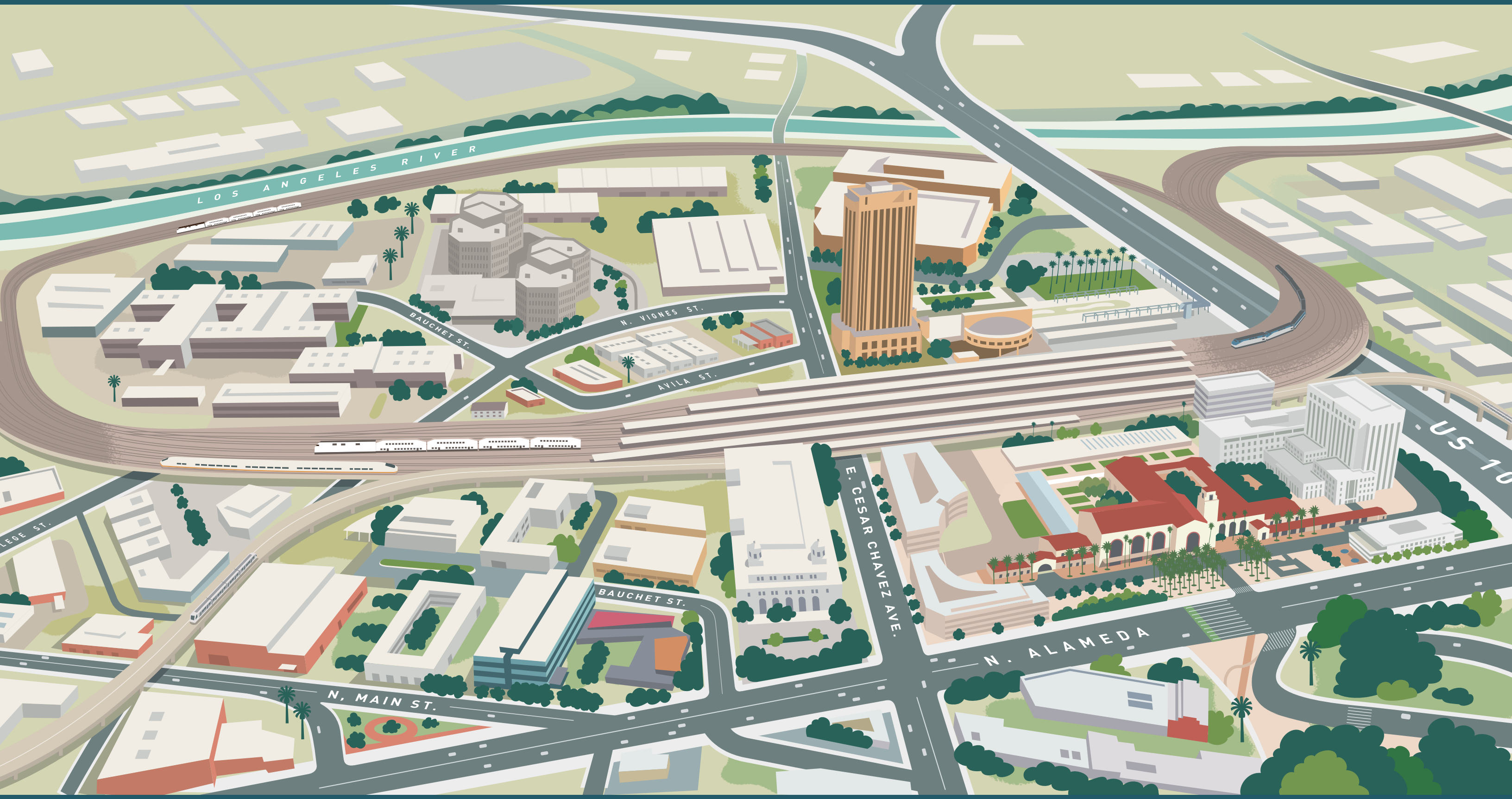
Los Angeles County
Metropolitan Transportation Authority

Link Union Station

DRAFT – Phase I Environmental Site Assessment

October 2016



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Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *19-Mar-07*

CLIENT:	Ninyo & Moore	Client Sample ID:	MW5-65
Lab Order:	090285	Collection Date:	3/6/2007 8:54:00 AM
Project:	Asphalt Plant #1, 206638008	Matrix:	SOIL
Lab ID:	090285-009		

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS

EPA 3550B — EPA 8270C

RunID: MS7_070312A QC Batch: 34095 PrepDate: 3/12/2007 Analyst: **MFR**

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
Benzidine (M)	ND	1600		µg/Kg	1	3/12/2007 02:00 PM
Benzo(a)anthracene	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Benzo(a)pyrene	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Benzo(b)fluoranthene	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Benzo(g,h,i)perylene	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Benzo(k)fluoranthene	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Benzoic acid	ND	1600		µg/Kg	1	3/12/2007 02:00 PM
Benzyl alcohol	ND	660		µg/Kg	1	3/12/2007 02:00 PM
Bis(2-chloroethoxy)methane	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Bis(2-chloroethyl)ether	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Bis(2-chloroisopropyl)ether	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Bis(2-ethylhexyl)phthalate	520	330		µg/Kg	1	3/12/2007 02:00 PM
Butylbenzylphthalate	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Chrysene	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Di-n-butylphthalate	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Di-n-octylphthalate	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Dibenz(a,h)anthracene	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Dibenzofuran	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Diethylphthalate	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Dimethylphthalate	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Fluoranthene	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Fluorene	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Hexachlorobenzene	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Hexachlorobutadiene	ND	660		µg/Kg	1	3/12/2007 02:00 PM
Hexachlorocyclopentadiene	ND	660		µg/Kg	1	3/12/2007 02:00 PM
Hexachloroethane	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Indeno(1,2,3-cd)pyrene	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Isophorone	ND	330		µg/Kg	1	3/12/2007 02:00 PM
N-Nitrosodi-n-propylamine	ND	330		µg/Kg	1	3/12/2007 02:00 PM
N-Nitrosodiphenylamine	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Naphthalene	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Nitrobenzene	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Pentachlorophenol	ND	1600		µg/Kg	1	3/12/2007 02:00 PM
Phenanthrene	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Phenol	ND	330		µg/Kg	1	3/12/2007 02:00 PM
Pyrene	ND	330		µg/Kg	1	3/12/2007 02:00 PM

Qualifiers:
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- ND Not Detected at the Reporting Limit
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Advanced Technology Laboratories *3275 Walnut Avenue, Signal Hill, CA 90755 Tel: 562. 989.4045 Fax: 562.989.4040*

Advanced Technology Laboratories

ANALYTICAL RESULTS

Print Date: *19-Mar-07*

CLIENT:	Ninyo & Moore	Client Sample ID:	MW5-95
Lab Order:	090285	Collection Date:	3/6/2007 10:15:00 AM
Project:	Asphalt Plant #1, 206638008	Matrix:	SOIL
Lab ID:	090285-012		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
HYDROCARBON CHAIN IDENTIFICATION						
EPA 3550B				EPA 8015B(M)		
RunID: GC7_BACK_070309A	QC Batch: 34057			PrepDate:	3/9/2007	Analyst: CBR
T/R Hydrocarbons: C13-C22	410	10		mg/Kg	10	3/10/2007 01:01 PM
T/R Hydrocarbons: C23-C32	110	10		mg/Kg	10	3/10/2007 01:01 PM
T/R Hydrocarbons: C33-C40	17	10		mg/Kg	10	3/10/2007 01:01 PM
SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS						
EPA 3550B				EPA 8270C		
RunID: MS7_070312A	QC Batch: 34095			PrepDate:	3/12/2007	Analyst: MFR
1,2,4-Trichlorobenzene	ND	330		µg/Kg	1	3/12/2007 02:34 PM
1,2-Dichlorobenzene	ND	330		µg/Kg	1	3/12/2007 02:34 PM
1,3-Dichlorobenzene	ND	330		µg/Kg	1	3/12/2007 02:34 PM
1,4-Dichlorobenzene	ND	330		µg/Kg	1	3/12/2007 02:34 PM
2,4,5-Trichlorophenol	ND	330		µg/Kg	1	3/12/2007 02:34 PM
2,4,6-Trichlorophenol	ND	330		µg/Kg	1	3/12/2007 02:34 PM
2,4-Dichlorophenol	ND	1600		µg/Kg	1	3/12/2007 02:34 PM
2,4-Dimethylphenol	ND	330		µg/Kg	1	3/12/2007 02:34 PM
2,4-Dinitrophenol	ND	1600		µg/Kg	1	3/12/2007 02:34 PM
2,4-Dinitrotoluene	ND	330		µg/Kg	1	3/12/2007 02:34 PM
2,6-Dinitrotoluene	ND	330		µg/Kg	1	3/12/2007 02:34 PM
2-Chloronaphthalene	ND	330		µg/Kg	1	3/12/2007 02:34 PM
2-Chlorophenol	ND	330		µg/Kg	1	3/12/2007 02:34 PM
2-Methylnaphthalene	480	330		µg/Kg	1	3/12/2007 02:34 PM
2-Methylphenol	ND	330		µg/Kg	1	3/12/2007 02:34 PM
2-Nitroaniline	ND	1600		µg/Kg	1	3/12/2007 02:34 PM
2-Nitrophenol	ND	330		µg/Kg	1	3/12/2007 02:34 PM
3,3´-Dichlorobenzidine	ND	660		µg/Kg	1	3/12/2007 02:34 PM
3-Nitroaniline	ND	1600		µg/Kg	1	3/12/2007 02:34 PM
4,6-Dinitro-2-methylphenol	ND	1600		µg/Kg	1	3/12/2007 02:34 PM
4-Bromophenyl-phenylether	ND	330		µg/Kg	1	3/12/2007 02:34 PM
4-Chloro-3-methylphenol	ND	660		µg/Kg	1	3/12/2007 02:34 PM
4-Chloroaniline	ND	660		µg/Kg	1	3/12/2007 02:34 PM
4-Chlorophenyl-phenylether	ND	330		µg/Kg	1	3/12/2007 02:34 PM
4-Methylphenol	ND	330		µg/Kg	1	3/12/2007 02:34 PM
4-Nitroaniline	ND	1600		µg/Kg	1	3/12/2007 02:34 PM
4-Nitrophenol	ND	1600		µg/Kg	1	3/12/2007 02:34 PM
Acenaphthene	ND	330		µg/Kg	1	3/12/2007 02:34 PM
Acenaphthylene	ND	330		µg/Kg	1	3/12/2007 02:34 PM
Anthracene	ND	330		µg/Kg	1	3/12/2007 02:34 PM

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ANALYTICAL RESULTS

Print Date: *19-Mar-07*

CLIENT:	Ninyo & Moore	Client Sample ID:	MW5-95
Lab Order:	090285	Collection Date:	3/6/2007 10:15:00 AM
Project:	Asphalt Plant #1, 206638008	Matrix:	SOIL
Lab ID:	090285-012		

SEMIVOLATILE ORGANIC COMPOUNDS BY GC/MS — EPA 3550B — EPA 8270C

RunID: MS7_070312A QC Batch: 34095 PrepDate: 3/12/2007 Analyst: MFR

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Bis(2-ethylhexyl)phthalate	590	330		µg/Kg	1	3/12/2007 02:34 PM
Butylbenzylphthalate	ND	330		µg/Kg	1	3/12/2007 02:34 PM
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Di-n-butylphthalate	ND	330		µg/Kg	1	3/12/2007 02:34 PM
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Dibenz(a,h)anthracene	ND	330		µg/Kg	1	3/12/2007 02:34 PM
Dibenzofuran	ND	330		µg/Kg	1	3/12/2007 02:34 PM
Diethylphthalate	ND	330		µg/Kg	1	3/12/2007 02:34 PM
Dimethylphthalate	ND	330		µg/Kg	1	3/12/2007 02:34 PM
Fluoranthene	ND	330		µg/Kg	1	3/12/2007 02:34 PM
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Hexachlorocyclopentadiene	ND	660		µg/Kg	1	3/12/2007 02:34 PM
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N-Nitrosodiphenylamine	ND	330		µg/Kg	1	3/12/2007 02:34 PM
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Nitrobenzene	ND	330		µg/Kg	1	3/12/2007 02:34 PM
Pentachlorophenol	ND	1600		µg/Kg	1	3/12/2007 02:34 PM
Phenanthrene	450	330		µg/Kg	1	3/12/2007 02:34 PM
Phenol	ND	330		µg/Kg	1	3/12/2007 02:34 PM
Pyrene	ND	330		µg/Kg	1	3/12/2007 02:34 PM

Qualifiers:
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- DO Surrogate Diluted Out
- E Value above quantitation range
- ND Not Detected at the Reporting Limit

Results are wet unless otherwise specified

3275 Walnut Avenue, Signal Hill, CA 90755 Tel: 562. 989.4045 Fax: 562.989.4040

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ANALYTICAL RESULTS

Print Date: *19-Mar-07*

CLIENT:	Ninyo & Moore	Client Sample ID:	MW5-125
Lab Order:	090285	Collection Date:	3/6/2007 11:09:00 AM
Project:	Asphalt Plant #1, 206638008	Matrix:	SOIL
Lab ID:	090285-018		

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
TOTAL PETROLEUM HYDROCARBONS						
EPA 1664_SGT/HEM (M)						
RunID: WETCHEM2_070307A QC Batch: 33978 PrepDate: 3/7/2007 Analyst: MFP						
Total Petroleum Hydrocarbons	ND	50		mg/Kg	1	3/7/2007

Qualifiers:
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- S Spike/Surrogate outside of limits due to matrix interference
- DO Surrogate Diluted Out
- E Value above quantitation range
- ND Not Detected at the Reporting Limit
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J-139 - Olympic Base MGP, 2424 E Olympic Boulevard

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HUMAN HEALTH RISK ASSESSMENT
FORMER OLYMPIC BASE MANUFACTURED GAS PLANT SITE
2424 EAST OLYMPIC BOULEVARD
LOS ANGELES, CALIFORNIA

Prepared for:

Southern California Gas Company
555 West 5th Street, GT 17E3
Los Angeles, California 90013

Prepared by:

IRIS ENVIRONMENTAL
1438 Webster Street, Suite 302
Oakland, California 94612
(510) 834-4747

March 2016
Project No. 15-1263B

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LIST OF ACRONYMS

ATSDR	Agency for Toxic Substances Disease Registry
ASTM	American Society of Testing and Materials
B(a)P	benzo(a)pyrene
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAAQS	California Ambient Air Quality Standard
Cal/EPA	California Environmental Protection Agency
CDI	chronic daily intake
CFR	Code of Federal Regulations
COC	chemical of concern
COPC	chemical of potential concern
CPAH	carcinogenic polycyclic aromatic hydrocarbons
CSF	cancer slope factor
DTSC	Department of Toxic Substances Control
EC	exposure concentration
EPC	exposure point concentration
HEAST	Health Effects Assessment Summary Tables
HERO	Human and Ecological Risk Office
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
IRIS	USEPA's Integrated Risk Information System
MGP	manufactured gas plant
MRL	Minimal Risk Level
$\mu g/m^3$	micrograms per cubic meter
µg/L	micrograms per liter
m^3/kg	cubic meters per kilogram
mg/kg	milligrams per kilogram
mg/kg/day	milligram of chemical per kilogram body weight per day

LIST OF ACRONYMS (continued)

mg/m^3	milligrams per cubic meter
NAAQS	National Ambient Air Quality Standard
NCEA	National Center of Environmental Assessment
NCP	National Contingency Plan
ND	non-detect
NOEL	No observed effects level
OEHHA	Cal/EPA Office of Environmental Health Hazard Assessment
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyls
PCE	tetrachloroethene
PEA	Preliminary Endangerment Assessment
PEF	particulate emission factor
PPRTV	provisional peer-reviewed toxicity value
PRG	Preliminary Remediation Goal
REL	reference exposure level
RfD	reference dose
RfC	reference concentration
RSL	Regional Screening Level
SIR	Site Investigation Report
STSC	Superfund Health Risk Technical Support Center
TCE	trichloroethene
TF	transfer factor
TPH	total petroleum hydrocarbons
TPH-d	total petroleum hydrocarbons quantified as diesel
TPH-g	total petroleum hydrocarbons quantified as gasoline
TPH-mo	total petroleum hydrocarbons quantified as motor oil
TRW ALM	USEPA Technical Review Workgroup Adult Lead Methodology
UCL	upper confidence limit
URF	unit risk factor
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

EXECUTIVE SUMMARY

Iris Environmental prepared this human health risk assessment (HHRA) on behalf of Southern California Gas Company (SoCalGas) for the former Olympic Base Manufactured Gas Plant (MGP) Site, located at 2424 East Olympic Boulevard in Los Angeles, California (Figure 1). SoCalGas owns a 16-acre property (Property) at this address and the area is zoned for commercial/heavy manufacturing. Approximately 7 acres of the Property constitute the Investigation Area (the "Site", Figure 2), which includes the former MGP and an extended area to the west of the former MGP. SoCalGas leases a portion of the Property to Waste Management Inc. and the City of Los Angeles Bureau of Street Services. The remainder of the Property, consisting of the Site, is fenced and currently unoccupied, with the exception of some infrequent storage and inspection activities that occur on a small portion of the Site.

Objectives of the HHRA

The purpose of this HHRA is to determine whether the levels of chemicals detected at the Site would pose a potential risk to current onsite or offsite commercial populations. Specifically, potential exposure to current onsite and offsite commercial populations to chemicals detected in the limited exposed soil areas of the Site are assessed in this HHRA. Additionally, potential inhalation exposures to current onsite and offsite commercial populations who could potentially be exposed to chemicals detected in soil gas are assessed in this HHRA under current Site conditions and uses.

Site Investigations

Site investigations were conducted at the Site between 1984 and 2014, and are described in more detail in the Site Investigation Report (SIR) (Parsons, 2015). As the purpose of this HHRA is to evaluate potential exposures and risks associated with current land-use scenarios, only recent data collected during the 2014 site investigation, as documented in the SIR (Parsons, 2015), reflective of potential current Site conditions and current exposures are evaluated.

A site investigation was conducted at the Site during two events (one in June 2014 and one in July 2014), both of which included drilling and soil vapor probe installation, as well as soil and soil gas sampling. Previous site investigations did not include soil gas sampling. The 2014 field investigations consisted of the following:

1) an initial soil and soil gas sampling based on nonbiased and biased soil and soil vapor probe locations;
2) evaluation of the initial set of data and refinement of soil and soil vapor sampling of deep boring locations based on discussions with the California Department of Toxic Substances Control (DTSC); and
3) drilling, sampling, and installation of selected deep soil gas probe locations, as well as sampling and installation of gas probes in previous areas where refusal was encountered.

The overall goal of the investigation was to further delineate the extent of polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPH), polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), and metals in the soil matrix; and VOCs in soil gas. In addition, the deep soil borings were installed to identify the extent of vertical impact within the Site and confirm previous observations that MGP impact has not affected groundwater.

Analytic Data Included in the Human Health Risk Assessment

Analytical data collected during the 2014 Site investigation are evaluated for use in the HHRA. As there are only two shallow soil samples locations that are unpaved (soil sampling locations F1-1 and F3-3), four nearby shallow samples that are actually covered with asphalt or concrete were additionally included to create a more robust exposed soil (0-2 feet below ground surface [bgs]) sample dataset. These exposed soil data and all soil gas data collected during the SI are included in the dataset used in the quantitative HHRA

Soil
TPH product mixtures were detected at various concentrations in all exposed soil (0-2 feet bgs) samples. The maximum detections of TPH quantified as motor oil (TPH-mo) and TPH quantified as diesel (TPH-d) were at F4-1 at 1.7 feet bgs. The maximum concentration of TPH quantified as gasoline (TPH-g) was detected at F3-5 at 1 foot bgs.

All PAHs except for dibenz(a,h)anthracene were detected at various concentrations in all exposed soil (0-2 feet bgs) samples. The maximum concentrations of benzo(a)pyrene (B[a]P) equivalent and naphthalene were both detected at F4-1 at 1.7 feet bgs.

Most metals analyzed for were detected at various concentrations in exposed soil (0-2 feet bgs) samples; antimony, arsenic, beryllium, cadmium, molybdenum, selenium, silver, and thallium were not detected. The maximum lead concentration was detected at F1-1 at 1 foot bgs.

Soil Gas
Out of 92 soil gas samples collected, benzene was detected in 31 samples, toluene in 55 samples, ethylbenzene in 25 samples, m,p-xylenes in 35 samples, naphthalene in 32 samples, o-xylenes in 30 samples, tetrachloroethene (PCE) in 87 samples, and trichloroethene (TCE) in 42 samples. A total of 50 samples had detections of at least one VOC.

Identification of Chemicals of Potential Concern

Analytical data collected during the Site investigation is evaluated for use in the HHRA.

Chemicals detected in onsite exposed area soil (0-2 feet bgs) that are included as chemicals of potential concern (COPCs) in the quantitative HHRA are as follows: TPH (diesel, gasoline, and motor oil ranges), various PAHs, and various inorganics;

Chemicals detected in soil gas that are included as COPCs in the quantitative HHRA are as follows: 1,1,1-trichloroethane, 1,1-dichloroethane, 1,2,4-trimethylbenzene, 1,3,5-

trimethylbenzene, 4-ethyltoluene, acetone, benzene, carbon disulfide, chloroform, cis-1,2-dichloroethene, dichlorodifluoromethane (Freon 12), ethylbenzene, m,p-xylenes, naphthalene, o-xylene, styrene, PCE, toluene, TCE, trichlorfluoromethane (Freon 11), and vinyl chloride.

Potentially Exposed Populations and Complete Exposure Pathways

Under current land use, commercial workers infrequently working at the Site could potentially be exposed to chemicals present at the Site. Workers do not continuously occupy the Site; rather, they may come, on a weekly or biweekly basis, to the Treatment Storage Disposal Facility (TSDF) to drop off or pick up materials (identified on Figure 2 as the Excluded Area). In addition to the drop-offs/pickup up activities, workers conduct weekly inspections of the TSDF facility, lasting, on average, roughly ½ hour per week. Accordingly, as the buildings are unoccupied and the majority of the Site is paved/covered, any exposures to current workers are expected to be very limited in nature. Additionally, commercial populations working at properties adjacent to the Site could potentially be exposed to chemicals present at the Site.

Based on the current uses of the Site and the current surrounding land use, the populations that are included in the HHRA are the following:

- current onsite commercial worker; and
- current offsite commercial worker (working adjacent to the property).

Results and Conclusions of the HHRA

<u>Current Onsite Commercial Worker Scenario</u>

The results of this HHRA indicate that none of the COPCs detected in soil gas at the Site pose a significant potential health risk to current onsite commercial workers. Estimated incremental cancer risks associated with COPCs in soil gas for the current onsite commercial worker based on soil gas sampling data are well below the lower end of the acceptable cancer risk range of 1 x 10^{-6} to 1 x 10^{-4} and the "target" cancer risk of 1 x 10^{-5} typically used by California Environmental Protection Agency (Cal/EPA) and United States Environmental Protection Agency (USEPA) in determining the need for mitigation in commercial settings. Further, the estimated noncancer hazards for the current onsite commercial worker are below the acceptable HI of 1.

The estimated incremental cancer risk associated with COPCs in soil for the current onsite commercial population is above the lower end of the acceptable risk range of 1 x 10^{-6} to 1 x 10^{-4}, but below the "target" cancer risk of 1 x 10^{-5} typically used by Cal/EPA and USEPA in determining the need for mitigation in commercial settings, due principally to the presence of carcinogenic PAHs (CPAHs). The estimated noncancer hazard for the current onsite commercial populations is below the acceptable HI of 1. The levels of lead in soils at the Site are not expected to result in an increase in the blood lead level in the fetus of the current onsite commercial worker above Cal/EPA Office of Environmental Health Hazard Assessment's (OEHHA's) benchmark value of 1 μg/dL.

Accordingly current conditions at the Site are fully protective of current onsite commercial populations.

We note that the HHRA did not conduct an onsite vapor intrusion evaluation, as none of the onsite buildings are currently occupied. If SoCalGas were to decide to occupy the buildings in the future, it would be prudent, at that point in time, to evaluate the potential significance of the vapor intrusion pathway for those buildings. There is a land use restriction currently on the property, and a soil management plan will be prepared to ensure that the paved surfaces remain paved, any subsurface intrusive work is conducted in a manner that is fully protective of the health of the workers, and any impacted soil is managed appropriately.

Current Offsite Commercial Worker Scenario

The results of the HHRA indicate that none of the COPCs detected in soil gas at the Site pose a significant potential health risk to current offsite commercial populations working nearby the Site. Estimated incremental cancer risks associated with COPCs in soil gas for the offsite commercial populations are only slightly above the lower end of the acceptable cancer risk range of 1×10^{-6} to 1×10^{-4} and well below the "target" cancer risk of 1×10^{-5} typically used by Cal/EPA and USEPA in determining the need for mitigation in commercial settings. Further, the estimated noncancer hazards associated with COPCs in soil gas for current offsite commercial workers are well below the acceptable HI of 1.

The estimated incremental cancer risk associated with COPCs in soil for the current offsite commercial population is well below the lower end of the acceptable risk range of 1×10^{-6} to 1×10^{-4} and the "target" cancer risk of 1×10^{-5} typically used by Cal/EPA and USEPA in determining the need for mitigation in commercial settings. The estimated noncancer hazard for the current offsite commercial populations is well below the acceptable HI of 1. The levels of lead in soils at the Site result in predicted air concentrations of lead that are below the California Ambient Air Quality Standards (CAAQS) and National Ambient Air Quality Standards(NAAQS).

Accordingly current conditions at the Site are fully protective of current offsite commercial populations.

As requested by DTSC, additional soil gas sampling will be conducted on the southern boundary of the Site to confirm the lateral extent of VOC impacts in soil gas (DTSC 2015). Once received, the additional soil gas data will be evaluated to confirm the conclusions presented in this HHRA that offsite vapor intrusion does not pose a significant potential health risk to offsite commercial workers.

1.0 INTRODUCTION AND OBJECTIVES

Iris Environmental prepared this human health risk assessment (HHRA) on behalf of Southern California Gas Company (SoCalGas) for the former Olympic Base Manufactured Gas Plant (MGP) Site, located at 2424 East Olympic Boulevard in Los Angeles, California (Figure 1). SoCalGas owns a 16-acre property (Property) at this address and the area is zoned for commercial/heavy manufacturing. Approximately 7 acres of the Property constitute the Investigation Area (the "Site", Figure 2), which includes the former MGP and an extended area to the west of the former MGP. SoCalGas leases a portion of the Property to Waste Management Inc. and the City of Los Angeles Bureau of Street Services. The remainder of the Property, consisting of the Site, is fenced and currently unoccupied, with the exception of some infrequent storage and inspection activities that occur on a small portion of the Site.

The purpose of this HHRA is to determine whether the level of chemicals detected at the Site would pose a potential risk to current onsite or offsite populations. Specifically, potential exposure of current onsite and offsite commercial populations to chemicals detected in the limited exposed soil areas of the Site are assessed in this HHRA. Additionally, potential inhalation exposures to current onsite and offsite commercial populations who could potentially be exposed to chemicals detected in soil gas are assessed in this HHRA under current Site conditions and uses.

The methodology used in this HHRA is consistent with risk assessment guidelines provided by the United States Environmental Protection Agency's (USEPA) "*Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A), Interim Final*" (USEPA, 1989) and by the California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control's (DTSC) *"Preliminary Endangerment Assessment Manual"* (Cal/EPA, 2013). According to the USEPA (1989), and as summarized below, there are four basic steps in the quantitative human health risk assessment process: (1) data collection and analysis, (2) exposure assessment, (3) toxicity assessment, and (4) risk characterization. These steps are summarized briefly as follows:

- Data Collection and Analysis: For this HHRA, Site environmental soil and soil gas sampling data were reviewed to identify the chemicals of potential concern (COPCs) and their representative concentrations to which current onsite and offsite populations could be exposed. The dataset for the HHRA was obtained from a recent Site investigation (as summarized in Section 2.2);
- Exposure Assessment: Site uses and physical features were evaluated to identify the pathways by which current onsite and offsite populations could be exposed to COPCs. The magnitude of the potential human exposures was also estimated;
- Toxicity Assessment: This phase of the risk assessment presents the relationship between the magnitude of exposure and potential adverse effects (dose-response assessment). As a part of the toxicity assessment, toxicity values were identified from the Cal/EPA-recommended sources, and were then used to estimate the likelihood of adverse effects which could potentially occur at different exposure levels; and

- Risk Characterization: The exposure and toxicity assessments were combined to characterize and quantify the potential for adverse health effects as a result of potential Site-specific exposures. The risk characterization estimates the likelihood that the estimated potential exposures to COPCs at the Site will result in either cancer or other noncancer adverse health effects.

The remaining sections of this report are as follows:

- Section 2.0 provides a description of the Site features and brief summary of the Site investigation results;
- Section 3.0 discusses the analytical data and identifies the COPCs that have been included in this HHRA;
- Section 4.0 identifies the populations that may potentially be exposed to Site COPCs, the pathways by which potential exposures may occur, and the exposure assumptions used to quantify potential exposures. Section 4.0 also presents the methodology for estimating representative exposure concentrations for chemicals present in soil and soil gas;
- Section 5.0 presents the toxicity values used in the calculation of the incremental cancer risks and noncancer hazard indices. Section 5.0 also presents the methodology for evaluating health effects associated with the lead detected in soil; and
- Section 6.0 presents the methodology and results of the characterization of potential human health risks posed by COPCs in soil and soil gas at the Site.

The references used in this report are presented in Section 7.0. There are five attachments that accompany the report. Attachment A presents all Site investigation data used in the calculations of health risks in this HHRA. Attachment B presents the outputs of the statistical evaluation for the estimation of representative exposure concentrations for chemicals present in soil and soil gas. Attachment C presents the fate and transport modeling used to estimate the emissions of COPCs from the Site and the corresponding predicted air concentrations to which the various human populations may be exposed. Attachment D presents the derivation of toxicity values for total petroleum hydrocarbons (TPH) product mixtures. Attachment E discusses the uncertainties inherent in the HHRA.

2.0 SITE DESCRIPTION AND SUMMARY OF SITE INVESTIGATIONS

This section provides a brief description of the features and current uses of the Site, as well as a brief summary of the Site investigation upon which this HHRA is based. The information in this section has been obtained and summarized from the Site Investigation Report ([SIR], Parsons, 2015).

2.1 Site Description

The Site is bounded by East Olympic Boulevard to the north, commercial properties and South Santa Fe Avenue to the west, railroad tracks to the east, and an unnamed alley and commercial properties to the south. The Los Angeles River is located to the east of the railroad tracks and within 500 feet of the Property limits. The Site is currently owned by SoCalGas and is mostly unoccupied except for infrequent visits by Site workers for short durations. In general, prominent adjoining land uses are as follows:

- North: Commercial and industrial properties north of Olympic Boulevard include a Shell Station, paper recycling, and light commercial/manufacturing. To the north of the Site and within the Property boundary, Waste Management Inc. has a recycling facility. Also northeast of the Site is an asphalt plant owned and operated by the City of Los Angeles.
- East: Immediately east of the Site are active railroad lines, as well as an Amtrak maintenance facility. The Los Angeles River is east of the railroad lines.
- South: South of the Site are large buildings consisting of import/export offices and metal recycling facilities within a large commercial warehouse property.
- West: Immediately west of the Site are commercial properties and Santa Fe Avenue. Small recycling facilities and textile manufacturing facilities are situated on the west side of Santa Fe Avenue. Within the Site, SoCalGas is operating a permitted storage facility.

The Site is almost entirely paved with asphalt and contains six unoccupied buildings, with a few small areas of exposed soil between Buildings 11 and 12, Buildings 12 and 13, and to the north and east of Building 8 (Figure 2).

Groundwater in the vicinity—and possibly beneath the Site—is greater than 200 feet below ground surface (bgs). Water was encountered during the SI at one deep boring location. At this location, saturated soil was encountered starting at 90.25 feet bgs to the top of clayey silt at 92.25 feet bgs. Deep groundwater beneath the Site is anticipated to flow toward the south to southwest; this estimate is based on local and regional surface topography and expected south to southwest bedrock dip direction beneath the Site (Dibblee Jr., 1989, as cited in Parsons, 2015).

A cap installed at the former MGP (identified as the MGP boundary in Figure 2) consists on average of 2 inches of asphalt over 5 inches of aggregate base. Stormwater runoff is collected in several concrete-lined gutters and drainage swales, and is directed to the existing drainage.
The Site is underlain by fill material to approximately 14 feet bgs. The fill material consists of loose sandy soil mixed with concrete, bricks, metal shards, and porcelain and glass fragments. It ranges from dark gray (10YR 4/1) to dark brown (10YR 3/3). Lampblack was generally

encountered in the fill material, either mixed as fragments or as layers. In general, this fill material was deepest within the old lampblack pits and the carbon settling sumps (also referred to as the southern waste area and the northern sumps area of the former MGP property). The Site is primarily underlain by dry, poorly to well-graded fine to coarse sands interbedded with gravel and cobble layers.

2.2 Summary of Site Investigation

Site investigations were conducted at the Site between 1984 and 2014, and are described in more detail in the SIR (Parsons, 2015). As the purpose of this HHRA is to evaluate potential exposures and risks associated with current land-use scenarios (see Section 4.0, Exposure Assessment), only recent data collected during the 2014 site investigation, as documented in the SIR (Parsons, 2015), reflective of potential current Site conditions and current exposures are evaluated. A Site plan with sample locations is provided in Figure 3 for soil and soil gas samples [1].

A site investigation was conducted at the Site during two events (one in June 2014 and one in July 2014), both of which included drilling and soil vapor probe installation, as well as soil and soil gas sampling. Previous site investigations did not include soil gas sampling. The 2014 field investigations consisted of the following:

1) an initial soil and soil gas sampling based on nonbiased and biased soil and soil vapor probe locations;
2) evaluation of the initial set of data and refinement of soil and soil vapor sampling of deep boring locations based on discussions with DTSC; and
3) drilling, sampling, and installation of selected deep soil gas probe locations, as well as sampling and installation of gas probes in previous areas where refusal was encountered.

As stated in the SIR (Parsons, 2015),the overall goal of the investigation was to further delineate the extent of polycyclic aromatic hydrocarbons (PAHs), TPH, PCBs, volatile organic compounds (VOCs), and metals in the soil matrix; and VOCs in soil gas. In addition, the deep soil borings were installed to identify the extent of vertical impact within the Site and confirm previous observations that MGP impacts have not affected groundwater.

Soil samples were collected from 56 boring placed according to both a systematic grid (a 100-foot by 100-foot grid) and biased sampling locations. Only a subset of these soil samples were included in the HHRA, the shallow soil samples in unpaved areas of the Site (i.e., exposed soil [0-2 feet bgs] between Buildings 12 and 13 and to the north of Building 8, as these samples represent soil to which current onsite and offsite commercial populations could be exposed. Exposed soil (0-2 feet bgs) was analyzed for TPH as diesel, gasoline, and motor oil (EPA Method 8015M), PAHs (EPA Method 8310), Title 22 metals (EPA Method 6010B and 7000 Series), and cyanide (EPA Method 9010). A total of six soil samples represent the exposed soil

[1] Note that Figure 3 presents previous soil sampling locations from Dames and Moore, as well as sampling locations from the recent 2014 Site Investigation.

to which current onsite and offsite populations could potentially be exposed (discussed more fully in Section 3.0, Data Evaluation below).

Soil gas samples were collected from locations selected based on a systematic grid (a 100-foot by 100-foot grid), with each grid containing one nested gas probe location. At each location, soil gas was collected at depths of 5, 15, 30, 60, and 80 to 85 feet bgs. All soil gas samples were included for evaluation in the HHRA. Soil gas samples were analyzed for VOCs using the TO-15 method.

2.3 Summary of Nature and Extent of Impacts

The nature and extent of impacts in soils and soil gas at the Site are summarized from the SIR (Parsons, 2015) and presented below.

Exposed Soil

TPH product mixtures were detected at various concentrations in all exposed soil (0-2 feet bgs) samples. The maximum detections of TPH quantified as motor oil (TPH-mo) and TPH quantified as diesel (TPH-d) were at F4-1 at 1.7 feet bgs. The maximum concentration of TPH quantified as gasoline (TPH-g) was detected at F3-5 at 1 foot bgs.

All PAHs except for dibenz(a,h)anthracene were detected at various concentrations in all exposed soil (0-2 feet bgs) samples. The maximum concentrations of benzo(a)pyrene (B[a]P) equivalent and naphthalene were both detected at F4-1 at 1.7 feet bgs.

Most metals analyzed for were detected at various concentrations in exposed soil (0-2 feet bgs) samples; antimony, arsenic, beryllium, cadmium, molybdenum, selenium, silver, and thallium were not detected. The maximum lead concentration was detected at F1-1 at 1 foot bgs.

Soil Gas

Out of 92 soil gas samples collected, benzene was detected in 31 samples, toluene in 55 samples, ethylbenzene in 25 samples, m,p-xylenes in 35 samples, naphthalene in 32 samples, o-xylenes in 30 samples, tetrachloroethene (PCE) in 87 samples, and trichloroethene (TCE) in 42 samples. A total of 50 samples had detections of at least one VOC. Concentrations of selected compounds (naphthalene, benzene, toluene, ethylbenzene, and xylenes (BTEX), PCE, and TCE) are summarized below:

- Benzene, ranging from 0.0018 mg/m^3 at A2-1-15 to 3.4 mg/m^3at C4-2-60;
- Toluene, ranging from .0.0021 mg/m^3at A2-1-15 to 4.7 mg/m^3at C4-2-60;
- Ethylbenzene, ranging from 0.0027 mg/m^3at E4-1-5 to 26 mg/m^3at C4-2-60;
- m,p-Xylene, ranging from 0.0023 mg/m^3at D5-3-15 to 13 mg/m^3at B4-2-85;
- Naphthalene, ranging from 0.0060 mg/m^3 at D5-2-15 to 23 mg/m^3 at C4-2-80;
- o-Xylene, ranging from 0.0024 mg/m^3at D5-3-15 to 11 mg/m^3 at C4-2-60;
- PCE, ranging from 0.0067 mg/m^3at E3-1-5 to 8.3 mg/m^3at C1-1-5; and
- TCE, ranging from 0.0029 mg/m^3at D5-3-15 to 0.90 mg/m^3at B5-1-5.

Summary of Site Investigation Findings

As summarized in the SIR (Parsons, 2015), the following conclusions and recommendations were derived from the investigation[2]:

- The Site's main contaminants of concern (COCs) are limited to the following:
  - PAHs, arsenic, mercury, and lead in soil;
  - TPH, which is detected in on-site soil, is largely co-located with PAH impacts; and
  - VOCs as PCE, TCE, BTEX, and naphthalene were detected in the soil gas.
- No significant cyanide or PCB detections were found.
- Most PAH, TPH, VOC, and lead soil detections are co-located and are mostly present in the non-native fill areas.
- The as-built sampling density for soil and soil gas exceeded the depths and density approved in the Work Plan. Soil gas sampling in the Site has clearly defined the nature of VOC impacts.
- None of the deep borings showed continuous TPH/PAH/VOC contamination. Impact was found to terminate at a maximum depth of approximately 37.5 ft at a small number of grid locations (A1 and A2).
- The tight clayey silt layer encountered consistently below the Site is affected by VOC/naphthalene across the Site, which is in line with off-site impacts immediately to the north at the Los Angeles City Asphalt Plant (Ninyo and Moore, 2006, as cited in Parsons, 2015).
- Results from this investigation show no active source of VOC impact down to the identified clayey silt layer starting at 80 feet bgs within the Site.
- Groundwater was not encountered during the course of this investigation at the completed maximum depth of 92 feet bgs. However, an isolated patch of saturated soil was encountered at B4-2 at 90.25 feet bgs. This saturated interval appears to be spatially limited and has not been encountered in any other deep boring during this investigation.
- Elevated levels of VOCs in soil gas were identified on Site during the investigation. Since the buildings are currently not occupied, the potential for vapor intrusion into onsite buildings evaluation of indoor air was not necessary. If SoCalGas were to decide to occupy the buildings in the future, it would be prudent, at that point in time, to evaluate the potential significance of the vapor intrusion pathway for those buildings.

[2] Note that the findings presented in this section correspond to the findings as presented in the SIR (Parsons, 2015), and thus represent the findings from the entire Site (not just the exposed soils).

3.0 DATA EVALUATION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

This section discusses the analytic data collected during the SI and the COPCs selected for inclusion in the HHRA.

3.1 Data Evaluation

Analytical data collected during the SI, as discussed in Section 2.0, are evaluated for use in the HHRA. As there are only two shallow soil samples locations that are unpaved (soil sampling locations F1-1 and F3-3), four nearby shallow samples that are actually covered with asphalt or concrete were additionally included to create a more robust exposed soil (0-2 feet bgs) sample dataset.[3] These exposed soil data and all soil gas data collected during the SI are included in the dataset used in the quantitative HHRA and are compiled and presented in Attachment A.

3.2 Selection of Chemicals of Potential Concern

The selection of COPCs for the quantitative HHRA was based on guidance provided by USEPA (1989) and Cal/EPA (1997). In general, all chemicals detected in the soil and soil gas samples were initially included in the quantitative HHRA.

<u>Carcinogenic Polycyclic Aromatic Hydrocarbons</u>
Concentrations of carcinogenic polycyclic aromatic hydrocarbons (CPAHs [4]) at the Site were compared to ambient levels. As CPAHs are virtually ubiquitous in surface soils, a comparison to ambient concentrations is one method useful in the determination of whether there are significant concentrations of CPAHs at a site compared to ambient concentrations.

A dataset of ambient concentrations for CPAHs developed for the southern California area was used in this HHRA for comparison. Background concentrations for CPAHs were determined using larger datasets developed for the southern California area. Southern California Edison (SCE) and SoCalGas have made available background sampling results from 20 different former MGP Sites located in the southern California area. The details of this study are presented in a report (ENVIRON, 2002); subsequently DTSC has issued an Advisory (Cal/EPA, 2009a) that supports the use of the CPAH background dataset as a tool for assessing CPAH impacts and making remediation decisions for CPAHs at sites.

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[3] Exposed soil (0-2 feet bgs) data include data collected at or near the exposed soil areas of the Site (i.e., between Buildings 12 and 13 and to the north and east of Building 8) and include the following six sampling locations: F1-1, F2-1, F3-1, F3-3, F3-5, and F4-1. No soil samples representative of exposed soil between Buildings 11 and 12 were collected.

[4] Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene are collectively referred to as CPAHs. The concentrations of these CPAHs were converted into B(a)P equivalent concentrations for purposes of assessing potential health risks associated with CPAHs in soils. Although naphthalene is also carcinogenic, it is a volatile PAH and thus, is evaluated separately in this HHRA.

The arithmetic mean and the 95% UCL of the mean of the background CPAH dataset, in B(a)P equivalents, are 0.16 milligrams per kilogram (mg/kg) and 0.24 mg/kg, respectively. Calculated B(a)P equivalent values in the background dataset range from non-detect (ND) (<0.00076 mg/kg) to 4.1 mg/kg. As indicated in Table 1, the UCL for B(a)P equivalents in exposed area (0-2 feet bgs) soil are above the UCL of the background dataset of 0.24 mg/kg, and therefore CPAHs were retained as a COPC and included in the quantitative HHRA.

Total Petroleum Hydrocarbons

Various mixtures of TPH have been reported in soil including TPH-d, TPH-g, and TPH-mo (Table 1). Risks to human health associated with the presence of TPH have historically been assessed by evaluating the significance of individual chemical constituents within the TPH mixtures (e.g., BTEX and PAHs) (Cal/EPA, 1994). However, for this HHRA, the TPH product mixtures, specifically, TPH-g, TPH-d, and TPH-mo, are also separately evaluated in accordance with the revised, Interim Final Preliminary Endangerment Assessment (PEA) Guidance manual (Cal/EPA, 2013). As described in detail in Section 5.3 below, toxicity criteria for use with the TPH product mixtures in soil are developed using toxicity information for specific aliphatic and aromatic hydrocarbon fractions found within each mixture.

Summary of Chemicals of Potential Concern

Chemicals that are included in the quantitative HHRA for soil and soil gas datasets are summarized below:

- Exposed Area Soil (0-2 feet bgs) (Table 1): The COPCs detected in exposed area soil (0-2 feet bgs) that are included in the quantitative HHRA are as follows: TPH (diesel, gasoline, and motor oil ranges), various PAHs, and various inorganics; and
- Soil Gas (Table 2): All VOCs detected in soil gas are included in the quantitative HHRA as COPCs and are as follows: 1,1,1-trichloroethane, 1,1-dichloroethane, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 4-ethyltoluene, acetone, benzene, carbon disulfide, chloroform, cis-1,2-dichloroethene, dichlorodifluoromethane (Freon 12), ethylbenzene, m,p-xylenes, naphthalene, o-xylene, styrene, PCE, toluene, TCE, trichlorfluoromethane (Freon 11), and vinyl chloride.

4.0 EXPOSURE ASSESSMENT

To determine whether the levels of chemicals present in soil and soil gas at the Site would pose a risk to human populations, it is necessary to identify the populations that may potentially be exposed to the chemicals present in soil and soil gas, and determine the pathways by which the exposures may occur. Identification of the potentially exposed populations requires an evaluation of the current land use of the Site.

Once the potentially exposed populations are identified, the complete exposure pathways by which the individuals may contact chemicals present in soil and soil gas must be determined. As the purpose of this HHRA is to assess whether the current conditions pose a risk to either onsite or offsite commercial workers, the HHRA focuses exclusively on the exposure pathways that would be complete, under current conditions, for these populations.

The following section presents a discussion of the chemical sources and potential transport mechanisms, identifies the potentially exposed populations and complete exposure pathways, discusses the human intake assumptions used in the HHRA, and summarizes the methodology for estimating representative exposure concentrations.

4.1 Chemical Sources and Potential Release Mechanisms

Onsite activities associated with the historical operations of the MGP at the Site may have resulted in limited release of chemicals to the soil. These limited releases are indicated by the detection of certain chemicals, particularly PAHs and TPH, in the soil and soil gas during the Site investigation activities. Post-MGP operations at the Site, together with industrial operations at adjoining properties, may also have resulted in chemical releases, and thus post-MGP activities could also be responsible for impacts identified during the site investigation, particularly the presence of PCE in soil gas.

4.2 Identification of Potentially Exposed Populations

As described above, the goal for the HHRA is to ensure that chemicals present at the Site would not pose an unacceptable risk to the health of current populations. Accordingly, the sole focus of the HHRA is on those exposure pathways that would be considered complete for the current land-use scenario.

As mentioned previously in Section 2.1, the Site is currently owned and occupied by SoCalGas and onsite buildings are unoccupied. The Site is bounded by East Olympic Boulevard to the north, commercial properties and South Santa Fe Avenue to the west, railroad tracks to the east, and an unnamed alley and commercial properties to the south. The Los Angeles River is located to the east of the railroad tracks and within 500 feet of the Property limits. The Site and the area are zoned for commercial/heavy industry. The Site is almost entirely paved with asphalt, with a few small areas of exposed soil between Buildings 11 and 12, Buildings 12 and 13, and to the north and east of Building 8.

Under current land use, commercial workers infrequently working at the Site could potentially be exposed to chemicals present at the Site. Workers do not continuously occupy the Site; rather, they may come, on a weekly or biweekly basis, to the Treatment Storage Disposal Facility (TSDF) to drop off or pick up materials (identified on Figure 2 as the Excluded Area). In addition to the drop-off/pickup activities, workers conduct weekly inspections of the TSDF facility, lasting, on average, roughly ½ hour per week. Accordingly, as the buildings are unoccupied and the majority of the Site is paved/covered, any exposures to current workers are expected to be very limited in nature. Further, commercial populations working at properties adjacent to the Site could potentially be exposed to chemicals present at the Site.

Based on the current uses of the Site and the current surrounding land use, the populations that are included in the HHRA are the following:

- current onsite commercial worker; and
- current offsite commercial worker (working adjacent to the property).

4.3 Exposure Pathways

The following section identifies the potentially complete exposure pathways through which current populations could be exposed to COPCs detected in soil and soil gas at the Site.

4.3.1 Complete Exposure Pathways

As previously indicated, complete exposure pathways require chemical sources, migration routes, an exposure point for contact, and human exposure routes.

As described above in Section 2.1, under current conditions, the surface of the Site is entirely covered by buildings or asphalt with the exception of limited exposed soil between Buildings11 and 12, 12 and 13 and north and east of Building 8 at the Site. As such, onsite commercial workers may be directly exposed to COPCs in exposed soil via ingestion, and dermal contact during limited infrequent work in these exposed soil areas. Current onsite commercial workers may also be indirectly exposed via inhalation to particulates generated from the exposed soils and to VOCs that could migrate up from the underlying soil into the outdoor air.

Current offsite commercial workers may be exposed to COPCs in exposed soil via inhalation of particulates from onsite exposed soil areas. Current offsite commercial workers may also be indirectly exposed to VOCs that could migrate up from the underlying soil into the indoor air (referred to as the vapor intrusion pathway) and outdoor air. A subset of the soil gas dataset comprising of soil gas sampling locations along the boundary of the Site are used to evaluate potential vapor intrusion for current offsite commercial workers. These boundary soil gas samples are most representative of potential vapor intrusion at offsite buildings.

In sum, based on our review of available Site data and the current Site use, the complete pathways through which current onsite and offsite commercial workers may be exposed to chemicals detected in soil and soil gas at the Site that are quantitatively evaluated in this HHRA include the following:

Current Onsite Commercial Worker

- Inhalation of volatiles migrating from soil up through the soil column, and into outdoor ambient air[5].
- Inhalation of particulates from exposed soil;
- Soil ingestion (i.e., exposed soil); and
- Dermal contact with soil (i.e., exposed soil).

Current Offsite Commercial Worker

- Inhalation of volatiles migrating from soil up through the soil column, and into indoor and outdoor ambient air[3]; and
- Inhalation of particulates from exposed soil.

4.4 Human Intake Assumptions

The route-specific assumptions used to estimate exposure to the chemicals in soil and soil gas at the Site are presented in Table 3. Exposure assumptions are taken from DTSC and USEPA guidance documents, wherever possible, and are cited in Table 3.

As stated above, based on our conversations with representatives from SoCalGas, we understand that the Site is basically unoccupied. Workers may periodically come to the Site to place equipment in storage, but would then leave. Accordingly, and as indicated in Table 3, this HHRA assumes that current workers have direct contact with soil (i.e., incidental ingestion and dermal contact with soil) for one-half hour per week for a total 25 year period. We believe that this Site-specific assumption is reasonable, based on the fact that workers are generally not present onsite, and that the areal extent of exposed soils is so limited.

As described in subsequent sections, the various exposure assumptions are combined to estimate the intake of a chemical through a given route of exposure (e.g., soil ingestion). The route-specific intakes are then combined in order to calculate the total intake, with all exposure pathways combined. The route-specific equations used to calculate chemical intake are presented in Table 4, for the current onsite and offsite commercial workers.

4.5 Estimation of Representative Exposure Concentrations

The following section presents the methods used to estimate the representative concentration of the COPCs in the soil and air to which current populations could be exposed.

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[5] Consistent with current DTSC risk assessment recommendations, the inhalation of VOCs in indoor and outdoor ambient air for commercial worker populations is evaluated using the results of the soil gas data.

As discussed by the USEPA (2002a), an estimate of the risk associated with a given exposure is based on an estimate of the average concentration from the sampling results. Typically, the upper confidence limit (UCL) of the arithmetic mean is used due to the uncertainty associated with estimating the true average concentration at a site. An estimate of the average concentration is used because:

1) carcinogenic and chronic noncarcinogenic toxicity criteria are based on lifetime average exposures; and
2) the average concentration is most representative of the concentration that would be contacted over an extended exposure period (USEPA, 2002a) (i.e., exposure point concentration [EPC]).

The UCL values for each chemical are calculated using USEPA guidance (listed below) and the USEPA statistical program, ProUCL Version 5.0 (USEPA, 2015c). Data for each chemical are analyzed to determine the distribution pattern (e.g., normal, lognormal, or gamma); printouts of ProUCL distribution analysis are included in Attachment B. As most chemical datasets did not fit a normal, lognormal, or gamma distribution pattern, nonparametric methods are used to calculate the UCL. In accordance with USEPA guidance (USEPA, 2013a), UCLs are not calculated for datasets with fewer than four detections or fewer than ten samples. Although the USEPA guidance (USEPA, 2013a) recommends either the use of the mean or the median when there are insufficient detections or number of samples in the dataset, the maximum detected concentration is conservatively used, in general, as the representative EPC in these cases in this HHRA.

The following documents are used for guidance in statistical analysis:

- U.S. Environmental Protection Agency (USEPA). 2002a. *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites*. Office of Emergency and Remedial Response. Washington, D.C. OSWER 9285.6-10. December; and
- U.S. Environmental Protection Agency (USEPA). 2013b. *ProUCL User Guide*. Office of Research and Development. Washington, D.C. EPA/600/R-07/041. September.

The datasets used in estimating exposures to chemicals present in soil and soil gas at the Site are summarized below.

4.5.1 Estimation of COPC Concentrations in Soil

4.5.1.1 Current Onsite and Offsite Commercial Workers

Current onsite and offsite commercial workers may be exposed to the exposed soil via inhalation of particulates. Current onsite commercial workers may also be exposed to exposed soil via direct contact pathways (i.e., soil ingestion and dermal contact) during infrequent site activities.

Summary statistics for COPCs in the exposed soil (0-2 feet bgs) dataset are provided in Table 1. As there were too few exposed soil (0-2 feet bgs) samples to reliably calculate UCLs, the maximum concentration detected was used as the EPC. The concentrations of chemicals in exposed soil that are used as the representative EPCs for evaluating potential exposures to current onsite and offsite commercial workers are presented in Table 5.

4.5.2 Estimation of Air Concentrations Resulting from Emissions from Soil

4.5.2.1 Volatile Organic Compounds

Indoor Air

Volatile compounds have the potential to volatilize from soil into soil gas, and migrate up through the soil column and into the indoor air space of an overlying building. This process is referred to as “vapor intrusion.” Building occupants could then be exposed via inhalation to these volatile compounds present in indoor air.

In general, soil gas data, rather than soil data, are preferred for use in transport modeling of volatile chemicals to indoor air, because soil gas data represent a direct measurement of the gas-phase constituents that may migrate to indoor air. The chemicals detected in soil gas at the Site include: 1,1,1-trichloroethane, 1,1-dichloroethane, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 4-ethyltoluene, acetone, benzene, carbon disulfide, chloroform, cis-1,2-dichloroethene, dichlorodifluoromethane (Freon 12), ethylbenzene, m,p-xylenes, naphthalene, o-xylene, styrene, PCE, toluene, TCE, trichlorfluoromethane (Freon 11), and vinyl chloride.

As previously mentioned, soil gas data collected from the boundary of the Site are used in the HHRA to evaluate the significance of the vapor intrusion pathway for offsite commercial populations. There are 14 boundary soil gas sampling locations at depths ranging from between 5 and 60 feet bgs (i.e., samples collected from 5, 15, 30 and/ or 60 feet bgs).[6], [7] Under the current land use scenario, vapor intrusion is of potential concern for existing offsite buildings, as none of the onsite buildings are occupied. Potential vapor intrusion into the current offsite buildings is evaluated with the Johnson & Ettinger Model equations, considering results of soil gas sampling at all boundary locations and sampling depths (i.e., ranging from 5 to 60 feet bgs) (see Figure 3). As described in detail in Attachment C, potential vapor intrusion into the current offsite buildings is modeled with the equations from the USEPA-recommended Johnson & Ettinger Model for soil gas (SG-SCREEN Version 2.0), as modified by the Cal/EPA DTSC Office of Human and Ecological Risk (HERO) (USEPA, 2004a; Cal/EPA, 2014a) using default soil properties.

In summary, the vapor intrusion pathway is evaluated for current offsite commercial workers. The details of the fate and transport modeling used to estimate concentrations of volatile

[6] Sampling depths are based on the top depth of the soil gas probe screen.
[7] All boundary soil gas samples are considered for evaluating vapor intrusion for the current offsite commercial scenario and include: A1-1, A1-2, A2-1, A3-1, A4-1, A5-1, B1-1, B6-1, C1-1, C6-1, D1-2, D4-2, D5-2, D5-3, E1-1, E4-1, E5-1, F1-2, F4-1, G1-1, G3-1, G4-1, H1-1, and H3-1.

chemicals in indoor air are presented in Attachment C. Physicochemical properties of the COPCs in soil and soil gas are presented in Table 6. The results of the transport modeling are presented in Table 14 for current offsite commercial workers; this table presents the modeled chemical concentration in indoor air associated with each measured chemical concentration in soil gas.

Ambient Air

The HHRA assumes that all receptor populations included in the HHRA could be exposed to volatile chemicals present in outdoor air as a result of transport from soil. Exposure to volatile constituents present in outdoor air could occur via the inhalation pathway. In general, soil gas data, rather than soil or groundwater data, are preferred for use in transport modeling of volatile chemicals to outdoor air, because soil gas data represent a direct measurement of the gas-phase constituents that may migrate to outdoor air.

To evaluate the outdoor air pathway, representative average concentrations are determined for each COPC in soil gas (i.e., detected in soil gas monitoring wells) using all soil gas data combined, including all sampling depths. Specifically, UCL values are calculated for the combined datasets using USEPA guidance and ProUCL[8]; printouts of ProUCL distribution analysis and recommended UCLs are included in Attachment B. As most datasets did not fit a normal, lognormal, or gamma distribution pattern, nonparametric methods are used to calculate the UCLs. Maximum detected concentrations are conservatively used as representative concentrations for any COPCs with insufficient detections to calculate UCLs. Summary statistics for the soil gas dataset are presented in Table 2. The soil gas exposure concentrations used to evaluate potential outdoor air exposures to current onsite and offsite commercial populations are presented in Table 15.

As discussed in Attachment C, transport from soil gas to outdoor air is modeled by assuming steady-state emissions in accordance with American Society of Testing and Materials (ASTM) guidance (ASTM, 1995) and a dispersion factor estimated in accordance with the USEPA Soil Screening Guidance (USEPA, 1996; 2002b). This transport process is characterized by the “transfer factor” (TF), which is defined as the volatile chemical concentration in onsite outdoor air (CA) divided by the volatile chemical concentration in soil gas (CSG). Thus, the concentration of a volatile-phase chemical in outdoor air may be expressed as a function of the chemical concentration in soil gas and the TF:

$$\mathrm{CA}\left(\mathrm{mg/m^3}\right) = \mathrm{CSG}\left(\mathrm{mg/m^3}\right) \times \mathrm{TF}$$

Chemical- and depth-specific TFs are developed as described in Attachment C, and are applied to the results of soil gas sampling. The results of this transport modeling from soil gas to outdoor air is presented in Table 15 for current onsite and offsite commercial populations; this

[8] UCLs are not calculated for soil gas datasets with fewer than four detections or 10 samples; such datasets are not considered sufficiently large enough for ProUCL to reliably evaluate a specific data population (USEPA, 2013a).

table presents the modeled chemical concentration in onsite outdoor air associated with each measured chemical concentration in soil gas.

The HHRA assumes that, under the current land use scenario, volatile chemicals emitted from soil gas to onsite outdoor air are further transported via advection (*i.e.*, wind) offsite, where offsite commercial receptors could be exposed via inhalation. It is conservatively assumed that this *offsite* commercial receptor is exposed to volatile chemicals at their estimated concentrations in *onsite* outdoor air. In actuality, the concentrations of volatile chemicals in outdoor air would likely be lower at offsite locations than onsite, due to dispersion.

4.5.2.2 Particulate Emissions

The HHRA assumes that current onsite and offsite commercial workers included in the health risk assessment could be exposed to particulate-phase chemicals present in outdoor air as a result of transport from Site soil (*i.e.*, chemicals adhered to airborne dust particles). In general, the concentration of a particulate-phase chemical in air (CA) is the product of the concentration of dust in air (CD) and the concentration of the chemical in soils (CS):

$$\mathrm{CA}\left(\mathrm{mg/m^3}\right) = \mathrm{CD}\left(\mathrm{mg/m^3}\right) \times \mathrm{CS}\left(\mathrm{mg/kg}\right) \times 10^{-6}\left(\mathrm{kg/mg}\right)$$

Thus, for a given concentration of a chemical in soil (CS), a determination of the concentration of that chemical in air (CA) requires a determination of the dust concentration in air (CD). In the context of modeling chemical transport from soils to outdoor air, the concentration of dust in air is expressed through the particulate emission factor (PEF). As defined by the USEPA Soil Screening Guidance (USEPA, 1996; 2002b), the PEF has units of cubic meters of air per kilogram of dust (m^3/kg), and is therefore equal to the reciprocal of the dust concentration:

$$\mathrm{PEF}\left(\mathrm{m^3/kg}\right) = \frac{1}{\mathrm{CD}\left(\mathrm{mg/m^3}\right)} \times 10^{+6}\left(\mathrm{mg/kg}\right)$$

Combining the preceding two equations, the concentration of a particulate-phase chemical in outdoor air may be expressed as a function of the chemical concentration in soil and the PEF:

$$\mathrm{CA}\left(\mathrm{mg/m^3}\right) = \frac{\mathrm{CS}\left(\mathrm{mg/kg}\right)}{\mathrm{PEF}\left(\mathrm{m^3/kg}\right)}$$

The chemical concentration in soil (CS) used to estimate the chemical concentration in air (CA) for a particular receptor is the EPC in soil for that receptor.

For commercial receptor populations, the dust concentration in air is assumed to be attributable to wind erosion. Wind erosion is modeled in accordance with the PEF methodology presented in the USEPA Soil Screening Guidance (USEPA, 1996; 2002b). The details of this calculation are described in Attachment C. Calculated PEFs and particulate-phase chemical concentrations in outdoor air are presented in Table 5 for current onsite and offsite commercial workers.

5.0 TOXICITY ASSESSMENT

The toxicity assessment characterizes the relationship between the magnitude of exposure to a chemical and the potential for adverse health effects. More specifically, the toxicity assessment identifies or derives toxicity values that can be used to estimate the likelihood of adverse health effects occurring in humans at different exposure levels. Consistent with regulatory risk assessment policy, adverse health effects resulting from chemical exposures are evaluated in two categories: carcinogenic effects and noncarcinogenic effects. All toxicity values used in the HHRA for COPCs in soils and soil gas are presented in Table 7. For evaluation of lead exposures, the traditional RfD approach is not applied, because most human health effects data are based on blood lead concentrations, rather than external dose (Cal/EPA, 2011).

5.1 Toxicity Assessment for Carcinogenic Effects

Current health risk assessment practice for carcinogens is based on the assumption that, for most substances, there is no threshold dose below which carcinogenic effects do not occur. This current "no-threshold" assumption for carcinogenic effects is based on an assumption that the carcinogenic processes are the same at high and low doses. This approach has generally been adopted by regulatory agencies as a conservative practice to protect public health, and the "no-threshold" assumption has been used in the agency-derived cancer slope factors (CSFs) and Unit Risk Factors (URFs) used in this HHRA. Although the magnitude of the risk declines with decreasing exposure, the risk is believed to be zero only at zero exposure.

The toxicity values used to quantify the response potency of a potential carcinogen are the following:

- The CSF, used in assessing the oral route of exposure, represents the excess lifetime cancer risk due to a continuous, constant lifetime exposure to a specified level of a carcinogen generally reported as excess incremental cancer risk per milligram of chemical per kilogram body weight per day $(mg/kg\text{-}day)^{-1}$.
- The URF, used to assess the inhalation route of exposure, represents the excess lifetime cancer risk due to a continuous, constant lifetime exposure to a specified level of a carcinogen in the air, generally reported as excess incremental cancer risk per microgram of chemical per cubic meter of air $(\mu g/m^3)^{-1}$; URFs are reported as excess incremental cancer risk per milligram of chemical per cubic meter of air $([mg/m^3]^{-1})$ in Table 7 for risk calculation purposes.

The Cal/EPA and USEPA have published a list of CSFs and URFs recommended for use in risk assessments. Consistent with DTSC's approach to evaluating potential vapor intrusion health risks (Cal/EPA 2014b), toxicity values for carcinogenic effects used in this HHRA were selected as the more conservative values obtained from either the Cal/EPA Office of Environmental Health Hazard Assessment (OEHHA) Toxicity Criteria Database (Cal/EPA 2015) or the USEPA Integrated Risk Information System (IRIS) on-line database (USEPA 2015b). In the absence of carcinogenic toxicity criteria from these sources, Provisional Peer-Reviewed Toxicity Values (PPRTVs) developed by the National Center of Environmental Assessment (NCEA)/Superfund

Health Risk Technical Support Center (STSC) (NCEA/STSC 2015) were used as an additional resource as recommended by the USEPA (2003a).

Table 7 presents the CSFs and URFs used in this HHRA. As indicated, COPCs in soil and soil gas at the Site that are currently regulated as carcinogens include: benzene, chloroform, ethylbenzene, tetrachloroethene, trichloroethene, vinyl chloride, naphthalene, B(a)P equivalents (inclusive of benzo(a)anthracene, B(a)P, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene), cobalt (via inhalation only), and nickel (via inhalation only).

5.2 Toxicity Assessment for Noncarcinogenic Effects

The toxicity assessment for noncarcinogenic effects requires the estimation of an exposure level below which no adverse health effects in humans are expected to occur. USEPA refers to these levels as reference doses (RfDs) for oral exposures and reference concentrations (RfCs) for inhalation exposures (USEPA, 1989). The noncancer RfD represents a dose, given in milligrams of chemical per kilogram of body weight per day (mg/kg/day), that would not be expected to cause adverse noncancer health effects in potentially exposed populations. The noncancer RfD is often referred to as the "acceptable dose." The noncancer RfC represents the airborne concentration (in units of milligrams per cubic meter [mg/m^3]) that would not be expected to cause adverse noncancer health effects in populations exposed through the inhalation pathway. OEHHA refers to these "acceptable air concentrations" as Reference Exposure Levels (RELs). As the inhalation RfCs/RELs are derived from inhalation toxicity studies, they are used for evaluating inhalation exposures (USEPA, 1989). Noncancer toxicity values used (i.e., RfDs and RfCs) correspond to those listed and recommended by Cal/EPA and USEPA.

Consistent with DTSC HERO's approach (Cal/EPA, 2014a), the more conservative RfD/REL and RfC/REL obtained from either OEHHA's list of chronic RELs (Cal/EPA, 2015) or USEPA's sources listed below are used in this HHRA.

As recommended by USEPA (USEPA, 2003a), the hierarchy of USEPA toxicity values for noncarcinogenic effects for the oral and inhalation exposures (i.e., RfDs and RfCs, respectively) used in this HHRA is as follows:

1. The USEPA-recommended RfDs and RfCs as maintained on the USEPA's IRIS on-line database (USEPA, 2015a);
2. The NCEA/STSC-recommended PPRTVs (as cited in USEPA, 2015b or USEPA, 2004b); and
3. Agency for Toxic Substances Disease Registry (ATSDR) Minimal Risk Levels (MRLs) (ATSDR, 2015) or other USEPA toxicity values as recommended or provided for specific chemicals in the USEPA Regional Screening Levels (RSLs) Table (USEPA, 2015b) or the USEPA Region IX Preliminary Remediation Goal (PRG) Table (USEPA, 2004b) (e.g., Health Effects Assessment Summary Tables [HEAST] toxicity values [USEPA, 1997]).

All noncarcinogenic toxicity values used in this risk assessment for COPCs in soil and soil gas at the Site are presented in Table 7.

5.3 Toxicity Assessment for Total Petroleum Hydrocarbons

Toxicity criteria for use with TPH product mixtures such as TPH-d, TPH-g, and TPH-mo are not available from the DTSC, OEHHA, or USEPA. However, noncancer toxicity criteria (i.e., RfDs and RfCs) have been developed for specific groups of aliphatic and aromatic hydrocarbons, notably for the following by the Total Petroleum Hydrocarbon Working Group (TPHCWG, 1997) and Massachusetts Department of Environmental Protection (MADEP; 2002):

- C5-C8 aliphatics
- C9-C18 aliphatics
- C9-C16 aromatics
- C19-C32 aliphatics
- C17-C32 aromatics

To evaluate noncancer hazards associated with potential exposures to the various TPH product mixtures reported in soil at the Site, noncancer toxicity criteria are developed for the various mixtures by: 1) determining percentages and weight fractions of the aforementioned specific groups of aliphatic and aromatic hydrocarbon ranges associated with each mixture; and 2) using this information to calculate weighted criteria for the mixtures from the criteria for the specific aliphatic and aromatic hydrocarbon range groups. Noncancer toxicity criteria are specifically developed for TPH-d, TPH-g, and TPH-mo in soil.

The development of the weighted noncancer toxicity criteria for the TPH product mixtures in soil, including the assumed percentages and weight fractions of aliphatic and aromatic hydrocarbons and the toxicity criteria selected for the aliphatic and aromatic hydrocarbon range groups, is presented in Attachment D. The weighted noncancer toxicity criteria developed for the TPH product mixtures used in the HHRAs are presented in Table 7.

5.4 Toxicity Assessment for Lead

The traditional RfD approach to the evaluation of chemicals is not applied to lead because most human health effects data are based on blood lead concentrations, rather than external dose (Cal/EPA, 2011). Blood lead concentration is an integrated measure of internal dose, reflecting total exposure from Site-related and background sources. A clear "no observed effects level" (NOEL) has not been established for such lead-related health effects endpoints such as birth weight, gestation period, heme synthesis and neurobehavioral development in children and fetuses, and blood pressure in middle-aged men. The Cal/EPA OEHHA has developed a 1 micrograms per deciliter (µg/dL) benchmark for source-specific incremental change in blood lead levels for protection of school children and fetuses (OEHHA, 2007).

The USEPA has developed a methodology for evaluating exposure and the potential for adverse health effects resulting from nonresidential exposure to lead in the environment, in

Recommendations of the Technical Review Workgroup for Lead for an Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil (TRW ALM; USEPA, 2003b). The methodology results in a blood lead concentration of concern for the protection of fetal health (in women of child-bearing age) and presents an algorithm for predicting quasi-steady state blood lead concentrations among adults who have relatively steady patterns of site exposure. DTSChas provided a spreadsheet (LeadSpread) that contains a modified version of USEPA's ALM which incorporates DTSC recommendations for evaluating current onsite commercial worker exposures to lead in exposed soil (0-2 feet bgs).

Per DTSC's current recommendation, the DTSC LeadSpread worksheets were used for evaluating commercial exposure to lead in soil, based on the benchmark change in blood level concentration of 1 µg/dL for the fetus of an adult worker (based on blood lead concentration at the 90th percentile, estimated using ALM).

Finally, to evaluate potential lead-in-air impacts for current offsite commercial workers, estimated average concentrations of lead-in-air were compared to the California Ambient Air Quality Standard (CAAQS) of 1.5 µg/m^3 (30-day average) (Cal/EPA, 2009b) and the National Ambient Air Quality Standard (NAAQS) of 0.15 µg/m^3 (90-day average) (USEPA, 2014). The average concentration of lead in air was estimated using the EPC for lead in exposed soil (0-2 feet bgs), 616 mg/kg (Table 1), and the PEF described in Section 4.5.2.2.

The results of the lead evaluation for the onsite and offsite commercial populations are discussed in the Risk Characterization section below.

6.0 RISK CHARACTERIZATION

This section of the HHRA presents the quantitative characterization of risks posed by the COPCs identified in soil and soil gas at the Site and the uncertainties associated with the projected risks.

This section is divided into three parts. The first part discusses the methodology used in calculating potential health risks to exposed populations posed by the presence of chemicals in the soil and soil gas. The second part presents the estimated cumulative potential incremental cancer risk and noncancer hazard posed by the presence of COPCs in soil and soil gas. The third and final part of this section presents the summary and conclusions of the risk characterization. A detailed discussion of uncertainties associated with the HHRA is presented in Attachment E.

6.1 Methodology

Estimating incremental cancer risks and noncancer hazard indices for exposures to chemicals in soil and soil gas requires information regarding chemical concentrations in the various media, the level of intake of the chemical, and the relationship between intake of the chemical and its toxicity as a function of human exposure to the chemical. The methodology used to derive the incremental cancer risks and noncancer hazard indices for the selected chemicals of concern is based principally on guidance provided in the regulatory documents listed below.

- U.S. Environmental Protection Agency (USEPA). 1989. *Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part A). Interim Final*. Office of Emergency and Remedial Response. EPA/540/1-89/002. Washington, D.C. December;
- U.S. Environmental Protection Agency (USEPA). 1991. *Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. Supplemental Guidance. Standard Default Exposure Factors.* Office of Emergency and Remedial Response. March 25;
- U.S. Environmental Protection Agency (USEPA). 2009. *Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment). Final.* OSWER Directive 9285.7-82. EPA-540-R1-070-002. January;
- California Environmental Protection Agency (Cal/EPA). 2013. *Preliminary Endangerment Assessment Manual,* Interim Final. Department of Toxic Substances Control (DTSC). October; and
- California Environmental Protection Agency (Cal/EPA). 2014b. *DTSC/Office of Human and Ecological Risk (HERO) Human Health Risk Assessment (HHRA) Note Number 1. Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Hazardous Waste Sites and Permitted Facilities.* Department of Toxic Substances Control. September 30.

The sections below present the equations used to derive the incremental cancer risks and noncancer hazard indices for the selected COPCs.

6.1.1 Carcinogenic Health Effects

The equations below describe the established relationship between estimated intake, toxicity, and risk for carcinogenic health effects. For carcinogenic effects, the relationship for the ingestion and dermal contact of soil pathways is given by the following equation (USEPA, 1989):

$$\text{Cancer Risk} = \text{CDI} \times \text{CSF}$$

Where:

Cancer Risk	=	Cancer risk; the incremental probability of an individual developing cancer as a result of exposure to a particular cumulative dose of a potential carcinogen (unitless);
CDI	=	Chronic Daily Intake of a chemical (mg chemical/kg body weight-day); and
CSF	=	Cancer Slope Factor; the toxicity value which indicates the upper limit on lifetime incremental cancer risk per unit of dose of chemical (mg chemical/kg body weight-day)$^{-1}$.

For carcinogenic effects, the relationship for the inhalation pathway is given by the following equation (USEPA, 2009):

$$\text{Cancer Risk} = \text{EC} \times \text{URF}$$

Where:

Cancer Risk	=	Cancer risk; the incremental probability of an individual developing cancer as a result of exposure to a particular cumulative concentration of a potential carcinogen (unitless);
EC	=	Exposure Concentration of a chemical (mg chemical/m^3 air); and
URF	=	Unit Risk Factor; the toxicity value which indicates the upper limit on lifetime incremental cancer risk per unit of concentration of chemical (mg chemical/m^3 air)$^{-1}$.

The formulas for developing the CDIs and ECs used in this evaluation are presented in Table 4. The calculated CDIs and ECs for the current onsite and offsite commercial populations for exposure to carcinogenic chemicals in soil are presented in Table 8.

Estimated incremental cancer risks associated with exposure to carcinogenic chemicals in soil for the current onsite and offsite commercial populations evaluated in this HHRA are presented in Table 10.

Estimated incremental cancer risks associated with exposure to carcinogenic VOCs in soil gas via inhalation of vapors in indoor and outdoor air for exposure scenarios evaluated in this HHRA are presented in the following tables:

- Table 14: current offsite commercial scenario, indoor air (vapor intrusion) risks; and
- Table 15: current onsite and offsite commercial worker scenarios, outdoor air risks;

As a point of reference, we note that the National Contingency Plan (NCP) (40 Code of Federal Regulations [CFR] 300) indicates that lifetime incremental cancer risks posed by a site should not exceed a range of one in one million (1×10^{-6}) to one hundred in a million (1×10^{-4}). Cal/EPA's point of departure for excess incremental lifetime cancer risk for all receptor groups is 1×10^{-6}, and risk management decisions may raise this criterion dependent on site specific conditions. For instance, the "target" cancer risk typically used by Cal/EPA and USEPA in determining the need for mitigation is 1×10^{-5} for commercial populations on commercial sites.

6.1.2 Noncarcinogenic Health Effects

The equations below describe the established relationship between estimated intake, toxicity, and risk for noncarcinogenic health effects. For noncarcinogenic effects, the relationship for the ingestion and dermal contact of soil pathways is given by the following equation (USEPA, 1989a):

$$\text{Hazard Quotient} = \text{CDI/RfD}$$
$$\text{Hazard Index} = \sum \text{Hazard Quotient}$$

Where:

Hazard Quotient	=	Hazard Quotient (HQ); an expression of the potential for a chemical to cause noncarcinogenic effects, which relates the allowable amount of a chemical (RfD) to the estimated Site-specific intake (unitless);
Hazard Index	=	Hazard Index (HI); the sum of the chemical-specific Hazard Quotients, which represents the cumulative potential for predicted exposures to result in noncarcinogenic effects (unitless);
CDI	=	Chronic Daily Intake of a chemical (mg chemical/kg body weight-day); and
RfD	=	Reference dose; the toxicity value indicating the threshold amount of chemical contacted below which no adverse health effects are expected (mg chemical/kg body weight-day).

For noncarcinogenic effects, the relationship for the inhalation pathway is given by the following equation (USEPA, 2009):

$$\text{Hazard Quotient} = \text{EC/RfC}$$
$$\text{Hazard Index} = \sum \text{Hazard Quotient}$$

Where:

Hazard Quotient	=	HQ; an expression of the potential for a chemical to cause noncarcinogenic effects, which relates the allowable concentration of a chemical (reference concentration [RfC]) to the estimated site-specific exposure concentration (unitless);
Hazard Index	=	HI; the sum of the chemical-specific Hazard Quotients, which represents the cumulative potential for predicted exposures to result in noncarcinogenic effects (unitless);
EC	=	Exposure Concentration of a chemical (mg chemical/m^3 air); and
RfC	=	Reference concentration; the toxicity value indicating the threshold concentration of chemical contacted below which no adverse health effects are expected (mg chemical/m^3 air).

The formulas for developing the CDIs and ECs used in this evaluation are presented in Table 4. The calculated CDIs and ECs for the current onsite and offsite commercial populations for exposure to noncarcinogenic chemicals in soil are presented in Table 9.

Estimated noncancer hazard indices associated with exposure to noncarcinogenic chemicals in soil for the current onsite and offsite commercial populations are presented in Table 11.

Estimated noncancer hazard indices associated with exposure to noncarcinogenic VOCs in soil gas via inhalation of vapors in indoor and outdoor air are presented in the following tables:

- Table 14: current offsite commercial scenario, indoor air (vapor intrusion) hazard indices; and
- Table 15: current onsite and offsite commercial worker scenarios, outdoor air hazard indices.

For noncancer health effects, an HI of less than or equal to 1 implies that the intake for a given population and chemical is less than or equal to levels where adverse noncancer health effects could occur. For noncancer health hazards, an HI of 1 is identified as the target level of concern. Chemical exposures that yield hazard indices of less than or equal to 1 are not expected to result in adverse noncancer health effects (USEPA, 1989).

6.2 Results of Cancer Risk and Noncancer Hazard Assessment

This section presents the results of the incremental cancer risk and noncancer hazard estimates for exposures to COPCs in soil and soil gas under the current land-use scenarios. The current land-use scenarios include the onsite and offsite commercial worker scenarios.

As previously indicated, the incremental cancer risks and noncancer hazards estimated under the exposure scenarios evaluated in this HHRA are presented in Tables 10, 11, 14, and 15. Also, result of the risk evaluation for lead in soil for the current onsite commercial worker using the

ALM is presented in Table 12. Results of the estimation of lead in air for the current offsite commercial worker are presented in Table 13.

6.2.1 Current Land-Use Scenarios

Onsite Commercial Worker

The estimated incremental cancer risks and noncancer HIs for the current onsite commercial worker posed by the presence of COPCs in exposed soil (0-2 feet bgs) and soil gas are summarized in the following table:

Media	Cancer Risk	Noncancer HI
Exposed Soil (0-2 feet bgs)	7.9E-06	0.0068
Soil Gas (outdoor air)	2.0E-07 (Average)	0.0061 (Average)
Cumulative	8.1E-06	0.013

Soil

As indicated in Table 10, the estimated total incremental cancer risk from COPCs in exposed soil (0-2 feet bgs) for current commercial workers is 7.9 x 10^{-6}, which is above the lower end of the acceptable cancer risk range of 1 x 10^{-6} to 1 x 10^{-4}, but below the "target" cancer risk of 1 x 10^{-5} typically used by Cal/EPA and USEPA in determining the need for mitigation in commercial settings. Nearly all of the estimated total incremental cancer risk for current commercial workers is attributable to CPAHs (expressed as B(a)P equivalents, 6.8 x 10^{-6}) in exposed soil (0-2 feet bgs), and approximately 100% of the estimated risk is attributable to the direct contact pathways (i.e., dermal contact and soil ingestion). More specifically, approximately 94% of the estimated total incremental cancer risk is attributable to the dermal contact pathway and 6% to the ingestion pathway.

As indicated in Table 11, the estimated total noncancer hazard from COPCs in exposed soil (0-2 feet bgs) for current commercial workers is 0.0068, which is below the acceptable HI of 1. Approximately 27%, 16%, 14%, 11%, 10%, 4%, and 4% of the estimated total noncancer HI for the current commercial worker is attributable to TPH-mo, cobalt, TPH-d, nickel, cyanide, vanadium, and pyrene, respectively. Approximately 67%, 21%, and 12% of the estimated total HI from soil for the current commercial worker is attributable to the dermal contact, inhalation of particulates, and ingestion pathways, respectively.

We note that potential direct exposure to exposed soil by the onsite commercial worker is likely overestimated in this HHRA. As previously stated, the majority of the Site is paved/covered and commercial workers are present at the site for only very limited periods to conduct specific activities (i.e., they may come, on a weekly or biweekly basis, to the TSDF to drop off or pick up materials and/or conduct weekly inspections of the TSDF facility, lasting, on average, roughly ½ hour per week). Additionally, the extent of exposed soils at the Site is extremely limited. Given the type of activities conducted by worker at the Site, it is unlikely that there would be any routine direct contact with these limited exposed soils present at the Site. Thus, the estimated cancer risk and noncancer HI associated with direct soil contact are likely overestimated and are lower than presented in this HHRA.

Soil Gas: Outdoor Air
The estimated incremental cancer risk and noncancer HI for the current onsite commercial worker from outdoor air VOC exposures were estimated using representative outdoor air EPCs modeled from representative soil gas concentrations (i.e., UCL or maximum concentration) based on data from all soil gas sampling locations. As shown in Table 15, the estimated incremental cancer risk and noncancer HI for the current onsite commercial workers from VOCs in outdoor air from soil gas are 2.0×10^{-7} and 0.0061, respectively. The estimated incremental cancer risk is well below the lower end of the acceptable range of 1×10^{-6} to 1×10^{-4}, and the estimated noncancer HI is well below the acceptable HI of 1.

Cumulative Incremental Cancer Risks and Noncancer HIs
In sum, the estimated cumulative incremental cancer risk and noncancer HI for the current onsite commercial worker from COPCs in exposed soil (0-2 feet bgs) and soil gas are 8.1×10^{-6} and 0.013, respectively. The estimated incremental cancer risk is slightly above the lower end of the acceptable cancer risk range of 1×10^{-6} to 1×10^{-4}, but below the “target” cancer risk of 1×10^{-5} typically used by Cal/EPA and USEPA in determining the need for mitigation in commercial settings. The estimated noncancer HI is below the acceptable HI of 1.

Lead Risk Assessment
As shown in Table 12, the EPC for lead of 616 mg/kg in exposed soil (0-2 feet bgs) results in an estimated increase in the blood lead level of 0.013 μg/dL in the fetus of the current onsite commercial worker, which is well below OEHHA’s benchmark value of 1 μg/dL.

Offsite Commercial Worker

The estimated incremental cancer risk and noncancer HI for the current offsite commercial population posed by the presence of COPCs in exposed soil (0-2 feet bgs) and soil gas are summarized in the following table:

Media	Cancer Risk	Noncancer HI
Exposed Soil (0-2 feet bgs)	1.2E-08	0.0014
Soil Gas (vapor intrusion)	2.1E-06 (Maximum)	0.028 (Maximum)
Soil Gas (outdoor air)	2.0E-07 (Average)	0.0061 (Average)
Cumulative	2.3E-06	0.036

Soil

As indicated in Table 10, the estimated total incremental cancer risk from COPCs in exposed soil (0-2 feet bgs) for current offsite commercial workers is 1.2 x 10^{-8}, which is well below the lower end of the acceptable cancer risk range of 1 x 10^{-6} to 1 x 10^{-4} and the "target" cancer risk of 1 x 10^{-5} typically used by Cal/EPA and USEPA in determining the need for mitigation in commercial settings. Approximately 74%, 19%, and 7% of the estimated total incremental cancer risk for current offsite commercial workers is attributable to cobalt (9.1 x 10^{-9}), CPAHs (expressed as B(a)P equivalents, 2.3 x 10^{-9}), and nickel (8.7 x 10^{-10}) in exposed soil (0-2 feet bgs), respectively.

As indicated in Table 11, the estimated total noncancer hazard from COPCs in exposed soil (0-2 feet bgs) for current offsite commercial workers is 0.0014, which is well below the acceptable HI of 1. Approximately 47%, 33%, 10%, and 9% of the estimated total noncancer HI for the current offsite commercial worker is attributable to nickel, cobalt, barium, and vanadium, respectively.

