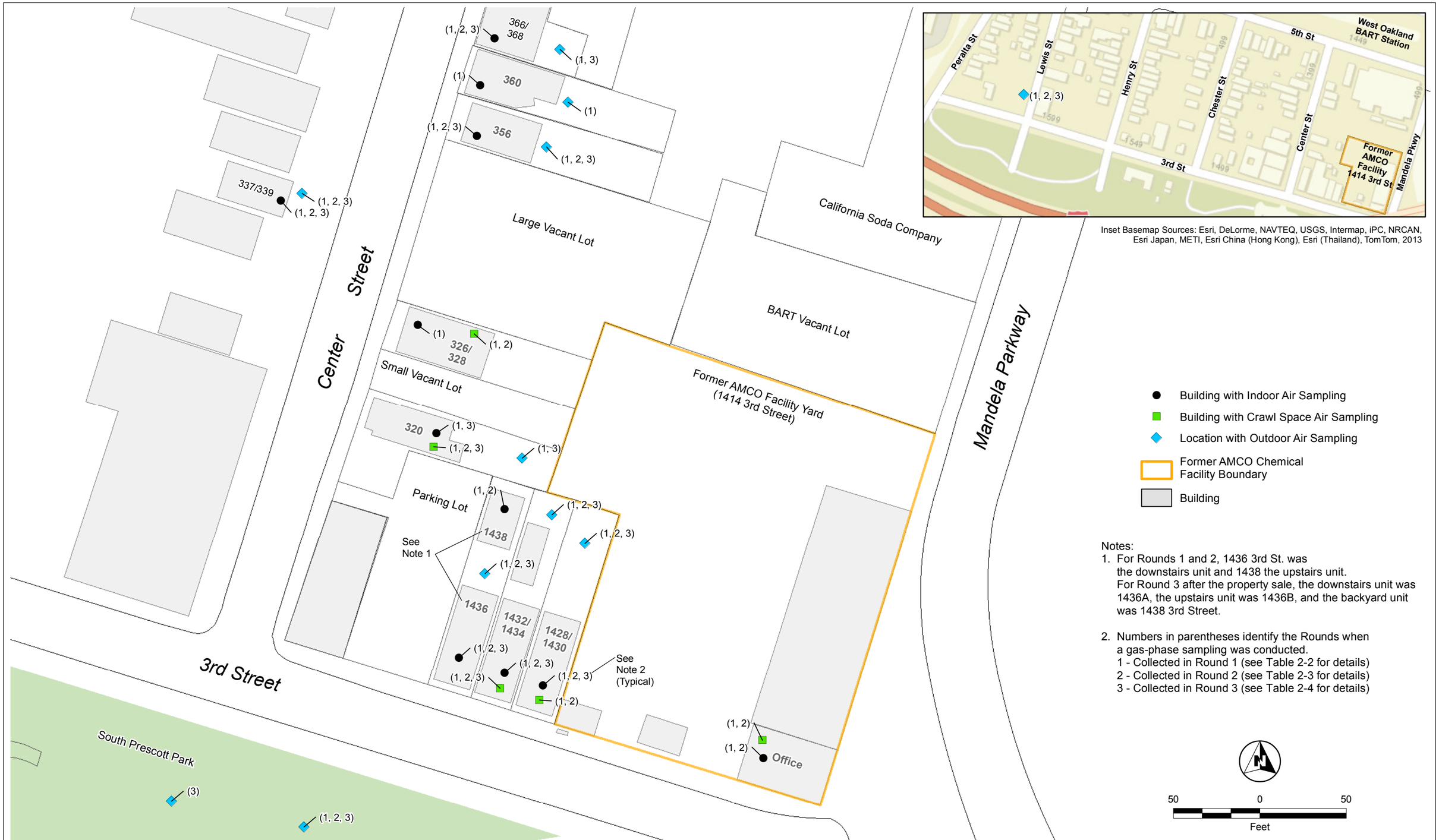

Inset Basemap Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013

Notes:

1. For Rounds 1 and 2, 1436 3rd St. was the downstairs unit and 1438 the upstairs unit. For Round 3 after the property sale, the downstairs unit was 1436A, the upstairs unit was 1436B, and the backyard unit was 1438 3rd Street.

2. Numbers in parentheses identify the Rounds when a gas-phase sampling was conducted.
   1 - Collected in Round 1 (see Table 2-2 for details)
   2 - Collected in Round 2 (see Table 2-3 for details)
   3 - Collected in Round 3 (see Table 2-4 for details)

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FIGURE 2-2
Indoor, Outdoor, Crawl Space, and
Background Ambient Air Sampling Locations

G:\ArcGIS\EPA\AMCO_Chemical\PROJECTS\Indoor_Air\Sample_Locs_Map.mxd 8/12/2014 [13:35 PM] EANDERSON, ITSI

Note:

Only groundwater monitoring wells installed at the time of the CPT-MIP investigation shown on figure.

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FIGURE 2-3
CPT-MIP Boring Locations

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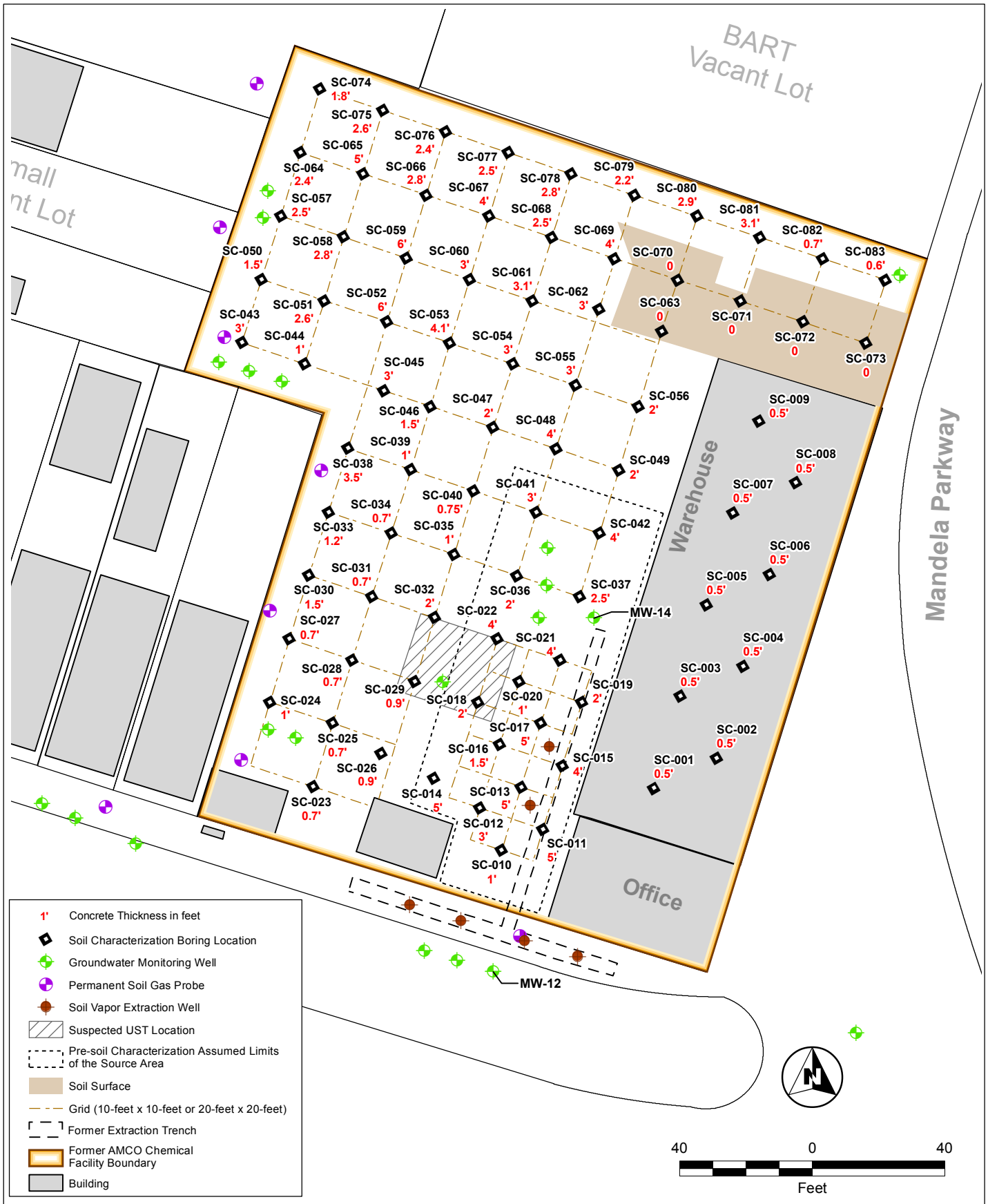

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FIGURE 2-4
Soil Characterization Sampling Grid and Concrete Thickness at Former AMCO Facility and Warehouse Building

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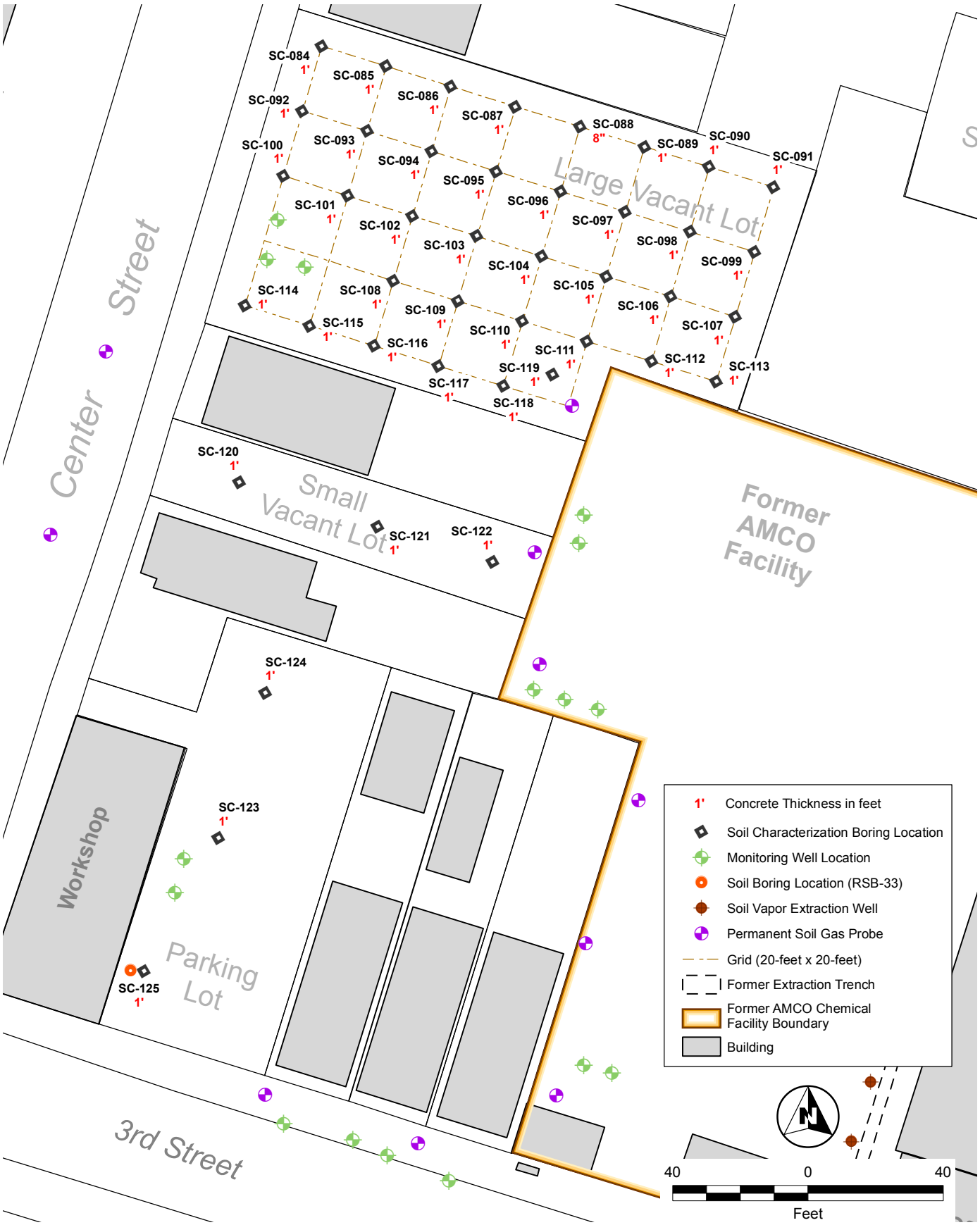

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FIGURE 2-5
Soil Characterization Sampling Grid and Concrete Thickness at the Large Vacant Lot, Small Vacant Lot, and Parking Lot

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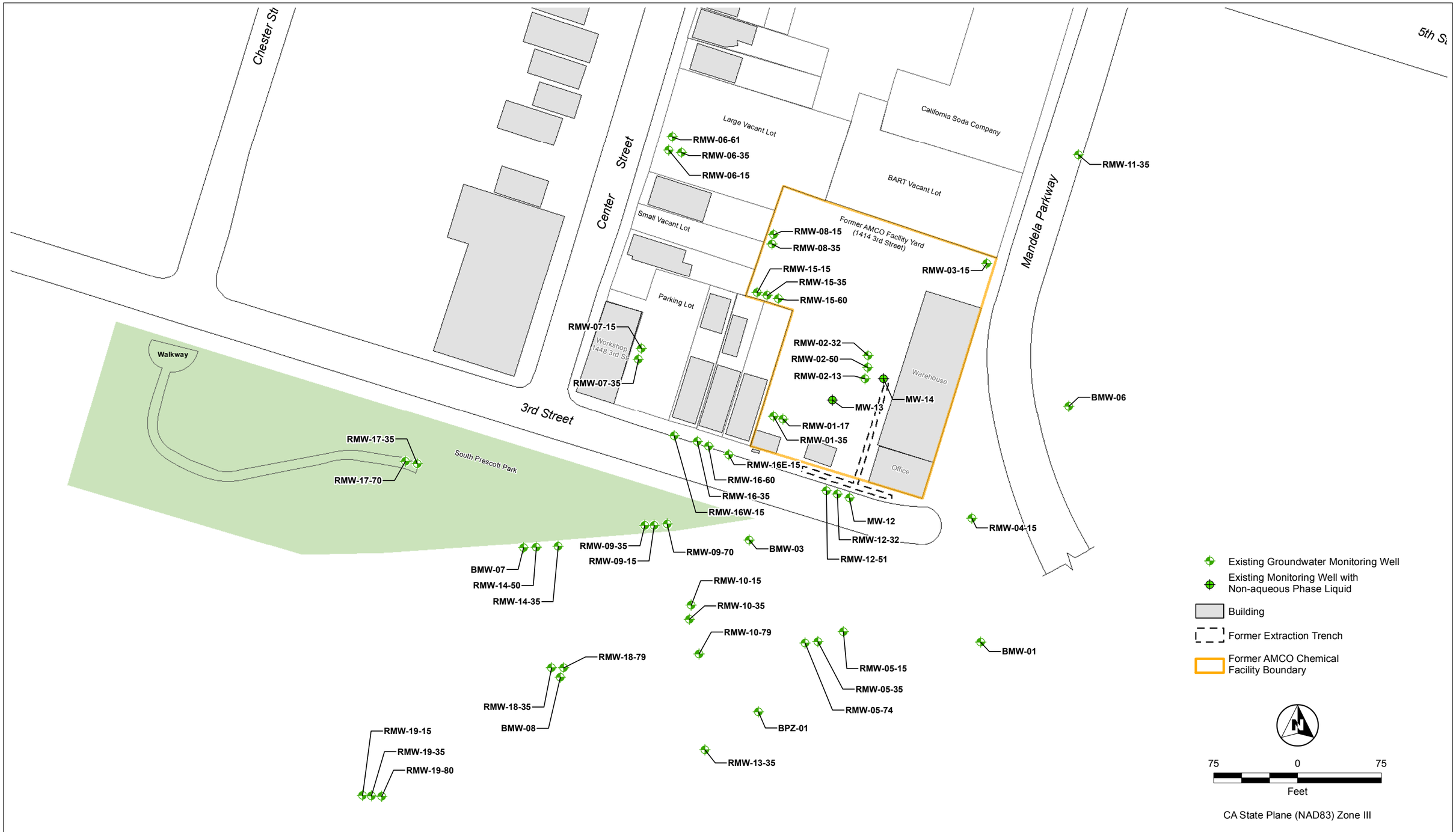