Soil Gas: Vapor Intrusion

As shown in Table 14, the estimated incremental cancer risks for the current offsite commercial worker from the vapor intrusion pathway range from 4.3 x 10^{-9} (F1-2 at 15 feet bgs) to 2.1 x 10^{-6} (C1-1 at 5 feet bgs, primarily driven by PCE). Estimated noncancer HIs range from 0.00012 (F1-2 at 15 feet bgs) to 0.028 (C1-1 at 5 feet bgs). The estimated maximum incremental cancer risk is slightly above the lower end, but well within the acceptable range of 1 x 10^{-6} to 1 x 10^{-4}, and below the "target" cancer risk of 1 x 10^{-5} typically used by Cal/EPA and USEPA in determining the need for mitigation in commercial settings. The estimated maximum noncancer HI is below the acceptable HI of 1.

One other soil gas sample had an estimated incremental cancer risk at the lower end of the acceptable cancer risk range of 1 x 10^{-6} to 1 x 10^{-4}, D1-2 at 5 feet bgs, primarily driven by PCE.

As requested by DTSC, additional soil gas sampling will be conducted on the southern boundary of the Site to confirm the lateral extent of VOC impacts in soil gas (DTSC 2015). Once received, the additional soil gas data will be evaluated to confirm the conclusions presented in this HHRA that offsite vapor intrusion does not pose a significant potential health risk to offsite commercial workers.

Soil Gas: Outdoor Air

The estimated incremental cancer risk and noncancer HI for the current offsite commercial worker from outdoor air VOC exposures were estimated using representative outdoor air EPCs modeled from representative soil gas concentrations (i.e., UCL or maximum concentration) based on data from all soil gas sampling locations. As shown in Table 15, the estimated incremental cancer risk and noncancer HI for the current offsite commercial worker from inhalation exposure to VOCs measured in soil gas that could be present in outdoor air are 2.0 x 10^{-7} and 0.0061, respectively. The estimated incremental cancer risk is well below both the lower end of the acceptable range of 1 x 10^{-6} to 1 x 10^{-4} and the "target" cancer risk of 1 x 10^{-5} typically used by Cal/EPA and USEPA in determining the need for mitigation for commercial sites, and the estimated noncancer HI is well below the acceptable HI of 1.

Cumulative Incremental Cancer Risks and Noncancer HIs
In sum, the estimated cumulative incremental cancer risk and noncancer HI for the current offsite commercial worker from COPCs in exposed soil (0-2 feet bgs) and soil gas are 2.3 x 10^{-6} and 0.036, respectively. The estimated incremental cancer risk is slightly above the lower end of the acceptable cancer risk range of 1 x 10^{-6} to 1 x 10^{-4}, but below the "target" cancer risk of 1 x 10^{-5} typically used by Cal/EPA and USEPA in determining the need for mitigation in commercial settings. The estimated noncancer HI is below the acceptable HI of 1.

As discussed in Section 5.4, to evaluate potential lead-in-air impacts for offsite commercial workers, estimated 30- and 90-day average concentrations of lead in air were based on the EPC for lead exposed soil (0-2 feet bgs). The estimated airborne concentration of lead is 0.00098 $\mu g/m^3$, which is below the relevant 30-day average CAAQS (1.5 $\mu g/m^3$) or 90-day average NAAQS (0.15 $\mu g/m^3$).

6.2.2 Uncertainties in Risk Characterization

The risk assessment includes several uncertainties that warrant discussion. Many of the assumptions used in this risk assessment, regarding the representativeness of the sampling data, human exposures, fate and transport modeling, and chemical toxicity are conservative, following agency guidance, and reflect a 90th or 95th percentile value, rather than a typical or average value. The use of several conservative exposure and toxicity assumptions can introduce considerable uncertainty into the risk assessment. By using conservative exposure or toxicity estimates, the assessment can develop a significant conservative bias that may result in the calculation of significantly higher cancer risks or noncancer hazards than are actually posed by the chemicals present in soil and soil gas. A discussion of the key uncertainties used in this evaluation for the Site is discussed in Attachment E.

6.3 Summary and Conclusions

An HHRA was conducted to determine whether the levels of chemicals detected at the Site would pose a risk to human health to either current onsite or offsite populations who could potentially be exposed to chemicals present in soil or soil gas at the Site.

The HHRA is intended to be conservative, resulting in projected estimates of health risks that are likely higher than the actual risks that may be posed by the Site. The human receptors that could potentially be impacted through use of the Site are identified and included in the evaluation. Exposed soil and all soil gas data collected during the SI are included in the datasets used in the quantitative HHRA. Chemicals detected in exposed soil within the top 2 feet bgs are included in the evaluation. All VOCs detected in soil gas are included in the evaluation. The detected concentrations at each Site boundary soil gas sample location and depth are used to estimate the concentrations that could be present in the indoor air of an adjacent commercial building as a result of vapor intrusion. For outdoor air exposure, the average concentrations of VOCs in soil gas are used to estimate the concentrations of VOCs that could be present in outdoor air to which human populations may be exposed. The quantitative risk results and corresponding conclusions for the current onsite offsite land use scenarios are summarized below.

6.3.1 Current Onsite Commercial Worker Scenario

The results of this HHRA indicate that none of the COPCs detected in soil gas at the Site pose a significant potential health risk to current onsite commercial workers. Estimated incremental cancer risks associated with COPCs in soil gas for the current onsite commercial worker based on soil gas sampling data are well below the lower end of the acceptable cancer risk range of 1×10^{-6} to 1×10^{-4} and the "target" cancer risk of 1×10^{-5} typically used by Cal/EPA and USEPA in determining the need for mitigation in commercial settings. Further, the estimated noncancer hazards for the current onsite commercial worker are below the acceptable HI of 1.

The estimated incremental cancer risk associated with COPCs in soil for the current onsite commercial population is above the lower end of the acceptable risk range of 1×10^{-6} to 1×10^{-4}, but below the "target" cancer risk of 1×10^{-5} typically used by Cal/EPA and USEPA in determining the need for mitigation in commercial settings, due principally to the presence of CPAHs. The estimated noncancer hazard for the current onsite commercial populations is below the acceptable HI of 1. The levels of lead in soils at the Site are not expected to result in an increase in the blood lead level in the fetus of the current onsite commercial worker above OEHHA's benchmark value of 1 μg/dL.

Accordingly current conditions at the Site are fully protective of current onsite commercial populations.

We note that the HHRA did not conduct an onsite vapor intrusion evaluation, as none of the onsite buildings are currently occupied. If SoCalGas were to decide to occupy the buildings in the future, it would be prudent, at that point in time, to evaluate the potential significance of the vapor intrusion pathway for those buildings. There is a land use restriction currently on the property, and a soil management plan will be prepared to ensure that the paved surfaces remain paved, any subsurface intrusive work is conducted in a manner that is fully protective of the health of the workers, and any impacted soil is managed appropriately.

6.3.2 Current Offsite Commercial Worker Scenario

The results of the HHRA indicate that none of the COPCs detected in soil gas at the Site pose a significant potential health risk to current offsite commercial populations working nearby the Site. Estimated incremental cancer risks associated with COPCs in soil gas for the offsite commercial populations are only slightly above the lower end of the acceptable cancer risk range of 1×10^{-6} to 1×10^{-4} and are well below the "target" cancer risk of 1×10^{-5} typically used by Cal/EPA and USEPA in determining the need for mitigation in commercial settings. Further, the estimated noncancer hazards associated with COPCs in soil gas for current offsite commercial workers are well below the acceptable HI of 1.

The estimated incremental cancer risk associated with COPCs in soil for the current offsite commercial population is well below the lower end of the acceptable risk range of 1×10^{-6} to 1×10^{-4} and the "target" cancer risk of 1×10^{-5} typically used by Cal/EPA and USEPA in determining the need for mitigation in commercial settings. The estimated noncancer hazard for the current offsite commercial populations is well below the acceptable HI of 1. The levels of lead in soils at the Site result in predicted air concentrations of lead that are below the CAAQS and NAAQS.

Accordingly current conditions at the Site are fully protective of current offsite commercial populations.

As requested by DTSC, additional soil gas sampling will be conducted on the southern boundary of the Site to confirm the lateral extent of VOC impacts in soil gas (DTSC 2015). Once received, the additional soil gas data will be evaluated to confirm the conclusions presented in this HHRA that offsite vapor intrusion does not pose a significant potential health risk to offsite commercial workers.

7.0 REFERENCES

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TABLES

TABLE 1
Summary of Chemicals Included in the Risk Assessment: Exposed Soil (0-2 feet bgs)
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical	Detection Frequency (Detections/ Samples Analyzed)	Range of Detected Site Concentrations (mg/kg)	Arithmetic Mean [a] (mg/kg)	UCL of Site Concentrations [b] (mg/kg)	Background Detection Frequency (Detections/ Samples Analyzed)	Range of Background Concentrations (mg/kg)	UCL of Background Concentrations (mg/kg)	Included in Risk Assessment [c]
Total Petroleum Hydrocarbons								
TPH-Diesel	6 / 6	19 - 411	111	NC	--	--	--	**Yes**
TPH-Gasoline	2 / 6	0.11 - 3.6	0.65	NC	--	--	--	**Yes**
TPH-Motor Oil	6 / 6	79 - 2,130	575	NC	--	--	--	**Yes**
Polycyclic Aromatic Hydrocarbons								
Acenaphthene	3 / 6	0.032 - 0.32	0.12	NC	--	--	--	**Yes**
Acenaphthylene	4 / 6	0.055 - 0.57	0.26	NC	--	--	--	**Yes**
Anthracene	5 / 6	0.027 - 1.2	0.44	NC	--	--	--	**Yes**
Benzo(a)Anthracene [d]	6 / 6	0.098 - 5.8	1.7	NC	--	--	--	**Yes**
Benzo(a)Pyrene [d]	6 / 6	0.61 - 13	4.0	NC	--	--	--	**Yes**
Benzo(b)Fluoranthene [d]	6 / 6	0.34 - 4.6	1.7	NC	--	--	--	**Yes**
Benzo(g,h,i)Perylene	6 / 6	2.3 - 27	8.4	NC	--	--	--	**Yes**
Benzo(k)Fluoranthene [d]	6 / 6	0.18 - 3.5	1.1	NC	--	--	--	**Yes**
Chrysene [d]	6 / 6	0.31 - 8.8	2.8	NC	--	--	--	**Yes**
Dibenz(a,h)Anthracene [d]	0 / 6	ND	NC	NC	--	--	--	**Yes** [g]
Fluoranthene	6 / 6	0.61 - 23	6.4	NC	--	--	--	**Yes**
Fluorene	4 / 6	0.037 - 1.0	0.29	NC	--	--	--	**Yes**
Indeno(1,2,3-c,d)Pyrene [d]	6 / 6	0.61 - 10	3.4	NC	--	--	--	**Yes**
Naphthalene	6 / 6	0.071 - 0.69	0.31	NC	--	--	--	**Yes**
Phenanthrene	6 / 6	0.30 - 16	5.2	NC	--	--	--	**Yes**
Pyrene	6 / 6	1.1 - 43	12	NC	--	--	--	**Yes**
Carcinogenic Polycyclic Aromatic Hydrocarbons								
Benzo(a)pyrene Equivalent [e]	6 / 6	0.74 - 16	4.9	NC	156/185	0.00076 - 4.1	0.24 [f]	**Yes**
Inorganics								
Antimony	0 / 6	ND	NC	NC	--	--	--	No
Arsenic	0 / 6	ND	NC	NC	--	--	--	No
Barium	6 / 6	46 - 192	125	NC	--	--	--	**Yes**
Beryllium	0 / 6	ND	NC	NC	--	--	--	No
Cadmium	0 / 6	ND	NC	NC	--	--	--	No
Chromium	6 / 6	7.5 - 18	12	NC	--	--	--	**Yes**
Cobalt	6 / 6	3.3 - 7.8	5.5	NC	--	--	--	**Yes**

TABLE 1
Summary of Chemicals Included in the Risk Assessment: Exposed Soil (0-2 feet bgs)
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical	**Detection Frequency (Detections/ Samples Analyzed)**	**Range of Detected Site Concentrations (mg/kg)**	**Arithmetic Mean [a] (mg/kg)**	**UCL of Site Concentrations [b] (mg/kg)**	**Background Detection Frequency (Detections/ Samples Analyzed)**	**Range of Background Concentrations (mg/kg)**	**UCL of Background Concentrations (mg/kg)**	**Included in Risk Assessment [c]**
Copper	6 / 6	20 - 149	68	NC	--	--	--	**Yes**
Cyanide	1 / 1	3.2	3.2	NC	--	--	--	**Yes**
Lead	6 / 6	55 - 616	245	NC	--	--	--	**Yes**
Mercury	4 / 6	0.20 - 0.47	0.25	NC	--	--	--	**Yes**
Molybdenum	0 / 6	ND	NC	NC	--	--	--	No
Nickel	6 / 6	5.0 - 26	12	NC	--	--	--	**Yes**
Selenium	0 / 6	ND	NC	NC	--	--	--	No
Silver	0 / 6	ND	NC	NC	--	--	--	No
Thallium	0 / 6	ND	NC	NC	--	--	--	No
Vanadium	6 / 6	17 - 37	27	NC	--	--	--	**Yes**
Zinc	6 / 6	59 - 311	177	NC	--	--	--	**Yes**

TABLE 1
Summary of Chemicals Included in the Risk Assessment: Exposed Soil (0-2 feet bgs)
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Notes:

mg/kg = milligrams per kilogram.

NC = Not calculated. For upper confidence limits (UCLs), in order for ProUCL 5.0 to reliably evaluate a specific data population (e.g., dataset of concentrations of a particular chemical measured at the Site), the population must include at least ten results including at least four detections (United States Environmental Protection Agency [USEPA], 2013).

ND = Not detected.

-- = Not analyzed for.

[a] Arithmetic means derived using one-half the reporting limit values for non-detect results.

[b] UCLs derived using ProUCL 5.0 (USEPA, 2015); ProUCL output is presented in Attachment B.

[c] Carcinogenic polycyclic aromatic hydrocarbons (PAHs) were included in the risk assessment if either the maximum detected concentration or the UCL is above maximum detected concentration or UCL in the background data set, respectively. All detected inorganics were included in the risk assessment as no background data were collected for screening purposes. All other chemicals (i.e., TPH and other PAHs) were included in the risk assessment if they were ever detected in soil.

[d] Carcinogenic PAH.

[e] Benzo(a)pyrene equivalent concentrations for carcinogenic PAHs calculated for each sample using Potency Equivalency Factors (PEF) developed by California Environmental Protection Agency (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA) (Cal/EPA, 1993, 2002) and recommended in Cal/EPA guidance (2011).

[f] Represents the 95% UCL of the ambient, carcinogenic PAH data set for Southern California (ENVIRON, 2002; Cal/EPA, 2009).

[g] Dibenz(a,h)anthracene included in the HHRA expressed as benzo(a)pyrene equivalent.

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TABLE 2
Summary of Chemicals Included in the Risk Assessment: Soil Gas
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical	Detection Frequency (Detections / Samples Analyzed)	Range of Detected Concentrations (mg/m^3)	Arithmetic Mean [a] (mg/m^3)	UCL of Site Concentrations [b] (mg/m^3)	Included in Risk Assessment [c]
Volatile Organic Chemicals					
1,1,1-Trichloroethane	21 / 92	0.0047 - 0.051	0.0050	0.0057	**Yes**
1,1,2,2-Tetrachloroethane	0 / 92	ND	ND	NC	No
1,1,2-Trichloroethane	0 / 92	ND	ND	NC	No
1,1,2-Trichlorotrifluoroethane (Freon 113)	0 / 92	ND	ND	NC	No
1,1-Dichloroethane	0 / 92	ND	ND	NC	No
1,1-Dichloroethene	3 / 92	0.0024 - 0.021	0.0025	NC	**Yes**
1,2,4-Trichlorobenzene	0 / 92	ND	ND	NC	No
1,2,4-Trimethylbenzene	32 / 92	0.0026 - 11	0.23	1.1	**Yes**
1,2-Dibromoethane (EDB)	0 / 92	ND	ND	NC	No
1,2-Dichlorobenzene	0 / 92	ND	ND	NC	No
1,2-Dichloroethane	0 / 92	ND	ND	NC	No
1,2-Dichloropropane	0 / 92	ND	ND	NC	No
1,2-Dichlorotetrafluoroethane (Freon 114)	0 / 92	ND	ND	NC	No
1,3,5-Trimethylbenzene	18 / 92	0.0026 - 5.2	0.14	0.57	**Yes**
1,3-Dichlorobenzene	0 / 92	ND	ND	NC	No
1,4-Dichlorobenzene	0 / 92	ND	ND	NC	No
2-Butanone (MEK)	0 / 92	ND	ND	NC	No
2-Hexanone	0 / 92	ND	ND	NC	No
2-Propanol	0 / 92	ND	ND	NC	No
4-Ethyltoluene	10 / 92	0.011 - 5.5	0.15	0.28	**Yes**
4-Methyl-2-pentanone (MIBK)	0 / 92	ND	ND	NC	No
Acetone	1 / 92	0.53	0.013	NC	**Yes**
Benzene	31 / 92	0.0018 - 3.4	0.10	0.40	**Yes**
Bromodichloromethane	0 / 92	ND	ND	NC	No

TABLE 2
Summary of Chemicals Included in the Risk Assessment: Soil Gas
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical	**Detection Frequency (Detections / Samples Analyzed)**	**Range of Detected Concentrations (mg/m^3)**	**Arithmetic Mean [a] (mg/m^3)**	**UCL of Site Concentrations [b] (mg/m^3)**	**Included in Risk Assessment [c]**
Bromoform	0 / 92	ND	ND	NC	No
Bromomethane	0 / 92	ND	ND	NC	No
Carbon Disulfide	21 / 92	0.0037 - 0.38	0.025	0.062	**Yes**
Carbon Tetrachloride	0 / 92	ND	ND	NC	No
Chlorobenzene	0 / 92	ND	ND	NC	No
Chloroethane	0 / 92	ND	ND	NC	No
Chloroform	11 / 92	0.0038 - 0.071	0.0041	0.0051	**Yes**
Chloromethane	0 / 92	ND	ND	NC	No
cis-1,2-Dichloroethene	3 / 92	0.083 - 0.12	0.0051	NC	**Yes**
cis-1,3-Dichloropropene	0 / 92	ND	ND	NC	No
Dibromochloromethane	0 / 92	ND	ND	NC	No
Dichlorodifluoromethane (Freon 12)	4 / 92	0.0028 - 0.0061	0.0031	0.0023	**Yes**
Ethylbenzene	25 / 92	0.0027 - 26	0.52	2.4	**Yes**
Hexachlorobutadiene	0 / 92	ND	ND	NC	No
m,p-Xylenes	35 / 92	0.0023 - 13	0.39	1.7	**Yes**
Methyl tert-butyl ether (MTBE)	0 / 92	ND	ND	NC	No
Methylene Chloride	0 / 92	ND	ND	NC	No
Naphthalene	32 / 92	0.0060 - 23	1.1	3.9	**Yes**
o-Xylene	30 / 92	0.0024 - 11	0.21	1.0	**Yes**
Styrene	6 / 92	0.0061 - 0.030	0.0030	0.0030	**Yes**
Tetrachloroethene	87 / 92	0.0067 - 8.3	0.53	1.4	**Yes**
Toluene	55 / 92	0.0021 - 4.7	0.079	0.40	**Yes**
trans-1,2-Dichloroethene	0 / 92	ND	ND	NC	No
trans-1,3-Dichloropropene	0 / 92	ND	ND	NC	No
Trichloroethene	42 / 92	0.0029 - 0.90	0.042	0.100	**Yes**

TABLE 2
Summary of Chemicals Included in the Risk Assessment: Soil Gas
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical	**Detection Frequency (Detections / Samples Analyzed)**	**Range of Detected Concentrations (mg/m^3)**	**Arithmetic Mean [a] (mg/m^3)**	**UCL of Site Concentrations [b] (mg/m^3)**	**Included in Risk Assessment [c]**
Trichlorofluoromethane (Freon 11)	9 / 92	0.0031 - 0.035	0.0040	0.0039	**Yes**
Vinyl Acetate	0 / 92	ND	ND	NC	No
Vinyl Chloride	1 / 92	0.0061	0.0015	NC	**Yes**

Notes:

mg/m^3 = milligrams per cubic meter.

NC = Not calculated. For upper confidence limits (UCLs), in order for ProUCL 5.0 to reliably evaluate a specific data population (e.g., dataset of concentrations of a particular chemical measured at the site), the population must include at least ten results including at least four detections (United States Environmental Protection Agency [USEPA], 2013).

ND = Not detected.

[a] Arithmetic means derived using one-half the reporting limit values for non-detect results.

[b] UCLs derived using ProUCL 5.0 (USEPA, 2015); ProUCL output is presented in Attachment B.

[c] All detected volatile organic compounds (VOCs) in soil gas were included in the risk assessment.

Sources:

United States Environmental Protection Agency (USEPA). 2013. ProUCL Version 5.0.00 Technical Guide. EPA/600/R-07/041. September.

USEPA. 2015. ProUCL Version 5.0.00. Downloaded from: http://www.epa.gov/esd/tsc/software.htm.

TABLE 3
Exposure Parameters
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Exposure Parameter	Symbol	Scenarios		Units
		Current Population		
		Onsite Commercial Worker	Offsite Commercial Worker	
Inhalation of Soil Particulates				
Particulate Emission Factor [a]	PEF	6.3E+08	6.3E+08	m^3/kg
Dermal Contact with Soil				
Surface Area [b]	SA	3,527	NA	cm^2/day
Adherence Factor [c]	AF	0.2	NA	mg/cm^2
Absorption Factor-PAHs [d]	ABS-PAH	0.15	NA	unitless
Absorption Factor-Metals [d]	ABS-Met	0.01	NA	unitless
Absorption Factor-Cyanide [d]	ABS-CN	0.01	NA	unitless
Absorption Factor-Mercury [d]	ABS-Hg	0.01	NA	unitless
Absorption Factor-Organics [d]	ABS-Org	0.1	NA	unitless
Conversion Factor	CF	1.0E-06	NA	kg/mg
Ingestion of Soil				
Ingestion Rate [e]	IR	100	NA	mg/day
Conversion Factor	CF	1.0E-06	NA	kg/mg
Population-Specific Intake Parameters				
Exposure Time	ET	8 [f]	8	hrs/day
Time Conversion Factor	TCF	24	24	hrs/day
Exposure Frequency [g]	EF	250	250	days/yr
Exposure Duration	ED	25 [h]	25 [h]	yrs
Body Weight	BW	80	NA	kg
Averaging Time-Carcinogens	AT_c	25,550	25,550	days
Averaging Time-Noncarcinogens	AT_{nc}	9,125	9,125	days

TABLE 3
Exposure Parameters
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Notes:

cm^2/day	=	centimeters squared per day
days/yr	=	days per year
hrs/day	=	hours per day
kg/mg	=	kilograms per milligram
m^3/kg	=	meters cubed per kilogram
mg/cm^2	=	milligrams per centimeters squared
mg/day	=	milligrams per day
NA	=	Not applicable; parameter not applicable to exposure scenario for exposure pathways evaluated in the HHRA.

[a] For the commercial worker and resident, the particulate emission factor (PEF) is calculated using the equations found in the Soil Screening Guidance (USEPA, 2002), with input parameters as found in

[b] For commercial workers, corresponds to the area of exposed skin of the head, heads, and forearms (USEPA, 2014).

[c] Soil adherence factors for commercial populations recommended by DTSC (Cal/EPA, 2014).

[d] Dermal absorption factors for specific compound classes from Cal/EPA (2013).

[e] Ingestion rates for commercial populations recommended by DTSC (Cal/EPA, 2014).

[f] For the onsite commercial worker, exposure time for direct contact with soil (i.e., dermal contact and ingestion pathway) is infrequent and assumed to be half an hour per week.

[g] For the commercial worker, corresponds to 5 days/week for 50 weeks/year.

[h] An exposure duration of 25 years for commercial populations is recommended by DTSC (Cal/EPA, 2014).

Sources:

California Environmental Protection Agency (Cal/EPA). 2013. *Preliminary Endangerment Assessment Guidance Manual.* Department of Toxic Substances Control (DTSC). Interim Final. October.

Cal/EPA. 2014. *DTSC/HERO Human Health Risk Assessment (HHRA) Note Number 1: Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Hazardous Waste Sites and Permitted Facilities.* Department of Toxic Substances Control (DTSC). September 30.

United States Environmental Protection Agency (USEPA). 2002. *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.* Office of Solid Waste and Emergency Response (OSWER). Washington, DC, December.

USEPA. 2014. *Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors.* OSWER 9200.1-120. February 6.

TABLE 4
Equations Used to Calculate Exposure Concentrations and Chronic Daily Intakes: Commercial Worker Scenario
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Exposure Concentration: Vapor Inhalation

Noncancer

$$EC_{inhv,\ worker,\ nc} = \frac{C_a \times ET \times (1/TCF) \times EF \times ED_{worker}}{AT_{nc,\ worker}}$$

Cancer

$$EC_{inhv,\ worker,\ c} = \frac{C_a \times ET \times (1/TCF) \times EF \times ED_{worker}}{AT_c}$$

where $C_a = C_{sg} \times \alpha$ for soil gas to indoor air pathway

where $C_a = C_{sg} \times TF$ for soil gas to outdoor air pathway

Exposure Concentration: Soil Particulate Inhalation

Noncancer

$$EC_{inhp,\ worker,\ nc} = \frac{C_s \times (1/PEF) \times ET \times 1/(TCF) \times EF \times ED_{worker}}{AT_{nc,\ worker}}$$

Cancer

$$EC_{inhp,\ worker,\ c} = \frac{C_s \times (1/PEF) \times ET \times (1/TCF) \times EF \times ED_{worker}}{ATc}$$

Chronic Daily Intake: Dermal Contact

Noncancer

$$CDI_{derm,\ worker,\ nc} = \frac{C_s \times SA_{worker} \times AF_{worker} \times ABS \times EF \times ED_{worker} \times CF}{BW_{worker} \times AT_{nc,\ worker}}$$

Cancer

$$CDI_{derm,\ worker,\ c} = \frac{C_s \times SA_{worker} \times AF_{worker} \times ABS \times EF \times ED_{worker} \times CF}{BW_{worker} \times AT_c}$$

Chronic Daily Intake: Soil Ingestion

Noncancer

$$CDI_{ing,\ worker,\ nc} = \frac{C_s \times IR_{worker} \times CF \times EF \times ED_{worker}}{BW_{worker} \times AT_{nc,\ worker}}$$

Cancer

$$CDI_{ing,\ worker,\ c} = \frac{C_s \times IR_{worker} \times CF \times EF \times ED_{worker}}{BW_{worker} \times AT_c}$$

TABLE 4
Equations Used to Calculate Exposure Concentrations and Chronic Daily Intakes:
Commercial Worker Scenario
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Where:

ABS =	Absorption Factor [unitless]
α =	Soil Gas-to-Indoor Air Attenuation Factor [unitless]
AF =	Soil to Skin Adherence Factor [mg/cm^2]
AT_c =	Averaging Time for Carcinogenic Compounds [days]
AT_{nc} =	Averaging Time for Noncarcinogenic Compounds [days]
BW =	Body Weight [kg]
C_a =	Concentration of Chemical in Air [mg/m^3]
C_s =	Concentration of Chemical in Soil [mg/kg]
C_{sg} =	Concentration of Chemical in Soil Gas [mg/m^3]
CDI_{derm} =	Chronic Daily Intake: Dermal Contact [$mg_{chemical}/kg_{body\ weight}$-day]
CDI_{ing} =	Chronic Daily Intake: Ingestion [$mg_{chemical}/kg_{body\ weight}$-day]
CF =	Conversion Factor [kg/mg]
EC_{inhp} =	Exposure Concentration: Soil Particulate Inhalation [$mg_{chemical}/m^3{}_{air}$]
EC_{inhv} =	Exposure Concentration: Vapor Inhalation [$mg_{chemical}/m^3{}_{air}$]
ED =	Exposure Duration [years]
EF =	Exposure Frequency [days/year]
ET =	Exposure Time [hours/day]
IR =	Soil Ingestion Rate [mg/day]
PEF =	Soil-to-Air Particulate Emission Factor [m^3/kg]
SA =	Surface Area of Exposed Skin [cm^2/day]
TCF =	Time Conversion Factor [hours/day]
TF =	Soil Gas-to-Air Transfer Factor [$mg/m^{3]}$/[mg/m^3]
worker =	Commercial Worker

TABLE 5
Exposure Point and Predicted Outdoor Air Concentrations for Chemicals of Potential Concern in Exposed Soil (0-2 feet bgs): Current Onsite and Offsite Scenarios
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

	Onsite/Offsite Commercial Worker		
Chemical	**Exposure Point Concentration for Soil (mg/kg) [a]**	**Particulate Emissions Factor (PEF) (m^3/kg)**	**Outdoor Airborne Particulate Concentration (mg/m^3) [b]**
Total Petroleum Hydrocarbons			
TPH-Diesel	4.1E+02	6.3E+08	6.5E-07
TPH-Gasoline	3.6E+00	6.3E+08	5.7E-09
TPH-Motor Oil	2.1E+03	6.3E+08	3.4E-06
Polycyclic Aromatic Hydrocarbons			
Acenaphthene	3.2E-01	6.3E+08	5.1E-10
Acenaphthylene	5.7E-01	6.3E+08	9.0E-10
Anthracene	1.2E+00	6.3E+08	1.8E-09
Benzo(a)anthracene	5.8E+00	6.3E+08	9.1E-09
Benzo(a)pyrene	1.3E+01	6.3E+08	2.1E-08
Benzo(b)fluoranthene	4.6E+00	6.3E+08	7.3E-09
Benzo(g,h,i)perylene	2.7E+01	6.3E+08	4.3E-08
Benzo(k)fluoranthene	3.5E+00	6.3E+08	5.5E-09
Chrysene	8.8E+00	6.3E+08	1.4E-08
Fluoranthene	2.3E+01	6.3E+08	3.6E-08
Fluorene	1.0E+00	6.3E+08	1.6E-09
Indeno(1,2,3-c,d)pyrene	1.0E+01	6.3E+08	1.6E-08
Naphthalene	6.9E-01	6.3E+08	1.1E-09
Phenanthrene	1.6E+01	6.3E+08	2.5E-08
Pyrene	4.3E+01	6.3E+08	6.9E-08
Carcinogenic Polycyclic Aromatic Hydrocarbons			
Benzo(a)pyrene Equivalent	1.6E+01	6.3E+08	2.5E-08
Inorganics			
Barium	1.9E+02	6.3E+08	3.0E-07
Chromium	1.8E+01	6.3E+08	2.8E-08
Cobalt	7.8E+00	6.3E+08	1.2E-08
Copper	1.5E+02	6.3E+08	2.4E-07
Cyanide	3.2E+00	6.3E+08	5.1E-09
Lead	6.2E+02	6.3E+08	9.8E-07
Mercury	4.7E-01	6.3E+08	7.4E-10
Nickel	2.6E+01	6.3E+08	4.1E-08
Vanadium	3.7E+01	6.3E+08	5.8E-08
Zinc	3.1E+02	6.3E+08	4.9E-07

Notes:

m^3/kg = meters cubed per kilogram.
mg/kg = milligrams per kilogram.

[a] The exposure point concentrations (EPCs) for exposed area soil (0-2 feet bgs) dataset are used for the evaluation of direct contact exposure pathways (i.e., ingestion and dermal contact) and inhalation of outdoor air particulates. The maximum detected concentration is used as too few samples are available for USEPA ProUCL 5.0 (2013) to reliably calculate upper confidence limits (UCLs) of the arithmetic mean.

[b] Outdoor air particulate concentration is calculated by dividing the soil EPC by the PEF.

Sources:

United States Environmental Protection Agency (USEPA). 2013. ProUCL Version 5.0.00 Technical Guide. EPA/600/R-07/041. September.

TABLE 6
Chemical Properties for Chemicals of Potential Concern
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical	Diffusivity in air, D_a (cm^2/s)		Diffusivity in water, D_w (cm^2/s)		Henry's Law Constant at Reference Temperature (25° C), H ($atm\text{-}m^3/mol$)		Dimensionless Henry's Law Constant at Reference Temperature (25° C), H' (unitless)		Organic Carbon Partition Coefficient, K_{oc} (cm^3/g)		Pure Component Water Solubility, S (mg/L)		Vapor Pressure, VP (mmHg)		Soil Saturation Concentration, C_{sat} , calculated (mg/kg)
Volatile Organic Compounds															
1,1,1-Trichloroethane	6.5E-02	1	9.6E-06	1	1.7E-02	1	7.0E-01	1	4.4E+01	1	1.3E+03	1	1.3E+02	1	5.2E+02
1,1-Dichloroethene	8.6E-02	1	1.1E-05	1	2.6E-02	1	1.1E+00	1	3.2E+01	1	2.4E+03	1	4.6E+02	1	9.6E+02
1,2,4-Trimethylbenzene	6.1E-02	1	7.9E-06	1	6.2E-03	1	2.5E-01	1	6.1E+02	1	5.7E+01	1	2.4E+00	2	2.1E+02
1,3,5-Trimethylbenzene	6.0E-02	1	7.8E-06	1	8.8E-03	1	3.6E-01	1	6.0E+02	1	4.8E+01	1	3.3E+00	2	1.8E+02
4-Ethyltoluene	6.8E-02	3	7.8E-06	4	5.0E-03	3	2.1E-01	3	1.8E+03	3	9.5E+01	3	3.0E+00	3	NA
Acetone	1.1E-01	1	1.2E-05	1	3.5E-05	1	1.4E-03	1	2.4E+00	1	1.0E+06	1	5.1E+02	1	4.7E+04
Benzene	9.0E-02	1	1.0E-05	1	5.6E-03	1	2.3E-01	1	1.5E+02	1	1.8E+03	1	9.5E+01	1	1.7E+03
Carbon Disulfide	1.1E-01	1	1.3E-05	1	1.4E-02	1	5.9E-01	1	2.2E+01	1	2.2E+03	1	3.6E+02	1	5.5E+02
Chloroform	7.7E-02	1	1.1E-05	1	3.7E-03	1	1.5E-01	1	3.2E+01	1	8.0E+03	1	1.9E+02	1	2.0E+03
cis-1,2-Dichloroethene	8.8E-02	1	1.1E-05	1	4.1E-03	1	1.7E-01	1	4.0E+01	1	6.4E+03	1	1.1E+02	1	1.9E+03
Dichlorodifluoromethane (Freon 12)	7.6E-02	1	1.1E-05	1	3.4E-01	1	1.4E+01	1	4.4E+01	1	2.8E+02	1	1.8E+02	2	6.8E+02
Ethylbenzene	6.8E-02	1	8.5E-06	1	7.9E-03	1	3.2E-01	1	4.5E+02	1	1.7E+02	1	9.5E+00	1	4.7E+02
m,p-Xylenes	6.8E-02	1	8.4E-06	1	7.2E-03	1	2.9E-01	1	3.8E+02	1	1.6E+02	1	8.5E+00	1	3.7E+02
o-Xylene	6.9E-02	1	8.5E-06	1	5.2E-03	1	2.1E-01	1	3.8E+02	1	1.8E+02	1	6.6E+00	1	4.2E+02
Styrene	7.1E-02	1	8.8E-06	1	2.8E-03	1	1.1E-01	1	4.5E+02	1	3.1E+02	1	6.2E+00	1	8.4E+02
Tetrachloroethene	5.0E-02	1	9.5E-06	1	1.8E-02	1	7.2E-01	1	9.5E+01	1	2.1E+02	1	1.7E+01	1	1.5E+02
Toluene	7.8E-02	1	9.2E-06	1	6.6E-03	1	2.7E-01	1	2.3E+02	1	5.3E+02	1	2.9E+01	1	7.8E+02
Trichloroethene	6.9E-02	1	1.0E-05	1	9.9E-03	1	4.0E-01	1	6.1E+01	1	1.3E+03	1	6.6E+01	1	5.9E+02
Trichlorofluoromethane (Freon 11)	6.5E-02	1	1.0E-05	1	9.7E-02	1	4.0E+00	1	4.4E+01	1	1.1E+03	1	5.4E+02	2	1.0E+03
Vinyl Chloride	1.1E-01	1	1.2E-05	1	2.8E-02	1	1.1E+00	1	2.2E+01	1	8.8E+03	1	9.1E+02	1	2.9E+02
Total Petroleum Hydrocarbons															
TPH-Diesel	7.0E-02	5	1.0E-05	5	7.2E-01	5	3.2E+01	5	5.0E+03	5	5.0E+00	5	1.1E-01	6	1.8E+02
TPH-Gasoline	7.0E-02	5	1.0E-05	5	8.0E-01	5	3.3E+01	5	5.0E+03	5	1.5E+02	5	6.4E+01	6	5.2E+03
TPH-Motor Oil	NA		NA		NA		NA		5.0E+03	5	5.0E+00	5	9.6E-08	6	NA

TABLE 6
Chemical Properties for Chemicals of Potential Concern
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical	Diffusivity in air, D_a (cm^2/s)		Diffusivity in water, D_w (cm^2/s)		Henry's Law Constant at Reference Temperature (25° C), H ($atm\text{-}m^3/mol$)		Dimensionless Henry's Law Constant at Reference Temperature (25° C), H' (unitless)		Organic Carbon Partition Coefficient, K_{oc} (cm^3/g)		Pure Component Water Solubility, S (mg/L)		Vapor Pressure, VP (mmHg)		Soil Saturation Concentration, C_{sat} , calculated (mg/kg)
Polycyclic Aromatic Hydrocarbons															
Acenaphthene	5.1E-02	1	8.3E-06	1	1.8E-04	1	7.5E-03	1	5.0E+03	1	3.9E+00	1	2.7E-03	1	1.2E+02
Acenaphthylene	6.6E-02	3	NA		1.1E-04	3	4.7E-03	3	3.6E+03	3	1.6E+01	3	9.1E-04	3	NA
Anthracene	3.9E-02	2	7.9E-06	2	5.6E-05	2	2.3E-03	2	1.6E+04	2	4.3E-02	2	2.7E-06	2	4.3E+00
Benzo(a)anthracene	2.6E-02	2	6.7E-06	2	1.2E-05	2	4.9E-04	2	1.8E+05	2	9.4E-03	2	1.9E-06	3	1.0E+01
Benzo(a)pyrene	4.8E-02	2	5.6E-06	2	4.6E-07	2	1.9E-05	2	5.9E+05	2	1.6E-03	2	5.5E-09	3	NA
Benzo(b)fluoranthene	4.8E-02	1	5.6E-06	1	6.6E-07	1	2.7E-05	1	6.0E+05	1	1.5E-03	1	5.0E-07	1	5.4E+00
Benzo(g,h,i)perylene	5.0E-02	3	NA		3.3E-07	3	1.4E-05	3	1.9E+06	3	2.6E-04	3	2.4E-10	3	NA
Benzo(k)fluoranthene	4.8E-02	2	5.6E-06	2	5.8E-07	2	2.4E-05	2	5.9E+05	2	8.0E-04	2	9.7E+10	3	NA
Chrysene	2.6E-02	1	6.7E-06	1	5.2E-06	1	2.1E-04	1	1.8E+05	1	2.0E-03	1	2.0E-06	1	2.2E+00
Dibenz(a,h)anthracene	4.5E-02	2	5.2E-06	2	1.4E-07	2	5.8E-06	2	1.9E+06	2	2.5E-03	2	1.0E-10	3	NA
Fluoranthene	2.8E-02	2	7.2E-06	2	8.9E-06	2	3.6E-04	2	5.5E+04	2	2.6E-01	2	8.7E-06	3	NA
Fluorene	4.4E-02	1	7.9E-06	1	9.6E-05	1	3.9E-03	1	9.2E+03	1	1.7E+00	1	5.7E-04	1	9.3E+01
Indeno(1,2,3-c,d)pyrene	4.5E-02	2	5.2E-06	2	3.5E-07	2	1.4E-05	2	2.0E+06	2	1.9E-04	2	3.5E-07	3	NA
Naphthalene	6.0E-02	1	8.4E-06	1	4.4E-04	1	1.8E-02	1	1.5E+03	1	3.1E+01	1	8.9E-02	1	2.9E+02
Phenanthrene	6.0E-02	3	NA		4.2E-05	3	1.7E-03	3	1.2E+04	3	1.2E+00	3	1.1E-04	3	NA
Pyrene	2.8E-02	1	7.2E-06	1	1.2E-05	1	4.9E-04	1	5.4E+04	1	1.4E-01	1	5.6E-05	1	4.4E+01
Carcinogenic Polycyclic Aromatic Hydrocarbons															
Benzo(a)pyrene Equivalent [a]	4.8E-02	2	5.6E-06	2	4.6E-07	2	1.9E-05	2	5.9E+05	2	1.6E-03	2	5.5E-09	3	NA
Inorganics															
Barium	NA		NA		NA		NA		NA		NA		NA		NA
Chromium	NA		NA		NA		NA		NA		NA		NA		NA
Cobalt	NA		NA		NA		NA		NA		NA		NA		NA
Copper	NA		NA		NA		NA		NA		NA		NA		NA
Cyanide	NA		NA		NA		NA		NA		NA		NA		NA

TABLE 6
Chemical Properties for Chemicals of Potential Concern
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical	Diffusivity in air, D_a (cm^2/s)		Diffusivity in water, D_w (cm^2/s)		Henry's Law Constant at Reference Temperature (25° C), H ($atm\text{-}m^3/mol$)		Dimensionless Henry's Law Constant at Reference Temperature (25° C), H' (unitless)		Organic Carbon Partition Coefficient, K_{oc} (cm^3/g)		Pure Component Water Solubility, S (mg/L)		Vapor Pressure, VP (mmHg)		Soil Saturation Concentration, C_{sat}, calculated (mg/kg)
Lead	NA		NA		NA		NA		NA		NA		NA		NA
Mercury	NA		NA		NA		NA		NA		NA		NA		NA
Nickel	NA		NA		NA		NA		NA		NA		NA		NA
Vanadium	NA		NA		NA		NA		NA		NA		NA		NA
Zinc	NA		NA		NA		NA		NA		NA		NA		NA

Notes:

NA = Not applicable.

[a] Benzo(a)pyrene values used as surrogate.

Sources:

1. California Environmental Protection Department (Cal/EPA). 2014. Department of Toxic Substances Control (DTSC). Human and Ecological Risk Division (HERD). Johnson and Ettinger screening-level soil gas model contained in Excel spreadsheet "HERD_Soil_Gas_Screening_Model_March2014.xls". Updated December.
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6. Massachusetts Department of Environmental Protection. 2002. *Characterizing Risks Posed by Petroleum Contamination; Implementation of the MADEP VPH/EPH Approach, Final Policy.* October 31.

TABLE 7
Carcinogenic and Noncarcinogenic Toxicity Values for Chemicals of Potential Concern
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical	Unit Risk Factor (URF) $(mg/m^3)^{-1}$		Cancer Slope Factor (CSF) $(mg/kg\text{-}day)^{-1}$		Chronic Reference Concentration (RfC) (mg/m^3)		Chronic Reference Dose (RfD) (mg/kg-day)	
	Inhalation	Source	Oral	Source	Inhalation	Source	Oral	Source
Volatile Organic Compounds								
1,1,1-Trichloroethane	NC	1	NC	1	1.0E+00	1	2.0E+00	2
1,1-Dichloroethene	NC	1	NC	1	7.0E-02	1	5.0E-02	2
1,2,4-Trimethylbenzene	NC	1	NC	1	7.0E-03	3	5.0E-02	4
1,3,5-Trimethylbenzene	NC	1	NC	1	4.0E-02	3a	1.0E-02	3
4-Ethyltoluene	NC	1	NC	1	1.0E-01	2b	2.0E-01	2b
Acetone	NC	1	NC	1	3.1E+01	5	9.0E-01	2
Benzene	2.9E-02	1	1.0E-01	1	3.0E-03	1	4.0E-03	2
Carbon Disulfide	NC	1	NC	1	7.0E-01	2	1.0E-01	2
Chloroform	2.3E-02	2	1.9E-02	1	9.8E-02	5	1.0E-02	2
cis-1,2-Dichloroethene	NC	1	NC	1	8.0E-03	2a	2.0E-03	2
Dichlorodifluoromethane (Freon 12)	NC	1	NC	1	1.0E-01	3	2.0E-01	2
Ethylbenzene	2.5E-03	1	1.1E-02	1	1.0E+00	2	1.0E-01	2
m,p-Xylenes	NC	1	NC	1	1.0E-01	2	2.0E-01	2
o-Xylene	NC	1	NC	1	1.0E-01	2	2.0E-01	2
Styrene	NC	1	NC	1	9.0E-01	1	2.0E-01	2
Tetrachloroethene	5.9E-03	1	5.4E-01	1	3.5E-02	1	6.0E-03	2
Toluene	NC	1	NC	1	3.0E-01	1	8.0E-02	2
Trichloroethene	4.1E-03	2	4.6E-02	2	2.0E-03	2	5.0E-04	2
Trichlorofluoromethane (Freon 11)	NC	1	NC	1	7.0E-01	6	3.0E-01	2
Vinyl Chloride	7.8E-02	1	2.7E-01	1	1.0E-01	2	3.0E-03	2
Total Petroleum Hydrocarbons								
TPH-Diesel	NC	1	NC	1	1.3E-01	7	5.9E-02	7
TPH-Gasoline	NC	1	NC	1	3.3E-01	7	6.0E-02	7
TPH-Motor Oil	NC	1	NC	1	5.9E-01	7	1.5E-01	7
Polycyclic Aromatic Hydrocarbons								
Acenaphthene	NC	1	NC	1	2.4E-01	2a	6.0E-02	2
Acenaphthylene	NC	1	NC	1	2.4E-01	2a	6.0E-02	2c
Anthracene	NC	1	NC	1	1.2E+00	2a	3.0E-01	2
Benzo(a)anthracene	na	1	na	1	1.2E-01	2a	3.0E-02	2d
Benzo(a)pyrene	na	1	na	1	1.2E-01	2a	3.0E-02	2d
Benzo(b)fluoranthene	na	1	na	1	1.2E-01	2a	3.0E-02	2d
Benzo(g,h,i)perylene	NC	1	NC	1	1.2E-01	2a	3.0E-02	2d
Benzo(k)fluoranthene	na	1	na	1	1.2E-01	2a	3.0E-02	2d
Chrysene	na	1	na	1	1.2E-01	2a	3.0E-02	2d
Dibenz(a,h)anthracene [e]	na	1	na	1	1.2E-01	2a	3.0E-02	2d
Fluoranthene	NC	1	NC	1	1.6E-01	2a	4.0E-02	2
Fluorene	NC	1	NC	1	1.6E-01	2a	4.0E-02	2
Indeno(1,2,3-c,d)pyrene	na	1	na	1	1.2E-01	2a	3.0E-02	2d
Naphthalene	3.4E-02	1	1.2E-01	1	3.0E-03	2	2.0E-02	2
Phenanthrene	NC	1	NC	1	1.2E+00	2a	3.0E-01	2e
Pyrene	NC	1	NC	1	1.2E-01	2a	3.0E-02	2
Carcinogenic Polycyclic Aromatic Hydrocarbons								
Benzo(a)pyrene Equivalent	1.1E+00	1	7.3E+00	2	NA	NA	NA	NA
Inorganics								
Barium	NC	1	NC	1	5.0E-04	6	2.0E-01	2
Chromium	NC	1f	NC	1f	6.0E+00	2a,f	1.5E+00	2f
Cobalt	9.0E+00	3	NC	1	6.0E-06	3	3.0E-04	3
Copper	NC	1	NC	1	1.6E-01	6a	4.0E-02	6g
Cyanide	NC	1	NC	1	8.0E-04	2	6.0E-04	2

TABLE 7
Carcinogenic and Noncarcinogenic Toxicity Values for Chemicals of Potential Concern
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical	Unit Risk Factor (URF) $(mg/m^3)^{-1}$		Cancer Slope Factor (CSF) $(mg/kg\text{-}day)^{-1}$		Chronic Reference Concentration (RfC) (mg/m^3)		Chronic Reference Dose (RfD) (mg/kg-day)	
	Inhalation	**Source**	**Oral**	**Source**	**Inhalation**	**Source**	**Oral**	**Source**
Lead	NA	h	NA	h	NA	h	NA	h
Mercury	NC	1	NC	1	3.0E-05	1	1.6E-04	1
Nickel	2.6E-01	1	NC	i	1.4E-05	1	1.1E-02	1
Vanadium	NC	1	NC	1	1.0E-04	5	5.0E-03	8
Zinc	NC	1	NC	1	1.2E+00	2a	3.0E-01	2

Notes:
NA = Not applicable.
NC = Not considered to be a carcinogen.
na = Carcinogenic PAHs (CPAHs) evalauted using benzo(a)pyrene equivalency method for soil.

a Route-to-route extrapolation from reference dose (RfDo) or reference concentration (RfC) using the following equations:
RfC = RfDo / (InhR / BW) or RfDo = RfC / (BW / Inhr), where:
Adult daily inhalation rate (InhR) = 20 m^3/day (Cal/EPA 2014), and
Adult body weight (BW) = 80 kg (Cal/EPA 2014).
b Surrogate value - assumes toxicity for xylenes
c Surrogate value - assumes toxicity for acenaphthene
d Because the USEPA has not developed an RfD for this chemical, the noncancer RfD for pyrene is used as a surrogate value.
e Though dibenz(a,h)anthracene was not detected, it was included in the risk assessment for purposes of calculating benzo(a)pyrene equivalent concentrations for carcinogenic PAHs.
f Toxicity values for Chromium (III).
g The RfD for copper is based on a drinking water standard of 1.3 mg/L.
h Lead exposure is evaluated using Cal/EPA OEHHA's benchmark approach. See text for details.
i This chemical is not considered a carcinogen by the route of ingestion.

Sources:

1. California Environmental Protection Agency (Cal/EPA), Office of Environmental Health Hazard Assessment (OEHHA). 2015. Toxicity Criteria Database. Table of cancer slope factors maintained at http://www.oehha.ca.gov/risk/ChemicalDB/index.asp; table of chronic RELs maintained online at http://www.oehha.ca.gov/air/allrels.html.
2. United States Environmental Protection Agency (USEPA). 2015a. *Integrated Risk Information System Database.* Maintained online at http://www.epa.gov/iris/index.html.
3. Superfund Health Risk Technical Support Center (STSC). 2015. *Provisional Peer Reviewed Toxicity Values* (PPRTV). Maintained online at: http://hhpprtv.ornl.gov/index.html.
4. United States Environmental Protection Agency (USEPA). 2004. *Region IX Preliminary Remediation Goals.* November. Found at http://www.epa.gov/region9/superfund/prg/files/04prgtable.pdf.
5. Agency for Toxic Substances and Disease Registry (ATSDR). 2015. *Minimal Risk Levels (MRLs) List*. Maintained online at: http://www.atsdr.cdc.gov/mrls/mrllist.asp.
6. United States Environmental Protection Agency (USEPA). 1997. *Health Effects Assessment (HEAST) Summary Tables. FY 1997 Update.* July. Office of Solid Waste and Emergency Response (OSWER).
7. Iris Environmental - toxicity value derived using guidance from the Total Petroleum Hydrocarbon Criteria Working Group (see report text).
8. United States Environmental Protection Agency (USEPA). 2015b. From *USEPA Regional Screening Levels for Chemical Contaminants at Superfund Sites*, June 2015. Available at: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm.

TABLE 8
Exposure Concentration and Chronic Daily Intake for Carcinogens in Exposed Soil (0-2 feet bgs): Current Onsite and Offsite Scenarios
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical	Onsite Commercial Worker			Offsite Commercial Worker
	EC: Particulate Inhalation (mg/m^3)	CDI: Dermal Contact (mg/kg-day)	CDI: Ingestion (mg/kg-day)	EC: Particulate Inhalation (mg/m^3)
Total Petroleum Hydrocarbons				
TPH-Diesel	NC	NC	NC	NC
TPH-Gasoline	NC	NC	NC	NC
TPH-Motor Oil	NC	NC	NC	NC
Polycyclic Aromatic Hydrocarbons				
Acenaphthene	NC	NC	NC	NC
Acenaphthylene	NC	NC	NC	NC
Anthracene	NC	NC	NC	NC
Benzo(a)anthracene	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA
Benzo(g,h,i)perylene	NC	NC	NC	NC
Benzo(k)fluoranthene	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA
Fluoranthene	NC	NC	NC	NC
Fluorene	NC	NC	NC	NC
Indeno(1,2,3-c,d)pyrene	NA	NA	NA	NA
Naphthalene	8.9E-11	4.4E-08	2.6E-09	8.9E-11
Phenanthrene	NC	NC	NC	NC
Pyrene	NC	NC	NC	NC
Carcinogenic Polycyclic Aromatic Hydrocarbons				
Benzo(a)pyrene Equivalent	2.0E-09	1.0E-06	6.1E-08	2.0E-09
Inorganics				
Barium	NC	NC	NC	NC
Chromium	NC	NC	NC	NC
Cobalt	1.0E-09	NC	NC	1.0E-09
Copper	NC	NC	NC	NC
Cyanide	NC	NC	NC	NC
Lead	na	na	na	na
Mercury	NC	NC	NC	NC
Nickel	3.3E-09	NC	NC	3.3E-09
Vanadium	NC	NC	NC	NC
Zinc	NC	NC	NC	NC

Notes:
CDI = Chronic Daily Intake.
EC = Exposure Concentration.
mg/m^3 = milligrams per cubic meter.
mg/kg-day = milligrams per kilogram per day.
NA = Not applicable. Carcinogenic PAHs are evaluated using benzo(a)pyrene equivalents.
na = Not applicable. Potential exposure to lead is evaluated using DTSC's Adult Lead Model. Please see text for discussion.
NC = Not considered a carcinogen.

TABLE 9
Exposure Concentration and Chronic Daily Intake for Noncarcinogens in Exposed Soil (0-2 feet bgs): Current Onsite and Offsite Scenarios
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical	Onsite Commercial Worker			Offsite Commercial Worker
	EC: Particulate Inhalation (mg/m^3)	CDI: Dermal Contact (mg/kg-day)	CDI: Ingestion (mg/kg-day)	EC: Particulate Inhalation (mg/m^3)
Total Petroleum Hydrocarbons				
TPH-Diesel	1.5E-07	5.0E-05	4.4E-06	1.5E-07
TPH-Gasoline	1.3E-09	4.4E-07	3.9E-08	1.3E-09
TPH-Motor Oil	7.7E-07	2.6E-04	2.3E-05	7.7E-07
Polycyclic Aromatic Hydrocarbons				
Acenaphthene	1.2E-10	5.9E-08	3.5E-09	1.2E-10
Acenaphthylene	2.1E-10	1.0E-07	6.1E-09	2.1E-10
Anthracene	4.2E-10	2.1E-07	1.2E-08	4.2E-10
Benzo(a)anthracene	2.1E-09	1.0E-06	6.2E-08	2.1E-09
Benzo(a)pyrene	4.8E-09	2.4E-06	1.4E-07	4.8E-09
Benzo(b)fluoranthene	1.7E-09	8.3E-07	4.9E-08	1.7E-09
Benzo(g,h,i)perylene	9.8E-09	4.9E-06	2.9E-07	9.8E-09
Benzo(k)fluoranthene	1.3E-09	6.3E-07	3.7E-08	1.3E-09
Chrysene	3.2E-09	1.6E-06	9.4E-08	3.2E-09
Fluoranthene	8.3E-09	4.2E-06	2.5E-07	8.3E-09
Fluorene	3.8E-10	1.9E-07	1.1E-08	3.8E-10
Indeno(1,2,3-c,d)pyrene	3.8E-09	1.9E-06	1.1E-07	3.8E-09
Naphthalene	2.5E-10	1.2E-07	7.3E-09	2.5E-10
Phenanthrene	5.6E-09	2.8E-06	1.7E-07	5.6E-09
Pyrene	1.6E-08	7.8E-06	4.6E-07	1.6E-08
Carcinogenic Polycyclic Aromatic Hydrocarbons				
Benzo(a)pyrene Equivalent	NA	NA	NA	NA
Inorganics				
Barium	6.9E-08	2.3E-06	2.1E-06	6.9E-08
Chromium	6.4E-09	2.1E-07	1.9E-07	6.4E-09
Cobalt	2.8E-09	9.4E-08	8.4E-08	2.8E-09
Copper	5.4E-08	1.8E-06	1.6E-06	5.4E-08
Cyanide	1.2E-09	3.9E-07	3.4E-08	1.2E-09
Lead	na	na	na	na
Mercury	1.7E-10	5.7E-09	5.0E-09	1.7E-10
Nickel	9.4E-09	3.1E-07	2.8E-07	9.4E-09
Vanadium	1.3E-08	4.5E-07	3.9E-07	1.3E-08
Zinc	1.1E-07	3.8E-06	3.3E-06	1.1E-07

Notes:

CDI = Chronic Daily Intake.
EC = Exposure Concentration.
mg/m^3 = milligrams per cubic meter.
mg/kg-day = milligrams per kilogram per day.
NA = Not applicable. Route-specific toxicity value for this compound was not available.
na = Not applicable. Potential exposure to lead is evaluated using DTSC's Adult Lead Model. Please see text for discussion.

TABLE 10
Estimated Cancer Risks from Exposed Soil (0-2 feet bgs):
Current Onsite and Offsite Scenarios
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical	Onsite Commercial Worker				Offsite Commercial Worker	
	Particulate Inhalation	Dermal Contact	Ingestion	Total Cancer Risk	Particulate Inhalation	Total Cancer Risk
Total Petroleum Hydrocarbons						
TPH-Diesel	NC	NC	NC	NC	NC	NC
TPH-Gasoline	NC	NC	NC	NC	NC	NC
TPH-Motor Oil	NC	NC	NC	NC	NC	NC
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	NC	NC	NC	NC	NC	NC
Acenaphthylene	NC	NC	NC	NC	NC	NC
Anthracene	NC	NC	NC	NC	NC	NC
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	NC	NC	NC	NC	NC	NC
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA
Fluoranthene	NC	NC	NC	NC	NC	NC
Fluorene	NC	NC	NC	NC	NC	NC
Indeno(1,2,3-c,d)pyrene	NA	NA	NA	NA	NA	NA
Naphthalene	3.0E-12	5.3E-09	3.1E-10	5.6E-09	3.0E-12	3.0E-12
Phenanthrene	NC	NC	NC	NC	NC	NC
Pyrene	NC	NC	NC	NC	NC	NC
Carcinogenic Polycyclic Aromatic Hydrocarbons						
Benzo(a)pyrene Equivalent	2.3E-09	7.5E-06	4.4E-07	7.9E-06	2.3E-09	2.3E-09
Inorganics						
Barium	NC	NC	NC	NC	NC	NC
Chromium	NC	NC	NC	NC	NC	NC
Cobalt	9.1E-09	NC	NC	9.1E-09	9.1E-09	9.1E-09
Copper	NC	NC	NC	NC	NC	NC

TABLE 10
Estimated Cancer Risks from Exposed Soil (0-2 feet bgs):
Current Onsite and Offsite Scenarios
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical	Onsite Commercial Worker				Offsite Commercial Worker	
	Particulate Inhalation	Dermal Contact	Ingestion	Total Cancer Risk	Particulate Inhalation	Total Cancer Risk
Cyanide	NC	NC	NC	NC	NC	NC
Lead	na	na	na	na	na	na
Mercury	NC	NC	NC	NC	NC	NC
Nickel	8.7E-10	NC	NC	8.7E-10	8.7E-10	8.7E-10
Vanadium	NC	NC	NC	NC	NC	NC
Zinc	NC	NC	NC	NC	NC	NC
Total Cancer Risk	**1.2E-08**	**7.5E-06**	**4.4E-07**	**7.9E-06**	**1.2E-08**	**1.2E-08**

Notes:
NA = Not applicable as carcinogenic PAHs are evaluated using benzo(a)pyrene equivalents.
na = Not applicable. Potential exposure to lead is evaluated using DTSC's Adult Lead Model. Please see text for discussion.
NC = Not considered a carcinogen.

TABLE 11
Estimated Noncancer Hazard Indices from Exposed Soil (0-2 feet bgs):
Current Onsite and Offsite Scenarios
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical	Onsite Commercial Worker				Offsite Commercial Worker	
	Particulate Inhalation	Dermal Contact	Ingestion	Total Hazard Index	Particulate Inhalation	Total Hazard Index
Total Petroleum Hydrocarbons						
TPH-Diesel	1.1E-06	8.4E-04	7.5E-05	9.2E-04	1.1E-06	1.1E-06
TPH-Gasoline	4.0E-09	7.3E-06	6.5E-07	7.9E-06	4.0E-09	4.0E-09
TPH-Motor Oil	1.3E-06	1.7E-03	1.5E-04	1.9E-03	1.3E-06	1.3E-06
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	4.9E-10	9.8E-07	5.8E-08	1.0E-06	4.9E-10	4.9E-10
Acenaphthylene	8.6E-10	1.7E-06	1.0E-07	1.8E-06	8.6E-10	8.6E-10
Anthracene	3.5E-10	7.0E-07	4.1E-08	7.4E-07	3.5E-10	3.5E-10
Benzo(a)anthracene	1.7E-08	3.5E-05	2.1E-06	3.7E-05	1.7E-08	1.7E-08
Benzo(a)pyrene	4.0E-08	8.0E-05	4.7E-06	8.5E-05	4.0E-08	4.0E-08
Benzo(b)fluoranthene	1.4E-08	2.8E-05	1.6E-06	2.9E-05	1.4E-08	1.4E-08
Benzo(g,h,i)perylene	8.2E-08	1.6E-04	9.7E-06	1.7E-04	8.2E-08	8.2E-08
Benzo(k)fluoranthene	1.0E-08	2.1E-05	1.2E-06	2.2E-05	1.0E-08	1.0E-08
Chrysene	2.7E-08	5.3E-05	3.1E-06	5.7E-05	2.7E-08	2.7E-08
Fluoranthene	5.2E-08	1.0E-04	6.2E-06	1.1E-04	5.2E-08	5.2E-08
Fluorene	2.4E-09	4.7E-06	2.8E-07	5.0E-06	2.4E-09	2.4E-09
Indeno(1,2,3-c,d)pyrene	3.1E-08	6.3E-05	3.7E-06	6.7E-05	3.1E-08	3.1E-08
Naphthalene	8.3E-08	6.2E-06	3.7E-07	6.7E-06	8.3E-08	8.3E-08
Phenanthrene	4.7E-09	9.4E-06	5.5E-07	9.9E-06	4.7E-09	4.7E-09
Pyrene	1.3E-07	2.6E-04	1.5E-05	2.8E-04	1.3E-07	1.3E-07
Inorganics						
Barium	1.4E-04	1.2E-05	1.0E-05	1.6E-04	1.4E-04	1.4E-04
Chromium	1.1E-09	1.4E-07	1.3E-07	2.7E-07	1.1E-09	1.1E-09
Cobalt	4.7E-04	3.1E-04	2.8E-04	1.1E-03	4.7E-04	4.7E-04
Copper	3.4E-07	4.5E-05	4.0E-05	8.5E-05	3.4E-07	3.4E-07
Cyanide	1.4E-06	6.4E-04	5.7E-05	7.0E-04	1.4E-06	1.4E-06
Lead	na	na	na	na	na	na
Mercury	5.7E-06	3.5E-05	3.1E-05	7.2E-05	5.7E-06	5.7E-06

TABLE 11
Estimated Noncancer Hazard Indices from Exposed Soil (0-2 feet bgs):
Current Onsite and Offsite Scenarios
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical	Onsite Commercial Worker				Offsite Commercial Worker	
	Particulate Inhalation	Dermal Contact	Ingestion	Total Hazard Index	Particulate Inhalation	Total Hazard Index
Nickel	6.7E-04	2.8E-05	2.5E-05	7.2E-04	6.7E-04	6.7E-04
Vanadium	1.3E-04	8.9E-05	7.9E-05	3.0E-04	1.3E-04	1.3E-04
Zinc	9.4E-08	1.3E-05	1.1E-05	2.4E-05	9.4E-08	9.4E-08
Total Hazard Index	**1.4E-03**	**4.6E-03**	**8.1E-04**	**6.8E-03**	**1.4E-03**	**1.4E-03**

Notes:
na = Not applicable. Potential exposure to lead is evaluated using DTSC's Adult Lead Model. Please see text for discussion.

TABLE 12
Risk Evaluation for Lead in Exposed Soil (0-2 feet bgs):
Adult Lead Model Output - Current Onsite Scenario
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

MODIFIED VERSION OF USEPA ADULT LEAD MODEL

CALCULATIONS OF BLOOD LEAD CONCENTRATIONS (PbBs) AND PRELIMINARY REMEDIATION GOAL (PRG)

EDIT RED CELL

Variable	Description of Variable	Units	
PbS	Soil lead concentration	ug/g or ppm	616
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9
BKSF	Biokinetic Slope Factor	ug/dL per ug/day	0.4
GSD_i	Geometric standard deviation PbB	--	1.8
PbB_0	Baseline PbB	ug/dL	0.0
IR_S	Soil ingestion rate (including soil-derived indoor dust)	g/day	0.00063 [a]
$AF_{S, D}$	Absorption fraction (same for soil and dust)	--	0.12
$EF_{S, D}$	Exposure frequency (same for soil and dust)	days/yr	250
$AT_{S, D}$	Averaging time (same for soil and dust)	days/yr	365
PbB_{adult}	**PbB of adult worker, geometric mean**	**ug/dL**	**0.013**
$PbB_{fetal, 0.90}$	90th percentile PbB among fetuses of adult workers	ug/dL	0.0
PbB_t	Target PbB level of concern (e.g., 10 ug/dL)	ug/dL	**1.0**
$P(PbB_{fetal} > PbB_t)$	**Probability that fetal PbB > PbB_t, assuming lognormal distribution**	**%**	**0.0%**

PRG90 **25452**

Click here for REFERENCES
Notes:
[a] Soil ingestion rate had been adjusted to account for an exposure time of 0.5 hour onsite, and exposure frequency of 1 day onsite per week.

TABLE 13
Calculation of Lead in Air - Current Offsite Scenario
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Lead in Air

Days	Lead in Unpaved Surface Soil (0 to 2 foot bgs) (CS) (mg/kg)	Lead in Air (CA) ($\mu g/m^3$)
1 - 30 or 1 - 90	616	0.00098

Equations
Days 1 - 30 of 30 day period, and Days 1 - 90 of 90 day period:

$$CA = (CS / PEF_{wind}) \times CF_{mg\text{-}\mu g}$$

where:
CA = lead in air ($\mu g/m^3$)
CS = lead in soil (mg/kg)
PEF_{wind} = particulate emission factor associated with wind erosion (6.3×10^8 m^3/kg), calculated as presented in Attachment C, Table C-6
$CF_{mg\text{-}\mu g}$ = conversion factor from milligrams to micrograms (1000 µg / mg)

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
A1-1	A1-1-5'	6/4/14	5	1,1,1-Trichloroethane	**0.051**	5.9E-04	3.0E-05	NC	6.9E-06	NC	6.9E-06		
A1-1	A1-1-5'	6/4/14	5	1,1-Dichloroethene	**0.0071**	6.8E-04	4.8E-06	NC	1.1E-06	NC	1.6E-05		
A1-1	A1-1-5'	6/4/14	5	1,2,4-Trimethylbenzene	0.00075	5.7E-04	4.3E-07	NC	9.7E-08	NC	1.4E-05		
A1-1	A1-1-5'	6/4/14	5	1,3,5-Trimethylbenzene	0.00075	5.7E-04	4.2E-07	NC	9.7E-08	NC	2.4E-06		
A1-1	A1-1-5'	6/4/14	5	Benzene	0.00050	6.9E-04	3.4E-07	2.8E-08	7.8E-08	8.1E-10	2.6E-05		
A1-1	A1-1-5'	6/4/14	5	Carbon Disulfide	0.00075	7.4E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07		
A1-1	A1-1-5'	6/4/14	5	Chloroform	0.00075	6.4E-04	4.8E-07	3.9E-08	1.1E-07	9.0E-10	1.1E-06		
A1-1	A1-1-5'	6/4/14	5	Dichlorodifluoromethane (Freon 12)	0.0010	6.4E-04	6.4E-07	NC	1.5E-07	NC	1.5E-06		
A1-1	A1-1-5'	6/4/14	5	Ethylbenzene	0.00075	6.1E-04	4.5E-07	3.7E-08	1.0E-07	9.3E-11	1.0E-07		
A1-1	A1-1-5'	6/4/14	5	m,p-Xylenes	0.0010	6.0E-04	6.0E-07	NC	1.4E-07	NC	1.4E-06		
A1-1	A1-1-5'	6/4/14	5	Naphthalene	0.0025	5.7E-04	1.4E-06	1.2E-07	3.2E-07	3.9E-09	1.1E-04		
A1-1	A1-1-5'	6/4/14	5	o-Xylene	0.00050	6.1E-04	3.0E-07	NC	6.9E-08	NC	6.9E-07		
A1-1	A1-1-5'	6/4/14	5	Styrene	0.00075	6.2E-04	4.6E-07	NC	1.1E-07	NC	1.2E-07		
A1-1	A1-1-5'	6/4/14	5	Tetrachloroethene	**1.0**	5.1E-04	5.1E-04	4.2E-05	1.2E-04	2.5E-07	3.3E-03		
A1-1	A1-1-5'	6/4/14	5	Toluene	**0.0078**	6.4E-04	5.0E-06	NC	1.1E-06	NC	3.8E-06		
A1-1	A1-1-5'	6/4/14	5	Trichloroethene	**0.11**	6.1E-04	6.7E-05	5.4E-06	1.5E-05	2.2E-08	7.6E-03		
A1-1	A1-1-5'	6/4/14	5	Trichlorofluoromethane (Freon 11)	**0.010**	5.9E-04	5.9E-06	NC	1.3E-06	NC	1.9E-06	2.7E-07	1.1E-02
A1-1	A1-1-15'	6/4/14	15	1,1,1-Trichloroethane	**0.037**	2.7E-04	1.0E-05	NC	2.3E-06	NC	2.3E-06		
A1-1	A1-1-15'	6/4/14	15	1,1-Dichloroethene	0.00075	3.4E-04	2.5E-07	NC	5.8E-08	NC	8.3E-07		
A1-1	A1-1-15'	6/4/14	15	1,2,4-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	6.3E-06		
A1-1	A1-1-15'	6/4/14	15	1,3,5-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	1.1E-06		
A1-1	A1-1-15'	6/4/14	15	Benzene	0.00050	3.5E-04	1.7E-07	1.4E-08	4.0E-08	4.1E-10	1.3E-05		
A1-1	A1-1-15'	6/4/14	15	Carbon Disulfide	0.00075	3.9E-04	2.9E-07	NC	6.7E-08	NC	9.6E-08		
A1-1	A1-1-15'	6/4/14	15	Chloroform	0.00075	3.1E-04	2.3E-07	1.9E-08	5.3E-08	4.4E-10	5.4E-07		
A1-1	A1-1-15'	6/4/14	15	Dichlorodifluoromethane (Freon 12)	0.0010	3.1E-04	3.1E-07	NC	7.0E-08	NC	7.0E-07		
A1-1	A1-1-15'	6/4/14	15	Ethylbenzene	0.00075	2.8E-04	2.1E-07	1.7E-08	4.9E-08	4.3E-11	4.9E-08		
A1-1	A1-1-15'	6/4/14	15	m,p-Xylenes	0.0010	2.8E-04	2.8E-07	NC	6.5E-08	NC	6.5E-07		
A1-1	A1-1-15'	6/4/14	15	Naphthalene	0.0025	2.6E-04	6.5E-07	5.3E-08	1.5E-07	1.8E-09	4.9E-05		
A1-1	A1-1-15'	6/4/14	15	o-Xylene	0.00050	2.9E-04	1.4E-07	NC	3.3E-08	NC	3.3E-07		
A1-1	A1-1-15'	6/4/14	15	Styrene	0.00075	2.9E-04	2.2E-07	NC	5.0E-08	NC	5.6E-08		
A1-1	A1-1-15'	6/4/14	15	Tetrachloroethene	**0.59**	2.2E-04	1.3E-04	1.1E-05	3.0E-05	6.3E-08	8.6E-04		
A1-1	A1-1-15'	6/4/14	15	Toluene	**0.0040**	3.1E-04	1.3E-06	NC	2.9E-07	NC	9.5E-07		
A1-1	A1-1-15'	6/4/14	15	Trichloroethene	**0.031**	2.8E-04	8.8E-06	7.2E-07	2.0E-06	3.0E-09	1.0E-03		
A1-1	A1-1-15'	6/4/14	15	Trichlorofluoromethane (Freon 11)	**0.0079**	2.7E-04	2.2E-06	NC	4.9E-07	NC	7.1E-07	6.9E-08	1.9E-03

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas:
Current Offsite Scenario
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
A1-2	A1-2-30'	7/23/14	30	1,1,1-Trichloroethane	0.0015	1.5E-04	2.3E-07	NC	5.2E-08	NC	5.2E-08		
A1-2	A1-2-30'	7/23/14	30	1,1-Dichloroethene	0.0015	1.9E-04	2.9E-07	NC	6.6E-08	NC	9.4E-07		
A1-2	A1-2-30'	7/23/14	30	1,2,4-Trimethylbenzene	0.0015	1.4E-04	2.1E-07	NC	4.9E-08	NC	7.0E-06		
A1-2	A1-2-30'	7/23/14	30	1,3,5-Trimethylbenzene	0.0015	1.4E-04	2.1E-07	NC	4.8E-08	NC	1.2E-06		
A1-2	A1-2-30'	7/23/14	30	Benzene	0.0010	2.0E-04	2.0E-07	1.6E-08	4.5E-08	4.7E-10	1.5E-05		
A1-2	A1-2-30'	7/23/14	30	Carbon Disulfide	**0.0041**	2.3E-04	9.4E-07	NC	2.2E-07	NC	3.1E-07		
A1-2	A1-2-30'	7/23/14	30	Chloroform	0.0015	1.8E-04	2.6E-07	2.1E-08	6.0E-08	4.9E-10	6.1E-07		
A1-2	A1-2-30'	7/23/14	30	Dichlorodifluoromethane (Freon 12)	0.0020	1.7E-04	3.5E-07	NC	7.9E-08	NC	7.9E-07		
A1-2	A1-2-30'	7/23/14	30	Ethylbenzene	0.0015	1.6E-04	2.4E-07	1.9E-08	5.4E-08	4.8E-11	5.4E-08		
A1-2	A1-2-30'	7/23/14	30	m,p-Xylenes	0.0020	1.6E-04	3.2E-07	NC	7.2E-08	NC	7.2E-07		
A1-2	A1-2-30'	7/23/14	30	Naphthalene	**0.055**	1.4E-04	7.8E-06	6.4E-07	1.8E-06	2.2E-08	5.9E-04		
A1-2	A1-2-30'	7/23/14	30	o-Xylene	0.0010	1.6E-04	1.6E-07	NC	3.6E-08	NC	3.6E-07		
A1-2	A1-2-30'	7/23/14	30	Styrene	0.0015	1.6E-04	2.5E-07	NC	5.6E-08	NC	6.2E-08		
A1-2	A1-2-30'	7/23/14	30	Tetrachloroethene	**0.29**	1.2E-04	3.5E-05	2.9E-06	8.0E-06	1.7E-08	2.3E-04		
A1-2	A1-2-30'	7/23/14	30	Toluene	0.0010	1.8E-04	1.8E-07	NC	4.0E-08	NC	1.3E-07		
A1-2	A1-2-30'	7/23/14	30	Trichloroethene	0.0015	1.6E-04	2.4E-07	1.9E-08	5.4E-08	8.0E-11	2.7E-05		
A1-2	A1-2-30'	7/23/14	30	Trichlorofluoromethane (Freon 11)	0.0020	1.5E-04	3.0E-07	NC	6.9E-08	NC	9.9E-08	4.0E-08	8.8E-04
A1-2	A1-2-60'	7/23/14	60	1,1,1-Trichloroethane	0.0015	8.0E-05	1.2E-07	NC	2.7E-08	NC	2.7E-08		
A1-2	A1-2-60'	7/23/14	60	1,1-Dichloroethene	0.0015	1.0E-04	1.6E-07	NC	3.6E-08	NC	5.1E-07		
A1-2	A1-2-60'	7/23/14	60	1,2,4-Trimethylbenzene	0.0015	7.5E-05	1.1E-07	NC	2.6E-08	NC	3.7E-06		
A1-2	A1-2-60'	7/23/14	60	1,3,5-Trimethylbenzene	0.0015	7.4E-05	1.1E-07	NC	2.6E-08	NC	6.4E-07		
A1-2	A1-2-60'	7/23/14	60	Benzene	0.0010	1.1E-04	1.1E-07	8.8E-09	2.5E-08	2.5E-10	8.2E-06		
A1-2	A1-2-60'	7/23/14	60	Carbon Disulfide	**0.0037**	1.3E-04	4.7E-07	NC	1.1E-07	NC	1.5E-07		
A1-2	A1-2-60'	7/23/14	60	Chloroform	0.0015	9.4E-05	1.4E-07	1.1E-08	3.2E-08	2.6E-10	3.3E-07		
A1-2	A1-2-60'	7/23/14	60	Dichlorodifluoromethane (Freon 12)	0.0020	9.3E-05	1.9E-07	NC	4.2E-08	NC	4.2E-07		
A1-2	A1-2-60'	7/23/14	60	Ethylbenzene	**0.0067**	8.4E-05	5.6E-07	4.6E-08	1.3E-07	1.1E-10	1.3E-07		
A1-2	A1-2-60'	7/23/14	60	m,p-Xylenes	0.0020	8.4E-05	1.7E-07	NC	3.8E-08	NC	3.8E-07		
A1-2	A1-2-60'	7/23/14	60	Naphthalene	**0.057**	7.5E-05	4.3E-06	3.5E-07	9.7E-07	1.2E-08	3.2E-04		
A1-2	A1-2-60'	7/23/14	60	o-Xylene	0.0010	8.4E-05	8.4E-08	NC	1.9E-08	NC	1.9E-07		
A1-2	A1-2-60'	7/23/14	60	Styrene	0.0015	8.7E-05	1.3E-07	NC	3.0E-08	NC	3.3E-08		
A1-2	A1-2-60'	7/23/14	60	Tetrachloroethene	**0.083**	6.3E-05	5.2E-06	4.3E-07	1.2E-06	2.5E-09	3.4E-05		
A1-2	A1-2-60'	7/23/14	60	Toluene	0.0010	9.5E-05	9.5E-08	NC	2.2E-08	NC	7.2E-08		
A1-2	A1-2-60'	7/23/14	60	Trichloroethene	0.0015	8.4E-05	1.3E-07	1.0E-08	2.9E-08	4.2E-11	1.4E-05		
A1-2	A1-2-60'	7/23/14	60	Trichlorofluoromethane (Freon 11)	0.0020	8.0E-05	1.6E-07	NC	3.7E-08	NC	5.2E-08	1.5E-08	3.9E-04

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas:
Current Offsite Scenario
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
A2-1	A2-1-5'	6/3/14	5	1,1,1-Trichloroethane	0.00075	5.9E-04	4.4E-07	NC	1.0E-07	NC	1.0E-07		
A2-1	A2-1-5'	6/3/14	5	1,1-Dichloroethene	**0.021**	6.8E-04	1.4E-05	NC	3.2E-06	NC	4.6E-05		
A2-1	A2-1-5'	6/3/14	5	1,2,4-Trimethylbenzene	0.00075	5.7E-04	4.3E-07	NC	9.7E-08	NC	1.4E-05		
A2-1	A2-1-5'	6/3/14	5	1,3,5-Trimethylbenzene	0.00075	5.7E-04	4.2E-07	NC	9.7E-08	NC	2.4E-06		
A2-1	A2-1-5'	6/3/14	5	Benzene	0.00050	6.9E-04	3.4E-07	2.8E-08	7.8E-08	8.1E-10	2.6E-05		
A2-1	A2-1-5'	6/3/14	5	Carbon Disulfide	0.00075	7.4E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07		
A2-1	A2-1-5'	6/3/14	5	Chloroform	0.00075	6.4E-04	4.8E-07	3.9E-08	1.1E-07	9.0E-10	1.1E-06		
A2-1	A2-1-5'	6/3/14	5	Dichlorodifluoromethane (Freon 12)	0.0010	6.4E-04	6.4E-07	NC	1.5E-07	NC	1.5E-06		
A2-1	A2-1-5'	6/3/14	5	Ethylbenzene	0.00075	6.1E-04	4.5E-07	3.7E-08	1.0E-07	9.3E-11	1.0E-07		
A2-1	A2-1-5'	6/3/14	5	m,p-Xylenes	0.0010	6.0E-04	6.0E-07	NC	1.4E-07	NC	1.4E-06		
A2-1	A2-1-5'	6/3/14	5	Naphthalene	**0.020**	5.7E-04	1.1E-05	9.3E-07	2.6E-06	3.1E-08	8.6E-04		
A2-1	A2-1-5'	6/3/14	5	o-Xylene	0.00050	6.1E-04	3.0E-07	NC	6.9E-08	NC	6.9E-07		
A2-1	A2-1-5'	6/3/14	5	Styrene	0.00075	6.2E-04	4.6E-07	NC	1.1E-07	NC	1.2E-07		
A2-1	A2-1-5'	6/3/14	5	Tetrachloroethene	**1.9**	5.1E-04	9.7E-04	7.9E-05	2.2E-04	4.7E-07	6.4E-03		
A2-1	A2-1-5'	6/3/14	5	Toluene	0.00050	6.4E-04	3.2E-07	NC	7.4E-08	NC	2.5E-07		
A2-1	A2-1-5'	6/3/14	5	Trichloroethene	**0.29**	6.1E-04	1.8E-04	1.4E-05	4.0E-05	5.9E-08	2.0E-02		
A2-1	A2-1-5'	6/3/14	5	Trichlorofluoromethane (Freon 11)	0.0010	5.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07	5.6E-07	2.7E-02
A2-1	A2-1-15'	6/4/14	15	1,1,1-Trichloroethane	0.00075	2.7E-04	2.0E-07	NC	4.7E-08	NC	4.7E-08		
A2-1	A2-1-15'	6/4/14	15	1,1-Dichloroethene	0.00075	3.4E-04	2.5E-07	NC	5.8E-08	NC	8.3E-07		
A2-1	A2-1-15'	6/4/14	15	1,2,4-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	6.3E-06		
A2-1	A2-1-15'	6/4/14	15	1,3,5-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	1.1E-06		
A2-1	A2-1-15'	6/4/14	15	Benzene	**0.0018**	3.5E-04	6.2E-07	5.1E-08	1.4E-07	1.5E-09	4.8E-05		
A2-1	A2-1-15'	6/4/14	15	Carbon Disulfide	0.00075	3.9E-04	2.9E-07	NC	6.7E-08	NC	9.6E-08		
A2-1	A2-1-15'	6/4/14	15	Chloroform	0.00075	3.1E-04	2.3E-07	1.9E-08	5.3E-08	4.4E-10	5.4E-07		
A2-1	A2-1-15'	6/4/14	15	Dichlorodifluoromethane (Freon 12)	0.0010	3.1E-04	3.1E-07	NC	7.0E-08	NC	7.0E-07		
A2-1	A2-1-15'	6/4/14	15	Ethylbenzene	0.00075	2.8E-04	2.1E-07	1.7E-08	4.9E-08	4.3E-11	4.9E-08		
A2-1	A2-1-15'	6/4/14	15	m,p-Xylenes	0.0010	2.8E-04	2.8E-07	NC	6.5E-08	NC	6.5E-07		
A2-1	A2-1-15'	6/4/14	15	Naphthalene	0.0025	2.6E-04	6.5E-07	5.3E-08	1.5E-07	1.8E-09	4.9E-05		
A2-1	A2-1-15'	6/4/14	15	o-Xylene	0.00050	2.9E-04	1.4E-07	NC	3.3E-08	NC	3.3E-07		
A2-1	A2-1-15'	6/4/14	15	Styrene	0.00075	2.9E-04	2.2E-07	NC	5.0E-08	NC	5.6E-08		
A2-1	A2-1-15'	6/4/14	15	Tetrachloroethene	**0.28**	2.2E-04	6.2E-05	5.1E-06	1.4E-05	3.0E-08	4.1E-04		
A2-1	A2-1-15'	6/4/14	15	Toluene	**0.0021**	3.1E-04	6.6E-07	NC	1.5E-07	NC	5.0E-07		
A2-1	A2-1-15'	6/4/14	15	Trichloroethene	**0.012**	2.8E-04	3.4E-06	2.8E-07	7.8E-07	1.1E-09	3.9E-04		
A2-1	A2-1-15'	6/4/14	15	Trichlorofluoromethane (Freon 11)	0.0010	2.7E-04	2.7E-07	NC	6.3E-08	NC	8.9E-08	3.5E-08	9.1E-04

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
A3-1	A3-1-5'	6/4/14	5	1,1,1-Trichloroethane	0.00075	5.9E-04	4.4E-07	NC	1.0E-07	NC	1.0E-07		
A3-1	A3-1-5'	6/4/14	5	1,1-Dichloroethene	0.00075	6.8E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
A3-1	A3-1-5'	6/4/14	5	1,2,4-Trimethylbenzene	0.00075	5.7E-04	4.3E-07	NC	9.7E-08	NC	1.4E-05		
A3-1	A3-1-5'	6/4/14	5	1,3,5-Trimethylbenzene	0.00075	5.7E-04	4.2E-07	NC	9.7E-08	NC	2.4E-06		
A3-1	A3-1-5'	6/4/14	5	Benzene	**0.0037**	6.9E-04	2.5E-06	2.1E-07	5.8E-07	6.0E-09	1.9E-04		
A3-1	A3-1-5'	6/4/14	5	Carbon Disulfide	0.00075	7.4E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07		
A3-1	A3-1-5'	6/4/14	5	Chloroform	0.00075	6.4E-04	4.8E-07	3.9E-08	1.1E-07	9.0E-10	1.1E-06		
A3-1	A3-1-5'	6/4/14	5	Dichlorodifluoromethane (Freon 12)	0.0010	6.4E-04	6.4E-07	NC	1.5E-07	NC	1.5E-06		
A3-1	A3-1-5'	6/4/14	5	Ethylbenzene	0.00075	6.1E-04	4.5E-07	3.7E-08	1.0E-07	9.3E-11	1.0E-07		
A3-1	A3-1-5'	6/4/14	5	m,p-Xylenes	0.0010	6.0E-04	6.0E-07	NC	1.4E-07	NC	1.4E-06		
A3-1	A3-1-5'	6/4/14	5	Naphthalene	0.0025	5.7E-04	1.4E-06	1.2E-07	3.2E-07	3.9E-09	1.1E-04		
A3-1	A3-1-5'	6/4/14	5	o-Xylene	0.00050	6.1E-04	3.0E-07	NC	6.9E-08	NC	6.9E-07		
A3-1	A3-1-5'	6/4/14	5	Styrene	0.00075	6.2E-04	4.6E-07	NC	1.1E-07	NC	1.2E-07		
A3-1	A3-1-5'	6/4/14	5	Tetrachloroethene	**0.12**	5.1E-04	6.1E-05	5.0E-06	1.4E-05	3.0E-08	4.0E-04		
A3-1	A3-1-5'	6/4/14	5	Toluene	0.00050	6.4E-04	3.2E-07	NC	7.4E-08	NC	2.5E-07		
A3-1	A3-1-5'	6/4/14	5	Trichloroethene	0.00075	6.1E-04	4.5E-07	3.7E-08	1.0E-07	1.5E-10	5.2E-05		
A3-1	A3-1-5'	6/4/14	5	Trichlorofluoromethane (Freon 11)	0.0010	5.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07	4.1E-08	7.8E-04
A3-1	A3-1-15'	6/4/14	15	1,1,1-Trichloroethane	0.00075	2.7E-04	2.0E-07	NC	4.7E-08	NC	4.7E-08		
A3-1	A3-1-15'	6/4/14	15	1,1-Dichloroethene	0.00075	3.4E-04	2.5E-07	NC	5.8E-08	NC	8.3E-07		
A3-1	A3-1-15'	6/4/14	15	1,2,4-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	6.3E-06		
A3-1	A3-1-15'	6/4/14	15	1,3,5-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	1.1E-06		
A3-1	A3-1-15'	6/4/14	15	Benzene	0.00050	3.5E-04	1.7E-07	1.4E-08	4.0E-08	4.1E-10	1.3E-05		
A3-1	A3-1-15'	6/4/14	15	Carbon Disulfide	0.00075	3.9E-04	2.9E-07	NC	6.7E-08	NC	9.6E-08		
A3-1	A3-1-15'	6/4/14	15	Chloroform	0.00075	3.1E-04	2.3E-07	1.9E-08	5.3E-08	4.4E-10	5.4E-07		
A3-1	A3-1-15'	6/4/14	15	Dichlorodifluoromethane (Freon 12)	0.0010	3.1E-04	3.1E-07	NC	7.0E-08	NC	7.0E-07		
A3-1	A3-1-15'	6/4/14	15	Ethylbenzene	0.00075	2.8E-04	2.1E-07	1.7E-08	4.9E-08	4.3E-11	4.9E-08		
A3-1	A3-1-15'	6/4/14	15	m,p-Xylenes	0.0010	2.8E-04	2.8E-07	NC	6.5E-08	NC	6.5E-07		
A3-1	A3-1-15'	6/4/14	15	Naphthalene	0.0025	2.6E-04	6.5E-07	5.3E-08	1.5E-07	1.8E-09	4.9E-05		
A3-1	A3-1-15'	6/4/14	15	o-Xylene	0.00050	2.9E-04	1.4E-07	NC	3.3E-08	NC	3.3E-07		
A3-1	A3-1-15'	6/4/14	15	Styrene	0.00075	2.9E-04	2.2E-07	NC	5.0E-08	NC	5.6E-08		
A3-1	A3-1-15'	6/4/14	15	Tetrachloroethene	**0.13**	2.2E-04	2.9E-05	2.4E-06	6.6E-06	1.4E-08	1.9E-04		
A3-1	A3-1-15'	6/4/14	15	Toluene	0.00050	3.1E-04	1.6E-07	NC	3.6E-08	NC	1.2E-07		
A3-1	A3-1-15'	6/4/14	15	Trichloroethene	**0.0037**	2.8E-04	1.1E-06	8.6E-08	2.4E-07	3.5E-10	1.2E-04		
A3-1	A3-1-15'	6/4/14	15	Trichlorofluoromethane (Freon 11)	0.0010	2.7E-04	2.7E-07	NC	6.3E-08	NC	8.9E-08	1.7E-08	3.8E-04

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
A4-1	A4-1-5'	6/4/14	5	1,1,1-Trichloroethane	**0.0064**	5.9E-04	3.8E-06	NC	8.6E-07	NC	8.6E-07		
A4-1	A4-1-5'	6/4/14	5	1,1-Dichloroethene	0.00075	6.8E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
A4-1	A4-1-5'	6/4/14	5	1,2,4-Trimethylbenzene	0.00075	5.7E-04	4.3E-07	NC	9.7E-08	NC	1.4E-05		
A4-1	A4-1-5'	6/4/14	5	1,3,5-Trimethylbenzene	0.00075	5.7E-04	4.2E-07	NC	9.7E-08	NC	2.4E-06		
A4-1	A4-1-5'	6/4/14	5	Benzene	0.00050	6.9E-04	3.4E-07	2.8E-08	7.8E-08	8.1E-10	2.6E-05		
A4-1	A4-1-5'	6/4/14	5	Carbon Disulfide	0.00075	7.4E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07		
A4-1	A4-1-5'	6/4/14	5	Chloroform	0.00075	6.4E-04	4.8E-07	3.9E-08	1.1E-07	9.0E-10	1.1E-06		
A4-1	A4-1-5'	6/4/14	5	Dichlorodifluoromethane (Freon 12)	0.0010	6.4E-04	6.4E-07	NC	1.5E-07	NC	1.5E-06		
A4-1	A4-1-5'	6/4/14	5	Ethylbenzene	0.00075	6.1E-04	4.5E-07	3.7E-08	1.0E-07	9.3E-11	1.0E-07		
A4-1	A4-1-5'	6/4/14	5	m,p-Xylenes	0.0010	6.0E-04	6.0E-07	NC	1.4E-07	NC	1.4E-06		
A4-1	A4-1-5'	6/4/14	5	Naphthalene	0.0025	5.7E-04	1.4E-06	1.2E-07	3.2E-07	3.9E-09	1.1E-04		
A4-1	A4-1-5'	6/4/14	5	o-Xylene	0.00050	6.1E-04	3.0E-07	NC	6.9E-08	NC	6.9E-07		
A4-1	A4-1-5'	6/4/14	5	Styrene	0.00075	6.2E-04	4.6E-07	NC	1.1E-07	NC	1.2E-07		
A4-1	A4-1-5'	6/4/14	5	Tetrachloroethene	**0.80**	5.1E-04	4.1E-04	3.3E-05	9.4E-05	2.0E-07	2.7E-03		
A4-1	A4-1-5'	6/4/14	5	Toluene	**0.0036**	6.4E-04	2.3E-06	NC	5.3E-07	NC	1.8E-06		
A4-1	A4-1-5'	6/4/14	5	Trichloroethene	**0.026**	6.1E-04	1.6E-05	1.3E-06	3.6E-06	5.3E-09	1.8E-03		
A4-1	A4-1-5'	6/4/14	5	Trichlorofluoromethane (Freon 11)	0.0010	5.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07	2.1E-07	4.6E-03
A4-1	A4-1-15'	6/4/14	15	1,1,1-Trichloroethane	**0.0063**	2.7E-04	1.7E-06	NC	3.9E-07	NC	3.9E-07		
A4-1	A4-1-15'	6/4/14	15	1,1-Dichloroethene	0.00075	3.4E-04	2.5E-07	NC	5.8E-08	NC	8.3E-07		
A4-1	A4-1-15'	6/4/14	15	1,2,4-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	6.3E-06		
A4-1	A4-1-15'	6/4/14	15	1,3,5-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	1.1E-06		
A4-1	A4-1-15'	6/4/14	15	Benzene	**0.0029**	3.5E-04	1.0E-06	8.2E-08	2.3E-07	2.4E-09	7.7E-05		
A4-1	A4-1-15'	6/4/14	15	Carbon Disulfide	0.00075	3.9E-04	2.9E-07	NC	6.7E-08	NC	9.6E-08		
A4-1	A4-1-15'	6/4/14	15	Chloroform	0.00075	3.1E-04	2.3E-07	1.9E-08	5.3E-08	4.4E-10	5.4E-07		
A4-1	A4-1-15'	6/4/14	15	Dichlorodifluoromethane (Freon 12)	0.0010	3.1E-04	3.1E-07	NC	7.0E-08	NC	7.0E-07		
A4-1	A4-1-15'	6/4/14	15	Ethylbenzene	0.00075	2.8E-04	2.1E-07	1.7E-08	4.9E-08	4.3E-11	4.9E-08		
A4-1	A4-1-15'	6/4/14	15	m,p-Xylenes	0.0010	2.8E-04	2.8E-07	NC	6.5E-08	NC	6.5E-07		
A4-1	A4-1-15'	6/4/14	15	Naphthalene	0.0025	2.6E-04	6.5E-07	5.3E-08	1.5E-07	1.8E-09	4.9E-05		
A4-1	A4-1-15'	6/4/14	15	o-Xylene	0.00050	2.9E-04	1.4E-07	NC	3.3E-08	NC	3.3E-07		
A4-1	A4-1-15'	6/4/14	15	Styrene	0.00075	2.9E-04	2.2E-07	NC	5.0E-08	NC	5.6E-08		
A4-1	A4-1-15'	6/4/14	15	Tetrachloroethene	**0.63**	2.2E-04	1.4E-04	1.1E-05	3.2E-05	6.8E-08	9.2E-04		
A4-1	A4-1-15'	6/4/14	15	Toluene	**0.0038**	3.1E-04	1.2E-06	NC	2.7E-07	NC	9.1E-07		
A4-1	A4-1-15'	6/4/14	15	Trichloroethene	**0.047**	2.8E-04	1.3E-05	1.1E-06	3.1E-06	4.5E-09	1.5E-03		
A4-1	A4-1-15'	6/4/14	15	Trichlorofluoromethane (Freon 11)	0.0010	2.7E-04	2.7E-07	NC	6.3E-08	NC	8.9E-08	7.7E-08	2.6E-03

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
A5-1	A5-1-5'	6/9/14	5	1,1,1-Trichloroethane	**0.028**	5.9E-04	1.6E-05	NC	3.8E-06	NC	3.8E-06		
A5-1	A5-1-5'	6/9/14	5	1,1-Dichloroethene	0.0015	6.8E-04	1.0E-06	NC	2.3E-07	NC	3.3E-06		
A5-1	A5-1-5'	6/9/14	5	1,2,4-Trimethylbenzene	**0.020**	5.7E-04	1.1E-05	NC	2.6E-06	NC	3.7E-04		
A5-1	A5-1-5'	6/9/14	5	1,3,5-Trimethylbenzene	**0.030**	5.7E-04	1.7E-05	NC	3.9E-06	NC	9.7E-05		
A5-1	A5-1-5'	6/9/14	5	Benzene	**0.011**	6.9E-04	7.6E-06	6.2E-07	1.7E-06	1.8E-08	5.8E-04		
A5-1	A5-1-5'	6/9/14	5	Carbon Disulfide	0.0015	7.4E-04	1.1E-06	NC	2.5E-07	NC	3.6E-07		
A5-1	A5-1-5'	6/9/14	5	Chloroform	0.0015	6.4E-04	9.6E-07	7.8E-08	2.2E-07	1.8E-09	2.2E-06		
A5-1	A5-1-5'	6/9/14	5	Dichlorodifluoromethane (Freon 12)	**0.0058**	6.4E-04	3.7E-06	NC	8.4E-07	NC	8.4E-06		
A5-1	A5-1-5'	6/9/14	5	Ethylbenzene	**0.012**	6.1E-04	7.3E-06	5.9E-07	1.7E-06	1.5E-09	1.7E-06		
A5-1	A5-1-5'	6/9/14	5	m,p-Xylenes	**0.028**	6.0E-04	1.7E-05	NC	3.9E-06	NC	3.9E-05		
A5-1	A5-1-5'	6/9/14	5	Naphthalene	**0.045**	5.7E-04	2.6E-05	2.1E-06	5.8E-06	7.1E-08	1.9E-03		
A5-1	A5-1-5'	6/9/14	5	o-Xylene	**0.013**	6.1E-04	7.9E-06	NC	1.8E-06	NC	1.8E-05		
A5-1	A5-1-5'	6/9/14	5	Styrene	0.0015	6.2E-04	9.3E-07	NC	2.1E-07	NC	2.3E-07		
A5-1	A5-1-5'	6/9/14	5	Tetrachloroethene	**0.19**	5.1E-04	9.7E-05	7.9E-06	2.2E-05	4.7E-08	6.4E-04		
A5-1	A5-1-5'	6/9/14	5	Toluene	**0.012**	6.4E-04	7.7E-06	NC	1.8E-06	NC	5.9E-06		
A5-1	A5-1-5'	6/9/14	5	Trichloroethene	**0.017**	6.1E-04	1.0E-05	8.4E-07	2.4E-06	3.4E-09	1.2E-03		
A5-1	A5-1-5'	6/9/14	5	Trichlorofluoromethane (Freon 11)	0.0020	5.9E-04	1.2E-06	NC	2.7E-07	NC	3.9E-07	1.4E-07	4.9E-03
B1-1	B1-1-5'	6/5/14	5	1,1,1-Trichloroethane	0.00075	5.9E-04	4.4E-07	NC	1.0E-07	NC	1.0E-07		
B1-1	B1-1-5'	6/5/14	5	1,1-Dichloroethene	0.00075	6.8E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
B1-1	B1-1-5'	6/5/14	5	1,2,4-Trimethylbenzene	0.00075	5.7E-04	4.3E-07	NC	9.7E-08	NC	1.4E-05		
B1-1	B1-1-5'	6/5/14	5	1,3,5-Trimethylbenzene	0.00075	5.7E-04	4.2E-07	NC	9.7E-08	NC	2.4E-06		
B1-1	B1-1-5'	6/5/14	5	Benzene	0.00050	6.9E-04	3.4E-07	2.8E-08	7.8E-08	8.1E-10	2.6E-05		
B1-1	B1-1-5'	6/5/14	5	Carbon Disulfide	0.00075	7.4E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07		
B1-1	B1-1-5'	6/5/14	5	Chloroform	0.00075	6.4E-04	4.8E-07	3.9E-08	1.1E-07	9.0E-10	1.1E-06		
B1-1	B1-1-5'	6/5/14	5	Dichlorodifluoromethane (Freon 12)	0.0010	6.4E-04	6.4E-07	NC	1.5E-07	NC	1.5E-06		
B1-1	B1-1-5'	6/5/14	5	Ethylbenzene	0.00075	6.1E-04	4.5E-07	3.7E-08	1.0E-07	9.3E-11	1.0E-07		
B1-1	B1-1-5'	6/5/14	5	m,p-Xylenes	0.0010	6.0E-04	6.0E-07	NC	1.4E-07	NC	1.4E-06		
B1-1	B1-1-5'	6/5/14	5	Naphthalene	0.0025	5.7E-04	1.4E-06	1.2E-07	3.2E-07	3.9E-09	1.1E-04		
B1-1	B1-1-5'	6/5/14	5	o-Xylene	0.00050	6.1E-04	3.0E-07	NC	6.9E-08	NC	6.9E-07		
B1-1	B1-1-5'	6/5/14	5	Styrene	0.00075	6.2E-04	4.6E-07	NC	1.1E-07	NC	1.2E-07		
B1-1	B1-1-5'	6/5/14	5	Tetrachloroethene	**0.44**	5.1E-04	2.3E-04	1.8E-05	5.1E-05	1.1E-07	1.5E-03		
B1-1	B1-1-5'	6/5/14	5	Toluene	0.00050	6.4E-04	3.2E-07	NC	7.4E-08	NC	2.5E-07		
B1-1	B1-1-5'	6/5/14	5	Trichloroethene	0.00075	6.1E-04	4.5E-07	3.7E-08	1.0E-07	1.5E-10	5.2E-05		
B1-1	B1-1-5'	6/5/14	5	Trichlorofluoromethane (Freon 11)	**0.0094**	5.9E-04	5.6E-06	NC	1.3E-06	NC	1.8E-06	1.1E-07	1.7E-03

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
B1-1	B1-1-15'	6/5/14	15	1,1,1-Trichloroethane	0.00075	2.7E-04	2.0E-07	NC	4.7E-08	NC	4.7E-08		
B1-1	B1-1-15'	6/5/14	15	1,1-Dichloroethene	0.00075	3.4E-04	2.5E-07	NC	5.8E-08	NC	8.3E-07		
B1-1	B1-1-15'	6/5/14	15	1,2,4-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	6.3E-06		
B1-1	B1-1-15'	6/5/14	15	1,3,5-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	1.1E-06		
B1-1	B1-1-15'	6/5/14	15	Benzene	0.00050	3.5E-04	1.7E-07	1.4E-08	4.0E-08	4.1E-10	1.3E-05		
B1-1	B1-1-15'	6/5/14	15	Carbon Disulfide	0.00075	3.9E-04	2.9E-07	NC	6.7E-08	NC	9.6E-08		
B1-1	B1-1-15'	6/5/14	15	Chloroform	0.00075	3.1E-04	2.3E-07	1.9E-08	5.3E-08	4.4E-10	5.4E-07		
B1-1	B1-1-15'	6/5/14	15	Dichlorodifluoromethane (Freon 12)	0.0010	3.1E-04	3.1E-07	NC	7.0E-08	NC	7.0E-07		
B1-1	B1-1-15'	6/5/14	15	Ethylbenzene	0.00075	2.8E-04	2.1E-07	1.7E-08	4.9E-08	4.3E-11	4.9E-08		
B1-1	B1-1-15'	6/5/14	15	m,p-Xylenes	0.0010	2.8E-04	2.8E-07	NC	6.5E-08	NC	6.5E-07		
B1-1	B1-1-15'	6/5/14	15	Naphthalene	0.0025	2.6E-04	6.5E-07	5.3E-08	1.5E-07	1.8E-09	4.9E-05		
B1-1	B1-1-15'	6/5/14	15	o-Xylene	0.00050	2.9E-04	1.4E-07	NC	3.3E-08	NC	3.3E-07		
B1-1	B1-1-15'	6/5/14	15	Styrene	0.00075	2.9E-04	2.2E-07	NC	5.0E-08	NC	5.6E-08		
B1-1	B1-1-15'	6/5/14	15	Tetrachloroethene	**0.71**	2.2E-04	1.6E-04	1.3E-05	3.6E-05	7.6E-08	1.0E-03		
B1-1	B1-1-15'	6/5/14	15	Toluene	0.00050	3.1E-04	1.6E-07	NC	3.6E-08	NC	1.2E-07		
B1-1	B1-1-15'	6/5/14	15	Trichloroethene	0.00075	2.8E-04	2.1E-07	1.7E-08	4.9E-08	7.1E-11	2.4E-05		
B1-1	B1-1-15'	6/5/14	15	Trichlorofluoromethane (Freon 11)	**0.014**	2.7E-04	3.8E-06	NC	8.8E-07	NC	1.3E-06	7.9E-08	1.1E-03
B6-1	B6-1-5'	6/9/14	5	1,1,1-Trichloroethane	**0.0099**	5.9E-04	5.8E-06	NC	1.3E-06	NC	1.3E-06		
B6-1	B6-1-5'	6/9/14	5	1,1-Dichloroethene	0.0015	6.8E-04	1.0E-06	NC	2.3E-07	NC	3.3E-06		
B6-1	B6-1-5'	6/9/14	5	1,2,4-Trimethylbenzene	**0.0072**	5.7E-04	4.1E-06	NC	9.3E-07	NC	1.3E-04		
B6-1	B6-1-5'	6/9/14	5	1,3,5-Trimethylbenzene	0.0015	5.7E-04	8.5E-07	NC	1.9E-07	NC	4.8E-06		
B6-1	B6-1-5'	6/9/14	5	Benzene	**0.0052**	6.9E-04	3.6E-06	2.9E-07	8.2E-07	8.5E-09	2.7E-04		
B6-1	B6-1-5'	6/9/14	5	Carbon Disulfide	0.0015	7.4E-04	1.1E-06	NC	2.5E-07	NC	3.6E-07		
B6-1	B6-1-5'	6/9/14	5	Chloroform	**0.0064**	6.4E-04	4.1E-06	3.3E-07	9.4E-07	7.7E-09	9.6E-06		
B6-1	B6-1-5'	6/9/14	5	Dichlorodifluoromethane (Freon 12)	0.0020	6.4E-04	1.3E-06	NC	2.9E-07	NC	2.9E-06		
B6-1	B6-1-5'	6/9/14	5	Ethylbenzene	0.0015	6.1E-04	9.1E-07	7.4E-08	2.1E-07	1.9E-10	2.1E-07		
B6-1	B6-1-5'	6/9/14	5	m,p-Xylenes	0.0020	6.0E-04	1.2E-06	NC	2.8E-07	NC	2.8E-06		
B6-1	B6-1-5'	6/9/14	5	Naphthalene	**0.053**	5.7E-04	3.0E-05	2.5E-06	6.9E-06	8.3E-08	2.3E-03		
B6-1	B6-1-5'	6/9/14	5	o-Xylene	0.0010	6.1E-04	6.1E-07	NC	1.4E-07	NC	1.4E-06		
B6-1	B6-1-5'	6/9/14	5	Styrene	0.0015	6.2E-04	9.3E-07	NC	2.1E-07	NC	2.3E-07		
B6-1	B6-1-5'	6/9/14	5	Tetrachloroethene	**0.032**	5.1E-04	1.6E-05	1.3E-06	3.7E-06	7.9E-09	1.1E-04		
B6-1	B6-1-5'	6/9/14	5	Toluene	0.0010	6.4E-04	6.4E-07	NC	1.5E-07	NC	4.9E-07		
B6-1	B6-1-5'	6/9/14	5	Trichloroethene	**0.0068**	6.1E-04	4.1E-06	3.4E-07	9.4E-07	1.4E-09	4.7E-04		
B6-1	B6-1-5'	6/9/14	5	Trichlorofluoromethane (Freon 11)	0.0020	5.9E-04	1.2E-06	NC	2.7E-07	NC	3.9E-07	1.1E-07	3.3E-03

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
B6-1	B6-1-15'	6/9/14	15	1,1,1-Trichloroethane	**0.0086**	2.7E-04	2.3E-06	NC	5.4E-07	NC	5.4E-07		
B6-1	B6-1-15'	6/9/14	15	1,1-Dichloroethene	0.0015	3.4E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
B6-1	B6-1-15'	6/9/14	15	1,2,4-Trimethylbenzene	**0.0071**	2.6E-04	1.8E-06	NC	4.2E-07	NC	6.0E-05		
B6-1	B6-1-15'	6/9/14	15	1,3,5-Trimethylbenzene	0.0015	2.6E-04	3.9E-07	NC	8.8E-08	NC	2.2E-06		
B6-1	B6-1-15'	6/9/14	15	Benzene	0.0010	3.5E-04	3.5E-07	2.8E-08	7.9E-08	8.2E-10	2.6E-05		
B6-1	B6-1-15'	6/9/14	15	Carbon Disulfide	0.0015	3.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07		
B6-1	B6-1-15'	6/9/14	15	Chloroform	0.0015	3.1E-04	4.7E-07	3.8E-08	1.1E-07	8.7E-10	1.1E-06		
B6-1	B6-1-15'	6/9/14	15	Dichlorodifluoromethane (Freon 12)	0.0020	3.1E-04	6.2E-07	NC	1.4E-07	NC	1.4E-06		
B6-1	B6-1-15'	6/9/14	15	Ethylbenzene	0.0015	2.8E-04	4.3E-07	3.5E-08	9.7E-08	8.7E-11	9.7E-08		
B6-1	B6-1-15'	6/9/14	15	m,p-Xylenes	0.0020	2.8E-04	5.7E-07	NC	1.3E-07	NC	1.3E-06		
B6-1	B6-1-15'	6/9/14	15	Naphthalene	**0.035**	2.6E-04	9.0E-06	7.4E-07	2.1E-06	2.5E-08	6.9E-04		
B6-1	B6-1-15'	6/9/14	15	o-Xylene	0.0010	2.9E-04	2.9E-07	NC	6.5E-08	NC	6.5E-07		
B6-1	B6-1-15'	6/9/14	15	Styrene	0.0015	2.9E-04	4.4E-07	NC	1.0E-07	NC	1.1E-07		
B6-1	B6-1-15'	6/9/14	15	Tetrachloroethene	**0.015**	2.2E-04	3.3E-06	2.7E-07	7.6E-07	1.6E-09	2.2E-05		
B6-1	B6-1-15'	6/9/14	15	Toluene	0.0010	3.1E-04	3.1E-07	NC	7.2E-08	NC	2.4E-07		
B6-1	B6-1-15'	6/9/14	15	Trichloroethene	0.0015	2.8E-04	4.3E-07	3.5E-08	9.8E-08	1.4E-10	4.9E-05		
B6-1	B6-1-15'	6/9/14	15	Trichlorofluoromethane (Freon 11)	0.0020	2.7E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07	2.9E-08	8.5E-04
C1-1	C1-1-5'	6/5/14	5	1,1,1-Trichloroethane	0.00075	5.9E-04	4.4E-07	NC	1.0E-07	NC	1.0E-07		
C1-1	C1-1-5'	6/5/14	5	1,1-Dichloroethene	0.00075	6.8E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
C1-1	C1-1-5'	6/5/14	5	1,2,4-Trimethylbenzene	0.00075	5.7E-04	4.3E-07	NC	9.7E-08	NC	1.4E-05		
C1-1	C1-1-5'	6/5/14	5	1,3,5-Trimethylbenzene	0.00075	5.7E-04	4.2E-07	NC	9.7E-08	NC	2.4E-06		
C1-1	C1-1-5'	6/5/14	5	Benzene	**0.0019**	6.9E-04	1.3E-06	1.1E-07	3.0E-07	3.1E-09	9.9E-05		
C1-1	C1-1-5'	6/5/14	5	Carbon Disulfide	0.00075	7.4E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07		
C1-1	C1-1-5'	6/5/14	5	Chloroform	0.00075	6.4E-04	4.8E-07	3.9E-08	1.1E-07	9.0E-10	1.1E-06		
C1-1	C1-1-5'	6/5/14	5	Dichlorodifluoromethane (Freon 12)	0.0010	6.4E-04	6.4E-07	NC	1.5E-07	NC	1.5E-06		
C1-1	C1-1-5'	6/5/14	5	Ethylbenzene	0.00075	6.1E-04	4.5E-07	3.7E-08	1.0E-07	9.3E-11	1.0E-07		
C1-1	C1-1-5'	6/5/14	5	m,p-Xylenes	0.0010	6.0E-04	6.0E-07	NC	1.4E-07	NC	1.4E-06		
C1-1	C1-1-5'	6/5/14	5	Naphthalene	0.0025	5.7E-04	1.4E-06	1.2E-07	3.2E-07	3.9E-09	1.1E-04		
C1-1	C1-1-5'	6/5/14	5	o-Xylene	0.00050	6.1E-04	3.0E-07	NC	6.9E-08	NC	6.9E-07		
C1-1	C1-1-5'	6/5/14	5	Styrene	0.00075	6.2E-04	4.6E-07	NC	1.1E-07	NC	1.2E-07		
C1-1	C1-1-5'	6/5/14	5	Tetrachloroethene	**8.3**	5.1E-04	4.3E-03	3.5E-04	9.7E-04	2.0E-06	2.8E-02		
C1-1	C1-1-5'	6/5/14	5	Toluene	0.00050	6.4E-04	3.2E-07	NC	7.4E-08	NC	2.5E-07		
C1-1	C1-1-5'	6/5/14	5	Trichloroethene	0.00075	6.1E-04	4.5E-07	3.7E-08	1.0E-07	1.5E-10	5.2E-05		
C1-1	C1-1-5'	6/5/14	5	Trichlorofluoromethane (Freon 11)	0.0010	5.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07	2.1E-06	2.8E-02

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas:
Current Offsite Scenario
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/ (mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
C1-1	C1-1-15'	6/5/14	15	1,1,1-Trichloroethane	0.00075	2.7E-04	2.0E-07	NC	4.7E-08	NC	4.7E-08		
C1-1	C1-1-15'	6/5/14	15	1,1-Dichloroethene	0.00075	3.4E-04	2.5E-07	NC	5.8E-08	NC	8.3E-07		
C1-1	C1-1-15'	6/5/14	15	1,2,4-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	6.3E-06		
C1-1	C1-1-15'	6/5/14	15	1,3,5-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	1.1E-06		
C1-1	C1-1-15'	6/5/14	15	Benzene	0.00050	3.5E-04	1.7E-07	1.4E-08	4.0E-08	4.1E-10	1.3E-05		
C1-1	C1-1-15'	6/5/14	15	Carbon Disulfide	0.00075	3.9E-04	2.9E-07	NC	6.7E-08	NC	9.6E-08		
C1-1	C1-1-15'	6/5/14	15	Chloroform	0.00075	3.1E-04	2.3E-07	1.9E-08	5.3E-08	4.4E-10	5.4E-07		
C1-1	C1-1-15'	6/5/14	15	Dichlorodifluoromethane (Freon 12)	0.0010	3.1E-04	3.1E-07	NC	7.0E-08	NC	7.0E-07		
C1-1	C1-1-15'	6/5/14	15	Ethylbenzene	0.00075	2.8E-04	2.1E-07	1.7E-08	4.9E-08	4.3E-11	4.9E-08		
C1-1	C1-1-15'	6/5/14	15	m,p-Xylenes	0.0010	2.8E-04	2.8E-07	NC	6.5E-08	NC	6.5E-07		
C1-1	C1-1-15'	6/5/14	15	Naphthalene	0.0025	2.6E-04	6.5E-07	5.3E-08	1.5E-07	1.8E-09	4.9E-05		
C1-1	C1-1-15'	6/5/14	15	o-Xylene	0.00050	2.9E-04	1.4E-07	NC	3.3E-08	NC	3.3E-07		
C1-1	C1-1-15'	6/5/14	15	Styrene	0.00075	2.9E-04	2.2E-07	NC	5.0E-08	NC	5.6E-08		
C1-1	C1-1-15'	6/5/14	15	Tetrachloroethene	**6.8**	2.2E-04	1.5E-03	1.2E-04	3.5E-04	7.3E-07	9.9E-03		
C1-1	C1-1-15'	6/5/14	15	Toluene	0.00050	3.1E-04	1.6E-07	NC	3.6E-08	NC	1.2E-07		
C1-1	C1-1-15'	6/5/14	15	Trichloroethene	**0.017**	2.8E-04	4.8E-06	3.9E-07	1.1E-06	1.6E-09	5.5E-04		
C1-1	C1-1-15'	6/5/14	15	Trichlorofluoromethane (Freon 11)	0.0010	2.7E-04	2.7E-07	NC	6.3E-08	NC	8.9E-08	7.3E-07	1.1E-02
C6-1	C6-1-5'	6/9/14	5	1,1,1-Trichloroethane	0.00075	5.9E-04	4.4E-07	NC	1.0E-07	NC	1.0E-07		
C6-1	C6-1-5'	6/9/14	5	1,1-Dichloroethene	0.00075	6.8E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
C6-1	C6-1-5'	6/9/14	5	1,2,4-Trimethylbenzene	0.00075	5.7E-04	4.3E-07	NC	9.7E-08	NC	1.4E-05		
C6-1	C6-1-5'	6/9/14	5	1,3,5-Trimethylbenzene	0.00075	5.7E-04	4.2E-07	NC	9.7E-08	NC	2.4E-06		
C6-1	C6-1-5'	6/9/14	5	Benzene	**0.0027**	6.9E-04	1.9E-06	1.5E-07	4.2E-07	4.4E-09	1.4E-04		
C6-1	C6-1-5'	6/9/14	5	Carbon Disulfide	0.00075	7.4E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07		
C6-1	C6-1-5'	6/9/14	5	Chloroform	0.00075	6.4E-04	4.8E-07	3.9E-08	1.1E-07	9.0E-10	1.1E-06		
C6-1	C6-1-5'	6/9/14	5	Dichlorodifluoromethane (Freon 12)	0.0010	6.4E-04	6.4E-07	NC	1.5E-07	NC	1.5E-06		
C6-1	C6-1-5'	6/9/14	5	Ethylbenzene	0.00075	6.1E-04	4.5E-07	3.7E-08	1.0E-07	9.3E-11	1.0E-07		
C6-1	C6-1-5'	6/9/14	5	m,p-Xylenes	0.0010	6.0E-04	6.0E-07	NC	1.4E-07	NC	1.4E-06		
C6-1	C6-1-5'	6/9/14	5	Naphthalene	0.0025	5.7E-04	1.4E-06	1.2E-07	3.2E-07	3.9E-09	1.1E-04		
C6-1	C6-1-5'	6/9/14	5	o-Xylene	0.00050	6.1E-04	3.0E-07	NC	6.9E-08	NC	6.9E-07		
C6-1	C6-1-5'	6/9/14	5	Styrene	0.00075	6.2E-04	4.6E-07	NC	1.1E-07	NC	1.2E-07		
C6-1	C6-1-5'	6/9/14	5	Tetrachloroethene	**0.077**	5.1E-04	3.9E-05	3.2E-06	9.0E-06	1.9E-08	2.6E-04		
C6-1	C6-1-5'	6/9/14	5	Toluene	0.00050	6.4E-04	3.2E-07	NC	7.4E-08	NC	2.5E-07		
C6-1	C6-1-5'	6/9/14	5	Trichloroethene	**0.0099**	6.1E-04	6.0E-06	4.9E-07	1.4E-06	2.0E-09	6.9E-04		
C6-1	C6-1-5'	6/9/14	5	Trichlorofluoromethane (Freon 11)	0.0010	5.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07	3.0E-08	1.2E-03

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/ (mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
C6-1	C6-1-15'	6/9/14	15	1,1,1-Trichloroethane	0.0015	2.7E-04	4.1E-07	NC	9.3E-08	NC	9.3E-08		
C6-1	C6-1-15'	6/9/14	15	1,1-Dichloroethene	0.0015	3.4E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
C6-1	C6-1-15'	6/9/14	15	1,2,4-Trimethylbenzene	0.0015	2.6E-04	3.9E-07	NC	8.9E-08	NC	1.3E-05		
C6-1	C6-1-15'	6/9/14	15	1,3,5-Trimethylbenzene	0.0015	2.6E-04	3.9E-07	NC	8.8E-08	NC	2.2E-06		
C6-1	C6-1-15'	6/9/14	15	Benzene	0.0010	3.5E-04	3.5E-07	2.8E-08	7.9E-08	8.2E-10	2.6E-05		
C6-1	C6-1-15'	6/9/14	15	Carbon Disulfide	0.0015	3.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07		
C6-1	C6-1-15'	6/9/14	15	Chloroform	0.0015	3.1E-04	4.7E-07	3.8E-08	1.1E-07	8.7E-10	1.1E-06		
C6-1	C6-1-15'	6/9/14	15	Dichlorodifluoromethane (Freon 12)	0.0020	3.1E-04	6.2E-07	NC	1.4E-07	NC	1.4E-06		
C6-1	C6-1-15'	6/9/14	15	Ethylbenzene	0.0015	2.8E-04	4.3E-07	3.5E-08	9.7E-08	8.7E-11	9.7E-08		
C6-1	C6-1-15'	6/9/14	15	m,p-Xylenes	0.0020	2.8E-04	5.7E-07	NC	1.3E-07	NC	1.3E-06		
C6-1	C6-1-15'	6/9/14	15	Naphthalene	0.0050	2.6E-04	1.3E-06	1.1E-07	2.9E-07	3.6E-09	9.8E-05		
C6-1	C6-1-15'	6/9/14	15	o-Xylene	0.0010	2.9E-04	2.9E-07	NC	6.5E-08	NC	6.5E-07		
C6-1	C6-1-15'	6/9/14	15	Styrene	**0.0061**	2.9E-04	1.8E-06	NC	4.1E-07	NC	4.5E-07		
C6-1	C6-1-15'	6/9/14	15	Tetrachloroethene	**0.017**	2.2E-04	3.8E-06	3.1E-07	8.7E-07	1.8E-09	2.5E-05		
C6-1	C6-1-15'	6/9/14	15	Toluene	0.0010	3.1E-04	3.1E-07	NC	7.2E-08	NC	2.4E-07		
C6-1	C6-1-15'	6/9/14	15	Trichloroethene	0.0015	2.8E-04	4.3E-07	3.5E-08	9.8E-08	1.4E-10	4.9E-05		
C6-1	C6-1-15'	6/9/14	15	Trichlorofluoromethane (Freon 11)	0.0020	2.7E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07	7.3E-09	2.2E-04
D1-2	D1-2-5'	7/23/14	5	1,1,1-Trichloroethane	0.0015	5.9E-04	8.8E-07	NC	2.0E-07	NC	2.0E-07		
D1-2	D1-2-5'	7/23/14	5	1,1-Dichloroethene	0.0015	6.8E-04	1.0E-06	NC	2.3E-07	NC	3.3E-06		
D1-2	D1-2-5'	7/23/14	5	1,2,4-Trimethylbenzene	0.0015	5.7E-04	8.5E-07	NC	1.9E-07	NC	2.8E-05		
D1-2	D1-2-5'	7/23/14	5	1,3,5-Trimethylbenzene	0.0015	5.7E-04	8.5E-07	NC	1.9E-07	NC	4.8E-06		
D1-2	D1-2-5'	7/23/14	5	Benzene	0.0010	6.9E-04	6.9E-07	5.6E-08	1.6E-07	1.6E-09	5.2E-05		
D1-2	D1-2-5'	7/23/14	5	Carbon Disulfide	**0.0063**	7.4E-04	4.7E-06	NC	1.1E-06	NC	1.5E-06		
D1-2	D1-2-5'	7/23/14	5	Chloroform	**0.014**	6.4E-04	9.0E-06	7.3E-07	2.0E-06	1.7E-08	2.1E-05		
D1-2	D1-2-5'	7/23/14	5	Dichlorodifluoromethane (Freon 12)	0.0020	6.4E-04	1.3E-06	NC	2.9E-07	NC	2.9E-06		
D1-2	D1-2-5'	7/23/14	5	Ethylbenzene	0.0015	6.1E-04	9.1E-07	7.4E-08	2.1E-07	1.9E-10	2.1E-07		
D1-2	D1-2-5'	7/23/14	5	m,p-Xylenes	0.0020	6.0E-04	1.2E-06	NC	2.8E-07	NC	2.8E-06		
D1-2	D1-2-5'	7/23/14	5	Naphthalene	**0.039**	5.7E-04	2.2E-05	1.8E-06	5.1E-06	6.1E-08	1.7E-03		
D1-2	D1-2-5'	7/23/14	5	o-Xylene	0.0010	6.1E-04	6.1E-07	NC	1.4E-07	NC	1.4E-06		
D1-2	D1-2-5'	7/23/14	5	Styrene	0.0015	6.2E-04	9.3E-07	NC	2.1E-07	NC	2.3E-07		
D1-2	D1-2-5'	7/23/14	5	Tetrachloroethene	**3.9**	5.1E-04	2.0E-03	1.6E-04	4.6E-04	9.6E-07	1.3E-02		
D1-2	D1-2-5'	7/23/14	5	Toluene	**0.0044**	6.4E-04	2.8E-06	NC	6.5E-07	NC	2.2E-06		
D1-2	D1-2-5'	7/23/14	5	Trichloroethene	0.0015	6.1E-04	9.1E-07	7.4E-08	2.1E-07	3.0E-10	1.0E-04		
D1-2	D1-2-5'	7/23/14	5	Trichlorofluoromethane (Freon 11)	0.0020	5.9E-04	1.2E-06	NC	2.7E-07	NC	3.9E-07	1.0E-06	1.5E-02

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas:
Current Offsite Scenario
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
D1-2	D1-2-15'	7/23/14	15	1,1,1-Trichloroethane	0.0015	2.7E-04	4.1E-07	NC	9.3E-08	NC	9.3E-08		
D1-2	D1-2-15'	7/23/14	15	1,1-Dichloroethene	0.0015	3.4E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
D1-2	D1-2-15'	7/23/14	15	1,2,4-Trimethylbenzene	**0.0057**	2.6E-04	1.5E-06	NC	3.4E-07	NC	4.8E-05		
D1-2	D1-2-15'	7/23/14	15	1,3,5-Trimethylbenzene	0.0015	2.6E-04	3.9E-07	NC	8.8E-08	NC	2.2E-06		
D1-2	D1-2-15'	7/23/14	15	Benzene	0.0010	3.5E-04	3.5E-07	2.8E-08	7.9E-08	8.2E-10	2.6E-05		
D1-2	D1-2-15'	7/23/14	15	Carbon Disulfide	**0.0061**	3.9E-04	2.4E-06	NC	5.5E-07	NC	7.8E-07		
D1-2	D1-2-15'	7/23/14	15	Chloroform	**0.013**	3.1E-04	4.0E-06	3.3E-07	9.2E-07	7.6E-09	9.4E-06		
D1-2	D1-2-15'	7/23/14	15	Dichlorodifluoromethane (Freon 12)	0.0020	3.1E-04	6.2E-07	NC	1.4E-07	NC	1.4E-06		
D1-2	D1-2-15'	7/23/14	15	Ethylbenzene	0.0015	2.8E-04	4.3E-07	3.5E-08	9.7E-08	8.7E-11	9.7E-08		
D1-2	D1-2-15'	7/23/14	15	m,p-Xylenes	0.0020	2.8E-04	5.7E-07	NC	1.3E-07	NC	1.3E-06		
D1-2	D1-2-15'	7/23/14	15	Naphthalene	**0.083**	2.6E-04	2.1E-05	1.7E-06	4.9E-06	5.9E-08	1.6E-03		
D1-2	D1-2-15'	7/23/14	15	o-Xylene	0.0010	2.9E-04	2.9E-07	NC	6.5E-08	NC	6.5E-07		
D1-2	D1-2-15'	7/23/14	15	Styrene	0.0015	2.9E-04	4.4E-07	NC	1.0E-07	NC	1.1E-07		
D1-2	D1-2-15'	7/23/14	15	Tetrachloroethene	**3.0**	2.2E-04	6.7E-04	5.5E-05	1.5E-04	3.2E-07	4.4E-03		
D1-2	D1-2-15'	7/23/14	15	Toluene	**0.0066**	3.1E-04	2.1E-06	NC	4.7E-07	NC	1.6E-06		
D1-2	D1-2-15'	7/23/14	15	Trichloroethene	**0.0015**	2.8E-04	4.3E-07	3.5E-08	9.8E-08	1.4E-10	4.9E-05		
D1-2	D1-2-15'	7/23/14	15	Trichlorofluoromethane (Freon 11)	0.0020	2.7E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07	3.9E-07	6.1E-03
D1-2	D1-2-30'	7/23/14	30	1,1,1-Trichloroethane	0.0015	1.5E-04	2.3E-07	NC	5.2E-08	NC	5.2E-08		
D1-2	D1-2-30'	7/23/14	30	1,1-Dichloroethene	0.0015	1.9E-04	2.9E-07	NC	6.6E-08	NC	9.4E-07		
D1-2	D1-2-30'	7/23/14	30	1,2,4-Trimethylbenzene	**0.0055**	1.4E-04	7.8E-07	NC	1.8E-07	NC	2.6E-05		
D1-2	D1-2-30'	7/23/14	30	1,3,5-Trimethylbenzene	0.0015	1.4E-04	2.1E-07	NC	4.8E-08	NC	1.2E-06		
D1-2	D1-2-30'	7/23/14	30	Benzene	0.0010	2.0E-04	2.0E-07	1.6E-08	4.5E-08	4.7E-10	1.5E-05		
D1-2	D1-2-30'	7/23/14	30	Carbon Disulfide	**0.0067**	2.3E-04	1.5E-06	NC	3.5E-07	NC	5.0E-07		
D1-2	D1-2-30'	7/23/14	30	Chloroform	**0.0094**	1.8E-04	1.6E-06	1.3E-07	3.8E-07	3.1E-09	3.8E-06		
D1-2	D1-2-30'	7/23/14	30	Dichlorodifluoromethane (Freon 12)	0.0020	1.7E-04	3.5E-07	NC	7.9E-08	NC	7.9E-07		
D1-2	D1-2-30'	7/23/14	30	Ethylbenzene	0.0015	1.6E-04	2.4E-07	1.9E-08	5.4E-08	4.8E-11	5.4E-08		
D1-2	D1-2-30'	7/23/14	30	m,p-Xylenes	0.0020	1.6E-04	3.2E-07	NC	7.2E-08	NC	7.2E-07		
D1-2	D1-2-30'	7/23/14	30	Naphthalene	**0.11**	1.4E-04	1.6E-05	1.3E-06	3.6E-06	4.3E-08	1.2E-03		
D1-2	D1-2-30'	7/23/14	30	o-Xylene	0.0010	1.6E-04	1.6E-07	NC	3.6E-08	NC	3.6E-07		
D1-2	D1-2-30'	7/23/14	30	Styrene	0.0015	1.6E-04	2.5E-07	NC	5.6E-08	NC	6.2E-08		
D1-2	D1-2-30'	7/23/14	30	Tetrachloroethene	**2.4**	1.2E-04	2.9E-04	2.4E-05	6.6E-05	1.4E-07	1.9E-03		
D1-2	D1-2-30'	7/23/14	30	Toluene	**0.0080**	1.8E-04	1.4E-06	NC	3.2E-07	NC	1.1E-06		
D1-2	D1-2-30'	7/23/14	30	Trichloroethene	**0.0082**	1.6E-04	1.3E-06	1.1E-07	3.0E-07	4.4E-10	1.5E-04		
D1-2	D1-2-30'	7/23/14	30	Trichlorofluoromethane (Freon 11)	0.0020	1.5E-04	3.0E-07	NC	6.9E-08	NC	9.9E-08	1.9E-07	3.3E-03

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
D4-2	D4-2-5'	7/23/14	5	1,1,1-Trichloroethane	0.0015	5.9E-04	8.8E-07	NC	2.0E-07	NC	2.0E-07		
D4-2	D4-2-5'	7/23/14	5	1,1-Dichloroethene	0.0015	6.8E-04	1.0E-06	NC	2.3E-07	NC	3.3E-06		
D4-2	D4-2-5'	7/23/14	5	1,2,4-Trimethylbenzene	**0.012**	5.7E-04	6.8E-06	NC	1.6E-06	NC	2.2E-04		
D4-2	D4-2-5'	7/23/14	5	1,3,5-Trimethylbenzene	**0.0066**	5.7E-04	3.7E-06	NC	8.5E-07	NC	2.1E-05		
D4-2	D4-2-5'	7/23/14	5	Benzene	**0.0064**	6.9E-04	4.4E-06	3.6E-07	1.0E-06	1.0E-08	3.3E-04		
D4-2	D4-2-5'	7/23/14	5	Carbon Disulfide	**0.014**	7.4E-04	1.0E-05	NC	2.4E-06	NC	3.4E-06		
D4-2	D4-2-5'	7/23/14	5	Chloroform	**0.0063**	6.4E-04	4.0E-06	3.3E-07	9.2E-07	7.6E-09	9.4E-06		
D4-2	D4-2-5'	7/23/14	5	Dichlorodifluoromethane (Freon 12)	0.0020	6.4E-04	1.3E-06	NC	2.9E-07	NC	2.9E-06		
D4-2	D4-2-5'	7/23/14	5	Ethylbenzene	**0.018**	6.1E-04	1.1E-05	8.9E-07	2.5E-06	2.2E-09	2.5E-06		
D4-2	D4-2-5'	7/23/14	5	m,p-Xylenes	**0.012**	6.0E-04	7.3E-06	NC	1.7E-06	NC	1.7E-05		
D4-2	D4-2-5'	7/23/14	5	Naphthalene	**0.24**	5.7E-04	1.4E-04	1.1E-05	3.1E-05	3.8E-07	1.0E-02		
D4-2	D4-2-5'	7/23/14	5	o-Xylene	**0.0050**	6.1E-04	3.0E-06	NC	6.9E-07	NC	6.9E-06		
D4-2	D4-2-5'	7/23/14	5	Styrene	0.0015	6.2E-04	9.3E-07	NC	2.1E-07	NC	2.3E-07		
D4-2	D4-2-5'	7/23/14	5	Tetrachloroethene	**0.065**	5.1E-04	3.3E-05	2.7E-06	7.6E-06	1.6E-08	2.2E-04		
D4-2	D4-2-5'	7/23/14	5	Toluene	**0.0066**	6.4E-04	4.3E-06	NC	9.7E-07	NC	3.2E-06		
D4-2	D4-2-5'	7/23/14	5	Trichloroethene	0.0015	6.1E-04	9.1E-07	7.4E-08	2.1E-07	3.0E-10	1.0E-04		
D4-2	D4-2-5'	7/23/14	5	Trichlorofluoromethane (Freon 11)	0.0020	5.9E-04	1.2E-06	NC	2.7E-07	NC	3.9E-07	4.1E-07	1.1E-02
D4-2	D4-2-15'	7/23/14	15	1,1,1-Trichloroethane	0.0015	2.7E-04	4.1E-07	NC	9.3E-08	NC	9.3E-08		
D4-2	D4-2-15'	7/23/14	15	1,1-Dichloroethene	0.0015	3.4E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
D4-2	D4-2-15'	7/23/14	15	1,2,4-Trimethylbenzene	**0.0077**	2.6E-04	2.0E-06	NC	4.5E-07	NC	6.5E-05		
D4-2	D4-2-15'	7/23/14	15	1,3,5-Trimethylbenzene	0.0015	2.6E-04	3.9E-07	NC	8.8E-08	NC	2.2E-06		
D4-2	D4-2-15'	7/23/14	15	Benzene	0.0010	3.5E-04	3.5E-07	2.8E-08	7.9E-08	8.2E-10	2.6E-05		
D4-2	D4-2-15'	7/23/14	15	Carbon Disulfide	0.0015	3.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07		
D4-2	D4-2-15'	7/23/14	15	Chloroform	0.0015	3.1E-04	4.7E-07	3.8E-08	1.1E-07	8.7E-10	1.1E-06		
D4-2	D4-2-15'	7/23/14	15	Dichlorodifluoromethane (Freon 12)	0.0020	3.1E-04	6.2E-07	NC	1.4E-07	NC	1.4E-06		
D4-2	D4-2-15'	7/23/14	15	Ethylbenzene	0.0015	2.8E-04	4.3E-07	3.5E-08	9.7E-08	8.7E-11	9.7E-08		
D4-2	D4-2-15'	7/23/14	15	m,p-Xylenes	0.0020	2.8E-04	5.7E-07	NC	1.3E-07	NC	1.3E-06		
D4-2	D4-2-15'	7/23/14	15	Naphthalene	**0.18**	2.6E-04	4.6E-05	3.8E-06	1.1E-05	1.3E-07	3.5E-03		
D4-2	D4-2-15'	7/23/14	15	o-Xylene	0.0010	2.9E-04	2.9E-07	NC	6.5E-08	NC	6.5E-07		
D4-2	D4-2-15'	7/23/14	15	Styrene	0.0015	2.9E-04	4.4E-07	NC	1.0E-07	NC	1.1E-07		
D4-2	D4-2-15'	7/23/14	15	Tetrachloroethene	**0.053**	2.2E-04	1.2E-05	9.6E-07	2.7E-06	5.7E-09	7.7E-05		
D4-2	D4-2-15'	7/23/14	15	Toluene	0.0010	3.1E-04	3.1E-07	NC	7.2E-08	NC	2.4E-07		
D4-2	D4-2-15'	7/23/14	15	Trichloroethene	0.0015	2.8E-04	4.3E-07	3.5E-08	9.8E-08	1.4E-10	4.9E-05		
D4-2	D4-2-15'	7/23/14	15	Trichlorofluoromethane (Freon 11)	0.0020	2.7E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07	1.4E-07	3.8E-03

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
D5-2	D5-2-5'	6/9/14	5	1,1,1-Trichloroethane	0.00075	5.9E-04	4.4E-07	NC	1.0E-07	NC	1.0E-07		
D5-2	D5-2-5'	6/9/14	5	1,1-Dichloroethene	0.00075	6.8E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
D5-2	D5-2-5'	6/9/14	5	1,2,4-Trimethylbenzene	0.00075	5.7E-04	4.3E-07	NC	9.7E-08	NC	1.4E-05		
D5-2	D5-2-5'	6/9/14	5	1,3,5-Trimethylbenzene	0.00075	5.7E-04	4.2E-07	NC	9.7E-08	NC	2.4E-06		
D5-2	D5-2-5'	6/9/14	5	Benzene	0.00050	6.9E-04	3.4E-07	2.8E-08	7.8E-08	8.1E-10	2.6E-05		
D5-2	D5-2-5'	6/9/14	5	Carbon Disulfide	0.00075	7.4E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07		
D5-2	D5-2-5'	6/9/14	5	Chloroform	0.00075	6.4E-04	4.8E-07	3.9E-08	1.1E-07	9.0E-10	1.1E-06		
D5-2	D5-2-5'	6/9/14	5	Dichlorodifluoromethane (Freon 12)	0.0010	6.4E-04	6.4E-07	NC	1.5E-07	NC	1.5E-06		
D5-2	D5-2-5'	6/9/14	5	Ethylbenzene	0.00075	6.1E-04	4.5E-07	3.7E-08	1.0E-07	9.3E-11	1.0E-07		
D5-2	D5-2-5'	6/9/14	5	m,p-Xylenes	0.0010	6.0E-04	6.0E-07	NC	1.4E-07	NC	1.4E-06		
D5-2	D5-2-5'	6/9/14	5	Naphthalene	**0.0025**	5.7E-04	1.4E-06	1.2E-07	3.2E-07	3.9E-09	1.1E-04		
D5-2	D5-2-5'	6/9/14	5	o-Xylene	0.00050	6.1E-04	3.0E-07	NC	6.9E-08	NC	6.9E-07		
D5-2	D5-2-5'	6/9/14	5	Styrene	0.00075	6.2E-04	4.6E-07	NC	1.1E-07	NC	1.2E-07		
D5-2	D5-2-5'	6/9/14	5	Tetrachloroethene	**0.27**	5.1E-04	1.4E-04	1.1E-05	3.2E-05	6.7E-08	9.0E-04		
D5-2	D5-2-5'	6/9/14	5	Toluene	**0.0030**	6.4E-04	1.9E-06	NC	4.4E-07	NC	1.5E-06		
D5-2	D5-2-5'	6/9/14	5	Trichloroethene	**0.0079**	6.1E-04	4.8E-06	3.9E-07	1.1E-06	1.6E-09	5.5E-04		
D5-2	D5-2-5'	6/9/14	5	Trichlorofluoromethane (Freon 11)	0.0010	5.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07	7.4E-08	1.6E-03
D5-2	D5-2-15'	6/9/14	15	1,1,1-Trichloroethane	0.00075	2.7E-04	2.0E-07	NC	4.7E-08	NC	4.7E-08		
D5-2	D5-2-15'	6/9/14	15	1,1-Dichloroethene	0.00075	3.4E-04	2.5E-07	NC	5.8E-08	NC	8.3E-07		
D5-2	D5-2-15'	6/9/14	15	1,2,4-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	6.3E-06		
D5-2	D5-2-15'	6/9/14	15	1,3,5-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	1.1E-06		
D5-2	D5-2-15'	6/9/14	15	Benzene	0.00050	3.5E-04	1.7E-07	1.4E-08	4.0E-08	4.1E-10	1.3E-05		
D5-2	D5-2-15'	6/9/14	15	Carbon Disulfide	0.00075	3.9E-04	2.9E-07	NC	6.7E-08	NC	9.6E-08		
D5-2	D5-2-15'	6/9/14	15	Chloroform	0.00075	3.1E-04	2.3E-07	1.9E-08	5.3E-08	4.4E-10	5.4E-07		
D5-2	D5-2-15'	6/9/14	15	Dichlorodifluoromethane (Freon 12)	0.0010	3.1E-04	3.1E-07	NC	7.0E-08	NC	7.0E-07		
D5-2	D5-2-15'	6/9/14	15	Ethylbenzene	0.00075	2.8E-04	2.1E-07	1.7E-08	4.9E-08	4.3E-11	4.9E-08		
D5-2	D5-2-15'	6/9/14	15	m,p-Xylenes	**0.0025**	2.8E-04	7.1E-07	NC	1.6E-07	NC	1.6E-06		
D5-2	D5-2-15'	6/9/14	15	Naphthalene	**0.0060**	2.6E-04	1.5E-06	1.3E-07	3.5E-07	4.3E-09	1.2E-04		
D5-2	D5-2-15'	6/9/14	15	o-Xylene	0.00050	2.9E-04	1.4E-07	NC	3.3E-08	NC	3.3E-07		
D5-2	D5-2-15'	6/9/14	15	Styrene	0.00075	2.9E-04	2.2E-07	NC	5.0E-08	NC	5.6E-08		
D5-2	D5-2-15'	6/9/14	15	Tetrachloroethene	**0.14**	2.2E-04	3.1E-05	2.5E-06	7.1E-06	1.5E-08	2.0E-04		
D5-2	D5-2-15'	6/9/14	15	Toluene	**0.0036**	3.1E-04	1.1E-06	NC	2.6E-07	NC	8.6E-07		
D5-2	D5-2-15'	6/9/14	15	Trichloroethene	**0.0093**	2.8E-04	2.6E-06	2.2E-07	6.0E-07	8.9E-10	3.0E-04		
D5-2	D5-2-15'	6/9/14	15	Trichlorofluoromethane (Freon 11)	0.0010	2.7E-04	2.7E-07	NC	6.3E-08	NC	8.9E-08	2.1E-08	6.5E-04

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
D5-3	D5-3-15'	6/9/14	15	1,1,1-Trichloroethane	0.00075	2.7E-04	2.0E-07	NC	4.7E-08	NC	4.7E-08		
D5-3	D5-3-15'	6/9/14	15	1,1-Dichloroethene	0.00075	3.4E-04	2.5E-07	NC	5.8E-08	NC	8.3E-07		
D5-3	D5-3-15'	6/9/14	15	1,2,4-Trimethylbenzene	**0.0093**	2.6E-04	2.4E-06	NC	5.5E-07	NC	7.8E-05		
D5-3	D5-3-15'	6/9/14	15	1,3,5-Trimethylbenzene	**0.0026**	2.6E-04	6.7E-07	NC	1.5E-07	NC	3.8E-06		
D5-3	D5-3-15'	6/9/14	15	Benzene	0.00050	3.5E-04	1.7E-07	1.4E-08	4.0E-08	4.1E-10	1.3E-05		
D5-3	D5-3-15'	6/9/14	15	Carbon Disulfide	0.00075	3.9E-04	2.9E-07	NC	6.7E-08	NC	9.6E-08		
D5-3	D5-3-15'	6/9/14	15	Chloroform	0.00075	3.1E-04	2.3E-07	1.9E-08	5.3E-08	4.4E-10	5.4E-07		
D5-3	D5-3-15'	6/9/14	15	Dichlorodifluoromethane (Freon 12)	0.0010	3.1E-04	3.1E-07	NC	7.0E-08	NC	7.0E-07		
D5-3	D5-3-15'	6/9/14	15	Ethylbenzene	0.00075	2.8E-04	2.1E-07	1.7E-08	4.9E-08	4.3E-11	4.9E-08		
D5-3	D5-3-15'	6/9/14	15	m,p-Xylenes	**0.0023**	2.8E-04	6.5E-07	NC	1.5E-07	NC	1.5E-06		
D5-3	D5-3-15'	6/9/14	15	Naphthalene	0.0025	2.6E-04	6.5E-07	5.3E-08	1.5E-07	1.8E-09	4.9E-05		
D5-3	D5-3-15'	6/9/14	15	o-Xylene	**0.0024**	2.9E-04	6.9E-07	NC	1.6E-07	NC	1.6E-06		
D5-3	D5-3-15'	6/9/14	15	Styrene	0.00075	2.9E-04	2.2E-07	NC	5.0E-08	NC	5.6E-08		
D5-3	D5-3-15'	6/9/14	15	Tetrachloroethene	**0.060**	2.2E-04	1.3E-05	1.1E-06	3.1E-06	6.4E-09	8.7E-05		
D5-3	D5-3-15'	6/9/14	15	Toluene	0.00050	3.1E-04	1.6E-07	NC	3.6E-08	NC	1.2E-07		
D5-3	D5-3-15'	6/9/14	15	Trichloroethene	**0.0029**	2.8E-04	8.3E-07	6.7E-08	1.9E-07	2.8E-10	9.4E-05		
D5-3	D5-3-15'	6/9/14	15	Trichlorofluoromethane (Freon 11)	**0.0034**	2.7E-04	9.3E-07	NC	2.1E-07	NC	3.0E-07	9.4E-09	3.3E-04
D5-3	D5-3-5'	6/12/14	5	1,1,1-Trichloroethane	0.00075	5.9E-04	4.4E-07	NC	1.0E-07	NC	1.0E-07		
D5-3	D5-3-5'	6/12/14	5	1,1-Dichloroethene	0.00075	6.8E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
D5-3	D5-3-5'	6/12/14	5	1,2,4-Trimethylbenzene	0.00075	5.7E-04	4.3E-07	NC	9.7E-08	NC	1.4E-05		
D5-3	D5-3-5'	6/12/14	5	1,3,5-Trimethylbenzene	0.00075	5.7E-04	4.2E-07	NC	9.7E-08	NC	2.4E-06		
D5-3	D5-3-5'	6/12/14	5	Benzene	0.00050	6.9E-04	3.4E-07	2.8E-08	7.8E-08	8.1E-10	2.6E-05		
D5-3	D5-3-5'	6/12/14	5	Carbon Disulfide	0.00075	7.4E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07		
D5-3	D5-3-5'	6/12/14	5	Chloroform	0.00075	6.4E-04	4.8E-07	3.9E-08	1.1E-07	9.0E-10	1.1E-06		
D5-3	D5-3-5'	6/12/14	5	Dichlorodifluoromethane (Freon 12)	0.0010	6.4E-04	6.4E-07	NC	1.5E-07	NC	1.5E-06		
D5-3	D5-3-5'	6/12/14	5	Ethylbenzene	0.00075	6.1E-04	4.5E-07	3.7E-08	1.0E-07	9.3E-11	1.0E-07		
D5-3	D5-3-5'	6/12/14	5	m,p-Xylenes	0.0010	6.0E-04	6.0E-07	NC	1.4E-07	NC	1.4E-06		
D5-3	D5-3-5'	6/12/14	5	Naphthalene	0.0025	5.7E-04	1.4E-06	1.2E-07	3.2E-07	3.9E-09	1.1E-04		
D5-3	D5-3-5'	6/12/14	5	o-Xylene	0.00050	6.1E-04	3.0E-07	NC	6.9E-08	NC	6.9E-07		
D5-3	D5-3-5'	6/12/14	5	Styrene	0.00075	6.2E-04	4.6E-07	NC	1.1E-07	NC	1.2E-07		
D5-3	D5-3-5'	6/12/14	5	Tetrachloroethene	**0.12**	5.1E-04	6.1E-05	5.0E-06	1.4E-05	3.0E-08	4.0E-04		
D5-3	D5-3-5'	6/12/14	5	Toluene	**0.0047**	6.4E-04	3.0E-06	NC	6.9E-07	NC	2.3E-06		
D5-3	D5-3-5'	6/12/14	5	Trichloroethene	**0.0086**	6.1E-04	5.2E-06	4.3E-07	1.2E-06	1.7E-09	6.0E-04		
D5-3	D5-3-5'	6/12/14	5	Trichlorofluoromethane (Freon 11)	0.0010	5.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07	3.7E-08	1.2E-03

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
E1-1	E1-1-5'	6/5/14	5	1,1,1-Trichloroethane	0.00075	5.9E-04	4.4E-07	NC	1.0E-07	NC	1.0E-07		
E1-1	E1-1-5'	6/5/14	5	1,1-Dichloroethene	0.00075	6.8E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
E1-1	E1-1-5'	6/5/14	5	1,2,4-Trimethylbenzene	0.00075	5.7E-04	4.3E-07	NC	9.7E-08	NC	1.4E-05		
E1-1	E1-1-5'	6/5/14	5	1,3,5-Trimethylbenzene	0.00075	5.7E-04	4.2E-07	NC	9.7E-08	NC	2.4E-06		
E1-1	E1-1-5'	6/5/14	5	Benzene	0.00050	6.9E-04	3.4E-07	2.8E-08	7.8E-08	8.1E-10	2.6E-05		
E1-1	E1-1-5'	6/5/14	5	Carbon Disulfide	0.00075	7.4E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07		
E1-1	E1-1-5'	6/5/14	5	Chloroform	**0.0048**	6.4E-04	3.1E-06	2.5E-07	7.0E-07	5.8E-09	7.2E-06		
E1-1	E1-1-5'	6/5/14	5	Dichlorodifluoromethane (Freon 12)	**0.0038**	6.4E-04	2.4E-06	NC	5.5E-07	NC	5.5E-06		
E1-1	E1-1-5'	6/5/14	5	Ethylbenzene	0.00075	6.1E-04	4.5E-07	3.7E-08	1.0E-07	9.3E-11	1.0E-07		
E1-1	E1-1-5'	6/5/14	5	m,p-Xylenes	0.0010	6.0E-04	6.0E-07	NC	1.4E-07	NC	1.4E-06		
E1-1	E1-1-5'	6/5/14	5	Naphthalene	0.0025	5.7E-04	1.4E-06	1.2E-07	3.2E-07	3.9E-09	1.1E-04		
E1-1	E1-1-5'	6/5/14	5	o-Xylene	0.00050	6.1E-04	3.0E-07	NC	6.9E-08	NC	6.9E-07		
E1-1	E1-1-5'	6/5/14	5	Styrene	0.00075	6.2E-04	4.6E-07	NC	1.1E-07	NC	1.2E-07		
E1-1	E1-1-5'	6/5/14	5	Tetrachloroethene	**0.0067**	5.1E-04	3.4E-06	2.8E-07	7.8E-07	1.7E-09	2.2E-05		
E1-1	E1-1-5'	6/5/14	5	Toluene	**0.0032**	6.4E-04	2.1E-06	NC	4.7E-07	NC	1.6E-06		
E1-1	E1-1-5'	6/5/14	5	Trichloroethene	0.00075	6.1E-04	4.5E-07	3.7E-08	1.0E-07	1.5E-10	5.2E-05		
E1-1	E1-1-5'	6/5/14	5	Trichlorofluoromethane (Freon 11)	0.0010	5.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07	1.2E-08	2.4E-04
E1-1	E1-1-15'	6/5/14	15	1,1,1-Trichloroethane	0.00075	2.7E-04	2.0E-07	NC	4.7E-08	NC	4.7E-08		
E1-1	E1-1-15'	6/5/14	15	1,1-Dichloroethene	0.00075	3.4E-04	2.5E-07	NC	5.8E-08	NC	8.3E-07		
E1-1	E1-1-15'	6/5/14	15	1,2,4-Trimethylbenzene	**0.0028**	2.6E-04	7.2E-07	NC	1.7E-07	NC	2.4E-05		
E1-1	E1-1-15'	6/5/14	15	1,3,5-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	1.1E-06		
E1-1	E1-1-15'	6/5/14	15	Benzene	**0.0021**	3.5E-04	7.3E-07	5.9E-08	1.7E-07	1.7E-09	5.5E-05		
E1-1	E1-1-15'	6/5/14	15	Carbon Disulfide	0.00075	3.9E-04	2.9E-07	NC	6.7E-08	NC	9.6E-08		
E1-1	E1-1-15'	6/5/14	15	Chloroform	0.00075	3.1E-04	2.3E-07	1.9E-08	5.3E-08	4.4E-10	5.4E-07		
E1-1	E1-1-15'	6/5/14	15	Dichlorodifluoromethane (Freon 12)	**0.0028**	3.1E-04	8.6E-07	NC	2.0E-07	NC	2.0E-06		
E1-1	E1-1-15'	6/5/14	15	Ethylbenzene	0.00075	2.8E-04	2.1E-07	1.7E-08	4.9E-08	4.3E-11	4.9E-08		
E1-1	E1-1-15'	6/5/14	15	m,p-Xylenes	**0.0037**	2.8E-04	1.1E-06	NC	2.4E-07	NC	2.4E-06		
E1-1	E1-1-15'	6/5/14	15	Naphthalene	0.0025	2.6E-04	6.5E-07	5.3E-08	1.5E-07	1.8E-09	4.9E-05		
E1-1	E1-1-15'	6/5/14	15	o-Xylene	**0.0033**	2.9E-04	9.4E-07	NC	2.2E-07	NC	2.2E-06		
E1-1	E1-1-15'	6/5/14	15	Styrene	0.00075	2.9E-04	2.2E-07	NC	5.0E-08	NC	5.6E-08		
E1-1	E1-1-15'	6/5/14	15	Tetrachloroethene	**0.31**	2.2E-04	6.9E-05	5.6E-06	1.6E-05	3.3E-08	4.5E-04		
E1-1	E1-1-15'	6/5/14	15	Toluene	**0.0072**	3.1E-04	2.3E-06	NC	5.1E-07	NC	1.7E-06		
E1-1	E1-1-15'	6/5/14	15	Trichloroethene	**0.0083**	2.8E-04	2.4E-06	1.9E-07	5.4E-07	7.9E-10	2.7E-04		
E1-1	E1-1-15'	6/5/14	15	Trichlorofluoromethane (Freon 11)	0.0010	2.7E-04	2.7E-07	NC	6.3E-08	NC	8.9E-08	3.8E-08	8.6E-04

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas:
Current Offsite Scenario
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
E1-1	E1-1-5'	6/9/14	5	1,1,1-Trichloroethane	0.0015	5.9E-04	8.8E-07	NC	2.0E-07	NC	2.0E-07		
E1-1	E1-1-5'	6/9/14	5	1,1-Dichloroethene	0.0015	6.8E-04	1.0E-06	NC	2.3E-07	NC	3.3E-06		
E1-1	E1-1-5'	6/9/14	5	1,2,4-Trimethylbenzene	0.0015	5.7E-04	8.5E-07	NC	1.9E-07	NC	2.8E-05		
E1-1	E1-1-5'	6/9/14	5	1,3,5-Trimethylbenzene	0.0015	5.7E-04	8.5E-07	NC	1.9E-07	NC	4.8E-06		
E1-1	E1-1-5'	6/9/14	5	Benzene	0.0010	6.9E-04	6.9E-07	5.6E-08	1.6E-07	1.6E-09	5.2E-05		
E1-1	E1-1-5'	6/9/14	5	Carbon Disulfide	0.0015	7.4E-04	1.1E-06	NC	2.5E-07	NC	3.6E-07		
E1-1	E1-1-5'	6/9/14	5	Chloroform	0.0015	6.4E-04	9.6E-07	7.8E-08	2.2E-07	1.8E-09	2.2E-06		
E1-1	E1-1-5'	6/9/14	5	Dichlorodifluoromethane (Freon 12)	**0.0061**	6.4E-04	3.9E-06	NC	8.9E-07	NC	8.9E-06		
E1-1	E1-1-5'	6/9/14	5	Ethylbenzene	0.0015	6.1E-04	9.1E-07	7.4E-08	2.1E-07	1.9E-10	2.1E-07		
E1-1	E1-1-5'	6/9/14	5	m,p-Xylenes	0.0020	6.0E-04	1.2E-06	NC	2.8E-07	NC	2.8E-06		
E1-1	E1-1-5'	6/9/14	5	Naphthalene	0.0050	5.7E-04	2.8E-06	2.3E-07	6.5E-07	7.9E-09	2.2E-04		
E1-1	E1-1-5'	6/9/14	5	o-Xylene	0.0010	6.1E-04	6.1E-07	NC	1.4E-07	NC	1.4E-06		
E1-1	E1-1-5'	6/9/14	5	Styrene	0.0015	6.2E-04	9.3E-07	NC	2.1E-07	NC	2.3E-07		
E1-1	E1-1-5'	6/9/14	5	Tetrachloroethene	**0.49**	5.1E-04	2.5E-04	2.0E-05	5.7E-05	1.2E-07	1.6E-03		
E1-1	E1-1-5'	6/9/14	5	Toluene	**0.0050**	6.4E-04	3.2E-06	NC	7.4E-07	NC	2.5E-06		
E1-1	E1-1-5'	6/9/14	5	Trichloroethene	**0.0078**	6.1E-04	4.7E-06	3.9E-07	1.1E-06	1.6E-09	5.4E-04		
E1-1	E1-1-5'	6/9/14	5	Trichlorofluoromethane (Freon 11)	0.0020	5.9E-04	1.2E-06	NC	2.7E-07	NC	3.9E-07	1.3E-07	2.5E-03
E4-1	E4-1-5'	6/5/14	5	1,1,1-Trichloroethane	0.00075	5.9E-04	4.4E-07	NC	1.0E-07	NC	1.0E-07		
E4-1	E4-1-5'	6/5/14	5	1,1-Dichloroethene	0.00075	6.8E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
E4-1	E4-1-5'	6/5/14	5	1,2,4-Trimethylbenzene	**0.0067**	5.7E-04	3.8E-06	NC	8.7E-07	NC	1.2E-04		
E4-1	E4-1-5'	6/5/14	5	1,3,5-Trimethylbenzene	**0.0034**	5.7E-04	1.9E-06	NC	4.4E-07	NC	1.1E-05		
E4-1	E4-1-5'	6/5/14	5	Benzene	**0.0043**	6.9E-04	3.0E-06	2.4E-07	6.7E-07	7.0E-09	2.2E-04		
E4-1	E4-1-5'	6/5/14	5	Carbon Disulfide	0.00075	7.4E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07		
E4-1	E4-1-5'	6/5/14	5	Chloroform	**0.0038**	6.4E-04	2.4E-06	2.0E-07	5.6E-07	4.6E-09	5.7E-06		
E4-1	E4-1-5'	6/5/14	5	Dichlorodifluoromethane (Freon 12)	0.0010	6.4E-04	6.4E-07	NC	1.5E-07	NC	1.5E-06		
E4-1	E4-1-5'	6/5/14	5	Ethylbenzene	**0.0027**	6.1E-04	1.6E-06	1.3E-07	3.7E-07	3.3E-10	3.7E-07		
E4-1	E4-1-5'	6/5/14	5	m,p-Xylenes	**0.014**	6.0E-04	8.5E-06	NC	1.9E-06	NC	1.9E-05		
E4-1	E4-1-5'	6/5/14	5	Naphthalene	0.0025	5.7E-04	1.4E-06	1.2E-07	3.2E-07	3.9E-09	1.1E-04		
E4-1	E4-1-5'	6/5/14	5	o-Xylene	**0.0071**	6.1E-04	4.3E-06	NC	9.8E-07	NC	9.8E-06		
E4-1	E4-1-5'	6/5/14	5	Styrene	0.00075	6.2E-04	4.6E-07	NC	1.1E-07	NC	1.2E-07		
E4-1	E4-1-5'	6/5/14	5	Tetrachloroethene	**0.13**	5.1E-04	6.7E-05	5.4E-06	1.5E-05	3.2E-08	4.3E-04		
E4-1	E4-1-5'	6/5/14	5	Toluene	**0.0066**	6.4E-04	4.3E-06	NC	9.7E-07	NC	3.2E-06		
E4-1	E4-1-5'	6/5/14	5	Trichloroethene	**0.017**	6.1E-04	1.0E-05	8.4E-07	2.4E-06	3.4E-09	1.2E-03		
E4-1	E4-1-5'	6/5/14	5	Trichlorofluoromethane (Freon 11)	0.0010	5.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07	5.1E-08	2.1E-03

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
E4-1	E4-1-15'	6/5/14	15	1,1,1-Trichloroethane	0.00075	2.7E-04	2.0E-07	NC	4.7E-08	NC	4.7E-08		
E4-1	E4-1-15'	6/5/14	15	1,1-Dichloroethene	0.00075	3.4E-04	2.5E-07	NC	5.8E-08	NC	8.3E-07		
E4-1	E4-1-15'	6/5/14	15	1,2,4-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	6.3E-06		
E4-1	E4-1-15'	6/5/14	15	1,3,5-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	1.1E-06		
E4-1	E4-1-15'	6/5/14	15	Benzene	**0.0026**	3.5E-04	9.0E-07	7.4E-08	2.1E-07	2.1E-09	6.9E-05		
E4-1	E4-1-15'	6/5/14	15	Carbon Disulfide	0.00075	3.9E-04	2.9E-07	NC	6.7E-08	NC	9.6E-08		
E4-1	E4-1-15'	6/5/14	15	Chloroform	0.00075	3.1E-04	2.3E-07	1.9E-08	5.3E-08	4.4E-10	5.4E-07		
E4-1	E4-1-15'	6/5/14	15	Dichlorodifluoromethane (Freon 12)	0.0010	3.1E-04	3.1E-07	NC	7.0E-08	NC	7.0E-07		
E4-1	E4-1-15'	6/5/14	15	Ethylbenzene	0.00075	2.8E-04	2.1E-07	1.7E-08	4.9E-08	4.3E-11	4.9E-08		
E4-1	E4-1-15'	6/5/14	15	m,p-Xylenes	0.0010	2.8E-04	2.8E-07	NC	6.5E-08	NC	6.5E-07		
E4-1	E4-1-15'	6/5/14	15	Naphthalene	**0.0081**	2.6E-04	2.1E-06	1.7E-07	4.8E-07	5.8E-09	1.6E-04		
E4-1	E4-1-15'	6/5/14	15	o-Xylene	0.00050	2.9E-04	1.4E-07	NC	3.3E-08	NC	3.3E-07		
E4-1	E4-1-15'	6/5/14	15	Styrene	0.00075	2.9E-04	2.2E-07	NC	5.0E-08	NC	5.6E-08		
E4-1	E4-1-15'	6/5/14	15	Tetrachloroethene	**0.100**	2.2E-04	2.2E-05	1.8E-06	5.1E-06	1.1E-08	1.5E-04		
E4-1	E4-1-15'	6/5/14	15	Toluene	**0.0059**	3.1E-04	1.8E-06	NC	4.2E-07	NC	1.4E-06		
E4-1	E4-1-15'	6/5/14	15	Trichloroethene	**0.013**	2.8E-04	3.7E-06	3.0E-07	8.5E-07	1.2E-09	4.2E-04		
E4-1	E4-1-15'	6/5/14	15	Trichlorofluoromethane (Freon 11)	0.0010	2.7E-04	2.7E-07	NC	6.3E-08	NC	8.9E-08	2.0E-08	8.1E-04
E5-1	E5-1-5'	6/9/14	5	1,1,1-Trichloroethane	0.00075	5.9E-04	4.4E-07	NC	1.0E-07	NC	1.0E-07		
E5-1	E5-1-5'	6/9/14	5	1,1-Dichloroethene	0.00075	6.8E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
E5-1	E5-1-5'	6/9/14	5	1,2,4-Trimethylbenzene	0.00075	5.7E-04	4.3E-07	NC	9.7E-08	NC	1.4E-05		
E5-1	E5-1-5'	6/9/14	5	1,3,5-Trimethylbenzene	0.00075	5.7E-04	4.2E-07	NC	9.7E-08	NC	2.4E-06		
E5-1	E5-1-5'	6/9/14	5	Benzene	0.00050	6.9E-04	3.4E-07	2.8E-08	7.8E-08	8.1E-10	2.6E-05		
E5-1	E5-1-5'	6/9/14	5	Carbon Disulfide	0.00075	7.4E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07		
E5-1	E5-1-5'	6/9/14	5	Chloroform	0.00075	6.4E-04	4.8E-07	3.9E-08	1.1E-07	9.0E-10	1.1E-06		
E5-1	E5-1-5'	6/9/14	5	Dichlorodifluoromethane (Freon 12)	0.0010	6.4E-04	6.4E-07	NC	1.5E-07	NC	1.5E-06		
E5-1	E5-1-5'	6/9/14	5	Ethylbenzene	0.00075	6.1E-04	4.5E-07	3.7E-08	1.0E-07	9.3E-11	1.0E-07		
E5-1	E5-1-5'	6/9/14	5	m,p-Xylenes	**0.0024**	6.0E-04	1.5E-06	NC	3.3E-07	NC	3.3E-06		
E5-1	E5-1-5'	6/9/14	5	Naphthalene	0.0025	5.7E-04	1.4E-06	1.2E-07	3.2E-07	3.9E-09	1.1E-04		
E5-1	E5-1-5'	6/9/14	5	o-Xylene	0.00050	6.1E-04	3.0E-07	NC	6.9E-08	NC	6.9E-07		
E5-1	E5-1-5'	6/9/14	5	Styrene	0.00075	6.2E-04	4.6E-07	NC	1.1E-07	NC	1.2E-07		
E5-1	E5-1-5'	6/9/14	5	Tetrachloroethene	**0.18**	5.1E-04	9.2E-05	7.5E-06	2.1E-05	4.4E-08	6.0E-04		
E5-1	E5-1-5'	6/9/14	5	Toluene	**0.0048**	6.4E-04	3.1E-06	NC	7.1E-07	NC	2.4E-06		
E5-1	E5-1-5'	6/9/14	5	Trichloroethene	**0.0097**	6.1E-04	5.9E-06	4.8E-07	1.3E-06	2.0E-09	6.7E-04		
E5-1	E5-1-5'	6/9/14	5	Trichlorofluoromethane (Freon 11)	0.0010	5.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07	5.2E-08	1.4E-03

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
E5-1	E5-1-15'	6/9/14	15	1,1,1-Trichloroethane	0.00075	2.7E-04	2.0E-07	NC	4.7E-08	NC	4.7E-08		
E5-1	E5-1-15'	6/9/14	15	1,1-Dichloroethene	0.00075	3.4E-04	2.5E-07	NC	5.8E-08	NC	8.3E-07		
E5-1	E5-1-15'	6/9/14	15	1,2,4-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	6.3E-06		
E5-1	E5-1-15'	6/9/14	15	1,3,5-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	1.1E-06		
E5-1	E5-1-15'	6/9/14	15	Benzene	0.00050	3.5E-04	1.7E-07	1.4E-08	4.0E-08	4.1E-10	1.3E-05		
E5-1	E5-1-15'	6/9/14	15	Carbon Disulfide	0.00075	3.9E-04	2.9E-07	NC	6.7E-08	NC	9.6E-08		
E5-1	E5-1-15'	6/9/14	15	Chloroform	0.00075	3.1E-04	2.3E-07	1.9E-08	5.3E-08	4.4E-10	5.4E-07		
E5-1	E5-1-15'	6/9/14	15	Dichlorodifluoromethane (Freon 12)	0.0010	3.1E-04	3.1E-07	NC	7.0E-08	NC	7.0E-07		
E5-1	E5-1-15'	6/9/14	15	Ethylbenzene	0.00075	2.8E-04	2.1E-07	1.7E-08	4.9E-08	4.3E-11	4.9E-08		
E5-1	E5-1-15'	6/9/14	15	m,p-Xylenes	0.0010	2.8E-04	2.8E-07	NC	6.5E-08	NC	6.5E-07		
E5-1	E5-1-15'	6/9/14	15	Naphthalene	0.0025	2.6E-04	6.5E-07	5.3E-08	1.5E-07	1.8E-09	4.9E-05		
E5-1	E5-1-15'	6/9/14	15	o-Xylene	0.00050	2.9E-04	1.4E-07	NC	3.3E-08	NC	3.3E-07		
E5-1	E5-1-15'	6/9/14	15	Styrene	0.00075	2.9E-04	2.2E-07	NC	5.0E-08	NC	5.6E-08		
E5-1	E5-1-15'	6/9/14	15	Tetrachloroethene	**0.14**	2.2E-04	3.1E-05	2.5E-06	7.1E-06	1.5E-08	2.0E-04		
E5-1	E5-1-15'	6/9/14	15	Toluene	**0.0029**	3.1E-04	9.1E-07	NC	2.1E-07	NC	6.9E-07		
E5-1	E5-1-15'	6/9/14	15	Trichloroethene	**0.0066**	2.8E-04	1.9E-06	1.5E-07	4.3E-07	6.3E-10	2.1E-04		
E5-1	E5-1-15'	6/9/14	15	Trichlorofluoromethane (Freon 11)	0.0010	2.7E-04	2.7E-07	NC	6.3E-08	NC	8.9E-08	1.8E-08	4.9E-04
F1-2	F1-2-5'	6/12/14	5	1,1,1-Trichloroethane	0.00075	5.9E-04	4.4E-07	NC	1.0E-07	NC	1.0E-07		
F1-2	F1-2-5'	6/12/14	5	1,1-Dichloroethene	0.00075	6.8E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
F1-2	F1-2-5'	6/12/14	5	1,2,4-Trimethylbenzene	**0.0075**	5.7E-04	4.3E-06	NC	9.7E-07	NC	1.4E-04		
F1-2	F1-2-5'	6/12/14	5	1,3,5-Trimethylbenzene	0.00075	5.7E-04	4.2E-07	NC	9.7E-08	NC	2.4E-06		
F1-2	F1-2-5'	6/12/14	5	Benzene	0.00050	6.9E-04	3.4E-07	2.8E-08	7.8E-08	8.1E-10	2.6E-05		
F1-2	F1-2-5'	6/12/14	5	Carbon Disulfide	0.00075	7.4E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07		
F1-2	F1-2-5'	6/12/14	5	Chloroform	0.00075	6.4E-04	4.8E-07	3.9E-08	1.1E-07	9.0E-10	1.1E-06		
F1-2	F1-2-5'	6/12/14	5	Dichlorodifluoromethane (Freon 12)	0.0010	6.4E-04	6.4E-07	NC	1.5E-07	NC	1.5E-06		
F1-2	F1-2-5'	6/12/14	5	Ethylbenzene	0.00075	6.1E-04	4.5E-07	3.7E-08	1.0E-07	9.3E-11	1.0E-07		
F1-2	F1-2-5'	6/12/14	5	m,p-Xylenes	**0.0062**	6.0E-04	3.7E-06	NC	8.6E-07	NC	8.6E-06		
F1-2	F1-2-5'	6/12/14	5	Naphthalene	0.0025	5.7E-04	1.4E-06	1.2E-07	3.2E-07	3.9E-09	1.1E-04		
F1-2	F1-2-5'	6/12/14	5	o-Xylene	**0.0053**	6.1E-04	3.2E-06	NC	7.3E-07	NC	7.3E-06		
F1-2	F1-2-5'	6/12/14	5	Styrene	0.00075	6.2E-04	4.6E-07	NC	1.1E-07	NC	1.2E-07		
F1-2	F1-2-5'	6/12/14	5	Tetrachloroethene	**0.023**	5.1E-04	1.2E-05	9.6E-07	2.7E-06	5.7E-09	7.7E-05		
F1-2	F1-2-5'	6/12/14	5	Toluene	**0.0048**	6.4E-04	3.1E-06	NC	7.1E-07	NC	2.4E-06		
F1-2	F1-2-5'	6/12/14	5	Trichloroethene	0.00075	6.1E-04	4.5E-07	3.7E-08	1.0E-07	1.5E-10	5.2E-05		
F1-2	F1-2-5'	6/12/14	5	Trichlorofluoromethane (Freon 11)	0.0010	5.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07	1.2E-08	4.3E-04