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FIGURE 2-6
Locations of Upper Aquifer Groundwater Monitoring Wells

G:\ArcGIS\EPA\AMCO_Chemical\PROJECTS\GW\Upper_Aquifer_Wells.mxd 8/12/2014 [14:02 PM] EANDERSON, ITSI

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FIGURE 2-7
Lower Aquifer
Groundwater Monitoring Well Location

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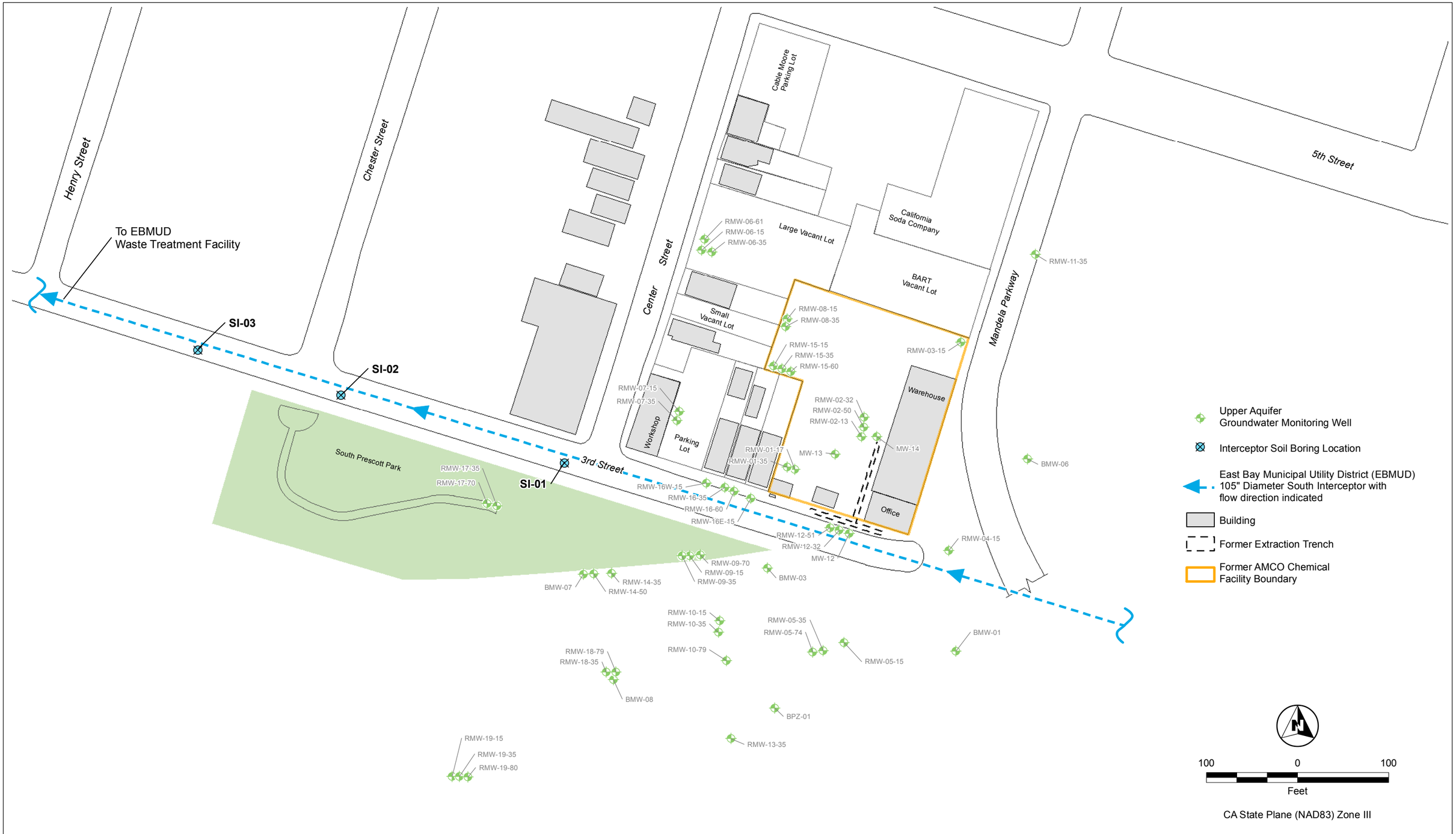

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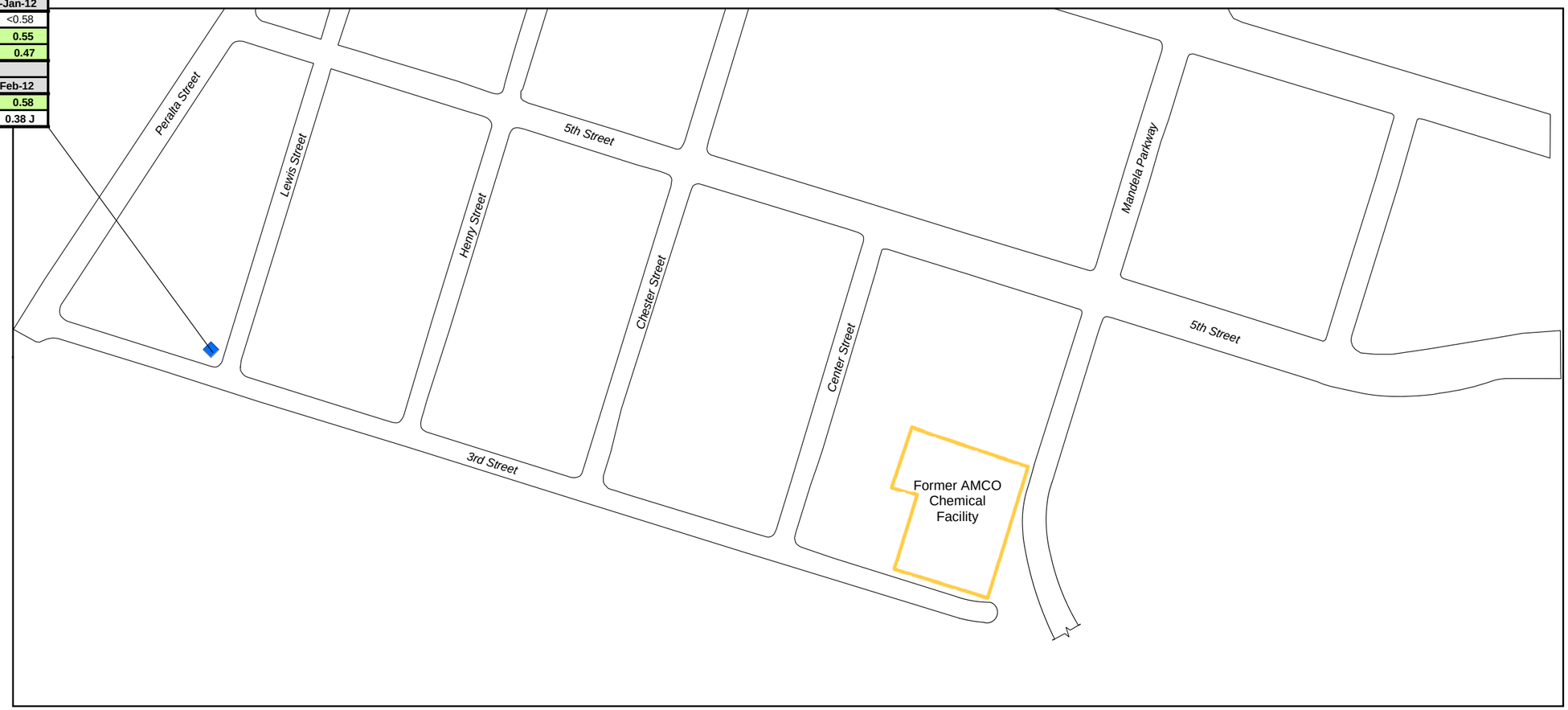
FIGURE 2-8
3rd Street Sewer Interceptor
Preferential Pathway Investigation Locations

G:\ArcGIS\EPA\AMCO_Chemical\PROJECTS\GW\EBMUD_Interceptor_SB.mxd 8/12/2014 [14:06 PM] EANDERSON, ITSI

Ambient Air	LEWIS-BGA01		
Sample Date	23-Jun-09	29-Sep-10	31-Jan-12
14-Dxn	<0.57	0.7	<0.58
BEN	0.31	0.47	0.55
CCl4	0.51	0.48	0.47
Ambient Air	LEWIS-BGA02		
Sample Date	24-Jun-09	30-Sep-10	1-Feb-12
BEN	<0.30	0.38	0.58
CCl4	0.47	0.53 J	0.38 J
Ambient Air	LEWIS-BGA03		
Sample Date	2-Feb-12		
BEN	0.92		
Ambient Air	LEWIS-BGA04		
Sample Date	3-Feb-12		
BEN	1.1		
CCl4	0.50		
Ambient Air	LEWIS-BGA05		
Sample Date	7-Feb-12		
BEN	0.85 J		
CCl4	0.48 J		



Volatile Organic Compound (VOC)		Residential Air Screening Level (ug/m^3)
BEN	Benzene	0.31
CCl4	Carbon Tetrachloride	0.41
14-Dxn	1,4-Dioxane	0.32

1. See Tables 2-2, 2-3, and 2-4 for details of the 2009 (Round 1), 2010 (Round 2), and 2012 (Round 3) gas-phase sampling events, respectively.
2. Screening levels for residential air are listed in Table 3-1.
3. Gas-phase samples analyzed by EPA Methods TO-15 and TO-15 SIM (Selective Ion Monitoring).

Background (ambient) Air Sampling Location

VOC concentration above the screening level and consistent with the concentration in ambient air.

All gas-phase concentrations in micrograms per cubic meter (ug/m^3)
J - estimated
< # - Not detected at listed reporting limit

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FIGURE 3-1
Concentrations Above Screening Levels in Background (Ambient) Air Samples Collected at Lewis Street

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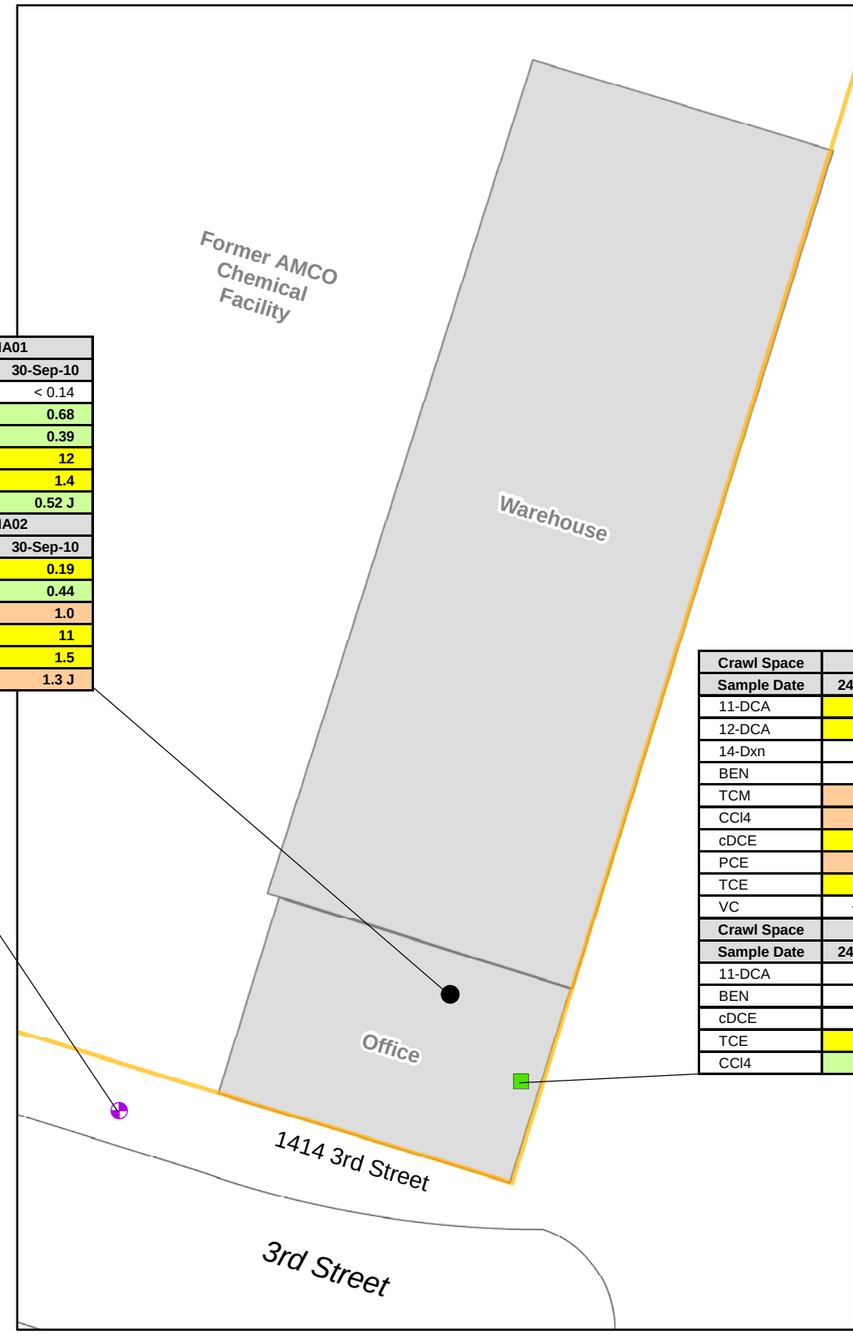
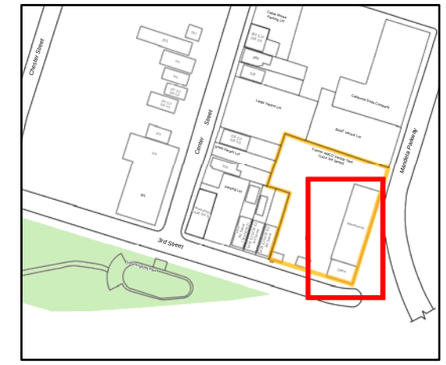