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
F1-2	F1-2-15'	6/12/14	15	1,1,1-Trichloroethane	0.00075	2.7E-04	2.0E-07	NC	4.7E-08	NC	4.7E-08		
F1-2	F1-2-15'	6/12/14	15	1,1-Dichloroethene	0.00075	3.4E-04	2.5E-07	NC	5.8E-08	NC	8.3E-07		
F1-2	F1-2-15'	6/12/14	15	1,2,4-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	6.3E-06		
F1-2	F1-2-15'	6/12/14	15	1,3,5-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	1.1E-06		
F1-2	F1-2-15'	6/12/14	15	Benzene	0.00050	3.5E-04	1.7E-07	1.4E-08	4.0E-08	4.1E-10	1.3E-05		
F1-2	F1-2-15'	6/12/14	15	Carbon Disulfide	0.00075	3.9E-04	2.9E-07	NC	6.7E-08	NC	9.6E-08		
F1-2	F1-2-15'	6/12/14	15	Chloroform	0.00075	3.1E-04	2.3E-07	1.9E-08	5.3E-08	4.4E-10	5.4E-07		
F1-2	F1-2-15'	6/12/14	15	Dichlorodifluoromethane (Freon 12)	0.0010	3.1E-04	3.1E-07	NC	7.0E-08	NC	7.0E-07		
F1-2	F1-2-15'	6/12/14	15	Ethylbenzene	0.00075	2.8E-04	2.1E-07	1.7E-08	4.9E-08	4.3E-11	4.9E-08		
F1-2	F1-2-15'	6/12/14	15	m,p-Xylenes	0.0010	2.8E-04	2.8E-07	NC	6.5E-08	NC	6.5E-07		
F1-2	F1-2-15'	6/12/14	15	Naphthalene	0.0025	2.6E-04	6.5E-07	5.3E-08	1.5E-07	1.8E-09	4.9E-05		
F1-2	F1-2-15'	6/12/14	15	o-Xylene	0.00050	2.9E-04	1.4E-07	NC	3.3E-08	NC	3.3E-07		
F1-2	F1-2-15'	6/12/14	15	Styrene	0.00075	2.9E-04	2.2E-07	NC	5.0E-08	NC	5.6E-08		
F1-2	F1-2-15'	6/12/14	15	Tetrachloroethene	**0.014**	2.2E-04	3.1E-06	2.5E-07	7.1E-07	1.5E-09	2.0E-05		
F1-2	F1-2-15'	6/12/14	15	Toluene	0.00050	3.1E-04	1.6E-07	NC	3.6E-08	NC	1.2E-07		
F1-2	F1-2-15'	6/12/14	15	Trichloroethene	0.00075	2.8E-04	2.1E-07	1.7E-08	4.9E-08	7.1E-11	2.4E-05		
F1-2	F1-2-15'	6/12/14	15	Trichlorofluoromethane (Freon 11)	0.0010	2.7E-04	2.7E-07	NC	6.3E-08	NC	8.9E-08	4.3E-09	1.2E-04
F4-1	F4-1-5'	6/17/14	5	1,1,1-Trichloroethane	**0.0067**	5.9E-04	3.9E-06	NC	9.0E-07	NC	9.0E-07		
F4-1	F4-1-5'	6/17/14	5	1,1-Dichloroethene	0.0015	6.8E-04	1.0E-06	NC	2.3E-07	NC	3.3E-06		
F4-1	F4-1-5'	6/17/14	5	1,2,4-Trimethylbenzene	0.0015	5.7E-04	8.5E-07	NC	1.9E-07	NC	2.8E-05		
F4-1	F4-1-5'	6/17/14	5	1,3,5-Trimethylbenzene	0.0015	5.7E-04	8.5E-07	NC	1.9E-07	NC	4.8E-06		
F4-1	F4-1-5'	6/17/14	5	Benzene	0.0010	6.9E-04	6.9E-07	5.6E-08	1.6E-07	1.6E-09	5.2E-05		
F4-1	F4-1-5'	6/17/14	5	Carbon Disulfide	0.0015	7.4E-04	1.1E-06	NC	2.5E-07	NC	3.6E-07		
F4-1	F4-1-5'	6/17/14	5	Chloroform	0.0015	6.4E-04	9.6E-07	7.8E-08	2.2E-07	1.8E-09	2.2E-06		
F4-1	F4-1-5'	6/17/14	5	Dichlorodifluoromethane (Freon 12)	0.0020	6.4E-04	1.3E-06	NC	2.9E-07	NC	2.9E-06		
F4-1	F4-1-5'	6/17/14	5	Ethylbenzene	0.0015	6.1E-04	9.1E-07	7.4E-08	2.1E-07	1.9E-10	2.1E-07		
F4-1	F4-1-5'	6/17/14	5	m,p-Xylenes	0.0020	6.0E-04	1.2E-06	NC	2.8E-07	NC	2.8E-06		
F4-1	F4-1-5'	6/17/14	5	Naphthalene	0.0050	5.7E-04	2.8E-06	2.3E-07	6.5E-07	7.9E-09	2.2E-04		
F4-1	F4-1-5'	6/17/14	5	o-Xylene	0.0010	6.1E-04	6.1E-07	NC	1.4E-07	NC	1.4E-06		
F4-1	F4-1-5'	6/17/14	5	Styrene	0.0015	6.2E-04	9.3E-07	NC	2.1E-07	NC	2.3E-07		
F4-1	F4-1-5'	6/17/14	5	Tetrachloroethene	**0.070**	5.1E-04	3.6E-05	2.9E-06	8.2E-06	1.7E-08	2.3E-04		
F4-1	F4-1-5'	6/17/14	5	Toluene	0.0010	6.4E-04	6.4E-07	NC	1.5E-07	NC	4.9E-07		
F4-1	F4-1-5'	6/17/14	5	Trichloroethene	0.0015	6.1E-04	9.1E-07	7.4E-08	2.1E-07	3.0E-10	1.0E-04		
F4-1	F4-1-5'	6/17/14	5	Trichlorofluoromethane (Freon 11)	0.0020	5.9E-04	1.2E-06	NC	2.7E-07	NC	3.9E-07	2.9E-08	6.5E-04

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/ (mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
F4-1	F4-1-15'	6/17/14	15	1,1,1-Trichloroethane	**0.0074**	2.7E-04	2.0E-06	NC	4.6E-07	NC	4.6E-07		
F4-1	F4-1-15'	6/17/14	15	1,1-Dichloroethene	0.0015	3.4E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
F4-1	F4-1-15'	6/17/14	15	1,2,4-Trimethylbenzene	0.0015	2.6E-04	3.9E-07	NC	8.9E-08	NC	1.3E-05		
F4-1	F4-1-15'	6/17/14	15	1,3,5-Trimethylbenzene	0.0015	2.6E-04	3.9E-07	NC	8.8E-08	NC	2.2E-06		
F4-1	F4-1-15'	6/17/14	15	Benzene	0.0010	3.5E-04	3.5E-07	2.8E-08	7.9E-08	8.2E-10	2.6E-05		
F4-1	F4-1-15'	6/17/14	15	Carbon Disulfide	0.0015	3.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07		
F4-1	F4-1-15'	6/17/14	15	Chloroform	0.0015	3.1E-04	4.7E-07	3.8E-08	1.1E-07	8.7E-10	1.1E-06		
F4-1	F4-1-15'	6/17/14	15	Dichlorodifluoromethane (Freon 12)	0.0020	3.1E-04	6.2E-07	NC	1.4E-07	NC	1.4E-06		
F4-1	F4-1-15'	6/17/14	15	Ethylbenzene	0.0015	2.8E-04	4.3E-07	3.5E-08	9.7E-08	8.7E-11	9.7E-08		
F4-1	F4-1-15'	6/17/14	15	m,p-Xylenes	0.0020	2.8E-04	5.7E-07	NC	1.3E-07	NC	1.3E-06		
F4-1	F4-1-15'	6/17/14	15	Naphthalene	0.0050	2.6E-04	1.3E-06	1.1E-07	2.9E-07	3.6E-09	9.8E-05		
F4-1	F4-1-15'	6/17/14	15	o-Xylene	0.0010	2.9E-04	2.9E-07	NC	6.5E-08	NC	6.5E-07		
F4-1	F4-1-15'	6/17/14	15	Styrene	0.0015	2.9E-04	4.4E-07	NC	1.0E-07	NC	1.1E-07		
F4-1	F4-1-15'	6/17/14	15	Tetrachloroethene	**0.059**	2.2E-04	1.3E-05	1.1E-06	3.0E-06	6.3E-09	8.6E-05		
F4-1	F4-1-15'	6/17/14	15	Toluene	0.0010	3.1E-04	3.1E-07	NC	7.2E-08	NC	2.4E-07		
F4-1	F4-1-15'	6/17/14	15	Trichloroethene	0.0015	2.8E-04	4.3E-07	3.5E-08	9.8E-08	1.4E-10	4.9E-05		
F4-1	F4-1-15'	6/17/14	15	Trichlorofluoromethane (Freon 11)	0.0020	2.7E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07	1.2E-08	2.8E-04
G1-1	G1-1-5'	6/12/14	5	1,1,1-Trichloroethane	**0.0081**	5.9E-04	4.8E-06	NC	1.1E-06	NC	1.1E-06		
G1-1	G1-1-5'	6/12/14	5	1,1-Dichloroethene	0.0015	6.8E-04	1.0E-06	NC	2.3E-07	NC	3.3E-06		
G1-1	G1-1-5'	6/12/14	5	1,2,4-Trimethylbenzene	**0.011**	5.7E-04	6.3E-06	NC	1.4E-06	NC	2.0E-04		
G1-1	G1-1-5'	6/12/14	5	1,3,5-Trimethylbenzene	**0.0064**	5.7E-04	3.6E-06	NC	8.3E-07	NC	2.1E-05		
G1-1	G1-1-5'	6/12/14	5	Benzene	**0.0042**	6.9E-04	2.9E-06	2.4E-07	6.6E-07	6.8E-09	2.2E-04		
G1-1	G1-1-5'	6/12/14	5	Carbon Disulfide	0.0015	7.4E-04	1.1E-06	NC	2.5E-07	NC	3.6E-07		
G1-1	G1-1-5'	6/12/14	5	Chloroform	0.0015	6.4E-04	9.6E-07	7.8E-08	2.2E-07	1.8E-09	2.2E-06		
G1-1	G1-1-5'	6/12/14	5	Dichlorodifluoromethane (Freon 12)	0.0020	6.4E-04	1.3E-06	NC	2.9E-07	NC	2.9E-06		
G1-1	G1-1-5'	6/12/14	5	Ethylbenzene	**0.0089**	6.1E-04	5.4E-06	4.4E-07	1.2E-06	1.1E-09	1.2E-06		
G1-1	G1-1-5'	6/12/14	5	m,p-Xylenes	**0.037**	6.0E-04	2.2E-05	NC	5.1E-06	NC	5.1E-05		
G1-1	G1-1-5'	6/12/14	5	Naphthalene	0.0050	5.7E-04	2.8E-06	2.3E-07	6.5E-07	7.9E-09	2.2E-04		
G1-1	G1-1-5'	6/12/14	5	o-Xylene	**0.012**	6.1E-04	7.3E-06	NC	1.7E-06	NC	1.7E-05		
G1-1	G1-1-5'	6/12/14	5	Styrene	0.0015	6.2E-04	9.3E-07	NC	2.1E-07	NC	2.3E-07		
G1-1	G1-1-5'	6/12/14	5	Tetrachloroethene	**0.016**	5.1E-04	8.2E-06	6.7E-07	1.9E-06	3.9E-09	5.3E-05		
G1-1	G1-1-5'	6/12/14	5	Toluene	**0.030**	6.4E-04	1.9E-05	NC	4.4E-06	NC	1.5E-05		
G1-1	G1-1-5'	6/12/14	5	Trichloroethene	0.0015	6.1E-04	9.1E-07	7.4E-08	2.1E-07	3.0E-10	1.0E-04		
G1-1	G1-1-5'	6/12/14	5	Trichlorofluoromethane (Freon 11)	0.0020	5.9E-04	1.2E-06	NC	2.7E-07	NC	3.9E-07	2.2E-08	9.1E-04

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor $[(mg/m^3)/(mg/m^3)]$[c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
G1-1	G1-1-15'	6/12/14	15	1,1,1-Trichloroethane	**0.0072**	2.7E-04	2.0E-06	NC	4.5E-07	NC	4.5E-07		
G1-1	G1-1-15'	6/12/14	15	1,1-Dichloroethene	0.0015	3.4E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
G1-1	G1-1-15'	6/12/14	15	1,2,4-Trimethylbenzene	0.0015	2.6E-04	3.9E-07	NC	8.9E-08	NC	1.3E-05		
G1-1	G1-1-15'	6/12/14	15	1,3,5-Trimethylbenzene	0.0015	2.6E-04	3.9E-07	NC	8.8E-08	NC	2.2E-06		
G1-1	G1-1-15'	6/12/14	15	Benzene	0.0010	3.5E-04	3.5E-07	2.8E-08	7.9E-08	8.2E-10	2.6E-05		
G1-1	G1-1-15'	6/12/14	15	Carbon Disulfide	0.0015	3.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07		
G1-1	G1-1-15'	6/12/14	15	Chloroform	0.0015	3.1E-04	4.7E-07	3.8E-08	1.1E-07	8.7E-10	1.1E-06		
G1-1	G1-1-15'	6/12/14	15	Dichlorodifluoromethane (Freon 12)	0.0020	3.1E-04	6.2E-07	NC	1.4E-07	NC	1.4E-06		
G1-1	G1-1-15'	6/12/14	15	Ethylbenzene	0.0015	2.8E-04	4.3E-07	3.5E-08	9.7E-08	8.7E-11	9.7E-08		
G1-1	G1-1-15'	6/12/14	15	m,p-Xylenes	**0.0060**	2.8E-04	1.7E-06	NC	3.9E-07	NC	3.9E-06		
G1-1	G1-1-15'	6/12/14	15	Naphthalene	0.0050	2.6E-04	1.3E-06	1.1E-07	2.9E-07	3.6E-09	9.8E-05		
G1-1	G1-1-15'	6/12/14	15	o-Xylene	0.0010	2.9E-04	2.9E-07	NC	6.5E-08	NC	6.5E-07		
G1-1	G1-1-15'	6/12/14	15	Styrene	**0.010**	2.9E-04	2.9E-06	NC	6.7E-07	NC	7.4E-07		
G1-1	G1-1-15'	6/12/14	15	Tetrachloroethene	**0.014**	2.2E-04	3.1E-06	2.5E-07	7.1E-07	1.5E-09	2.0E-05		
G1-1	G1-1-15'	6/12/14	15	Toluene	**0.0057**	3.1E-04	1.8E-06	NC	4.1E-07	NC	1.4E-06		
G1-1	G1-1-15'	6/12/14	15	Trichloroethene	0.0015	2.8E-04	4.3E-07	3.5E-08	9.8E-08	1.4E-10	4.9E-05		
G1-1	G1-1-15'	6/12/14	15	Trichlorofluoromethane (Freon 11)	0.0020	2.7E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07	7.0E-09	2.2E-04
G3-1	G3-1-5'	6/12/14	5	1,1,1-Trichloroethane	0.00075	5.9E-04	4.4E-07	NC	1.0E-07	NC	1.0E-07		
G3-1	G3-1-5'	6/12/14	5	1,1-Dichloroethene	0.00075	6.8E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
G3-1	G3-1-5'	6/12/14	5	1,2,4-Trimethylbenzene	0.00075	5.7E-04	4.3E-07	NC	9.7E-08	NC	1.4E-05		
G3-1	G3-1-5'	6/12/14	5	1,3,5-Trimethylbenzene	0.00075	5.7E-04	4.2E-07	NC	9.7E-08	NC	2.4E-06		
G3-1	G3-1-5'	6/12/14	5	Benzene	0.00050	6.9E-04	3.4E-07	2.8E-08	7.8E-08	8.1E-10	2.6E-05		
G3-1	G3-1-5'	6/12/14	5	Carbon Disulfide	0.00075	7.4E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07		
G3-1	G3-1-5'	6/12/14	5	Chloroform	0.00075	6.4E-04	4.8E-07	3.9E-08	1.1E-07	9.0E-10	1.1E-06		
G3-1	G3-1-5'	6/12/14	5	Dichlorodifluoromethane (Freon 12)	0.0010	6.4E-04	6.4E-07	NC	1.5E-07	NC	1.5E-06		
G3-1	G3-1-5'	6/12/14	5	Ethylbenzene	0.00075	6.1E-04	4.5E-07	3.7E-08	1.0E-07	9.3E-11	1.0E-07		
G3-1	G3-1-5'	6/12/14	5	m,p-Xylenes	0.0010	6.0E-04	6.0E-07	NC	1.4E-07	NC	1.4E-06		
G3-1	G3-1-5'	6/12/14	5	Naphthalene	0.0025	5.7E-04	1.4E-06	1.2E-07	3.2E-07	3.9E-09	1.1E-04		
G3-1	G3-1-5'	6/12/14	5	o-Xylene	0.00050	6.1E-04	3.0E-07	NC	6.9E-08	NC	6.9E-07		
G3-1	G3-1-5'	6/12/14	5	Styrene	0.00075	6.2E-04	4.6E-07	NC	1.1E-07	NC	1.2E-07		
G3-1	G3-1-5'	6/12/14	5	Tetrachloroethene	**0.13**	5.1E-04	6.7E-05	5.4E-06	1.5E-05	3.2E-08	4.3E-04		
G3-1	G3-1-5'	6/12/14	5	Toluene	**0.0046**	6.4E-04	3.0E-06	NC	6.8E-07	NC	2.3E-06		
G3-1	G3-1-5'	6/12/14	5	Trichloroethene	**0.0090**	6.1E-04	5.5E-06	4.4E-07	1.2E-06	1.8E-09	6.2E-04		
G3-1	G3-1-5'	6/12/14	5	Trichlorofluoromethane (Freon 11)	0.0010	5.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07	4.0E-08	1.2E-03

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor $[(mg/m^3)/(mg/m^3)]$[c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
G3-1	G3-1-15'	6/12/14	15	1,1,1-Trichloroethane	0.00075	2.7E-04	2.0E-07	NC	4.7E-08	NC	4.7E-08		
G3-1	G3-1-15'	6/12/14	15	1,1-Dichloroethene	0.00075	3.4E-04	2.5E-07	NC	5.8E-08	NC	8.3E-07		
G3-1	G3-1-15'	6/12/14	15	1,2,4-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	6.3E-06		
G3-1	G3-1-15'	6/12/14	15	1,3,5-Trimethylbenzene	0.00075	2.6E-04	1.9E-07	NC	4.4E-08	NC	1.1E-06		
G3-1	G3-1-15'	6/12/14	15	Benzene	0.00050	3.5E-04	1.7E-07	1.4E-08	4.0E-08	4.1E-10	1.3E-05		
G3-1	G3-1-15'	6/12/14	15	Carbon Disulfide	0.00075	3.9E-04	2.9E-07	NC	6.7E-08	NC	9.6E-08		
G3-1	G3-1-15'	6/12/14	15	Chloroform	0.00075	3.1E-04	2.3E-07	1.9E-08	5.3E-08	4.4E-10	5.4E-07		
G3-1	G3-1-15'	6/12/14	15	Dichlorodifluoromethane (Freon 12)	0.0010	3.1E-04	3.1E-07	NC	7.0E-08	NC	7.0E-07		
G3-1	G3-1-15'	6/12/14	15	Ethylbenzene	0.00075	2.8E-04	2.1E-07	1.7E-08	4.9E-08	4.3E-11	4.9E-08		
G3-1	G3-1-15'	6/12/14	15	m,p-Xylenes	0.0010	2.8E-04	2.8E-07	NC	6.5E-08	NC	6.5E-07		
G3-1	G3-1-15'	6/12/14	15	Naphthalene	0.0025	2.6E-04	6.5E-07	5.3E-08	1.5E-07	1.8E-09	4.9E-05		
G3-1	G3-1-15'	6/12/14	15	o-Xylene	0.00050	2.9E-04	1.4E-07	NC	3.3E-08	NC	3.3E-07		
G3-1	G3-1-15'	6/12/14	15	Styrene	0.00075	2.9E-04	2.2E-07	NC	5.0E-08	NC	5.6E-08		
G3-1	G3-1-15'	6/12/14	15	Tetrachloroethene	**0.14**	2.2E-04	3.1E-05	2.5E-06	7.1E-06	1.5E-08	2.0E-04		
G3-1	G3-1-15'	6/12/14	15	Toluene	0.00050	3.1E-04	1.6E-07	NC	3.6E-08	NC	1.2E-07		
G3-1	G3-1-15'	6/12/14	15	Trichloroethene	0.00075	2.8E-04	2.1E-07	1.7E-08	4.9E-08	7.1E-11	2.4E-05		
G3-1	G3-1-15'	6/12/14	15	Trichlorofluoromethane (Freon 11)	0.0010	2.7E-04	2.7E-07	NC	6.3E-08	NC	8.9E-08	1.8E-08	3.0E-04
G4-1	G4-1-5'	6/12/14	5	1,1,1-Trichloroethane	0.0015	5.9E-04	8.8E-07	NC	2.0E-07	NC	2.0E-07		
G4-1	G4-1-5'	6/12/14	5	1,1-Dichloroethene	0.0015	6.8E-04	1.0E-06	NC	2.3E-07	NC	3.3E-06		
G4-1	G4-1-5'	6/12/14	5	1,2,4-Trimethylbenzene	**0.0055**	5.7E-04	3.1E-06	NC	7.1E-07	NC	1.0E-04		
G4-1	G4-1-5'	6/12/14	5	1,3,5-Trimethylbenzene	0.0015	5.7E-04	8.5E-07	NC	1.9E-07	NC	4.8E-06		
G4-1	G4-1-5'	6/12/14	5	Benzene	0.0010	6.9E-04	6.9E-07	5.6E-08	1.6E-07	1.6E-09	5.2E-05		
G4-1	G4-1-5'	6/12/14	5	Carbon Disulfide	0.0015	7.4E-04	1.1E-06	NC	2.5E-07	NC	3.6E-07		
G4-1	G4-1-5'	6/12/14	5	Chloroform	0.0015	6.4E-04	9.6E-07	7.8E-08	2.2E-07	1.8E-09	2.2E-06		
G4-1	G4-1-5'	6/12/14	5	Dichlorodifluoromethane (Freon 12)	0.0020	6.4E-04	1.3E-06	NC	2.9E-07	NC	2.9E-06		
G4-1	G4-1-5'	6/12/14	5	Ethylbenzene	0.0015	6.1E-04	9.1E-07	7.4E-08	2.1E-07	1.9E-10	2.1E-07		
G4-1	G4-1-5'	6/12/14	5	m,p-Xylenes	**0.017**	6.0E-04	1.0E-05	NC	2.3E-06	NC	2.3E-05		
G4-1	G4-1-5'	6/12/14	5	Naphthalene	0.0050	5.7E-04	2.8E-06	2.3E-07	6.5E-07	7.9E-09	2.2E-04		
G4-1	G4-1-5'	6/12/14	5	o-Xylene	**0.0056**	6.1E-04	3.4E-06	NC	7.8E-07	NC	7.8E-06		
G4-1	G4-1-5'	6/12/14	5	Styrene	0.0015	6.2E-04	9.3E-07	NC	2.1E-07	NC	2.3E-07		
G4-1	G4-1-5'	6/12/14	5	Tetrachloroethene	**0.037**	5.1E-04	1.9E-05	1.5E-06	4.3E-06	9.1E-09	1.2E-04		
G4-1	G4-1-5'	6/12/14	5	Toluene	**0.012**	6.4E-04	7.7E-06	NC	1.8E-06	NC	5.9E-06		
G4-1	G4-1-5'	6/12/14	5	Trichloroethene	0.0015	6.1E-04	9.1E-07	7.4E-08	2.1E-07	3.0E-10	1.0E-04		
G4-1	G4-1-5'	6/12/14	5	Trichlorofluoromethane (Freon 11)	0.0020	5.9E-04	1.2E-06	NC	2.7E-07	NC	3.9E-07	2.1E-08	6.5E-04

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
G4-1	G4-1-15'	6/12/14	15	1,1,1-Trichloroethane	0.0015	2.7E-04	4.1E-07	NC	9.3E-08	NC	9.3E-08		
G4-1	G4-1-15'	6/12/14	15	1,1-Dichloroethene	0.0015	3.4E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
G4-1	G4-1-15'	6/12/14	15	1,2,4-Trimethylbenzene	0.0015	2.6E-04	3.9E-07	NC	8.9E-08	NC	1.3E-05		
G4-1	G4-1-15'	6/12/14	15	1,3,5-Trimethylbenzene	0.0015	2.6E-04	3.9E-07	NC	8.8E-08	NC	2.2E-06		
G4-1	G4-1-15'	6/12/14	15	Benzene	0.0010	3.5E-04	3.5E-07	2.8E-08	7.9E-08	8.2E-10	2.6E-05		
G4-1	G4-1-15'	6/12/14	15	Carbon Disulfide	0.0015	3.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07		
G4-1	G4-1-15'	6/12/14	15	Chloroform	0.0015	3.1E-04	4.7E-07	3.8E-08	1.1E-07	8.7E-10	1.1E-06		
G4-1	G4-1-15'	6/12/14	15	Dichlorodifluoromethane (Freon 12)	0.0020	3.1E-04	6.2E-07	NC	1.4E-07	NC	1.4E-06		
G4-1	G4-1-15'	6/12/14	15	Ethylbenzene	0.0015	2.8E-04	4.3E-07	3.5E-08	9.7E-08	8.7E-11	9.7E-08		
G4-1	G4-1-15'	6/12/14	15	m,p-Xylenes	**0.0096**	2.8E-04	2.7E-06	NC	6.2E-07	NC	6.2E-06		
G4-1	G4-1-15'	6/12/14	15	Naphthalene	0.0050	2.6E-04	1.3E-06	1.1E-07	2.9E-07	3.6E-09	9.8E-05		
G4-1	G4-1-15'	6/12/14	15	o-Xylene	**0.0054**	2.9E-04	1.5E-06	NC	3.5E-07	NC	3.5E-06		
G4-1	G4-1-15'	6/12/14	15	Styrene	0.0015	2.9E-04	4.4E-07	NC	1.0E-07	NC	1.1E-07		
G4-1	G4-1-15'	6/12/14	15	Tetrachloroethene	**0.038**	2.2E-04	8.5E-06	6.9E-07	1.9E-06	4.1E-09	5.5E-05		
G4-1	G4-1-15'	6/12/14	15	Toluene	**0.012**	3.1E-04	3.8E-06	NC	8.6E-07	NC	2.9E-06		
G4-1	G4-1-15'	6/12/14	15	Trichloroethene	0.0015	2.8E-04	4.3E-07	3.5E-08	9.8E-08	1.4E-10	4.9E-05		
G4-1	G4-1-15'	6/12/14	15	Trichlorofluoromethane (Freon 11)	0.0020	2.7E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07	9.6E-09	2.6E-04
H1-1	H1-1-5'	6/12/14	5	1,1,1-Trichloroethane	**0.017**	5.9E-04	1.0E-05	NC	2.3E-06	NC	2.3E-06		
H1-1	H1-1-5'	6/12/14	5	1,1-Dichloroethene	0.0015	6.8E-04	1.0E-06	NC	2.3E-07	NC	3.3E-06		
H1-1	H1-1-5'	6/12/14	5	1,2,4-Trimethylbenzene	0.0015	5.7E-04	8.5E-07	NC	1.9E-07	NC	2.8E-05		
H1-1	H1-1-5'	6/12/14	5	1,3,5-Trimethylbenzene	0.0015	5.7E-04	8.5E-07	NC	1.9E-07	NC	4.8E-06		
H1-1	H1-1-5'	6/12/14	5	Benzene	0.0010	6.9E-04	6.9E-07	5.6E-08	1.6E-07	1.6E-09	5.2E-05		
H1-1	H1-1-5'	6/12/14	5	Carbon Disulfide	0.0015	7.4E-04	1.1E-06	NC	2.5E-07	NC	3.6E-07		
H1-1	H1-1-5'	6/12/14	5	Chloroform	0.0015	6.4E-04	9.6E-07	7.8E-08	2.2E-07	1.8E-09	2.2E-06		
H1-1	H1-1-5'	6/12/14	5	Dichlorodifluoromethane (Freon 12)	0.0020	6.4E-04	1.3E-06	NC	2.9E-07	NC	2.9E-06		
H1-1	H1-1-5'	6/12/14	5	Ethylbenzene	0.0015	6.1E-04	9.1E-07	7.4E-08	2.1E-07	1.9E-10	2.1E-07		
H1-1	H1-1-5'	6/12/14	5	m,p-Xylenes	0.0020	6.0E-04	1.2E-06	NC	2.8E-07	NC	2.8E-06		
H1-1	H1-1-5'	6/12/14	5	Naphthalene	0.0050	5.7E-04	2.8E-06	2.3E-07	6.5E-07	7.9E-09	2.2E-04		
H1-1	H1-1-5'	6/12/14	5	o-Xylene	0.0010	6.1E-04	6.1E-07	NC	1.4E-07	NC	1.4E-06		
H1-1	H1-1-5'	6/12/14	5	Styrene	0.0015	6.2E-04	9.3E-07	NC	2.1E-07	NC	2.3E-07		
H1-1	H1-1-5'	6/12/14	5	Tetrachloroethene	**0.049**	5.1E-04	2.5E-05	2.0E-06	5.7E-06	1.2E-08	1.6E-04		
H1-1	H1-1-5'	6/12/14	5	Toluene	0.0010	6.4E-04	6.4E-07	NC	1.5E-07	NC	4.9E-07		
H1-1	H1-1-5'	6/12/14	5	Trichloroethene	0.0015	6.1E-04	9.1E-07	7.4E-08	2.1E-07	3.0E-10	1.0E-04		
H1-1	H1-1-5'	6/12/14	5	Trichlorofluoromethane (Freon 11)	0.0020	5.9E-04	1.2E-06	NC	2.7E-07	NC	3.9E-07	2.4E-08	5.8E-04

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas:
Current Offsite Scenario
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
H1-1	H1-1-15'	6/12/14	15	1,1,1-Trichloroethane	**0.018**	2.7E-04	4.9E-06	NC	1.1E-06	NC	1.1E-06		
H1-1	H1-1-15'	6/12/14	15	1,1-Dichloroethene	0.0015	3.4E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
H1-1	H1-1-15'	6/12/14	15	1,2,4-Trimethylbenzene	0.0015	2.6E-04	3.9E-07	NC	8.9E-08	NC	1.3E-05		
H1-1	H1-1-15'	6/12/14	15	1,3,5-Trimethylbenzene	0.0015	2.6E-04	3.9E-07	NC	8.8E-08	NC	2.2E-06		
H1-1	H1-1-15'	6/12/14	15	Benzene	0.0010	3.5E-04	3.5E-07	2.8E-08	7.9E-08	8.2E-10	2.6E-05		
H1-1	H1-1-15'	6/12/14	15	Carbon Disulfide	0.0015	3.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07		
H1-1	H1-1-15'	6/12/14	15	Chloroform	0.0015	3.1E-04	4.7E-07	3.8E-08	1.1E-07	8.7E-10	1.1E-06		
H1-1	H1-1-15'	6/12/14	15	Dichlorodifluoromethane (Freon 12)	0.0020	3.1E-04	6.2E-07	NC	1.4E-07	NC	1.4E-06		
H1-1	H1-1-15'	6/12/14	15	Ethylbenzene	0.0015	2.8E-04	4.3E-07	3.5E-08	9.7E-08	8.7E-11	9.7E-08		
H1-1	H1-1-15'	6/12/14	15	m,p-Xylenes	0.0020	2.8E-04	5.7E-07	NC	1.3E-07	NC	1.3E-06		
H1-1	H1-1-15'	6/12/14	15	Naphthalene	0.0050	2.6E-04	1.3E-06	1.1E-07	2.9E-07	3.6E-09	9.8E-05		
H1-1	H1-1-15'	6/12/14	15	o-Xylene	0.0010	2.9E-04	2.9E-07	NC	6.5E-08	NC	6.5E-07		
H1-1	H1-1-15'	6/12/14	15	Styrene	0.0015	2.9E-04	4.4E-07	NC	1.0E-07	NC	1.1E-07		
H1-1	H1-1-15'	6/12/14	15	Tetrachloroethene	**0.045**	2.2E-04	1.0E-05	8.2E-07	2.3E-06	4.8E-09	6.5E-05		
H1-1	H1-1-15'	6/12/14	15	Toluene	0.0010	3.1E-04	3.1E-07	NC	7.2E-08	NC	2.4E-07		
H1-1	H1-1-15'	6/12/14	15	Trichloroethene	0.0015	2.8E-04	4.3E-07	3.5E-08	9.8E-08	1.4E-10	4.9E-05		
H1-1	H1-1-15'	6/12/14	15	Trichlorofluoromethane (Freon 11)	0.0020	2.7E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07	1.0E-08	2.6E-04
H3-1	H3-1-5'	6/12/14	5	1,1,1-Trichloroethane	0.0015	5.9E-04	8.8E-07	NC	2.0E-07	NC	2.0E-07		
H3-1	H3-1-5'	6/12/14	5	1,1-Dichloroethene	0.0015	6.8E-04	1.0E-06	NC	2.3E-07	NC	3.3E-06		
H3-1	H3-1-5'	6/12/14	5	1,2,4-Trimethylbenzene	**0.0083**	5.7E-04	4.7E-06	NC	1.1E-06	NC	1.5E-04		
H3-1	H3-1-5'	6/12/14	5	1,3,5-Trimethylbenzene	0.0015	5.7E-04	8.5E-07	NC	1.9E-07	NC	4.8E-06		
H3-1	H3-1-5'	6/12/14	5	Benzene	0.0010	6.9E-04	6.9E-07	5.6E-08	1.6E-07	1.6E-09	5.2E-05		
H3-1	H3-1-5'	6/12/14	5	Carbon Disulfide	0.0015	7.4E-04	1.1E-06	NC	2.5E-07	NC	3.6E-07		
H3-1	H3-1-5'	6/12/14	5	Chloroform	0.0015	6.4E-04	9.6E-07	7.8E-08	2.2E-07	1.8E-09	2.2E-06		
H3-1	H3-1-5'	6/12/14	5	Dichlorodifluoromethane (Freon 12)	0.0020	6.4E-04	1.3E-06	NC	2.9E-07	NC	2.9E-06		
H3-1	H3-1-5'	6/12/14	5	Ethylbenzene	**0.0072**	6.1E-04	4.4E-06	3.6E-07	9.9E-07	8.9E-10	9.9E-07		
H3-1	H3-1-5'	6/12/14	5	m,p-Xylenes	**0.030**	6.0E-04	1.8E-05	NC	4.1E-06	NC	4.1E-05		
H3-1	H3-1-5'	6/12/14	5	Naphthalene	0.0050	5.7E-04	2.8E-06	2.3E-07	6.5E-07	7.9E-09	2.2E-04		
H3-1	H3-1-5'	6/12/14	5	o-Xylene	**0.012**	6.1E-04	7.3E-06	NC	1.7E-06	NC	1.7E-05		
H3-1	H3-1-5'	6/12/14	5	Styrene	0.0015	6.2E-04	9.3E-07	NC	2.1E-07	NC	2.3E-07		
H3-1	H3-1-5'	6/12/14	5	Tetrachloroethene	**0.72**	5.1E-04	3.7E-04	3.0E-05	8.4E-05	1.8E-07	2.4E-03		
H3-1	H3-1-5'	6/12/14	5	Toluene	**0.019**	6.4E-04	1.2E-05	NC	2.8E-06	NC	9.3E-06		
H3-1	H3-1-5'	6/12/14	5	Trichloroethene	0.0015	6.1E-04	9.1E-07	7.4E-08	2.1E-07	3.0E-10	1.0E-04		
H3-1	H3-1-5'	6/12/14	5	Trichlorofluoromethane (Freon 11)	0.0020	5.9E-04	1.2E-06	NC	2.7E-07	NC	3.9E-07	1.9E-07	3.0E-03

TABLE 14

Estimated Vapor Intrusion Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas: Current Offsite Scenario

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Soil Gas Sample Location[a]	Sample ID	Sample Date	Sampling Depth (feet bgs)	Chemical	Soil Gas Concentration (mg/m^3)[b]	Attenuation Factor [(mg/m^3)/(mg/m^3)][c]	Exposure Point Concentration (EPC) in Indoor Air (mg/m^3)[d]	Exposure Concentration (EC) in Indoor Air – Cancer Effects (mg/m^3)[e]	Exposure Concentration (EC) in Indoor Air – Noncancer Effects (mg/m^3)[e]	Incremental Cancer Risk from Vapor Intrusion (unitless)[f]	Noncancer Hazard Quotient from Vapor Intrusion (unitless)[f]	Cumulative Cancer Risk	Cumulative Noncancer Hazard
H3-1	H3-1-15'	6/12/14	15	1,1,1-Trichloroethane	0.0015	2.7E-04	4.1E-07	NC	9.3E-08	NC	9.3E-08		
H3-1	H3-1-15'	6/12/14	15	1,1-Dichloroethene	0.0015	3.4E-04	5.1E-07	NC	1.2E-07	NC	1.7E-06		
H3-1	H3-1-15'	6/12/14	15	1,2,4-Trimethylbenzene	**0.0073**	2.6E-04	1.9E-06	NC	4.3E-07	NC	6.2E-05		
H3-1	H3-1-15'	6/12/14	15	1,3,5-Trimethylbenzene	0.0015	2.6E-04	3.9E-07	NC	8.8E-08	NC	2.2E-06		
H3-1	H3-1-15'	6/12/14	15	Benzene	**0.0072**	3.5E-04	2.5E-06	2.0E-07	5.7E-07	5.9E-09	1.9E-04		
H3-1	H3-1-15'	6/12/14	15	Carbon Disulfide	0.0015	3.9E-04	5.9E-07	NC	1.3E-07	NC	1.9E-07		
H3-1	H3-1-15'	6/12/14	15	Chloroform	**0.0078**	3.1E-04	2.4E-06	2.0E-07	5.5E-07	4.5E-09	5.6E-06		
H3-1	H3-1-15'	6/12/14	15	Dichlorodifluoromethane (Freon 12)	0.0020	3.1E-04	6.2E-07	NC	1.4E-07	NC	1.4E-06		
H3-1	H3-1-15'	6/12/14	15	Ethylbenzene	**0.0057**	2.8E-04	1.6E-06	1.3E-07	3.7E-07	3.3E-10	3.7E-07		
H3-1	H3-1-15'	6/12/14	15	m,p-Xylenes	**0.019**	2.8E-04	5.4E-06	NC	1.2E-06	NC	1.2E-05		
H3-1	H3-1-15'	6/12/14	15	Naphthalene	0.0050	2.6E-04	1.3E-06	1.1E-07	2.9E-07	3.6E-09	9.8E-05		
H3-1	H3-1-15'	6/12/14	15	o-Xylene	**0.0072**	2.9E-04	2.1E-06	NC	4.7E-07	NC	4.7E-06		
H3-1	H3-1-15'	6/12/14	15	Styrene	**0.0075**	2.9E-04	2.2E-06	NC	5.0E-07	NC	5.6E-07		
H3-1	H3-1-15'	6/12/14	15	Tetrachloroethene	**0.47**	2.2E-04	1.0E-04	8.6E-06	2.4E-05	5.0E-08	6.8E-04		
H3-1	H3-1-15'	6/12/14	15	Toluene	**0.017**	3.1E-04	5.3E-06	NC	1.2E-06	NC	4.1E-06		
H3-1	H3-1-15'	6/12/14	15	Trichloroethene	0.0015	2.8E-04	4.3E-07	3.5E-08	9.8E-08	1.4E-10	4.9E-05		
H3-1	H3-1-15'	6/12/14	15	Trichlorofluoromethane (Freon 11)	0.0020	2.7E-04	5.5E-07	NC	1.3E-07	NC	1.8E-07	6.5E-08	1.1E-03

Notes:

bgs = below ground surface.

NC = Not considered to be a carcinogen.

mg/m^3 = milligrams per cubic meter.

[a] All locations and depths along the Investigation Area boundary are included for soil gas samples representative of exposures to current offsite commercial workers (see report).

[b] Measured chemical concentration in soil gas. Detected results are presented in **bold**. Non-detect results are represented by one-half the laboratory reporting limit; non-detect results are included if the chemical was detected in at least one site soil gas sample. For duplicate samples (including purge samples), the higher detected concentration is presented. In the case of non-detect results in both duplicate and primary samples, one-half of the lower of the two detection limits was evaluated.

[c] The attenuation factor represents the relationship between the chemical concentration in soil gas and the chemical concentration in indoor air (resulting from volatilization from soil gas, *i.e.*, vapor intrusion). The methodology used in the calculation of attenuation factors is presented in Attachment C.

[d] The exposure point concentration (EPC) in indoor air is the predicted estimated indoor air concentration the receptor may be exposed to while in indoor air.

[e] The exposure concentrations (ECs) are analogous to chronic daily intakes (CDIs).

[f] Incremental cancer risks and noncancer hazard quotients were calculated using equations presented in Table 4 and exposure parameters presented in Table 3.

TABLE 15
Estimated Outdoor Air Inhalation Cancer Risks and Noncancer Hazard Indices for VOCs in Soil Gas:
Current Onsite and Offsite Scenarios
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical	Representative Concentration in Soil Gas (mg/m^3)[a]	Transfer Factor [(mg/m^3)/(mg/m^3)][b]	Exposure Point Concentration (EPC) in Outdoor Air (mg/m^3)[c]	Exposure Concentration (EC) in Outdoor Air – Cancer Effects (mg/m^3)[d]	Exposure Concentration (EC) in Outdoor Air – Noncancer Effects (mg/m^3)[d]	Incremental Cancer Risk in Outdoor Air (unitless)[e]	Noncancer Hazard Quotient in Outdoor Air (unitless)[e]
1,1,1-Trichloroethane	0.0057	1.6E-05	9.0E-08	NC	2.0E-08	NC	2.0E-08
1,1-Dichloroethene	***0.021***	2.1E-05	4.4E-07	NC	1.0E-07	NC	1.4E-06
1,2,4-Trimethylbenzene	1.1	1.5E-05	1.6E-05	NC	3.7E-06	NC	5.3E-04
1,3,5-Trimethylbenzene	0.57	1.5E-05	8.3E-06	NC	1.9E-06	NC	4.8E-05
4-Ethyltoluene	0.28	1.7E-05	4.6E-06	NC	1.1E-06	NC	1.1E-05
Acetone	***0.53***	2.6E-05	1.4E-05	NC	3.1E-06	NC	1.0E-07
Benzene	0.40	2.2E-05	8.7E-06	7.1E-07	2.0E-06	2.1E-08	6.6E-04
Carbon Disulfide	0.062	2.6E-05	1.6E-06	NC	3.7E-07	NC	5.2E-07
Chloroform	0.0051	1.9E-05	9.5E-08	7.8E-09	2.2E-08	1.8E-10	2.2E-07
cis-1,2-Dichloroethene	***0.12***	2.1E-05	2.6E-06	NC	5.9E-07	NC	7.3E-05
Dichlorodifluoromethane (Freon 12)	0.0023	1.8E-05	4.2E-08	NC	9.7E-09	NC	9.7E-08
Ethylbenzene	2.4	1.7E-05	4.0E-05	3.3E-06	9.1E-06	8.1E-09	9.1E-06
m,p-Xylenes	1.7	1.7E-05	2.8E-05	NC	6.4E-06	NC	6.4E-05
Naphthalene	3.9	1.5E-05	5.7E-05	4.7E-06	1.3E-05	1.6E-07	4.4E-03
o-Xylene	1.0	1.7E-05	1.7E-05	NC	3.8E-06	NC	3.8E-05
Styrene	0.0030	1.7E-05	5.2E-08	NC	1.2E-08	NC	1.3E-08
Tetrachloroethene	1.4	1.2E-05	1.7E-05	1.4E-06	3.9E-06	8.2E-09	1.1E-04
Toluene	0.40	1.9E-05	7.6E-06	NC	1.7E-06	NC	5.7E-06
Trichloroethene	0.100	1.7E-05	1.7E-06	1.4E-07	3.8E-07	5.6E-10	1.9E-04
Trichlorofluoromethane (Freon 11)	0.0039	1.6E-05	6.2E-08	NC	1.4E-08	NC	2.0E-08
Vinyl Chloride	***0.0061***	2.6E-05	1.6E-07	1.3E-08	3.6E-08	1.0E-09	3.6E-07
					Total	**2.0E-07**	**6.1E-03**

Notes:

NC = Not considered to be a carcinogen.

mg/m^3 = micrograms per cubic meter

[a] Unless otherwise indicated, upper confidence limits (UCLs) of the arithmetic mean of all soil gas data combined (i.e., regardless of soil gas sample depth) are used as representative concentrations in soil gas for evaluating inhalation of VOCs in outdoor air. Maximum detected concentrations are **bolded** and *italicized* .

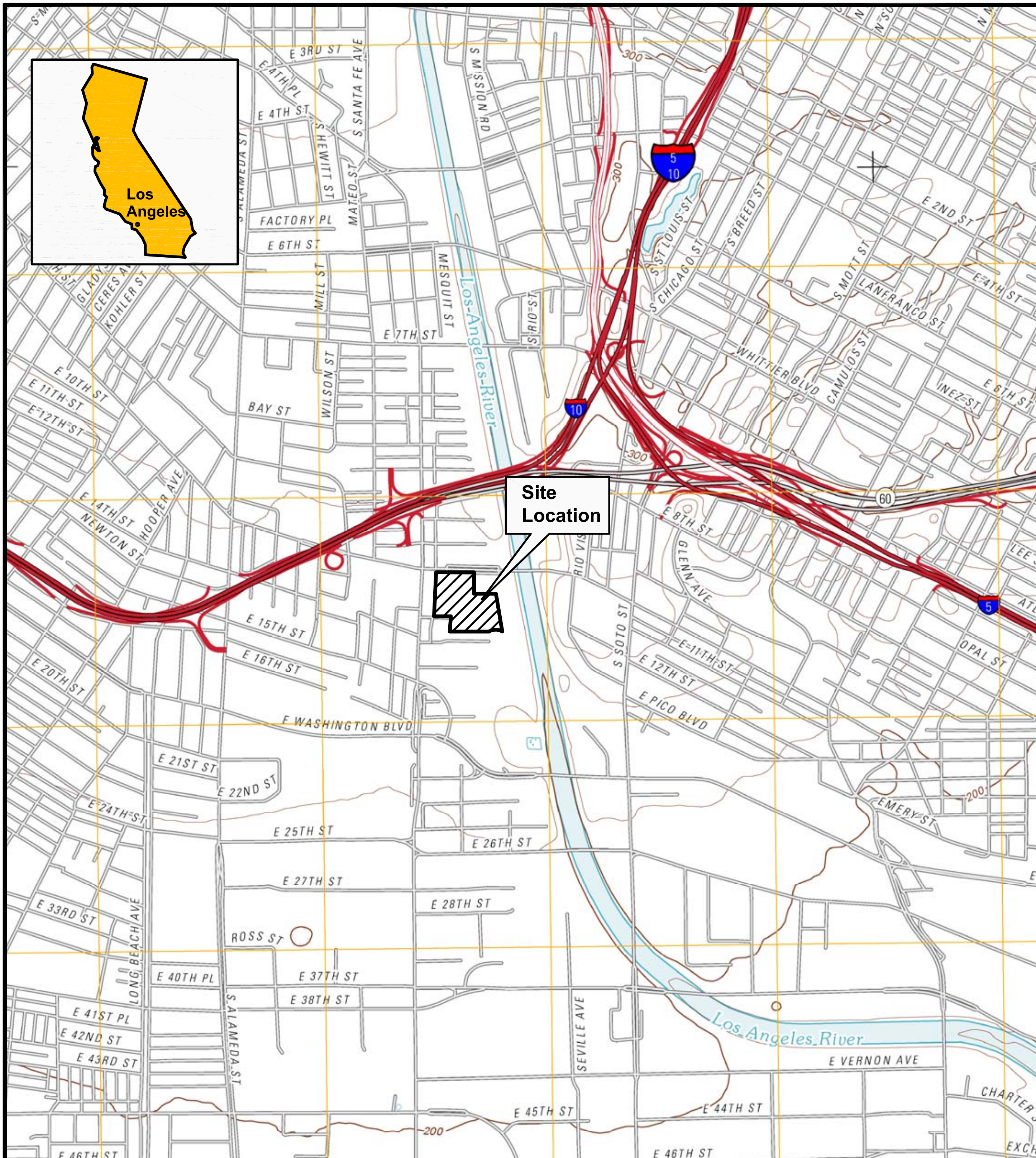
[b] The transfer factor represents the relationship between the chemical concentration in soil gas and the chemical concentration in outdoor air (resulting from volatilization from soil gas into outdoor air). The methodology used in the calculation of transfer factors is presented in Attachment C.

[c] The exposure point concentration (EPC) in outdoor air is the predicted estimated concentration the receptor is exposed to while outdoors.

[d] The exposure concentrations (ECs) are analogous to chronic daily intakes (CDIs).

[e] Incremental cancer risks and noncancer hazard quotients were calculated using equations presented in Table 4 and exposure parameters presented in Table 3.

FIGURES



Source: USGS 7.5' Quadrangle, Los Angeles, California, 2012

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0 1000 2000 4000
SCALE IN FEET

IRIS ENVIRONMENTAL
1438 Webster Street, Suite 302
Oakland, California 94612
Ph. (510) 834-4747 Fax: (510) 834-4199

Site Vicinity Map
Former Olympic Base Manufactured Gas Plant Site
2424 E. Olympic Boulevard
Los Angeles, California

Figure
1

Drafter: EC
Date: 09/25/15
Contract Number: 15-1263B

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Basemap: Google Earth March 23, 2015

LEGEND:

- Approximate property boundary
- Investigation area boundary
- Excluded area - permitted hazardous waste (PCB) storage area
- MGP site boundary
- Exposed soil area

N

0 80 160 320
SCALE IN FEET

IRIS ENVIRONMENTAL
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Oakland, California 94612
Ph. (510) 834-4747 Fax: (510) 834-4199

Investigation Area Layout and Boundary Map
Former Olympic Base Manufactured Gas Plant Site
2424 E. Olympic Boulevard
Los Angeles, California

Figure
2

Drafter: EC
Date: 09/25/15
Contract Number: 15-1263B

IRIS ENVIRONMENTAL
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Soil and Soil Gas Sampling Locations - June/July Investigation
Former Olympic Base Manufactured Gas Plant Site
2424 E. Olympic Boulevard
Los Angeles, California

Figure
3

Drafter: EC
Date: 09/25/15
Contract Number: 15-1263B

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ATTACHMENT A

SITE INVESTIGATION DATA INCLUDED IN HHRA

ATTACHMENT A
SITE INVESTIGATION DATA INCLUDED IN THE HHRA

As discussed in Section 3.1 of the human health risk assessment (HHRA) for the Investigation Area of the Former Olympic Base Manufactured Gas Plant Site (the "Site"), all exposed soil (0-2 feet below ground surface [bgs]) and soil gas data collected during the recent Site investigation were included in the dataset used in the quantitative HHRA.

Soil and soil gas samples included in the HHRA are summarized in Tables A-1 through A-4. Included in Tables A-2 of this attachment is a summary of analytical data for individual polycyclic aromatic hydrocarbons (PAHs) as well as expressed in benzo(a)pyrene equivalent for the carcinogenic PAH results for exposed area soil 0-2 feet bgs.

ATTACHMENT A
TABLES

TABLE A-1
ANALYTICAL DATA INCLUDED IN THE HHRA: EXPOSED SOIL (0-2 FEET BGS)
TOTAL PETROLEUM HYDROCARBONS
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Location ID	Sample ID	Depth (feet bgs)	Sample Date	TPH-Diesel	TPH-Gasoline	TPH-Motor Oil
F1-1	F1-1-1	1	6/6/2014	44.3	<0.1	464
F2-1	F2-1-1	1	6/6/2014	54	<0.1	418
F3-1	F3-1-1	1	6/12/2014	19	<0.1	79
F3-3	F3-3-1	1	6/6/2014	50.4	<0.1	224
F3-5	F3-5-1	1	6/12/2014	84.3	3.62	136
F4-1	F4-1-1.7	1.7	6/12/2014	411	0.106 J	2,130

Notes:
All analytical results are presented in milligrams per kilogram (mg/kg).
-- = not analyzed for.
< = Analyte was not detected at the detection limit given.
bgs = below ground surface.
J = result is less than the reporting limit (RL), but greater than or equal to the method detection limit (MDL) and the concentration is an approximated value.

TABLE A-2
ANALYTICAL DATA INCLUDED IN THE HHRA: EXPOSED SOIL (0-2 FEET BGS)
POLYCYCLIC AROMATIC HYDROCARBONS
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Location ID	Sample ID	Depth (feet bgs)	Sample Date	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Benzo(a)pyrene Equivalent
F1-1	F1-1-1	1	6/6/2014	<0.05	<0.05	<0.05	0.36	1.3	0.80	3.2	0.41	0.66	<0.05	1.4	<0.05	1.3	0.083 J	0.43	2.6	1.6
F2-1	F2-1-1	1	6/6/2014	<0.02	<0.02	0.027 J	0.098	0.61	0.34	2.3	0.18	0.31	<0.02	0.61	<0.02	0.61	0.071	0.30	1.1	0.74
F3-1	F3-1-1	1	6/12/2014	0.032 J	0.055	0.11	0.31	0.87	0.41	2.4	0.25	0.53	<0.02	1.2	0.037 J	0.88	0.086	0.82	2.2	1.1
F3-3	F3-3-1	1	6/6/2014	0.32	0.37	0.22	1.1	3.6	1.7	9.9	0.95	1.6	<0.1	4.2	0.15 J	4.4	0.48	2.2	7.1	4.4
F3-5	F3-5-1	1	6/12/2014	0.21	0.56	1.2	2.7	4.6	2.2	5.7	1.5	4.9	<0.1	8.2	1.0	3.0	0.48	12	13	5.6
F4-1	F4-1-1.7	1.7	6/12/2014	<0.2	0.57	1.1	5.8	13	4.6	27	3.5	8.8	<0.2	23	0.5	10	0.69	16	43	16

Notes:
All analytical results are presented in milligrams per kilogram (mg/kg).
< = Analyte was not detected at the detection limit given.
bgs = below ground surface.
J = result is less than the reporting limit (RL), but greater than or equal to the method detection limit (MDL) and the concentration is an approximated value.

TABLE A-3
ANALYTICAL DATA INCLUDED IN THE HHRA: EXPOSED SOIL (0-2 FEET BGS)
INORGANICS
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Location ID	Sample ID	Depth (feet bgs)	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Cyanide	Lead	Mercury	Molybdenum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
F1-1	F1-1-1	1	6/6/2014	<1	<1	192	<1.3	<1.3	18	7.8	149	--	616	0.34	<2.5	26	<1	<2.5	<1	37	311
F2-1	F2-1-1	1	6/6/2014	<1	<1	83	<1.3	<1.3	8.5	4.7 J	36	--	109	<0.1	<2.5	8.4	<1	<2.5	<1	23	205
F3-1	F3-1-1	1	6/12/2014	<1	<1	178	<1.3	<1.3	13	6.9	50	--	98	0.20	<2.5	12	<1	<2.5	<1	30	138
F3-3	F3-3-1	1	6/6/2014	<1	<1	46	<1.3	<1.3	7.5	3.3 J	20	--	55	<0.1	<2.5	5.0	<1	<2.5	<1	17	59
F3-5	F3-5-1	1	6/12/2014	<1	<1	108	<1.3	<1.3	12	5.4	115	--	194	0.47	<2.5	11	<1	<2.5	<1	27	188
F4-1	F4-1-1.7	1.7	6/12/2014	<1	<1	144	<1.3	<1.3	11	5	36	3.2	398	0.40	<2.5	11	<1	<2.5	<1	26	159

Notes:
All analytical results are presented in milligrams per kilogram (mg/kg).
-- = not analyzed for.
< = Analyte was not detected at the detection limit given.
bgs = below ground surface.
J = result is less than the reporting limit (RL), but greater than or equal to the method detection limit (MDL) and the concentration is an approximated value.

TABLE A-4
ANALYTICAL DATA INCLUDED IN THE HHRA: SOIL GAS
VOLATILE ORGANIC COMPOUNDS
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Location ID	Sample ID	Depth (feet bgs)	Sample Date	Boundary Sample	Sample Type	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1,2-Trichlorotrifluoroethane (Freon 113)	1,1-Dichloroethane	1,1-Dichloroethene	1,2,4-Trichlorobenzene	1,2,4-Trimethylbenzene	1,2-Dibromoethane (EDB)	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,2-Dichlorotetrafluoroethane (Freon 114)	1,3,5-Trimethylbenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Butanone (MEK)	2-Hexanone	2-Propanol	4-Ethyltoluene	4-Methyl-2-pentanone (MIBK)	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	Carbon Disulfide
A1-1	A1-1-5'	5	6/4/2014	Yes		0.0511	<0.002	<0.0015	<0.0025	<0.0015	0.00709	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
A1-1	A1-1-15'	15	6/4/2014	Yes		0.0368	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
A1-2	A1-2-30'	30	7/23/2014	Yes		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	0.00405
A1-2	A1-2-60'	60	7/23/2014	Yes		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	0.0037
A2-1	A2-1-5'	5	6/3/2014	Yes	1 Purge	<0.0015	<0.002	<0.0015	<0.0025	<0.0015	0.021	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
A2-1	A2-1-5'	5	6/3/2014	Yes	10 Purge	<0.0015	<0.002	<0.0015	<0.0025	<0.0015	0.0103	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
A2-1	A2-1-5'	5	6/3/2014	Yes	3 Purge	<0.0015	<0.002	<0.0015	<0.0025	<0.0015	0.00751	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
A2-1	A2-1-15'	15	6/4/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	0.00184	<0.0015	<0.0015	<0.0015	<0.0015
A3-1	A3-1-5'	5	6/4/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	0.00367	<0.0015	<0.0015	<0.0015	<0.0015
A3-1	A3-1-15'	15	6/4/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
A3-1	A3-1-15'	15	6/4/2014	Yes	DUP	<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
A4-1	A4-1-5'	5	6/4/2014	Yes		0.00638	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
A4-1	A4-1-15'	15	6/4/2014	Yes		0.00633	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	0.00285	<0.0015	<0.0015	<0.0015	<0.0015
A5-1	A5-1-5'	5	6/9/2014	Yes		0.0282	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.0202	<0.004	<0.004	<0.003	<0.003	<0.005	0.0295	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	0.0106	<0.003	<0.003	<0.003	<0.003
B1-1	B1-1-5'	5	6/5/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
B1-1	B1-1-15'	15	6/5/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
B2-1	B2-1-5'	5	6/5/2014	No		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
B2-1	B2-1-15'	15	6/5/2014	No		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	0.00205	<0.0015	<0.0015	<0.0015	<0.0015
B3-1	B3-1-5'	5	6/4/2014	No		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
B3-1	B3-1-15'	15	6/4/2014	No		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
B4-1	B4-1-5'	5	6/4/2014	No		0.00807	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
B4-1	B4-1-15'	15	6/4/2014	No		0.00589	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	0.00232	<0.0015	<0.0015	<0.0015	<0.0015
B4-2	B4-2-30'	30	7/22/2014	No		<0.03	<0.04	<0.03	<0.05	<0.03	<0.03	<0.02	0.414	<0.04	<0.04	<0.03	<0.03	<0.05	1.82	<0.04	<0.04	<0.1	<0.1	<1	0.456	<0.1	<0.1	<0.02	<0.03	<0.03	<0.03	0.361
B4-2	B4-2-85'	85	7/22/2014	No		<0.03	<0.04	<0.03	<0.05	<0.03	<0.03	<0.02	9.86	<0.04	<0.04	<0.03	<0.03	<0.05	4.78	<0.04	<0.04	<0.1	<0.1	<1	2.77	<0.1	<0.1	0.786	<0.03	<0.03	<0.03	0.123
B4-2	B4-2-85'	85	7/22/2014	No	DUP	<0.03	<0.04	<0.03	<0.05	<0.03	<0.03	<0.02	10.9	<0.04	<0.04	<0.03	<0.03	<0.05	5.23	<0.04	<0.04	<0.1	<0.1	<1	2.81	<0.1	<0.1	0.779	<0.03	<0.03	<0.03	0.137
B5-1	B5-1-5'	5	6/9/2014	No		0.0126	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
B5-1	B5-1-15'	15	6/9/2014	No		0.0124	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	0.0053	<0.003	<0.003	<0.003	<0.003
B6-1	B6-1-5'	5	6/9/2014	Yes		0.00993	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.00722	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	0.00517	<0.003	<0.003	<0.003	<0.003
B6-1	B6-1-15'	15	6/9/2014	Yes		0.00856	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.00708	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
C1-1	C1-1-5'	5	6/5/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	0.00188	<0.0015	<0.0015	<0.0015	<0.0015
C1-1	C1-1-15'	15	6/5/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
C2-1	C2-1-5'	5	6/5/2014	No		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	0.00235	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
C2-1	C2-1-15'	15	6/5/2014	No		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
C3-1	C3-1-5'	5	6/17/2014	No		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	0.0181	<0.003	<0.003	<0.003	<0.003
C3-2	C3-2-5'	5	7/23/2014	No		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.00688	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	0.00968
C3-2	C3-2-15'	15	7/23/2014	No		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.0125	<0.004	<0.004	<0.003	<0.003	<0.005	0.00604	<0.004	<0.004	<0.01	<0.01	<0.1	0.0109	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	0.0464
C3-2	C3-2-30'	30	7/22/2014	No		<0.015	<0.02	<0.015	<0.025	<0.015	<0.015	<0.01	0.0403	<0.02	<0.02	<0.015	<0.015	<0.025	<0.015	<0.02	<0.02	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.01	<0.015	<0.015	<0.015	0.383
C3-2	C3-2-60'	60	7/22/2014	No		<0.03	<0.04	<0.03	<0.05	<0.03	<0.03	<0.02	0.545	<0.04	<0.04	<0.03	<0.03	<0.05	0.213	<0.04	<0.04	<0.1	<0.1	<1	0.692	<0.1	<0.1	2.07	<0.03	<0.03	<0.03	0.317
C3-2	C3-2-85'	85	7/22/2014	No		<0.03	<0.04	<0.03	<0.05	<0.03	<0.03	<0.02	0.452	<0.04	<0.04	<0.03	<0.03	<0.05	0.192	<0.04	<0.04	<0.1	<0.1	<1	0.436	<0.1	<0.1	1.05	<0.03	<0.03	<0.03	0.0492
C4-2	C4-2-5'	5	7/22/2014	No		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.027	<0.004	<0.004	<0.003	<0.003	<0.005	0.0186	<0.004	<0.004	<0.01	<0.01	<0.1	0.0143	<0.01	<0.01	0.0238	<0.003	<0.003	<0.003	0.03
C4-2	C4-2-15'	15	7/23/2014	No		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.0452	<0.004	<0.004	<0.003	<0.003	<0.005	0.0282	<0.004	<0.004	<0.01	<0.01	<0.1	0.0153	<0.01	0.53	1.09	<0.003	<0.003	<0.003	0.327
C4-2	C4-2-30'	30	7/22/2014	No		<0.03	<0.04	<0.03	<0.05	<0.03	<0.03	<0.02	1.17	<0.04	<0.04	<0.03	<0.03	<0.05	0.865	<0.04	<0.04	<0.1	<0.1	<1	1.43	<0.1	<0.1	0.15	<0.03	<0.03	<0.03	0.249
C4-2	C4-2-60'	60	7/22/2014	No		<0.03	<0.04	<0.03	<0.05	<0.03	<0.03	<0.02	5.13	<0.04	<0.04	<0.03	<0.03	<0.05	2.73	<0.04	<0.04	<0.1	<0.1	<1	5.49	<0.1	<0.1	3.38	<0.03	<0.03	<0.03	0.215
C4-2	C4-2-80'	80	7/22/2014	No		<0.03	<0.04	<0.03	<0.05	<0.03	<0.03	<0.02	2.3	<0.04	<0.04	<0.03	<0.03	<0.05	1.35	<0.04	<0.04	<0.1	<0.1	<1	1.77	<0.1	<0.1	0.77	<0.03	<0.03	<0.03	0.0635
C5-1	C5-1-5'	5	6/9/2014	No		0.00538	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	0.00332	<0.0015	<0.0015	<0.0015	<0.0015
C5-1	C5-1-5'	5	6/9/2014	No	DUP	0.00523	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	0.00354	<0.0015	<0.0015	<0.0015	<0.0015
C5-1	C5-1-15'	15	6/9/2014	No		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.0139	<0.004	<0.004	<0.003	<0.003	<0.005	0.00727	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	0.00971	<0.003	<0.003	<0.003	<0.003
C6-1	C6-1-5'	5	6/9/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	0.00274	<0.0015	<0.0015	<0.0015	<0.0015
C6-1	C6-1-15'	15	6/9/2014	Yes		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
D1-2	D1-2-5'	5	7/23/2014	Yes		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	0.00632
D1-2	D1-2-15'	15	7/23/2014	Yes		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.0057	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	0.0061
D1-2	D1-2-30'	30	7/23/2014	Yes		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.0055	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	0.00598
D1-2	D1-2-30'	30	7/23/2014	Yes	DUP	<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.0055	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	0.00669
D2-2	D2-2-5'	5	7/23/2014	No		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	0.00598
D2-2	D2-2-15'	15	7/23/2014	No		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	0.00542

TABLE A-4
ANALYTICAL DATA INCLUDED IN THE HHRA: SOIL GAS
VOLATILE ORGANIC COMPOUNDS
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Location ID	Sample ID	Depth (feet bgs)	Sample Date	Boundary Sample	Sample Type	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1,2-Trichlorotrifluoroethane (Freon 113)	1,1-Dichloroethane	1,1-Dichloroethene	1,2,4-Trichlorobenzene	1,2,4-Trimethylbenzene	1,2-Dibromoethane (EDB)	1,2-Dichlorobenzene	1,2-Dichloroethane	1,2-Dichloropropane	1,2-Dichlorotetrafluoroethane (Freon 114)	1,3,5-Trimethylbenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Butanone (MEK)	2-Hexanone	2-Propanol	4-Ethyltoluene	4-Methyl-2-pentanone (MIBK)	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane	Carbon Disulfide
D2-2	D2-2-30'	30	7/23/2014	No		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	0.00542
D3-1	D3-1-15'	15	6/5/2014	No		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	0.00274	<0.0015	<0.0015	<0.0015	<0.0015
D4-2	D4-2-5'	5	7/23/2014	Yes		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.0123	<0.004	<0.004	<0.003	<0.003	<0.005	0.00658	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	0.00642	<0.003	<0.003	<0.003	0.0139
D4-2	D4-2-15'	15	7/23/2014	Yes		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.00772	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
D5-1	D5-1-5'	5	6/9/2014	No		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	0.00253	<0.0015	<0.0015	<0.0015	<0.0015
D5-1	D5-1-15'	15	6/9/2014	No		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	0.00264	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
D5-2	D5-2-5'	5	6/9/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
D5-2	D5-2-15'	15	6/9/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
D5-3	D5-3-5'	5	6/12/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
D5-3	D5-3-15'	15	6/9/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	0.00934	<0.002	<0.002	<0.0015	<0.0015	<0.0025	0.00263	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
E1-1	E1-1-5'	5	6/5/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
E1-1	E1-1-5'	5	6/9/2014	Yes		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
E1-1	E1-1-5'	5	6/9/2014	Yes	DUP	<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
E1-1	E1-1-15'	15	6/5/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	0.00281	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	0.00211	<0.0015	<0.0015	<0.0015	<0.0015
E2-1	E2-1-5'	5	6/12/2014	No		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
E2-1	E2-1-15'	15	6/12/2014	No		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
E3-1	E3-1-5'	5	6/5/2014	No		0.00595	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	0.0258	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	0.00319	<0.0015	<0.0015	<0.0015	<0.0015
E3-1	E3-1-15'	15	6/5/2014	No		0.00469	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	0.0129	<0.002	<0.002	<0.0015	<0.0015	<0.0025	0.00359	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
E4-1	E4-1-5'	5	6/5/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	0.00668	<0.002	<0.002	<0.0015	<0.0015	<0.0025	0.0034	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	0.00434	<0.0015	<0.0015	<0.0015	<0.0015
E4-1	E4-1-15'	15	6/5/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	0.00256	<0.0015	<0.0015	<0.0015	<0.0015
E5-1	E5-1-5'	5	6/9/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
E5-1	E5-1-15'	15	6/9/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
F1-2	F1-2-5'	5	6/12/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	0.00747	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
F1-2	F1-2-15'	15	6/12/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
F2-1	F2-1-5'	5	6/12/2014	No		0.00862	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
F2-1	F2-1-15'	15	6/12/2014	No		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	0.00667	<0.0015	<0.0015	<0.0015	<0.0015
F3-1	F3-1-5'	5	6/17/2014	No		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
F3-1	F3-1-15'	15	6/17/2014	No		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
F3-5	F3-5-5'	5	6/17/2014	No		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
F3-5	F3-5-5'	5	6/17/2014	No	DUP	<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
F3-5	F3-5-15'	15	6/17/2014	No		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
F4-1	F4-1-5'	5	6/17/2014	Yes		0.00665	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
F4-1	F4-1-15'	15	6/17/2014	Yes		0.00736	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
G1-1	G1-1-5'	5	6/12/2014	Yes		0.00807	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.0107	<0.004	<0.004	<0.003	<0.003	<0.005	0.00639	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	0.00415	<0.003	<0.003	<0.003	<0.003
G1-1	G1-1-15'	15	6/12/2014	Yes		0.00715	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
G2-1	G2-1-5'	5	6/12/2014	No		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.0148	<0.004	<0.004	<0.003	<0.003	<0.005	0.00644	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
G2-1	G2-1-5'	5	6/12/2014	No	DUP	<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.0154	<0.004	<0.004	<0.003	<0.003	<0.005	0.006	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
G2-1	G2-1-15'	15	6/12/2014	No		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
G3-1	G3-1-5'	5	6/12/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
G3-1	G3-1-5'	5	6/12/2014	Yes	DUP	<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
G3-1	G3-1-15'	15	6/12/2014	Yes		<0.0015	<0.002	<0.0015	<0.0025	<0.0015	<0.0015	<0.001	<0.0015	<0.002	<0.002	<0.0015	<0.0015	<0.0025	<0.0015	<0.002	<0.002	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.001	<0.0015	<0.0015	<0.0015	<0.0015
G4-1	G4-1-5'	5	6/12/2014	Yes		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.00531	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
G4-1	G4-1-5'	5	6/12/2014	Yes	DUP	<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.0055	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
G4-1	G4-1-15'	15	6/12/2014	Yes		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
H1-1	H1-1-5'	5	6/12/2014	Yes		0.0173	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
H1-1	H1-1-15'	15	6/12/2014	Yes		0.0181	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	<0.003	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
H3-1	H3-1-5'	5	6/12/2014	Yes		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.0083	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.002	<0.003	<0.003	<0.003	<0.003
H3-1	H3-1-15'	15	6/12/2014	Yes		<0.003	<0.004	<0.003	<0.005	<0.003	<0.003	<0.002	0.00727	<0.004	<0.004	<0.003	<0.003	<0.005	<0.003	<0.004	<0.004	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	0.00715	<0.003	<0.003	<0.003	<0.003

TABLE A-4
ANALYTICAL DATA INCLUDED IN THE HHRA: SOIL GAS
VOLATILE ORGANIC COMPOUNDS
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Location ID	Sample ID	Depth (feet bgs)	Sample Date	Boundary Sample	Sample Type	Carbon Tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Dibromochloromethane	Dichlorodifluoromethane (Freon 12)	Ethylbenzene	Hexachlorobutadiene	m,p-Xylenes	Methyl tert-butyl ether (MTBE)	Methylene Chloride	Naphthalene	o-Xylene	Styrene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene	Trichlorofluoromethane (Freon 11)	Vinyl Acetate	Vinyl Chloride
A1-1	A1-1-5'	5	6/4/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	1.01	0.00784	<0.0015	<0.0015	0.109	0.0103	<0.005	<0.001
A1-1	A1-1-15'	15	6/4/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.588	0.00399	<0.0015	<0.0015	0.0311	0.00792	<0.005	<0.001
A1-2	A1-2-30'	30	7/23/2014	Yes		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	0.055	<0.002	<0.003	0.286	<0.002	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
A1-2	A1-2-60'	60	7/23/2014	Yes		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	0.00673	<0.012	<0.004	<0.002	<0.01	0.0566	<0.002	<0.003	0.0827	<0.002	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
A2-1	A2-1-5'	5	6/3/2014	Yes	1 Purge	<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	0.0198	<0.001	<0.0015	1.93	<0.001	<0.0015	<0.0015	0.287	<0.002	<0.005	<0.001
A2-1	A2-1-5'	5	6/3/2014	Yes	10 Purge	<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	0.00705	<0.001	<0.0015	1.03	<0.001	<0.0015	<0.0015	0.142	<0.002	<0.005	<0.001
A2-1	A2-1-5'	5	6/3/2014	Yes	3 Purge	<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	0.00804	<0.001	<0.0015	0.919	<0.001	<0.0015	<0.0015	0.12	<0.002	<0.005	<0.001
A2-1	A2-1-15'	15	6/4/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.28	0.00209	<0.0015	<0.0015	0.0119	<0.002	<0.005	<0.001
A3-1	A3-1-5'	5	6/4/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.117	<0.001	<0.0015	<0.0015	<0.0015	<0.002	<0.005	<0.001
A3-1	A3-1-15'	15	6/4/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.126	<0.001	<0.0015	<0.0015	0.00371	<0.002	<0.005	<0.001
A3-1	A3-1-15'	15	6/4/2014	Yes	DUP	<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.122	<0.001	<0.0015	<0.0015	0.00365	<0.002	<0.005	<0.001
A4-1	A4-1-5'	5	6/4/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.8	0.00358	<0.0015	<0.0015	0.0262	<0.002	<0.005	<0.001
A4-1	A4-1-15'	15	6/4/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.634	0.00381	<0.0015	<0.0015	0.0471	<0.002	<0.005	<0.001
A5-1	A5-1-5'	5	6/9/2014	Yes		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	0.00583	0.0122	<0.012	0.0282	<0.002	<0.01	0.045	0.0127	<0.003	0.188	0.0119	<0.003	<0.003	0.0169	<0.004	<0.01	<0.002
B1-1	B1-1-5'	5	6/5/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.44	<0.001	<0.0015	<0.0015	<0.0015	0.00944	<0.005	<0.001
B1-1	B1-1-15'	15	6/5/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.712	<0.001	<0.0015	<0.0015	<0.0015	0.0139	<0.005	<0.001
B2-1	B2-1-5'	5	6/5/2014	No		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.372	0.00407	<0.0015	<0.0015	0.026	0.0153	<0.005	<0.001
B2-1	B2-1-15'	15	6/5/2014	No		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.489	0.00388	<0.0015	<0.0015	0.0149	0.0345	<0.005	<0.001
B3-1	B3-1-5'	5	6/4/2014	No		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	0.0111	<0.006	0.0284	<0.001	<0.005	<0.005	0.0151	<0.0015	0.0861	<0.001	<0.0015	<0.0015	<0.0015	<0.002	<0.005	<0.001
B3-1	B3-1-15'	15	6/4/2014	No		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	0.00271	<0.001	<0.005	<0.005	0.00365	<0.0015	0.102	<0.001	<0.0015	<0.0015	<0.0015	<0.002	<0.005	<0.001
B4-1	B4-1-5'	5	6/4/2014	No		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.481	0.00368	<0.0015	<0.0015	0.376	<0.002	<0.005	<0.001
B4-1	B4-1-15'	15	6/4/2014	No		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.458	0.00433	<0.0015	<0.0015	0.623	<0.002	<0.005	<0.001
B4-2	B4-2-30'	30	7/22/2014	No		<0.04	<0.02	<0.03	<0.03	<0.02	<0.03	<0.03	<0.04	<0.04	0.0582	<0.12	0.233	<0.02	<0.1	1.25	0.148	<0.03	0.102	<0.02	<0.03	<0.03	<0.03	<0.04	<0.1	<0.02
B4-2	B4-2-85'	85	7/22/2014	No		<0.04	<0.02	<0.03	<0.03	<0.02	0.0555	<0.03	<0.04	<0.04	2.91	<0.12	12	<0.02	<0.1	10.6	3.5	<0.03	<0.03	0.588	<0.03	<0.03	<0.03	<0.04	<0.1	<0.02
B4-2	B4-2-85'	85	7/22/2014	No	DUP	<0.04	<0.02	<0.03	<0.03	<0.02	0.0828	<0.03	<0.04	<0.04	2.9	<0.12	13.1	<0.02	<0.1	10.8	3.61	<0.03	<0.03	0.52	<0.03	<0.03	<0.03	<0.04	<0.1	<0.02
B5-1	B5-1-5'	5	6/9/2014	No		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	<0.01	<0.002	<0.003	0.506	0.00644	<0.003	<0.003	0.902	<0.004	<0.01	<0.002
B5-1	B5-1-15'	15	6/9/2014	No		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	0.0049	<0.002	<0.01	<0.01	<0.002	<0.003	0.258	0.00723	<0.003	<0.003	0.215	<0.004	<0.01	<0.002
B6-1	B6-1-5'	5	6/9/2014	Yes		<0.004	<0.002	<0.003	0.00644	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	0.0529	<0.002	<0.003	0.0319	<0.002	<0.003	<0.003	0.00682	<0.004	<0.01	<0.002
B6-1	B6-1-15'	15	6/9/2014	Yes		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	0.0346	<0.002	<0.003	0.0154	<0.002	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
C1-1	C1-1-5'	5	6/5/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	8.3	<0.001	<0.0015	<0.0015	<0.0015	<0.002	<0.005	<0.001
C1-1	C1-1-15'	15	6/5/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	6.8	<0.001	<0.0015	<0.0015	0.0169	<0.002	<0.005	<0.001
C2-1	C2-1-5'	5	6/5/2014	No		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	1.65	0.00315	<0.0015	<0.0015	0.0302	<0.002	<0.005	<0.001
C2-1	C2-1-15'	15	6/5/2014	No		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	3.53	0	<0.0015	<0.0015	0.0224	0.00305	<0.005	<0.001
C3-1	C3-1-5'	5	6/17/2014	No		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	<0.01	<0.002	<0.003	0.0126	<0.002	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
C3-2	C3-2-5'	5	7/23/2014	No		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	0.00933	<0.012	<0.004	<0.002	<0.01	0.129	<0.002	<0.003	0.00773	<0.002	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
C3-2	C3-2-15'	15	7/23/2014	No		<0.004	<0.002	<0.003	0.0429	<0.002	<0.003	<0.003	<0.004	<0.004	0.0118	<0.012	0.00629	<0.002	<0.01	0.23	0.00686	<0.003	0.078	0.00445	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
C3-2	C3-2-30'	30	7/22/2014	No		<0.02	<0.01	<0.015	0.0708	<0.01	<0.015	<0.015	<0.02	<0.02	<0.015	<0.06	<0.02	<0.01	<0.05	6.91	<0.01	<0.015	0.082	<0.01	<0.015	<0.015	<0.015	<0.02	<0.05	<0.01
C3-2	C3-2-60'	60	7/22/2014	No		<0.04	<0.02	<0.03	<0.03	<0.02	0.124	<0.03	<0.04	<0.04	1.69	<0.12	1.87	<0.02	<0.1	9.17	0.451	<0.03	<0.03	0	<0.03	<0.03	0.0977	<0.04	<0.1	<0.02
C3-2	C3-2-85'	85	7/22/2014	No		<0.04	<0.02	<0.03	<0.03	<0.02	0.104	<0.03	<0.04	<0.04	1.53	<0.12	0.704	<0.02	<0.1	21.9	0.569	<0.03	<0.03	0.384	<0.03	<0.03	<0.03	<0.04	<0.1	<0.02
C4-2	C4-2-5'	5	7/22/2014	No		<0.004	<0.002	<0.003	0.0122	<0.002	<0.003	<0.003	<0.004	<0.004	0.056	<0.012	0.0252	<0.002	<0.01	0.953	0.0217	0.0126	0.167	0.0112	<0.003	<0.003	0.148	<0.004	<0.01	<0.002
C4-2	C4-2-15'	15	7/23/2014	No		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	0.0716	<0.012	0.125	<0.002	<0.01	0.676	0.0595	0.0296	0.238	0.368	<0.003	<0.003	0.278	<0.004	<0.01	0.00606
C4-2	C4-2-30'	30	7/22/2014	No		<0.04	<0.02	<0.03	<0.03	<0.02	<0.03	<0.03	<0.04	<0.04	8.08	<0.12	1.7	<0.02	<0.1	11	2.24	<0.03	0.0732	0.219	<0.03	<0.03	0.081	<0.04	<0.1	<0.02
C4-2	C4-2-60'	60	7/22/2014	No		<0.04	<0.02	<0.03	<0.03	<0.02	<0.03	<0.03	<0.04	<0.04	25.5	<0.12	13	<0.02	<0.1	17	10.6	<0.03	<0.03	4.65	<0.03	<0.03	0.151	<0.04	<0.1	<0.02
C4-2	C4-2-80'	80	7/22/2014	No		<0.04	<0.02	<0.03	<0.03	<0.02	<0.03	<0.03	<0.04	<0.04	7.42	<0.12	4.96	<0.02	<0.1	23.4	1.75	<0.03	<0.03	0.429	<0.03	<0.03	<0.03	<0.04	<0.1	<0.02
C5-1	C5-1-5'	5	6/9/2014	No		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.388	0.0058	<0.0015	<0.0015	0.0205	<0.002	<0.005	<0.001
C5-1	C5-1-5'	5	6/9/2014	No	DUP	<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.328	0.00407	<0.0015	<0.0015	0.0196	<0.002	<0.005	<0.001
C5-1	C5-1-15'	15	6/9/2014	No		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	0.00734	<0.012	0.0181	<0.002	<0.01	0.0177	0.00868	0.0118	0.207	0.0136	<0.003	<0.003	0.0233	<0.004	<0.01	<0.002
C6-1	C6-1-5'	5	6/9/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.0766	<0.001	<0.0015	<0.0015	0.00988	<0.002	<0.005	<0.001
C6-1	C6-1-15'	15	6/9/2014	Yes		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	<0.01	<0.002	0.00609	0.017	<0.002	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
D1-2	D1-2-5'	5	7/23/2014	Yes		<0.004	<0.002	<0.003	0.0143	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	0.0394	<0.002	<0.003	3.93	0.00441	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
D1-2	D1-2-15'	15	7/23/2014	Yes		<0.004	<0.002	<0.003	0.0131	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	0.0833	<0.002	<0.003	3.04	0.00656	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
D1-2	D1-2-30'	30	7/23/2014	Yes		<0.004	<0.002	<0.003	0.00937	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	0.114	<0.002	<0.003	2.35	0.00539	<0.003	<0.003	0.00816	<0.004	<0.01	<0.002
D1-2	D1-2-30'	30	7/23/2014	Yes	DUP	<0.004	<0.002	<0.003	0.00898	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	0.0969	<0.002	<0.003	2.16	0.00795	<0.003	<0.003	0.00698	<0.004	<0.01	<0.002
D2-2	D2-2-5'	5	7/23/2014	No		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	0.00677	<0.012	<0.004	<0.002	<0.01	0.0587	<0.002	<0.003	0.444	<0.002	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
D2-2	D2-2-15'	15	7/23/2014	No		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	0.0089	<0.012	<0.004	<0.002	<0.01	0.0123	<0.002	<0.003	0.517	<0.002	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002

TABLE A-4
ANALYTICAL DATA INCLUDED IN THE HHRA: SOIL GAS
VOLATILE ORGANIC COMPOUNDS
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Location ID	Sample ID	Depth (feet bgs)	Sample Date	Boundary Sample	Sample Type	Carbon Tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Dibromochloromethane	Dichlorodifluoromethane (Freon 12)	Ethylbenzene	Hexachlorobutadiene	m,p-Xylenes	Methyl tert-butyl ether (MTBE)	Methylene Chloride	Naphthalene	o-Xylene	Styrene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Trichloroethene	Trichlorofluoromethane (Freon 11)	Vinyl Acetate	Vinyl Chloride
D2-2	D2-2-30'	30	7/23/2014	No		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	0.00929	<0.012	<0.004	<0.002	<0.01	0.0639	<0.002	<0.003	0.82	<0.002	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
D3-1	D3-1-15'	15	6/5/2014	No		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	0.00325	<0.001	<0.005	0.0833	<0.001	<0.0015	0.222	0.00663	<0.0015	<0.0015	0.0108	<0.002	<0.005	<0.001
D4-2	D4-2-5'	5	7/23/2014	Yes		<0.004	<0.002	<0.003	0.0063	<0.002	<0.003	<0.003	<0.004	<0.004	0.0182	<0.012	0.0116	<0.002	<0.01	0.241	0.00504	<0.003	0.0653	0.00656	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
D4-2	D4-2-15'	15	7/23/2014	Yes		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	0.18	<0.002	<0.003	0.0532	<0.002	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
D5-1	D5-1-5'	5	6/9/2014	No		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	0.0027	<0.001	<0.005	<0.005	0.0027	<0.0015	0.233	0.0025	<0.0015	<0.0015	0.00356	0.00361	<0.005	<0.001
D5-1	D5-1-15'	15	6/9/2014	No		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	0.00486	<0.001	<0.005	<0.005	0.00261	<0.0015	0.133	0.00308	<0.0015	<0.0015	0.00392	<0.002	<0.005	<0.001
D5-2	D5-2-5'	5	6/9/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.271	0.00304	<0.0015	<0.0015	0.00794	<0.002	<0.005	<0.001
D5-2	D5-2-15'	15	6/9/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	0.00247	<0.001	<0.005	0.00597	<0.001	<0.0015	0.142	0.00355	<0.0015	<0.0015	0.00929	<0.002	<0.005	<0.001
D5-3	D5-3-5'	5	6/12/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.119	0.00471	<0.0015	<0.0015	0.00859	<0.002	<0.005	<0.001
D5-3	D5-3-15'	15	6/9/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	0.00233	<0.001	<0.005	<0.005	0.00241	<0.0015	0.0601	<0.001	<0.0015	<0.0015	0.00288	0.00335	<0.005	<0.001
E1-1	E1-1-5'	5	6/5/2014	Yes		<0.002	<0.001	<0.0015	0.00483	<0.001	<0.0015	<0.0015	<0.002	0.00383	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.00671	0.00324	<0.0015	<0.0015	<0.0015	<0.002	<0.005	<0.001
E1-1	E1-1-5'	5	6/9/2014	Yes		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	0.00613	<0.003	<0.012	<0.004	<0.002	<0.01	<0.01	<0.002	<0.003	0.49	0.00501	<0.003	<0.003	0.00784	<0.004	<0.01	<0.002
E1-1	E1-1-5'	5	6/9/2014	Yes	DUP	<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	0.00593	<0.003	<0.012	<0.004	<0.002	<0.01	<0.01	<0.002	<0.003	0.467	0.00486	<0.003	<0.003	0.00623	<0.004	<0.01	<0.002
E1-1	E1-1-15'	15	6/5/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	0.00283	<0.0015	<0.006	0.00372	<0.001	<0.005	<0.005	0.00325	<0.0015	0.308	0.0072	<0.0015	<0.0015	0.00827	<0.002	<0.005	<0.001
E2-1	E2-1-5'	5	6/12/2014	No		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.0732	<0.001	<0.0015	<0.0015	<0.0015	<0.002	<0.005	<0.001
E2-1	E2-1-15'	15	6/12/2014	No		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.0598	<0.001	<0.0015	<0.0015	<0.0015	<0.002	<0.005	<0.001
E3-1	E3-1-5'	5	6/5/2014	No		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	0.00504	<0.006	0.0178	<0.001	<0.005	0.00969	0.00938	<0.0015	0.127	0.00908	<0.0015	<0.0015	<0.0015	<0.002	<0.005	<0.001
E3-1	E3-1-15'	15	6/5/2014	No		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	0.00429	<0.001	<0.005	0.0206	0.00261	<0.0015	0.0983	0.00235	<0.0015	<0.0015	<0.0015	<0.002	<0.005	<0.001
E4-1	E4-1-5'	5	6/5/2014	Yes		<0.002	<0.001	<0.0015	0.00381	<0.001	<0.0015	<0.0015	<0.002	<0.002	0.00271	<0.006	0.0135	<0.001	<0.005	<0.005	0.00708	<0.0015	0.129	0.00656	<0.0015	<0.0015	0.0171	<0.002	<0.005	<0.001
E4-1	E4-1-15'	15	6/5/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	0.00807	<0.001	<0.0015	0.0997	0.00588	<0.0015	<0.0015	0.0125	<0.002	<0.005	<0.001
E5-1	E5-1-5'	5	6/9/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	0.00241	<0.001	<0.005	<0.005	<0.001	<0.0015	0.184	0.00475	<0.0015	<0.0015	0.00972	<0.002	<0.005	<0.001
E5-1	E5-1-15'	15	6/9/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.138	0.00291	<0.0015	<0.0015	0.0066	<0.002	<0.005	<0.001
F1-2	F1-2-5'	5	6/12/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	0.00621	<0.001	<0.005	<0.005	0.0053	<0.0015	0.0233	0.00475	<0.0015	<0.0015	<0.0015	<0.002	<0.005	<0.001
F1-2	F1-2-15'	15	6/12/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.0139	<0.001	<0.0015	<0.0015	<0.0015	<0.002	<0.005	<0.001
F2-1	F2-1-5'	5	6/12/2014	No		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.0491	<0.001	<0.0015	<0.0015	<0.0015	<0.002	<0.005	<0.001
F2-1	F2-1-15'	15	6/12/2014	No		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.0335	<0.001	<0.0015	<0.0015	<0.0015	<0.002	<0.005	<0.001
F3-1	F3-1-5'	5	6/17/2014	No		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	<0.01	<0.002	<0.003	0.0673	<0.002	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
F3-1	F3-1-15'	15	6/17/2014	No		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	<0.01	<0.002	<0.003	0.0499	<0.002	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
F3-5	F3-5-5'	5	6/17/2014	No		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	0.00881	<0.002	<0.01	<0.01	0.00521	<0.003	0.313	0.00904	<0.003	<0.003	0.00719	<0.004	<0.01	<0.002
F3-5	F3-5-5'	5	6/17/2014	No	DUP	<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	0.0082	<0.002	<0.01	<0.01	0.00504	<0.003	0.286	0.00851	<0.003	<0.003	0.00623	<0.004	<0.01	<0.002
F3-5	F3-5-15'	15	6/17/2014	No		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	<0.01	<0.002	<0.003	0.131	<0.002	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
F4-1	F4-1-5'	5	6/17/2014	Yes		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	<0.01	<0.002	<0.003	0.0698	<0.002	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
F4-1	F4-1-15'	15	6/17/2014	Yes		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	<0.01	<0.002	<0.003	0.0591	<0.002	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
G1-1	G1-1-5'	5	6/12/2014	Yes		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	0.00885	<0.012	0.0369	<0.002	<0.01	<0.01	0.0124	<0.003	0.0159	0.0298	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
G1-1	G1-1-15'	15	6/12/2014	Yes		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	0.00603	<0.002	<0.01	<0.01	<0.002	0.01	0.0143	0.00573	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
G2-1	G2-1-5'	5	6/12/2014	No		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	0.00777	<0.012	0.0386	<0.002	<0.01	<0.01	0.0151	<0.003	0.0585	0.0204	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
G2-1	G2-1-5'	5	6/12/2014	No	DUP	<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	0.01	<0.012	0.0415	<0.002	<0.01	<0.01	0.0157	<0.003	0.0618	0.024	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
G2-1	G2-1-15'	15	6/12/2014	No		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	<0.01	<0.002	<0.003	0.0365	0.00814	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
G3-1	G3-1-5'	5	6/12/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.132	0.00456	<0.0015	<0.0015	0.00837	<0.002	<0.005	<0.001
G3-1	G3-1-5'	5	6/12/2014	Yes	DUP	<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.121	0.00432	<0.0015	<0.0015	0.00902	<0.002	<0.005	<0.001
G3-1	G3-1-15'	15	6/12/2014	Yes		<0.002	<0.001	<0.0015	<0.0015	<0.001	<0.0015	<0.0015	<0.002	<0.002	<0.0015	<0.006	<0.002	<0.001	<0.005	<0.005	<0.001	<0.0015	0.142	<0.001	<0.0015	<0.0015	<0.0015	<0.002	<0.005	<0.001
G4-1	G4-1-5'	5	6/12/2014	Yes		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	0.0161	<0.002	<0.01	<0.01	0.00543	<0.003	0.0366	0.0107	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
G4-1	G4-1-5'	5	6/12/2014	Yes	DUP	<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	0.0165	<0.002	<0.01	<0.01	0.00564	<0.003	0.0337	0.0124	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
G4-1	G4-1-15'	15	6/12/2014	Yes		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	0.00964	<0.002	<0.01	<0.01	0.00538	<0.003	0.0378	0.0124	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
H1-1	H1-1-5'	5	6/12/2014	Yes		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	<0.01	<0.002	<0.003	0.0494	<0.002	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
H1-1	H1-1-15'	15	6/12/2014	Yes		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	<0.003	<0.012	<0.004	<0.002	<0.01	<0.01	<0.002	<0.003	0.0454	<0.002	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
H3-1	H3-1-5'	5	6/12/2014	Yes		<0.004	<0.002	<0.003	<0.003	<0.002	<0.003	<0.003	<0.004	<0.004	0.00716	<0.012	0.0303	<0.002	<0.01	<0.01	0.0115	<0.003	0.719	0.0191	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002
H3-1	H3-1-15'	15	6/12/2014	Yes		<0.004	<0.002	<0.003	0.00781	<0.002	<0.003	<0.003	<0.004	<0.004	0.00569	<0.012	0.0191	<0.002	<0.01	<0.01	0.00716	0.00754	0.465	0.0172	<0.003	<0.003	<0.003	<0.004	<0.01	<0.002

Notes:
All analytical results are presented in milligrams per meter cubed (mg/m^3).
< = Analyte was not detected at the detection limit given.
bgs = below ground surface.
DUP = field duplicate sample.
J = result is less than the reporting limit (RL), but greater than or equal to the method detection limit (MDL) and the concentration is an approximated value.