Indoor Air	CMI-IA01	
Sample Date	24-Jun-09	30-Sep-10
12-DCA	0.14 J	< 0.14
14-Dxn	< 0.80	0.68
BEN	0.36	0.39
cDCE	1.2	12
TCE	0.25	1.4
CCl4	0.36	0.52 J
Indoor Air	**CMI-IA02**	
Sample Date	**24-Jun-09**	**30-Sep-10**
12-DCA	0.12 J	0.19
BEN	0.33	0.44
TCM	< 0.89	1.0
cDCE	2.0	11
TCE	0.36	1.5
CCl4	0.37	1.3 J

Soil Gas	PSG07		
Sample Date	24-Jun-09	4-Oct-10	6-Feb-12
11-DCA	2,000	1,200	160
TCM	39 J	< 60	< 15
cDCE	38,000	14,000	1,400
PCE	10,000	3,600	480
tDCE	820	410	44
TCE	11,000	4,500	480

Crawl Space	CMI-CA01	
Sample Date	24-Jun-09	30-Sep-10
11-DCA	24	30
12-DCA	0.13 J	< 0.28
14-Dxn	< 0.67	1.6
BEN	0.30	0.55 J
TCM	0.52 J	< 1.7
CCl4	0.84	0.52 J
cDCE	260	270
PCE	14	11
TCE	28	14
VC	< 0.048	0.26
Crawl Space	**CMI-CA02**	
Sample Date	**24-Jun-09**	**30-Sep-10**
11-DCA	0.97	2.1
BEN	0.31	0.62
cDCE	7.1	15
TCE	2.0	2.2
CCl4	0.53	0.48 J

Volatile Organic Compound (VOC)		Residential Air Screening Level (ug/m^3)
BEN	Benzene	0.31
CCl4	Carbon Tetrachloride	0.41
11-DCA	1,1-Dichloroethane	1.5
12-DCA	1,2-Dichloroethane	0.094
cDCE	cis-1,2-Dichloroethene	7.3
tDCE	trans-1,2-Dichloroethene	63
14-Dxn	1,4-Dioxane	0.32
PCE	Tetrachloroethene	9.4
TCE	Trichloroethene	0.43
TCM	Trichloromethane	0.11
VC	Vinyl Chloride	0.16



- Indoor Air Sampling Location
- Crawl Space Air Sampling Location
- Permanent Soil Gas Probe
- Former AMCO Chemical Facility Boundary
- VOC concentration above the screening level and not present in background (ambient) air.
- VOC concentration above the screening level and above the concentration in background (ambient) air.
- VOC concentration above the screening level and consistent with the concentration in ambient air.

All gas-phase concentrations in micrograms per cubic meter (ug/m^3)
J - estimated
<# - Not detected at listed reporting limit

1. See Tables 2-2, 2-3, and 2-4 for details of the 2009 (Round 1), 2010 (Round 2), and 2012 (Round 3) gas-phase sampling events, respectively.
2. Screening levels for residential air are listed in Table 3-1.
3. Gas-phase samples analyzed by EPA Methods TO-15 and TO-15 SIM (Selective Ion Monitoring).

25 0 25
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FIGURE 3-2
Concentrations Above Screening Levels in Gas-Phase Samples Collected at 1414 3rd Street

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Soil Gas	1428-SG01	
Sample Date	24-Jun-09	29-Sep-10
11-DCA	7.4	12
14-Dxn	< 0.60	0.93
BEN	0.77	0.92
TCM	23	6.9
PCE	22	60
TCE	36	91

Soil Gas	PSG04	
Sample Date	24-Jun-09	1-Oct-10
11-DCA	0.053 J	70
BEN	0.34	18
cDCE	0.14 J	18
EBZ	0.21	1.0
TCE	0.35	3.4
VC	< 0.048	22

Soil Gas	1428-SG02	
Sample Date	24-Jun-09	29-Sep-10
BEN	0.44	2.4
TCM	48	1.1
PCE	5.0	50

Outdoor Air	1428-OA01		
Sample Date	24-Jun-09	29-Sep-10	31-Jan-12
12-DCA	0.21	< 0.14	< 0.13
BEN	0.31	0.43	0.56
NAPH	0.76 J	< 4.7	< 4.3
CCl4	0.62	0.44 J	0.49

Soil Gas	PSG05		
Sample Date	24-Jun-09	1-Oct-10	06-Feb-12
11-DCA	32	68	15 J
BEN	1.3 J	< 18	< 5.2
TCM	20 J	35	< 16
cDCE	170	230	54 J
PCE	6,200	10,000	3,700 J
tDCE	77	110	30 J
TCE	5,700	9,000	2,800

Crawl Space	1428-CA02
Sample Date	24-Jun-09
14-DCB	0.35 J
TCM	0.38 J

Indoor Air	1428-IA01		
Sample Date	24-Jun-09	29-Sep-10	31-Jan-12
12-DCA	0.36	0.14	0.70
14-DCB	0.17 J	16	< 1.1
14-Dxn	< 0.62	3.8 J	< 0.66
BEN	1.0	2.1 J	< 0.29
TCM	2.4	< 0.83	1.2 J
CCl4	0.40	0.47 J	0.32 J

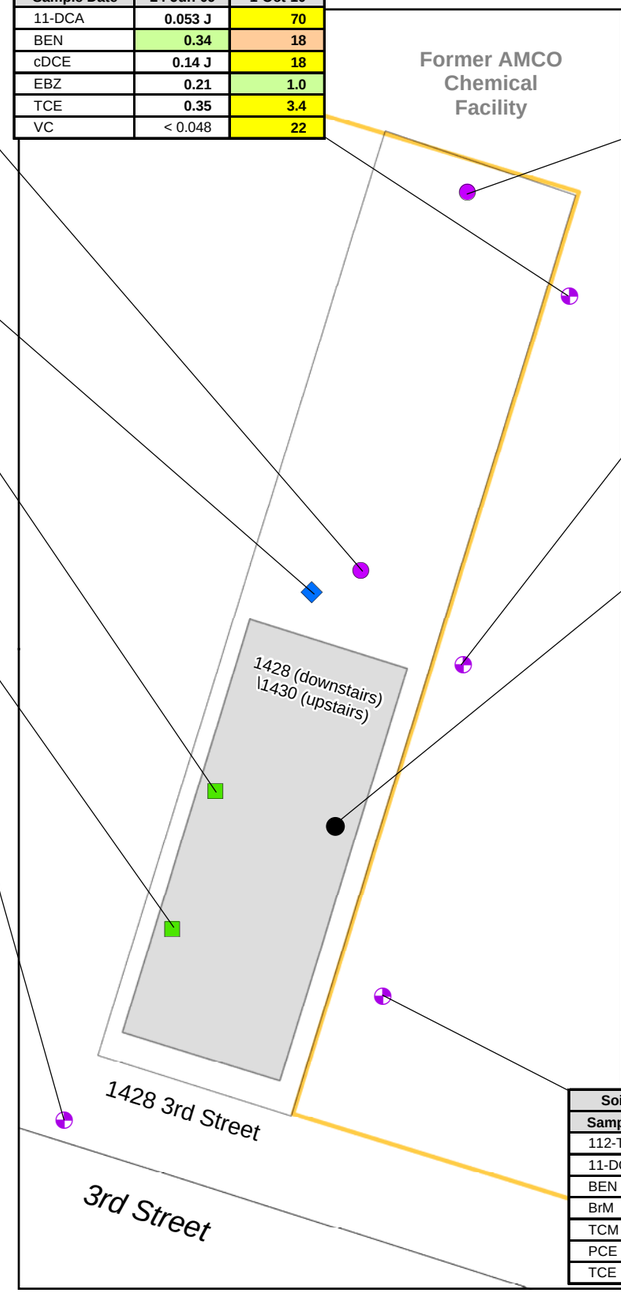
Crawl Space	1428-CA01	
Sample Date	24-Jun-09	30-Sep-10
124-TMB	57	< 0.86
14-Dxn	< 29	8.0
BEN	< 13	0.51
EBZ	4.0 J	0.16
TCE	2.9 J	< 0.19
CCl4	< 10	0.56 J

Indoor Air	1428-IA03		
Sample Date	24-Jun-09	29-Sep-10	31-Jan-12
12-DCA	0.14	0.18	0.80
14-DCB	< 0.62	20	1.1
BEN	0.65	0.55	1.0
TCM	1.2	< 0.85	1.3
EBZ	3.2	0.44	0.74
PCE	58	3.2	26
CCl4	0.52	0.50 J	0.41

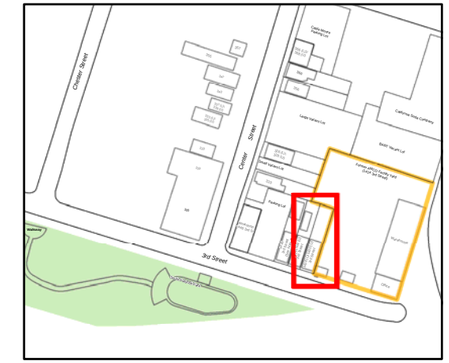
Indoor Air	1428-IA04		
Sample Date	24-Jun-09	29-Sep-10	31-Jan-12
12-DCA	0.37	< 0.14	1.4
14-DCB	0.34 J	27	< 0.94
BEN	0.72	0.55	1.0
TCM	2.4	< 0.82	1.7
EBZ	1.0	0.40	0.61
NAPH	0.79 J	< 4.4	< 4.1
CCl4	0.42	0.46 J	0.49

Indoor Air	1428-IA05	
Sample Date	24-Jun-09	31-Jan-12
12-DCA	0.38	0.93
BEN	0.78	0.93
TCM	2.7	1.6
CCl4	0.42	0.47

Soil Gas	PSG08		
Sample Date	24-Jun-09	4-Oct-10	06-Feb-12
BEN	0.49	< 0.28	< 0.26
TCM	34	4.2	8.2



Soil Gas	PSG06	
Sample Date	24-Jun-09	1-Oct-10
112-TCA	0.23 J	< 2.5
11-DCA	63	67
BEN	1.2 J	< 3.7
BrM	< 4.5 UJ	9.1 J
TCM	66	34
PCE	23	28
TCE	160	180



- Outdoor Air Sampling Location
- Indoor Air Sampling Location
- Crawl Space Air Sampling Location
- Soil Gas Sampling Location
- Permanent Soil Gas Probe
- Former AMCO Chemical Facility Boundary
- VOC concentration above the screening level and not present in background (ambient) air.
- VOC concentration above the screening level and above the concentration in background (ambient) air.
- VOC concentration above the screening level and consistent with the concentration in ambient air.

All gas-phase concentrations in micrograms per cubic meter (ug/m^3)
J - estimated
<# - Not detected at listed reporting limit
UJ - Not detected at estimated reporting limit

Volatile Organic Compound (VOC)		Residential Air Screening Level (ug/m^3)
BEN	Benzene	0.31
BrM	Bromomethane	5.2
CCl4	Carbon Tetrachloride	0.41
14-DCB	1,4-Dichlorobenzene	0.22
11-DCA	1,1-Dichloroethane	1.5
12-DCA	1,2-Dichloroethane	0.094
cDCE	cis-1,2-Dichloroethene	7.3
tDCE	trans-1,2-Dichloroethene	63
14-Dxn	1,4-Dioxane	0.32
EBZ	Ethylbenzene	0.97
NAPH	Naphthalene	0.072
PCE	Tetrachloroethene	9.4
112-TCA	1,1,2-Trichloroethane	0.15
TCE	Trichloroethene	0.43
TCM	Trichloromethane	0.11
124-TMB	1,2,4-Trimethylbenzene	7.3
VC	Vinyl Chloride	0.16

1. See Tables 2-2, 2-3, and 2-4 for details of the 2009 (Round 1), 2010 (Round 2), and 2012 (Round 3) gas-phase sampling events, respectively.
2. Screening levels for residential air are listed in Table 3-1.
3. Gas-phase samples analyzed by EPA Methods TO-15 and TO-15 SIM (Selective Ion Monitoring).

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FIGURE 3-3
Concentrations Above Screening Levels in Gas-Phase Samples Collected at 1428 3rd Street

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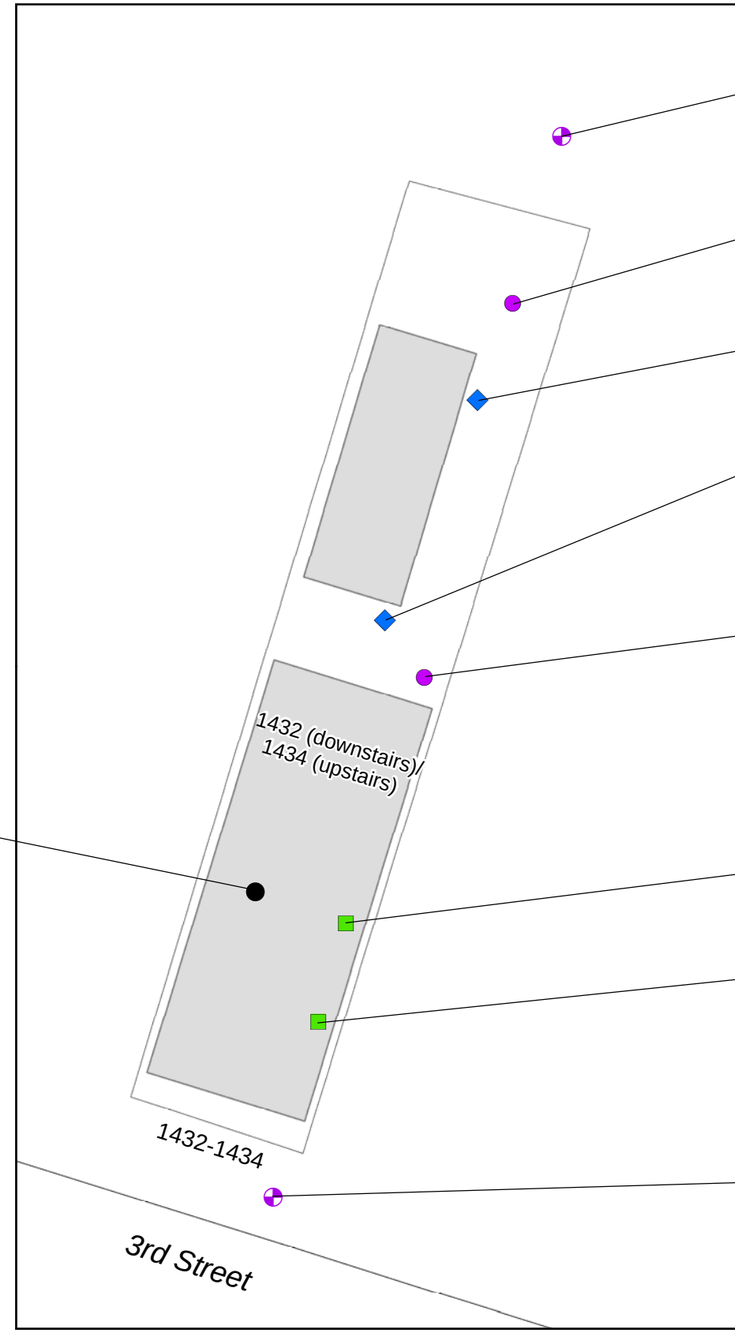
Indoor Air	1434-IA01 (Upstairs Unit)		
Sample Date	25-Jun-09	29-Sep-10	31-Jan-12
12-DCA	0.11 J	0.21	0.16
BEN	< 0.28	0.63	0.59
TCM	0.21 J	< 0.87	0.88
NAPH	1.6 J	25	16 J
CCl4	0.49	0.62 J	0.51
Indoor Air	**1432-IA01 (Downstairs Unit)**		
Sample Date	**25-Jun-09**	**29-Sep-10**	**31-Jan-12**
12-DCA	0.12 J	< 0.21	< 0.14
14-DCB	2.4	6.4	2.2 J
14-Dxn	< 0.58	1.9	< 0.64
BEN	0.31	0.94	0.61
TCM	2.7	3.2	2.6
NAPH	75 J	380	14 J
CCl4	0.43	0.62 J	0.47
Indoor Air	**1432-IA03 (Downstairs Unit)**		
Sample Date	**25-Jun-09**	**29-Sep-10**	**31-Jan-12**
12-DCA	0.077 J	< 0.14	0.23
14-DCB	< 1.0	< 1.1	3.8
BEN	< 0.28	0.59	0.74
TCM	0.29 J	< 0.87	< 0.74
EBZ	0.35	1.0	0.93
NAPH	0.79 J	< 4.7	6.9 J
CCl4	0.45	0.55 J	0.37

Volatile Organic Compound (VOC)		Residential Air Screening Level (ug/m^3)
BEN	Benzene	0.31
CCl4	Carbon Tetrachloride	0.41
14-DCB	1,4-Dichlorobenzene	0.22
12-DCA	1,2-Dichloroethane	0.094
14-Dxn	1,4-Dioxane	0.32
EBZ	Ethylbenzene	0.97
NAPH	Naphthalene	0.072
TCE	Trichloroethene	0.43
TCM	Trichloromethane	0.11
VC	Vinyl Chloride	0.16



Soil Gas	PSG03		
Sample Date	24-Jun-09	01-Oct-10	06-Feb-12
TCM	3.0	10	1.7 J

Soil Gas	1432-SG02
Sample Date	28-Sep-10
BEN	1.0
EBZ	13
TCE	1.8

Outdoor Air	1432-OA02		
Sample Date	25-Jun-09	29-Sep-10	31-Jan-12
BEN	< 0.26	0.47	0.47
CCl4	0.42	0.46 J	0.49

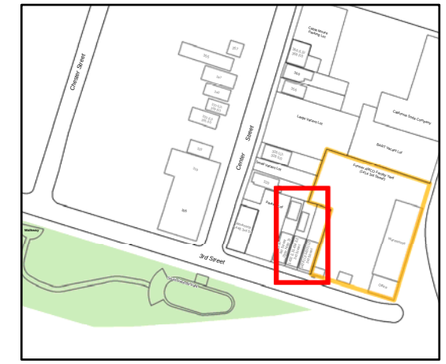
Outdoor Air	1432-OA01		
Sample Date	25-Jun-09	29-Sep-10	31-Jan-12
BEN	0.34	0.52	0.61
CCl4	0.43	0.48 J	0.47

Soil Gas	1432-SG01	
Sample Date	24-Jun-09	28-Sep-10
BEN	0.49	5.2
TCM	280	3.8
EBZ	0.44	6.2
TCE	0.31	1.3

Crawl Space	1432-CA02		
Sample Date	25-Jun-09	29-Sep-10	31-Jan-12
14-DCB	0.29 J	< 0.62	< 0.54
BEN	0.35	0.80	0.46
EBZ	0.16	1.2	0.29
TCE	0.66	< 0.18	< 0.16
VC	0.037 J	0.048	0.21
CCl4	0.43	< 0.48	0.51

Crawl Space	1432-CA01		
Sample Date	25-Jun-09	29-Sep-10	31-Jan-12
BEN	0.52	0.65	0.4
CCl4	0.47	0.42 J	0.51

Soil Gas	PSG08		
Sample Date	24-Jun-09	04-Oct-10	06-Feb-12
BEN	0.49	< 0.28	< 0.26
TCM	34	4.2	8.2



- Outdoor Air Sampling Location
- Indoor Air Sampling Location
- Crawl Space Air Sampling Location
- Soil Gas Sampling Location
- Permanent Soil Gas Probe
- VOC concentration above the screening level and not present in background (ambient) air.
- VOC concentration above the screening level and above the concentration in background (ambient) air.
- VOC concentration above the screening level and consistent with the concentration in ambient air.

All gas-phase concentrations in micrograms per cubic meter (ug/m^3)
J - estimated
<# - Not detected at listed reporting limit

1. See Tables 2-2, 2-3, and 2-4 for details of the 2009 (Round 1), 2010 (Round 2), and 2012 (Round 3) gas-phase sampling events, respectively.
2. Screening levels for residential air are listed in Table 3-1.
3. Gas-phase samples analyzed by EPA Methods TO-15 and TO-15 SIM (Selective Ion Monitoring).

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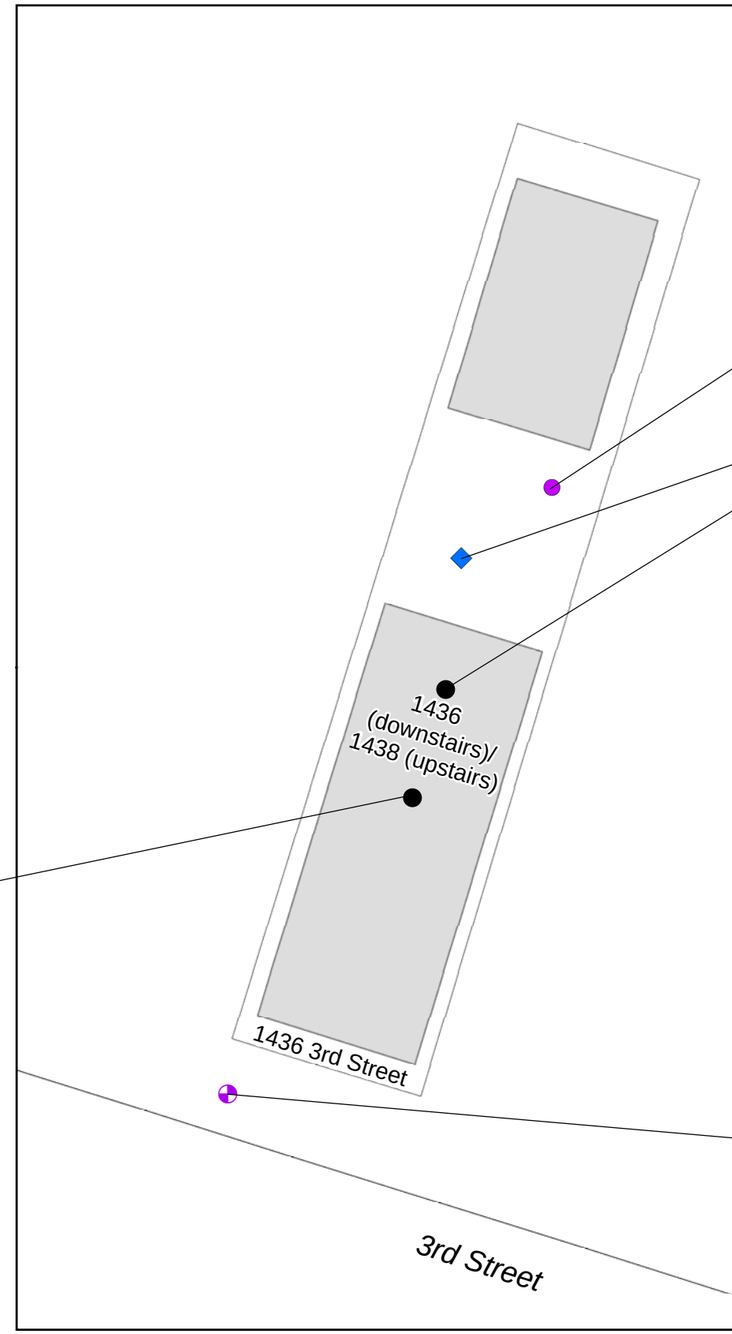
FIGURE 3-4
Concentrations Above Screening Levels in Gas-Phase Samples Collected at 1432-1434 3rd Street

Indoor Air	1436-IA01 (Downstairs)		
Sample Date	24-Jun-09	29-Sep-10	03-Feb-12
12-DCA	1.1 J	3.2	< 0.14
14-DCB	0.67 J	2.0	< 1.0
14-Dxn	0.36 J	< 0.58	< 0.63
BEN	0.50	1.4	1.2
TCM	1.6	< 0.79	< 0.85
EBZ	1.0	1.2	0.35
NAPH	1.0 J	< 4.2	< 4.6
TCE	0.91	< 0.17	< 0.19
CCl4	0.45	0.51 J	0.40 J
Indoor Air	**1436-IA03 (Downstairs)**		
Sample Date	**24-Jun-09**	**29-Sep-10**	**03-Feb-12**
12-DCA	0.38	1.5	< 0.14
14-DCB	0.75 J	1.8	< 1.0
14-Dxn	0.47 J	< 0.48	< 0.60
BEN	0.49	1.3	1.1
TCM	1.7	< 0.65	< 0.82
NAPH	1.2 J	< 3.5	< 4.4
CCl4	0.50	0.52 J	0.40 J
Indoor Air	**1436-IA04 (Downstairs)**		
Sample Date	**24-Jun-09**	**29-Sep-10**	**03-Feb-12**
12-DCA	0.34	1.1	< 0.14
14-DCB	0.58 J	2.0	< 1.0
14-Dxn	0.30 J	0.63	< 0.60
BEN	0.47	1.1	1.1
TCM	1.8	< 0.69	< 0.82
NAPH	0.76 J	< 3.7	< 4.4
CCl4	0.48	0.44 J	0.34 J
Indoor Air	**1436-IA05 (Downstairs)**		
Sample Date	**24-Jun-09**	**29-Sep-10**	**03-Feb-12**
14-DCB	2.2	28	< 1.0
BEN	0.84	< 1.3	0.98
TCM	3.0	< 3.9	< 0.83
EBZ	0.49	1.0	5.1
NAPH	0.63 J	< 21	< 4.5
CCl4	0.45	< 1.0	0.40 J

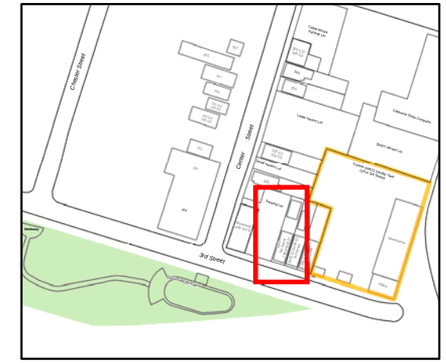


Soil Gas	1436-SG01	
Sample Date	24-Jun-09	28-Sep-10
14-Dxn	< 0.50	1.4
BEN	0.61	1.1
TCM	7.6	2.4

Outdoor Air	1436-OA01		
Sample Date	24-Jun-09	29-Sep-10	03-Feb-12
BEN	0.66	0.55	0.94
CCl4	0.46 J	0.47 J	0.40 J

Indoor Air	1438-IA01 (Upstairs)	
Sample Date	24-Jun-09	29-Sep-10
12-DCA	0.15	< 0.14
BEN	0.36	0.59 J
CCl4	0.37	0.56 J
Indoor Air	**1438-IA02 (Upstairs)**	
Sample Date	**24-Jun-09**	
12-DCA	0.20	
BEN	0.40	
TCM	0.48 J	
Indoor Air	**1438-IA03 (Upstairs)**	
Sample Date	**24-Jun-09**	**29-Sep-10**
12-DCA	0.25	< 0.14
BEN	0.48	0.72
TCM	0.43 J	< 0.82
CCl4	0.37	0.72
Indoor Air	**1438-IA04 (Upstairs)**	
Sample Date	**24-Jun-09**	**29-Sep-10**
12-DCA	0.23	0.14
14-Dxn	< 0.60	1.6
BEN	0.40	0.69
TCM	0.41 J	< 0.85
CCl4	0.39	0.49 J

Soil Gas	PSG09	
Sample Date	24-Jun-09	04-Oct-10
14-DCB	0.23 J	< 1.0
14-Dxn	0.38 J	< 0.61
BEN	0.69	< 0.27
TCM	0.26 J	< 0.83
NAPH	2.6 J	< 4.4
PCE	11	15
1122-TCA	0.15 J	< 0.23



- Outdoor Air Sampling Location
- Indoor Air Sampling Location
- Soil Gas Sampling Location
- Permanent Soil Gas Probe
- VOC concentration above the screening level and not present in background (ambient) air.
- VOC concentration above the screening level and above the concentration in background (ambient) air.
- VOC concentration above the screening level and consistent with the concentration in ambient air.

All gas-phase concentrations in micrograms per cubic meter (ug/m^3)
J - estimated
<# - Not detected at listed reporting limit

1. See Tables 2-2, 2-3, and 2-4 for details of the 2009 (Round 1), 2010 (Round 2), and 2012 (Round 3) gas-phase sampling events, respectively.
2. Screening levels for residential air are listed in Table 3-1.
3. Gas-phase samples analyzed by EPA Methods TO-15 and TO-15 SIM (Selective Ion Monitoring).

Volatile Organic Compound (VOC)		Residential Air Screening Level (ug/m^3)
BEN	Benzene	0.31
CCl4	Carbon Tetrachloride	0.41
14-DCB	1,4-Dichlorobenzene	0.22
12-DCA	1,2-Dichloroethane	0.094
14-Dxn	1,4-Dioxane	0.32
EBZ	Ethylbenzene	0.97
NAPH	Naphthalene	0.072
PCE	Tetrachloroethene	9.4
1122-TCA	1,1,2,2-Tetrachloroethane	0.042
TCE	Trichloroethene	0.43
TCM	Trichloromethane	0.11