ATTACHMENT B

DATA STATISTICAL EVALUATION

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	5/6/2015 2:05:23 PM
From File	qryProUCL_Input_SG.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Chemical (1,1,1-trichloroethane)

General Statistics

Total Number of Observations	92	Number of Distinct Observations	24
Number of Detects	21	Number of Non-Detects	71
Number of Distinct Detects	20	Number of Distinct Non-Detects	4
Minimum Detect	4.69	Minimum Non-Detect	1.5
Maximum Detect	51.1	Maximum Non-Detect	30
Variance Detects	140.6	Percent Non-Detects	77.17%
Mean Detects	13.12	SD Detects	11.86
Median Detects	8.07	CV Detects	0.904
Skewness Detects	2.257	Kurtosis Detects	4.934
Mean of Logged Detects	2.323	SD of Logged Detects	0.656

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.675	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.908	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.279	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.193	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	4.313	Standard Error of Mean	0.807
SD	7.441	95% KM (BCA) UCL	5.726
95% KM (t) UCL	5.655	95% KM (Percentile Bootstrap) UCL	5.669
95% KM (z) UCL	5.641	95% KM Bootstrap t UCL	6.39
90% KM Chebyshev UCL	6.735	95% KM Chebyshev UCL	7.832
97.5% KM Chebyshev UCL	9.354	99% KM Chebyshev UCL	12.35

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.6	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.753	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.252	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.192	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.145	k star (bias corrected MLE)	1.871
Theta hat (MLE)	6.116	Theta star (bias corrected MLE)	7.014
nu hat (MLE)	90.11	nu star (bias corrected)	78.57
MLE Mean (bias corrected)	13.12	MLE Sd (bias corrected)	9.593

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.336	nu hat (KM)	61.83
Approximate Chi Square Value (61.83, α)	44.74	Adjusted Chi Square Value (61.83, β)	44.51
95% Gamma Approximate KM-UCL (use when n>=50)	5.96	95% Gamma Adjusted KM-UCL (use when n<50)	5.991

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	3.087
Maximum	51.1	Median	0.01
SD	7.853	CV	2.544
k hat (MLE)	0.183	k star (bias corrected MLE)	0.184
Theta hat (MLE)	16.88	Theta star (bias corrected MLE)	16.76
nu hat (MLE)	33.66	nu star (bias corrected)	33.9
MLE Mean (bias corrected)	3.087	MLE Sd (bias corrected)	7.193
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (33.90, α)	21.58	Adjusted Chi Square Value (33.90, β)	21.43
95% Gamma Approximate UCL (use when n>=50)	4.849	95% Gamma Adjusted UCL (use when n<50)	4.884

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.869	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.908	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.221	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.193	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	4.227	Mean in Log Scale	0.607
SD in Original Scale	7.479	SD in Log Scale	1.283
95% t UCL (assumes normality of ROS data)	5.523	95% Percentile Bootstrap UCL	5.607
95% BCA Bootstrap UCL	5.933	95% Bootstrap t UCL	6.17
95% H-UCL (Log ROS)	5.878		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	4.96	Mean in Log Scale	0.772
SD in Original Scale	8.038	SD in Log Scale	1.195
95% t UCL (Assumes normality)	6.352	95% H-Stat UCL	6.005

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	5.655	95% KM (% Bootstrap) UCL	5.669

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chemical (1,2,4-trimethylbenzene)

General Statistics

Total Number of Observations	92	Number of Distinct Observations	33
Number of Detects	32	Number of Non-Detects	60
Number of Distinct Detects	31	Number of Distinct Non-Detects	2
Minimum Detect	2.64	Minimum Non-Detect	1.5
Maximum Detect	10900	Maximum Non-Detect	3
Variance Detects	4463586	Percent Non-Detects	65.22%
Mean Detects	663.7	SD Detects	2113
Median Detects	12.4	CV Detects	3.183
Skewness Detects	4.23	Kurtosis Detects	19.07

Mean of Logged Detects	3.399	SD of Logged Detects	2.26

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.365	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.93	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.397	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.157	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	231.8	Standard Error of Mean	134.1
SD	1266	95% KM (BCA) UCL	495.8
95% KM (t) UCL	454.7	95% KM (Percentile Bootstrap) UCL	478.8
95% KM (z) UCL	452.5	95% KM Bootstrap t UCL	1136
90% KM Chebyshev UCL	634.2	95% KM Chebyshev UCL	816.5
97.5% KM Chebyshev UCL	1069	99% KM Chebyshev UCL	1566

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	5.08	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.889	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.363	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.171	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.232	k star (bias corrected MLE)	0.231
Theta hat (MLE)	2861	Theta star (bias corrected MLE)	2872
nu hat (MLE)	14.85	nu star (bias corrected)	14.79
MLE Mean (bias corrected)	663.7	MLE Sd (bias corrected)	1381

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0335	nu hat (KM)	6.167
Approximate Chi Square Value (6.17, α)	1.726	Adjusted Chi Square Value (6.17, β)	1.689
95% Gamma Approximate KM-UCL (use when n>=50)	828.4	95% Gamma Adjusted KM-UCL (use when n<50)	846.4

Gamma (KM) may not be used when k hat (KM) is < 0.1

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	230.8
Maximum	10900	Median	0.01
SD	1273	CV	5.516
k hat (MLE)	0.11	k star (bias corrected MLE)	0.114
Theta hat (MLE)	2091	Theta star (bias corrected MLE)	2024
nu hat (MLE)	20.31	nu star (bias corrected)	20.99
MLE Mean (bias corrected)	230.8	MLE Sd (bias corrected)	683.6
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (20.99, α)	11.58	Adjusted Chi Square Value (20.99, β)	11.47
95% Gamma Approximate UCL (use when n>=50)	418.3	95% Gamma Adjusted UCL (use when n<50)	422.4

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.791	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.93	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.241	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.157	Detected Data Not Lognormal at 5% Significance Level	

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	231	Mean in Log Scale	-1.164
SD in Original Scale	1273	SD in Log Scale	4.224
95% t UCL (assumes normality of ROS data)	451.6	95% Percentile Bootstrap UCL	483.5
95% BCA Bootstrap UCL	599.5	95% Bootstrap t UCL	1261
95% H-UCL (Log ROS)	40555		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	231.5	Mean in Log Scale	1.161
SD in Original Scale	1273	SD in Log Scale	2.125
95% t UCL (Assumes normality)	452.1	95% H-Stat UCL	67.35

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

97.5% KM (Chebyshev) UCL 1069

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chemical (1,3,5-trimethylbenzene)

General Statistics

Total Number of Observations	92	Number of Distinct Observations	21
Number of Detects	18	Number of Non-Detects	74
Number of Distinct Detects	18	Number of Distinct Non-Detects	3
Minimum Detect	2.63	Minimum Non-Detect	1.5
Maximum Detect	5230	Maximum Non-Detect	15
Variance Detects	1886291	Percent Non-Detects	80.43%
Mean Detects	695.5	SD Detects	1373
Median Detects	23.4	CV Detects	1.975
Skewness Detects	2.544	Kurtosis Detects	6.853
Mean of Logged Detects	3.948	SD of Logged Detects	2.641

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.591	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.897	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.36	Lilliefors GOF Test
5% Lilliefors Critical Value	0.209	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	137.3	Standard Error of Mean	69.88
SD	651.4	95% KM (BCA) UCL	264.4
95% KM (t) UCL	253.4	95% KM (Percentile Bootstrap) UCL	257.8
95% KM (z) UCL	252.2	95% KM Bootstrap t UCL	410.5
90% KM Chebyshev UCL	346.9	95% KM Chebyshev UCL	441.9
97.5% KM Chebyshev UCL	573.7	99% KM Chebyshev UCL	832.6

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.413	Anderson-Darling GOF Test
5% A-D Critical Value	0.856	Detected Data Not Gamma Distributed at 5% Significance Level

K-S Test Statistic	0.281	Kolmogrov-Smirnoff GOF	
5% K-S Critical Value	0.222	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.27	k star (bias corrected MLE)	0.262
Theta hat (MLE)	2574	Theta star (bias corrected MLE)	2653
nu hat (MLE)	9.726	nu star (bias corrected)	9.438
MLE Mean (bias corrected)	695.5	MLE Sd (bias corrected)	1358

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0444	nu hat (KM)	8.173
Approximate Chi Square Value (8.17, α)	2.836	Adjusted Chi Square Value (8.17, β)	2.786
95% Gamma Approximate KM-UCL (use when n>=50)	395.7	95% Gamma Adjusted KM-UCL (use when n<50)	402.8

Gamma (KM) may not be used when k hat (KM) is < 0.1

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	136.1
Maximum	5230	Median	0.01
SD	655.2	CV	4.815
k hat (MLE)	0.103	k star (bias corrected MLE)	0.107
Theta hat (MLE)	1320	Theta star (bias corrected MLE)	1272
nu hat (MLE)	18.97	nu star (bias corrected)	19.69
MLE Mean (bias corrected)	136.1	MLE Sd (bias corrected)	416
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (19.69, α)	10.62	Adjusted Chi Square Value (19.69, β)	10.52
95% Gamma Approximate UCL (use when n>=50)	252.2	95% Gamma Adjusted UCL (use when n<50)	254.8

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.865	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.897	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.216	Lilliefors GOF Test
5% Lilliefors Critical Value	0.209	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	136.2	Mean in Log Scale	-4.538
SD in Original Scale	655.2	SD in Log Scale	5.867
95% t UCL (assumes normality of ROS data)	249.7	95% Percentile Bootstrap UCL	249.2
95% BCA Bootstrap UCL	323.1	95% Bootstrap t UCL	442.6
95% H-UCL (Log ROS)	71406141		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	137	Mean in Log Scale	0.8
SD in Original Scale	655	SD in Log Scale	1.969
95% t UCL (Assumes normality)	250.5	95% H-Stat UCL	30.93

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

97.5% KM (Chebyshev) UCL 573.7

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chemical (4-ethyltoluene)

General Statistics

Total Number of Observations	92	Number of Distinct Observations	13
Number of Detects	10	Number of Non-Detects	82
Number of Distinct Detects	10	Number of Distinct Non-Detects	3
Minimum Detect	10.9	Minimum Non-Detect	5
Maximum Detect	5490	Maximum Non-Detect	50
Variance Detects	2985134	Percent Non-Detects	89.13%
Mean Detects	1312	SD Detects	1728
Median Detects	574	CV Detects	1.316
Skewness Detects	1.838	Kurtosis Detects	3.485
Mean of Logged Detects	5.781	SD of Logged Detects	2.336

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.778	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.24	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.28	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	147.1	Standard Error of Mean	74.34
SD	676.5	95% KM (BCA) UCL	287.8
95% KM (t) UCL	270.7	95% KM (Percentile Bootstrap) UCL	275.3
95% KM (z) UCL	269.4	95% KM Bootstrap t UCL	420.9
90% KM Chebyshev UCL	370.1	95% KM Chebyshev UCL	471.2
97.5% KM Chebyshev UCL	611.4	99% KM Chebyshev UCL	886.8

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.365	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.784	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.198	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.282	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.46	k star (bias corrected MLE)	0.389
Theta hat (MLE)	2852	Theta star (bias corrected MLE)	3376
nu hat (MLE)	9.203	nu star (bias corrected)	7.776
MLE Mean (bias corrected)	1312	MLE Sd (bias corrected)	2105

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0473	nu hat (KM)	8.702
Approximate Chi Square Value (8.70, α)	3.148	Adjusted Chi Square Value (8.70, β)	3.095
95% Gamma Approximate KM-UCL (use when n>=50)	406.7	95% Gamma Adjusted KM-UCL (use when n<50)	413.6

Gamma (KM) may not be used when k hat (KM) is < 0.1

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	142.7
Maximum	5490	Median	0.01
SD	681.1	CV	4.774
k hat (MLE)	0.0967	k star (bias corrected MLE)	0.101
Theta hat (MLE)	1476	Theta star (bias corrected MLE)	1416
nu hat (MLE)	17.79	nu star (bias corrected)	18.54
MLE Mean (bias corrected)	142.7	MLE Sd (bias corrected)	449.4
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (18.54, α)	9.782	Adjusted Chi Square Value (18.54, β)	9.681
95% Gamma Approximate UCL (use when n>=50)	270.4	95% Gamma Adjusted UCL (use when n<50)	273.2

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.857	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.25	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.28	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	143.2	Mean in Log Scale	-4.394
SD in Original Scale	681	SD in Log Scale	5.785
95% t UCL (assumes normality of ROS data)	261.2	95% Percentile Bootstrap UCL	269.3
95% BCA Bootstrap UCL	329.4	95% Bootstrap t UCL	452.9
95% H-UCL (Log ROS)	44106890		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	2.063	95% H-UCL (KM -Log)	36.82
KM SD (logged)	1.49	95% Critical H Value (KM-Log)	2.771
KM Standard Error of Mean (logged)	0.164		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	146.1	Mean in Log Scale	1.741
SD in Original Scale	680.4	SD in Log Scale	1.643
95% t UCL (Assumes normality)	264	95% H-Stat UCL	36.61

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	270.7	95% KM (Percentile Bootstrap) UCL	275.3

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chemical (benzene)

General Statistics

Total Number of Observations	92	Number of Distinct Observations	34
Number of Detects	31	Number of Non-Detects	61
Number of Distinct Detects	30	Number of Distinct Non-Detects	4
Minimum Detect	1.84	Minimum Non-Detect	1
Maximum Detect	3380	Maximum Non-Detect	20
Variance Detects	545503	Percent Non-Detects	66.3%

Mean Detects	304.2	SD Detects	738.6
Median Detects	5.17	CV Detects	2.428
Skewness Detects	3.102	Kurtosis Detects	10.39
Mean of Logged Detects	2.673	SD of Logged Detects	2.42

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.487	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.929	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.422	Lilliefors GOF Test
5% Lilliefors Critical Value	0.159	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	103.2	Standard Error of Mean	47.21
SD	445.4	95% KM (BCA) UCL	193.9
95% KM (t) UCL	181.7	95% KM (Percentile Bootstrap) UCL	181.3
95% KM (z) UCL	180.9	95% KM Bootstrap t UCL	271.1
90% KM Chebyshev UCL	244.8	95% KM Chebyshev UCL	309
97.5% KM Chebyshev UCL	398	99% KM Chebyshev UCL	572.9

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	4.819	Anderson-Darling GOF Test
5% A-D Critical Value	0.887	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.355	Kolmogrov-Smirnoff GOF
5% K-S Critical Value	0.174	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.236	k star (bias corrected MLE)	0.234
Theta hat (MLE)	1292	Theta star (bias corrected MLE)	1299
nu hat (MLE)	14.6	nu star (bias corrected)	14.52
MLE Mean (bias corrected)	304.2	MLE Sd (bias corrected)	628.6

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0537	nu hat (KM)	9.879
Approximate Chi Square Value (9.88, α)	3.867	Adjusted Chi Square Value (9.88, β)	3.807
95% Gamma Approximate KM-UCL (use when n>=50)	263.7	95% Gamma Adjusted KM-UCL (use when n<50)	267.9

Gamma (KM) may not be used when k hat (KM) is < 0.1

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	102.5
Maximum	3380	Median	0.01
SD	448	CV	4.37
k hat (MLE)	0.117	k star (bias corrected MLE)	0.121
Theta hat (MLE)	874.2	Theta star (bias corrected MLE)	849.4
nu hat (MLE)	21.58	nu star (bias corrected)	22.21
MLE Mean (bias corrected)	102.5	MLE Sd (bias corrected)	295.1
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (22.21, α)	12.49	Adjusted Chi Square Value (22.21, β)	12.38
95% Gamma Approximate UCL (use when n>=50)	182.2	95% Gamma Adjusted UCL (use when n<50)	183.9

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.749	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.929	Detected Data Not Lognormal at 5% Significance Level

Lilliefors Test Statistic	0.261	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.159	Detected Data Not Lognormal at 5% Significance Level	

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	102.6	Mean in Log Scale	-2.083
SD in Original Scale	448	SD in Log Scale	4.325
95% t UCL (assumes normality of ROS data)	180.2	95% Percentile Bootstrap UCL	187.8
95% BCA Bootstrap UCL	208.2	95% Bootstrap t UCL	263.8
95% H-UCL (Log ROS)	28459		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	103.2	Mean in Log Scale	0.717
SD in Original Scale	447.9	SD in Log Scale	2.022
95% t UCL (Assumes normality)	180.8	95% H-Stat UCL	32.71

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

97.5% KM (Chebyshev) UCL 398

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chemical (carbon disulfide)

General Statistics

Total Number of Observations	92	Number of Distinct Observations	22
Number of Detects	21	Number of Non-Detects	71
Number of Distinct Detects	20	Number of Distinct Non-Detects	2
Minimum Detect	3.7	Minimum Non-Detect	1.5
Maximum Detect	383	Maximum Non-Detect	3
Variance Detects	19069	Percent Non-Detects	77.17%
Mean Detects	106.9	SD Detects	138.1
Median Detects	30	CV Detects	1.292
Skewness Detects	1.06	Kurtosis Detects	-0.557
Mean of Logged Detects	3.467	SD of Logged Detects	1.753

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.742	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.908	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.29	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.193	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	25.56	Standard Error of Mean	8.346
SD	78.12	95% KM (BCA) UCL	39.55
95% KM (t) UCL	39.43	95% KM (Percentile Bootstrap) UCL	39.31
95% KM (z) UCL	39.29	95% KM Bootstrap t UCL	44.24
90% KM Chebyshev UCL	50.6	95% KM Chebyshev UCL	61.94
97.5% KM Chebyshev UCL	77.68	99% KM Chebyshev UCL	108.6

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.301	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.803	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.206	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.2	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.523	k star (bias corrected MLE)	0.48
Theta hat (MLE)	204.3	Theta star (bias corrected MLE)	222.6
nu hat (MLE)	21.98	nu star (bias corrected)	20.18
MLE Mean (bias corrected)	106.9	MLE Sd (bias corrected)	154.3

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.107	nu hat (KM)	19.7
Approximate Chi Square Value (19.70, α)	10.63	Adjusted Chi Square Value (19.70, β)	10.53
95% Gamma Approximate KM-UCL (use when n>=50)	47.37	95% Gamma Adjusted KM-UCL (use when n<50)	47.85

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	24.41
Maximum	383	Median	0.01
SD	78.91	CV	3.232
k hat (MLE)	0.131	k star (bias corrected MLE)	0.134
Theta hat (MLE)	185.7	Theta star (bias corrected MLE)	181.6
nu hat (MLE)	24.19	nu star (bias corrected)	24.73
MLE Mean (bias corrected)	24.41	MLE Sd (bias corrected)	66.59
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (24.73, α)	14.41	Adjusted Chi Square Value (24.73, β)	14.28
95% Gamma Approximate UCL (use when n>=50)	41.91	95% Gamma Adjusted UCL (use when n<50)	42.28

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.863	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.908	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.195	Lilliefors GOF Test
5% Lilliefors Critical Value	0.193	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	24.7	Mean in Log Scale	-1.566
SD in Original Scale	78.82	SD in Log Scale	3.727
95% t UCL (assumes normality of ROS data)	38.36	95% Percentile Bootstrap UCL	39.28
95% BCA Bootstrap UCL	41.06	95% Bootstrap t UCL	44.41
95% H-UCL (Log ROS)	2044		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	25.2	Mean in Log Scale	0.765
SD in Original Scale	78.67	SD in Log Scale	1.716
95% t UCL (Assumes normality)	38.83	95% H-Stat UCL	16.2

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL 61.94

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chemical (chloroform)

General Statistics

Total Number of Observations	92	Number of Distinct Observations	14
Number of Detects	11	Number of Non-Detects	81
Number of Distinct Detects	11	Number of Distinct Non-Detects	3

Minimum Detect	3.81	Minimum Non-Detect	1.5
Maximum Detect	70.8	Maximum Non-Detect	30
Variance Detects	429.9	Percent Non-Detects	88.04%
Mean Detects	17.44	SD Detects	20.74
Median Detects	9.37	CV Detects	1.189
Skewness Detects	2.187	Kurtosis Detects	4.393
Mean of Logged Detects	2.424	SD of Logged Detects	0.892

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.658	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.85	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.378	Lilliefors GOF Test
5% Lilliefors Critical Value	0.267	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	3.465	Standard Error of Mean	0.943
SD	8.59	95% KM (BCA) UCL	5.1
95% KM (t) UCL	5.032	95% KM (Percentile Bootstrap) UCL	5.099
95% KM (z) UCL	5.016	95% KM Bootstrap t UCL	7.92
90% KM Chebyshev UCL	6.293	95% KM Chebyshev UCL	7.574
97.5% KM Chebyshev UCL	9.352	99% KM Chebyshev UCL	12.84

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.897	Anderson-Darling GOF Test
5% A-D Critical Value	0.746	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.285	Kolmogrov-Smirnoff GOF
5% K-S Critical Value	0.261	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.29	k star (bias corrected MLE)	0.999
Theta hat (MLE)	13.52	Theta star (bias corrected MLE)	17.46
nu hat (MLE)	28.39	nu star (bias corrected)	21.98
MLE Mean (bias corrected)	17.44	MLE Sd (bias corrected)	17.45

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.163	nu hat (KM)	29.95
Approximate Chi Square Value (29.95, α)	18.45	Adjusted Chi Square Value (29.95, β)	18.31
95% Gamma Approximate KM-UCL (use when n>=50)	5.624	95% Gamma Adjusted KM-UCL (use when n<50)	5.669

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	2.094

Maximum	70.8	Median	0.01
SD	8.921	CV	4.26
k hat (MLE)	0.168	k star (bias corrected MLE)	0.17
Theta hat (MLE)	12.48	Theta star (bias corrected MLE)	12.35
nu hat (MLE)	30.88	nu star (bias corrected)	31.21
MLE Mean (bias corrected)	2.094	MLE Sd (bias corrected)	5.085
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (31.21, α)	19.45	Adjusted Chi Square Value (31.21, β)	19.3
95% Gamma Approximate UCL (use when n>=50)	3.361	95% Gamma Adjusted UCL (use when n<50)	3.387

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.901	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.214	Lilliefors GOF Test
5% Lilliefors Critical Value	0.267	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	2.581	Mean in Log Scale	-1.162
SD in Original Scale	8.837	SD in Log Scale	2.096
95% t UCL (assumes normality of ROS data)	4.112	95% Percentile Bootstrap UCL	4.202
95% BCA Bootstrap UCL	5.169	95% Bootstrap t UCL	7.106
95% H-UCL (Log ROS)	6.094		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	0.661	95% H-UCL (KM -Log)	2.954
KM SD (logged)	0.73	95% Critical H Value (KM-Log)	2.038
KM Standard Error of Mean (logged)	0.0816		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	4.083	Mean in Log Scale	0.498
SD in Original Scale	9.247	SD in Log Scale	1.098
95% t UCL (Assumes normality)	5.685	95% H-Stat UCL	3.939

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	5.032	95% KM (% Bootstrap) UCL	5.099

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chemical (dichlorodifluoromethane (freon 12))

General Statistics

Total Number of Observations	92	Number of Distinct Observations	8
Number of Detects	4	Number of Non-Detects	88
Number of Distinct Detects	4	Number of Distinct Non-Detects	4
Minimum Detect	2.83	Minimum Non-Detect	2

Maximum Detect	6.13	Maximum Non-Detect	40
Variance Detects	2.523	Percent Non-Detects	95.65%
Mean Detects	4.655	SD Detects	1.588
Median Detects	4.83	CV Detects	0.341
Skewness Detects	-0.301	Kurtosis Detects	-3.968
Mean of Logged Detects	1.49	SD of Logged Detects	0.366

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.895	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.27	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	2.152	Standard Error of Mean	0.0901
SD	0.665	95% KM (BCA) UCL	N/A
95% KM (t) UCL	2.302	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	2.301	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	2.423	95% KM Chebyshev UCL	2.545
97.5% KM Chebyshev UCL	2.715	99% KM Chebyshev UCL	3.049

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.376	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.657	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.305	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.395	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	10.56	k star (bias corrected MLE)	2.806
Theta hat (MLE)	0.441	Theta star (bias corrected MLE)	1.659
nu hat (MLE)	84.47	nu star (bias corrected)	22.45
MLE Mean (bias corrected)	4.655	MLE Sd (bias corrected)	2.779

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	10.48	nu hat (KM)	1929
Approximate Chi Square Value (N/A, α)	1828	Adjusted Chi Square Value (N/A, β)	1826
95% Gamma Approximate KM-UCL (use when n>=50)	2.271	95% Gamma Adjusted KM-UCL (use when n<50)	2.273

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.406
Maximum	6.13	Median	0.01

SD	1.109	CV	2.733
k hat (MLE)	0.258	k star (bias corrected MLE)	0.257
Theta hat (MLE)	1.574	Theta star (bias corrected MLE)	1.582
nu hat (MLE)	47.44	nu star (bias corrected)	47.22
MLE Mean (bias corrected)	0.406	MLE Sd (bias corrected)	0.801
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (47.22, α)	32.45	Adjusted Chi Square Value (47.22, β)	32.26
95% Gamma Approximate UCL (use when n>=50)	0.591	95% Gamma Adjusted UCL (use when n<50)	N/A

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.898	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.272	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.97	Mean in Log Scale	-0.44
SD in Original Scale	1.047	SD in Log Scale	0.904
95% t UCL (assumes normality of ROS data)	1.151	95% Percentile Bootstrap UCL	1.16
95% BCA Bootstrap UCL	1.19	95% Bootstrap t UCL	1.197
95% H-UCL (Log ROS)	1.189		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	0.741	95% H-UCL (KM -Log)	2.214
KM SD (logged)	0.195	95% Critical H Value (KM-Log)	1.705
KM Standard Error of Mean (logged)	0.0274		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	3.105	Mean in Log Scale	0.597
SD in Original Scale	5.026	SD in Log Scale	0.828
95% t UCL (Assumes normality)	3.975	95% H-Stat UCL	3.068

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	2.302	95% KM (Percentile Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chemical (ethylbenzene)

General Statistics

Total Number of Observations	92	Number of Distinct Observations	28
Number of Detects	25	Number of Non-Detects	67
Number of Distinct Detects	25	Number of Distinct Non-Detects	3
Minimum Detect	2.71	Minimum Non-Detect	1.5

Maximum Detect	25500	Maximum Non-Detect	15
Variance Detects	28924361	Percent Non-Detects	72.83%
Mean Detects	1898	SD Detects	5378
Median Detects	11.1	CV Detects	2.833
Skewness Detects	3.909	Kurtosis Detects	16.6
Mean of Logged Detects	3.868	SD of Logged Detects	2.784

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.411	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.918	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.393	Lilliefors GOF Test
5% Lilliefors Critical Value	0.177	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	516.9	Standard Error of Mean	305.8
SD	2874	95% KM (BCA) UCL	1061
95% KM (t) UCL	1025	95% KM (Percentile Bootstrap) UCL	1068
95% KM (z) UCL	1020	95% KM Bootstrap t UCL	1989
90% KM Chebyshev UCL	1434	95% KM Chebyshev UCL	1850
97.5% KM Chebyshev UCL	2426	99% KM Chebyshev UCL	3559

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	3.683	Anderson-Darling GOF Test
5% A-D Critical Value	0.9	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.351	Kolmogrov-Smirnoff GOF
5% K-S Critical Value	0.194	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.2	k star (bias corrected MLE)	0.203
Theta hat (MLE)	9494	Theta star (bias corrected MLE)	9369
nu hat (MLE)	9.997	nu star (bias corrected)	10.13
MLE Mean (bias corrected)	1898	MLE Sd (bias corrected)	4217

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0324	nu hat (KM)	5.955
Approximate Chi Square Value (5.95, α)	1.617	Adjusted Chi Square Value (5.95, β)	1.582
95% Gamma Approximate KM-UCL (use when n>=50)	1904	95% Gamma Adjusted KM-UCL (use when n<50)	1946

Gamma (KM) may not be used when k hat (KM) is < 0.1

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	515.8

Maximum	25500	Median	0.01
SD	2890	CV	5.602
k hat (MLE)	0.0955	k star (bias corrected MLE)	0.0997
Theta hat (MLE)	5399	Theta star (bias corrected MLE)	5175
nu hat (MLE)	17.58	nu star (bias corrected)	18.34
MLE Mean (bias corrected)	515.8	MLE Sd (bias corrected)	1634
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (18.34, α)	9.637	Adjusted Chi Square Value (18.34, β)	9.536
95% Gamma Approximate UCL (use when n>=50)	981.7	95% Gamma Adjusted UCL (use when n<50)	992

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.773	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.918	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.288	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.177	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	515.9	Mean in Log Scale	-2.94
SD in Original Scale	2890	SD in Log Scale	5.467
95% t UCL (assumes normality of ROS data)	1017	95% Percentile Bootstrap UCL	1062
95% BCA Bootstrap UCL	1362	95% Bootstrap t UCL	1977
95% H-UCL (Log ROS)	18144837		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	516.7	Mean in Log Scale	1.047
SD in Original Scale	2889	SD in Log Scale	2.274
95% t UCL (Assumes normality)	1017	95% H-Stat UCL	92.43

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

97.5% KM (Chebyshev) UCL 2426

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chemical (m,p-xylenes)

General Statistics

Total Number of Observations	92	Number of Distinct Observations	38
Number of Detects	35	Number of Non-Detects	57
Number of Distinct Detects	35	Number of Distinct Non-Detects	3
Minimum Detect	2.33	Minimum Non-Detect	2
Maximum Detect	13100	Maximum Non-Detect	20
Variance Detects	9854157	Percent Non-Detects	61.96%
Mean Detects	1030	SD Detects	3139
Median Detects	16.5	CV Detects	3.048

Skewness Detects	3.535	Kurtosis Detects	11.9
Mean of Logged Detects	3.376	SD of Logged Detects	2.503

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.371	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.934	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.429	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.15	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	393.1	Standard Error of Mean	208.7
SD	1973	95% KM (BCA) UCL	749.2
95% KM (t) UCL	739.9	95% KM (Percentile Bootstrap) UCL	770.7
95% KM (z) UCL	736.3	95% KM Bootstrap t UCL	1497
90% KM Chebyshev UCL	1019	95% KM Chebyshev UCL	1303
97.5% KM Chebyshev UCL	1696	99% KM Chebyshev UCL	2469

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	5.233	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.904	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.365	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.165	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.206	k star (bias corrected MLE)	0.207
Theta hat (MLE)	5007	Theta star (bias corrected MLE)	4973
nu hat (MLE)	14.4	nu star (bias corrected)	14.5
MLE Mean (bias corrected)	1030	MLE Sd (bias corrected)	2263

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0397	nu hat (KM)	7.309
Approximate Chi Square Value (7.31, α)	2.342	Adjusted Chi Square Value (7.31, β)	2.297
95% Gamma Approximate KM-UCL (use when n>=50)	1227	95% Gamma Adjusted KM-UCL (use when n<50)	1251

Gamma (KM) may not be used when k hat (KM) is < 0.1

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	391.9
Maximum	13100	Median	0.01
SD	1984	CV	5.062
k hat (MLE)	0.107	k star (bias corrected MLE)	0.111
Theta hat (MLE)	3669	Theta star (bias corrected MLE)	3544

nu hat (MLE)	19.65	nu star (bias corrected)	20.35
MLE Mean (bias corrected)	391.9	MLE Sd (bias corrected)	1178
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (20.35, α)	11.11	Adjusted Chi Square Value (20.35, β)	11
95% Gamma Approximate UCL (use when n>=50)	717.8	95% Gamma Adjusted UCL (use when n<50)	724.9

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.827	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.934	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.216	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.15	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	392	Mean in Log Scale	-0.981
SD in Original Scale	1984	SD in Log Scale	4.336
95% t UCL (assumes normality of ROS data)	735.6	95% Percentile Bootstrap UCL	759.4
95% BCA Bootstrap UCL	943	95% Bootstrap t UCL	1595
95% H-UCL (Log ROS)	90864		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	392.8	Mean in Log Scale	1.49
SD in Original Scale	1983	SD in Log Scale	2.159
95% t UCL (Assumes normality)	736.4	95% H-Stat UCL	103.2

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

97.5% KM (Chebyshev) UCL 1696

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chemical (naphthalene)

General Statistics

Total Number of Observations	92	Number of Distinct Observations	33
Number of Detects	32	Number of Non-Detects	60
Number of Distinct Detects	31	Number of Distinct Non-Detects	2
Minimum Detect	5.97	Minimum Non-Detect	5
Maximum Detect	23400	Maximum Non-Detect	10
Variance Detects	43443338	Percent Non-Detects	65.22%
Mean Detects	3269	SD Detects	6591
Median Detects	83.3	CV Detects	2.016
Skewness Detects	2.115	Kurtosis Detects	3.549
Mean of Logged Detects	5.319	SD of Logged Detects	2.57

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.564	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.93	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.402	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.157	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	1140	Standard Error of Mean	437.5
SD	4130	95% KM (BCA) UCL	1914
95% KM (t) UCL	1867	95% KM (Percentile Bootstrap) UCL	1908
95% KM (z) UCL	1860	95% KM Bootstrap t UCL	2354
90% KM Chebyshev UCL	2453	95% KM Chebyshev UCL	3047
97.5% KM Chebyshev UCL	3872	99% KM Chebyshev UCL	5493

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.985	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.877	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.288	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.17	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.255	k star (bias corrected MLE)	0.252
Theta hat (MLE)	12807	Theta star (bias corrected MLE)	12964
nu hat (MLE)	16.34	nu star (bias corrected)	16.14
MLE Mean (bias corrected)	3269	MLE Sd (bias corrected)	6510

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0763	nu hat (KM)	14.03
Approximate Chi Square Value (14.03, α)	6.593	Adjusted Chi Square Value (14.03, β)	6.512
95% Gamma Approximate KM-UCL (use when n>=50)	2427	95% Gamma Adjusted KM-UCL (use when n<50)	2457

Gamma (KM) may not be used when k hat (KM) is < 0.1

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1137
Maximum	23400	Median	0.01
SD	4153	CV	3.652
k hat (MLE)	0.0993	k star (bias corrected MLE)	0.103
Theta hat (MLE)	11457	Theta star (bias corrected MLE)	11012
nu hat (MLE)	18.26	nu star (bias corrected)	19
MLE Mean (bias corrected)	1137	MLE Sd (bias corrected)	3539
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (19.00, α)	10.12	Adjusted Chi Square Value (19.00, β)	10.02
95% Gamma Approximate UCL (use when n>=50)	2136	95% Gamma Adjusted UCL (use when n<50)	2158

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.886	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.93	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.168	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.157	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1138	Mean in Log Scale	0.0779
SD in Original Scale	4153	SD in Log Scale	4.851
95% t UCL (assumes normality of ROS data)	1857	95% Percentile Bootstrap UCL	1892
95% BCA Bootstrap UCL	2155	95% Bootstrap t UCL	2213
95% H-UCL (Log ROS)	5797213		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	1139	Mean in Log Scale	2.606
SD in Original Scale	4153	SD in Log Scale	2.508
95% t UCL (Assumes normality)	1859	95% H-Stat UCL	915.5

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

97.5% KM (Chebyshev) UCL 3872

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chemical (o-xylene)

General Statistics

Total Number of Observations	92	Number of Distinct Observations	32
Number of Detects	30	Number of Non-Detects	62
Number of Distinct Detects	29	Number of Distinct Non-Detects	3
Minimum Detect	2.41	Minimum Non-Detect	1
Maximum Detect	10600	Maximum Non-Detect	10
Variance Detects	4180067	Percent Non-Detects	67.39%
Mean Detects	653.3	SD Detects	2045
Median Detects	9.03	CV Detects	3.129
Skewness Detects	4.362	Kurtosis Detects	20.64
Mean of Logged Detects	3.17	SD of Logged Detects	2.428

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.372	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.927	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.398	Lilliefors GOF Test
5% Lilliefors Critical Value	0.162	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	213.7	Standard Error of Mean	126
SD	1188	95% KM (BCA) UCL	438.4
95% KM (t) UCL	423	95% KM (Percentile Bootstrap) UCL	435.5
95% KM (z) UCL	420.9	95% KM Bootstrap t UCL	1047
90% KM Chebyshev UCL	591.6	95% KM Chebyshev UCL	762.8
97.5% KM Chebyshev UCL	1000	99% KM Chebyshev UCL	1467

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	4.522	Anderson-Darling GOF Test
5% A-D Critical Value	0.894	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.361	Kolmogrov-Smirnoff GOF
5% K-S Critical Value	0.177	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.219	k star (bias corrected MLE)	0.219
Theta hat (MLE)	2983	Theta star (bias corrected MLE)	2979
nu hat (MLE)	13.14	nu star (bias corrected)	13.16

MLE Mean (bias corrected)	653.3	MLE Sd (bias corrected)	1395

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0324	nu hat (KM)	5.956
Approximate Chi Square Value (5.96, α)	1.617	Adjusted Chi Square Value (5.96, β)	1.582
95% Gamma Approximate KM-UCL (use when n>=50)	787	95% Gamma Adjusted KM-UCL (use when n<50)	804.6

Gamma (KM) may not be used when k hat (KM) is < 0.1

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	213
Maximum	10600	Median	0.01
SD	1195	CV	5.607
k hat (MLE)	0.108	k star (bias corrected MLE)	0.112
Theta hat (MLE)	1969	Theta star (bias corrected MLE)	1904
nu hat (MLE)	19.91	nu star (bias corrected)	20.59
MLE Mean (bias corrected)	213	MLE Sd (bias corrected)	636.9
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (20.59, α)	11.29	Adjusted Chi Square Value (20.59, β)	11.18
95% Gamma Approximate UCL (use when n>=50)	388.6	95% Gamma Adjusted UCL (use when n<50)	392.4

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.796	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.927	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.268	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.162	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	213.1	Mean in Log Scale	-1.977
SD in Original Scale	1195	SD in Log Scale	4.568
95% t UCL (assumes normality of ROS data)	420.1	95% Percentile Bootstrap UCL	445.6
95% BCA Bootstrap UCL	602.3	95% Bootstrap t UCL	1008
95% H-UCL (Log ROS)	129762		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	213.6	Mean in Log Scale	0.787
SD in Original Scale	1194	SD in Log Scale	2.186
95% t UCL (Assumes normality)	420.5	95% H-Stat UCL	55.08

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

97.5% KM (Chebyshev) UCL 1000

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chemical (styrene)

General Statistics

Total Number of Observations	92	Number of Distinct Observations	10
Number of Detects	6	Number of Non-Detects	86
Number of Distinct Detects	6	Number of Distinct Non-Detects	4
Minimum Detect	6.09	Minimum Non-Detect	1.5
Maximum Detect	29.6	Maximum Non-Detect	30
Variance Detects	72.74	Percent Non-Detects	93.48%
Mean Detects	12.94	SD Detects	8.529
Median Detects	10.9	CV Detects	0.659
Skewness Detects	1.992	Kurtosis Detects	4.36
Mean of Logged Detects	2.42	SD of Logged Detects	0.548

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.767	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.349	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	2.313	Standard Error of Mean	0.428
SD	3.592	95% KM (BCA) UCL	3.095
95% KM (t) UCL	3.024	95% KM (Percentile Bootstrap) UCL	2.999
95% KM (z) UCL	3.017	95% KM Bootstrap t UCL	3.123
90% KM Chebyshev UCL	3.596	95% KM Chebyshev UCL	4.177
97.5% KM Chebyshev UCL	4.984	99% KM Chebyshev UCL	6.568

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.452	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.7	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.284	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.334	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	3.721	k star (bias corrected MLE)	1.972
Theta hat (MLE)	3.477	Theta star (bias corrected MLE)	6.563
nu hat (MLE)	44.65	nu star (bias corrected)	23.66
MLE Mean (bias corrected)	12.94	MLE Sd (bias corrected)	9.215

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.415	nu hat (KM)	76.3
Approximate Chi Square Value (76.30, α)	57.18	Adjusted Chi Square Value (76.30, β)	56.91
95% Gamma Approximate KM-UCL (use when n>=50)	3.087	95% Gamma Adjusted KM-UCL (use when n<50)	3.101

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.864
Maximum	29.6	Median	0.01
SD	3.78	CV	4.374
k hat (MLE)	0.189	k star (bias corrected MLE)	0.19
Theta hat (MLE)	4.571	Theta star (bias corrected MLE)	4.545
nu hat (MLE)	34.79	nu star (bias corrected)	34.99
MLE Mean (bias corrected)	0.864	MLE Sd (bias corrected)	1.982
		Adjusted Level of Significance (β)	0.0474

Approximate Chi Square Value (34.99, α)	22.46	Adjusted Chi Square Value (34.99, β)	22.3
95% Gamma Approximate UCL (use when n>=50)	1.347	95% Gamma Adjusted UCL (use when n<50)	1.356

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.251	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.776	Mean in Log Scale	-0.449
SD in Original Scale	3.734	SD in Log Scale	1.428
95% t UCL (assumes normality of ROS data)	2.423	95% Percentile Bootstrap UCL	2.425
95% BCA Bootstrap UCL	2.719	95% Bootstrap t UCL	2.995
95% H-UCL (Log ROS)	2.649		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	0.549	95% H-UCL (KM -Log)	2.218
KM SD (logged)	0.535	95% Critical H Value (KM-Log)	1.87
KM Standard Error of Mean (logged)	0.0638		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	2.972	Mean in Log Scale	0.39
SD in Original Scale	5.013	SD in Log Scale	0.979
95% t UCL (Assumes normality)	3.84	95% H-Stat UCL	2.997

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	3.024	95% KM (Percentile Bootstrap) UCL	2.999

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chemical (tetrachloroethene)

General Statistics

Total Number of Observations	92	Number of Distinct Observations	85
Number of Detects	87	Number of Non-Detects	5
Number of Distinct Detects	84	Number of Distinct Non-Detects	1
Minimum Detect	6.71	Minimum Non-Detect	30
Maximum Detect	8300	Maximum Non-Detect	30
Variance Detects	1684625	Percent Non-Detects	5.435%
Mean Detects	556.3	SD Detects	1298
Median Detects	132	CV Detects	2.333
Skewness Detects	4.308	Kurtosis Detects	20.53
Mean of Logged Detects	5.08	SD of Logged Detects	1.506

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.443	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.34	**Lilliefors GOF Test**

5% Lilliefors Critical Value	0.095	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	526.9	Standard Error of Mean	132.2
SD	1261	95% KM (BCA) UCL	740.6
95% KM (t) UCL	746.6	95% KM (Percentile Bootstrap) UCL	755.1
95% KM (z) UCL	744.3	95% KM Bootstrap t UCL	860.1
90% KM Chebyshev UCL	923.5	95% KM Chebyshev UCL	1103
97.5% KM Chebyshev UCL	1353	99% KM Chebyshev UCL	1842

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	4.54	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.818	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.17	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.101	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.51	k star (bias corrected MLE)	0.5
Theta hat (MLE)	1090	Theta star (bias corrected MLE)	1112
nu hat (MLE)	88.79	nu star (bias corrected)	87.06
MLE Mean (bias corrected)	556.3	MLE Sd (bias corrected)	786.5

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.175	nu hat (KM)	32.13
Approximate Chi Square Value (32.13, α)	20.17	Adjusted Chi Square Value (32.13, β)	20.02
95% Gamma Approximate KM-UCL (use when n>=50)	839.1	95% Gamma Adjusted KM-UCL (use when n<50)	845.4

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	526.1
Maximum	8300	Median	128
SD	1268	CV	2.41
k hat (MLE)	0.387	k star (bias corrected MLE)	0.381
Theta hat (MLE)	1361	Theta star (bias corrected MLE)	1380
nu hat (MLE)	71.14	nu star (bias corrected)	70.15
MLE Mean (bias corrected)	526.1	MLE Sd (bias corrected)	852
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (70.15, α)	51.87	Adjusted Chi Square Value (70.15, β)	51.62
95% Gamma Approximate UCL (use when n>=50)	711.5	95% Gamma Adjusted UCL (use when n<50)	715

Lognormal GOF Test on Detected Observations Only

Lilliefors Test Statistic	0.0847	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.095	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	526.8	Mean in Log Scale	4.941
SD in Original Scale	1268	SD in Log Scale	1.58
95% t UCL (assumes normality of ROS data)	746.5	95% Percentile Bootstrap UCL	753.3
95% BCA Bootstrap UCL	832.2	95% Bootstrap t UCL	895.1
95% H-UCL (Log ROS)	784.8		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	4.945	95% H-UCL (KM -Log)	762.6
KM SD (logged)	1.564	95% Critical H Value (KM-Log)	2.858
KM Standard Error of Mean (logged)	0.164		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	526.9	Mean in Log Scale	4.952
SD in Original Scale	1268	SD in Log Scale	1.56
95% t UCL (Assumes normality)	746.6	95% H-Stat UCL	761.8

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

97.5% KM (Chebyshev) UCL 1353

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chemical (toluene)

General Statistics

Total Number of Observations	92	Number of Distinct Observations	55
Number of Detects	55	Number of Non-Detects	37
Number of Distinct Detects	51	Number of Distinct Non-Detects	4
Minimum Detect	2.09	Minimum Non-Detect	1
Maximum Detect	4650	Maximum Non-Detect	20
Variance Detects	399960	Percent Non-Detects	40.22%
Mean Detects	131.7	SD Detects	632.4
Median Detects	6.56	CV Detects	4.801
Skewness Detects	7.012	Kurtosis Detects	50.75
Mean of Logged Detects	2.356	SD of Logged Detects	1.636

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.22	Normal GOF Test on Detected Observations Only
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.437	Lilliefors GOF Test
5% Lilliefors Critical Value	0.119	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	79.21	Standard Error of Mean	51.42
SD	488.7	95% KM (BCA) UCL	186.5
95% KM (t) UCL	164.7	95% KM (Percentile Bootstrap) UCL	177.7
95% KM (z) UCL	163.8	95% KM Bootstrap t UCL	539.7
90% KM Chebyshev UCL	233.5	95% KM Chebyshev UCL	303.4
97.5% KM Chebyshev UCL	400.3	99% KM Chebyshev UCL	590.9

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	11.25	Anderson-Darling GOF Test
5% A-D Critical Value	0.875	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.388	Kolmogrov-Smirnoff GOF
5% K-S Critical Value	0.131	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.277	k star (bias corrected MLE)	0.274
Theta hat (MLE)	475.9	Theta star (bias corrected MLE)	481.1
nu hat (MLE)	30.45	nu star (bias corrected)	30.12
MLE Mean (bias corrected)	131.7	MLE Sd (bias corrected)	251.7

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0263	nu hat (KM)	4.833
Approximate Chi Square Value (4.83, α)	1.076	Adjusted Chi Square Value (4.83, β)	1.049
95% Gamma Approximate KM-UCL (use when n>=50)	355.8	95% Gamma Adjusted KM-UCL (use when n<50)	365

Gamma (KM) may not be used when k hat (KM) is < 0.1

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	78.75
Maximum	4650	Median	3.565
SD	491.5	CV	6.241
k hat (MLE)	0.159	k star (bias corrected MLE)	0.161
Theta hat (MLE)	496.8	Theta star (bias corrected MLE)	490.4
nu hat (MLE)	29.17	nu star (bias corrected)	29.55
MLE Mean (bias corrected)	78.75	MLE Sd (bias corrected)	196.5
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (29.55, α)	18.14	Adjusted Chi Square Value (29.55, β)	18
95% Gamma Approximate UCL (use when n>=50)	128.3	95% Gamma Adjusted UCL (use when n<50)	129.3

Lognormal GOF Test on Detected Observations Only

Lilliefors Test Statistic	0.246	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.119	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	78.94	Mean in Log Scale	0.898
SD in Original Scale	491.5	SD in Log Scale	2.309
95% t UCL (assumes normality of ROS data)	164.1	95% Percentile Bootstrap UCL	177.5
95% BCA Bootstrap UCL	269.1	95% Bootstrap t UCL	517.8
95% H-UCL (Log ROS)	88.49		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	79.2	Mean in Log Scale	1.323
SD in Original Scale	491.4	SD in Log Scale	1.831
95% t UCL (Assumes normality)	164.3	95% H-Stat UCL	36.94

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

97.5% KM (Chebyshev) UCL 400.3

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chemical (trichloroethene)

General Statistics

Total Number of Observations	92	Number of Distinct Observations	45
Number of Detects	42	Number of Non-Detects	50
Number of Distinct Detects	41	Number of Distinct Non-Detects	4
Minimum Detect	2.88	Minimum Non-Detect	1.5
Maximum Detect	902	Maximum Non-Detect	30
Variance Detects	31792	Percent Non-Detects	54.35%
Mean Detects	88.31	SD Detects	178.3
Median Detects	16.9	CV Detects	2.019
Skewness Detects	3.25	Kurtosis Detects	11.61
Mean of Logged Detects	3.211	SD of Logged Detects	1.501

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.525	Shapiro Wilk GOF Test
5% Shapiro Wilk Critical Value	0.942	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.34	Lilliefors GOF Test
5% Lilliefors Critical Value	0.137	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	41.35	Standard Error of Mean	13.36
SD	126.6	95% KM (BCA) UCL	65.57
95% KM (t) UCL	63.55	95% KM (Percentile Bootstrap) UCL	65.48
95% KM (z) UCL	63.32	95% KM Bootstrap t UCL	83.71
90% KM Chebyshev UCL	81.42	95% KM Chebyshev UCL	99.58
97.5% KM Chebyshev UCL	124.8	99% KM Chebyshev UCL	174.3

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	3.367	Anderson-Darling GOF Test
5% A-D Critical Value	0.813	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.267	Kolmogrov-Smirnoff GOF
5% K-S Critical Value	0.144	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.5	k star (bias corrected MLE)	0.48
Theta hat (MLE)	176.6	Theta star (bias corrected MLE)	183.9
nu hat (MLE)	42.01	nu star (bias corrected)	40.34
MLE Mean (bias corrected)	88.31	MLE Sd (bias corrected)	127.4

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.107	nu hat (KM)	19.64
Approximate Chi Square Value (19.64, α)	10.58	Adjusted Chi Square Value (19.64, β)	10.48
95% Gamma Approximate KM-UCL (use when n>=50)	76.72	95% Gamma Adjusted KM-UCL (use when n<50)	77.5

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	40.32
Maximum	902	Median	0.01
SD	127.6	CV	3.164
k hat (MLE)	0.161	k star (bias corrected MLE)	0.163
Theta hat (MLE)	250.9	Theta star (bias corrected MLE)	247.8
nu hat (MLE)	29.57	nu star (bias corrected)	29.94

MLE Mean (bias corrected)	40.32	MLE Sd (bias corrected)	99.95
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (29.94, α)	18.45	Adjusted Chi Square Value (29.94, β)	18.3
95% Gamma Approximate UCL (use when n>=50)	65.44	95% Gamma Adjusted UCL (use when n<50)	65.96

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.865	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.942	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.154	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.137	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	40.89	Mean in Log Scale	1.06
SD in Original Scale	127.4	SD in Log Scale	2.469
95% t UCL (assumes normality of ROS data)	62.96	95% Percentile Bootstrap UCL	63.78
95% BCA Bootstrap UCL	74.16	95% Bootstrap t UCL	82.1
95% H-UCL (Log ROS)	171.5		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	41.65	Mean in Log Scale	1.683
SD in Original Scale	127.2	SD in Log Scale	1.828
95% t UCL (Assumes normality)	63.69	95% H-Stat UCL	52.65

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL 99.58

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chemical (trichlorofluoromethane (freon 11))

General Statistics

Total Number of Observations	92	Number of Distinct Observations	13
Number of Detects	9	Number of Non-Detects	83
Number of Distinct Detects	9	Number of Distinct Non-Detects	4
Minimum Detect	3.05	Minimum Non-Detect	2
Maximum Detect	34.5	Maximum Non-Detect	40
Variance Detects	95.91	Percent Non-Detects	90.22%
Mean Detects	11.26	SD Detects	9.793
Median Detects	9.44	CV Detects	0.869
Skewness Detects	1.897	Kurtosis Detects	4.278
Mean of Logged Detects	2.128	SD of Logged Detects	0.81

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.792	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.229	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.295	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	3.036	Standard Error of Mean	0.479
SD	4.144	95% KM (BCA) UCL	3.835
95% KM (t) UCL	3.832	95% KM (Percentile Bootstrap) UCL	3.856
95% KM (z) UCL	3.824	95% KM Bootstrap t UCL	4.44
90% KM Chebyshev UCL	4.474	95% KM Chebyshev UCL	5.125
97.5% KM Chebyshev UCL	6.029	99% KM Chebyshev UCL	7.805

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.353	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.731	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.184	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.283	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.854	k star (bias corrected MLE)	1.31
Theta hat (MLE)	6.074	Theta star (bias corrected MLE)	8.595
nu hat (MLE)	33.38	nu star (bias corrected)	23.59
MLE Mean (bias corrected)	11.26	MLE Sd (bias corrected)	9.839

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.537	nu hat (KM)	98.74
Approximate Chi Square Value (98.74, α)	76.82	Adjusted Chi Square Value (98.74, β)	76.51
95% Gamma Approximate KM-UCL (use when n>=50)	3.902	95% Gamma Adjusted KM-UCL (use when n<50)	3.918

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.166
Maximum	34.5	Median	0.01
SD	4.445	CV	3.811
k hat (MLE)	0.188	k star (bias corrected MLE)	0.189
Theta hat (MLE)	6.19	Theta star (bias corrected MLE)	6.154
nu hat (MLE)	34.66	nu star (bias corrected)	34.87
MLE Mean (bias corrected)	1.166	MLE Sd (bias corrected)	2.679
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (34.87, α)	22.36	Adjusted Chi Square Value (34.87, β)	22.2
95% Gamma Approximate UCL (use when n>=50)	1.819	95% Gamma Adjusted UCL (use when n<50)	1.832

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.932	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.185	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.295	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.682	Mean in Log Scale	-0.965
SD in Original Scale	4.375	SD in Log Scale	1.741
95% t UCL (assumes normality of ROS data)	2.44	95% Percentile Bootstrap UCL	2.555
95% BCA Bootstrap UCL	2.785	95% Bootstrap t UCL	3.232
95% H-UCL (Log ROS)	3.038		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	0.865	95% H-UCL (KM -Log)	2.99

KM SD (logged)	0.512	95% Critical H Value (KM-Log)	1.856
KM Standard Error of Mean (logged)	0.0611		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	3.971	Mean in Log Scale	0.755
SD in Original Scale	6.246	SD in Log Scale	0.94
95% t UCL (Assumes normality)	5.054	95% H-Stat UCL	4.108

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	3.832	95% KM (Percentile Bootstrap) UCL	3.856

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ATTACHMENT C

MODELING METHODOLOGIES

ATTACHMENT C
MODELING METHODOLOGIES

C.1 Introduction

The conceptual Site model for the Investigation Area at the former Olympic Base Manufactured Gas Plant (MGP) site, located in Los Angeles, California ("the Site") includes the inhalation of vapor-phase chemicals in indoor and outdoor air, and the inhalation of particulate-phase chemicals in outdoor air as potentially complete exposure pathways to be evaluated in the human health risk assessment (HHRA). These exposure pathways require the transport of chemicals of potential concern (COPCs) from the impacted medium (soil gas or soil) to the exposure medium (indoor or outdoor air), where persons may be potentially exposed to the COPCs via the inhalation route. Given the presence of current onsite and offsite populations that may be exposed to Site-related chemicals, and the assumption of several potential exposure scenarios, there are four distinct transport pathways that involve the movement of COPCs from one medium to another:

1) transport of vapor-phase COPCs from onsite soil gas to offsite indoor air, where current offsite commercial populations may be exposed;
2) transport of vapor-phase COPCs from onsite soil gas to onsite outdoor air where current onsite and offsite commercial populations may be exposed; and
3) transport of particulate-phase COPCs from onsite soil to onsite outdoor air, where current onsite and offsite commercial populations may be exposed.

Current offsite commercial populations are conservatively assumed to work directly at the boundaries on the Site and are assumed to be exposed to the predicted onsite outdoor vapor-phase COPC concentrations. However, the concentrations to which offsite populations are potentially exposed would be lower than onsite concentrations due to dispersion.

This Attachment describes the methodologies employed to model the transport of chemicals from one medium to another for each of the transport pathways listed above.

The subsurface transport of a COPC is governed by soil and source properties and by the physicochemical properties of the chemical. Chemical properties that influence transport include its diffusivity in air, diffusivity in water, Henry's law constant, solubility in water, and organic carbon partitioning coefficient. Physiochemical properties for COPCs in soil gas and their sources are documented in Table C-1. As Site-specific soil parameter values were not available, default soil parameter values were conservatively used for modeling the transport of vapor-phase COPCs from onsite soil gas to offsite indoor and/or outdoor air, as presented in Table C-2.

C.2 Vapor-Phase Transport from Onsite Soil Gas to Offsite Indoor Air

Volatile chemicals present in the subsurface beneath the Site have the potential to volatilize from soil and migrate up through the soil column and into the indoor air space of buildings, where current offsite commercial populations may be exposed via inhalation. This transport phenomenon is referred to as "vapor intrusion" and is discussed in Section 4.5.2 of the HHRA.

The transport of a volatile chemical from soil gas to indoor air is represented by the attenuation factor, or alpha (α). By definition, the attenuation factor represents the ratio of the chemical concentration in indoor air (attributable to vapor intrusion) to the chemical concentration in soil gas beneath the building. Thus, the concentration of a volatile chemical in indoor air may be expressed as a function of the chemical concentration in soil gas and the attenuation factor:

$$C_{IA} = C_{SG} \times \alpha \qquad \text{(Eq. C-1)}$$

where:

C_{IA} = chemical concentration in indoor air ($\mu g/m^3$);

C_{SG} = chemical concentration in soil gas ($\mu g/m^3$); and

α = attenuation factor (unitless).

The transport of volatile COPCs from soil gas to indoor air is modeled using the methodology and equations set forth in the USEPA-recommended Johnson & Ettinger Model for soil gas (SG-SCREEN Version 2.0), as modified by the California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC) (USEPA, 2004; Cal/EPA, 2014). As recommended by DTSC (Cal/EPA, 2011), soil gas, rather than soil data are used to evaluate the vapor intrusion pathway, because soil gas data represent a direct measurement of the volatile chemical that has the potential to migrate into indoor air.

Inputs to the Johnson and Ettinger Model include: soil properties, depth of soil gas contamination, physicochemical properties of the COPCs, and building parameters.

Site-specific soil temperature is estimated using USEPA (2004) guidelines. Physicochemical properties of the COPCs in soil gas are presented in Table C-1; this table also presents corrected (to soil temperature) Henry's Law constants and effective diffusivities of the COPCs, as calculated using the equations in the Johnson and Ettinger Model. Model default values for dry bulk density, total porosity, and water-filled porosity are used as soil input parameters and model default values are used for building parameters were also used. The soil and building parameters used in the Johnson and Ettinger Model are summarized in Table C-2.

Volatile organic compounds (VOCs) detected in soil gas sampling locations which were included in the analysis of the vapor intrusion pathway are:

- 1,1,1-Trichloroethane
- 1,1-Dichloroethene
- 1,2,4-Trimethylbenzene
- 1,3,5-Trimethylbenzene
- Benzene
- Carbon Disulfide
- Chloroform
- Dichlorodifluoromethane (Freon 12)
- Ethylbenzene
- m,p-Xylenes
- Naphthalene
- o-Xylene
- Styrene
- Tetrachloroethene
- Toluene
- Trichloroethene
- Trichlorofluoromethane (Freon 11)

For those VOCs detected in at least one soil gas sample, the maximum detected concentration at each sampled depth of each soil gas sampling location is used as the representative soil gas concentration in the Johnson and Ettinger Model equations; for sampling locations where a VOC was not detected (but detected elsewhere), one-half the detection limit is used into the Model equations. In this way, worst-case concentrations of chemicals in the indoor air space of current offsite commercial buildings and the maximum potential health risks to current offsite commercial population associated with inhalation exposure to the COPCs present in indoor air are estimated. Maximum risks are calculated for each location where detected VOCs were sampled for in soil gas.

The attenuation factors estimated using the equations from the Johnson & Ettinger Model for the current offsite commercial population are provided in Table C-3 and the chemical concentrations in indoor air for soil gas COPCs are presented in Table 14 of the HHRA for current offsite commercial population.

C.3 Vapor-Phase Transport from Onsite Soil Gas to Onsite Outdoor Air

Volatile chemicals present in the subsurface beneath the Site have the potential to volatilize from soil and migrate up through the soil column and into outdoor air, where current onsite and offsite commercial populations may be exposed via inhalation. As with indoor air, it is preferable to estimate the transport of vapor-phase chemicals from the subsurface to outdoor air using soil gas data (rather than soil or groundwater data), as soil gas data represent the most direct measurement of the contaminants that may potentially migrate to outdoor air; this preferred approach is used in estimating outdoor vapor exposures for all receptors. This transport of onsite soil gas to onsite outdoor air is similar to vapor intrusion, described above in Section C.2, except the chemicals are emitted and dispersed into outdoor air rather than indoor air. COPCs for the soil gas-to-outdoor air pathway are the same as those defined above in Section C.2 with the addition of 4-ethyltoluene, acetone, cis-1,2-dichloroethene, and vinyl chloride[1].

[1] As discussed in Section 4.3.1 of the HHRA, the soil gas sampling dataset for the vapor intrusion pathway evaluation only includes soil gas samples from the boundary of the Site as these boundary soil gas samples are most representative of potential vapor intrusion at offsite buildings. All soil gas samples collected during the Site investigation are included for evaluation of outdoor air.

The transport of a volatile chemical from soil gas to outdoor air is represented by the transfer factor (TF). Analogous to the attenuation factor, discussed above, the transfer factor represents the ratio of the chemical concentration in outdoor air (attributable to transport from soil gas) to the chemical concentration in soil gas. Thus, the concentration of a volatile chemical in outdoor air may be expressed as a function of the chemical concentration in soil gas and the transfer factor:

$$C_{OA} = C_{SG} \times TF \qquad \text{(Eq. C-2)}$$

where:

C_{OA} = chemical concentration in outdoor air ($\mu g/m^3$);

C_{SG} = chemical concentration in soil gas ($\mu g/m^3$); and

TF = transfer factor (unitless).

As described in the following sections below, the transfer factor incorporates two distinct processes: the diffusive transport of volatile chemicals from soil gas to the ground surface; and the dispersion of volatile chemicals from the ground surface into the ambient air. The transfer factors estimated for COPCs in soil gas are provided in Table C-4 and the chemical concentration in outdoor air for soil gas COPCs are presented in Table 15 of the HHRA for commercial scenarios.

Chemical concentrations in outdoor air are calculated for detected VOCs in soil gas based on the representative concentration across the Site (i.e., the upper confidence limit of the mean [UCL] or the maximum detected concentration)[2] and the chemical-specific transfer factor for the most conservative (i.e., shallow) soil gas sampling depth (i.e., 5 feet below ground surface [bgs]).

C.3.1 Transfer Factor Methodology

The transfer factor incorporates two distinct processes: the diffusive transport (*i.e.*, flux) of volatile chemicals from at-depth soil gas to the ground surface; and the dispersion of volatile chemicals from the ground surface into the ambient air. The steady-state diffusive flux of each COPC from soil gas to the ground surface is estimated using the approach recommended in *Standard Guide for Risk-based Corrective Action Applied at Petroleum Release Sites* (ASTM, 1995):

$$Q_{ss} = \frac{D_{effV} \times C_{SG}}{d} \times CF1 \times CF2 \qquad \text{(Eq. C-3)}$$

where:

Q_{ss} = steady state flux from subsurface vapor source ($g/m^2/s$);

[2] The UCL is not calculated for datasets with fewer than four detections or fewer than ten samples and the maximum detected concentration is used as the representative concentration in soil gas.

D_{effV} = vadose zone effective diffusion coefficient (cm^2/s);

C_{SG} = chemical concentration in soil gas ($\mu g/m^3$);

d = depth of soil gas sample (m);

CF1 = area conversion factor, 10^{-4} m^2/cm^2; and

CF2 = mass conversion factor, 10^3 g/kg.

This flux model requires that there are no non-aqueous phase liquids (NAPLs) present. If this model is used to estimate the flux of NAPLs, the flux would be overestimated. The presence of NAPLs has not been identified at the Site in the areas where soil gas samples were collected.

The concentration of each COPC in outdoor air is modeled using the "Q over C" dispersion-factor approach recommended in the S*upplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (USEPA, 2002):

$$C_{OA} = \frac{Q_{ss}}{(Q/C)_{vol}} \qquad \text{(Eq. C-4)}$$

where:

$(Q/C)_{vol}$ = dispersion factor for volatiles ($g/m^2/s$ per kg/m^3).

Combining Equations C-2, C-3, and C-4 yields:

$$TF = \frac{D_{effV}}{d \times (Q/C)_{vol}} \times 10^{-4}\, m^2/cm^2 \times 10^3\, g/kg \qquad \text{(Eq. C-5)}$$

The dispersion factor [$(Q/C)_{vol}$] represents the reciprocal of the ratio of the annual-average geometric mean air concentration at the center of a square source area to the emission flux from that source area. The dispersion factor for the Site is estimated as recommended in the *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (USEPA, 2002). The dispersion factor is a function of the source area and of empirical coefficients which are based on air dispersion modeling for specific climate zones (USEPA, 2002). The Site area of 7 acres is used to estimate the dispersion factor. Default dispersion coefficients specific to the Site region (Los Angeles area) are used (USEPA, 2002). Calculation of the dispersion factor is documented in Table C-5. Use of the calculated dispersion factor for current onsite and offsite commercial populations are particularly conservative, given that the simulated dispersion is directly above the source area (USEPA, 2002) and not dispersion to ambient air at a different location entirely (i.e., offsite area). Exposure point concentrations (EPCs) of the soil gas COPCs in ambient air for the current offsite commercial worker is therefore likely to be lower than those estimated using the dispersion factor calculated herein.

C.4 Particulate-Phase Transport from Onsite Soil to Onsite Outdoor Air

Non-volatile chemicals present in onsite soil (*i.e.*, adhered to soil particles) have the potential to be emitted into the ambient air via wind erosion of impacted soil, where current onsite and offsite commercial populations may be exposed via inhalation. As presented in Table 5 of the HHRA, COPCs for the soil-to-outdoor air pathway for exposed soil (0-2 feet bgs) include: three total petroleum hydrocarbons (TPHs), 15 polycyclic aromatic hydrocarbons (PAHs); and 10 inorganics.

The transport of particulate-phase chemicals from soil to outdoor air is represented by the particulate emission factor (PEF). The PEF represents the ratio of the chemical concentration in soil to the chemical concentration in outdoor air (attributable to transport from soil). Thus, the particulate-phase concentration of a chemical in outdoor air may be expressed as a function of the chemical concentration in soil and PEF:

$$C_{OA,p} = C_S \times \frac{1}{PEF} \qquad \text{(Eq. C-6)}$$

where:

$C_{OA,p}$ = particulate-phase chemical concentration in outdoor air (mg/m^3);

C_S = chemical concentration in soil (mg/kg); and

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

As defined, the PEF is effectively equal to the reciprocal of the dust concentration in air. Unlike the attenuation factors and TFs discussed above, the PEF is not chemical-specific. The PEF incorporates two distinct processes: the wind erosion of impacted particulate matter (*i.e.*, dust) from the ground surface, and the dispersion of the particulate matter into the ambient air. The PEF for the Site is estimated using the approach recommended in the *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (USEPA, 2002). The flux of impacted particulate matter from the ground surface is estimated using USEPA-recommended default values for all input parameters. The dispersion of particulate matter into onsite outdoor air is estimated using a site-specific particulate matter dispersion factor [$(Q/C)_{wind}$], analogous to the volatile dispersion factor discussed above. For current onsite and offsite commercial populations, calculation of the PEF is documented in Table C-6 and predicted particulate-phase chemical concentrations in outdoor air for COPCs in onsite soil are presented in Table 5 of the HHRA.

C.5 References

American Society for Testing and Materials (ASTM). 1995. *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites.* Designation: E 1739-95.

California Environmental Protection Agency (Cal/EPA). 2011. *Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (Vapor Intrusion Guidance).* Department of Toxic Substances Control. October.

California Environmental Protection Agency (Cal/EPA). 2014. Johnson and Ettinger SG-SCREEN Model, EPA Version 2.0, dated April 2003, as modified by DTSC in March and updated in December.

United States Environmental Protection Agency (USEPA). 1995. Air/*Superfund National Technical Guidance Study Series: Guideline for Predictive Baseline Emissions Estimation for Superfund Sites.* Office of Air Quality Planning and Standards. November.

United States Environmental Protection Agency (USEPA). 2002. *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites*. Office of Solid Waste and Emergency Response. Washington, D.C. OSWER/9355.4-24. December.

United States Environmental Protection Agency (USEPA). 2004. *User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings*. Office of Emergency and Remedial Response Washington, D.C. Revised February 22, 2004.

ATTACHMENT C

TABLES

TABLE C-1
Physicochemical Properties for Volatile Chemicals of Potential Concern in Soil Gas
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical of Potential Concern	Diffusivity in air, D_a (cm^2/s)		Diffusivity in water, D_w (cm^2/s)		Henry's Law Constant at Reference Temperature (25° C), H ($atm\text{-}m^3/mol$)		Dimensionless Henry's Law Constant at Reference Temperature, H' (unitless)		Enthalpy of Vaporization at the Normal Boiling Point, $DH_{v,b}$ (cal/mol)		Normal Boiling Point, T_B (K)		Critical Temperature, T_C (K)		Enthalpy of Vaporization at Average Soil Temperature, $DH_{v,TS}$ (cal/mol)		Henry's Law Constant at Average Soil Temperature, H_{TS} ($atm\text{-}m^3/mol$)		Dimensionless Henry's Law Constant at Average Soil Temperature, H'_{TS} (unitless)		Vadose Zone Effective Diffusion Coefficient, D_{effV} (cm^2/s)	
Volatile Organic Compounds																						
1,1,1-Trichloroethane	6.5E-02	1	9.6E-06	1	1.7E-02	1	7.0E-01	1	7.1E+03	1	3.5E+02	1	5.5E+02	1	7.8E+03	J&E	1.3E-02	J&E	5.5E-01	J&E	1.0E-02	J&E
1,1-Dichloroethene	8.6E-02	1	1.1E-05	1	2.6E-02	1	1.1E+00	1	6.2E+03	1	3.0E+02	1	5.8E+02	1	6.3E+03	J&E	2.1E-02	J&E	8.7E-01	J&E	1.4E-02	J&E
1,2,4-Trimethylbenzene	6.1E-02	1	7.9E-06	1	6.2E-03	1	2.5E-01	1	9.4E+03	1	4.4E+02	1	6.5E+02	1	1.2E+04	J&E	4.1E-03	J&E	1.7E-01	J&E	9.8E-03	J&E
1,3,5-Trimethylbenzene	6.0E-02	1	7.8E-06	1	8.8E-03	1	3.6E-01	1	9.3E+03	1	4.4E+02	1	6.4E+02	1	1.2E+04	J&E	5.9E-03	J&E	2.5E-01	J&E	9.7E-03	J&E
4-Ethyltoluene	6.8E-02	3	7.8E-06	2	5.0E-03	3	2.1E-01	3	NA		4.3E+02	4	NA		NA		5.0E-03	J&E	2.1E-01	J&E	1.1E-02	J&E
Acetone	1.1E-01	1	1.2E-05	1	3.5E-05	1	1.4E-03	1	7.0E+03	1	3.3E+02	1	5.1E+02	1	7.4E+03	J&E	2.7E-05	J&E	1.1E-03	J&E	1.7E-02	J&E
Benzene	9.0E-02	1	1.0E-05	1	5.6E-03	1	2.3E-01	1	7.3E+03	1	3.5E+02	1	5.6E+02	1	8.0E+03	J&E	4.2E-03	J&E	1.8E-01	J&E	1.4E-02	J&E
Carbon Disulfide	1.1E-01	1	1.3E-05	1	1.4E-02	1	5.9E-01	1	6.4E+03	1	3.2E+02	1	5.5E+02	1	6.6E+03	J&E	1.1E-02	J&E	4.8E-01	J&E	1.7E-02	J&E
Chloroform	7.7E-02	1	1.1E-05	1	3.7E-03	1	1.5E-01	1	7.0E+03	1	3.3E+02	1	5.4E+02	1	7.5E+03	J&E	2.8E-03	J&E	1.2E-01	J&E	1.2E-02	J&E
cis-1,2-Dichloroethene	8.8E-02	1	1.1E-05	1	4.1E-03	1	1.7E-01	1	7.2E+03	1	3.3E+02	1	5.4E+02	1	7.6E+03	J&E	3.1E-03	J&E	1.3E-01	J&E	1.4E-02	J&E
Dichlorodifluoromethane (Freon 12	7.6E-02	1	1.1E-05	1	3.4E-01	1	1.4E+01	1	9.4E+03	1	2.4E+02	1	3.8E+02	1	8.1E+03	J&E	2.6E-01	J&E	1.1E+01	J&E	1.2E-02	J&E
Ethylbenzene	6.8E-02	1	8.5E-06	1	7.9E-03	1	3.2E-01	1	8.5E+03	1	4.1E+02	1	6.2E+02	1	1.0E+04	J&E	5.6E-03	J&E	2.3E-01	J&E	1.1E-02	J&E
m,p-Xylenes	6.8E-02	1	8.4E-06	1	7.2E-03	1	2.9E-01	1	8.5E+03	1	4.1E+02	1	6.2E+02	1	1.0E+04	J&E	5.1E-03	J&E	2.1E-01	J&E	1.1E-02	J&E
Naphthalene	6.0E-02	1	8.4E-06	1	4.4E-04	1	1.8E-02	1	1.0E+04	1	4.9E+02	1	7.5E+02	1	1.3E+04	J&E	2.8E-04	J&E	1.2E-02	J&E	9.8E-03	J&E
o-Xylene	6.9E-02	1	8.5E-06	1	5.2E-03	1	2.1E-01	1	8.7E+03	1	4.2E+02	1	6.3E+02	1	1.0E+04	J&E	3.6E-03	J&E	1.5E-01	J&E	1.1E-02	J&E
Styrene	7.1E-02	1	8.8E-06	1	2.8E-03	1	1.1E-01	1	8.7E+03	1	4.2E+02	1	6.4E+02	1	1.0E+04	J&E	1.9E-03	J&E	8.0E-02	J&E	1.1E-02	J&E
Tetrachloroethene	5.0E-02	1	9.5E-06	1	1.8E-02	1	7.2E-01	1	8.3E+03	1	3.9E+02	1	6.2E+02	1	9.5E+03	J&E	1.3E-02	J&E	5.3E-01	J&E	8.2E-03	J&E
Toluene	7.8E-02	1	9.2E-06	1	6.6E-03	1	2.7E-01	1	7.9E+03	1	3.8E+02	1	5.9E+02	1	9.1E+03	J&E	4.9E-03	J&E	2.0E-01	J&E	1.3E-02	J&E
Trichloroethene	6.9E-02	1	1.0E-05	1	9.9E-03	1	4.0E-01	1	7.5E+03	1	3.6E+02	1	5.4E+02	1	8.4E+03	J&E	7.4E-03	J&E	3.1E-01	J&E	1.1E-02	J&E
Trichlorofluoromethane (Freon 11)	6.5E-02	1	1.0E-05	1	9.7E-02	1	4.0E+00	1	6.0E+03	1	3.0E+02	1	4.7E+02	1	6.1E+03	J&E	7.9E-02	J&E	3.3E+00	J&E	1.1E-02	J&E
Vinyl Chloride	1.1E-01	1	1.2E-05	1	2.8E-02	1	1.1E+00	1	5.3E+03	1	2.6E+02	1	4.3E+02	1	4.9E+03	J&E	2.3E-02	J&E	9.8E-01	J&E	1.7E-02	J&E

Notes:
J&E = Calculated by Johnson & Ettinger model.
NA = not available.