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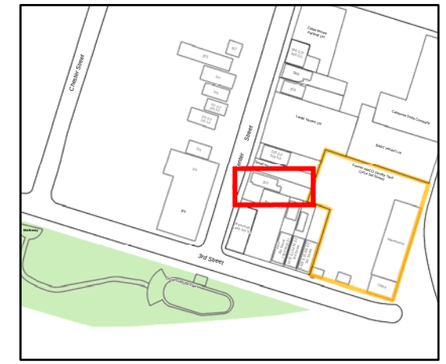
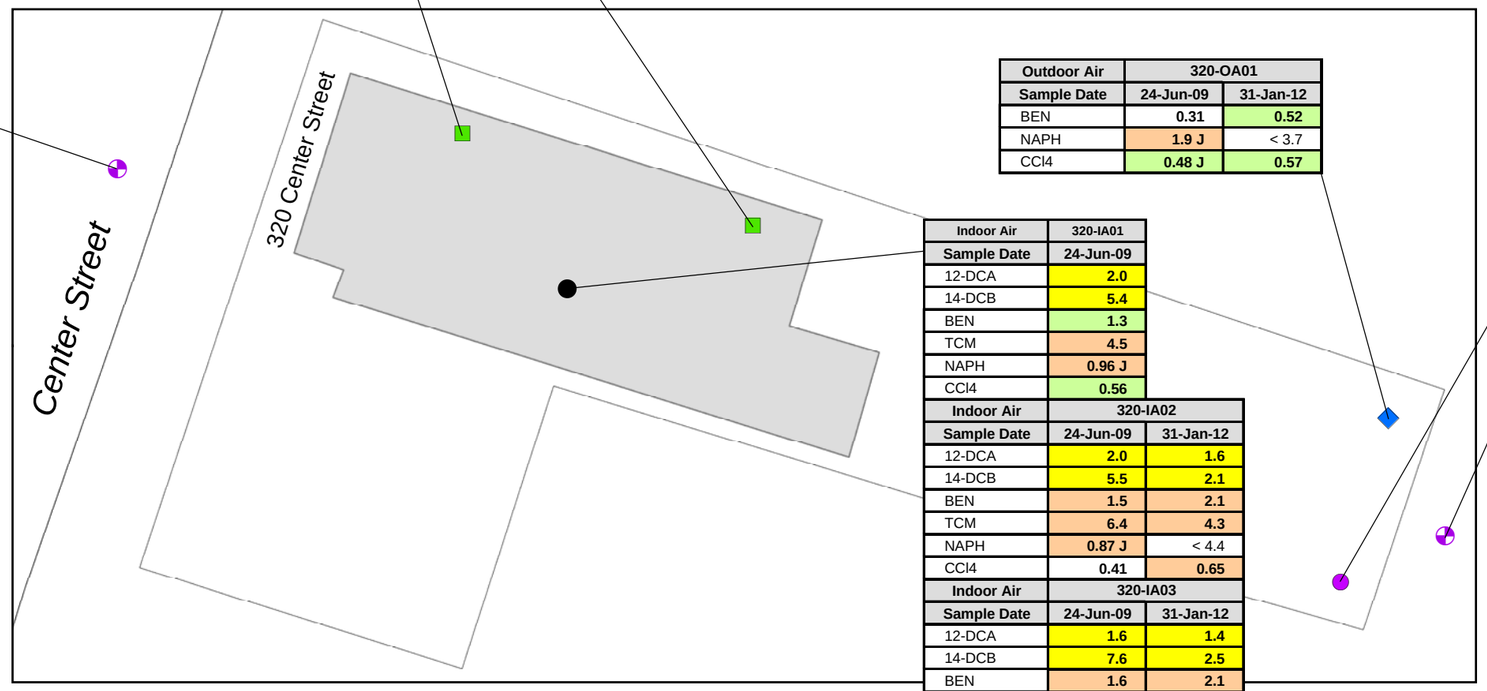
FIGURE 3-5
Concentrations Above Screening Levels in Gas-Phase Samples Collected at 1436-1438 3rd Street

Crawl Space	320-CA02		
Sample Date	24-Jun-09	30-Sep-10	31-Jan-12
12-DCA	0.31	< 0.11	< 0.13
14-DCB	0.34 J	< 0.85	< 0.95
BEN	0.54	0.80	0.56
EBZ	0.47	2.7	0.52
TCE	0.68	< 0.15	< 0.17
CCl4	0.37 J	0.51 J	0.43

Crawl Space	320-CA01		
Sample Date	24-Jun-09	30-Sep-10	31-Jan-12
12-DCA	0.26	< 0.17	< 0.13
14-DCB	0.35 J	< 1.2	< 0.97
BEN	0.66	0.89	0.57
EBZ	0.45	2.8	0.33
TCE	0.99	< 0.22	< 0.17
VC	0.021 J	< 0.053	0.25
CCl4	0.37	0.47 J	0.50



Soil Gas	PSG11	
Sample Date	24-Jun-09	4-Oct-10
11-DCA	< 0.15	3.2
cDCE	< 0.15	140
PCE	160	180
TCE	0.34	94
VC	< 0.048	0.25



Outdoor Air	320-OA01	
Sample Date	24-Jun-09	31-Jan-12
BEN	0.31	0.52
NAPH	1.9 J	< 3.7
CCl4	0.48 J	0.57

Indoor Air	320-IA01
Sample Date	24-Jun-09
12-DCA	2.0
14-DCB	5.4
BEN	1.3
TCM	4.5
NAPH	0.96 J
CCl4	0.56

Indoor Air	320-IA02	
Sample Date	24-Jun-09	31-Jan-12
12-DCA	2.0	1.6
14-DCB	5.5	2.1
BEN	1.5	2.1
TCM	6.4	4.3
NAPH	0.87 J	< 4.4
CCl4	0.41	0.65

Indoor Air	320-IA03	
Sample Date	24-Jun-09	31-Jan-12
12-DCA	1.6	1.4
14-DCB	7.6	2.5
BEN	1.6	2.1
TCM	5.4	4.9
NAPH	0.88 J	< 4.6
CCl4	0.44	0.60

Indoor Air	320-IA04	
Sample Date	24-Jun-09	31-Jan-12
12-DCA	1.9	1.6
14-DCB	5.9	2.3
BEN	1.6	2.2
TCM	4.3	4.5
NAPH	0.82 J	< 4.2
CCl4	0.38	0.62

Indoor Air	320-IA05
Sample Date	24-Jun-09
12-DCA	1.6
14-DCB	7.3
BEN	1.5
TCM	5.8
CCl4	0.43

Soil Gas	320-SG01
Sample Date	23-Jun-09
BEN	0.61
TCM	0.81

Soil Gas	PSG03		
Sample Date	24-Jun-09	1-Oct-10	6-Feb-12
TCM	3.0	10	1.7 J

Outdoor Air Sampling Location

Indoor Air Sampling Location

Crawl Space Air Sampling Location

Soil Gas Sampling Location

Permanent Soil Gas Probe

VOC concentration above the screening level and not present in background (ambient) air.

VOC concentration above the screening level and above the concentration in background (ambient) air.

VOC concentration above the screening level and consistent with the concentration in ambient air.

All gas-phase concentrations in micrograms per cubic meter (ug/m^3)
J - estimated
<# - Not detected at listed reporting limit

Volatile Organic Compound (VOC)		Residential Air Screening Level (ug/m^3)
BEN	Benzene	0.31
CCl4	Carbon Tetrachloride	0.41
14-DCB	1,4-Dichlorobenzene	0.22
11-DCA	1,1-Dichloroethane	1.5
12-DCA	1,2-Dichloroethane	0.094
cDCE	cis-1,2-Dichloroethene	7.3
EBZ	Ethylbenzene	0.97
NAPH	Naphthalene	0.072
PCE	Tetrachloroethene	9.4
TCE	Trichloroethene	0.43
TCM	Trichloromethane	0.11
VC	Vinyl Chloride	0.16

1. See Tables 2-2, 2-3, and 2-4 for details of the 2009 (Round 1), 2010 (Round 2), and 2012 (Round 3) gas-phase sampling events, respectively.
2. Screening levels for residential air are listed in Table 3-1.
3. Gas-phase samples analyzed by EPA Methods TO-15 and TO-15 SIM (Selective Ion Monitoring).

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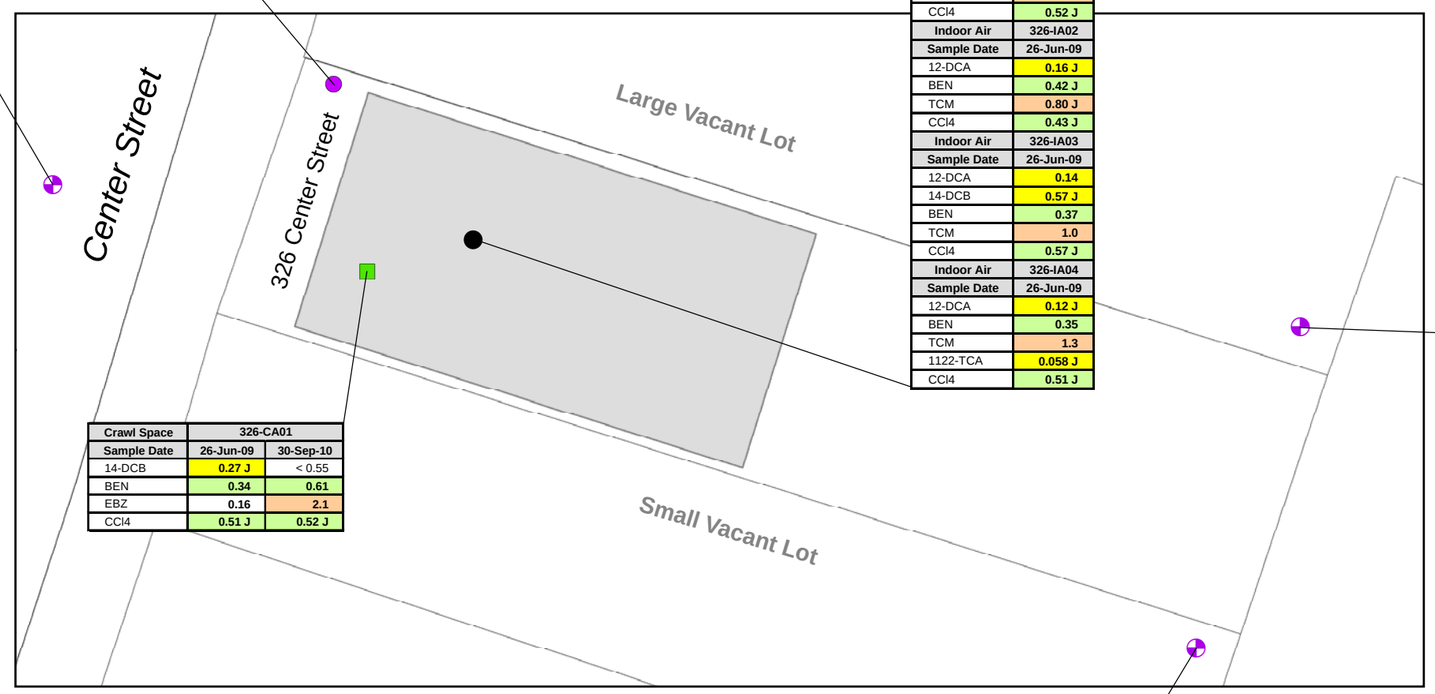
FIGURE 3-6
Concentrations Above Screening Levels in Gas-Phase Samples Collected at 320 Center Street



Soil Gas	326SG
Sample Date	29-Sep-10
11-DCA	2.7
BEN	1.9
TCM	21
PCE	730
TCE	18

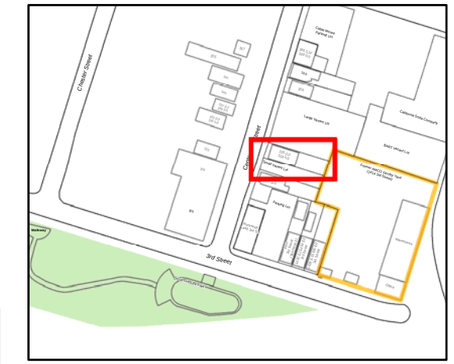
Soil Gas	PSG12	
Sample Date	24-Jun-09	4-Oct-10
14-Dxn	< 0.67	1.3
PCE	130	72

Indoor Air	326-IA01
Sample Date	26-Jun-09
12-DCA	0.14 J
14-DCB	0.26 J
BEN	0.34
TCM	0.97
CCl4	0.52 J
Indoor Air	**326-IA02**
Sample Date	**26-Jun-09**
12-DCA	0.16 J
BEN	0.42 J
TCM	0.80 J
CCl4	0.43 J
Indoor Air	**326-IA03**
Sample Date	**26-Jun-09**
12-DCA	0.14
14-DCB	0.57 J
BEN	0.37
TCM	1.0
CCl4	0.57 J
Indoor Air	**326-IA04**
Sample Date	**26-Jun-09**
12-DCA	0.12 J
BEN	0.35
TCM	1.3
1122-TCA	0.058 J
CCl4	0.51 J

Crawl Space	326-CA01	
Sample Date	26-Jun-09	30-Sep-10
14-DCB	0.27 J	< 0.55
BEN	0.34	0.61
EBZ	0.16	2.1
CCl4	0.51 J	0.52 J

Soil Gas	PSG01	
Sample Date	24-Jun-09	29-Sep-10
11-DCA	190	210
BEN	41 J	36
TCM	28 J	< 53
cDCE	33,000	31,000
PCE	16,000	16,000
tDCE	4,900	3,400
TCE	17,000	17,000
VC	640	680

Soil Gas	PSG02	
Sample Date	24-Jun-09	4-Oct-10
12-DCA	0.10 J	< 0.22
TCM	1.6	1.4
PCE	150	180
TCE	0.27	0.57



Volatile Organic Compound (VOC)		Residential Air Screening Level (ug/m^3)
BEN	Benzene	0.31
1122-TCA	1,1,2,2-Tetrachloroethane	0.042
CCl4	Carbon Tetrachloride	0.41
14-DCB	1,4-Dichlorobenzene	0.22
11-DCA	1,1-Dichloroethane	1.5
12-DCA	1,2-Dichloroethane	0.094
cDCE	cis-1,2-Dichloroethene	7.3
tDCE	trans-1,2-Dichloroethene	63
14-Dxn	1,4-Dioxane	0.32
EBZ	Ethylbenzene	0.97
PCE	Tetrachloroethene	9.4
TCE	Trichloroethene	0.43
TCM	Trichloromethane	0.11
VC	Vinyl Chloride	0.16

- Indoor Air Sampling Location
- Crawl Space Air Sampling Location
- Soil Gas Sampling Location
- Permanent Soil Gas Probe
- VOC concentration above the screening level and not present in background (ambient) air.
- VOC concentration above the screening level and above the concentration in background (ambient) air.
- VOC concentration above the screening level and consistent with the concentration in ambient air.

All gas-phase concentrations in micrograms per cubic meter (ug/m^3)
J - estimated
<# - Not detected at listed reporting limit

1. See Tables 2-2, 2-3, and 2-4 for details of the 2009 (Round 1), 2010 (Round 2), and 2012 (Round 3) gas-phase sampling events, respectively.
2. Screening levels for residential air are listed in Table 3-1.
3. Gas-phase samples analyzed by EPA Methods TO-15 and TO-15 SIM (Selective Ion Monitoring).

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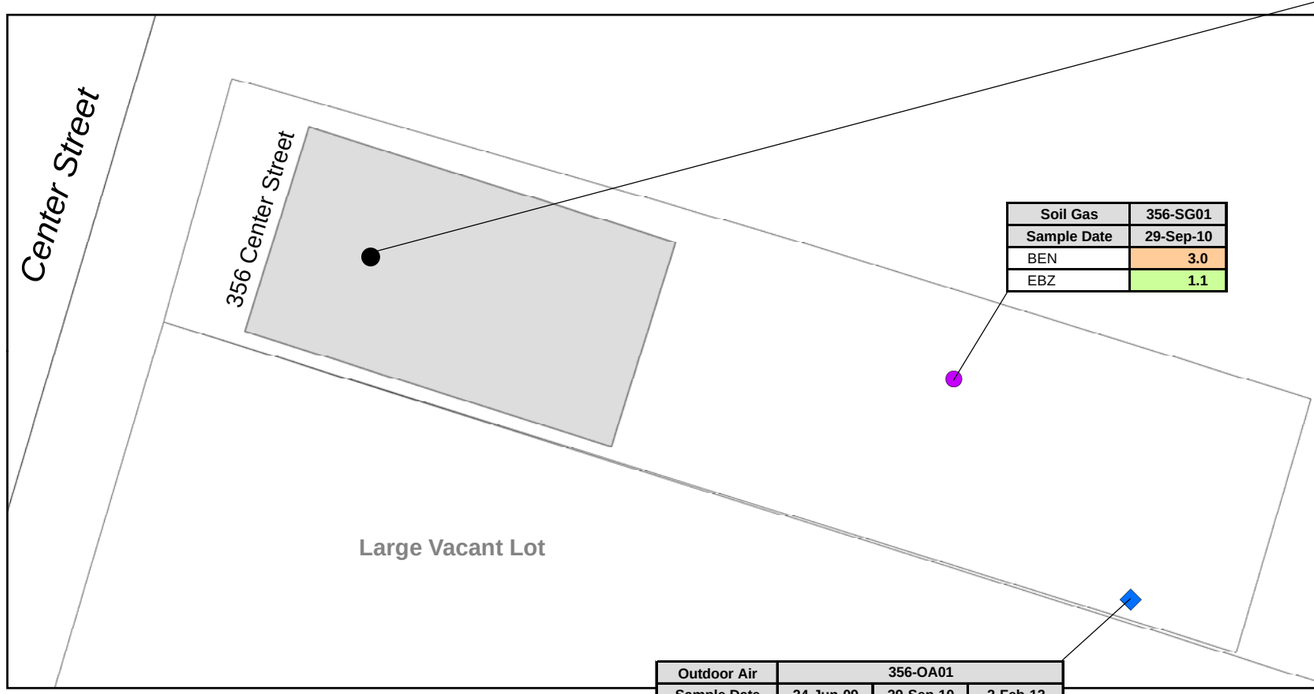
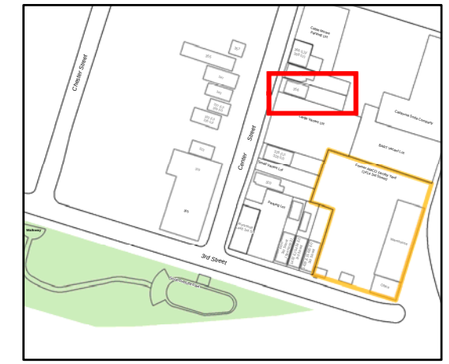
FIGURE 3-7
Concentrations Above Screening Levels in Gas-Phase Samples Collected at 326 Center Street



Soil Gas	356-SG01
Sample Date	29-Sep-10
BEN	3.0
EBZ	1.1

Outdoor Air	356-OA01		
Sample Date	24-Jun-09	29-Sep-10	2-Feb-12
14-DCB	0.62 J	< 0.86	< 0.99
14-Dxn	0.89	19	< 0.59
BEN	0.41	0.52	1.3
NAPH	1.9 J	< 3.8	< 4.3
CCl4	0.50 J	0.49 J	0.39

Indoor Air	356-IA01		
Sample Date	24-Jun-09	29-Sep-10	2-Feb-12
124-TMB	29	4.6	8.8
12-DCA	1.3	0.41	0.27
14-Dxn	< 0.76	17	< 0.56
BEN	8.6	2.6	4.9
TCM	3.1	1.7	1.4
EBZ	17	3.5	7.6
NAPH	2.9 J	< 4.0	< 4.1
CCl4	0.52 J	0.52 J	0.38 J
Indoor Air	**356-IA02**		
Sample Date	24-Jun-09	29-Sep-10	2-Feb-12
124-TMB	27	5.3	7.4
12-DCA	1.3	0.47	0.27
BEN	7.8	3.2	4.4
TCM	2.5	1.3	1.1
EBZ	15	4.4	6.7
NAPH	3.0 J	< 4.6	< 4.9
CCl4	0.55 J	0.52 J	0.44 J
Indoor Air	**356-IA03**		
Sample Date	24-Jun-09	29-Sep-10	2-Feb-12
124-TMB	26	8.4	6.0
12-DCA	1.4	0.94	0.61
14-Dxn	< 0.64	1.3	< 0.60
BEN	7.4	4.9	4.2
TCM	1.8	1.3	1.2
EBZ	15	6.0	5.6
NAPH	2.7 J	< 4.5	< 4.4
CCl4	0.53 J	0.51 J	0.49
Indoor Air	**356-IA04**		
Sample Date	24-Jun-09	29-Sep-10	2-Feb-12
124-TMB	35	5.1	8.3
12-DCA	0.32	0.59	0.27
14-Dxn	< 0.72	0.73	< 0.67
BEN	10	3.3	5.4
TCM	0.90 J	0.88	< 0.91
EBZ	21	4.2	7.5
NAPH	2.60 J	< 4.4	< 4.9
CCl4	0.53 J	0.52 J	0.44
Indoor Air	**356-IA05**		
Sample Date	24-Jun-09	29-Sep-10	2-Feb-12
124-TMB	26	23	8.2
12-DCA	0.39	0.58	0.41
14-Dxn	< 0.76	0.79	< 0.66
BEN	7.8	12	5.7
TCM	0.92 J	2.4	< 0.89
EBZ	15	19	7.4
NAPH	2.5 J	< 5.7	< 4.8
CCl4	0.51 J	0.57 J	0.49
Indoor Air	**356-IA06**		
Sample Date	24-Jun-09	29-Sep-10	2-Feb-12
124-TMB	0.49 J	< 0.84	8.9
12-DCA	1.3	0.34	0.28 J
BEN	0.91	0.91	4.0
EBZ	0.89	0.42	6.3
CCl4	0.45 J	0.50 J	0.49



Volatile Organic Compound (VOC)		Residential Air Screening Level (ug/m^3)
BEN	Benzene	0.31
CCl4	Carbon Tetrachloride	0.41
14-DCB	1,4-Dichlorobenzene	0.22
12-DCA	1,2-Dichloroethane	0.094
14-Dxn	1,4-Dioxane	0.32
EBZ	Ethylbenzene	0.97
NAPH	Naphthalene	0.072
TCM	Trichloromethane	0.11
124-TMB	1,2,4-Trimethylbenzene	7.3

1. See Tables 2-2, 2-3, and 2-4 for details of the 2009 (Round 1), 2010 (Round 2), and 2012 (Round 3) gas-phase sampling events, respectively.
2. Screening levels for residential air are listed in Table 3-1.
3. Gas-phase samples analyzed by EPA Methods TO-15 and TO-15 SIM (Selective Ion Monitoring).

- Outdoor Air Sampling Location
- Indoor Air Sampling Location
- Soil Gas Sampling Location
- VOC concentration above the screening level and not present in background (ambient) air.
- VOC concentration above the screening level and above the concentration in background (ambient) air.
- VOC concentration above the screening level and consistent with the concentration in ambient air.

All gas-phase concentrations in micrograms per cubic meter (ug/m^3)
J - estimated
<# - Not detected at listed reporting limit

15 0 15
Feet

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FIGURE 3-8
Concentrations Above Screening Levels in Gas-Phase Samples Collected at 356 Center Street

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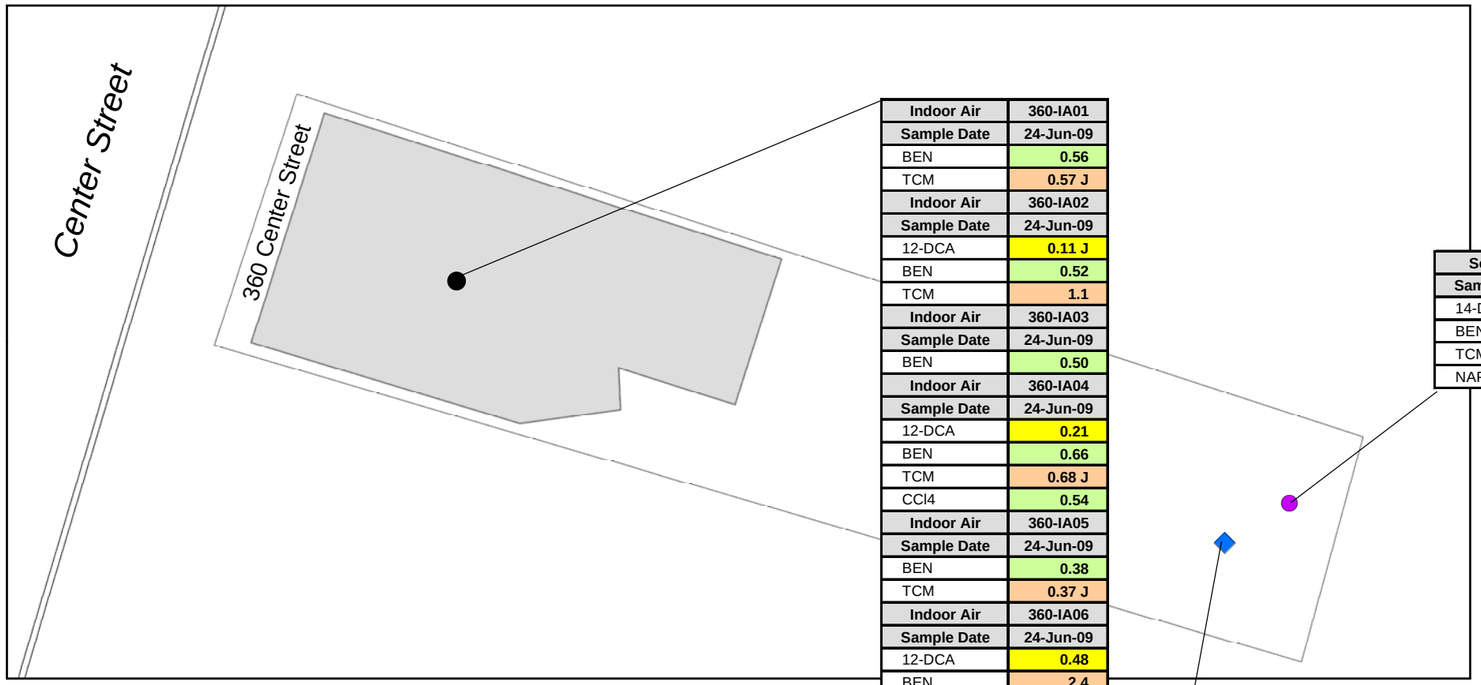

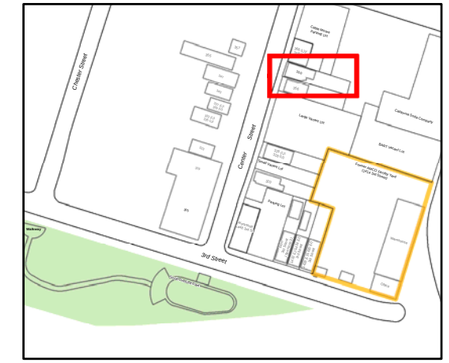

Indoor Air	360-IA01
Sample Date	24-Jun-09
BEN	0.56
TCM	0.57 J
Indoor Air	360-IA02
Sample Date	24-Jun-09
12-DCA	0.11 J
BEN	0.52
TCM	1.1
Indoor Air	360-IA03
Sample Date	24-Jun-09
BEN	0.50
Indoor Air	360-IA04
Sample Date	24-Jun-09
12-DCA	0.21
BEN	0.66
TCM	0.68 J
CCl4	0.54
Indoor Air	360-IA05
Sample Date	24-Jun-09
BEN	0.38
TCM	0.37 J
Indoor Air	360-IA06
Sample Date	24-Jun-09
12-DCA	0.48
BEN	2.4
NAPH	2.2 J
Indoor Air	360-IA07
Sample Date	24-Jun-09
BEN	0.56
TCM	0.65 J
Indoor Air	360-IA08
Sample Date	24-Jun-09
BEN	0.52
TCM	0.34 J
Indoor Air	360-IA09
Sample Date	24-Jun-09
14-DCB	0.24 J
BEN	0.51
TCM	1.4
NAPH	0.74 J

Soil Gas	360-SG01
Sample Date	23-Jun-09
14-Dxn	0.56 J
BEN	1.0
TCM	6.9
NAPH	0.97 J

Outdoor Air	360-OA01
Sample Date	24-Jun-09
12-DCA	0.15
14-Dxn	0.36 J
BEN	0.36

Outdoor Air Sampling Location

Indoor Air Sampling Location

Soil Gas Sampling Location

VOC concentration above the screening level and not present in background (ambient) air.

VOC concentration above the screening level and above the concentration in background (ambient) air.

VOC concentration above the screening level and consistent with the concentration in ambient air.

All gas-phase concentrations in micrograms per cubic meter (ug/m^3)
J - estimated
<# - Not detected at listed reporting limit

20 0 20
Feet

Volatile Organic Compound (VOC)		Residential Air Screening Level (ug/m^3)
BEN	Benzene	0.31
CCl4	Carbon Tetrachloride	0.41
14-DCB	1,4-Dichlorobenzene	0.22
12-DCA	1,2-Dichloroethane	0.094
14-Dxn	1,4-Dioxane	0.32
NAPH	Naphthalene	0.072
TCM	Trichloromethane	0.11

1. See Tables 2-2, 2-3, and 2-4 for details of the 2009 (Round 1), 2010 (Round 2), and 2012 (Round 3) gas-phase sampling events, respectively.
2. Screening levels for residential air are listed in Table 3-1.
3. Gas-phase samples analyzed by EPA Methods TO-15 and TO-15 SIM (Selective Ion Monitoring).

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FIGURE 3-9
Concentrations Above Screening Levels in Gas-Phase Samples Collected at 360 Center Street

Soil Gas	PARK-SG01	
Sample Date	25-Jun-09	30-Sep-10
BEN	0.80	3.4
TCM	14	200
EBZ	0.17	1.1
PCE	41	0.35

Soil Gas	PARK-SG02	
Sample Date	25-Jun-09	30-Sep-10
BEN	0.80	2.3
TCM	94	27
EBZ	0.11 J	1.0
PCE	3.0	11
TCE	0.31	0.50

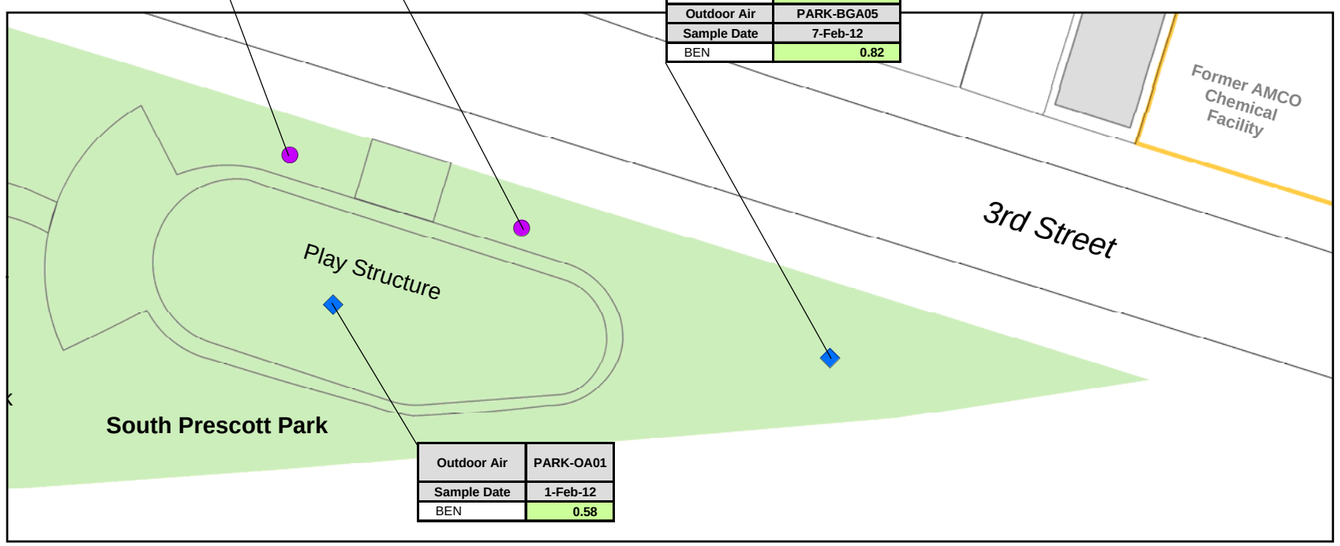
Outdoor Air	PARK-BGA01	
Sample Date	28-Sep-10	31-Jan-12
14-Dxn	0.96	< 0.55
BEN	0.59	0.52
CCl4	0.48 J	0.52

Outdoor Air	PARK-BGA02		
Sample Date	24-Jun-09	30-Sep-10	1-Feb-12
12-DCA	0.29	< 0.14	< 0.59
BEN	0.41	0.37	0.65
CCl4	0.53	0.57 J	0.39 J

Outdoor Air	PARK-BGA03	
Sample Date	25-Jun-09	2-Feb-12
BEN	< 0.27	0.98
CCl4	0.43	0.35 J

Outdoor Air	PARK-BGA04
Sample Date	3-Feb-12
BEN	1.1
EBZ	1.1
CCl4	0.49

Outdoor Air	PARK-BGA05
Sample Date	7-Feb-12
BEN	0.82



Outdoor Air	PARK-OA01
Sample Date	1-Feb-12
BEN	0.58

- Outdoor Air Sampling Location
- Soil Gas Sampling Location
- Former AMCO Chemical Facility Boundary
- Building
- VOC concentration above the screening level and not present in background (ambient) air.
- VOC concentration above the screening level and above the concentration in background (ambient) air.
- VOC concentration above the screening level and consistent with the concentration in ambient air.