References:

1. California Environmental Protection Department (Cal/EPA). 2014. Department of Toxic Substances Control (DTSC). Human and Ecological Risk Office (HERO). Johnson and Ettinger screening-level soil gas model contained in Excel spreadsheet "HERO_Soil-Gas_Screening_Model_March2014 - updated Dec 2014.xlsm".
2. United States Environmental Protection Agency (USEPA). 2006. Water9, Version 3. June 29. URL: http://www.epa.gov/ttn/chief/software/water/water9_3.
3. SRC PhysProp Database. 2002. Available at http://esc.syrres.com/interkow/physdemo.htm and methods from Schwarzenback R. P. et al. 1993. Environmental Organic Chemistry. John Wiley and Sons, Inc., New York, NY.

TABLE C-2
Johnson & Ettinger Model Input Data: Commercial Scenario
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Parameter	Symbol	Commercial	Units	Reference
Building Properties				
Depth below grade to bottom of enclosed space floor	L_F	15	cm	DTSC/HERO default (Cal/EPA, 2014)
Building ventilation rate[1]	Q_b	6.8E+04	cm^3/s	Calculated: $A_{b,sg}$ x AXR_b x H
Area of enclosed space below grade[2]	$A_{b,sg}$	1.0E+06	cm^2	DTSC/HERO default (Cal/EPA, 2014)
Building air exchange rate[2]	AXR_b	1.0	hr^{-1}	DTSC/HERO default (Cal/EPA, 2014)
Building height[2]	H	244	cm	DTSC/HERO default (Cal/EPA, 2014)
Vapor flow rate into building	Q_{soil}	5	L/min	DTSC/HERO default (Cal/EPA, 2014)
Soil Properties				
Average soil temperature	T_s	19	^oC	Average regional soil temerature for Los Angeles from Figure 8 of USEPA, 2004
SCS soil type		Default	--	
Dry bulk density	ρ_b	1.66	g/cm^3	DTSC/HERO default (Cal/EPA, 2014)
Total porosity	η	0.375	cm^3/cm^3	DTSC/HERO default (Cal/EPA, 2014)
Water-filled porosity	θ_w	0.054	cm^3/cm^3	DTSC/HERO default (Cal/EPA, 2014)

Notes:

1. Building ventilation rate is provided as input to the Johnson & Ettinger model in the 'Intermediate Calculations Sheet.' All other input parameters are provided as input in the 'Data Entry Sheet.'
2. Area of enclosed space below grade, building exchange rate, and building height are not provided as input to the Johnson & Ettinger model. These parameters are used to calculate building ventilation rate, which is provided as input to the Johnson & Ettinger model.

References:

Cal/EPA. 2014. Johnson and Ettinger SG-SCREEN Model, EPA Version 2.0, dated April 2003, as modified by Department of Toxic Substances Control (DTSC)/Office of Human and Ecological Risk (HERO). Updated December.

USEPA. 2004. User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. Office of Emergency and Remedial Response Washington, D.C.

TABLE C-3
Attenuation Factors: Commercial Scenario
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical of Potential Concern	Depth-Specific Attenuation Factor			
	5 ft bgs	15 ft bgs	30 ft bgs	60 ft bgs
Volatile Organic Compounds				
1,1,1-Trichloroethane	5.9E-04	2.7E-04	1.5E-04	8.0E-05
1,1-Dichloroethene	6.8E-04	3.4E-04	1.9E-04	1.0E-04
1,2,4-Trimethylbenzene	5.7E-04	2.6E-04	1.4E-04	7.5E-05
1,3,5-Trimethylbenzene	5.7E-04	2.6E-04	1.4E-04	7.4E-05
Benzene	6.9E-04	3.5E-04	2.0E-04	1.1E-04
Carbon disulfide	7.4E-04	3.9E-04	2.3E-04	1.3E-04
Chloroform	6.4E-04	3.1E-04	1.8E-04	9.4E-05
Dichlorodifluoromethane (Freon 12)	6.4E-04	3.1E-04	1.7E-04	9.3E-05
Ethylbenzene	6.1E-04	2.8E-04	1.6E-04	8.4E-05
m,p-Xylenes	6.0E-04	2.8E-04	1.6E-04	8.4E-05
Naphthalene	5.7E-04	2.6E-04	1.4E-04	7.5E-05
o-Xylene	6.1E-04	2.9E-04	1.6E-04	8.4E-05
Styrene	6.2E-04	2.9E-04	1.6E-04	8.7E-05
Tetrachloroethene	5.1E-04	2.2E-04	1.2E-04	6.3E-05
Toluene	6.4E-04	3.1E-04	1.8E-04	9.5E-05
Trichloroethene	6.1E-04	2.8E-04	1.6E-04	8.4E-05
Trichlorofluoromethane (Freon 11)	5.9E-04	2.7E-04	1.5E-04	8.0E-05

Notes:

1. By definition, the attenuation factor (α) is the ratio of the chemical concentration in indoor air to the chemical
   $\alpha = C_{IA} / C_{SG}$
   where C_{IA} is the chemical concentration in indoor air and C_{SG} is the chemical concentration in soil gas.
2. Attenuation factors at depth are calculated with the USEPA-recommended Johnson & Ettinger Model for soil gas (SG-SCREEN Version 2.0), as modified by DTSC/HERO (Johnson and Ettinger, 1991; USEPA, 2004; Cal/EPA, 2014), and as modified by Iris Environmental.

References:

Cal/EPA. 2014. Johnson and Ettinger SG-SCREEN Model, EPA Version 2.0, dated April 2003, as modified by Department of Toxic Substances Control (DTSC)/Office of Human and Ecological Risk (HERO). Updated December.

Johnson, P.C., and R.A. Ettinger. 1991. Heuristic model for predicting the intrusion rate of contaminant vapors in buildings. Environ. Sci. Technol. 25: 1445-1452.

United States Environmental Protection Agency (USEPA). 2004. User's Guide for Evaluating Subsurface Vapor Intrusion into Buildings. Office of Emergency and Remedial Response Washington, D.C. Revised February 22, 2004.

TABLE C-4

Transfer Factors from Soil Gas to Ambient Air
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Chemical of Potential Concern	Depth-Specific Transfer Factor
	5 ft bgs
Volatile Organic Compounds	
1,1,1-Trichloroethane	1.6E-05
1,1-Dichloroethene	2.1E-05
1,2,4-Trimethylbenzene	1.5E-05
1,3,5-Trimethylbenzene	1.5E-05
4-Ethyltoluene	1.7E-05
Acetone	2.6E-05
Benzene	2.2E-05
Carbon Disulfide	2.6E-05
Chloroform	1.9E-05
cis-1,2-Dichloroethene	2.1E-05
Dichlorodifluoromethane (Freon 12)	1.8E-05
Ethylbenzene	1.7E-05
m,p-Xylenes	1.7E-05
Naphthalene	1.5E-05
o-Xylene	1.7E-05
Styrene	1.7E-05
Tetrachloroethene	1.2E-05
Toluene	1.9E-05
Trichloroethene	1.7E-05
Trichlorofluoromethane (Freon 11)	1.6E-05
Vinyl Chloride	2.6E-05

Notes:

1. The methodology used in the calculation of transfer factors, the ratios of the chemical concentration in outdoor air to the chemical concentration in soil gas, is presented in the text of Attachment C.

TABLE C-5
Dispersion Factor Calculation for Volatile Compounds
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Site-specific Dispersion Factor for Volatiles (USEPA 2002, Equation D-1)

$Q/C_{vol} = A \exp[(\ln A_{site} - B)^2 (1/C)]$ = **43.56** $(g/m^2\text{-}s) / (kg/m^3)$

where:

A_{site}	7.0	acres	areal extent of the Site
Location	LA	--	General location (USEPA 2002)
A	11.9110	--	constant, default value presented in Exhibit D-3 (USEPA, 2002)
B	18.4385	--	constant, default value presented in Exhibit D-3 (USEPA, 2002)
C	209.7845	--	constant, default value presented in Exhibit D-3 (USEPA, 2002)

References:

USEPA. 2002. *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.* Office of Solid Waste and Emergency Response. Washington, D.C., December.

TABLE C-6
Particulate Emission Factor Equations and Parameters
Former Olympic Base Manufactured Gas Plant Site
Los Angeles, California

Particulate Emission Factor (PEF), (USEPA 2002, Equation 4-5)

$$PEF\ (m^3/kg) = \frac{Q/C \times 3600\ s/h}{0.036 \times (1-V) \times (U_m/U_t)^3 \times F(x)} = \mathbf{6.3E+08}\ m^3/kg$$

where:

Q/C_{wind}	43.56	$(g/m^2\text{-}s) / (kg/m^3)$	dispersion factor (calculated)
V	0.5	unitless	fraction veg. cover (default from USEPA, 2002)
U_m	4.69	m/s	mean annual windspeed (default from USEPA, 2002)
U_t	11.32	m/s	threshold value of windspeed at 7 m (default from USEPA, 2002)
F(x)	0.194	unitless	function dependent on U_m/U_t (default from USEPA, 2002)

Site-specific Dispersion Factor for Particulates (USEPA 2002, Equation D-1)

$$Q/C_{wind} = A \exp[(\ln A_{site} - B)^2 (1/C)] = \mathbf{43.56}\ (g/m^2\text{-}s) / (kg/m^3)$$

where:

A_{site}	7.0	acres	areal extent of the Site
Location	LA	--	General location (USEPA, 2002)
A	11.9110	--	constant, default value presented in Exhibit D-2 (USEPA, 2002)
B	18.4385	--	constant, default value presented in Exhibit D-2 (USEPA, 2002)
C	209.7845	--	constant, default value presented in Exhibit D-2 (USEPA, 2002)

References:

USEPA. 2002. *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.* Office of Solid Waste and Emergency Response. Washington, D.C., December.

ATTACHMENT D

DETERMINATION OF TOTAL PETROLEUM HYDROCARBON TOXICITY VALUES

ATTACHMENT D
DERIVATION OF TOTAL PETROLEUM HYDROCARBON TOXICITY VALUES

D.1 Introduction

As indicated in Section 4.2.1 of the human health risk assessment (HHRA), noncancer toxicity criteria were developed for three total petroleum hydrocarbon (TPH) mixtures in soil at the Former Olympic Base Manufactured Gas Plant site (the "Site") in Los Angeles, California. The methodology for the development of these criteria is presented below.

D.2 Methodology

Noncancer toxicity criteria were developed for TPH in the gasoline, diesel, and motor oil ranges (TPH-g, TPH-d, and TPH-mo) in soil using California Environmental Protection Agency (Cal/EPA) toxicity values (Cal/EPA, 2013) for the following groups of aliphatic and aromatic hydrocarbons:

- C5-C8 aliphatics
- C9-C18 aliphatics
- C19-C32 aliphatics
- C9-C16 aromatics
- C17-C32 aromatics

While the aromatic fraction of TPH-g consists largely of smaller hydrocarbons (specifically, C6-C8 aromatics), contributions from these hydrocarbons were evaluated by relying on individual constituents within that group exclusively that have their own toxicity criteria (i.e., benzene, toluene, ethylbenzene, and xylenes [BTEX], others) (Cal/EPA, 2013). Cal/EPA (2013)-recommended toxicity criteria for the aliphatic and aromatic hydrocarbon groups listed above are presented in Table D-1 for the development of toxicity criteria for the TPH product mixtures in soil.

As described herein, noncancer toxicity criteria were developed for the TPH product mixtures in soil at the Site by: 1) determining percentages and weight fractions of the aforementioned specific groups of aliphatic and aromatic hydrocarbon range groups associated with each mixture; and 2) using this information to calculate weighted criteria for the mixtures from the criteria for the specific aliphatic and aromatic hydrocarbon range groups.

The process followed to develop noncancer toxicity criteria for the TPH product mixtures in soil involved the following steps:

1. *Estimate percentages of aliphatics/aromatics in each TPH product mixture*. Percentages of aliphatics associated with each TPH product mixture in soil were

determined from composition information on gasoline and diesel provided by the Agency for Toxic Substances and Disease Registry (ATSDR) toxicological profile for total petroleum hydrocarbons (ATSDR, 1999) and composition information on motor oil provided by the Total Petroleum Hydrocarbon Working Group (TPHCWG, 1998). Gasoline and diesel are described by ATSDR (1999) as being approximately 65% aliphatics, 35% aromatics; and motor oils are described by the TPHCWG as being approximately 73% aliphatics, 22% aromatics, and 5% other constituents (i.e., metals, chlorinated solvents), which normalizes to 77% aliphatics, 23% aromatics.

2. *Estimate percentage weights of the aliphatic/aromatic hydrocarbon range groups with toxicity criteria in each TPH product mixture*. Percentage weights of the aliphatic/aromatic hydrocarbon range groups with toxicity criteria in each TPH product mixture were calculated using the aliphatic/aromatic percentages described above and weight fractions of hydrocarbons. Weight fractions of hydrocarbons within TPH-g and TPH-d were obtained from Metcalf & Eddy (1993). For TPH-mo, equal weights of C18 to C32 hydrocarbons were assumed. This approach is conservative considering TPH-mo is composed primarily of C25 to C32 hydrocarbons (California State Water Resources Control Board [SWRCB], 2012). The weight fractions of hydrocarbons within each TPH product mixture, and the estimated percentage weights for each aliphatic/aromatic hydrocarbon range group, are presented in Table D-1.

3. *Calculate weighted reference doses (RfDs) and reference concentrations (RfCs) for each TPH product mixture*. In the final step, the weighted RfDs and RfCs were estimated for each TPH product mixture using the following equation:

$$Weighted\ RfD = \frac{1}{\sum (P_x / RfD_x)} \qquad (1)$$

Where:	Weighted RfD	=	RfD (or RfC) for TPH product mixture (milligrams per kilogram per day [mg/kg-day]) (or milligrams per cubic meter [mg/m^3] for RfC)
	P_x	=	Percentage of hydrocarbon group occurring in the TPH product mixture
	RfD_x	=	RfD (or RfC) for hydrocarbon group (mg/kg-day or mg/m^3)

The RfDs and RfCs estimated for each TPH product mixture in soil are presented in Table D-1.

D.3 References

Agency for Toxic Substances Disease Registry (ATSDR). 1999. *Toxicological Profile for Total Petroleum Hydrocarbons (TPH)*. U.S. Department of Health and Human Services. September.

California Environmental Protection Agency (Cal/EPA). 2013. *Preliminary Endangerment Assessment Guidance Manual*. Interim Final. Department of Toxic Substances Control (DTSC). October.

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ATTACHMENT D

TABLE

TABLE D-1

WEIGHTED TOXICITY CRITERIA FOR TPH PRODUCT MIXTURES IN SOIL AND SOIL GAS

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Hydrocarbon Range	Cal/EPA (2013) RfD (mg/kg-day)	Cal/EPA (2013) RfC (mg/m^3)
C5-C8 aliphatics	0.04	0.7
C9-C18 aliphatics	0.1	0.3
C19-C32 aliphatics	2	8[1]
C9-C16 aromatics	0.03[2]	0.05
C17-C32 aromatics	0.04	0.16[1]

Chemical	Carbon chains[3]	Aliphatic/Aromatic Percentages[4]		Percentage Weights for Each Hydrocarbon Range (P_x)[5]					Weighted RfD[6] (mg/kg-day)	Weighted RfC[6] (mg/m^3)
		Percent aliphatics	Percent aromatics	C5-C8 aliphatics	C9-C18 aliphatics	C19-C32 aliphatics	C9-C16 aromatics	C17-C32 aromatics		
TPH-gasoline	C5 to C10	65%	35%	49%	16%	0%	9%	0%	**0.060**	**0.33**
TPH-diesel	C10 to >C20	65%	35%	0%	59%	7%	26%	9%	**0.059**	**0.13**
TPH-motor oil	C18 to >C34	77%	23%	0%	5%	72%	0%	23%	**0.15**	**0.59**

Notes:

1. RfCs have not been recommended by Cal/EPA (2013) for C19-C32 aliphatics and C17-C32 aromatics as these hydrocarbon fractions are not considered volatile. However, to enable an evaluation of potential human health risks via particulate inhalation for these non-volatile fractions, RfCs were calculated via route-extrapolation from their respective RfDs using the following equation:
   RfC (mg/m^3) = RfD (mg/kg-day) x 80 kg / 20 m^3/day
2. For C9-C16 aromatics, oral RfDs of 0.03 mg/kg-day and 0.004 mg/kg-day are recommended by Cal/EPA (2013), with 0.03 mg/kg-day recommended if naphthalenes and methylnaphthalenes have been analyzed and evaluated individually.
3. Carbon chain size associated with TPH-g and TPH-d provided by Metcalf & Eddy, Inc. (1993). Carbon chain size associated with TPH-lo and TPH-mo provided by TPHCWG (1998).
4. Aliphatic/aromatic percentages associated with each TPH mixture determined as follows:
   TPH-gasoline - composition provided by ATSDR (1999): "...a general hydrocarbon distribution consisting of 4-8% alkanes, 2-5% alkenes, 25-40% isoalkanes, 3-7% cyclohexanes, 1-4% cycloalkenes, and 20-50% aromatics." Assumed 35% aromatic composition as a mid-point.
   TPH-diesel - composition provided by ATSDR (1999): "The composition consists of approximately 64% aliphatic hydrocarbons (straight chain alkanes and cycloalkanes), 1-2% unsaturated hydrocarbons (alkenes), and 35% aromatic hydrocarbons (including alkylbenzenes and 2-, 3-ring aromatics)."
   TPH-motor oil - based on average weight composition information provided by TPHCWG (1998) for motor oils (C18 to >C34): 29% total cycloalkanes, 44% total straight-chain and branched alkanes, 22% total aromatics, 5% other constituents (i.e., metals, chlorinated solvents), which normalizes to 77% aliphatics, 23% aromatics.

TABLE D-1

WEIGHTED TOXICITY CRITERIA FOR TPH PRODUCT MIXTURES IN SOIL AND SOIL GAS

Former Olympic Base Manufactured Gas Plant Site

Los Angeles, California

Notes (continued):

5. Percentage weights for each aliphatic/aromatic hydrocarbon range calculated using the aliphatic/aromatic percentages described in footnote 4 above and the following weight fractions of hydrocarbons for each TPH mixture:
   - TPH-gasoline - 75% C5 to C8, used to calculate the percentage weight of C5-C8 aliphatics, and 25% C9 to C12, used to calculate the percentage weight of C9-C18 aliphatics and C9-C16 aromatics. Hydrocarbon weight percents obtained from Figure 3-1 of Metcalf & Eddy, Inc., 1993.
   - TPH-diesel - 90% C10 to C18 and 10% C19 to C28, used to calculate the percentage weight of C9-C18 aliphatics and C19-C32 aliphatics, respectively. 75% C10 to C16 and 25% C17 to C28, used to calculate the percentage weight of C9-C16 aromatics and C17-C32 aromatics, respectively. Hydrocarbon weight percents obtained from Figure 3-3 of Metcalf & Eddy, Inc., 1993.
   - TPH-lo/TPH-mo - Assumed equal weights of C18 to C32 hydrocarbons to calculate percentage weights of C9-C18 aliphatics and C19-C32 aliphatics (1/15 x 77% = 5% C9-C18 aliphatics; 14/15 x 77% = 72% C19-C32 aliphatics). Assuming 5% C9-C18 aliphatics for TPH-lo/TPH-mo is conservative considering TPH-lo/TPH-mo is composed primarily of C25 to C32 hydrocarbons (SWRCB, 2012). 100% C18 to >C34 used to calculate the percentage weight of C17-C32 aromatics.
6. Weighted RfDs and RfCs calculated as follows:

$$Weighted\ RfD = \frac{1}{\sum(P_x / RfD_x)} \qquad Weighted\ RfC = \frac{1}{\sum(P_x / RfC_x)}$$

Abbreviations:

m^3/day = cubic meters per day

mg/kg-day = milligrams per kilogram per day

mg/m^3 = milligrams per cubic meter

RfC = reference concentration

RfD = reference dose

TPH-diesel = total petroleum hydrocarbons in the diesel range

TPH-gasoline = total petroleum hydrocarbons in the gasoline range

TPH-motor oil = total petroleum hydrocarbons in the motor oil range

References:

Agency for Toxic Substances Disease Registry (ATSDR). 1999. *Toxicological Profile for Total Petroleum Hydrocarbons (TPH)*. U.S. Department of Health and Human Services. September.

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Total Petroleum Hydrocarbon Working Group (TPHCWG). 1998. *Volume 2. Composition of Petroleum Mixtures*. Amherst Scientific Publishers, Amherst, MA.

ATTACHMENT E

UNCERTAINTIES IN THE RISK ASSESSMENT

ATTACHMENT E
UNCERTAINTIES IN THE RISK ASSESSMENT

E.1 Introduction

Risk assessment includes several uncertainties that warrant discussion. Many of the assumptions used in this human health risk assessment (HHRA) regarding the representativeness of the sampling data, human exposures, fate and transport modeling, and chemical toxicity are conservative, following agency guidance, and reflect a 90th or 95th percentile value, rather than a typical or average value. The use of several conservative exposure and toxicity assumptions can introduce considerable uncertainty into the risk assessment. By using conservative exposure or toxicity estimates, the assessment can develop a significant conservative bias that may result in the calculation of significantly higher cancer risks or noncancer hazards than is actually posed by the chemicals present in soil, soil gas, and groundwater at the Investigation Area of the former Olympic Base Manufactured Gas Plant site (the "Site") in Los Angeles, California. A discussion of the key uncertainties used in this evaluation for the Site is discussed below.

E.2 Uncertainties in the Exposure Assumptions

As described below, numerous assumptions must be made in order to estimate potential human exposure to the chemicals of potential concern (COPCs) at the Site.

Exposure Assumptions and Pathways

Consistent with recommended California Environmental Protection Agency (Cal/EPA, 2014) default exposure assumptions, we have assumed that commercial populations examined in this HHRA are directly exposed to soil on a daily basis, for a continual 25-year exposure period, respectively. The assumed exposure durations used in this HHRA represent upper-bound estimates of the total amount of time that an individual may be working in one location. As the average commercial exposure duration in one location is actually less than 25 years, the cumulative exposures and risks presented in this HHRA may represent overestimates of the more typical exposures that might be incurred in a commercial setting.

Additionally, as discussed in Section 4.4 of the HHRA, based on our conversations with representatives from the Southern California Gas Company, we understand the Site is basically unoccupied. Workers may periodically come to the Site to place equipment in storage, but would then leave. Thus, the actual exposures to soil at the Site under current onsite commercial use would probably be much lower than what has been estimated in this assessment.

The selection of complete exposure pathways is another area of uncertainty in all risk assessments. In general, this HHRA has quantified all potentially complete exposure pathways through which individuals could become exposed to chemicals present in onsite exposed soil (0-2 feet below ground surface) and soil gas. Accordingly, we believe that the exposure pathways quantified in this HHRA capture the range of theoretical current exposures, and thus provide a conservative estimate of exposures that could occur at the Site.

Bioavailability of Chemicals in Soil

Another exposure factor that has not been taken into account in this assessment is the bioavailability of chemicals in soil. Studies support that certain organic compounds, particularly highly lipophilic compounds such as carcinogenic polycyclic aromatic hydrocarbons (CPAHs), tend to be tightly bound to soil (Kelsey et al., 1997). This phenomenon can substantially reduce the bioavailability of chemicals to people exposed to chemicals in soil. A reduction in the bioavailability of the chemicals adsorbed to soil would reduce the projected health risk associated with exposure to soil. Low bioavailability could substantially reduce estimated risks below levels calculated using the default assumption that all chemicals are 100% bioavailable.

Calculation of Soil Exposure Point Concentrations (EPC)

In accordance with United States Environmental Protection Agency (USEPA) guidance (USEPA, 2013), upper confidence limits (UCLs) were not calculated for datasets with fewer than four detections or fewer than ten samples. The exposed soil (0-2 feet below ground surface [bgs]) is comprised of six samples and thus, of insufficient size to calculate UCLs. Although the USEPA guidance (USEPA, 2013) recommends either the use of the mean or the median in these cases, the maximum detected concentration was conservatively used as the representative EPC. The UCL for the primary risk driver, CPAHs (express as benzo(a)pyrene equivalents), for all soil samples collected from depths between 0 and 2 feet bgs across the Site is 12 mg/kg, which is lower than the maximum detected concentration of 16 mg/kg. Therefore, the use of maximum concentrations of COPCs detected in soil (0-2 feet bgs) as the representative EPC will result in an overestimate of cancer risks and noncancer hazards.

Furthermore, the UCL for lead for all soil samples collected from depths between 0 and 2 feet bgs across the Site is 404 mg/kg, which is lower than the maximum detected concentration of 616 mg/kg. Therefore, the use of maximum concentration for lead detected in soil (0-2 feet bgs) as the representative EPC will result in an overestimate of the blood lead level in the fetus of the adult worker.

Calculation of Soil Gas Exposure Concentrations (EC)

As discussed in Attachment C (Modeling Methodologies) of the HHRA, the maximum detected concentrations of soil gas were conservatively used to model exposure concentrations (ECs) in the HHRA for the evaluation of inhalation of indoor air vapor pathway. All VOCs detected in Site boundary soil gas samples were included in the evaluation and the maximum detected concentration on a point-by-point soil gas sample basis (e.g., each sample location/depth) was used to estimate the concentrations representative of indoor air (i.e., the EC) to which current offsite commercial[1] populations may be exposed. To characterize worst-case impacts, vapor intrusion into current offsite commercial buildings is modeled on a point-by-point soil gas sample basis, i.e., the transport of COPCs from each boring location and sampling depth (i.e., 5, 15, 30, and/or 60 feet bgs) is evaluated separately. Use of the maximum detected concentrations of COPCs in soil gas will overestimate estimated cancer risks and noncancer hazards for current receptors evaluated in the HHRA as individuals inside a building are more likely exposed to an average concentration (e.g., UCL) rather than the maximum concentration of COPCs of individual soil gas samples. Therefore, concentrations of chemicals in the indoor air space of current offsite buildings and maximum potential health risks to current offsite commercial workers associated with inhalation exposure to the COPCs present in indoor air presented in the HHRA are overestimated and likely lower than estimated in this HHRA.

As discussed in Section 4.5.2.1 of the HHRA, potential risks associated with inhalation of VOCs in outdoor air for current onsite and offsite commercial workers were evaluated using estimated UCLs for the COPCs in soil gas, or maximum detected concentrations in instances where UCLs were not calculated (i.e., for datasets with fewer than four detections or fewer than ten samples). The use of maximum concentrations of COPCs detected in soil gas as representative ECs would likely overestimate associated cancer risks and noncancer hazards. In this HHRA, UCLs were not calculated for 1,1-dichloroethene, acetone, cis-1,2-dichloroethene, and vinyl chloride; thus, the maximum detected concentration was conservatively used as the representative EC for the inhalation of VOCs in outdoor air pathway. However, estimated incremental cancer risk for current onsite and offsite commercial workers were below the lower end of the acceptable cancer risk range of 1×10^{-6} to 1×10^{-4} and estimated noncancer hazard is well below the acceptable hazard index (HI) of 1 (Table 15 of the HHRA). Therefore, the use of maximum detected concentrations as representative ECs for select COPCs in soil gas for the inhalation of VOCs in outdoor air pathway does not materially impact the conclusions of the HHRA.

The estimated UCLs for COPCs in soil gas were calculated using soil gas data from all sampling locations and depths. The use of all sampling depths rather than the 5-foot sampling depth to calculate 95%UCLs to model transport of vapors through the soil column (i.e., assuming that the vapor source is at 5 feet bgs) and into outdoor air may overestimate or underestimate the representative outdoor air EC and associated outdoor air inhalation cancer risks and noncancer hazards.

As shown on Table 15 of the HHRA, the main cancer risk drivers for the outdoor air inhalation pathway are benzene and naphthalene. The highest concentrations of benzene

[1] Boundary soil gas samples considered for evaluating vapor intrusion for the current offsite commercial scenario include: A1-1, A1-2, A2-1, A3-1, A4-1, A5-1, B1-1, B6-1, C1-1, C6-1, D1-2, D4-2, D5-2, D5-3, E1-1, E4-1, E5-1, F1-2, F4-1, G1-1, G3-1, G4-1, H1-1, and H3-1.

(3.38 mg/m^3) and naphthalene (23.4 mg/m^3) in soil gas were detected in samples collected at 60 feet bgs and 80 feet bgs, respectively. The detected concentrations of benzene and naphthalene in samples collected at 5 feet bgs ranged from 0.00188 mg/m^3 up to 0.0238 mg/m^3 and from 0.00705 mg/m^3 up to 0.953 mg/m^3, respectively The maximum detected concentrations of benzene and naphthalene in 5-foot soil gas samples were below the 95% UCLs used as the EPCs; i.e., 95%UCLs for benzene and naphthalene of 0.40 mg/m^3 and 3.9 mg/m^3, respectively. Fourteen out of 92 total soil gas samples were collected at depths between 30 feet bgs and 85 feet bgs. To account for the highest concentrations of benzene and naphthalene in soil gas at depth, all samples were included in the estimate of representative soil gas concentration for the evaluation of the outdoor air inhalation pathway and conservatively assumed to attenuate from the shallowest sampling depth of 5 feet bgs. Therefore, the use of all sampling depths rather than the 5-foot sampling depth in calculating the 95%UCL results in an overestimate of the representative outdoor air EC and estimated cancer risk and noncancer HI for the outdoor air inhalation pathway for benzene and naphthalene in soil gas.

For tetrachloroethene (PCE) in soil gas, the highest concentration of 8.3 mg/m^3 was detected in a 5-foot sample. The next highest detection of PCE of 6.8 mg/m^3 was in a 15-foot sample. The 95%UCL of the 5-foot samples (i.e., 1. 6 mg/m^3) is only slightly higher than the 95%UCL of all samples (i.e., 1.4 mg/m^3). Therefore, use of 5-foot samples rather than all samples in calculating the 95%UCL for PCE would result in an insignificant increase in the outdoor air inhalation cancer risk and noncancer HI for PCE and would not change the overall total cancer risk and noncancer HI because naphthalene and benzene are the primary risk drivers for this pathway.

Fate and Transport Modeling Associated with Volatile Compounds in Soil Gas

Soil Gas to Indoor Air

As recommended by Cal/EPA (2011), the methodology and equations from the Johnson and Ettinger SG-SCREEN Model for soil gas were used to estimate potential vapor intrusion risks for the current offsite commercial populations in this HHRA. The modeling is based on the assumption that the source of contamination is infinite and fixed in place. Both of these assumptions are conservative for soil sources. First, the actual source of contamination is likely finite and will deplete over time, as volatile chemicals migrate upward through the soil column. This depletion can be further accelerated by biodegradation. Second, as the contamination is depleted, the distance between the source and the building will increase, resulting in decreased transport into the indoor environment. Thus, the actual long-term exposures that may occur at the Site are likely significantly lower than assumed in the calculation of current potential health risks, especially if biodegradation is occurring.

The Johnson and Ettinger model is sensitive to the soil property inputs. Therefore, obtaining a site conceptual framework that accurately describes site lithology is critical to generating accurate modeling results. No site-specific soil properties were used in the model; instead the conservative model default soil property values were used as model inputs. These conservative source and model assumptions incorporated into the model could result in an overestimate of exposure concentrations and actual long-term exposures that may occur at the Site are likely significantly lower than assumed in the calculation of current potential risks. The conservative default modeling building assumptions used as inputs to the model are presented in Table C-2 of Attachment C, Modeling Methodologies.

Soil Gas to Outdoor Air

Current offsite commercial workers are assumed to work directly at the boundaries on the Site and be exposed to the predicted onsite outdoor vapor-phase COPC concentrations. However, use of the calculated dispersion factor for a current onsite commercial population applied to the offsite commercial workers is particularly conservative, given that the simulated dispersion is directly above the source area (USEPA, 2002) and not dispersion to ambient air at a different location entirely. Therefore, potential health risks to current offsite commercial workers associated with inhalation exposure to the COPCs present in outdoor ambient air presented in the HHRA are overestimated and likely lower than estimated in this HHRA.

E.3 Uncertainties in the Toxicity Assessment

Uncertainty in the toxicity assessment arises for those chemicals which rely on animal studies as the basis for determining the appropriate toxicity value. All risk assessments assume that adverse effects observed in animal toxicity experiments would also be observed in humans (animal-to-human extrapolation), and that the toxic effect observed after exposure by one route would occur following exposure by a different route (route-to-route extrapolation).

In order to adjust for uncertainties that arise from the use of animal data, regulatory agencies often base the reference dose for noncarcinogenic effects on the most sensitive animal species (i.e., the species that experiences adverse effects at the lowest dose) and adjust the dose via the use of safety or uncertainty factors. The adjustment compensates for the lack of knowledge regarding interspecies extrapolation and possibility that humans are more sensitive than the most sensitive experimental animal species tested. The use of uncertainty factors is considered to be health protective.

Second, when route-specific toxicity data were unavailable, data were derived by route-to-route extrapolation, and equal absorption rates for both routes were assumed (i.e., oral to inhalation and inhalation to oral). This may or may not reflect the actual differences in toxicity that can be associated with the route of exposure, but is considered to be a conservative and health-protective assumption. For dermal exposure to soil, chemical-specific absorption data generally were not available. Instead, dermal absorption rates, which were based on the default assumptions provided by the Cal/EPA (2013), were assumed.

Cal/EPA has published a cancer potency factor for naphthalene. The cancer potency factor was based on inhalation studies with rats, conducted by the National Toxicology

Program (NTP). According to Cal/EPA, the results of these inhalation studies show clear evidence of respiratory epithelial adenomas and olfactory epithelial neuroblastomas in male and female rats. As the studies are focused on the inhalation route of exposure, and as the cancers observed in these studies are associated with the respiratory system, it is possible that the observed carcinogenicity is route-specific, and would not be observed if exposures were to occur via the oral route. Nonetheless, as a conservative screening-level approach, the cancer potency factor for naphthalene developed by Cal/EPA has been applied to the oral and dermal routes of exposure in this HHRA. Accordingly, the cancer risk for naphthalene estimated in this HHRA is based on the assumption that inhalation, oral and dermal exposure to naphthalene present in soil could result in cancer effects.

E.4 References

California Environmental Protection Agency (Cal/EPA). 2014. *DTSC/Office of Human and Ecological Risk (HERO) Human Health Risk Assessment (HHRA) Note Number 1. Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Hazardous Waste Sites and Permitted Facilities.* Department of Toxic Substances Control. September 30.

California Environmental Protection Agency (Cal/EPA). 2013. *Preliminary Endangerment Assessment Guidance Manual*, Interim Final. Department of Toxic Substances Control (DTSC). October.

California Environmental Protection Agency (Cal/EPA). 2011. *Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air*. Department of Toxic Substances Control. October.

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J-142 - Former Eastern Iron & Metal, 2200 E 11th Street

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CDM
18581 Teller Avenue, Suite 200
Irvine California 92612
tel: 949 752-5452
fax: 949 752-1307

December 13, 2002

California Environmental Protection Agency
Department of Toxic Substances Control
Southern California Region
Site Mitigation Program
1011 North Grandview Avenue
Glendale, California 91201
Attn: Ms. Jessy Philip

Subject: Former Eastern Iron & Metal Co.
2200 E. 11th Street - Los Angeles, CA
DTSC Site Code: 11045-300595-00
Preliminary Endangerment Assessment
CDM Project No: 20415.31813.T7.RPT
CDM File No: 20415.31813

Dear Ms. Philip:

On behalf of the Whittaker Corporation, Camp Dresser & McKee Inc. (CDM) is submitting two copies of the Preliminary Endangerment Assessment for the Former Eastern Iron & Metal Co site. Additionally, one copy is being sent to Dr. Pollack in Sacramento.

Please feel free to contact me if you have any questions.

Sincerely,

CAMP DRESSER & McKEE, INC.

Michael O Bower

Michael O. Bower
Senior Hydrogeologist

Cc: Eric Lardiere, Whittaker Corp.
Pat Cafferty, Munger, Tolles and Olsen

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CDM Transmittal

CDM Camp Dresser & McKee Inc.

18581 Teller Avenue, Suite 200
Irvine, California 92612
Tel: (949)752-5452
Fax: (949)752-1307

To:	Ms. Jessy Phillip	**From:**	Michael Bower
Company:	California Environmental Protection Agency Department of Toxic Substances Control Southern California Region Site Mitigation Program 1011 North Grandview Avenue Glendale, California 91201	**Date:**	December 13, 2002
Re:	Eastern Iron & Metal PEA Report - Revised		
Job #:	20415.31813.T1-PMT	**Work Group #:**	
Via:	*Mail:*	*Overnight:* x	*Courier:*

For your information		**Approved**	
For your review	x	**Approved as noted**	
For your signature	x	**Returned to you for correction**	

- **Message:**

Here are your 2 copies of the revised PEA. Additional copy was sent to Gerald Pollock 12/13/02. Call me if you have questions.

Contents

Appendices

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Executive Summary

ES.1 Purpose of Investigation

The purpose of this investigation is to evaluate and determine whether the current or historic activities at the Site have resulted in the release or threatened release of hazardous substances that may pose a risk to human health or the environment. The specific objectives of the PEA are to determine and document the presence of any hazardous substances and concentrations of associated target contaminants at the Site through background research and field investigation. Also, this PEA provides the necessary data to perform a Human Health Risk Screening Evaluation and estimate the potential threat to public health and/or the environment.

ES.2 Site Background and Current Status

In 1995, the Department of Toxic Substances Control (DTSC) conducted a screening evaluation of the potential adverse health effects from exposure to lead in the Site soil and determined that the Site did not pose an immediate threat to public health or the environment. In 1996 and 1997, DTSC and the City of Los Angeles collected soil samples from the Site and adjacent streets for analytical testing. Based on these data, DTSC identified antimony, arsenic, cadmium, chromium, copper, lead, and zinc as being metals of potential concern. Lead was identified as the primary metal of concern

In July 1999, on behalf of Whittaker Corporation, Acton Mickelson Environmental, Inc. (AME) collected thirty-one soil samples from 8 locations throughout the Site. Soma Corporation used these data combined with the previous DTSC and City of Los Angeles data to conduct a risk evaluation of the Site in September 1999. Upon review of the AME report and the Soma Corporation evaluation, DTSC (in their letter dated June 22, 2000) required Whittaker Corporation to develop and execute a Preliminary Endangerment Assessment (PEA) Work Plan for the former Eastern Iron and Metal Co. property.

ES.3 Known and Potential Releases

There are no known or potential releases. Past Site activities, possibly impacted fill material being used for the warehouse foundation, and contamination from the near-by Western Lead Smelting facility may account for the elevated metals in Site soils.

ES.4 Significant Contamination

Elevated metals were identified in Site soil samples collected for this PEA. California hazardous waste standards were exceeded for Antimony (maximum value of 5,120 mg/kg), Arsenic (maximum value of 3,410 mg/kg), copper (maximum value of 41.2 mg/kg), and lead (maximum value of 25,700 mg/kg).

ES.5 Pathways Demonstrating Potential Threat

Soil ingestion and inhalation pathways were evaluated as part of the HHSA However, the Site is completely covered with a 6-inch thick concrete slab (warehouse floor), and a small asphalt parking lot. Based on current land use and the lack of exposure to the impacted soils, a potential threat to residential or industrial workers does not exist.

ES.6 Potentially Exposed Populations

Based on the lack of exposure, potentially exposed populations do not exist

ES.7 Conclusions and Recommendations

Results of the PEA and supplemental risk analysis indicate that:

- No currently complete exposure pathways exist at the Site because of impermeable cover (buildings and pavement). No actions would be necessary to interrupt exposure pathways as long as Site conditions do not change significantly.

- Possible risks associated with hypothetical future residential use of the Site are above common regulatory thresholds for fill, native surface, and native subsurface soils. Residential development is unlikely given current Site ownership and surrounding land uses

- Based on a hypothetical situation where the impermeable barrier (concrete warehouse floor and asphalt parking lot) was removed and the soil exposed, the hypothetical Site-related risk for future workers (industrial and construction) for fill and native surface soils (ground surface to 10 feet bgs) are relatively high and fall in the range of risks and hazards often considered unacceptable. Risks associated with hypothetical exposure to antimony, arsenic and lead dominate risks, and each of these COPCs is found in the fill and native surface soils in significantly elevated concentrations.

- Based on a hypothetical situation where the impermeable barrier (concrete warehouse floor and asphalt parking lot) was removed and the soil exposed, the hypothetical Site-related risks for future workers (industrial and construction) for native subsurface soils (greater than 10 feet bgs) are relatively low and fall generally within the range of risks and hazards that could be found acceptable. Risks associated with hypothetical exposure to chromium, and perhaps arsenic, in native subsurface soils are likely to be related to background, rather than Site-related contamination.

- The PEA equations for soil exposure assume that adults and children and industrial workers will ingest and have dermal contact with exposed soils. These equations are very conservative given the actual conditions at the Site and overestimate potential risks from exposure to Site soils. The construction worker scenario, where workers become exposed to Site soils only after the building has been demolished, is the only realistic scenario presented. In this scenario, under construction, risks to the Site construction workers should be managed as part of ongoing institutional controls.

Section 1 Introduction

On behalf of Whittaker Corporation, Camp Dresser & McKee Inc. (CDM) has prepared this Preliminary Endangerment Assessment (PEA) for the former Eastern Iron and Metal Co., 2200 E. 11th Street, Los Angeles, California. The PEA was conducted in accordance with the guidelines set forth in the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) PEA Guidance Manual (January, 1994).

From approximately 1947 through 1963, Eastern Iron and Metal Co. used facilities formerly at the Site for producing various metals from different sources of feedstock including lead, tin, and antimony alloys. In 1971, a large warehouse, approximately 22,000 square feet in size, was constructed on the Site. The building is presently used for general warehousing and distribution operations by Bestoys, a toy manufacturing company.

In 1995, the Department of Toxic Substance Control (DTSC) conducted a screening evaluation of the potential adverse health effects from exposure to lead in the Site soil and determined that the Site did not pose an immediate threat to public health or the environment. In 1996 and 1997, DTSC and the City of Los Angeles collected soil samples from the Site and adjacent streets for analytical testing. Based on these data, DTSC identified antimony, arsenic, cadmium, chromium, copper, lead, and zinc as being metals of potential concern. Lead was identified as the primary metal of concern.

In July 1999, on behalf of Whittaker Corporation, Acton Mickelson Environmental, Inc. (AME) collected thirty-one soil samples from 8 locations throughout the Site. Soma Corporation used these data combined with the previous DTSC and City of Los Angeles data to conduct a risk evaluation of the Site in September 1999. Upon review of the AME report and the Soma Corporation evaluation, DTSC (in their letter dated June 22, 2000) required Whittaker Corporation to develop and execute a Preliminary Endangerment Assessment (PEA) Work plan for the former Eastern Iron and Metal Co. property. The AME Sampling and Analysis Report has been included in Appendix A.

1.1 PEA Objectives

The PEA is a part of the integrated site mitigation process that is overseen by DTSC. The overall objective of the PEA is to evaluate and determine whether the current or historic activities at the Site have resulted in the release or threatened release of hazardous substances that may pose a risk to human health or environment. The specific objectives of the PEA are provided below:

- Determine and document the presence of any hazardous substances and concentrations of associated target contaminants at the Site through background research and field investigation.

- Identify areas of the Site with the highest levels of contamination (if any).

- Provide sufficient data of acceptable quality to perform a Human Health Risk Screening Evaluation and estimate the potential threat to public health and/or the environment.

- Identify the general extent of contamination and determine the need for any expedited response actions, and/or further Site characterization.

- Provide data and information necessary for the DTSC site listing process.

This PEA report meets the above-mentioned objectives.

1.2 Report Organization

The PEA report has been organized into ten sections

The introduction in Section 1.0 presents historical information and the objectives of this PEA.

Section 2.0 describes the Site. The following matters are addressed: history of the Site; contact information; identification numbers; zoning and land use.

Section 3.0 contains Site background, including results of background research and information regarding topography, climate, geology, hydrogeology and the potential areas of concern with respect to chemical contamination.

Section 4.0 discusses the apparent problem requiring the PEA.

Section 5.0 presents the environmental setting and discusses various exposure pathways.

Section 6.0 presents sampling activities and results.

Section 7.0 presents the human health screening evaluation.

Section 8.0 presents ecological screening evaluation.

Section 9.0 presents conclusions and recommendations.

Section 10.0 presents the references used in the preparation of this PEA

2
Section Two

Section 2
Site Description

The following sections provide a description of the Site and the surrounding land use, the sources and results of the background research, the Site status and historical activities, the potential areas of concern with respect to chemical contaminants, and the environmental setting.

2.1 Site Location and Description

The former Eastern Iron and Metal Co. site (Site) is located in an industrial area of Los Angeles approximately five miles south of the downtown area (Figure 2-1). The surrounding area includes numerous scrap metal, metal recycling, warehousing, clothing manufacturing, and other industrial facilities The Santa Monica Freeway (FWY 10) is located approximately 800 feet to the north. The Los Angeles River is approximately 2,000 feet east of the Site.

The Site is the property at 2200 East 11th Street, and is comprised of the parcel bounded on the north by East 11th street and on the east and west by Mateo Street and Santa Clara Street, respectively.

Some of the Site information presented in this section and environmental information on surrounding sites was obtained from the EDR Radius Map search, which was included in Appendix B of the PEA Work plan (CDM, 2001).

2.1.1 Site Name

The Site is the property at 2200 East 11th Street, Los Angeles, California, 90021. The Site is currently an active warehouse for Bestoys, with boxed inventory stored throughout the structure.

2.1.2 Site Address

The Site is the property at 2200 East 11th Street, Los Angeles, California, 90021.

2.1.3 Designated Contact Person

Mr. Eric G. Lardiere, Vice President, Secretary and General Counsel, Whittaker Corporation, is the Designated Contact Person.

2.1.4 Mailing Address

The mailing address for this project is:

Whittaker Corporation
1955 N. Surveyor Avenue
Simi Valley, California 93603-3349

2.1.5 Telephone Number

Mr Lardiere's phone number is (805) 526-5700 ext 6650.

2.1.6 Other Site Names

Eastern Iron and Metal Co (a.k.a Eastern Iron Works, Eastern Smelting and Refining, and Metals Refining Co., Inc.) owned the property from approximately 1930 to 1966. Aaron Ferer & Sons, Inc owned the Site from 1966 to 1971. Harold Roach acquired the Site in 1971 Vermont Development Co., Gary Finkel, Dennis Roach and Steven Roach acquired the Site from Harold Roach in 1971. The current owners, Gary and Patricia Finkel, acquired the Site in 1981 National Aerosol Products Co. (NAPC) leased the building from approximately October 1971 to September 1996 The Site is currently an active warehouse for Bestoys, with boxed inventory stored throughout the structure.

2.1.7 U.S. Environmental Protection Agency (USEPA) Identification Number

Based on a review of the regulatory database search report, the Site is listed in the CERCLIS database. The Site ID number is 101115051. The Site status as of 10/14/98 is PEAR – Preliminary Endangerment Assessment Required.

2.1.8 CalSites Database Number

The Site is listed in the CalSites database with Facility ID number 19330382 The Site status as of 10/14/98 is PEAR – Preliminary Endangerment Assessment Required.

2.1.9 Assessor's Parcel Number and Maps

The approximately 0.7 acre property is Lot 3 (known as Assessor's Parcel No 5167-011-030), Tract 789, as recorded on page 24 of book 17 of maps in the Los Angeles County Recorder's Office

2.1.10 Township, Range, Section and Meridian

The geographic coordinates of the Site are 34° 00′ 04″ N latitude and 118° 13′ 46″ W longitude, Township 2 South, Range 13 West of the San Bernardino Baseline and Meridian (USGS, Los Angeles Quadrangle, 7.5-minute Series, 1981).

2.1.11 Site Zoning

According to the City of Los Angeles Department of Building and Safety, the Site is zoned M^3-1 (heavy industrial).

2.1.12 Site Maps and Photographs

A vicinity map depicting the Site and surrounding area is included as Figure 2-1. A Site plan map is included as Figure 2-2. Site photographs were included in Appendix C of the PEA Work plan (CDM, 2001).

3 Section Three

Section 3
Background

3.1 Regulatory Status

A review of selected regulatory agency databases for documented environmental concerns on the Site was conducted by EDR. The Site is listed on the CERCLIS and CalSites databases. The Site status as of 10/14/98 is PEAR – Preliminary Endangerment Assessment Required.

Available records from the files of appropriate regulatory agencies were reviewed to establish the current status of facilities within a 1-mile radius of the Site with documented environmental impacts to the subsurface. These sites are summarized in Table 2-1. The numerous industrial sites may have had some impacts to Site soil, which are likely limited to possible metals in surface soil or fill material. Based on information obtained in the EDR search, it is not likely that volatile organic compounds or petroleum hydrocarbons from these sites have impacted subsurface soils at the Site. The adjacent site most likely to have impacted Site soils is the former Western Lead facility. Because of the high lead concentrations in soil, and the lead concentrations in soil samples collected in the adjacent right-of-way, Site soil may have been impacted by lead smelting operations performed at the former Western Lead facility. The former Western Lead facility operated a lead smelting facility with secondary blast furnace that recycled lead-acid batteries in the 1950's and 1960's. Remedial action, including soil removal, is currently being performed at the former Western Lead facility property. The Estee Battery Co. and International Lead conducted lead smelting operations before Western Lead owned this location.

3.2 Physical and Environmental Characteristics

3.2.1 Site Topography

The Site lies at an elevation of approximately 230 feet above mean sea level (MSL). The ground surface in the Site vicinity is relatively flat with a slight slope to the south. At this time, the amount of fill, placed on the property prior to warehouse construction is unknown. Soil borings drilled beneath the warehouse floor encountered what may be fill soil ranging from 6.5 to 12.5 feet in thickness.

The slope in the Site vicinity is generally directed towards the Los Angeles River, which is the nearest surface water body located approximately 2000 feet east of the Site. No other surface water bodies are located within a one-mile radius of the Site. Water from the Los Angeles River is used for groundwater recharge in Griffith Park and areas near the Pacific Coast; the river is not a source of drinking, irrigation, or industrial processing water (DWR, 1961).

3.2.2 Site Geology and Soil Types

The Site is located within the Los Angeles Basin at the northern end of the Peninsular Ranges geomorphic province. The geomorphic province trends northwest and reflects the dominant northwesterly trend of major fold belts and fault zones in the Southern California region. The Site is located within the Los Angeles Narrows, in the Forebay area of the Central Basin of the greater Los Angeles Coastal Plain (DWR, 1961). The Site is located on the western floodplain of the Los Angeles River and east of the Elysian Hills, which have been deformed by folding and faulting. Major geologic structural features in the vicinity of the Site include the Newport-Inglewood, Santa Monica-Hollywood, and Raymond Fault Zones, and the Union Street and Los Angeles Downtown Oil Fields.

The Site is underlain by recent alluvium, which generally consists of gravel, sand, silt, and clay deposited by the Los Angeles River. In the Los Angeles Narrows region, the alluvium is unconformably underlain by basement rock of the upper Pliocene Pico Formation and Miocene sedimentary rocks consisting of clay shales, sandstones, and conglomerates and volcanic rocks. These formations are not known to produce fresh water in the coastal plain.

Logs from a number of soil borings drilled on Site indicate that the underlying soil is predominantly brown, fine- to medium-grained sand with occasional silt layers to depths of 5 to 10 feet below ground surface (bgs). Some borings reported the presence of artificial fill and rubble in the top 6.5 to 12.5 feet of material. Below this depth, layers of fine- to coarse-grained sand with varying amounts of gravel (10 – 50 percent) and occasional silt and clay were encountered to the maximum explored depth of 40 feet bgs. Several of the borings encountered refusal between the depths of 11 and 22 feet bgs, which was attributed to suspected cobble layers.

3.2.3 Site Hydrogeologic Setting

The Site lies within the Los Angeles Forebay Area, which is located in the northern portion of the Central Groundwater Basin. The Central Basin is bounded on the north by the Elysian Park and Repetto Hills; the Newport-Inglewood uplift to the west and south; and the Puente Hills to the east. The Site is situated in an alluvial valley referred to as Los Angeles Narrows, through which the Los Angeles River flows, with the Elysian Park Hills to the west, and the Repetto Hills to the east. The hills consist of Tertiary-age Fernando and Puente Formations, which are non-water bearing units (DWR, 1962). The nearest useable groundwater occurs in alluvial deposits within the Central Basin. The Los Angeles Narrows at one time served as a recharge area for the basin. However, the area is presently completely paved and little percolation of precipitation is possible (DWR, 1961).

The shallow-most aquifer beneath the Site is the Gaspur aquifer, which consists predominantly of sand and gravel, with a small percentage of clay (DWR, 1961). In the Site vicinity, the Gaspur aquifer ranges in thickness from 45 to 120 feet. The Gaspur aquifer is not used as a water supply source in the Los Angeles Metropolitan area and has poor water quality due to contaminants from industrial properties located within the region.

According to the Los Angeles County Department of Public Works, there are no water supply or observation wells within a three-mile radius of the Site. The nearest observation well (No 2772-E) to the Site is located approximately 4 miles to the north, near San Fernando Road. The depth to groundwater at the observation well was last measured on May 2, 1994, and the groundwater elevation was reportedly 289 7 feet MSL, which is approximately 35 feet below ground surface. The regional groundwater flow direction in the Site vicinity is reportedly to the southwest. Groundwater was not encountered drilling deep soil borings at the Western Smelting facility Site. Groundwater was not encountered during this PEA investigation.

3.2.4 Site Climatological Setting

Normal annual rainfall for the Los Angeles area is approximately 12 inches per year, with most of the precipitation occurring in the winter months of January and February. In general, from late October through early April, measurable rain falls in about one day in four. From July through August, trace or no measurable rain falls. The maximum amount of precipitation recorded in a single month in Los Angeles is reportedly 11.07 inches. The maximum amount of precipitation recorded in a 24-hour period is reportedly 6.19 inches (National Climatic Data Center, 1993).

The average annual temperature in the Los Angeles area normally ranges from 60 to 65 degrees. The average annual wind speed in the area is approximately 6 miles per hour (mph) to the west, with little seasonal variability and limited capability to horizontally disperse air contaminants (Los Angeles International Airport, 1994).

3.3 Current and Historical Land Uses

The following section is based on CDM's review of documents to which it had access and is not and should no be construed to be an admission of any fact by Whitaker Corporation.

3.3.1 Property Ownership

Eastern Iron and Metal Co owned the Site property from approximately 1930 to 1966. Aaron Ferer & Sons, Inc., a former subsidiary of Whittaker Corporation, acquired the Site in 1966 from Eastern Iron & Metal Co. Harold Roach acquired the Site in 1971 Vermont Development Co., Gary Finkel, Dennis Roach and Steven Roach acquired the Site from Harold Roach in 1971. Gary and Patricia Finkel, husband and wife, acquired the remaining interests from other partners of Vermont Development Co and became the property owners in June 1981.

3.3.2 Facility Ownership/Operators

Eastern Iron and Metal Co. (a.k.a. Eastern Iron Works, Metals Refining Co., or Eastern Smelting and Refining) performed metal production operations at the Site from approximately 1940 to 1966.

There is no information regarding Site operations during the period from 1966 through 1971 Although there is no documentation, CDM understands that the Site was vacant during that period.

Vermont Development Co. owned the warehouse from 1971 to 1981, when Gary and Patricia Finkel acquired the remaining property interests. Following construction of the current warehouse in 1971, the Site was leased by NAPC for aerosol can and raw materials storage. NAPC vacated the property in September 1996. Subsequently, the warehouse was leased for storage of fabric and linen materials, and for the current tenant, Bestoys, Inc., a toy manufacturing company, for boxed inventory storage.

3.3.3 Business Type

Prior to 1966, metal refining operations were performed at the Site. Following construction of the current warehouse in 1971, the Site has been leased for warehouse/storage as detailed in Section 2.4.2

3.3.4 Years of Operation

Metal refining operations occurred from approximately 1940 to 1966. Warehouse operations have continued at the Site since warehouse construction in 1971.

3.3.5 Business/Manufacturing Activities

Eastern Iron and Metal Co. (a.k.a. Eastern Iron Works, Metals Refining Co., or Eastern Smelting and Refining) performed metal production operations at the Site from approximately 1940 to 1966

Eastern Iron and Metal Co. operations are described as follows: "To engage in the business of smelting, refining, treating, processing and dealing in nonferrous metals." "To purchase, sell, barter, trade and deal in nonferrous metals of all kinds and all kinds of surplus commodities, whether as principal, factor, agent, or otherwise." (1947 Incorporation Filing)

Manufacturing Processes with Potential Environmental Impacts:

- Scrap metal yard (approximately 50-60 percent of facility)
- Foundry operated 3 cupolas heated by oil furnaces to re-melt scrap iron, bronze, brass, and lead into ingots and products.
- Operations inside a closed building. Smoke stack connected to dust collection system (baghouse).

Following construction of the current warehouse in 1971, the Site was leased by NAPC for aerosol can and raw materials storage. NAPC vacated the property in September 1996. Subsequently, the warehouse was leased for storage of fabric and linen materials, and for the current tenant, Bestoys, Inc., a toy manufacturing company, for boxed inventory storage Based on the records reviewed, manufacturing has not taken place at the Site since the warehouse was constructed

3.4 Surrounding Property Land Uses

At the time of the Site visit by CDM and DTSC in January 2001, the surrounding land use was observed to be primarily industrial, with warehouses, scrap metal yards and other light industrial properties. In general, the prominent adjoining land uses are as follows:

North: Across 11th Street is a warehouse occupied by a clothing wholesaler.

East: Commercial buildings are present across Mateo Street.

South: A scrap metal yard occupies the property.

West: There is a residence at the corner of 14th and Wilson Streets in addition to wholesale produce distributors.

The Western Lead site (previously the International Lead Co. and the Estee Battery Co.), a former lead smelting facility that recycled lead acid batteries in the 1950's and 1960's, is located approximately 120 feet to the northwest at 2182 East 11th Street. The Union Pacific right-of-way runs through Santa Clara Street and stops at the western boundary of the Site.

3.5 Hazardous Substance/Waste Management Information

3.5.1 Records Review

3.5.1.1 Agency Files

Regulatory agencies were contacted for any files or records for all of the historic and current addresses identified for the Site. The following agency files were reviewed for the Site and for the Western Smelting Site at 2182 E. 11th Street:

- California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control
- City of Los Angeles Department of Building and Safety
- City of Los Angeles Department of Water and Power

The following summarizes pertinent environmental investigations performed to date. Soil sample locations from previous studies are displayed on Figure 3-1.

On December 18, 1996, DTSC collected one surface soil sample on the Site property and five surface soil samples from Santa Clara and Mateo streets immediately adjacent to the Site. Lead was detected at values ranging from 39,000 mg/kg to

420 mg/kg in the surface soil samples. The surface soil sample collected on Site contained lead at a concentration of 1,500 mg/kg

The City of Los Angeles, Department of General Services, Division of Standards, collected surface and subsurface soil samples within paved streets and the exposed soil right-of-way near the former metals melting facilities. The soil samples were collected during April and May 1997. The highest lead concentration observed in these soil samples was 52,900 mg/kg (see Figure 3-1 for sample location summary). Soil sample results from six locations in the right-of-way were above the total threshold limit concentration (TTLC) for California hazardous waste (TTLC is 1000 mg/kg for lead).

In comparison, DTSC files indicate lead concentrations in soil up to 574,000 mg/kg at the Western Lead site. A number of soil samples at the Western Lead site exceeded 10,000 mg/kg, or 10 times the TTLC, for lead.

In May 1999, Acton Mickelson Environmental, Inc. collected soil samples from eight Site locations (7 inside the warehouse and 1 in the parking lot). AME analyzed samples from primarily native material, and tended to exclude "fill" samples from analyses. These sample depths ranged from 3.5 to 21.5 feet bgs. Sample results for lead ranged from 2.2 mg/kg to 2910 mg/kg. The AME Sampling and Analysis Report is included in Appendix A.

3.5.1.2 Site Owner/Operator Records

Owner/Operator records regarding metal refining operations at the Site are not available (these operations ceased prior to 1966). The current owners have operated a warehouse at the Site since 1971. Warehouse operations are not likely to have impacted Site subsurface soils. Inspection of the warehouse floor and asphalt parking lot during the January 2001 Site walk with DTSC, showed no evidence of staining or spills.

3.5.1.3 Topographic Map Review

The USGS topographic map (Los Angeles Quadrangle, 7.5-minute Series, 1981) reviewed for this project shows the area surrounding the Site as essentially flat. Elevation at the Site is approximately 130 feet above sea level, with topography sloping gently to the south. Topography appears to be controlled by the Los Angeles River, located approximately 2000 feet to the east, flowing south. Based on review of aerial photographs (Section 2.6.1.4), Site topography has not changed significantly over time.

The warehouse floor is approximately 2 to 4 feet above ground surface. Drainage of stormwater from Site and adjacent properties, and flow to sanitary sewer was not evaluated.

3.5.1.4 Aerial Photograph Review

Historic aerial photographs available from the Fairchild Aerial Photography Collection at Whittier College were review for coverage of the Site. Aerial photographs showing the Site and surrounding area were reviewed for the years 1940, 1947, 1952, 1956, 1960, 1964, and 1971. The following observations are made based on the aerial photographs:

- The 1940 aerial photograph shows the Site has not been developed.
- The 1947 aerial photograph shows the foundry and storage areas of the Site appear to be operational.
- Aerial photographs from 1952, 1956, 1960, and 1964 show the Site did not undergo significant changes during that time period.
- The aerial photograph from 1971 (April 1), shows that the Site buildings have been demolished, the ground appears bare, and has been graded flat consistent with the surrounding area.

3.5.1.5 Sanborn Map Review

A review of Sanborn Fire Insurance maps obtained from EDR for the years 1906, 1950, 1953, 1954, 1959, 1960, 1967, and 1970 shows development of the Site consistent with observations made in Section 2.6.1.4. The Sanborn Maps were included in Appendix D of the PEA Work plan (CDM, 2001). The following observations were made:

- The 1906 map shows the Site is not developed. The area appears to be residential, mostly undeveloped, with a few residential buildings located to the west of the Site.
- The 1950 map shows the Site buildings have been constructed. The Site is listed as a "Smelter & Foundry," and the scrap metal shed, scrap metal yard, and unloading dock are marked on the Site property.
- The 1953 map shows the same buildings and facilities that were marked on the 1950 map. Three circular objects have been drawn on the map in the northwest corner of the Site. These features are marked as "Tanks" on the Sanborn maps. Although not specifically identified, these are most likely fuel tanks for the cupolas.
- Sanborn maps from 1954, 1959, 1960, 1967, and 1970 show the same Site features apparent on the 1953 map.

3.5.1.6 Assessor Information

General information regarding the Site (known as Assessor's Parcel No. 5167-011-030) was obtained by searching the City of Los Angeles parcel information database. A summary of the general parcel information was presented in Appendix E of the PEA Work plan (CDM, 2001).

3.5.1.7 Building Department Review

Los Angeles City Department of Building and Safety records show that a building permit was issued in 1951 to brace an existing smoke tower. Another building permit was issued in 1952 for replacement of an old smoke chamber. Building permits were issued in 1971 to demolish existing structures and to build the new warehouse.

3.5.1.8 City Directory Review

In the 1959 yellow pages, the Site was listed as Eastern Smelting and Refining, and advertised as a supplier of pig lead, caulking lead, and antimonial lead. The 1963 yellow pages list the Site as Metals Refining Co., and advertised as a supplier of lead, tin, and antimony alloys.

3.5.1.9 Oil and Gas Map Review

The Munger Map of California and Alaska Oil and Gas Fields, dated 1997, was reviewed for oil and gas wells located on or near the Site. Wells were not depicted on the Site.

4 Section Four

Section 4
Apparent Problem

The overall objective of this PEA is to determine and document the presence of hazardous substances and/or wastes at the Site. In 1995, the Department of Toxic Substance Control (DTSC) conducted a screening evaluation of the potential adverse health effects from exposure to lead in the Site soil and determined that the Site did not pose an immediate threat to public health or the environment. In 1996 and 1997, DTSC and the City of Los Angeles collected soil samples from the Site and adjacent streets for analytical testing. Based on these data, DTSC identified antimony, arsenic, cadmium, chromium, copper, lead, and zinc as being metals of potential concern. Lead was identified as the primary metal of concern.

In July 1999, on behalf of Whittaker Corporation, Acton Mickelson Environmental, Inc. (AME) collected thirty-one soil samples from 8 locations throughout the Site. Samples were analyzed primarily from native soil. Soma Corporation used these data combined with the previous DTSC and City of Los Angeles data to conduct a risk evaluation of the Site in September 1999. Upon review of the AME report and the Soma Corporation evaluation, DTSC (in their letter dated June 22, 2000) required Whittaker Corporation to develop and execute a PEA for the former Eastern Iron and Metal Co. property. The AME Sampling and Analysis Report has been included in Appendix A. Data collected for this PEA and from the AME sampling event are used to complete the human health screening evaluation presented in Section 7.

5 Section Five

Section 5
Environmental Setting

General information related to exposure pathways are presented in this section A detailed discussion of exposure pathways considered for the human health screening evaluation is presented in Section 7

5.1 Factors Related to Soil Pathways

The topography of the Site and surrounding area are flat with a gentle slope toward the Los Angeles River to the east The Site is primarily a warehouse, with the concrete warehouse floor approximately 4 to 5 feet above ground surface The warehouse floor was raised above ground surface to facilitate loading/unloading. The warehouse covers approximately 90 percent of the Site, with the remainder of the Site consisting of an asphalt-covered parking lot There is no evidence of any exposure to Site soil. The concrete warehouse floor and the asphalt parking lot are in good condition, and preclude both infiltration of precipitation and contact of any surface water runoff with Site soil as well as any direct exposure to Site soils.

No evidence of releases can be observed from visual inspection at the Site. Soil, vegetation, and wildlife are not visible

5.2 Factors Related to Water Pathways

There has not been a release or threatened release to water at the Site. Because the Site is completely covered, there is no opportunity for Site soils to impact surface or groundwater. The depth to groundwater at the Site coupled with the lack of infiltration, make it unlikely that the metals in Site soil could leach to groundwater. Metals in soil are not typically mobile, and in the absence of surface water infiltration, are unlikely to affect groundwater. The AME data, that show metals concentrations in native soil are less than concentrations in fill soil, support the observation that metals are not migrating downward.

5.3 Factors Related to Air Pathways

Because the Site is completely covered, there is no chance for the metals identified in Site soils to become airborne. No documented release to the atmosphere was found, and no threat exists as long as the Site is completely covered with asphalt and concrete.

6
Section Six

Section 6
Sampling Activities and Results

6.1 Sampling Objectives and Rationale

The overall objective of this PEA is to determine and document the presence of hazardous substances and/or wastes at the Site The specific objectives of the field investigation include:

- Identify the nature and extent of lead and other Title 22 metals concentrations in Site soils, in both fill and native materials.
- Identify the areas with the highest levels of contamination (if any).
- Provide sufficient analytical data of acceptable quality to perform the PEA screening to estimate the risk to human health and environment.

The sampling performed by CDM supplements the AME data by focusing primarily on fill material. The sampling strategy including soil boring locations were given verbal approval by DTSC in the project-scoping meeting (January 11, 2001) and during the Site-walk (February 5, 2001). DTSC was present during the geophysical utility clearance and gave verbal approval for the final locations (2/21/02).

Based on DTSC comments on the February 2002 sample results, CDM collected additional soil samples from boring C-02. DTSC requested deeper drilling to determine the extent of fill soil at that boring, and sampling to confirm that the elevated metals concentrations observed in C-02 soil samples has been delineated. CDM agreed to collect a soil sample from immediately beneath the fill/native soil contact and from 5 feet below the fill/native soil contact

6.1.1 Soil Sampling

Figure 3-2 shows the soil boring locations. The soil borings were drilled and soil samples collected according to the Sampling and Analysis Plan presented in the PEA Work plan (CDM, 2001). No deviations from the proposed sampling plan were noted during field operations. The soil sampling activities are summarized below:

- Nine soil borings to depths of 15 feet below ground surface (bgs) were completed at the Site during February 2002 The soil borings were chosen to provide additional horizontal and vertical coverage of shallow subsurface soils.
- Soil samples were collected at depths of 1, 5, 10 and 15 feet bgs for the February 2002 investigation. The range of sample depths was chosen to assess shallow soil conditions not addressed by AME. The deeper soil sample results will be used in conjunction with the AME data to assess the vertical distribution of metals in Site soils.

- CDM collected soil samples from depths of 21 and 26 feet bgs from C-02B (six inches from original C-02) on October 17, 2002.

6.1.2 Soil Analytical Program

Soil samples obtained during the PEA investigation were analyzed by California Code of Regulations (CCR) Title 22 Metals by EPA Methods 6000/7000 series.

Information about the inorganic compounds analyzed by the analytical method and the proposed quantitation limits is included in Section 3.3 of the PEA Work plan (CDM, 2001).

6.2 Sampling Methods and Procedures

This section summarizes the methods and procedures that were used to collect surface and subsurface soil samples for lithologic description and laboratory analysis. All field work was performed under the supervision of a California Registered Geologist. A Site Health and Safety Plan (HASP) was prepared in accordance with 29 Code of Federal Regulations (CFR) 1910.120 and 8 California Code of Regulations (CCR) 5192 and was included as Appendix F of the PEA Work plan.

6.2.1 Drilling Methods

Underground Service Alert (USA) was notified prior to drilling to locate existing underground utilities and obstructions. A geophysical survey using Ground Penetrating Radar (GPR) and Electro Magnetic (EM) techniques was conducted to identify buried structures or piping and determine final boring locations. Warehouse as-built drawings were requested from the current Owner/Operator to locate utilities beneath the warehouse floor, but were not provided.

The soil borings were advanced using a hydraulically-driven Geoprobe™ sampling system. Concrete coring was used to access Site soils inside the warehouse. The soil sampling proceeded according to the PEA Work Plan, and no significant deviations were noted by the field geologist.

Groundwater was not encountered in any of the soil borings. In fact, the field geologist noted very low moisture content on all of the soil samples logged.

6.2.2 Soil Sample Collection Methods

A total of 36 soil samples were collected and sent to the laboratory for analysis. Soil samples were collected according to the PEA Work Plan. No deviations from the Work Plan were noted during field operations.

6.2.3 Field Screening Procedures

Once brought to the surface, the samples were observed for signs of contamination based on visible staining or discoloration and the presence of unusual odors Field screening results were recorded in the field logbook and on the borehole log. Field screening of Site soils using the PID showed no signs of contamination from organic materials.

6.2.4 Containment and Disposal of Investigation-Derived Waste

Investigation-derived waste (IDW) generated during field activities generally includes: drill cuttings; decontamination fluids; any used personal protective equipment (PPE), debris (e.g , empty cement bags, etc), and miscellaneous disposable sampling equipment All drill cuttings and decontamination fluids was assumed to be hazardous waste and labeled as such All drilling and sampling equipment was removed from the Site at the end of each day One drum containing soil cuttings and decon water was placed in the warehouse area and secured. The drum was clearly labeled and with material, sample date, etc. The analytical data have been received and the waste profiling is complete. This information has been presented to the Site owners so that the container may be removed for off-site disposal.

6.3 Summary of Drilling Observations

CDM advanced ten soil borings for this PEA (including the additional drilling of boring C-02B), and collected soil samples primarily from fill material. The soil boring logs are presented in Appendix B. Additionally, AME advanced eight soil borings during their 1999 investigation (Appendix A), and analyzed soil samples primarily from native material.

Three geologic cross-sections were derived based on the field observations (including the AME boring logs) The cross-section location map is presented on Figure 3-3 The geologic cross-sections are shown on Figures 3-4 through 3-6 The cross-sections show the "fill" beneath the warehouse floor to consist of approximately 3 to 15 feet of predominately clays and silts. Bricks, possibly foundry sand, and some material that is possibly slag were found at various intervals in the "fill" interval

The native material was obvious due to increased downward pressure required during soil sampling, and also the lack of bricks and other materials noted in the "fill." These native materials consisted of predominately well-sorted to poorly-sorted sands and silty sands

6.4 Laboratory Analytical Results

The analytical laboratory chosen to perform the analyses of samples collected during this project was certified by California Department of Health Services (CA DHS) for hazardous waste analysis CalScience, of Orange California, performed the analyses. In general, the laboratory adhered to those recommendations as promulgated in criteria described in "Test Methods for the Analysis of Solid Wastes, " (SW-846, 3rd Ed); and the Federal Register "40 CFR Part 136", October 1984. All method-specific quality control measures, such as external and internal standard calibration procedures, instrument performance verifications, quantitation using method of standard additions, etc , which are suggested within any referenced method (e g , gas chromatograph [GC] methods in SW-846) were performed

The soil samples were analyzed according to the QA/QC plan specified in the PEA Work Plan No deviations were noted. Specific comments on data usability are presented in Section 7

All laboratory data are presented in Appendix C Elevated metals were identified in Site soil samples collected for this PEA. California hazardous waste standards were exceeded for Antimony (maximum value of 5,120 mg/kg), Arsenic (maximum value of 3,410 mg/kg), copper (maximum value of 41.2 mg/kg), and lead (maximum value of 25,700 mg/kg) Section 7 discusses the analytical data in much greater detail.

Figure 3-2 shows the location and depth for sample results for these metals in Site soil The elevated concentrations appear to be limited to "fill" material beneath the warehouse both laterally and vertically Although there are elevated concentrations throughout the Site, the highest reported detection of arsenic, antimony, copper and lead all come from one sample (C-02 at 15 feet) The "extreme" high values associated with sample C-02-15 appear to be isolated. Deeper samples collected by AME did not show indication of metals impacted native soil at depth

CDM collected additional soil samples at C-02 (C-02B) in October 2002. Fill material was observed to a depth of 20 feet bgs Soil samples were collected from native soil at 21 and 26 feet bgs to confirm that the vertical extent of elevated metals observed in sample C-02-15 has been delineated The concentration of Title 22 metals in C-02B-21 and C-02B-26 are consistent with concentrations observed in other Site native material samples.

7 Section Seven

Section 7
Human Health Screening Evaluation

The purpose of the human health screening evaluation (HHSE) is to provide an estimate of the potential chronic health hazard and risk from contamination at the Site This evaluation is divided into the following five components:

Section 7.1, Exposure Pathways and Media of Concern, describes the exposure routes and media of exposure that are considered in the HHSE

Section 7.2, Exposure Point Concentrations and Chemical Groups describes the analytical data and their adequacy for inclusion in the HHSE, defines the chemicals of potential concern (COPCs) for human health, and calculates the exposure concentrations.

Section 7.3, Toxicity Values and Summary Tables, summarizes the potential for each COPC to cause adverse effects in exposed individuals

Section 7.4, Risk Characterization and Summary Tables, combines the risk characterization with the toxicological criteria presented in the toxicity assessment to estimate carcinogenic risks and noncarcinogenic hazards.

Section 7.5, Uncertainty Analysis, describes the impact of uncertainties associated with the database, exposure assumptions, and toxicity assessment on the final step of the risk assessment and risk characterization

7.1 Exposure Pathways and Media of Concern

The Site conceptual exposure model is a description of potential exposure pathways associated with the Site, including potential sources of contamination, transport mechanisms, exposure routes, and potentially exposed populations Only exposure pathways likely to be complete and to contribute significantly to overall exposure are evaluated quantitatively in the HHSE.

A complete exposure pathway consists of the following four elements:

- A source and mechanism of release of chemicals to the environment
- A transport medium for the released chemical
- An exposure point (the point of potential contact between receptor and medium)
- An exposure route (e.g., inhalation, ingestion)

The site conceptual exposure model for the Site, illustrated in Figure 7-1, highlights pathways that are potentially complete and significant. These pathways have been selected for quantitative evaluation.

In accordance with PEA guidance, potentially exposed populations are assumed to be an adult resident and a child resident (CalEPA, 1999). Actual onsite receptors, industrial workers and future construction workers, will have less potential for exposure because they spend less time at the Site than residents would in their homes. Furthermore, the Site is completely covered by a concrete floor or asphalt pavement. Therefore, soil pathways are not expected to be complete. However, these pathways are evaluated in this report as a worst-case scenario.

7.1.1 Potential Exposure Pathways

As discussed in the April 6, 2001 PEA Work plan for the Site, the purpose of the PEA Sampling and Analysis was to document the presence of hazardous substances and/or wastes that may be present at the Site. As such, the focus of the sampling was on the Title 22 metal concentrations in the soil. No other compounds (such as VOCs or SVOCs) nor media (such as groundwater or soil gas) are evaluated in this analysis.

7.1.1.1 Soil

Metals were detected in the near-surface soils (upper 10 feet bgs). As a result, human receptors could theoretically become exposed to contaminants through direct contact with contaminated soil or inhalation of COPCs released to air through fugitive dust.

7.1.1.1.1 Incidental Ingestion and Dermal Contact with Contaminated Soil

The Site is completely covered with asphalt/concrete pavement, the main building, or other structures that prevent contact with underlying soil. For the purposes of this PEA, the Site is assumed to be uncovered (unpaved) and exposure to COPCs in subsurface soil could occur. If soil is exposed, a potential receptor could be in physical contact with the soil (dermal exposure), and could incidentally ingest soil particles.

7.1.1.1.2 Inhalation of Contaminated Soil in Fugitive Dust/Ambient Air

Although the Site is completely covered with asphalt/concrete pavement, the main building, or other structures that prevent contact with underlying soil, this PEA assumes that the Site is not covered (unpaved) and that exposure to COPCs in subsurface soil could occur. If the Site is uncovered, soil particles could be entrained in the air during soil disturbance and inhaled by a potential receptor.

7.1.1.1.3 Inhalation of Volatile Chemicals Migrating to Indoor Air

Soil contaminants could volatilize into soil gas and seep through foundation cracks of on-Site buildings into indoor air and be inhaled by a potential receptor. However, the identified soil contaminants at the Site are inorganics, which are essentially nonvolatile. Inhalation of contaminants in fugitive dust thus adequately describes exposure to soil contaminants through inhalation. Therefore, no quantitative evaluation of inhalation of volatile chemicals in indoor air is necessary.

7.1.1.2 Groundwater

Human exposure to contaminated groundwater may occur if municipal or private wells draw from a contaminated source However, according to the Los Angeles County Department of Public Works, no water supply or observation wells are within a three-mile radius of the Site Groundwater is not expected (currently and in the future) to be used as drinking water by the Site Groundwater near the Site is estimated to be at approximately 30 feet to 35 feet bgs, and the deepest soil contamination measured in borings conducted at the facility was 21 feet bgs. Metals in subsurface soils are not expected to migrate to groundwater under current conditions because impervious covers (pavement and buildings) greatly attenuate or eliminate infiltration of precipitation. Further, given ready availability, the facility at the Site likely will continue to use water from the City's distribution system and will not install a well at the site to draw and use shallow groundwater from beneath the Site. Receptors at the Site will not be exposed to contaminants in groundwater and this exposure pathway is not quantitatively evaluated in this HHSE.

No surface water features exist on the Site, and no potential for discharge of contaminated groundwater to surface water has been identified. This evaluation includes consideration of storm water, but this pathway is not evaluated further because no potential for exposure to contaminated surface water exists on the site.

7.1.2 Summary of Populations and Exposure Pathways Selected for Quantitative Evaluation

7.1.2.1 Soil

Since the Site is covered with useable buildings and asphalt/concrete pavement, long-term exposure to Site soils will not occur in the foreseeable future. However, in accordance with the PEA guidance, the Site is assumed to be unpaved and exposure to surface soil (to a depth of 10 feet bgs), and subsurface soil will occur, which provides for an extremely conservative scenario for potential exposure. Depths of soil samples ranged from 0.5 feet to 26 feet bgs, and all of these data are included in the calculation of the exposure concentrations.

Following PEA guidance, potentially exposed populations are assumed to be adult and child residents (CalEPA 1999). Actual on-Site receptors are current and future industrial workers and future construction workers. As mentioned above, the Site is completely covered with asphalt/concrete pavement, the main buildings, or other structures that prevent contact with underlying soil. If this condition were to be changed and the Site were uncovered, adult and child residents would hypothetically be exposed through incidental ingestion and dermal contact with the soil, as well as inhalation of soil particles entrained as fugitive dust. Residential development of the site is highly unlikely, but is included in the analysis based on regulatory guidance.

Although not required for the PEA HHSE, actual on-Site receptors, industrial workers and future construction workers, are retained as potential receptors and evaluated for Site exposure. This exposure scenario is currently the only realistic one for the Site for the foreseeable future. Given the industrial zoning of the Site and its surroundings, the Site is likely to remain industrial in the future. Construction workers may be exposed if any demolition or reconstruction of the Site is performed in the future.

7.2 Exposure Point Concentrations and Chemical Groups

This section describes analytical data from the supplemental investigation performed at the Site and their adequacy for inclusion in the HHSE. Section 7.2.1 discusses CDM's evaluation of the investigation data quality and representativeness and identifies data usable for the HHSE. Section 7.2.2 summarizes the selection of chemicals of potential concern (COPCs) for the Site, and Section 7.2.3 summarizes the methodology for the calculation of the exposure point concentrations for the COPCs

7.2.1 Data Quality and Data Representativeness

7.2.1.1 Data Considered of Adequate Quality for the HHSE

Soil data were evaluated by CDM for usability in the screening HHSE. Soil data were obtained from three sources: AME 1999 Sampling and Analysis Report and CDM's February 2002 sampling event and CDM's October 2002 sampling event. Data evaluation was performed in accordance with procedures recommended by USEPA (1990a), and included consideration of the following data quality/data representativeness issues: source and recentness of data, sampling locations, adequacy of documentation, data quality control, adequacy of analytical methods, reporting limits, completeness, and comparability. Soil data from the AME 1999 report and CDM soil data collected in February 2002 and October 2002 were considered useable for the screening HHSE.

7.2.1.2 Adequacy and Representativeness of Database for Calculation of Exposure Point Concentrations

Several criteria are considered when assessing data needs for calculation of exposure point concentrations These include comparability of data from different sources, adequacy of the size of the data sets, and proper selection of sampling locations for evaluation of different pathways. USEPA's (1990a) Guidance for Data Usability in Risk Assessment cites data representativeness as one of the main criteria that must be evaluated when selecting data for use in the HHSE Representativeness is defined as the extent to which data accurately characterize contamination that people using a site might contact Data representative for the HHSE must reflect the characteristics of the Site, should be of high quality, and must adequately represent data needs for each exposure pathway to be evaluated.

7.2.1.2.1 Surface and Subsurface Soil

Human exposure to surface and subsurface soil is evaluated in the HHSE. Fifty -one soil samples (not including two duplicates) taken from 17 locations at depths ranging from 1 foot bgs to 26 feet bgs and analyzed for CCR Title 22 metals were considered for use in the HHSE An additional 28 soil samples were taken from 9 of these same locations at depths ranging from 0.5 feet bgs to 21 feet bgs and analyzed for lead only.

Soil samples evaluated were collected at locations spread across the Site Sample locations were chosen in areas with suspected or past contamination and in other areas to provide spatial coverage As a result, exposure point concentrations calculated from these data are unlikely to underestimate soil contamination and are likely somewhat biased toward locations of contamination. Because of this bias, use of available Site data will therefore provide a conservative estimate (overestimate) of risk, . Overall, risk estimates are likely to dramatically overestimate potential site risks because almost all of the Site soils are inaccessible during normal operations due to the asphalt pavement and structures, and this condition is unlikely to change significantly in the foreseeable future.

Soil data considered in this screening HHSE are provided in Appendix D. To prevent overrepresentation by samples with duplicates, each duplicate and original pair of data were averaged to produce a single result. If a compound was detected in one sample and not in the duplicate, only the detected concentration was used.

Soil data were divided into three categories – fill, native surface soils, and native subsurface soils -- prior to conducting statistical analyses. This division of data was performed to assist the risk manager in identifying sources and locations of greatest concern. The three datasets are described in the following sections.

7.2.1.2.2 *Fill Soil*

The fill soil dataset consists of 19 soil samples (not including two duplicates) taken from 9 locations at depths ranging from 1 foot bgs to 15 feet bgs and analyzed for CCR Title 22 metals. An additional 5 soil samples were taken from 3 locations at depths ranging from 0.5 feet bgs to 5 feet bgs and analyzed for lead only. Fill soils were differentiated from native soils by the field geologist during drilling. Fill soils contained brick fragments, slag, foundry sand, and other materials to distinguish them from native soils.

Only one soil sample in this dataset was collected from a depth of 15 feet bgs. All other samples were collected from less than or equal to 10 feet bgs. Metals concentrations in the 15-foot-bgs sample within an order of magnitude of typical fill sample concentrations at shallower depths. All fill samples were grouped together without separating the one subsurface soil sample from the surface soil samples. Concentrations of metals in deeper fill could be overestimated using this approach, but data are insufficient for a complete analysis. Soil data included in the fill data subset are provided in Appendix D-1 and summarized in Table 7-1.