All gas-phase concentrations in micrograms per cubic meter (ug/m^3)
J - estimated
<# - Not detected at listed reporting limit

Volatile Organic Compound (VOC)		Residential Air Screening Level (ug/m^3)
BEN	Benzene	0.31
CCl4	Carbon Tetrachloride	0.41
12-DCA	1,2-Dichloroethane	0.094
14-Dxn	1,4-Dioxane	0.32
EBZ	Ethylbenzene	0.97
PCE	Tetrachloroethene	9.4
TCE	Trichloroethene	0.43
TCM	Trichloromethane	0.11

1. See Tables 2-2, 2-3, and 2-4 for details of the 2009 (Round 1), 2010 (Round 2), and 2012 (Round 3) gas-phase sampling events, respectively.
2. Screening levels for residential air are listed in Table 3-1.
3. Gas-phase samples analyzed by EPA Methods TO-15 and TO-15 SIM (Selective Ion Monitoring).

45 0 45
Feet

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FIGURE 3-10
Concentrations Above Screening Levels in Gas-Phase Samples Collected at South Prescott Park

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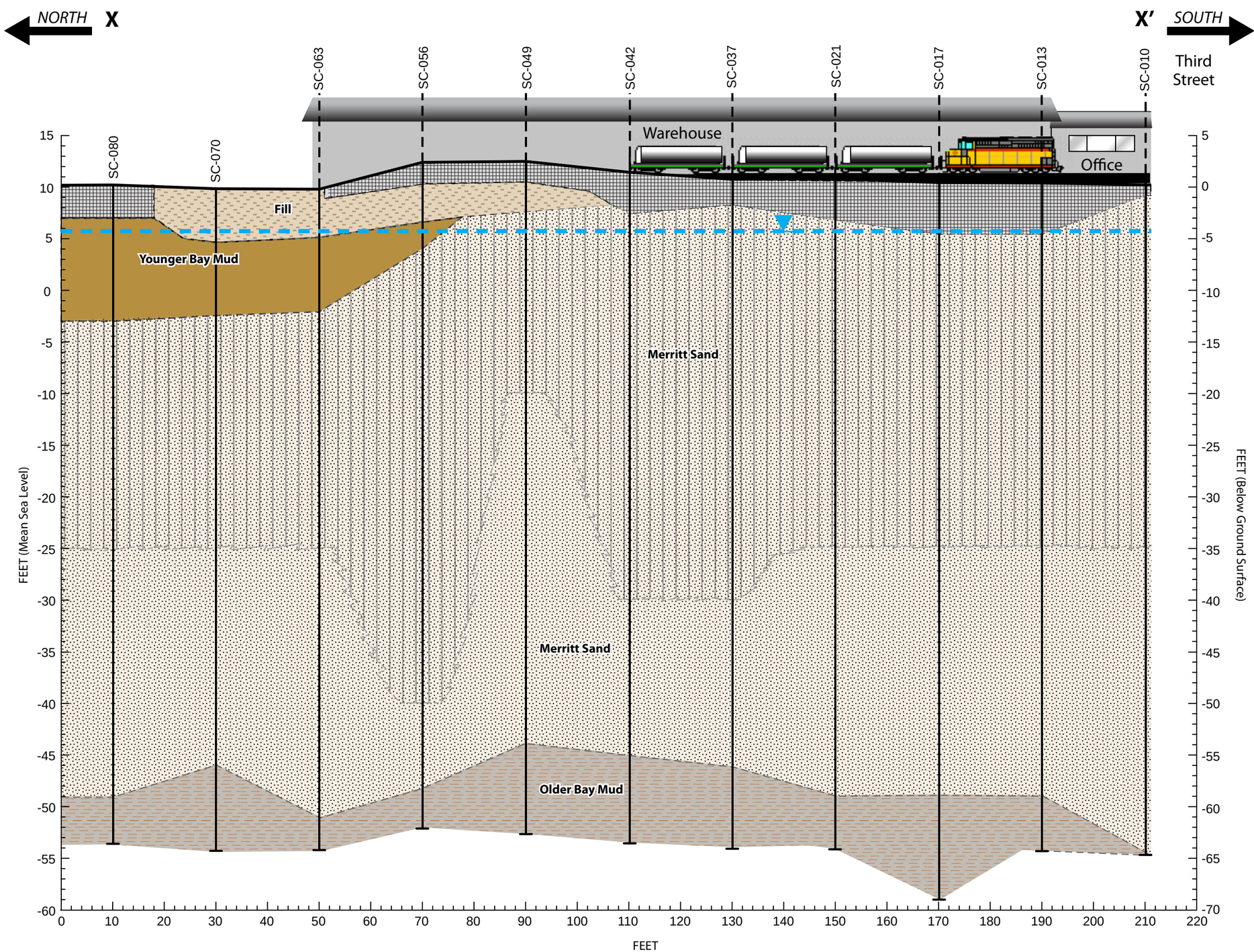

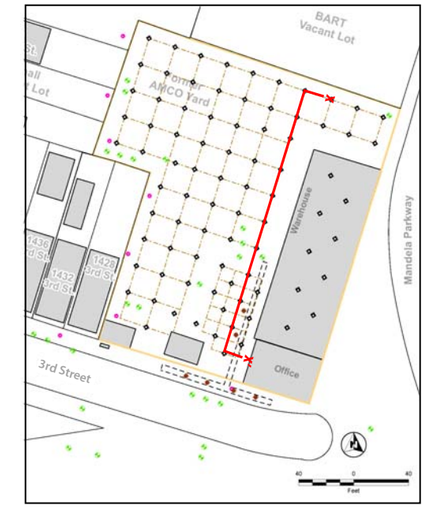

LEGEND

- Concrete Pavement (thickness varies)
- Gravelly sand, silty sand, debris (Fill)
- Silts, silty sand, clayey sand, organic soils (Younger Bay Mud)
- Clayey sand, silty sand, fine sand with 15-30% silts and clays (Merritt Sand)
- Silty sand, fine sand with 5-20% silts and clays (Merritt Sand)
- Stiff clay with sand lenses (Older Bay Mud)
- Groundwater level projected from groundwater elevation in February 2012 at monitoring well RMW-02-13

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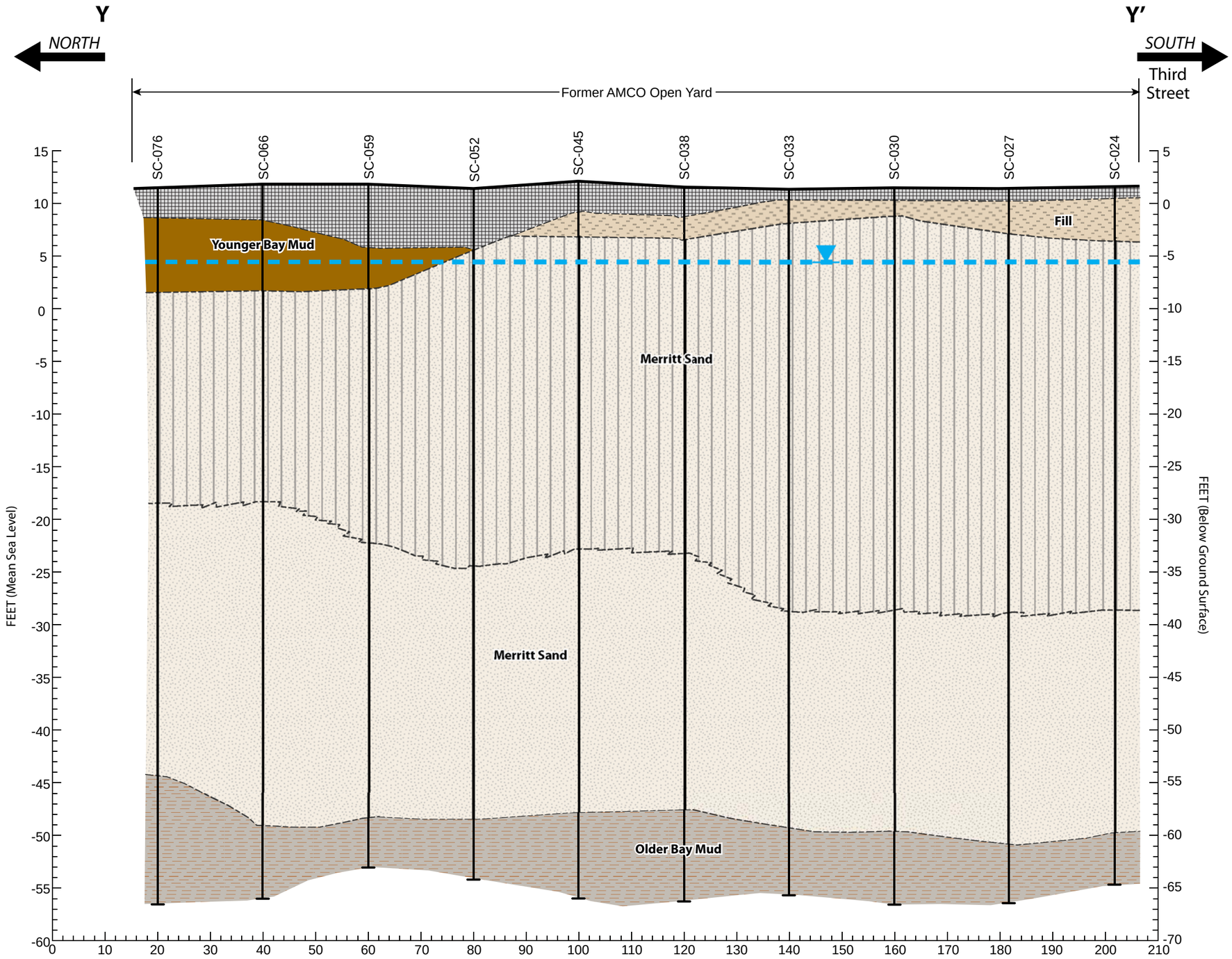
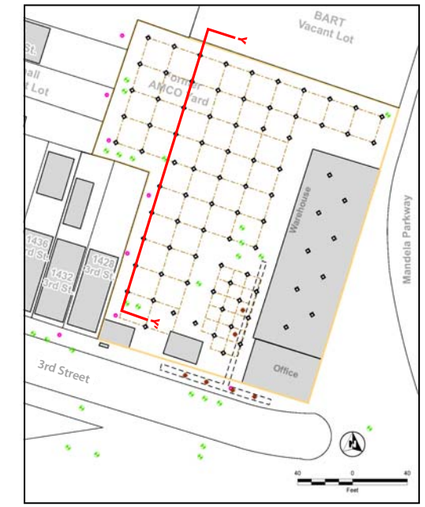
FIGURE 4-1
Geologic Cross-Section X-X'





LEGEND

- Concrete Pavement (thickness varies)
- Gravelly sand, silty sand, debris (Fill)
- Silts, silty sand, clayey sand, organic soils (Younger Bay Mud)
- Clayey sand, silty sand, fine sand with 15-30% silts and clays (Merritt Sand)
- Silty sand, fine sand with 5-20% silts and clays (Merritt Sand)
- Stiff clay with sand lenses (Older Bay Mud)
- Groundwater level projected from groundwater elevation in February 2012 at monitoring well RMW-02-13

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FIGURE 4-2
Geologic Cross-Section Y-Y'