7.2.1.2.3 *Native Soil*

Native soils at the site were identified based on being more difficult to advance the rods during drilling, and the lack of materials like brick fragments noted in the fill material. Because future residents or industrial workers would be most likely to be exposed to the surface soils and contamination in soil was greater in the surface soil than in the subsurface soil, native soils were divided into two categories – native surface soils and native subsurface soils. Construction workers may also only be exposed in the future to only shallower soils if no extensive excavation is performed. These two datasets are described in the following sections

7.2.1.2.3.1 Native Soil - Surface

For this evaluation, native surface soil was defined to include all soil samples from depths ranging from 0.5 feet bgs to 10 feet bgs. This subset of data consists of 13 soil samples taken from 9 different locations and analyzed for CCR Title 22 metals. An additional 3 soil samples were taken from 2 locations and analyzed for lead only. Soil data included in this subset are provided in Appendix D-2 and summarized in Table 7-2.

7.2.1.2.3.2 Native Soil - Subsurface

Native subsurface soil was defined as soil samples from depths greater than 10 feet bgs. This subset of data consists of 19 soil samples taken from 15 different locations at depths ranging from 10.5 feet bgs to 26 feet bgs and analyzed for CCR Title 22 metals. An additional 20 soil samples were taken from 9 locations and analyzed for lead only. Soil data included in this subset are provided in Appendix D-3 and summarized in Table 7-3.

7.2.1.3 Reporting Limits

Reporting limits for the 2002 soil samples were at or below proposed reporting limits in the Work plan for all metals except arsenic, barium, beryllium, selenium, and zinc. However, barium and zinc were detected in all samples above the reporting limit, and detection frequencies for arsenic (95%) and beryllium (74%) were high, suggesting that no underestimation of Site concentrations occurred as a result of high reporting limits. Site concentrations of selenium could be somewhat underestimated; however, as discussed in later sections, selenium, even at the highest detected concentrations does not appear to represent a significant human health threat.

Overall, reporting limits for the 2002 soil samples were appropriate to ensure protection of human receptors for the data selected for use in the HHSE. Reporting limits for the 1999 data were higher than the reporting limits for the 2002 soil samples; however, they were sufficiently low and appropriate to ensure protection of human receptors for the data selected for use in the HHSE. The XRF analysis by the mobile laboratory for lead had higher reporting limits than the reporting limits of the fixed laboratory, but given the relatively high lead concentrations at the Site, the mobile laboratory reporting limit for lead was sufficiently low and appropriate to ensure protection of human receptors for the data selected for use in the HHSE.

7.2.2 Chemicals of Potential Concern (COPC)

This section discusses methods used to select COPCs for the Site. Only COPCs are evaluated quantitatively in the HHSE. COPCs were selected according to procedures outlined in the PEA Guidance Manual. The PEA Manual recommends consideration of the following in the selection of COPCs:

- Comparison with background data
- Evaluation of analytical methods
- Evaluation of reporting limits
- Evaluation of qualified data
- Evaluation of blanks

As discussed in Section 7 2.2, data available for the HHRA were considered adequate to represent concentrations at the Site. Since no background data were available for the Site, all detected compounds were selected as COPCs Thallium was the only compound that was analyzed for but not detected above the detection limits for all three datasets. Silver was not detected above detection limits in the native subsurface soil dataset. All other compounds were detected in samples from all three datasets at frequencies higher than 5 percent.

7.2.3 Exposure Point Concentrations

7.2.3.1 Methodology

Statistical methods were used to estimate exposure concentrations following USEPA guidance (USEPA, 1997). Version 2 of USEPA's ProUCL program developed by Lockheed Martin in May 2001 was used for calculating the exposure point concentration. The upper confidence limit (UCL) is often used to compare analytical results to a regulatory threshold. The 95% UCL is defined as the limit where you are 95% sure that the true population mean is lower than the 95% UCL. If the 95% UCL is higher than a regulatory threshold, it is an indication that the actual average concentration may exceed that threshold. For the purposes of preparing this PEA report, the 95% UCL is used as the exposure point concentration (USEPA, 1997)

Using the ProUCL program, exposure concentrations were calculated using several steps First, the dataset was checked for normality using the Shapiro-Wilk W Test for datasets with less than 50 points. Then 95% UCLs were calculated using the appropriate statistic based on whether the distributions were normal, lognormal or neither. Calculation results are provided in Appendix E Formulas used for the calculation are provided in the user's guide for ProUCL. When samples did not contain detectable levels of a contaminant, one-half of the reporting limit was substituted for calculating UCL and average exposure point concentrations. Sample-specific reporting limits, taken from laboratory data sheets, were used for all "nondetects" unless the reporting limit exceeded the maximum detection for the chemical. In the latter case, the data point was excluded from the calculations. If the ProUCL-recommended calculated UCL was greater than the maximum detected on-Site concentration or if ProUCL provided no recommendation, the UCL calculated by an appropriate statistic was used.

7.2.3.2 Summary

A summary of the exposure concentrations for the fill soil, native soil - surface, and native soil - subsurface soil datasets is provided in Table 7-4 For a third of the COPCs soil data distributions were non-parametric, and a statistic such as the standard bootstrap was used to calculate the 95% UCL Somewhat less than half of the COPCs had lognormal distributions, and generally ProUCL recommended statistics were used for UCLs. The ProUCL calculation output is provided in Appendix E.

Table 7-4 also provides generic background estimates for California. These values were not used in COPC screening and are provided for reference only. Background issues are, however, critical to interpretation of risk results and are further discussed under Uncertainties (Section 7.4) The background values used for comparison in Table 7-4 were taken from a report on metals concentrations in California soils performed by the Kearney Foundataion (Bradford, et. al , 1996)

7.3 Toxicity Values and Summary Tables

The purpose of the toxicity assessment is to evaluate the potential for each COPC to cause adverse effects in exposed individuals. Adverse effects include both noncarcinogenic and carcinogenic health effects in humans.

Sources of toxicity information include, in order of descending priority, are:

- Office of Environmental Health Hazard Assessment (OEHHA)
- USEPA's Integrated Risk Information System (IRIS)
- Health Effects Assessment Summary Tables (HEAST), and USEPA criteria documents
- Agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profiles

The hierarchy of toxicological information sources used in this risk assessment follows PEA Manual (CalEPA 1999).

This section explains how toxicity criteria for carcinogens and noncarcinogens are developed and expressed, and summarizes toxicity values for each COPC. Individual chemical profiles in support of toxicity values are presented in Appendix F. These profiles describe important toxicokinetic findings (absorption into, distribution in, metabolism by, and excretion from the body), outline major adverse effects, discuss uncertainties and important data gaps, and summarize important studies used in the derivation of toxicity values. The general basis for the development of toxicity values for carcinogens and noncarcinogens is presented in subsections 7.3.1 and 7.3.2, respectively, along with a summary of the toxicity values for all COPCs.

7.3.1 Carcinogens

7.3.1.1 Evidence of Carcinogenicity

USEPA has developed a classification system for carcinogens, which characterizes the overall weight of evidence of carcinogenicity based on the availability of human, animal, and other supportive data. Three major factors are considered:

- The quality of evidence from human studies
- The quality of evidence from animal studies
- Other supportive data assessed to determine whether the overall weight of evidence should be modified

USEPA classification system for the characterization of the overall weight of carcinogenicity has the following five categories:

1. Group A - Human Carcinogen. This category indicates that there is sufficient evidence from epidemiological studies to support a causal association between an agent and cancer.
2. Group B - Probable Human Carcinogen. This category generally indicates that there is at least limited evidence from epidemiological studies of carcinogenicity to humans (Group B1) or that, in the absence of adequate data on humans, there is sufficient evidence of carcinogenicity in animals (Group B2).
3. Group C - Possible Human Carcinogen. This category indicates that there is limited evidence of carcinogenicity in animals in the absence of adequate data on humans.
4. Group D - Not Classified. This category indicates that the evidence for carcinogenicity in animals is inadequate.
5. Group E - Evidence of Noncarcinogenicity to Humans. This category indicates that there is evidence for noncarcinogenicity in at least two adequate animal tests in different species or in both epidemiological and animal studies.

7.3.1.2 Cancer Slope Factors

USEPA Cancer Assessment Group (CAG) (now the Cancer Review and Validation Effort, or CRAVE Committee) has used a variety of specialized models to estimate the upper bound risk of carcinogenesis for more than 50 compounds. Data from animal or epidemiological studies are used to determine slope factors, which are expressed as $(mg/kg\text{-}day)^{-1}$ for a lifetime exposure. The cancer slope factor (CSF) describes the increase in an individual's risk of developing cancer over a 70-year lifetime per unit of exposure where the unit of exposure is expressed as mg/kg-day.

CSFs are calculated using methods protective of human health and are based on the assumption that cancer risks decrease linearly with decreasing dose The 95 percent upper confidence limit estimate for the slope is used in most cases to compensate for animal to human extrapolation and other uncertainties The resulting CSFs are considered to be upper range estimates that are unlikely to underestimate carcinogenic potential in humans.

When the upper-bound CSF is multiplied by the lifetime average daily dose of a potential carcinogen, the product is the upper-bound lifetime individual cancer risk associated with exposure at that dose The calculated risk is thus an estimate of the increased likelihood of cancer resulting from exposure to a chemical For example, if the product of the CSF and the average daily dose is 1×10^{-6}, the predicted upper-bound cancer risk for the exposed population is one in one million, or 0.0001 percent This risk is in addition to any "background" risk of cancer not related to the chemical exposure

Calculation of risk often relies on data derived from chronic animal bioassays The likelihood that an animal carcinogen is also a human carcinogen is a function of the following factors:

- The number of tissues affected by the chemical
- The number of animal species, strains, sexes, and number of experiments and doses showing a carcinogenic response
- The occurrence of clear-cut dose-response relationships as well as a high level of statistical significance of the increased tumor incidence in treated compared to control groups
- A dose-related decrease in time-to-tumor occurrence or time-to-death with tumor
- A dose-related increase in the proportion of malignant tumors

Animal studies are usually conducted using relatively high doses to observe adverse effects. Because humans are expected to be exposed at lower doses, data are adjusted using a mathematical model Data from animal studies are fitted to a linearized multi-stage model and a dose-response curve is obtained The low-dose slope of the dose-response curve is subjected to various adjustments (e.g., calculation of 95 percent UCL), and inter-species scaling factors are often applied to derive slope factors for humans. Dose-response data derived from human epidemiological studies are fitted to dose-time-response curves on an individual basis. These models provide conservative but plausible estimates of upper limits on lifetime risk. Although the actual risk is unlikely to be higher than the estimated risk, it could be considerably lower In some instances, it may even be zero

CSFs for carcinogenic COPC for the Site are listed in Table 7-5. Data used to develop CSFs for chemicals associated with the Site are summarized in the toxicity profiles presented in Appendix F.

7.3.2 Noncarcinogens

Reference doses (RfDs) are toxicity values developed by USEPA for chemicals exhibiting noncarcinogenic effects. RfDs are usually derived from no observable adverse effect levels (NOAELs) taken either from human studies, often involving workplace exposures, or from animal studies, and are adjusted downward using uncertainty or modifying factors. For example, a modifying factor of 2 to 10 may be applied if the database on a particular chemical lacks information on possible reproductive or developmental toxicity

Uncertainty factors are generally applied to adjust for the possibility that humans are more sensitive than experimental animals and that there may be sensitive subpopulations of humans (e.g., children, pregnant women, individuals with hay fever or asthma). Depending upon the information available, other factors may also be applied.

The RfD is intended as an estimate of the daily exposure to a COPC that would not cause adverse effects even if the exposure occurs continuously over a lifetime. RfDs are presented in units of mg/kg-day for comparison with estimated chronic daily intake into the body. Chronic exposure in this instance is not clearly defined, but need not be a lifetime exposure. Generally, exposures must continue for several years to be considered chronic. Intakes less than the RfD are not likely to cause adverse health effects. Chronic daily intakes greater than the RfD indicate a possibility for adverse effects. Whether such exposures actually produce adverse effects, however, is a function of a number of factors such as accuracy of uncertainty factors applied to the NOAEL, appropriateness of animal models used in studies extrapolated to humans, and potential for the chemical to cause effects in organs or systems (e.g., reproductive and immune systems) that have not been adequately studied. Generally, protective assumptions made by USEPA in deriving RfDs will, in most cases, mean that exposures slightly in excess of the RfD will be associated with a low risk for adverse effects, with the probability of adverse effects increasing with increasing exposure.

RfDs can be generated for subchronic exposures as well as chronic exposures. Subchronic is generally assumed to be exposures of several weeks to a few years. Since construction workers at the Site are expected to be exposed for no more than 8 weeks, a subchronic reference dose is most appropriate for assessing risks to these receptors. Subchronic RfDs are derived in the same manner as RfDs for chronic exposure, except that data from shorter term animal studies, or human exposures, are used. The RfDs for COPC for the Site are presented in Table 7-6.

7.4 Risk Characterization and Summary Tables

In the final step of risk assessment, exposure estimates are combined with the toxicological criteria presented in the toxicity assessment to estimate carcinogenic risks and noncarcinogenic hazards. Cancer risk estimates are presented in Section 7 4 1, and hazard estimates for noncarcinogens are presented in Section 7 4 2 Section 7 4 3 presents model results

7.4.1 Residential Scenario

7.4.1.1 Cancer Risk Estimates for Soil Matrix

7.4.1.1.1 Ingestion and Dermal Contact with Soil

To evaluate potential risks from exposure to carcinogens through ingestion and dermal contact for residents using the PEA procedure, soil concentrations are multiplied by cancer slope factors and a constant to develop upper range incremental lifetime cancer risks. Individual chemical cancer risks for soil were calculated using the following PEA equation (CalEPA 1999):

$$Risk_{soil} = (SF_o x C_s x(1.57x10^{-6})) + (SF_o x C_s x(1.87x10^{-5}) x ABS)$$

Where:	$Risk_{soil}$	=	Cancer Risk for Soil pathway
	SF_o	=	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$
	C_s	=	Concentration in Soil (mg/kg)
	ABS	=	Absorption Factor (dimensionless)

Constant values in this formula (1.57×10^{-6} and 1.87×10^{-5}) represent adult plus child resident intake parameters for ingestion and dermal exposure to soil, respectively. These constants are based on the following exposure factors:

- an incidental soil ingestion rate of 200 mg/day for a child resident and 100 mg/day for an adult
- an averaging time of 70 years
- an exposure frequency for soil ingestion of 350 days/year and an exposure frequency for dermal contact of 350 days/year for a child resident and 100 days/year for an adult resident
- an exposure duration of 6 years for a child resident and 24 years for an adult resident
- a body weight of 15 kilograms (kg) for a child resident and 70 kg for an adult resident
- 2,000 cm2 of skin surface area exposed for a child resident and 5,800 cm2 for an adult resident

- a soil to skin adherence factor of 1 mg/cm2

Chemical-specific absorption factors were obtained from Table 2 in the PEA Manual (CalEPA, 1999) and are shown on Table 7-7

Of the COPCs in site soil, only arsenic and cadmium are considered carcinogenic following oral and/or dermal exposure. Total cancer risk for residents due to ingestion and dermal contact with fill soil only at the Site is 3×10^{-3}. Arsenic accounts for more than 99 percent of this total cancer risk

Total cancer risk for residents due to ingestion and dermal contact with native surface soil at the Site is 3×10^{-5}. Arsenic accounts for more than 63 percent of this total cancer risk.

Total cancer risk for residents due to ingestion and dermal contact with native subsurface soil at the Site is 2×10^{-5}. Arsenic accounts for more than 91 percent of this total cancer risk.

The above cancer risk estimates exceed the target risk of 1×10^{-6} used in the PEA guidance. However, cancer risks associated with background concentrations of arsenic often exceed this threshold. The importance of background in interpretation of the above risks is discussed in detail in Section 7.5.1.

7.4.1.1.2 Inhalation of Soil Particles in Fugitive Dust

To evaluate potential risks from residential exposure to carcinogens through inhalation of soil particles in fugitive dust using the PEA procedure, soil concentrations are multiplied by a suspended particulate matter factor to estimate air concentrations. The air concentrations are then multiplied by cancer slope factors and a constant to develop upper range incremental lifetime cancer risks due to inhalation of fugitive dust. Individual chemical cancer risks for soil were calculated using the following PEA equations (CalEPA 1999):

$$C_a = C_s x(5x10^{-8})$$

$$Risk_{air} = SF_i x C_a x(0.149)$$

Where:

	$Risk_{air}$	=	Cancer Risk for Air pathway
	SF_i	=	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$
	C_a	=	Concentration in Air (mg/m^3)
	C_s	=	Concentration in Soil (mg/kg)

The constant value in the first formula (5×10^{-8}) represents the National Ambient Air Quality Standard for the annual average respirable portion (PM_{10}) of suspended particulate matter of 50 $\mu g/m^3$. The constant value in the second formula (0.149) represents adult plus child resident intake parameters for inhalation exposure to soil This constant is based on the following exposure factors:

- an ambient air inhalation rate of 10 m^3/day for a child resident and 20 m^3/day for an adult resident
- an averaging time of 70 years
- an exposure frequency for soil ingestion of 350 days/year
- an exposure duration of 6 years for a child resident and 24 years for an adult resident
- a body weight of 15 kilograms (kg) for a child resident and 70 kg for an adult resident

Results are shown on Table 7-8. Of the COPCs, only arsenic, beryllium, cadmium, chromium (VI), and nickel in the Site soil are considered carcinogenic following inhalation exposure. Total cancer risk for residents due to inhalation of fill soil through fugitive dust at the Site is 2 x 10^{-4}. Chromium accounts for more than 59 percent of this total cancer risk. Arsenic contributes 40% of this total cancer risk.

Total cancer risk for residents due to inhalation of native surface soil through fugitive dust at the Site is 6 x 10^{-5}. Chromium accounts for more than 95 percent of this total cancer risk.

Total cancer risk for residents due to inhalation of native subsurface soil through fugitive dust at the Site is 3 x 10^{-5}. Chromium accounts for more than 97 percent of this total cancer risk.

The above cancer risk estimates exceed the target risk of 1 x 10^{-6} used in the PEA guidance. However, cancer risks associated with background concentrations of arsenic and chromium often exceed this threshold, especially where all chromium in soil is assumed to be present as chromium (VI) The importance of background and of chromium speciation in soil in interpretation of the above risks is discussed in detail in Section 7.5.1

7.4.1.2 Hazard Quotients and Hazard Indices for Noncarcinogens in Soil Matrix

7.4.1.2.1 Ingestion and Dermal Contact with Soil

To evaluate noncancer health effects of residents through ingestion and dermal contact with soil, estimated chemical exposures are compared to RfDs to determine if exposures are within a range that is likely to cause adverse health effects. The ratio of exposure to toxicity for a single chemical is called a hazard quotient (HQ) and was calculated using the following PEA equation:

$$Hazard_{soil} = ((C_s / RfD_o)x(1\ 28x10^{-5})) + ((C_s / RfD_o)x(1\ 28x10^{-4})xABS)$$

Where:

	$Hazard_{soil}$	=	Hazard for Soil pathway
	RfD_o	=	Oral Reference Dose (mg/kg-day)
	C_s	=	Concentration in Soil (mg/kg)
	ABS	=	Absorption Factor (dimensionless)

The constant values in this formula (1.28 x 10^{-5} and 1.28 x 10^{-4}) represent child resident intake parameters for incidental ingestion of and dermal contact with soil, respectively. These constants are based on the following exposure factors:

- an incidental soil ingestion rate of 200 mg/day
- an exposure frequency of 350 days/year
- an exposure duration and averaging time of 6 years, a body weight of 15 kg
- 2,000 cm^2 of skin surface area exposed, and soil to skin adherence factor of 1 mg/cm^2

Chemical-specific absorption factors were obtained from Table 2 in the PEA Manual (CalEPA, 1999) and are shown on Table 7-7.

HQ calculations for soil exposure are summarized in Table 7-7. The HQ is based on the assumption that a level of exposure (RfD) exists below which even sensitive populations are unlikely to experience adverse health effects. The hazard index (HI) is a summation of HQs for all of the individual chemicals. A HI greater than 1 indicates a potential for adverse health effects.

The calculated HI for ingestion and dermal exposure to fill soil at the Site for both adult and child residents is 107, which is above the target of one. Arsenic contributes 50% to the total hazard index, and antimony 48 percent.

The calculated HI for ingestion and dermal exposure to native surface soil at the Site for both adult and child residents is 2, which is above the target of one. Antimony contributes 54 percent to the total hazard index, and arsenic, cadmium, and copper each contribute roughly 10 percent.

The calculated HI for ingestion and dermal exposure to native subsurface soil at the Site for both adult and child residents is 0.7, which is below the target of one. Arsenic contributes 36 percent to the total hazard index, and antimony 32 percent.

7.4.1.2.2 *Inhalation of Soil Particles in Fugitive Dust*

To evaluate noncancer health effects of residents from exposure to noncarcinogens through inhalation of soil particles in fugitive dust using the PEA procedure, soil concentrations are multiplied by a suspended particulate matter factor to estimate air concentrations as described in Section 7.4.1.1.2. Estimated chemical exposures are then compared to RfDs to determine if exposures are within a range that is likely to cause adverse health effects. The ratio of exposure to toxicity for a single chemical is called a hazard quotient (HQ) and was calculated using the following PEA equation (CalEPA 1999):

$$Hazard_{air} = \frac{C_a}{RfD_i} x(0.639)$$

Where:	$Hazard_{air}$	=	Hazard for Air pathway
	RfD_i	=	Inhalation Reference Dose (mg/kg-day)
	C_a	=	Concentration in Air (mg/m^3)
	C_s	=	Concentration in Soil (mg/kg)

The constant value in the formula (0.639) represents the child resident intake parameters for inhalation exposure to soil. The constant is based on the following exposure factors:

- an soil inhalation rate of 10 m3/day for a child
- an averaging time of 6 years
- an exposure frequency for soil ingestion of 350 days/year
- an exposure duration of 6 years for a child
- a body weight of 15 kilograms (kg) for a child

The calculated HI for inhalation exposure to fill soil at the Site for a child resident is 0.4, which is below the target of one. Forty-seven percent of the total hazard index is attributable to exposure to barium. Antimony and arsenic each contribute roughly 25% to the total hazard index.

HQ calculations for soil exposure are summarized in Table 7-8. The calculated HI for inhalation exposure to native surface soil at the Site for a child resident is 0.03, which is below the target of one. Barium contributes 76 percent to the total hazard index.

HQ calculations for soil exposure are summarized in Table 7-8. The calculated HI for inhalation exposure to native subsurface soil at the Site for a child resident is 0.02, which is below the target of one. Barium contributes 83 percent to the total hazard index

7.4.2 Industrial Worker Scenario

7.4.2.1 Cancer Risk Estimates for Soil Matrix

7.4.2.1.1 Ingestion of and Dermal Contact with Soil

To evaluate potential risks of industrial workers from exposure to carcinogens through ingestion and dermal contact, soil concentrations are multiplied by cancer slope factors and exposure factors to develop upper range incremental lifetime cancer risks. Since the PEA equations are developed specifically for a residential scenario, the following equation from USEPA (1989) was used to calculate individual chemical cancer risks for ingestion of and dermal contact with soil:

$$Risk_{soil} = \frac{SF_o x C_s x EF x ED x 10^{-6}}{BW x AT} x[IR + (ABS x AF x SA)]$$

Where:	$Risk_{soil}$	=	Cancer Risk for Soil pathway
	SF_o	=	Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$
	C_s	=	Concentration in Soil (mg/kg)
	EF	=	Exposure Frequency (days/year)
	ED	=	Exposure Duration (years)
	BW	=	Body Weight (kg)
	IR	=	Ingestion Rate (mg-soil/day)
	AT	=	Averaging Time (days)
	ABS	=	Absorption Factor (dimensionless)
	AF	=	Soil to Skin Adherence Factor (mg/cm^2)
	SA	=	Surface Area (cm^2/event)

The constant value in this formula (10^{-6}) is a conversion from milligrams to kilograms. Exposure factors used for the industrial worker scenario are briefly identified below and summarized with references in Table 7-9.

- an incidental soil ingestion rate of 50 mg/day
- an averaging time of 25,550 days (70 years)
- an exposure frequency of 250 days/year – this is equivalent to a 5 day work week with 2 weeks off for vacation a year
- an exposure duration of 25 years for an adult
- a body weight of 70 kg
- 3,300 cm^2 of skin surface area exposed – this includes heads, hands, and forearms from the average of 50th percentile male and females over 18 years of age
- a soil to skin adherence factor of 1 mg/cm^2

Chemical-specific absorption factors were obtained from Table 2 in the PEA Manual (CalEPA, 1999) and are shown on Table 7-10.

Of the COPCs in Site soil, only arsenic and cadmium the Site soil are considered to be carcinogenic following ingestion and/or dermal exposure. Total cancer risk for industrial workers due to ingestion and dermal contact with fill soil at the Site is 8×10^{-4}. Arsenic accounts for more than 99 percent of this total cancer risk.

Total cancer risk for industrial workers due to ingestion and dermal contact with native surface soil at the Site is 5×10^{-6}. Arsenic accounts for 78 percent of this total cancer risk.

The total cancer risk for industrial workers due to ingestion and dermal contact with native subsurface soil at the Site is 4×10^{-6}. Arsenic accounts for 96 percent of this total cancer risk.

The above cancer risk estimates exceed the target risk of 1×10^{-6} used in the PEA guidance. However, cancer risks associated with background concentrations of arsenic often exceed this threshold. The importance of background in interpretation of the above risks is discussed in detail in Section 7.5.1.

7.4.2.1.2 *Inhalation of Soil Particles in Fugitive Dust*

To evaluate potential risks of industrial workers from exposure to carcinogens through inhalation of fugitive dust, air concentrations are multiplied by cancer slope factors and exposure factors to develop upper range incremental lifetime cancer risks. To calculate the air concentration from the soil concentration, soil concentrations were multiplied by a suspended particulate matter factor to estimate air concentrations as described in Section 7.4.1.1.2. Since the PEA equations are developed specifically for a residential scenario, the following equation from USEPA (1989) was used to calculate individual chemical cancer risks for inhalation of soil:

$$Risk_{air} = \frac{SF_i x C_a x InRxEFxED}{BWxAT}$$

Where:

	$Risk_{air}$	=	Cancer Risk for Air pathway
	SF_i	=	Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$
	C_a	=	Concentration in Air (mg/m^3)
	EF	=	Exposure Frequency (days/year)
	ED	=	Exposure Duration (years)
	BW	=	Body Weight (kg)
	InR	=	Inhalation Rate (m^3/day)
	AT	=	Averaging Time (days)

Exposure factors used for the industrial worker scenario are the same as identified in Section 7 4 2 1 1 and summarized with references in Table 7-9. An inhalation rate of 15.2 m^3/day was used for the industrial worker

Results for this pathway are summarized in Table 7-11. Total cancer risk for industrial workers due to inhalation of fugitive dust from fill soil at the Site is 8×10^{-5}. Arsenic accounts for more than 40 percent of this total cancer risk, and chromium 59 percent.

Total cancer risk for industrial workers due to inhalation of fugitive dust from native surface soil at the Site is 2×10^{-5}. Chromium accounts for more than 95 percent of this total cancer risk

Total cancer risk for industrial workers due to inhalation of fugitive dust from native subsurface soil at the Site is 1×10^{-5}. Chromium accounts for more than 97 percent of this total cancer risk

The above cancer risk estimates exceed the target risk of 1×10^{-6} used in the PEA guidance. However, cancer risks associated with background concentrations of arsenic and chromium often exceed this threshold, especially where all chromium in soil is assumed to be present as chromium (VI). The importance of background and of chromium speciation in soil in interpretation of the above risks is discussed in detail in Section 7 5 1.

7.4.2.2 Hazard Quotients and Hazard Indices for Noncarcinogens in Soil Matrix

7.4.2.2.1 Ingestion and Dermal Contact with Soil

To evaluate potential risks of industrial workers from exposure to noncarcinogens through ingestion and dermal contact, estimated chemical exposures are compared to RfDs to determine if exposures are within a range that is likely to cause adverse health effects. Since the PEA equations are developed specifically for a residential scenario, the following equation from USEPA (1989) was used to calculate individual chemical hazard quotients for ingestion of and dermal contact with soil:

$$Hazard_{soil} = \frac{C_s xEFxEDx\,10^{-6}}{RfD_o xBWxAT} x[IR + (ABSxAFxSA)]$$

Where:

	$Hazard_{soil}$	=	Hazard Quotient for Soil pathway
	RfD_o	=	Oral Reference Dose (mg/kg-day)
	C_s	=	Concentration in Soil (mg/kg)
	EF	=	Exposure Frequency (days/year)
	ED	=	Exposure Duration (years)
	BW	=	Body Weight (kg)
	IR	=	Ingestion Rate (mg-soil/day)
	AT	=	Averaging Time (days)
	ABS	=	Absorption Factor (dimensionless)
	AF	=	Soil to Skin Adherence Factor (mg/cm^2)
	SA	=	Surface Area (cm^2/event)

The constant value in this formula (10^{-6}) is a conversion from milligrams to kilograms. Exposure factors used for the industrial worker scenario are the same as identified in Section 7.4.2.1.1 and summarized with references in Table 7-9, except the averaging time for noncarcinogens is 9,125 days (25 years). Chemical-specific absorption factors were obtained from Table 2 in the PEA Manual (CalEPA, 1999) and are shown on Table 7-10.

The total hazard index for industrial workers due to ingestion and dermal contact with fill soil at the Site is 8. Arsenic accounts for 60 percent of this hazard index, and antimony for more than 38 percent.

The total hazard index for industrial workers due to ingestion and dermal contact with native surface soil at the Site is 0.1. Antimony accounts for 52 percent of this hazard index, and arsenic for more than 20 percent.

The total hazard index for industrial workers due to ingestion and dermal contact with native subsurface soil at the Site is 0.05. Arsenic accounts for 47 percent of this hazard index, and antimony for more than 27 percent.

7.4.2.2.2 Inhalation of Soil Particles in Fugitive Dust

To evaluate potential risks of industrial workers from exposure to carcinogens through inhalation of fugitive dust, estimated chemical exposures are compared to RfDs to determine if exposures are within a range that is likely to cause adverse health effects. To calculate the air concentration from the soil concentration, soil concentrations were multiplied by a suspended particulate matter factor to estimate air concentrations as described in Section 7.4.1.1.2 Since the PEA equations are developed specifically for a residential scenario, the following equation from USEPA (1989) was used to calculate individual chemical hazard quotients for inhalation of fugitive dust:

$$Hazard_{air} = \frac{C_a xInRxEFxED}{RfD_i xBWxAT}$$

Where:	$Hazard_{air}$	=	Hazard Quotient for Air pathway
	RfD_i	=	Inhalation Reference Dose (mg/kg-day)
	C_a	=	Concentration in Air (mg/m^3)
	EF	=	Exposure Frequency (days/year)
	ED	=	Exposure Duration (years)
	BW	=	Body Weight (kg)
	InR	=	Inhalation Rate (m^3/day)
	AT	=	Averaging Time (days)

Exposure factors used for the industrial worker scenario are the same as identified in Sections 7.4.2.1.1 and 7.4.2.2.1 and summarized with references in Table 7-9, except an averaging time of 9,125 days (25 years) was used to calculate noncarcinogenic risks.

Results for this pathway are summarized in Table 7-11 The total hazard index for industrial workers due to inhalation of fugitive dust from fill soil at the Site is 0.1. Barium accounts for more than 47 percent of this total cancer risk while antimony and arsenic contribute roughly for 25 percent to this total cancer risk.

The total hazard index for industrial workers due to inhalation of fugitive dust from native surface soil at the Site is 0.01. Barium accounts for more than 76 percent of this total cancer risk.

The total hazard index for industrial workers due to inhalation of fugitive dust from native subsurface soil at the Site is 0 004 Barium accounts for more than 82 percent of this total cancer risk.

7.4.3 Construction Worker Scenario

7.4.3.1 Cancer Risk Estimates for Soil Matrix

7.4.3.1.1 Ingestion and Dermal Contact with Soil

To evaluate potential risks of construction workers from exposure to carcinogens through ingestion and dermal contact, soil concentrations are multiplied by cancer slope factors and a constant to develop upper range incremental lifetime cancer risks. The same USEPA (1989) equations used for the industrial worker were used to calculate the risk for the construction worker. Exposure factors used for the construction worker scenario are briefly identified below and summarized with references in Table 7-9.

- an incidental soil ingestion rate of 480 mg/day
- an averaging time of 25,550 days (70 years)
- an exposure frequency of 60 days/year when the soil is disturbed
- an exposure duration of 1 year for a construction job
- a body weight of 70 kg
- 3,600 cm^2 of skin surface area exposed – this includes heads, hands, and forearms
- a soil to skin adherence factor of 0.8 mg/cm^2

Chemical-specific absorption factors were obtained from Table 2 in the PEA Manual (CalEPA, 1999) and are shown on Table 7-12.

Total cancer risk for construction workers due to ingestion and dermal contact with fill soil at the Site is 3×10^{-5}. Arsenic accounts for more than 99 percent of this total cancer risk.

Total cancer risk for construction workers due to ingestion and dermal contact with native surface soil at the Site is 2×10^{-7}. Arsenic accounts for more than 60 percent of this total cancer risk.

Total cancer risk for construction workers due to ingestion and dermal contact with native subsurface soil at the Site is 1×10^{-7}. Arsenic accounts for more than 90 percent of this total cancer risk.

The above cancer risk associated with fill soil exceeds the target risk of 1 x 10^{-6} used in the PEA guidance. However, cancer risks associated with background concentrations of arsenic often exceed this threshold. The importance of background in interpretation of the above risks is discussed in detail in Section 7.5.1.

7.4.3.1.2 Inhalation of Soil Particles in Fugitive Dust

To evaluate potential risks of construction workers from exposure to carcinogens through inhalation of fugitive dust, air concentrations are multiplied by cancer slope factors and exposure factors to develop upper range incremental lifetime cancer risks. To calculate the air concentration from the soil concentration, soil concentrations were multiplied by a suspended particulate matter factor to estimate air concentrations as described in Section 7.4.1.1.2. The same USEPA (1989) equation used in Section 7.4.2.1.2 to calculate individual chemical cancer risks for inhalation of soil for industrial workers was used to calculate the cancer risks for the construction worker.

The exposure factors used for the construction worker scenario are the same as described in Section 7.4.3.1.1 and summarized with references in Table 7-9. An inhalation rate of 29.2 m^3/day was used for the construction worker.

Total cancer risk for construction workers due to inhalation of fugitive dust from fill soil at the Site is 1 x 10^{-6}. Chromium accounts for more than 59 percent of this total cancer risk, and arsenic for 40 percent.

Total cancer risk for construction workers due to inhalation of fugitive dust from native surface soil at the Site is 4 x 10^{-7}. Chromium accounts for more than 95 percent of this total cancer risk.

Total cancer risk for construction workers due to inhalation of fugitive dust from native subsurface soil at the Site is 2 x 10^{-7}. Chromium accounts for more than 97 percent of this total cancer risk.

The above cancer risk estimates do not exceed the target risk of 1 x 10^{-6} used in the PEA guidance. However, cancer risks associated with background concentrations of arsenic and chromium often exceed this threshold, especially where all chromium in soil is assumed to be present as chromium (VI). The importance of background and of chromium speciation in soil in interpretation of the above risks is discussed in detail in Section 7.5.1.

7.4.3.2 Hazard Quotients and Hazard Indices for Noncarcinogens in Soil Matrix

7.4.3.2.1 Ingestion and Dermal Contact with Soil

To evaluate potential risks of construction workers from exposure to noncarcinogens through ingestion and dermal contact, the same USEPA (1989) equation used to calculate individual chemical hazard quotients for inhalation of fugitive dust for industrial workers was used to calculate the hazard quotients for construction workers.

The exposure factors used for the construction worker scenario are the same as described in Section 7 4.3 1.1 and summarized with references in Table 7-9, except the averaging time for noncarcinogens is 9,125 days (25 years). Chemical-specific absorption factors were obtained from Table 2 in the PEA Manual (CalEPA, 1999) and are shown on Table 7-12

The total hazard index for construction workers due to ingestion and dermal contact with fill soil at the Site is 8.8 Antimony and arsenic each accounts for more than 49 percent of this total hazard index

The total hazard index for construction workers due to ingestion and dermal contact with native surface soil at the Site is 0.2. Antimony accounts for more than 53 percent of this total hazard index, and arsenic and cadmium account for 13 and 10 percent, respectively, of this total hazard index.

The total hazard index for construction workers due to ingestion and dermal contact with native subsurface soil at the Site is 0.06 Arsenic accounts for more than 34 percent of this total hazard index, and antimony accounts for 32 percent, respectively, of this total hazard index

7.4.3.2.2 *Inhalation of Soil Particles in Fugitive Dust*

To evaluate potential hazards to construction workers from exposure to noncarcinogens through ingestion and dermal contact, the same USEPA (1989) equation used to calculate individual chemical hazard quotients for inhalation of fugitive dust for industrial workers was used to calculate the hazard quotients for construction workers.

The exposure factors used for the construction worker scenario are the same as described in Section 7.4 3.1.1 and summarized with references in Table 7-9, except the averaging time for noncarcinogens is 9,125 days (25 years). Chemical-specific absorption factors were obtained from Table 2 in the PEA Manual (CalEPA, 1999) and are shown on Table 7-13.

The total hazard index for construction workers due to inhalation of fill soil at the Site is 0 05. Barium accounts for more than 47 percent of this total hazard index. Antimony and arsenic each contribute roughly 25 percent of this total hazard index.

The total hazard index for construction workers due to inhalation of native surface soil at the Site is 0.004. Barium accounts for more than 76 percent of this total hazard index

The total hazard index for construction workers due to inhalation of native subsurface soil at the Site is 0 002. Barium accounts for more than 82 percent of this total hazard index.

7.4.4 Results of Lead Risk Modeling

Lead concentrations in soil were evaluated using the most current available version of the Leadspread lead risk assessment spreadsheet (v 7.0) provided by the DTSC (2000). Several assumptions were made for this model:

- Lead concentration in drinking water at the Site was assumed to be equivalent to the California maximum contaminant level (MCL) (15 $\mu g/L$)

- Lead concentration in air was assumed to be 0.030 $\mu g/m^3$, the 90th percentile air concentration during the year 2000 at Los Angeles – North Main Street, the nearest California Air Resources Board monitoring station to the Site (CARB online database, 2002).

- Maximum lead concentrations detected in the soil samples were used as exposure concentrations (25,700 mg/kg for near-surface and subsurface soil and 8,890 mg/kg for surface soil).

- Leadspread default values were used for the remaining model parameters.

For hypothetical future residents, Leadspread results for exposure to fill soil, native surface soil, and native subsurface soil are presented in Tables 7-14, 7-15, and 7-16. Results indicate that childhood exposure to 23,461 $\mu g/g$ of lead in the fill surface and subsurface soil will result in blood-lead concentrations of 891 micrograms per deciliter ($\mu g/dL$) in normal nonpica children at the 99th percentile and 1,385 $\mu g/dL$ in pica children at the 99th percentile. These values are far above the CalEPA acceptable level of 10 $\mu g/dL$. Adult residents might also experience high blood lead concentration, up to 236 $\mu g/dL$ at the 99th percentile. Note that the high blood lead levels predicted are purely hypothetical. All of the levels are above those that could be tolerated, and here, provide only an illustration of the severity of the contamination if exposure to site soil were to occur.

Similar Leadspread results for exposure to native surface soil are presented in Table 7-15. Results indicate that chronic exposure to 2,995 $\mu g/g$ of lead in the surface soil will result in blood-lead concentrations of 118 micrograms per deciliter ($\mu g/dL$) in normal nonpica children at the 99th percentile and 181 $\mu g/dL$ in pica children at the 99th percentile. These values are above the CalEPA acceptable level of 10 $\mu g/dL$. High blood lead concentrations are again predicted for adult residents, 33 $\mu g/dL$ at the 99th percentile.

Leadspread results for exposure to native subsurface soil are presented in Table 7-16. Results indicate that chronic exposure to 383 $\mu g/g$ of lead in the surface soil will result in blood-lead concentrations of 18.9 micrograms per deciliter ($\mu g/dL$) in normal nonpica children at the 99th percentile and 27 $\mu g/dL$ in pica children at the 99th percentile. These values are above the CalEPA acceptable level of 10 $\mu g/dL$. Blood lead concentrations for adult residents, 7.1 $\mu g/dL$ at the 99th percentile, are lower and within the acceptable level.

For occupational exposures, predicted blood lead concentrations for exposure to fill soil, native surface soil, and native subsurface soil are much less, 48 5, 9 1, and 4.1 μg/dL, respectively.

Predictions for occupational exposures are applicable to both industrial and construction workers. Exposures to lead are assessed over a relatively short period, because only a few months of exposure is required for blood lead levels to reach a new psuedo-equilibrium. Potential toxic effects are based a new blood lead level, and no assumptions are made about the duration of time this blood lead level is maintained. Thus, exposure duration is not a critical factor in evaluating worker lead exposure and the above predictions are equally applicable for industrial and occupational settings.

For all adult exposures, a blood lead concentration target is still 10 μg/dL. Since blood lead in a pregnant women and the developing fetus are about the same, this low blood lead level is necessary to protect unborn children of working and stay-at-home mothers.

7.4.5 Total Risk and Hazard

Table 7-17 shows a summary of the cancer risks and HIs for all pathways and potential receptors.

A person on the site would likely be exposed to a combination of the native and fill surface soils. Since the exact portions of fill and native would vary across the site, the total risks and hazards for the surface soil are presented in this section as a range from native surface soil to fill soil, indicating that potential risks will vary between the two, depending on how people might use the site.

7.4.5.1 Adult and Child Residents

Cancer risk for residents for exposure to COPCs in surface soil at the Site ranged from 8×10^{-5} for native surface soil to 3×10^{-3} for fill soil. This range is above the cancer risk threshold of 10^{-6} used by DTSC's PEA guidance manual. The majority of the risk for exposure to the fill soil is attributable to ingestion and dermal contact with arsenic in the soil. The majority of the risk for exposure to the native surface soil is attributable to inhalation of chromium (VI) in the soil.

Total cancer risk for exposure to COPCs in native subsurface soil at the Site for residents is 10^{-5}, which is also above the cancer risk threshold of 10^{-6} used by DTSC's PEA guidance manual. The majority of this risk is attributable to inhalation of hexavalent chromium in fugitive dust.

The HI for exposure to COPCs in surface soil at the Site for both adult and child residents ranged from 2 for the native surface soil to 107 for the fill soil. This range is above the target level of one, indicating possible adverse health effects. The majority of the risk for exposure to the fill soil is attributable to ingestion and dermal contact with antimony and arsenic in the soil. The majority of the risk for exposure to the native surface soil is attributable to ingestion and dermal contact with antimony in the soil.

The HI for exposure to COPCs in native subsurface soil at the Site for both adult and child residents is 0.7, which is below the target level of one, indicating no adverse health effects.

7.4.5.2 Industrial Workers

Cancer risk for industrial workers for exposure to COPCs in surface soil at the Site ranged from 3 x 10^{-5} for native surface soil to 8 x 10^{-4} for fill soil. This range is above the cancer risk threshold of 10^{-6} used by DISC's PEA guidance manual. The majority of the risk for exposure to fill soil is attributable to ingestion and dermal contact with arsenic in the soil. The majority of the risk for exposure to native surface soil is attributable to inhalation of chromium (VI) in the soil.

The cancer risk for industrial workers for exposure to COPCs in native subsurface soil at the Site is 10^{-5}. The majority of the native subsurface soil risk is attributable to inhalation of chromium in the soil.

The HI for exposure to COPCs in surface soil at the Site for industrial workers ranged from 0.1 for native surface soil to 8 for fill soil. The low end of this range is below the target of one, indicating no adverse health effects, and the high end of this range is above the target level of one, indicating possible adverse health effects. The majority of the risk for exposure to fill soil is attributable to ingestion and dermal contact with arsenic and antimony in the soil.

The HI for exposure to COPCs in native subsurface soil at the Site for industrial workers is 0.05, which is below the target level of one, indicating no adverse health effects.

7.4.5.3 Construction Workers

Cancer risk for exposure to COPCs in surface soil at the Site for construction workers ranged from 6 x 10^{-7} for native surface soil to 3 x 10^{-5} for fill soil. The low end of this range is below the cancer risk threshold of 10^{-6} used by DTSC's PEA guidance manual, and the high end of this range is above the cancer risk threshold of 10^{-6}. The majority of the risk for exposure to fill soil is attributable to ingestion and dermal contact with arsenic in the soil.

The combined cancer risk for exposure to COPCs in native subsurface soil at the Site for construction workers is 10^{-7}, which is below the cancer risk threshold of 10^{-6} used by DTSC's PEA guidance manual.

HIs for construction workers for exposure to COPCs in surface soil at the Site ranged from 0.2 for native surface soil to 9 for fill soil. The low end of this range is below the target of one, indicating no adverse health effects, and the high end of this range is above the target level of one, indicating possible adverse health effects. The majority of the risk for exposure to fill soil is attributable to ingestion and dermal contact with arsenic and antimony in the soil.

The HI for exposure to COPCs in surface soil at the Site for construction workers for exposure to native subsurface soil is 0 06, which is below the target level of one, indicating no adverse health effects.

7.4.5.4 Lead Exposure

Chronic exposure to 23,461 μg/g of lead in the fill soil could hypothetically result in blood-lead concentrations of 891 micrograms per deciliter (μg/dL) in normal nonpica children at the 99th percentile and 1,385 μg/dL in pica children at the 99th percentile. Chronic exposure to 2,995 μg/g of lead in the native surface soil could hypothetically result in blood-lead concentrations of 118 micrograms per deciliter (μg/dL) in normal nonpica children at the 99th percentile and 181 μg/dL in pica children at the 99th percentile. Chronic exposure to 383 μg/g of lead in the native surface soil could hypothetically result in blood-lead concentrations of 19 micrograms per deciliter (μg/dL) in normal nonpica children at the 99th percentile and 27 μg/dL in pica children at the 99th percentile. These values are all above the CalEPA acceptable level of 10 μg/dL. This blood lead target is also exceeded for adult residents for fill and native surface soils and for industrial and construction workers for fill soil.

Occupational exposures result in the lowest predictions for blood lead levels. Predicted blood levels would be consistent with remediation goals of 3,500 and 5,500 mg/kg for limit blood lead concentrations to 10 μg/dL or less at 95th and 99th percentiles, respectively. These possible remediation goals are exceeded by only a few of the data points available for the Site.

7.5 Uncertainties Analysis

A degree of uncertainty is associated with the risk assessment. This section describes the impact of uncertainties associated with the database, exposure assumptions, and toxicity assessment on the final step of the risk assessment and risk characterization. In addition, uncertainties inherent in risk characterization are identified and discussed.

7.5.1 Uncertainties in the Database

7.5.1.1 Total Chromium as Hexavalent Chromium

The PEA guidance requires that total chromium results be evaluated as hexavalent chromium when speciation data is not available. As a result, risks calculated for hexavalent chromium likely overestimate actual risks on-Site. Often, chromium (VI) makes up only a fraction of total chromium, and EPA (2002) assumes that Cr (VI) makes up only 15% of the total in calculating preliminary remediation goals (PRGs) for use at hazardous waste sites in Region 9.

Probable significant overestimation of hexavalent chromium concentrations in soils may be important for risk management when considering exposure of industrial workers to particulates at the site. For this exposure pathway, inhalation of chromium in fugitive dust accounts for a large portion of the cancer risk.

7.5.1.2 Background Concentrations

Site-specific background concentrations for COPCs are not available. However, concentrations observed at the Site for several COPCs are likely to be indistinguishable from background. Comparisons of exposure point concentrations with arithmetic average and ranges for background suggest that barium, beryllium, chromium, cobalt, mercury, molybdenum, nickel, silver and vanadium concentrations fall within, and often below the ranges of concentrations encountered in a variety of California soils. This observation holds true for fill, native surface, and native subsurface soils. Of these metals, chromium was occasionally a risk driver for surface soils. Chromium concentrations at the Site appear to be below average for California. Risks associated with exposure to chromium are probably not Site-related. Since, as discussed above, risks due to exposure to chromium are already overestimated due to the assumption that all chromium is present as Cr(VI), background considerations for this metal could be critical for risk management.

Site concentrations of arsenic in native surface and native subsurface soil are well within the range for background concentrations commonly reported as indicted by the low UCLs estimated for exposure concentrations.

Higher concentrations of arsenic are observed in fill soils, and some Site-related impact cannot be ruled out. However, this impact is ameliorated to some degree by depth of observed contamination. Significant site redevelopment combined with spread of contaminated fill onto the surface would have to occur before any human exposure would be possible.

Outside of some elevated levels of arsenic in fill, only antimony and lead are present in elevated concentrations, and are also likely to be important for risk management at the Site. That is, only these COPCs are associated with cancer risks or non-cancer hazards above target levels. These COPCs are observed in significantly elevated concentrations in subsurface soils, and are probably related to past Site activities.

7.5.2 Uncertainties in Exposure Assessment

Quantitative estimates of chemical exposure may contain significant uncertainty. Assumptions used in the exposure assessment are derived from a combination of USEPA and CalEPA guidance, Site-specific information, and professional judgment, with each of the potential information sources being subject to uncertainty

7.5.2.1 Future Land Use Assumptions

Exposure parameters for residential land use as required by the PEA guidance are more conservative than those used to evaluate industrial workers and future construction workers at the existing warehouse Site. Since the Site will be used as an industrial warehouse, risks will be substantially less than those estimated in the HHSE as shown in Table 7-17.

7.5.2.2 Exposure to Site Soils

The majority of the Site is covered with asphalt/concrete pavement or buildings resulting in minimal or no routes of exposure for users of the Site to surface and subsurface soils. Equations for soil exposure assume that all receptors adult and child residents and industrial workers will ingest and dermally contact exposed soils and breath in fugitive dust from disturbing these soils. These equations are very conservative given the actual conditions at the Site. Moreover, no plans for dramatic redevelopment exist where materials beneath current pavement/buildings would be uncovered, spread over the site, and left available for subsequent exposure. Possible exposures for the foreseeable future at the site are essentially zero.

7.5.2.3 Bioavailability of Metals

The calculation of risks herein used standard approaches established by the USEPA and California DTSC. These procedures incorporate default assumptions regarding the percentage of total metals in soils that are truly bioavailable, and can be absorbed into the body after inhalation, ingestion or dermal contact. Default assumptions for bioavailability are generally conservative, i.e., the actual percentage of bioavailable metals (such as lead or arsenic) may actually be considerably less than assumed. For example, DTSC's Leadspread approach assumes that as much as 40% of total lead is available for absorption following ingestion. However, studies at smelter and similar sites with lead contamination in the western U.S. have shown that actual bioavailability of lead may be as low as 10% in some instances. Health threats evaluated in this assessment may be overestimated to some extent because default assumptions were used for bioavailability in all instances.

7.5.3 Uncertainties in Toxicity Assessment

A potentially large source of uncertainty is inherent in the derivation of USEPA toxicity criteria (i.e., RfDs, and cancer slope factors). In many cases, data must be extrapolated from animals to sensitive humans by the application of uncertainty factors to an estimated NOAEL or lowest-observed adverse effects level (LOAEL) for noncancerous effects. While designed to be protective, in many cases uncertainty factors overestimate the magnitude of differences that may exist between human and animals, and among humans.

In some cases, however, toxicity criteria may be based on studies that did not detect the most sensitive adverse effects. For example, many past studies have not measured possible toxic effects on the immune system. Moreover, some chemicals may cause subtle effects not easily recognized in animal studies.

In addition, derivation of cancer slope factors often involves linear extrapolation of effects at high doses to potential effects a lower doses commonly seen in environmental exposure settings Currently, it is not known whether linear extrapolation is appropriate Probably, the shape of the dose response curve for carcinogenesis varies with different chemicals and mechanisms of action It is not possible at this time to describe such differences in quantitative terms.

7.5.4 Uncertainties in Risk Characterization

7.5.4.1 Use of Residential Exposure Scenario

The industrial land use and potential receptors of on-Site industrial workers have already been identified for this Site. However, the PEA guidance requires that the Site be evaluated as residential. This approach results in an overestimation of risks when land use can reasonably be predicted to remain non-residential. For example, the residential exposure assumes that a resident child would spend 24 hours a day, 350 days per year, for six years in his home compared to the 8 to 10 hours per day, five days per week, 250 days per year that an industrial worker would spend at the facility. Similarly, inhalation rates and soil ingestion rates would be lower for industrial workers than for residential receptors because industrial worker receptors would be primarily indoors limiting outdoor soil exposure. The impact of different land use assumptions on risk estimates is summarized in Table 7-17.

7.5.4.2 Pavement Cover

The Site is completely covered with asphalt pavement or buildings, which essentially eliminates all possible routes of exposure to surface and subsurface soils for users of the Site. The PEA equations for soil exposure assume that adult and children and industrial workers will ingest and dermally contact exposed soils. These equations are very conservative given the actual conditions at the Site and overestimate potential risks from exposure to Site soils. The construction worker scenario, where workers become exposed to Site soils only after the building has been demolished, is the only realistic scenario presented.

Section Eight

Section 8
Ecological Screening Evaluation

A PEA report requires that an Ecological Screening Evaluation be prepared and submitted to DTSC. The PEA report includes Site background information and environmental setting, historical information and operations, field investigation procedures, presentation and evaluation of investigation data, including analytical results and boring logs.

As presented in this report, the Site is in an industrial setting in downtown Los Angeles. There are no nearby wildlife habitats. Furthermore, as the entire Site is covered with concrete or asphalt, it is not likely that Site conditions could impact wildlife habitats if they were nearby.

9

Section Nine

Section 9
Community Profile

A DTSC public participation specialist was present at the January 11, 2001 project scoping meeting. Preliminary guidance from the DTSC public participation specialist is that a Public Participation Plan (PPP) only would be required should remedial action be required at the Site. The PPP, if necessary, will be prepared by CDM, under the direction and guidance of DTSC, to establish the procedures and protocols for informing the community surrounding the Site of the PEA investigation. The PPP will be submitted under separate cover.

10

Section Ten

Section 10
Conclusions and Recommendations

Results of the PEA and supplemental risk analysis indicate that:

- The stated objectives of this PEA have been met. The nature and extent of contamination has been adequately identified, and sufficient data have been gathered to perform the HHSE.

- No currently complete exposure pathways exist at the Site because of impermeable cover (buildings and pavement). No actions are necessary to interrupt exposure pathways as long as Site conditions do not change significantly.

- Possible risks associated with hypothetical future residential use of the Site are above common regulatory thresholds for fill, native surface, and native subsurface soils. Residential development is unlikely given current Site ownership and surrounding land uses.

- Based on a hypothetical situation where the impermeable barrier (concrete warehouse floor and asphalt parking lot) was removed and soil exposed, hypothetical Site-related risk for future workers (industrial and construction) for fill and native surface soils (ground surface to 10 feet bgs) are relatively high and fall in the range of risks and hazards often considered unacceptable. Risks associated with hypothetical exposure to antimony, arsenic and lead dominate risks, and each of these COPCs is found in the fill and native surface soils in significantly elevated concentrations.

- Based on a hypothetical situation where the impermeable barrier (concrete warehouse floor and asphalt parking lot) was removed and soil exposed, hypothetical Site-related risks for future workers (industrial and construction) for native subsurface soils (greater than 10 feet bgs) are relatively low and fall generally within the range of risks and hazards that could be found acceptable. Risks associated with hypothetical exposure to chromium, and perhaps arsenic, in native subsurface soils are likely to be related to background, rather than Site-related contamination.

- The PEA equations for soil exposure assume that adult and children and industrial workers will ingest and have dermal contact with exposed soils. These equations are very conservative given the actual conditions at the Site and overestimate potential risks from exposure to Site soils. The construction worker scenario, where workers become exposed to Site soils only after the building has been demolished, is the only realistic scenario presented. If significant construction at the site were contemplated, some management of possible health risks might be required.

11 Section Eleven

Former Eastern Iron & Metal Co.
2200 East 11th Street
Los Angeles, California
DTSC Site Code: 11045-300595-00

Preliminary Endangerment Assessment

December 13, 2002

Prepared for:

Whittaker Corporation
1955 North Surveyor Avenue
Simi Valley, California 93063-3349

Prepared by:

CDM
18581 Teller Avenue, Suite 200
Irvine, California 92612

Project No. 20415-31813

Section 11
References

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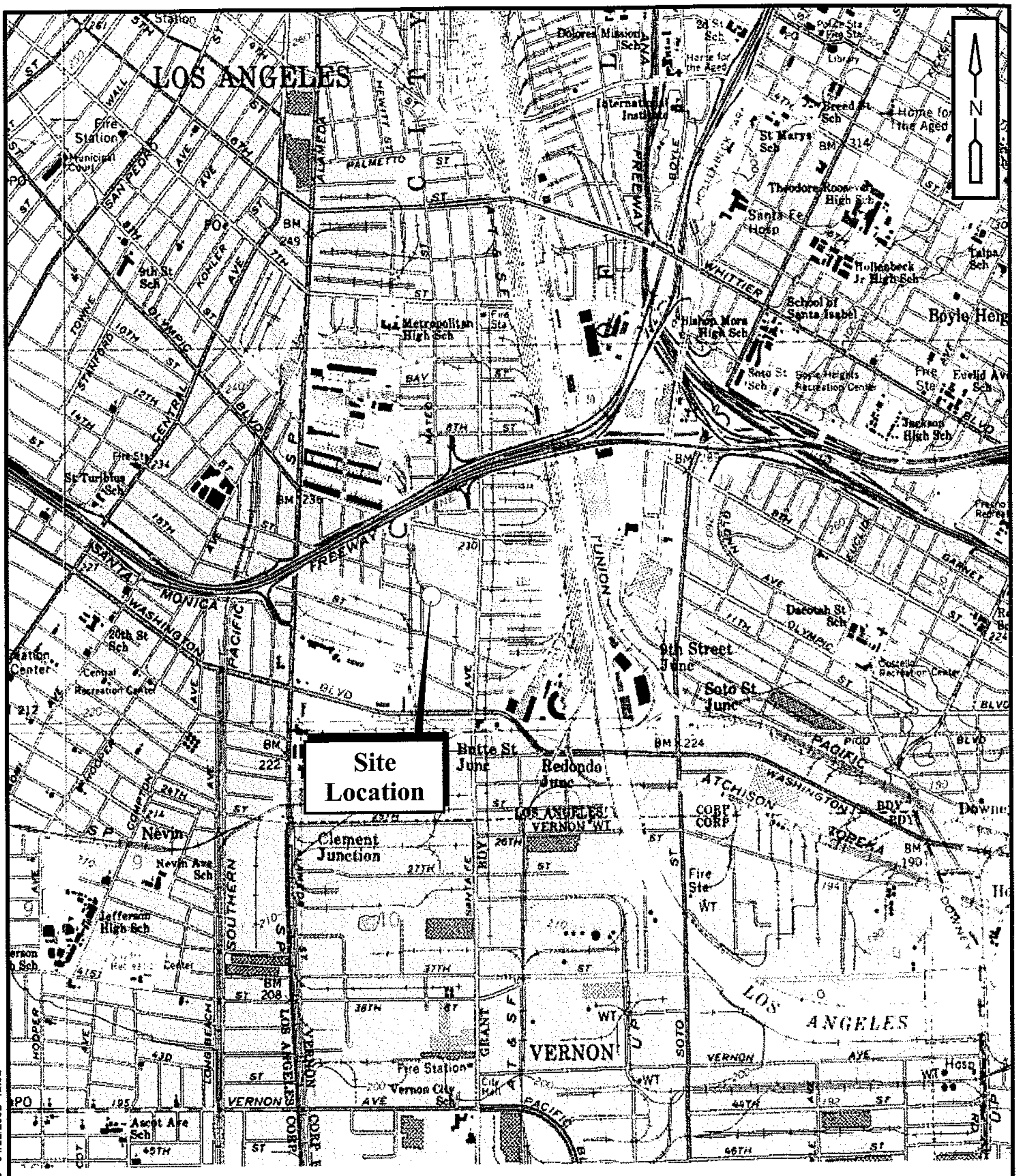
Section 12
Figures



REFERENCE: Base map from USGS 7.5 minute
Los Angeles California (1981)

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Scale: 1 in. = 2,000 ft.

EASTERN SMELTING AND REFINING
2200 EAST 11th STREET, LOS ANGELES, CALIFORNIA

Site Vicinity Map

CDM
environmental engineers, scientists, planners, & management consultants

Figure 2-1

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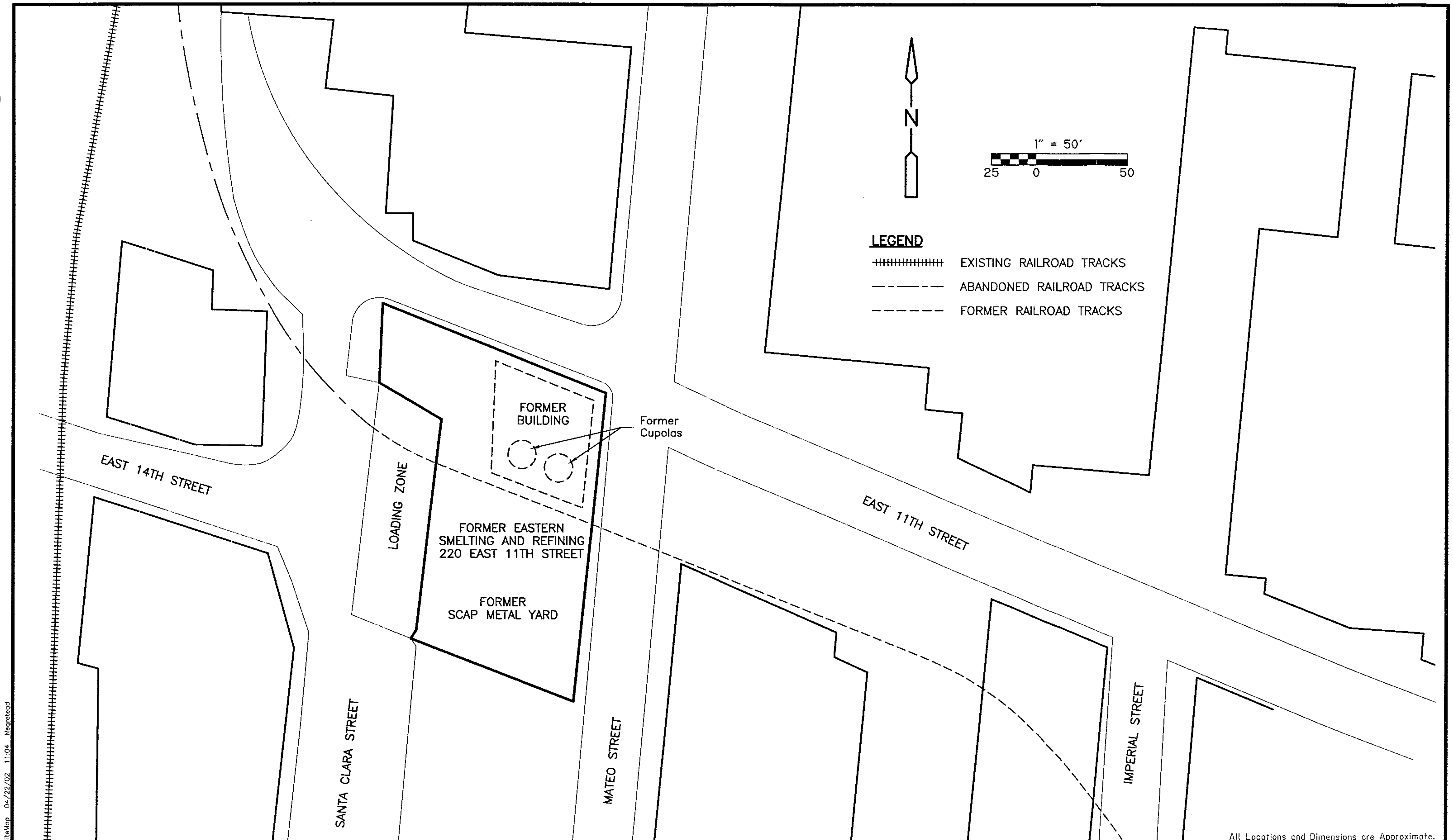

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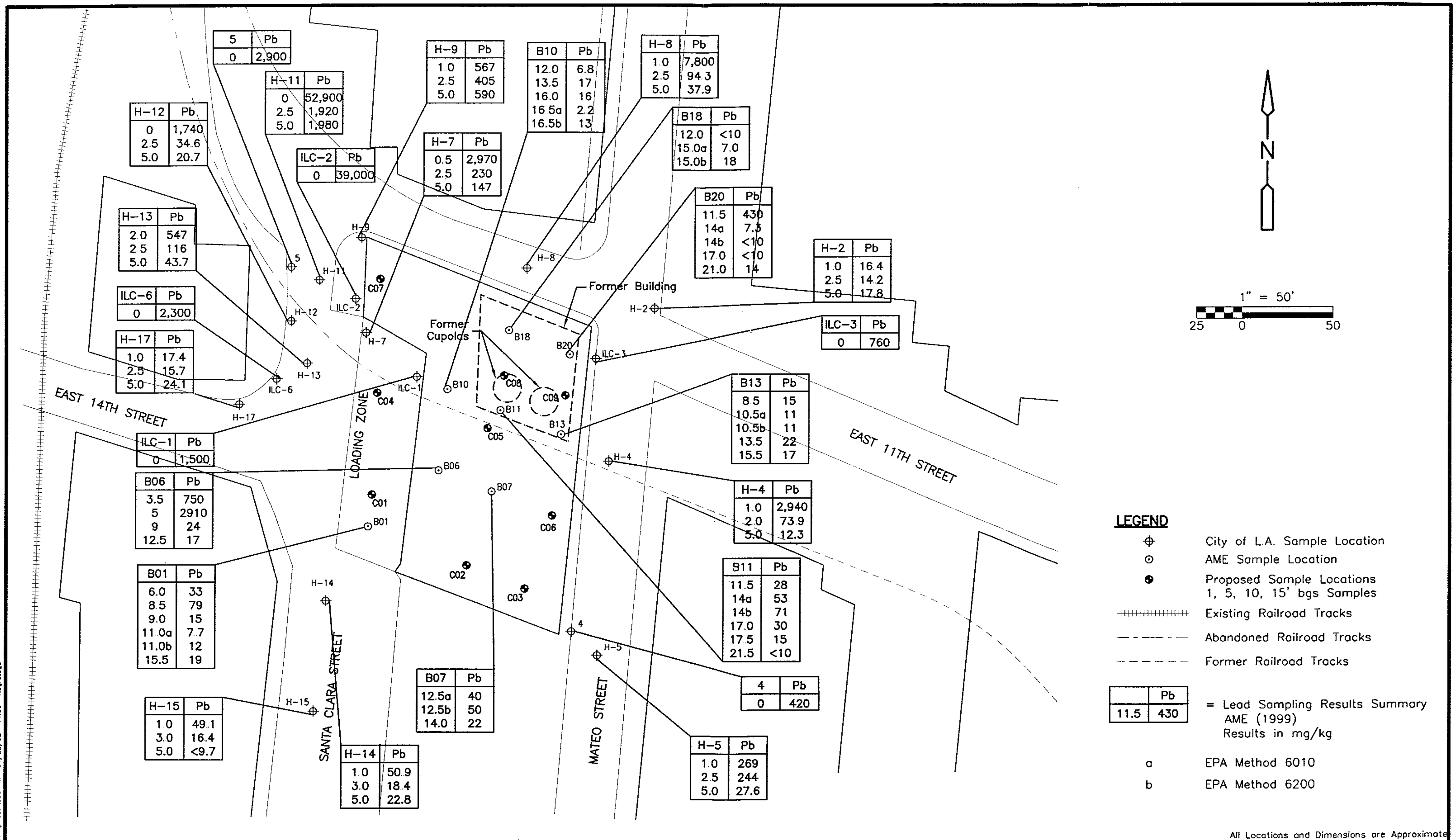
EASTERN SMELTING AND REFINING
2200 EAST 11th STREET, LOS ANGELES, CALIFORNIA

CDM
environmental engineers, scientists, planners, & management consultants

Site Map

Figure 2-2



CDM
environmental engineers, scientists, planners, & management consultants

FORMER EASTERN IRON AND METAL CO.
2200 EAST 11th STREET, LOS ANGELES, CALIFORNIA

Previous Studies Lead Sampling Results

Figure 3-1

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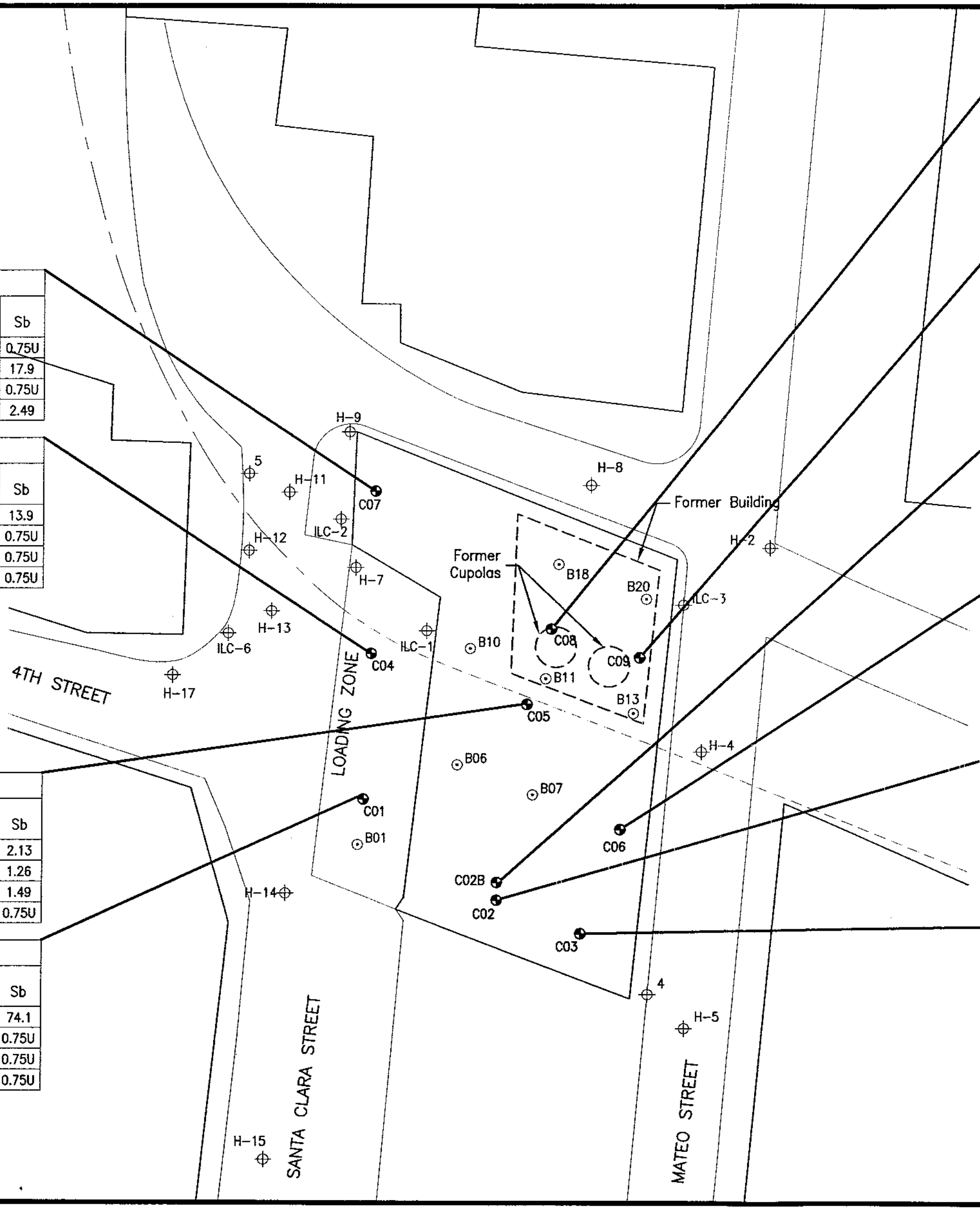

C07

Depth (feet bgs)	As	Ba	Cu	Pb	Sb
1'	4.89	180	47.6	58.4	0.75U
5'	28.2	137	517	2670D	17.9
10'	3.49	101	60.5	82.5	0.75U
15'	0.75U	114	4.35	11.8	2.49

C04

Depth (feet bgs)	As	Ba	Cu	Pb	Sb
1'	20.3	274	1930D	2930D	13.9
5'	1 73	101	191	5.76	0.75U
10'	0.75U	28.4	3.96	1.73	0.75U
15'	0.753	37.9	5.43	1.5	0.75U

C05

Depth (feet bgs)	As	Ba	Cu	Pb	Sb
1'	2.15	157	33.5	64.6	2.13
5'	1.26	141	373	7.44	1.26
10'	1.49	128	224	8.42	1.49
15'	0.75U	32.5	30.8	1.95	0.75U

C01

Depth (feet bgs)	As	Ba	Cu	Pb	Sb
1'	6.65	192	717	8890D	74.1
5'	1.04	112	20.4	8.02	0.75U
10'	0.75U	25.4	24.7	77.1	0.75U
12'	0.75U	59.6	9.56	3.33	0.75U

C08

Depth (feet bgs)	As	Ba	Cu	Pb	Sb
1'	5.79	180	70.3	242	0.75U
5'	8.96	126	69.9	3200D	4.66
10'	10.7	126	30.5	2120D	0.75U
15'	0.75U	38.4	5.09	8.99	0.75U

C09

Depth (feet bgs)	As	Ba	Cu	Pb	Sb
1'	3.67	193	38.8	37.9	0.75U
5'	0.919	91.9	13.7	6.56	0.75U
10'	0.75U	31.9	2.79	1.47	0.75U
15'	0.75U	32	3.87	1.55	0.75U

C02B

Depth (feet bgs)	As	Ba	Cu	Pb	Sb
20.8'	4.84	44.1	610	867	4.03
26'	ND	44.3	5.47	1.67	ND

C06

Depth (feet bgs)	As	Ba	Cu	Pb	Sb
1'	5.16	211	34.5	18.9	0.75U
5'	51.1	235	1730D	10600D	41.2
10'	0.75U	22.3	3.33	2.36	0.75U
15'	0.75U	26.2	22.7	3.5	0.75U

C02

Depth (feet bgs)	As	Ba	Cu	Pb	Sb
1'	4.23	230	32.3	54.2	0.75U
5'	23.4	167	1120D	2030D	33.5
10'	66.5	264	229	4700D	97.4
15'	3410D	2080D	1810D	25700D	5120D

C03

Depth (feet bgs)	As	Ba	Cu	Pb	Sb
1'	5.7	187	41.9	36	0.75U
5'	13.2	1600D	2220D	7540D	68.9
10'	2.46	151	31.9	10.2	0.75U
15'	0.75U	25.4	17	3.12	0.75U

LEGEND

- City of L.A. Sample Location
- AME Sample Location
- CDM Sample Locations 1, 5, 10, 15' bgs Samples
- Existing Railroad Tracks
- Abandoned Railroad Tracks
- Former Railroad Tracks

As = Arsenic
Ba = Barium
Cu = Copper
Pb = Lead
Sb = Antimony
bgs = below ground surface
u Not detected above apecified laboratory reporting limit
D Sample diluted by laboratory

All results in mg/kg.

All Locations and Dimensions are Approximate.

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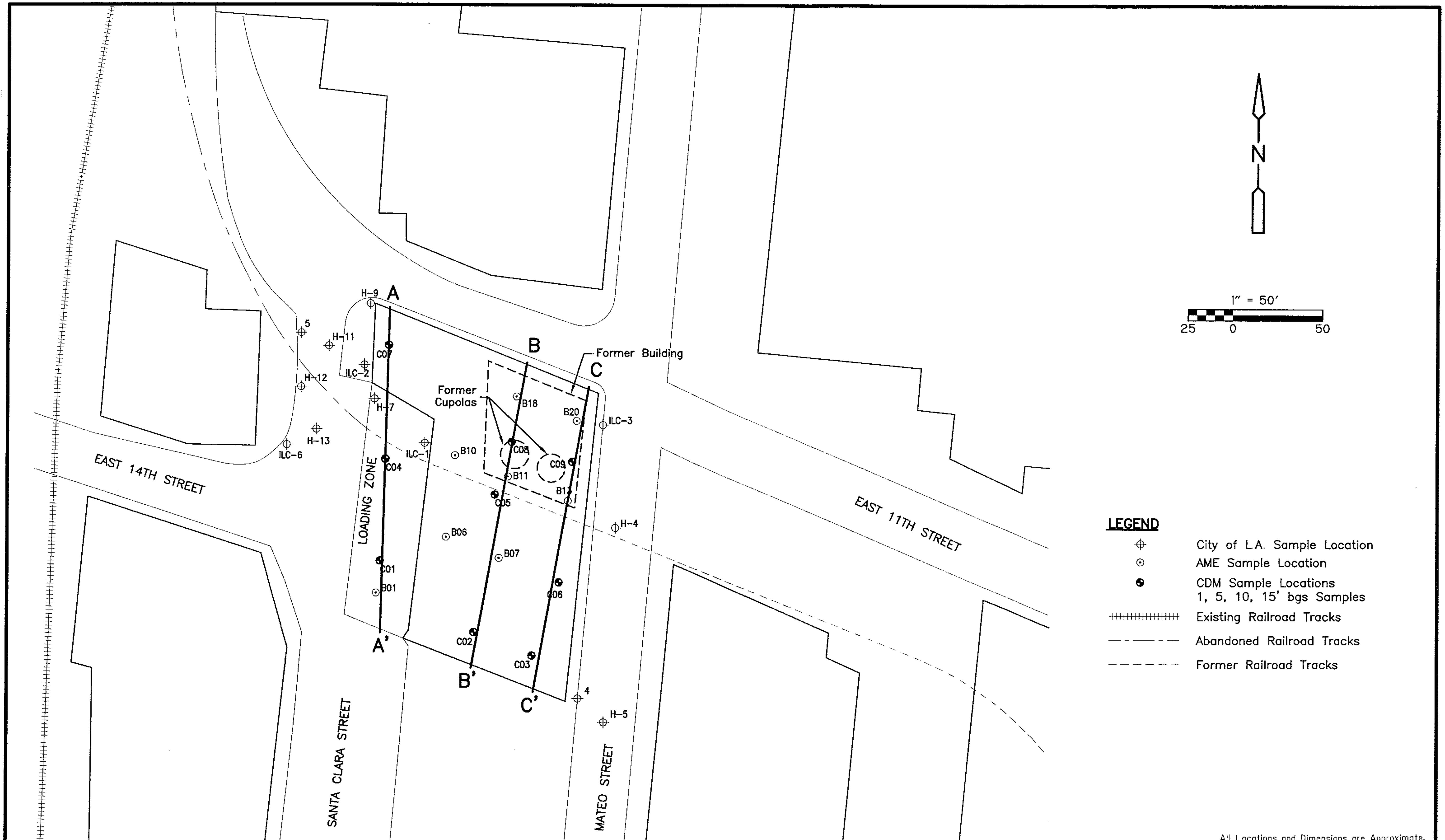
CDM

EASTERN SMELTING AND REFINING
2200 EAST 11th STREET, LOS ANGELES, CALIFORNIA

CDM Sample Locations and Results

Figure 3-2



EASTERN SMELTING AND REFINING
2200 EAST 11th STREET, LOS ANGELES, CALIFORNIA

Cross-Section Location Map

Figure 3-3

CDM

Section 13
Tables

Ta...e 2-1

Former Eastern Smelting and Refining
EDR Radius Map Search Summary

Site	Address	Distance	Type	Status	Database
LA Pumping Plant #10	2251 E. 11th St.	0 to 1/8	Plant	Small quantity generator. No known contamination.	RCRIS
National Aerosol Prods.	2193 E 14th St.	0 to 1/8	Chemical Man.	Large quantity generator. No known contamination.	RCRIS
SOS Metals	1920 S. Imperial St.	0 to 1/8	Metals Co.	Small quantity generator. No known contamination.	RCRIS
A&S Env Recovery	2261 E. 15th St.	1/8 to 1/4	Recycler	Haz. Waste generator. No known contamination.	RCRIS
A&S Metal Recycle	1960 Mateo Pl.	1/8 to 1/4	Recycler	Small quantity generator. No known contamination.	RCRIS
AEP Industries	2222 E. Olympic Blvd.	1/8 to 1/4	Recycler	Small quantity generator. No known contamination.	RCRIS
Asbestos Cleanup & Cons.	2030 E. 15th St.	1/8 to 1/4	Construction	Haz. Waste generator. No known contamination.	RCRIS
Crown Coach Corp.	2428 E. 12th St.	1/8 to 1/4	Manufacturing	UST Site. No known contamination.	RCRIS
Delta CME	1751 S. Sante Fe Ave.	1/8 to 1/4	Manufacturing	Small quantity generator. No known contamination.	RCRIS
EG Smith Const.	1333 Wilson St	1/8 to 1/4	Construction	Small quantity generator. No known contamination.	RCRIS
Howard Scrap Metal	2110 E. 15th St.	1/8 to 1/4	Metals Co.	Small quantity generator. No known contamination.	RCRIS
International Lead Co.	2182 E. 11th Street	1/8 to 1/4	Former Lead Smelter	Soil removal action performed. Further investigation performed - results not presented	CERCLIS
LA Print and Dye	1960 S. Sante Fe Ave.	1/8 to 1/4	Printing	Small quantity generator. No known contamination.	RCRIS
Martin Metals Inc.	1321 Wilson St	1/8 to 1/4	Metals Co.	Small quantity generator. No known contamination.	RCRIS
Monico Alloys Inc.	2301 E. 15th St.	1/8 to 1/4	Metals Co.	Haz. Waste generator. No known contamination.	RCRIS

Ta... 2-1

Former Eastern Smelting and Refining
EDR Radius Map Search Summary

Site	Address	Distance	Type	Status	Database
PJs Screen Printing	1421 Lawrence	1/8 to 1/4	Printing	Small quantity generator. No known contamination.	RCRIS
Shell Oil Co.	1520 S. Sante Fe Ave.	1/8 to 1/4	Gas Co.	LUST Site. No known contamination	RCRIS
SZ Hamen Co.	1900 S. Sante Fe Ave.	1/8 to 1/4	Construction	Small quantity generator. No known contamination.	RCRIS
Team Sports Wear	1503 S. Sante Fe Ave.	1/8 to 1/4	Manufacturing	Small quantity generator. No known contamination.	RCRIS
US Brass	1350 Elwood St.	1/8 to 1/4	Metals Co.	Small quantity generator. No known contamination.	RCRIS
Alameda Cor Sale Parcel 497B	2425 E. Washington Blvd.	1/4 to 1/2	Railroad Transportatio	Voluntary cleanup performed. Remedial Action - soil removal complete.	CAL-SITES
Amtrak	2435 E. Washington Blvd.	1/4 to 1/2	Railroad Transportatio	PEA performed. Some VOCs in soil and soil gas found. Voluntary cleanup in progress.	CAL-SITES
Asphalt Plant #1	2484 E. Olympic Blvd.	1/4 to 1/2	Asphalt Co.	LUST Site. No known contamination	Coretese
Bardco Manf.	2450 E. 23rd St.	1/4 to 1/2	Electronic Equipment	Suspected UST and a Clarifier. Possible hydrocarbon contamination. PEA recommended.	CAL-SITES
City National Bank	2209 S. Sante Fe Ave.	1/4 to 1/2	Metals Co.	NFA for DTSC.	CAL-SITES
Ind. Wire Prods.	2451 E. 23rd St.	1/4 to 1/2	Metals Co.	NFA for DTSC.	CAL-SITES
LA City Fire Department	2474 Porter St.	1/4 to 1/2	Fire Station	LUST Site. Remedial action completed or deemed unnecessary.	LUST
Los Angeles CRA-Sale Parcel 497A	2429 E. Washington Blvd.	1/4 to 1/2	Railroad Transportatio	Voluntary cleanup performed. Remedial Action - soil removal complete.	CAL-SITES

Table 2-1

Former Eastern Smelting and Refining
EDR Radius Map Search Summary

Site	Address	Distance	Type	Status	Database
Ryder Truck Rental # 91	1508 S. Alameda St.	1/4 to 1/2	Truck Rental	LUST Site. No known contamination	Coretese
So CA Gas Co Olympic Base	2424 E. Olympic Blvd.	1/4 to 1/2	Gas Co.	Waste stored on site. No known contamination.	CORRACTS
Unocal #0152	1800 E. Olympic Blvd.	1/4 to 1/2	Gas Station	LUST Site. Remedial action completed or deemed unnecessary.	Coretese
76 Products Station #0898	1543 Hooper Ave.	1/2 to 1	Gas Station	LUST Site. No known contamination	Coretese
76 Products Station #2124	801 Hooper Ave.	1/2 to 1	Gas Station	LUST Site. No known contamination	Coretese
76 Products Station #4010	791 S. Central Ave.	1/2 to 1	Gas Station	LUST Site. Remedial action completed or deemed unnecessary.	Coretese
Abegg & Reinhold Co.	2533 E. 26th St.	1/2 to 1	Machinery & Equipmen	NFA for DTSC.	CAL-SITES
ALCO Plating Corp.	1400 Long Beach Ave.	1/2 to 1	Plating	Soil Contamination. PEA ordered.	CAL-SITES
Baily & Schmitz Co.	2101 E. 7th St.	1/2 to 1	Furnature	NFA for DTSC.	CAL-SITES
Dean and Associates	700 S. Sante Fe Ave.	1/2 to 1	Utilities	1987 liquid and soil removal. DTSC certified complete.	CAL-SITES
Domestic Linen Supply	1640 Compton Ave.	1/2 to 1	Linen Supply	LUST Site. No known contamination	Coretese
EKCO Metals	1700 Perrino Pl.	1/2 to 1	Reclaiming Facility	LUST Site. Metals contamination in soils.	CORRACTS
First Nationwide Bank	2309/2311 S. Sante Fe Ave.	1/2 to 1	Metals Co.	NFA for DTSC.	CAL-SITES
FishKing Processors	1640 Compton Ave.	1/2 to 1	Repair Facilities	Soil contamination. PEA ordered. Soil removal. NFA.	CAL-SITES
Flo-Tronic Metal Manf.	2885 E. Washington Blvd.	1/2 to 1	Metals Co.	RCRA generator. NFA.	CAL-SITES
Former Gap Products	1460 E. Washington Blvd.	1/2 to 1	Metals Co.	PEA performed. PCE and metals found in soil. Removal action performed.	CAL-SITES

T. ; 2-1

Former Eastern Smelting and Refining
EDR Radius Map Search Summary

Site	Address	Distance	Type	Status	Database
Industrial Service Co.	1700 Soto St	1/2 to 1	Manufacturing	Haz. Waste generator. No known contamination.	CORRACTS
Kellog Oil Co.	2465 E. 25th St.	1/2 to 1	Petroleum Products	NFA for DTSC.	CAL-SITES
M-5 Steel	2901/2921 SACO St.	1/2 to 1	Metals Co.	Pet. Hyd., mercury, and lead contamination indicated by soil investigation. PEA required by DTSC.	CAL-SITES
Santa Fe/W.A. Grant	2144 E. 7th St.	1/2 to 1	Metals Co.	NFA for DTSC.	CAL-SITES
Shell Oil Co.	1541 S. Central Ave.	1/2 to 1	Gas Co.	Small quantity generator. No known contamination.	Coretese
Shelmac Corp.	1440 E. Walnut St	1/2 to 1	Metals Co.	NFA for DTSC.	CAL-SITES
So Cal Gas/LA-Alameda MGP	725 Channing St.	1/2 to 1	Utilities	PEA performed. PAHs and metals found in soil. Further investigaion required.	CAL-SITES
Teledyne West. Wire & Cable	2425 E. 30th St.	1/2 to 1	Metals Co.	NFA for DTSC.	CAL-SITES
Texaco Truck Stop	1345 7th St.	1/2 to 1	Gas Station	LUST Site. Remedial action completed or deemed unnecessary.	Coretese
Water Chemists Inc.	1275 S. Boyle Ave.	1/2 to 1	Chemical Man.	LUST Site. No known contamination	Coretese

Table 3-1

Former Eastern Smelting and Refining
PEA Sampling
Soil Sampling and Analytical Program

Boring Number	Total Depth (ft bgs)	Analytical Samples Per Boring	Analytical Methods (number of analyses per boring)	Location Rationale
SITE AREA (See Figure 3)				
C01	15	4	Metals - Title 22 (2 - 4)	Soil boring to fill in between AME samples B01 and B05 in Site SW portion - in parking lot area
C02	15	4	Metals - Title 22 (2 - 4)	Soil boring to acquire data along Site southern edge
C03	15	4	Metals - Title 22 (2 - 4)	Soil boring to acquire data in the SE corner of the Site
C04	15	4	Metals - Title 22 (2 - 4)	Soil boring for the western Site boundary in parking lot, and adjacent to LA City street samples
C05	15	4	Metals - Title 22 (2 - 4)	Soil borings to characterize aerial extent - approximate Site center

Table 3-1

Former Eastern Smelting and Refining
PEA Sampling
Soil Sampling and Analytical Program

Boring Number	Total Depth (ft bgs)	Analytical Samples Per Boring	Analytical Methods (number of analyses per boring)	Location Rationale
SITE AREA (continued)				
C06	15	4	Metals - Title 22 (2 - 4)	Soil boring characterize eastern Site boundary - replace AME sample location B08 (not sampled)
C07	15	4	Metals - Title 22 (2 - 4)	Soil borings to characterize Site NW Corner - replace AME sample location B16 (not sampled)
C08	15	4	Metals - Title 22 (2 - 4)	Soil borings to characterize Site in former smelter area - replace AME sample location B14 (not sampled)
C09	15	4	Metals - Title 22 (2 - 4)	Soil borings to characterize Site in former smelter area - replace AME sample location B15 (not sampled)

bgs - below ground surface

Table 3-2

Former Eastern Smelting and Refining
PEA Sampling
Sample Preservation, Holding Times, and Container Requirements

Analytical Parameter	EPA Analytical Method	Preservative*	Holding Time	Container Requirements**
Polynuclear Aromatic Hydrocarbons	8310/8270	Cool to 4 Deg. C for solid and liquid samples	14 days for extraction, 40 days for analysis of extract	Acrylic or brass liner, with Teflon sheets and plastic end caps (1-gallon amber glass with Teflon lined cap for liquid samples)
Volatile Organic Compounds	8260	Cool to 4 Deg. C (HCL to pH < 2, and Cool to 4 Deg. C for liquid samples)	14 days	Acrylic or brass liner, with Teflon sheets and plastic end caps (40-ml glass vials with Teflon lined septum for liquid samples)
CCR Title 22 Metals		Cool to 4 Deg. C (HNO3 to pH < 2, and Cool to 4 Deg. C for liquid samples)	6 Months	Acrylic or brass liner with Teflon sheets and plastic end caps (polyethylene jar for liquid samples)
Antimony	6010			
Arsenic	7060			
Barium	6010			
Beryllium	6010			
Cadmium	6010			
Chromium, total	6010			
Cobalt	6010			
Copper	6010			
Lead	6010			
Mercury	7471		28 days	
Molybdenum	6010			
Nickel	6010			
Selenium	7740			
Silver	6010			
Thallium	6010			
Vanadium	6010			
Zinc	6010			

* - Liquid samples include trip blanks, equipment blanks, field blanks, and groundwater (if collected).
** - For each analytical soil sample, one 6-inch long acrylic or brass liner is anticipated to collect soil for one or more of the above target analytes
CCR - California Code of Regulations

Table 4-1

Former Eastern Smelting and Refining
PEA Sampling
Field Instrument Calibration and Maintenance Procedures

Parameter	Instrument	Purpose	Calibration Procedure and Schedule	Maintenance Schedule
Ionizable Organic Vapors	PID - Thermo Environmental OVM 580B, or Equivalent	Health and Safety, Field Screening	Calibrate using zero air and 100 ppm isobutylene span gas prior to first use and daily thereafter.	Clean following use. Clean lamp if calibration performance is off. Recharge battery pack daily.
Total Organic Vapors	FID - Foxboro OVA 128, or equivalent	Health and Safety, Field Screening	Calibrate using zero air and 50 ppm hexane span gas prior to first use and daily thereafter.	Clean following use. Check and refill hydrogen supply as necessary. Recharge battery pack daily

PID - Photo ionization detector
FID - Flame ionization detector

Table 4-2

Former Eastern Smelting and Refining
PEA Sampling
Summary of Field QC Samples

Field QC Sample	Frequency	Analytical Parameters	QC Criteria
Field Duplicate Sample (Co-located Replicate)	1 per 20 samples (5%)	All target analytes as the original sample	RPD +/- 20% (VOCs +/- 35%)
Equipment Blank/ Decontamination Rinseate Blank	1 per day of sampling	All the target analytes for the day	Blank concentration less than PQL
Field Blank	1 per 50 soil borings	VOCs, PAHs, and CCR Title 22 Metals	Blank concentration less than PQL

VOCs - Volatile organic compounds (EPA Method 8260)
PAHs - Polynuclear aromatic hydrocarbons (EPA Methods 8310 or 8270)
CCR - California Code of Regulations
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

Table 4-3

Former Eastern Smelting and Refining
PEA Sampling
Summary of Laboratory QC Requirements

QC Requirement [a]	*Method*						
	8260	8270	8310	6010	7060	7471	7740
Initial Calibration (No. of pts.)	5	5	5	3[b]	3	4	3
Continuing Calibration Verification [c]	X	X	X	X	X	X	X
Internal Standards (if internal standard calibration is used - each sample 2 IS)[d]	X	X	X				
Surrogate Standards	X	X	X				
Retention Time Window Establishment	X	X	X				
Reagent/Method Blanks	X	X	X	X	X	X	X
Matrix Spike and Matrix Spike Duplicates (1/20 samples)	X	X	X	X[e]	X[e]	X[e]	X[e]
QC Check Sample (1/20 samples)	X	X	X	X	X	X[f]	X[f]
Second Column Confirmation							
Method of Standard Addition (MSA) [g]					X		X
Analytical Spikes (1/10 samples)					X		X
Duplicate Injection (each sample)					X		
Duplicates				X	X	X	X
Interference Check Sample				X			
Serial dilution				X			

Notes:

a QC criteria for all methods will be consistent with published methods

b ICP initial calibrations are to be analyzed as required by Method 6010 and to be consistent with manufacturer's instructions.

c Continuing calibration verification checks will be analyzed every 12 hours for Methods 8260 and 8270; and every 10 samples for Methods 6010, 7060 and 7471.

d IS recovery limits = 40-120% relative to the IS response for the daily calibration.

e MSDs are not required.

f QC check standard 1/15 samples

g MSA to be performed if analytical spike recoveries are less than 85% or greater than 115% and the analyte result is greater than 50% of the analytical spike concentration.