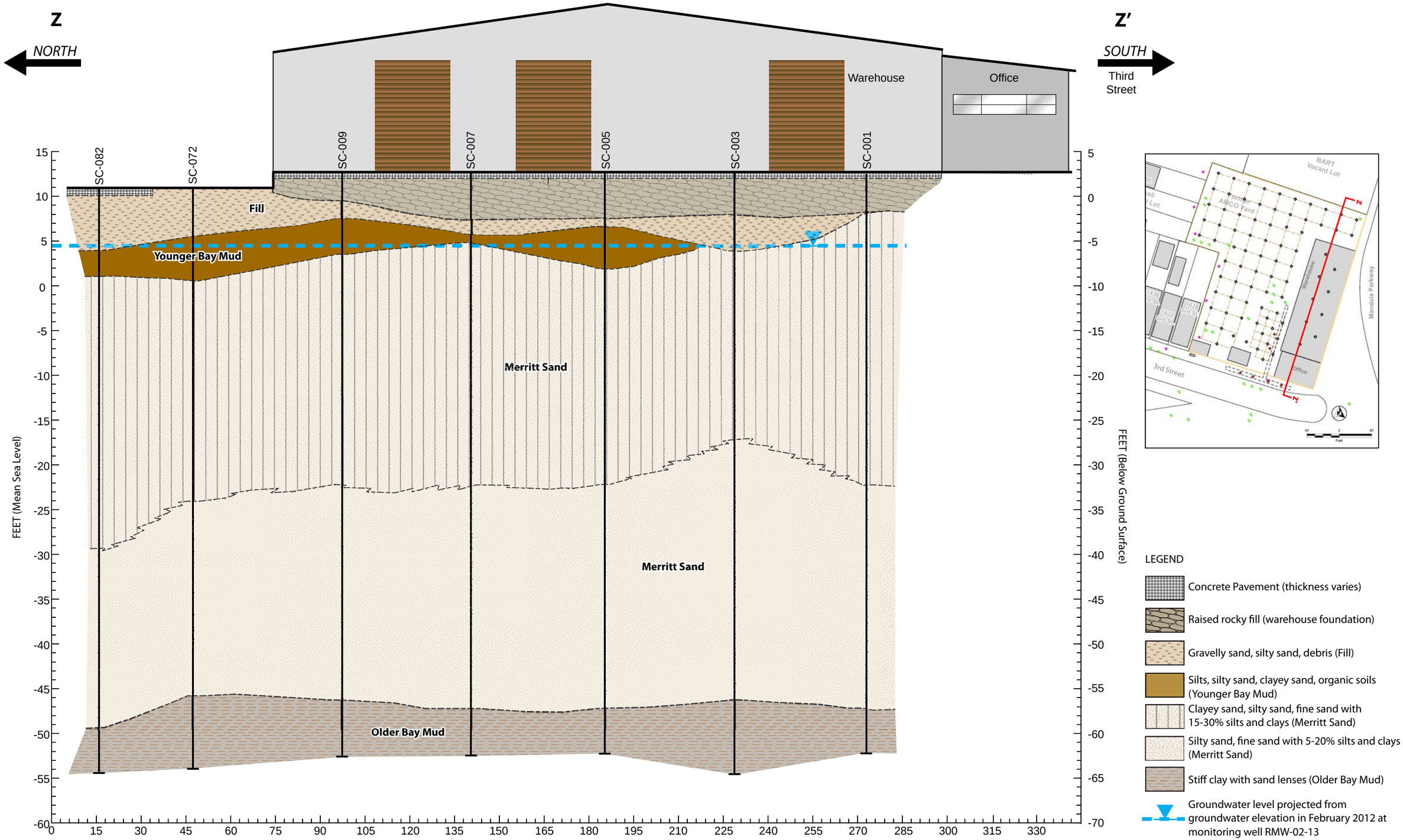

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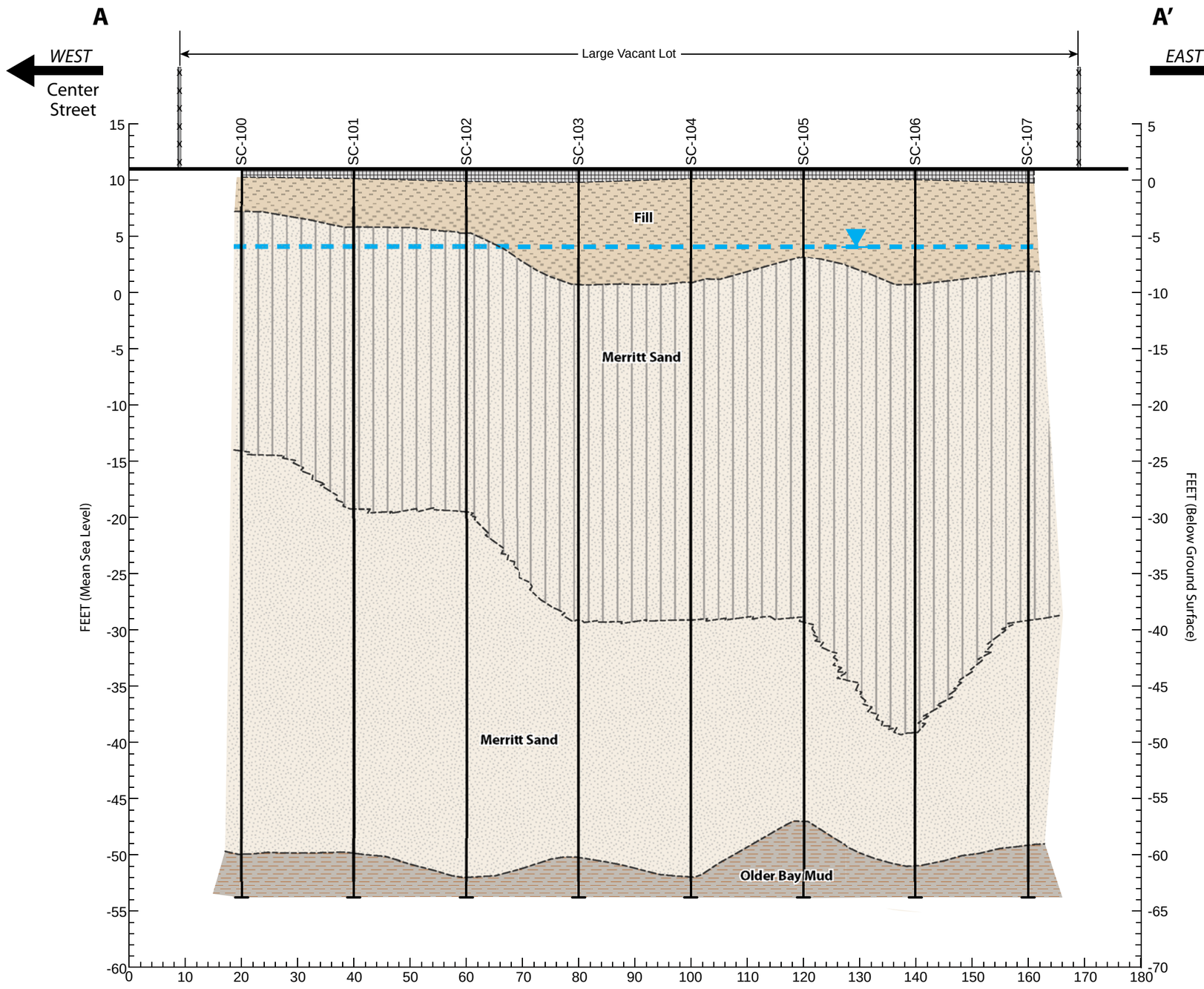
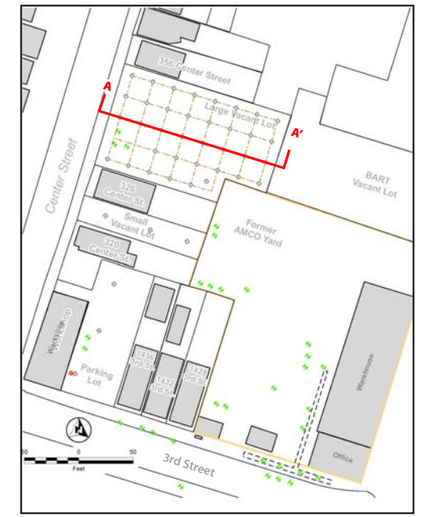
FIGURE 4-3
Geologic Cross-Section Z-Z'





LEGEND

- Concrete Pavement (thickness varies)
- Gravelly sand, silty sand, debris (Fill)
- Silts, silty sand, clayey sand, organic soils (Younger Bay Mud)
- Clayey sand, silty sand, fine sand with 15-30% silts and clays (Merritt Sand)
- Silty sand, fine sand with 5-20% silts and clays (Merritt Sand)
- Stiff clay with sand lenses (Older Bay Mud)
- Groundwater level projected from groundwater elevation in February 2012 at monitoring well RMW-02-13

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FIGURE 4-4
Geologic Cross-Section A-A'

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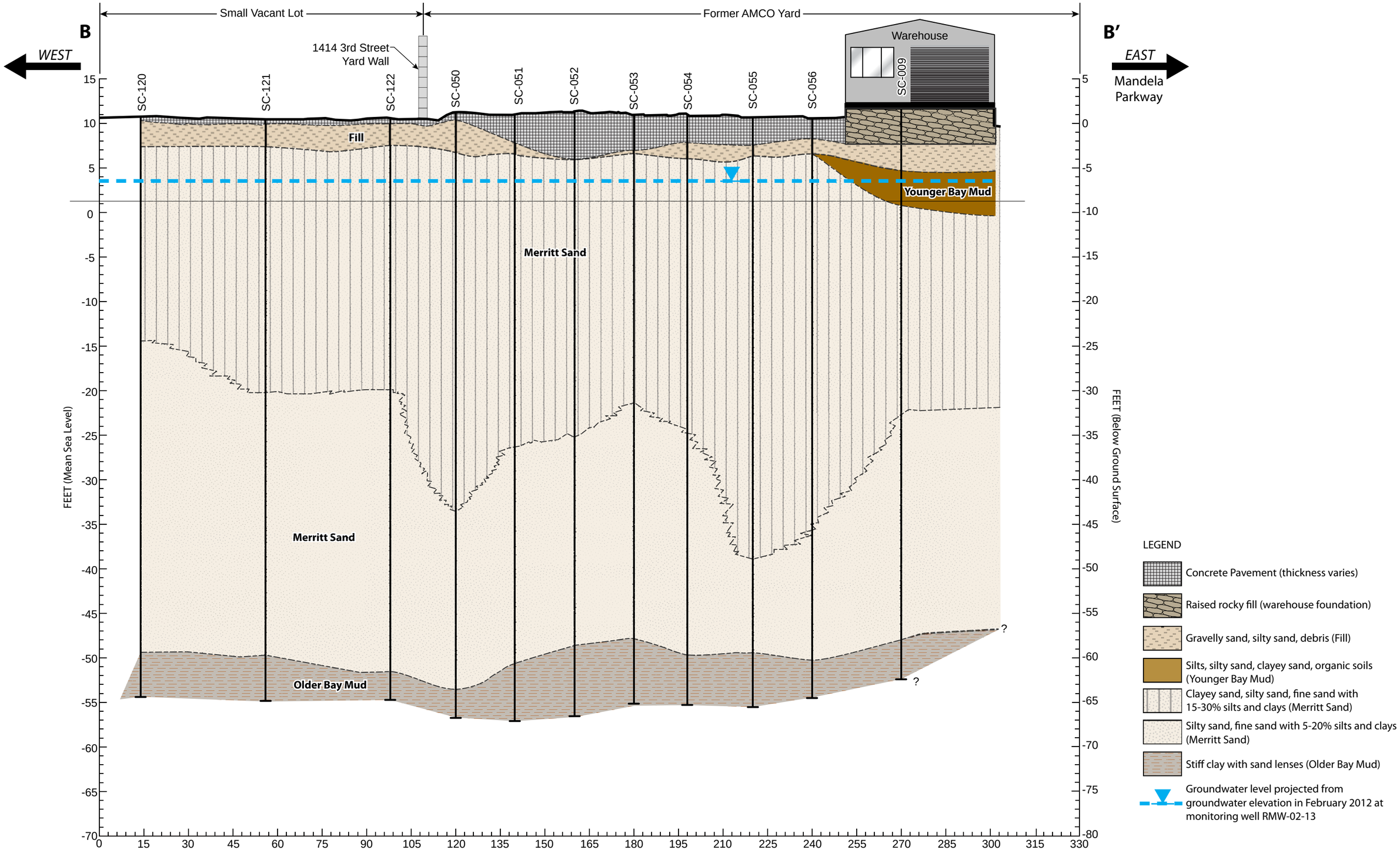

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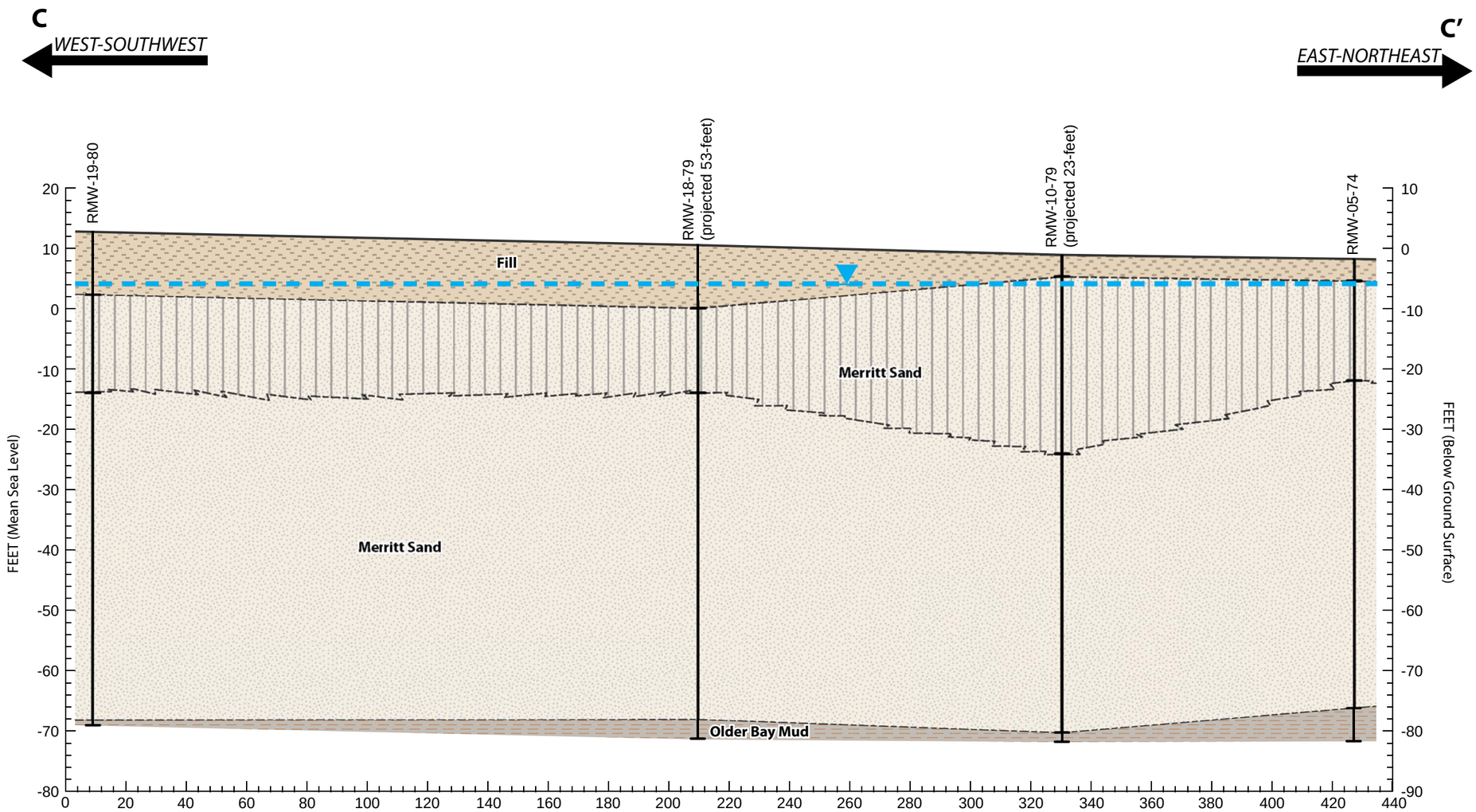
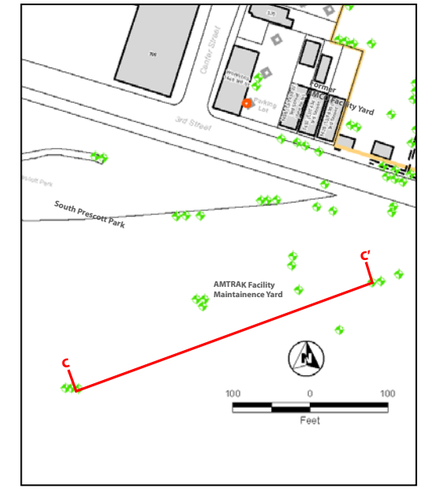
Oakland, California

FIGURE 4-5
Geologic Cross-Section B-B'





LEGEND

- 6-inch Asphalt Cap
- Gravelly sand, silty sand, debris (Fill)
- Silts, silty sand, clayey sand, organic soils (Younger Bay Mud)
- Clayey sand, silty sand, fine sand with 15-30% silts and clays (Merritt Sand)
- Silty sand, fine sand with 5-20% silts and clays (Merritt Sand)
- Stiff clay with sand lenses (Older Bay Mud)
- Groundwater level projected from groundwater elevation in February 2012 at monitoring well RMW-18-79

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FIGURE 4-6
Geologic Cross-Section C-C'