Table 7-1
Summary of Detected Parameters in Fill Soil Analytical Results
Former Eastern Iron & Metal Co.
2200 E. 11th Street, Los Angeles, California

Parameter	Analytical Method	Units	Samples Detected Minimum	Samples Maximum	Samples Mean[a]	Samples Median[a]	Samples Number Of Detections	Total Number of Samples	Samples Frequency Detected
Antimony	EPA 6010B	mg/kg	4.66	5120	286.52	0.375	9	19	47.4%
Arsenic	EPA 6010B	mg/kg	1.26	3410	194.63	7.805	18	19	94.7%
Barium	EPA 6010B	mg/kg	38.4	2080	352.47	180	19	19	100.0%
Beryllium	EPA 6010B	mg/kg	0.266	1.32	0.37	0.321	14	19	73.7%
Cadmium	EPA 6010B	mg/kg	0.645	20.2	3.77	1.73	14	19	73.7%
Chromium (Total)	EPA 6010B	mg/kg	4.96	85.7	25.08	20.7	19	19	100.0%
Cobalt	EPA 6010B	mg/kg	4.66	13.9	7.88	7.86	19	19	100.0%
Copper	EPA 6010B	mg/kg	5.09	3135	622.77	70.3	19	19	100.0%
Lead	EPA 6010B	mg/kg	7.44	25700	2979.32	1500	23	23	100.0%
Mercury	EPA 7471A	mg/kg	0.086	0.989	0.33	0.181	15	19	78.9%
Molybdenum	EPA 6010B	mg/kg	0.286	9.74	2.98	2.7	18	19	94.7%
Nickel	EPA 6010B	mg/kg	4.79	72.1	27.44	26.9	19	19	100.0%
Selenium	EPA 6010B	mg/kg	1.59	16.6	1.59	0.375	4	19	21.1%
Silver	EPA 6010B	mg/kg	0.261	1.0795	0.30	0.125	6	19	31.6%
Vanadium	EPA 6010B	mg/kg	10.6	42.6	25.37	25.8	19	19	100.0%
Zinc	EPA 6010B	mg/kg	25.2	12100	1368.63	101	19	19	100.0%

Note:
mg/kg - milligrams per kilogram
a - These statistics include 1/2 the detection limits for constituents not detected.

Table 7-2
Summary of Detected Parameters in Native Surface Soil Analytical Results
Former Eastern Iron & Metal Co.
2200 E. 11th Street, Los Angeles, California

Parameter	Analytical Method	Units	Samples Detected Minimum	Samples Maximum	Samples Mean[a]	Samples Median[a]	Samples Number Of Detections	Total Number of Samples	Samples Frequency Detected
Antimony	EPA 6010B	mg/kg	74.1	74.1	6.76	0.375	1	13	7.7%
Arsenic	EPA 6010B	mg/kg	0.919	6.65	2.11	1.49	9	13	69.2%
Barium	EPA 6010B	mg/kg	22.3	192	88.15	91.9	13	13	100.0%
Beryllium	EPA 6010B	mg/kg	0.288	0.717	0.31	0.25	5	13	38.5%
Cadmium	EPA 6010B	mg/kg	0.976	34.6	4.53	0.25	6	13	46.2%
Chromium (Total)	EPA 6010B	mg/kg	2.21	21	11.18	13	13	13	100.0%
Cobalt	EPA 6010B	mg/kg	2.01	13	7.11	7.33	13	13	100.0%
Copper	EPA 6010B	mg/kg	2.79	717	138.71	31.9	13	13	100.0%
Lead	EPA 6010B	mg/kg	1.47	8890	580.13	12.6	16	16	100.0%
Mercury	EPA 7471A	mg/kg	0.032	0.463	0.17	0.14	12	13	92.3%
Molybdenum	EPA 6010B	mg/kg	0.257	1	0.42	0.303	7	13	53.8%
Nickel	EPA 6010B	mg/kg	1.84	51.6	12.90	10.1	13	13	100.0%
Selenium	EPA 6010B	mg/kg	1.1	2.1	0.56	0.375	2	13	15.4%
Silver	EPA 6010B	mg/kg	0.284	0.284	0.14	0.125	1	11	9.1%
Vanadium	EPA 6010B	mg/kg	6.04	46.7	23.48	24	13	13	100.0%
Zinc	EPA 6010B	mg/kg	11.4	1140	235.66	132	13	13	100.0%

Note:
mg/kg - milligrams per kilogram
a - These statistics include 1/2 the detection limits for constituents not detected.

Table 7-3
Summary of Detected Parameters in Native Subsurface Soil Analytical Results
Former Eastern Iron & Metal Co.
2200 E. 11th Street, Los Angeles, California

Parameter	Analytical Method	Units	Samples Detected Minimum	Samples Maximum	Samples Mean[a]	Samples Median[a]	Samples Number Of Detections	Total Number of Samples	Samples Frequency Detected
Antimony	EPA 6010B	mg/kg	2.49	12	3.48	5	3	19	15.8%
Arsenic	EPA 6010B	mg/kg	0.753	9.7	2.33	2.7	11	19	57.9%
Barium	EPA 6010B	mg/kg	25.4	150	53.05	44.3	19	19	100.0%
Beryllium	EPA 6010B	mg/kg	0.27	0.27	0.20	0.25	1	19	5.3%
Cadmium	EPA 6010B	mg/kg	0.92	4.2	1.03	0.25	8	19	42.1%
Chromium (Total)	EPA 6010B	mg/kg	0.396	13	6.23	6.39	19	19	100.0%
Cobalt	EPA 6010B	mg/kg	2.13	6.44	3.82	3.81	18	19	94.7%
Copper	EPA 6010B	mg/kg	3.87	610	66.40	14	19	19	100.0%
Lead	EPA 6010B	mg/kg	1.5	867	47.91	12	19	39	48.7%
Mercury	EPA 7471A	mg/kg	0.022	0.961	0.12	0.052	15	19	78.9%
Molybdenum	EPA 6010B	mg/kg	0.335	1	0.61	1	2	19	10.5%
Nickel	EPA 6010B	mg/kg	0.257	13	5.58	5.1	19	19	100.0%
Selenium	EPA 6010B	mg/kg	2.2	2.4	0.84	1	2	19	10.5%
Vanadium	EPA 6010B	mg/kg	0.549	23	14.55	14	19	19	100.0%
Zinc	EPA 6010B	mg/kg	7.66	390	103.90	56	19	19	100.0%

Note:
mg/kg - milligrams per kilogram

Table 7-4
Summary of Exposure Concentrations for COPCs
Former Eastern Iron & Metal Co.
2200 E. 11th Street, Los Angeles, California

Parameter	Units	Fill Soil Exposure Concentration	Native Surface Soil Exposure Concentration	Native Subsurface Soil Exposure Concentration	California Background Estimates[d]
Soil[a]					
Antimony	mg/kg	1,457 [c,1]	31 3 [c 1]	6 48 [c,1]	0.6 (0 15 - 1 95)
Arsenic	mg/kg	974 [c 1]	5.16 [b,6]	4 68 [c,1]	3 5 (0.6 - 11)
Barium	mg/kg	886 [c 1]	114 [a 3]	64 5 [b 2]	509 (133 - 1400)
Beryllium	mg/kg	0.49 [b 2]	0 60 [c,1]	0.26 [c 1]	1 28 (0 25 - 2 7)
Cadmium	mg/kg	10 8 [b 6]	15 9 [c 1]	2 23 [c 1]	0 36 (0 05 - 1.7)
Chromium (Total)	mg/kg	33 6 [b 2]	14 4 [a,3]	7 42 [a,3]	122 (23 - 1579)
Cobalt	mg/kg	8 70 [a 3]	9 16 [a,3]	4.42 [a,3]	14.9 (2 7 -46 9)
Copper	mg/kg	2,293 [b,6]	608 [b 6]	210 [c 1]	28 7 (9 1 - 96 4)
Lead	mg/kg	23,461 [b,6]	2,995 [c 1]	383 [c 4]	23.9 (12 4 - 97.1)
Mercury	mg/kg	0.80 [b,6]	0 29 [b,2]	0 33 [c,1]	0 26 (0.05 - 0 9)
Molybdenum	mg/kg	7.72 [b 6]	0 78 [b,2]	0.78 [c,5]	1 3 (0.1 - 9 6)
Nickel	mg/kg	37 5 [b 2]	29 9 [b,2]	6 90 [a 3]	57 (9 - 509)
Selenium	mg/kg	5.34 [c 1]	1.17 [c 1]	1 44 [c,1]	0 058 (0.015 - 0 43)
Silver	mg/kg	0.58 [c,1]	0 20 [c 1]	NA	0 8 (0 1 - 8 3)
Vanadium	mg/kg	28 8 [a,3]	30 0 [a 3]	17.0 [a 3]	112 (39-288)
Zinc	mg/kg	4,428 [c,1]	737 [b,6]	245 [b,6]	149 (88-236)

Notes:

[a] - Dataset has a normal distribution

[b] - Dataset has a lognormal distribution

[c] - Dataset has a non-parametric distribution

[d] - Taken from Kearny Data Set (Bradford, 1996)

NA - Not analyzed Compound not selected as COPC

mg/kg - milligrams per kilogram

[1] - Exposure concentration calculated using Chebyshev (mean,std) formula

[2] - Exposure concentration calculated using 95% H-statistic UCL formula

[3] - Exposure concentration calculated using Student's t formula

[4] - Exposure concentration calculated using Bootstrap t formula

[5] - Exposure concentration calculated using Jacknife formula

[6] - Exposure concentration calculated using 95% Chebyshev (MVUE) formula

Table 7-5
Slope Factors for COPCs
Former Eastern Iron & Metal Co.
2200 E. 11th Street, Los Angeles, California

Compound	SF_oral (mg/kg/day)$^{-1}$	Ref	SF_inhal (mg/kg/day)$^{-1}$	Ref
Metals				
Arsenic	1.50E+00	I	1.20E+01	I
Beryllium	NA		8.40E+00	OE
Cadmium	3.80E-01	OE	1.50E+01	OE
Chromium (VI)	NA		5.10E+02	OE
Nickel	NA		9.10E-01	I

Notes:

NA - Not Available

OE - CalEPA. OEHHA Cancer Potency Factors, March 2002

I - IRIS online database, March 2002

(mg/kg-day)$^{-1}$ - per milligram per kilogram per day

SF_oral - Oral Slope Factor

SF_inhal - Inhalation Slope Factor

Table 7-6
Reference Doses and Reference Concentrations for COPCs
Former Eastern Iron & Metal Co.
2200 E. 11th Street, Los Angeles, California

Compound	RfD_oral (mg/kg/day)	Ref	RfD_inhal (mg/kg/day)	Ref
Metals				
Antimony	4.00E-04	I	NA	
Arsenic	3.00E-04	I	NA	
Barium	7.00E-02	I	1.40E-04	h
Beryllium	2.00E-03	I	5.70E-06	I
Cadmium	1.00E-03	I	NA	
Chromium (VI)	3.00E-03	I	NA	
Cobalt	6.20E-02	n	NA	
Copper	3.70E-02	h	NA	
Mercury	3.00E-04	I	8.60E-05	I
Molybdenum	5.00E-03	I	NA	
Nickel	2.00E-02	I	NA	
Selenium	5.00E-03	I	NA	
Silver	5.00E-03	I	NA	
Vanadium	7.00E-03	h	NA	
Zinc	3.00E-01	I	NA	

References:

I - IRIS online database March 2002
n - National Center for Environmental Assessment
h - HEAST
RfD_oral - Oral Reference Dose
RfD_inhal - Inhalation Reference Dose
(mg/kg-day) - milligram per kilogram per day

Table 7-7
Risks Due to Ingestion and Dermal Contact with Soil - Residential Scenario
Former Eastern Iron & Metal Co.
2200 E. 11th Street, Los Angeles, California

Compound	Cs (mg/kg)			SF_oral	ABS	RISKsoil					
	Fill Soil	Native Surface Soil	Native Subsurface Soil	$(mg/kg\text{-}day)^{-1}$		Fill Soil	Native Surface Soil	Native Subsurface Soil			
Carcinogenic Exposure											
Arsenic	974	5.16	4.68	1.50E+00	0.03	3.12E-03	1.65E-05	1.50E-05	0.9979063	0.6330644	0.9177185
Beryllium	0.49	0.60	0.26	NA	0.01	NA	NA	NA			
Cadmium	10.8	15.9	2.23	3.80E-01	0.001	6.54E-06	9.58E-06	1.34E-06			
Chromium (VI)	33.6	14.4	7.42	NA	0	NA	NA	NA			
Nickel	37.5	29.9	6.90	NA	0.01	NA	NA	NA			
					TOTAL RISKsoil	**3.E-03**	**3.E-05**	**2.E-05**			

Compound	Cs (mg/kg)			RfD_oral	ABS	HAZARDsoil					
	Fill Soil	Native Surface Soil	Native Subsurface Soil	(mg/kg-day)		Fill Soil	Native Surface Soil	Native Subsurface Soil			
Noncarcinogenic Exposure											
Antimony	1,457	31.3	6.48	4.00E-04	0.01	51	1.1	0.23	0.4794058	0.537324	0.3185289
Arsenic	974	5.16	4.68	3.00E-04	0.03	54	0.29	0.26	0.5046368	0.1396303	0.3625516
Barium	886	114	64	7.00E-02	0.01	0.18	0.023	0.013			
Beryllium	0.49	0.60	0.26	2.00E-03	0.01	0.0035	0.0042	0.0019			
Cadmium	10.8	15.9	2.23	1.00E-03	0.001	0.14	0.21	0.029		0.1000123	
Chromium (VI)	33.6	14.4	7.42	3.00E-03	0	0.14	0.061	0.032			
Cobalt	8.70	9.16	4.42	6.20E-02	0.01	0.0020	0.0021	0.0010			
Copper	2,293	608	210	3.70E-02	0.01	0.87	0.23	0.080		0.1127299	
Mercury	0.80	0.29	0.33	3.00E-04	0.01	0.037	0.014	0.016			
Molybdenum	7.72	0.78	0.78	5.00E-03	0.01	0.022	0.002	0.0022			
Nickel	37.5	29.9	6.90	2.00E-02	0.01	0.026	0.021	0.0049			
Selenium	5.34	1.17	1.44	5.00E-03	0.01	0.015	0.0033	0.0041			
Silver	0.58	0.20		5.00E-03	0.01	0.0016	0.00057				
Vanadium	28.8	30.0	17.04	7.00E-03	0.01	0.058	0.060	0.034			
Zinc	4,428	737	245	3.00E-01	0.01	0.21	0.035	0.011			
					TOTAL HAZARDsoil	**107**	**2.1**	**0.7**			

Formulas:
RISKsoil = (SFo x Cs x 4.7E-7) + (SFo x Cs x 1.1E-6) + (SFo x Cs x 7.8E-6 x ABS) + (SFo x Cs x 1.1E-5 x ABS)
HAZARDsoil = [(Cs/RfDo) x 1.28E-5)] +[Cs/RfDo) x 1.28E-4 x ABS]

Notes:

Cs - exposure concentration in soil	mg/kg - milligrams per kilogram
RfD_oral - Oral Reference Dose	mg/kg-day - milligrams per kilogram per day
SF_oral - Oral Slope Factor	$(mg/kg\text{-}day)^{-1}$ - per milligram per kilogram per day
ABS - Absorption Factor	

Table 7-8
Risks Due to Inhalation of Fugitive Dust - Residential Scenario
Former Eastern Iron & Metal Co.
2200 E. 11th Street, Los Angeles, California

Compound	Cs (mg/kg)			Ca (mg/m^3)			SF_inhal	RISKair					
	Fill Soil	Native Surface Soil	Native Subsurface Soil	Fill Soil	Native Surface Soil	Native Subsurface Soil	(mg/kg-day)$^{-1}$	Fill Soil	Native Surface Soil	Native Subsurface Soil			
Carcinogenic Exposure													
Arsenic	974	5.16	4.68	4.87E-05	2.58E-07	2.34E-07	12.00	8.7E-05	4.6E-07	4.2E-07	0.4025617	0.0080867	0.014474
Beryllium	0.49	0.60	0.26	2.46E-08	3.00E-08	1.31E-08	8.40	3.1E-08	3.7E-08	1.6E-08			
Cadmium	10.8	15.9	2.23	5.41E-07	7.93E-07	1.11E-07	15.00	1.2E-06	1.8E-06	2.5E-07			
Chromium (VI)	33.6	14.4	7.42	1.68E-06	7.19E-07	3.71E-07	510.00	1.3E-04	5.5E-05	2.8E-05	59.1%	95.7%	97.5%
Nickel	37.5	29.9	6.90	1.88E-06	1.50E-06	3.4485E-07	0.91	2.5E-07	2.0E-07	4.7E-08			
							TOTAL RISKair	**2.E-04**	**6.E-05**	**3.E-05**			

Compound	Cs (mg/kg)			Ca (mg/m^3)			RfD_inhal	HAZARDair					
	Fill Soil	Native Surface Soil	Native Subsurface Soil	Fill Soil	Native Surface Soil	Native Subsurface Soil	(mg/kg-day)	Fill Soil	Native Surface Soil	Native Subsurface Soil			
Noncarcinogenic Exposure													
Antimony	1,457	31.3	6.48	7.29E-05	1.57E-06	3.24E-07	4.00E-04	0.12	0.0025	0.00052	0.2715465		
Arsenic	974	5.16	4.68	4.87E-05	2.58E-07	2.34E-07	3.00E-04	0.10	0.00055	0.00050	0.2418628		
Barium	886	114	64	4.43E-05	5.69E-06	3.22E-06	1.40E-04	0.20	0.026	0.015	0.4714341	0.7649759	0.8270614
Beryllium	0.49	0.60	0.26	2.46E-08	3.00E-08	1.31E-08	5.70E-06	0.0028	0.0034	0.0015			
Cadmium	10.8	15.87	2.23	5.41E-07	7.93E-07	1.11E-07	1.00E-03	0.00035	0.00051	0.000071			
Chromium (VI)	33.6	14.37	7.42	1.68E-06	7.19E-07	3.71E-07	3.00E-03	0.00036	0.00015	0.000079			
Cobalt	8.70	9.16	4.42	4.35E-07	4.58E-07	2.21E-07	6.20E-02	0.0000045	0.0000047	0.0000023			
Copper	2,293	608	210	1.15E-04	3.04E-05	1.05E-05	3.70E-02	0.0020	0.00052	0.00018			
Mercury	0.80	0.29	0.33	3.98E-08	1.45E-08	1.66E-08	8.60E-05	0.00030	0.00011	0.00012			
Molybdenum	7.72	0.78	0.78	3.86E-07	3.89E-08	3.89E-08	5.00E-03	0.000049	0.0000050	0.0000050			
Nickel	37.5	29.9	6.90	1.88E-06	1.50E-06	3.45E-07	2.00E-02	0.000060	0.000048	0.000011			
Selenium	5.34	1.17	1.44	2.67E-07	5.86E-08	7.19E-08	5.00E-03	0.000034	0.0000075	0.0000092			
Silver	0.58	0.20		2.89E-08	1.01E-08		5.00E-03	0.0000037	0.0000013				
Vanadium	28.8	30.0	17.04	1.44E-06	1.50E-06	8.52E-07	7.00E-03	0.00013	0.00014	0.000078			
Zinc	4,428	737	245	2.21E-04	3.69E-05	1.22E-05	3.00E-01	0.00047	0.000079	0.000026			
							TOTAL HAZARDair	**0.4**	**0.03**	**0.02**			

Formulas:
Ca = Cs x 5E-8
RISKair = (SFi x Ca x 0.149)
HAZARDair = (Ca/RfDi) x 0.639
Notes:
Cs - exposure concentration in soil
Ca - exposure concentration in air
RfD_inhal - Inhalation Reference Dose
SF_inhal - Inhalation Slope Factor

mg/kg - milligrams per kilogram
mg/kg-day - milligrams per kilogram per day
mg/m3 - milligrams per cubic meter
(mg/kg-day)-1 - per milligram per kilogram per day

Table 7-9
Exposure Parameters for the Industrial Worker and Construction Worker Scenarios
Former Eastern Iron & Metal Co.
2200 E. 11th Street, Los Angeles, California

Exposure Parameter	Symbol	Units	Industrial Worker		Construction Worker	
			Carcinogenic	Noncarcinogenic	Carcinogenic	Noncarcinogenic
Body Weight	BW	kg	70 [a]	70 [a]	70 [a]	70 [a]
Averaging Time	AT	days	25550 [a]	9125 [a]	25550 [a]	365 [d]
Exposure Frequency	EF	days/year	250 [a]	250 [a]	60 [d]	60 [d]
Exposure Duration	ED	years	25	25	1 [d]	1 [d]
Inhalation rate	InR	m^3/day	15 2 [g]	15 2 [g]	29 2 [b]	29 2 [b]
Ingestion Rate-soil	IR	mg/day	50 [g]	50 [g]	480 [a]	480 [a]
Surface Area	SA	cm^2/event	3300 [f]	3300 [f]	3600 [d]	3600 [d]
Soil to Skin Adherence Factor	AF	mg/cm^2	1	1	0.8 [e]	0.8 [e]

[a] USEPA, 1989a Risk Assessment Guidance for Superfund. Volume I - Human Health Evaluation Manual. Part A EPA/540/1-89/002. Office of Emergency and Remedial Response Washington D C

[b] USEPA 1989b Exposure Factors Handbook. EPA/600/8-89/043.

[c] USEPA 1991. Risk Assessment Guidance for Superfund Volume I - Human Health Evaluation Manual. Supplemental Guidance Standard Default Exposure Factors Interim final OSWER Directive #9285 6-03.

[d] Site-specific Professional judgment

[e] DTSC, 2000. Guidance for the Dermal Exposure Pathway

[f] USEPA, 2001. Risk Assessment Guidance for Superfund. Volume I - Human Health Evaluation Manual. Part E Supplemental Guidance for Dermal Risk Assessment Interim Draft OSWER 9285 7-02EP

[g] USEPA, 1997 Exposure Factors Handbook EPA/600/P-95/002Fa

Table 7-10
Risks Due to Ingestion and Dermal Contact with Soil - Industrial Worker Scenario
Former Eastern Iron & Metal Co.
2200 E. 11th Street, Los Angeles, California

Compound	Cs (mg/kg)			SF_oral	ABS	RISKsoil		
	Fill Soil	Native Surface Soil	Native Subsurface Soil	(mg/kg-day)-1		Fill Soil	Native Surface Soil	Native Subsurface Soil
Carcinogenic Exposure								
Arsenic	974	5.16	4.68	1.50E+00	0.03	7.6E-04	4.0E-06	3.7E-06
Beryllium	0.49	0.60	0.26	NA	0.01	NC	NC	NC
Cadmium	10.8	15.9	2.23	3.80E-01	0.001	7.7E-07	1.1E-06	1.6E-07
Chromium (VI)	33.6	14.4	7.42	NA	0	NC	NC	NC
Nickel	37.5	29.9	6.90	NA	0.01	NC	NC	NC
					TOTAL RISKsoil	**8.E-04**	**5.E-06**	**4.E-06**

Compound	Cs (mg/kg)			RfD_oral	ABS	HAZARDsoil		
	Fill Soil	Native Surface Soil	Native Subsurface Soil	(mg/kg-day)		Fill Soil	Native Surface Soil	Native Subsurface Soil
Noncarcinogenic Exposure								
Antimony	1,457	31.3	6.48	4.00E-04	0.01	3	6.E-02	1.E-02
Arsenic	974	5.16	4.68	3.00E-04	0.03	5	3.E-02	2.E-02
Barium	886	114	64	7.00E-02	0.01	1.E-02	1.E-03	7.E-04
Beryllium	0.49	0.60	0.26	2.00E-03	0.01	2.E-04	2.E-04	1.E-04
Cadmium	10.8	15.87	2.23	1.00E-03	0.001	6.E-03	8.E-03	1.E-03
Chromium (VI)	33.6	14.37	7.42	3.00E-03	0	5.E-03	2.E-03	1.E-03
Cobalt	8.70	9.16	4.42	6.20E-02	0.01	1.E-04	1.E-04	6.E-05
Copper	2,293	608	210	3.70E-02	0.01	5.E-02	1.E-02	5.E-03
Mercury	0.80	0.29	0.33	3.00E-04	0.01	2.E-03	8.E-04	9.E-04
Molybdenum	7.72	0.78	0.78	5.00E-03	0.01	1.E-03	1.E-04	1.E-04
Nickel	37.5	29.9	6.90	2.00E-02	0.01	2.E-03	1.E-03	3.E-04
Selenium	5.34	1.17	1.44	5.00E-03	0.01	9.E-04	2.E-04	2.E-04
Silver	0.58	0.20		5.00E-03	0.01	9.E-05	3.E-05	
Vanadium	28.8	30.0	17.04	7.00E-03	0.01	3.E-03	3.E-03	2.E-03
Zinc	4,428	737	245	3.00E-01	0.01	1.E-02	2.E-03	7.E-04
					TOTAL HAZARDsoil	**7.8**	**0.12**	**0.05**

Formulas:
RISKsoil = (Cs x SFo x EF x ED x 10^-6/(BW x AT)) x (IR + (ABS*AF*SA))
HAZARDsoil = ((Cs x EF x ED x 10^-6/(BW x AT)) x (IR + (ABS*AF*SA)))/RfDo
*See Table 7-8 for definition of exposure parameters
Notes:
Cs - exposure concentration in soil
RfD_oral - Oral Reference Dose
SF_oral - Oral Slope Factor
ABS - Absorption Factor
mg/kg - milligrams per kilogram
(mg/kg-day)-1 - per milligram per kilogram per day
mg/kg-day - milligrams per kilogram per day

Table 7-11
Risks Due to Inhalation of Fugitive Dust - Industrial Worker Scenario
Former Eastern Iron & Metal Co.
2200 E. 11th Street, Los Angeles, California

Compound	Cs (mg/kg)			Ca (mg/m^3)			SF_inhal	RISKair		
	Fill Soil	Native Surface Soil	Native Subsurface Soil	Fill Soil	Native Surface Soil	Native Subsurface Soil	$(mg/kg\text{-}day)^{-1}$	Fill Soil	Native Surface Soil	Native Subsurface Soil
Carcinogenic Exposure										
Arsenic	974	5.16	4.68	4.9E-05	2.6E-07	2.3E-07	12.00	3.1E-05	1.6E-07	1.5E-07
Beryllium	0.49	0.60	0.26	2.5E-08	3.0E-08	1.3E-08	8.40	1.1E-08	1.3E-08	5.9E-09
Cadmium	10.8	15.9	2.23	5.4E-07	7.9E-07	1.1E-07	15.00	4.3E-07	6.3E-07	8.9E-08
Chromium (VI)	33.6	14.4	7.42	1.7E-06	7.2E-07	3.7E-07	510.00	4.6E-05	1.9E-05	1.0E-05
Nickel	37.5	29.9	6.90	1.9E-06	1.5E-06	3.4E-07	0.91	9.1E-08	7.2E-08	1.7E-08
							TOTAL RISKair	**8.E-05**	**2.E-05**	**1.E-05**

Compound	Cs (mg/kg)			Ca (mg/m^3)			RfD_inhal	HAZARDair		
	Fill Soil	Native Surface Soil	Native Subsurface Soil	Fill Soil	Native Surface Soil	Native Subsurface Soil	(mg/kg-day)	Fill Soil	Native Surface Soil	Native Subsurface Soil
Noncarcinogenic Exposure										
Antimony	1,457	31.3	6.48	7.3E-05	1.6E-06	3.2E-07	4.00E-04	3E-02	6E-04	1E-04
Arsenic	974	5.16	4.68	4.9E-05	2.6E-07	2.3E-07	3.00E-04	2E-02	1E-04	1E-04
Barium	886	114	64	4.4E-05	5.7E-06	3.2E-06	1.40E-04	5E-02	6E-03	3E-03
Beryllium	0.49	0.60	0.26	2.5E-08	3.0E-08	1.3E-08	5.70E-06	6E-04	8E-04	3E-04
Cadmium	10.8	15.87	2.23	5.4E-07	7.9E-07	1.1E-07	1.00E-03	8E-05	1E-04	2E-05
Chromium (VI)	33.6	14.37	7.42	1.7E-06	7.2E-07	3.7E-07	3.00E-03	8E-05	4E-05	2E-05
Cobalt	*8.70*	*9.16*	*4.42*	*4.4E-07*	*4.6E-07*	*2.2E-07*	*6.20E-02*	*1E-06*	*1E-06*	*5E-07*
Copper	2,293	608	210	1.1E-04	3.0E-05	1.0E-05	3.70E-02	5E-04	1E-04	4E-05
Mercury	0.80	0.29	0.33	4.0E-08	1.4E-08	1.7E-08	8.60E-05	7E-05	3E-05	3E-05
Molybdenum	7.72	0.78	0.78	3.9E-07	3.9E-08	3.9E-08	5.00E-03	1E-05	1E-06	1E-06
Nickel	37.5	29.9	6.90	1.9E-06	1.5E-06	3.4E-07	2.00E-02	1E-05	1E-05	3E-06
Selenium	5.34	1.17	1.44	2.7E-07	5.9E-08	7.2E-08	5.00E-03	8E-06	2E-06	2E-06
Silver	0.58	0.20		2.9E-08	1.0E-08	0.0E+00	5.00E-03	9E-07	3E-07	0E+00
Vanadium	28.8	30.0	17.04	1.4E-06	1.5E-06	8.5E-07	7.00E-03	3E-05	3E-05	2E-05
Zinc	4,428	737	245	2.2E-04	3.7E-05	1.2E-05	3.00E-01	1E-04	2E-05	6E-06
							TOTAL HAZARDair	***0.10***	***0.008***	***0.004***

Formulas:
Ca = Cs x 5E-8
RISKair = (Ca x SFi x InR x EF x ED/(BW x AT))
HAZARDair = ((Ca x InR x EF x ED/(BW x AT))/RfDi
*See Table 7-8 for definition of exposure parameters
Notes:
Cs - exposure concentration in soil
Ca - exposure concentration in air
RfD_inhal - Inhalation Reference Dose
SF_inhal - Inhalation Slope Factor

mg/kg - milligrams per kilogram
(mg/kg-day)-1 - per milligram per kilogram per day
mg/m3 - milligrams per cubic meter
mg/kg-day - milligrams per kilogram per day

Table 7-12
Risks Due to Ingestion and Dermal Contact with Soil - Construction Worker Scenario
Former Eastern Iron & Metal Co.
2200 E. 11th Street, Los Angeles, California

Compound	Cs (mg/kg)			SF_oral	ABS	RISKsoil		
	Fill Soil	Native Surface Soil	Native Subsurface Soil	$(mg/kg\text{-}day)^{-1}$		Fill Soil	Native Surface Soil	Native Subsurface Soil
Carcinogenic Exposure								
Arsenic	974	5.16	4.68	1.50E+00	0.03	2.8E-05	1.5E-07	1.3E-07
Beryllium	0.49	0.60	0.26	NA	0.01	NC	NC	NC
Cadmium	10.8	15.9	2.23	3.80E-01	0.001	6.7E-08	9.8E-08	1.4E-08
Chromium (VI)	33.6	14.4	7.42	NA	0	NC	NC	NC
Nickel	37.5	29.9	6.90	NA	0.01	NC	NC	NC
					TOTAL RISKsoil	**3.E-05**	**2.E-07**	**1.E-07**

Compound	Cs (mg/kg)			RfD_oral	ABS	HAZARDsoil		
	Fill Soil	Native Surface Soil	Native Subsurface Soil	(mg/kg-day)		Fill Soil	Native Surface Soil	Native Subsurface Soil
Noncarcinogenic Exposure								
Antimony	1,457	31.3	6.48	4.00E-04	0.01	4.E+00	9.E-02	2E-02
Arsenic	974	5.16	4.68	3.00E-04	0.03	4.E+00	2.E-02	2E-02
Barium	886	114	64	7.00E-02	0.01	2E-02	2E-03	1E-03
Beryllium	0.49	0.60	0.26	2.00E-03	0.01	3E-04	4E-04	2E-04
Cadmium	10.8	15.87	2.23	1.00E-03	0.001	1E-02	2E-02	3E-03
Chromium (VI)	33.6	14.37	7.42	3.00E-03	0	1E-02	5E-03	3E-03
Cobalt	8.70	9.16	4.42	6.20E-02	0.01	2E-04	2E-04	9E-05
Copper	2,293	608	210	3.70E-02	0.01	7E-02	2E-02	7E-03
Mercury	0.80	0.29	0.33	3.00E-04	0.01	3E-03	1E-03	1E-03
Molybdenum	7.72	0.78	0.78	5.00E-03	0.01	2E-03	2E-04	2E-04
Nickel	37.5	29.9	6.90	2.00E-02	0.01	2E-03	2E-03	4E-04
Selenium	5.34	1.17	1.44	5.00E-03	0.01	1E-03	3E-04	3E-04
Silver	0.58	0.20		5.00E-03	0.01	1E-04	5E-05	0E+00
Vanadium	28.8	30.0	17.04	7.00E-03	0.01	5E-03	5E-03	3E-03
Zinc	4,428	737	245	3.00E-01	0.01	2E-02	3E-03	1E-03
					TOTAL HAZARDsoil	**8.8**	**0.2**	**0.06**

Formulas:
RISKsoil = (Cs x SFo x EF x ED x 10^-6/(BW x AT)) x (IR + (ABS*AF*SA))
HAZARDsoil = ((Cs x EF x ED x 10^-6/(BW x AT)) x (IR + (ABS*AF*SA)))/RfDo
*See Table 7-8 for definition of exposure parameters
Notes:
Cs - exposure concentration in soil
RfD_oral - Oral Reference Dose
SF_oral - Oral Slope Factor
ABS - Absorption Factor
mg/kg - milligrams per kilogram
mg/kg-day - milligrams per kilogram per day
(mg/kg-day)-1 - per milligram per kilogram per day

Table 7-13
Risks Due to Inhalation of Fugitive Dust - Construction Worker Scenario
Former Eastern Iron & Metal Co.
2200 E. 11th Street, Los Angeles, California

Compound	Cs (mg/kg)			Ca (mg/m^3)			SF_inhal	RISKair		
	Fill Soil	Native Surface Soil	Native Subsurface Soil	Fill Soil	Native Surface Soil	Native Subsurface Soil	$(mg/kg\text{-}day)^{-1}$	Fill Soil	Native Surface Soil	Native Subsurface Soil
Carcinogenic Exposure										
Arsenic	974	5.16	4.68	4.9E-05	2.6E-07	2.3E-07	12.00	5.7E-07	3.0E-09	2.8E-09
Beryllium	0.49	0.60	0.26	2.5E-08	3.0E-08	1.3E-08	8.40	2.0E-10	2.5E-10	1.1E-10
Cadmium	10.8	15.9	2.23	5.4E-07	7.9E-07	1.1E-07	15.00	8.0E-09	1.2E-08	1.6E-09
Chromium (VI)	33.6	14.4	7.42	1.7E-06	7.2E-07	3.7E-07	510.00	8.4E-07	3.6E-07	1.9E-07
Nickel	37.5	29.9	6.90	1.9E-06	1.5E-06	3.4E-07	0.91	1.7E-09	1.3E-09	3.1E-10
							TOTAL RISKair	**1.E-06**	**4.E-07**	**2.E-07**

Compound	Cs (mg/kg)			Ca (mg/m^3)			RfD_inhal	HAZARDair		
	Fill Soil	Native Surface Soil	Native Subsurface Soil	Fill Soil	Native Surface Soil	Native Subsurface Soil	(mg/kg-day)	Fill Soil	Native Surface Soil	Native Subsurface Soil
Noncarcinogenic Exposure										
Antimony	1,457	31.3	6.48	7.3E-05	1.6E-06	3.2E-07	4.00E-04	1E-02	3E-04	6E-05
Arsenic	974	5.16	4.68	4.9E-05	2.6E-07	2.3E-07	3.00E-04	1E-02	6E-05	5E-05
Barium	886	114	64	4.4E-05	5.7E-06	3.2E-06	1.40E-04	2E-02	3E-03	2E-03
Beryllium	0.49	0.60	0.26	2.5E-08	3.0E-08	1.3E-08	5.70E-06	3E-04	4E-04	2E-04
Cadmium	10.8	15.87	2.23	5.4E-07	7.9E-07	1.1E-07	1.00E-03	4E-05	5E-05	8E-06
Chromium (VI)	33.6	14.37	7.42	1.7E-06	7.2E-07	3.7E-07	3.00E-03	4E-05	2E-05	8E-06
Cobalt	8.70	9.16	4.42	4.4E-07	4.6E-07	2.2E-07	6.20E-02	5E-07	5E-07	2E-07
Copper	2,293	608	210	1.1E-04	3.0E-05	1.0E-05	3.70E-02	2E-04	6E-05	2E-05
Mercury	0.80	0.29	0.33	4.0E-08	1.4E-08	1.7E-08	8.60E-05	3E-05	1E-05	1E-05
Molybdenum	7.72	0.78	0.78	3.9E-07	3.9E-08	3.9E-08	5.00E-03	5E-06	5E-07	5E-07
Nickel	37.5	29.9	6.90	1.9E-06	1.5E-06	3.4E-07	2.00E-02	6E-06	5E-06	1E-06
Selenium	5.34	1.17	1.44	2.7E-07	5.9E-08	7.2E-08	5.00E-03	4E-06	8E-07	1E-06
Silver	0.58	0.20		2.9E-08	1.0E-08	0.0E+00	5.00E-03	4E-07	1E-07	0E+00
Vanadium	28.8	30.0	17.04	1.4E-06	1.5E-06	8.5E-07	7.00E-03	1E-05	1E-05	8E-06
Zinc	4,428	737	245	2.2E-04	3.7E-05	1.2E-05	3.00E-01	5E-05	8E-06	3E-06
							TOTAL HAZARDair	**0.05**	**0.00**	**0.002**

Formulas:
Ca = Cs x 5E-8
RISKair = (Ca x SFi x InR x EF x ED/(BW x AT))
HAZARDair = ((Ca x InR x EF x ED/(BW x AT))/RfDi
*See Table 7-8 for definition of exposure parameters
Notes:
Cs - exposure concentration in soil
Ca - exposure concentration in air
RfD_inhal - Inhalation Reference Dose
SF_inhal - Inhalation Slope Factor

mg/kg - milligrams per kilogram
mg/kg-day - milligrams per kilogram per day
mg/m^3 - milligrams per cubic meter
(mg/kg-day)-1 - per milligram per kilogram per day

Table 7-14

LEAD RISK ASSESSMENT SPREADSHEET - Fill Soil

CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE to version 7

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.03
Lead in Soil/Dust (ug/g)	23461
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m^3)	1.5

OUTPUT							
	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	78.9	144.1	170.5	207.2	235.8	675	1062
BLOOD Pb, CHILD	298.1	544.5	644.3	783.1	891.1	146	247
BLOOD Pb, PICA CHILD	463.2	846.2	1001.3	1217.0	1384.9	94	159
BLOOD Pb, OCCUPATIONAL	16.2	29.6	35.1	42.6	48.5	3472	5461

EXPOSURE PARAMETERS			
	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/d	0.0001	
Soil ingestion	*mg/day*	50	100
Soil ingestion, pica	mg/day		200
Ingestion constant	(ug/dl)/(ug/d	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/d	0.08	0.19
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	10557.3	

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PATHWAYS						
ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.90	1%	1.4E-5	0.33	2%
Soil Ingestion	8.8E-4	20.65	26%	6.3E-4	14.75	91%
Inhalation, bkgrnd		0.05	0%		0.04	0%
Inhalation	2.5E-6	0.06	0%	1.8E-6	0.04	0%
Water Ingestion		0.84	1%		0.84	5%
Food Ingestion, bkgrnd		0.22	0%		0.23	1%
Food Ingestion	2.4E-3	56.16	71%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	1.31	0%		1.31	0%
Soil Ingestion	7.0E-3	165.16	55%	1.4E-2	330.33	71%
Inhalation	2.0E-6	0.05	0%		0.05	0%
Inhalation, bkgrnd		0.04	0%		0.04	0%
Water Ingestion		0.96	0%		0.96	0%
Food Ingestion, bkgrnd		0.50	0%		0.50	0%
Food Ingestion	5.5E-3	130.07	44%		130.07	28%

Table 7-15

LEAD RISK ASSESSMENT SPREADSHEET - Native Surface Soil

CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE to version 7

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.03
Lead in Soil/Dust (ug/g)	*2995*
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m^3)	1.5

OUTPUT	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	11.0	20.2	23.9	29.0	33.0	675	1062
BLOOD Pb, CHILD	39.4	71.9	85.1	103.4	117.7	146	247
BLOOD Pb, PICA CHILD	60.5	110.4	130.7	158.8	180.7	94	159
BLOOD Pb, OCCUPATIONAL	3.0	5.5	6.6	8.0	9.1	3472	5461

EXPOSURE PARAMETERS	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
D[illegible]al uptake constant	(ug/dl)/(ug/d	0.0001	
S[illegible]gestion	mg/day	50	100
Soil ingestion, pica	mg/day		200
Ingestion constant	(ug/dl)/(ug/d	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/d	0.08	0.19
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	1347.8	

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PATHWAYS						
ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.11	1%	1.4E-5	0.04	1%
Soil Ingestion	8.8E-4	2.64	24%	6.3E-4	1.88	62%
Inhalation, bkgrnd		0.05	0%		0.04	1%
Inhalation	2.5E-6	0.01	0%	1.8E-6	0.01	0%
Water Ingestion		*0.84*	*8%*		0.84	28%
Food Ingestion, bkgrnd		0.22	2%		0.23	8%
Food Ingestion	2.4E-3	7.17	65%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution !		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.17	0%		0.17	0%
Soil Ingestion	7.0E-3	21.09	54%	1.4E-2	42.17	70%
Inhalation	2.0E-6	0.01	0%		0.01	0%
Inhalation, bkgrnd		0.04	0%		0.04	0%
Water Ingestion		0.96	2%		0.96	2%
Food Ingestion, bkgrnd		0.50	1%		0.50	1%
Food Ingestion	5.5E-3	16.60	42%		16.60	27%

Table 7-16

LEAD RISK ASSESSMENT SPREADSHEET - Native Subsurface Soil

CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL

USER'S GUIDE to version 7

INPUT	
MEDIUM	LEVEL
Lead in Air (ug/m^3)	0.03
Lead in Soil/Dust (ug/g)	383
Lead in Water (ug/l)	15
% Home-grown Produce	7%
Respirable Dust (ug/m^3)	1.5

OUTPUT	Percentile Estimate of Blood Pb (ug/dl)					PRG-99	PRG-95
	50th	90th	95th	98th	99th	(ug/g)	(ug/g)
BLOOD Pb, ADULT	2.4	4.3	5.1	6.2	7.1	675	1062
BLOOD Pb, CHILD	6.3	11.6	13.7	16.7	18.9	146	247
BLOOD Pb, PICA CHILD	9.0	16.5	19.5	23.7	27.0	94	159
BLOOD Pb, OCCUPATIONAL	1.4	2.5	2.9	3.6	4.1	3472	5461

EXPOSURE PARAMETERS	units	adults	children
Days per week	days/wk	7	
Days per week, occupational		5	
Geometric Standard Deviation		1.6	
Blood lead level of concern (ug/dl)		10	
Skin area, residential	cm^2	5700	2900
Skin area occupational	cm^2	2900	
Soil adherence	ug/cm^2	70	200
Dermal uptake constant	(ug/dl)/(ug/d	0.0001	
Soil ingestion	mg/day	50	100
Soil ingestion, pica	mg/day		200
Ingestion constant	(ug/dl)/(ug/d	0.04	0.16
Bioavailability	unitless	0.44	
Breathing rate	m^3/day	20	6.8
Inhalation constant	(ug/dl)/(ug/d	0.08	0.19
Water ingestion	l/day	1.4	0.4
Food ingestion	kg/day	1.9	1.1
Lead in market basket	ug/kg	3.1	
Lead in home-grown produce	ug/kg	172.2	

Click here for REFERENCES

PATHWAYS

ADULTS	Residential			Occupational		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	3.8E-5	0.01	1%	1.4E-5	0.01	0%
Soil Ingestion	8.8E-4	0.34	14%	6.3E-4	0.24	18%
Inhalation, bkgrnd		0.05	2%		0.04	3%
Inhalation	2.5E-6	0.00	0%	1.8E-6	0.00	0%
Water Ingestion		0.84	35%		0.84	62%
Food Ingestion, bkgrnd		0.22	9%		0.23	17%
Food Ingestion	2.4E-3	0.92	39%			0%

CHILDREN	typical			with pica		
	Pathway contribution			Pathway contribution		
Pathway	PEF	ug/dl	percent	PEF	ug/dl	percent
Soil Contact	5.6E-5	0.02	0%		0.02	0%
Soil Ingestion	7.0E-3	2.69	42%	1.4E-2	5.39	60%
Inhalation	2.0E-6	0.00	0%		0.00	0%
Inhalation, bkgrnd		0.04	1%		0.04	0%
Water Ingestion		0.96	15%		0.96	11%
Food Ingestion, bkgrnd		0.50	8%		0.50	6%
Food Ingestion	5.5E-3	2.12	33%		2.12	23%

Table 7-17
Summary of Total Risks and Hazard Indices
Former Eastern Iron & Metal Co.
2200 E. 11th Street, Los Angeles, California

Pathway	Adult/Child Resident			Industrial Worker			Construction Worker		
Carcinogenic Risk	**Fill Soil**	**Native Surface Soil**	**Native Subsurface Soil**	**Fill Soil**	**Native Surface Soil**	**Native Subsurface Soil**	**Fill Soil**	**Native Surface Soil**	**Native Subsurface Soil**
Ingestion and dermal contact with soil	3E-03	3E-05	2E-05	8E-04	5E-06	4E-06	3E-05	2E-07	1E-07
Inhalation of fugitive dust/soil	2E-04	6E-05	3E-05	8E-05	2E-05	1E-05	1E-06	4E-07	2E-07
Total Cancer Risk for All Pathways	**3E-03**	**8E-05**	**5E-05**	**8E-04**	**3E-05**	**1E-05**	**3E-05**	**6E-07**	**3E-07**
Hazard Index									
Ingestion and dermal contact with soil	107	2	0.7	8	0.1	0.05	8.8	0.2	0.06
Inhalation of fugitive dust/soil	0.4	0.03	0.02	0.1	0.01	0.004	0.05	0.004	0.002
Total Hazard Index for All Pathways	**107**	**2**	**0.7**	**8**	**0.1**	**0.05**	**9**	**0.2**	**0.06**
Leadspread									
Exposure to lead, non-pica child, 99th percentile	**891**	**118**	**19**						
Exposure to lead, pica child, 99th percentile	**1,385**	**181**	**27**						
Exposure to lead, adult, 99th percentile	**236**	**33**	**7.1**	**48**	**9.1**	**4.1**	**48.5**	**9.1**	**4.1**

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J-144 - Shell, 1410 S Soto Street

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CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

State Water Resources Control Board

November 6, 2014

Mr. Joe Lentini
Equilon Enterprises LLC dba Shell Oil Products US
20945 South Wilmington Avenue
Carson, CA 90810-1039

Dear Mr. Lentini:

UNDERGROUND STORAGE TANK CASE CLOSURE FOR SHELL SERVICE STATION, 1410 SOUTH SOTO STREET, LOS ANGELES, LOS ANGELES COUNTY

This letter confirms completion of a site investigation and remedial action for the underground storage tanks (USTs) case formerly located at the above-described location (Site). This Site has the following identifying numbers:

- Geotracker No. T0603753581
- City of Los Angeles Case No. TTXS0000246

Thank you for your cooperation throughout this investigation. Your willingness and promptness when responding to our inquiries concerning the former USTs are greatly appreciated.

Based on information in the above-referenced case file and with the provision that the information provided to this agency was accurate and representative of Site conditions, this agency finds that the investigation and corrective action carried out at your Site is in compliance with the requirements of subdivisions (a) and (b) of section 25296.10 of the Health and Safety Code and with corrective action regulations adopted pursuant to section 25299.3 of the Health and Safety Code and that no further action related to the petroleum release(s) at the Site is required. This notice is issued pursuant to subdivision (g) of section 25296.10 of the Health and Safety Code.

Claims for reimbursement of corrective action costs submitted to the UST Cleanup Fund more than 365 days after the date of this letter or issuance or activation of the Fund's Letter of Commitment, whichever occurs later, will not be reimbursed unless one of the following exceptions apply:

- Claims are submitted pursuant to section 25299.57 of the Health and Safety Code, subdivision (k) (reopened UST case); or
- Submission within the time frame was beyond the claimant's reasonable control, ongoing work is required for closure that will result in the submission of claims beyond that time period, or that under the circumstances of the case, it would be unreasonable or inequitable to impose the 365 day time period.

If you have any questions regarding this matter, please contact Mr. George Lockwood at (916) 341-5752 or George.Lockwood@waterboards.ca.gov.

Sincerely,

Victoria A. Whitney

Victoria A. Whitney, Deputy Director
Division of Water Quality

cc: [Via email only]

Mr. Samuel Unger, Executive Officer
Los Angeles Regional Water Quality Control Board
(Samuel.Unger@waterboards.ca.gov)

Mr. Yue Rong
Los Angeles Regional Water Quality Control Board
(Yue.Rong@waterboards.ca.gov)

Ms. Frances McChesney
State Water Resources Control Board
(Frances.McChesney@waterboards.ca.gov)

Mr. Eloy Luna
City of Los Angeles
(Eloy.Luna@lacity.org)

Mr. George Lockwood
State Water Resources Control Board
(George.Lockwood@waterboards.ca.gov)

Mr. Matthew Cohen
State Water Resources Control Board
(Matthew.Cohen@waterboards.ca.gov)

Mr. John Huff
Wayne Perry, INC.
Jhuff@wpinc.com

URS

March 16, 2009

Mr. Charles O'Neill
Staff Project Manager
Shell Oil Products US
20945 South Wilmington Avenue
Carson, CA 90810

Re: **Phase II Environmental Site Assessment Report**
Shell Service Station
1410 South Soto Street
Los Angeles, California
SAP No. 135550

Dear Mr. Charles O'Neill:

INTRODUCTION

URS Corporation (URS) is pleased to present this letter report entitled "Phase II Environmental Site Assessment Report" for the Shell service station located at 1410 South Soto Street, Los Angeles, California ("the Site"), as illustrated on Figure 1. This investigation was conducted for Shell Oil Products US (Shell) as part of the due diligence program of specific retail assets in southern California and was not overseen by local regulatory agencies. The primary purpose of the investigation was to evaluate subsurface conditions at the Site.

EXECUTIVE SUMMARY

On February 2, 2009, URS drilled and sampled a total of six (6) soil borings at the Site including three soil borings (B01 through B03) located adjacent to the dispenser island area and three soil borings (B04, B06, and B07) located adjacent to the gasoline/diesel underground storage tank (UST) complex. Soil boring B05 could not be advanced. The soil boring had been cleared to seven (7) feet below ground surface (bgs), however, a mixture of "suspect" pea gravel and soil was encountered, therefore the soil boring was eliminated due to safety concerns. Soil borings advanced adjacent to the USTs were drilled to approximately 41.5 feet below ground surface (bgs) and those advanced adjacent to the dispensers were drilled to approximately 21.5 feet bgs. A summary of the results of this subsurface investigation are presented below.

- Total Purgeable Petroleum Hydrocarbons calculated as Gasoline (TPPH) concentrations were not detected in the soil samples analyzed from soil borings located adjacent to the gasoline/diesel UST complex and dispenser islands. A Total Petroleum Hydrocarbons calculated as diesel (TPH-d) concentration of 15 mg/kg was detected in soil boring B02, located adjacent to the dispenser islands, at ten (10) feet bgs.

- Volatile Organic Compounds (VOC) consisting of Benzene, Toluene, Ethylbenzene, and total Xylenes (BTEX) were not detected in the soil samples analyzed from the soil borings located adjacent to the gasoline/diesel UST complex and dispenser islands.
- Fuel additive compounds 1,2-Dibromoethane (EDB) and 1,2-Dichloroethane (EDC) were not detected in the soil samples analyzed from soil borings located adjacent to the gasoline/diesel UST complex and dispenser islands.
- Fuel oxygenate compounds consisting of Methyl-t-Butyl Ether (MTBE), Tert-Butyl Alcohol (TBA), Diisopropyl Ether (DIPE), Ethyl-t-Butyl Ether (ETBE), Tert-Amyl-Methyl Ether (TAME) and ethanol concentrations were not detected in the soil samples analyzed from the soil borings located adjacent to the gasoline/diesel UST complex and dispenser islands.
- Soil encountered at the Site generally consisted of fine to medium sand, silty sand, and clayey silt to the total depth explored of approximately 41.5 feet bgs.
- Groundwater was not encountered in the subsurface.

SITE BACKGROUND

The Site is currently an active Shell retail service station. Site structures include a service station building, located in the center portion of the lot, and two (2) dispenser islands on each side of the building. Site facilities include an underground storage tank (UST) area with three (3) underground (gasoline and diesel) tanks and two (2) dispenser islands. Limited vehicle parking is located along the eastern border of the Site. Site features are illustrated on Figure 2.

Surrounding land use consists of commercial properties in all directions.

PROJECT OBJECTIVE

The objective of this investigation was to evaluate the subsurface conditions for the presence of petroleum hydrocarbons around the existing USTs and dispenser islands associated with the current service station operations.

SCOPE OF WORK

The scope of work for this investigation included drilling a total of six (6) soil borings at the Site including three soil borings (B01 through B03) located adjacent to the dispenser island area and three soil borings (B04, B06, and B07) located adjacent to the gasoline/diesel UST complex. Soil borings advanced adjacent to the USTs were drilled to approximately 41.5 feet below ground surface (bgs) and those advanced adjacent to the dispensers were drilled to approximately 21.5 feet bgs. Soil boring B05 could not be advanced. The soil boring had been cleared to seven (7) feet below ground surface (bgs), however, a mixture of "suspect" pea gravel and soil was encountered, and therefore the soil boring was eliminated due to safety concerns. Variances from the Shell approved scope of work for this Site were granted for soil borings B01 through B03; these three borings were located between 3 and 4.5 feet from underground utility lines.

PRE-DRILLING ACTIVITIES

Utility Clearance

On January 20, 2009, the entire Site area and each soil boring were marked for underground service alert (USA) clearance. On January 23, 2009, USA was notified 48-hours in advance of drilling activities and ticket numbers A90230878 and A90230886 were issued to URS as compliance of proper notification. On January 26, 2009, a geophysical survey was conducted to identify subsurface utilities in the vicinity of the proposed soil boring locations. If utilities were located within five (5) feet of the proposed boring location, then the boring was relocated or eliminated.

Soil Boring Permits

No local permits were required to advance soil borings at the Site as part of this investigation.

Health and Safety

A Site-specific health and safety plan dated January 2009 was prepared for the Site in accordance with the HSE Contractor Safety Program. Prior to each field activity, URS performed a safety tailgate meeting with all staff and subcontractors working on the project. Field copies of the Borehole Clearance Checklist, ES Preconstruction/Pre-job Planning Checklist, Job Clearance Form, Minimal Business Interference (MBI) checklist and Safe Work System – Hot Work Permit are provided in Attachment A.

Borehole Clearance

On January 28 and 29, 2009, URS cleared each soil boring to approximately seven (7) feet bgs using air-vacuum technology. Air vacuum technology consists of removing soil from the borehole location using high vacuum air suction. Removed soil is captured in a steel tank. Upon completion of borehole clearance activities, captured soil was used to backfill the open borehole. A temporary asphalt patch was placed over each cleared borehole and finished flush with existing grade surface. If an obstruction was identified in the borehole, then the borehole surface was backfilled with existing soil and finished flush to existing grade with concrete.

HOLLOW STEM AUGER DRILLING ACTIVITIES

On February 2 and 3, 2009, URS advanced a total of six (6) soil borings, B01 through B04, B06, and B07 at the Site. Soil borings were drilled using a CME 75 hollow stem auger drill rig. Upon reaching the desired sample depth, the California modified split spoon sampler was driven 18-inches into the center of the auger using a 140 pound hammer to collect relatively undisturbed soil samples. The sampler was lined with 2-inch diameter by 6-inch long rings, which were used to collect the soil samples. Blow counts were recorded on the boring logs to estimate soil density. Each soil sample was collected in a stainless steel sample sleeve capped with Teflon™ sheets and plastic end caps. For all samples collected, sample labels with the following information were affixed to each sleeve: soil boring number, sample depth, and sampling date and time. Sealed and labeled samples were immediately placed in plastic bags and stored in a chilled ice chest.

Sampling and Logging

The initial soil sample was collected from 10 feet bgs; thereafter, soil samples were collected at five-foot intervals to the maximum depth explored. During drilling operations, boring logs were completed by a field geologist working under the supervision of a California Professional Geologist. The following sampling information was recorded on each boring log: boring number and location; drilling method; sample date and time; sample depth; lithologic description in general accordance with the Unified Soil Classification System (USCS) including soil type, particle size and distribution, color (using the Munsell soil color chart), and moisture content; description of any visible evidence of soil contamination (i.e., discoloration, unusual odors, etc.); and Photo-Ionization Detector (PID) readings. Copies of the boring logs are provided in Attachment B.

In order to obtain headspace readings of a discrete soil sample, the following procedures were used when field screening with the PID. A portion of the sample was placed into a sealed plastic bag. The sample was then agitated to break up any large pieces of soil, and allowed to equilibrate for approximately 10 minutes. Finally the PID probe was inserted into the bag and a volatile measurement was then recorded.

URS sampling personnel wore clean, nitrile or equivalent protective gloves while collecting and handling the samples. Samples were tightly sealed, uniquely labeled, and stored on ice during transportation to the laboratory.

Decontamination

Drilling equipment and sampling tools were decontaminated with an Alconox™ (or equivalent) detergent solution to minimize cross-contamination. Clean, disposable nitrile gloves were worn when decontaminating the sampling equipment. Decontamination water was stored onsite in a properly labeled Department of Transportation (DOT) approved 55-gallon drum.

Backfill and Disposal

Following drilling and sampling activities, borings were back filled with cement-bentonite grout. The top of the borehole was finished at-grade with concrete. Soil cuttings were placed onsite in properly labeled DOT approved 55-gallon drums. The soil was profiled and transported to American Remedial Technologies of California located in Lynnwood, California for disposal. A composite sample was collected from 12 drums collected during the advancement of soil borings B01 through B04, B06, and B07. The composite sample was analyzed for Title 22 Metals for waste characterization purposes. One (1) drum of decontamination water was profiled and transported by American Integrated Services, Inc. located in Wilmington, California for disposal at Crosby & Overton in Long Beach, CA. Waste disposal manifests can be found in Attachment C.

LABORATORY ANALYSES

During the Site investigation, soil samples were collected from soil borings B01 through B04, B06, and B07 beginning at approximately 10 feet bgs and typically at 5 foot intervals thereafter to the maximum depth of the boring. One sample per boring was submitted for laboratory analyses. The sample submitted for analyses either had the highest headspace readings using a

PID, visual indications of hydrocarbon impact, or was the deepest sample collected if there was no evidence of hydrocarbon impact.

A summary of the constituents analyzed for the soil samples is presented below.

Soil Samples

The soil samples collected from borings B01 through B04, B06, and B07, located adjacent to the gasoline/diesel UST complex and dispenser islands, were analyzed for the following constituents:

- Total Purgeable Petroleum Hydrocarbons calculated as Gasoline (TPPH) using EPA Method 8260M;

- Total Petroleum Hydrocarbons calculated as diesel (TPH-d) using EPA Method 8015M;

- Volatile Organic Compounds (VOC) consisting of Benzene, Toluene, Ethylbenzene, and total Xylenes (BTEX) using EPA Method 8260B;

- Fuel additives consisting of 1,2-Dibromoethane (EDB) and 1,2-Dichloroethane (EDC) using EPA Method 8260B; and

- Fuel Oxygenate Compounds consisting of Methyl-t-Butyl Ether (MTBE), Tert-Butyl Alcohol (TBA), Diisopropyl Ether (DIPE), Ethyl-t-Butyl Ether (ETBE), Tert-Amyl-Methyl Ether (TAME) and Ethanol using EPA Method 8260B.

The samples were submitted to Calscience Environmental Laboratories Incorporated located in Garden Grove, California. Chain-of-custody procedures were followed from sample collection to sample analysis. Certified laboratory analytical reports are presented in Attachment D.

LIMITED DATA VALIDATION

Limited data validation was completed for the soil samples collected as part of this Site investigation. The limited data validation includes a 100 percent completeness check of the following quality control parameters:

- Chain of Custody documentation;
- Sample Receipt Times;

- Laboratory Holding Times;
- Method Blanks;
- Surrogate Recoveries;
- Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD); and
- Matrix Spike/ Matrix Spike Duplicate (MS/MSD).

The limited data validation memorandum is included as Attachment E.

INVESTIGATION RESULTS

This section presents the results of the due diligence program conducted at the Site.

Soil analytical results were compared to industrial use Preliminary Remediation Goals (PRGs) per Environmental Protection Agency (EPA) Region 9 and the Maximum Soil Screening Levels (MSSLs) issued by the Los Angeles Regional Water Quality Control Board (LARWQCB). The MSSLs are the local limits for this Site.

Subsurface Conditions

During the investigation, six (6) soil borings (B01 through B04, B06, and B07) were completed to depths ranging from approximately 21.5 to 41.5 feet bgs. Soil encountered at the Site generally consisted of fine to medium sand, silty sand, and clayey silt to the total depth explored of 41.5 feet bgs. Groundwater was not encountered in any of the borings.

During the investigation, staining and slight odor were observed in the sample collected from soil boring B02; however, only slight odor was observed in samples collected from soil borings B01, B03, B04, B06, and B07. PID headspace readings generally ranged between 0.0 and 24.7 parts per million (ppm). The highest PID reading was 24.7 ppm, as measured in the sample collected from soil boring B01 at 20 feet bgs.

Soil Analytical Results

Laboratory analytical results for soil samples are summarized in Tables 1 and 2. Soil analytical results are also illustrated on Figure 3. The certified analytical laboratory report and chain-of-custody documentation is presented in Attachment D.

TPPH concentrations were not detected in the soil samples analyzed from soil borings located adjacent to the gasoline/diesel UST complex and the dispenser islands. A TPH-d concentration of 15 mg/kg was detected in soil boring B02, located adjacent to the dispenser islands, at ten (10) feet bgs.

VOCs consisting of BTEX were not detected in the soil samples analyzed from the soil borings located adjacent to the gasoline/diesel UST complex and dispenser islands.

Fuel additive compounds EDC and EDB were not detected in the soil samples analyzed from the soil borings located adjacent to the gasoline/diesel UST complex and dispenser islands.

Fuel oxygenate compounds consisting of MTBE, TBA, DIPE, ETBE, TAME, and ethanol concentrations were not detected in the soil samples analyzed from the soil borings located adjacent to the gasoline/diesel UST complex and dispenser islands.

UNAUTHORIZED RELEASE REPORTING

An Unauthorized Release Report (URR) was not submitted for this Site to the local oversight agency as PID readings, visual observations, and laboratory analytical data did not suggest indications of a new release at this Site.

SENSITIVE RECEPTOR SURVEY

URS performed a sensitive receptor survey (SRS) at the Site, which consisted of a desktop survey to identify any drinking water supply wells within 1,000-feet of the property. In the event that drinking water supply wells were identified by the current and/or any previous sensitive receptor surveys, a field verification was performed to confirm the existence of these wells.

A previous sensitive receptor survey was available for the subject property. Delta Environmental Consultants, Inc. (Delta) prepared a sensitive receptor survey for the Site dated December 6, 2005. The survey performed by Delta did not identify water wells within 1,000-feet of the Site.

URS contracted Environmental Data Resources, Inc. (EDR) of Milford, Connecticut to perform a search of Federal and State water agency records, which include local public records, for the presence of drinking water supply wells within ½-mile radius of the Site. A copy of the report obtained from EDR is provided in Attachment F. The information provided by EDR did not identify any wells within ½-mile of the Site.

In addition, URS reviewed online well information available through the County of Los Angeles Department of Public Works (LACDPW) website (http://ladpw.org/wrd/wellinfo/well.cfm). No active wells were identified within 1,000-feet of the Site on the LACDPW website.

SUMMARY OF FINDINGS

Based on the results of this subsurface investigation, URS concludes the following.

- TPPH concentrations were not detected in the soil samples analyzed from soil borings located adjacent to the gasoline/diesel UST complex and the dispenser islands. A TPH-d concentration of 15 mg/kg was detected in soil boring B02, located adjacent to the dispenser islands, at ten (10) feet bgs.
- VOCs consisting of BTEX were not detected in the soil samples analyzed from soil borings located adjacent to the gasoline/diesel UST complex and the dispenser islands.
- Fuel additive compounds EDC and EDB were not detected in the soil samples analyzed from soil borings located adjacent to the gasoline/diesel UST complex and the dispenser islands.
- Fuel oxygenate compounds consisting of MTBE, TBA, DIPE, ETBE, TAME, and ethanol concentrations were not detected in the soil samples analyzed from soil borings located adjacent to the gasoline/diesel UST complex and the dispenser islands.
- Soil encountered at the Site generally consisted of fine to medium sand, silty sand, and clayey silt to the total depth explored of approximately 41.5 feet bgs.
- Groundwater was not encountered on the Site

CONCLUSIONS

Based on review of field observations and laboratory results as well as available historical files, the following conclusions have been made for this site.

- TPPH, BTEX, EDC, EDB, and all fuel oxygenate compounds consisting of MTBE, TBA, DIPE, ETBE, TAME, and ethanol were non-detect for all soil samples collected and submitted for laboratory analysis.
- TPH-d was non-detect for the soil samples analyzed from soil borings B01, B03, B04, B06, and B07.

- TPH-d was detected at 15 mg/kg in the soil sample analyzed from soil boring B02 at ten (10) feet bgs. This concentration was compared to industrial use Preliminary Remediation Goals (PRGs) per Environmental Protection Agency (EPA) Region 9 and the Maximum Soil Screening Levels (MSSLs), issued by the Los Angeles Regional Water Quality Control Board (LARWQCB). The MSSL for TPH-d is 1000 mg/kg, assuming a conservative distance of 20 feet above groundwater in sand. Therefore, the detected concentration of TPH-d is below the MSSL. A PRG is not available for TPH-d.

- A previous URR, dated December 23, 2002, lists gasoline and diesel. In the *Tank Removal and Overexcavation Soil Sampling Report*, dated December 23, 2002, TPH-d was detected near the dispensers at a concentration of 56 mg/kg, which is above the detected concentration of 15 mg/kg in soil boring B02, located adjacent to the dispenser islands.

- Slight staining and odor were observed in the soil samples collected during the field investigation.

- In addition, based on the results of the SRS, there is no well identified within 1,000 feet of the Site.

URS

If you have any questions regarding this letter report, please do not hesitate to call the undersigned at (213) 996-2200.

Sincerely,

URS CORPORATION

Carole M. Bartel
Staff Geologist

Joseph L. Montoya, C.E.G., C.HG.
Senior Project Geologist

Alexis M. Bahou, P.E.
Project Manager

List of Attachments:

Figure 1 - Vicinity Map
Figure 2 - Boring Locations
Figure 3 - Soil Analytical Results

Table 1 - Summary of Soil Analytical Results – BTEX and TPH
Table 2 - Summary of Soil Analytical Results – Fuel Oxygenates, Additives, and Ethanol

Attachment A - Shell Safety Field Forms
Attachment B - Boring Logs
Attachment C - Waste Disposal Manifests
Attachment D - Certified Laboratory Analytical Reports
Attachment E - Data Validation Memorandum
Attachment F - Sensitive Receptor Survey Documentation

FIGURES

1 1/2 0 1MILE

SCALE: 1"=5000'

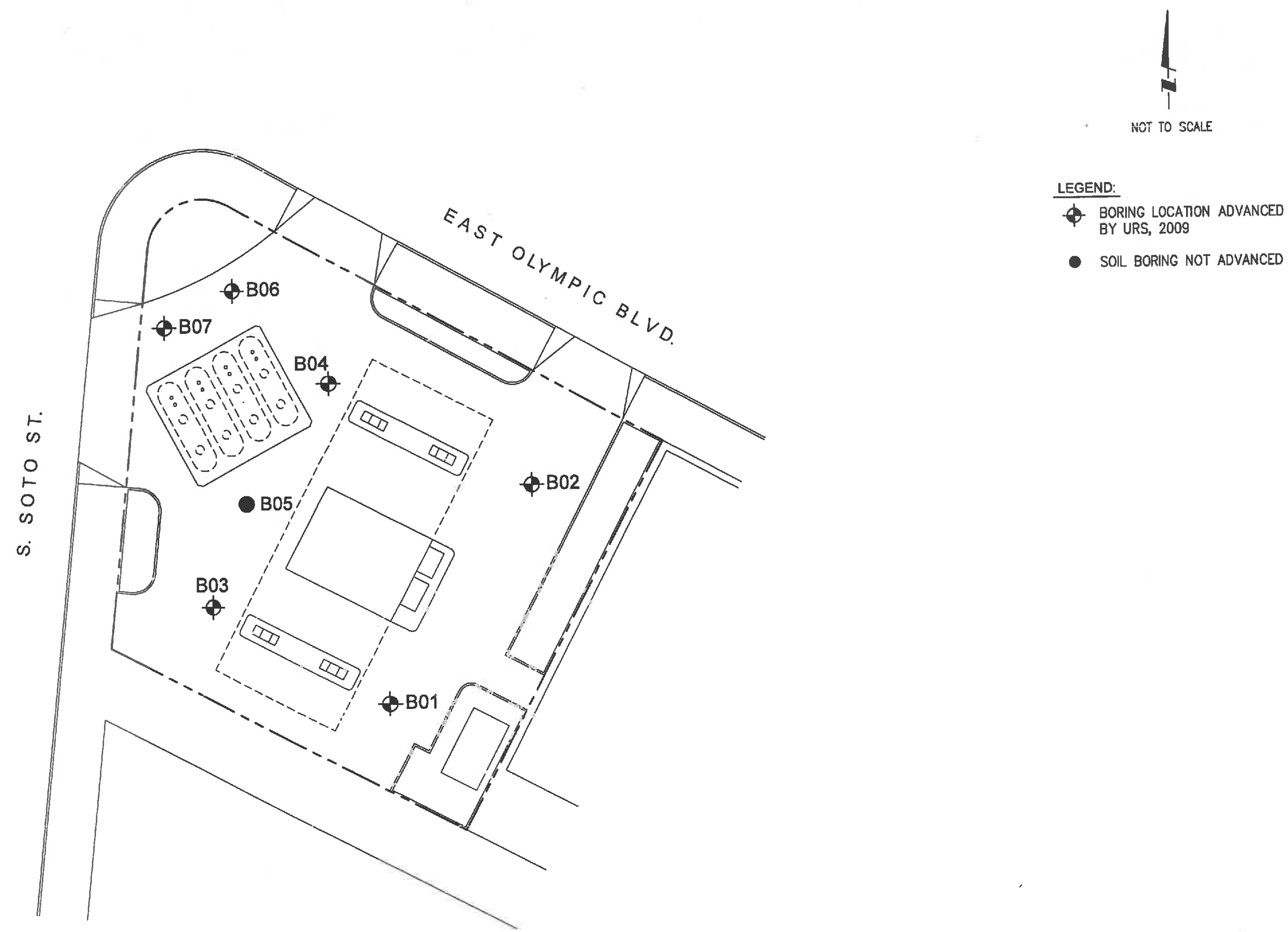
VICINITY MAP

FIGURE 1

SHELL STATION 135550
1410 S SOTO STREET
LOS ANGELES, CA 90023

URS

P:\Projects\Shell\2009\Cadd Site Plans\135550-01-VICINITY MAP.dwg 02/11/2009 08:14



Project No. 49194400.03000

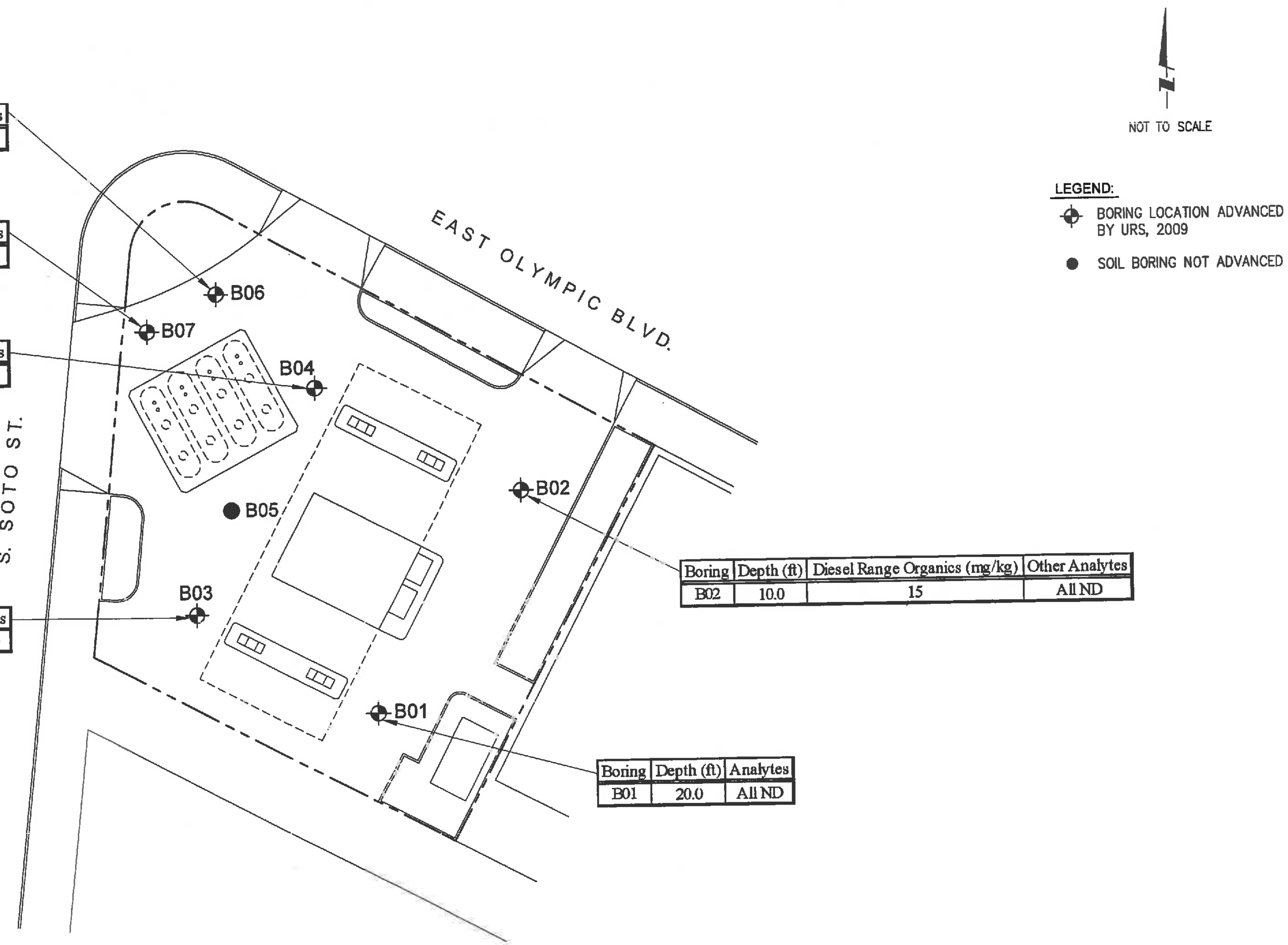
BORING LOCATIONS

URS | March 2009

SHELL STATION 135550 – 1410 S. SOTO STREET, LOS ANGELES, CA 90023

FIGURE 2

P:\Projects\Shell\2009\Cadd Site Plans\135550-02.dwg 03/09/2009 09:49



Boring	Depth (ft)	Analytes
B06	40.0	All ND

Boring	Depth (ft)	Analytes
B07	20.0	All ND

Boring	Depth (ft)	Analytes
B04	40.0	All ND

Boring	Depth (ft)	Analytes
B03	20.0	All ND

Boring	Depth (ft)	Diesel Range Organics (mg/kg)	Other Analytes
B02	10.0	15	All ND

Boring	Depth (ft)	Analytes
B01	20.0	All ND

Project No. 49194400.03000

SOIL ANALYTICAL RESULTS

URS

March 2009

SHELL STATION 135550 – 1410 S. SOTO STREET, LOS ANGELES, CA 90023

FIGURE 3

P:\Projects\Shell\2009\Codd Site Plans\135550-03-soil.dwg 03/09/2009 09:43

TABLES

TABLE 1
SUMMARY OF SOIL ANALYTICAL RESULTS - BTEX AND TPH
Shell Service Station 135550
1410 S Soto St
Los Angeles, California

Sample ID	Sample Date	Sample Depth (feet)	Benzene (ug/kg)	Ethylbenzene (ug/kg)	Toluene (ug/kg)	Diesel Range Organics (mg/kg)	TPPH (ug/kg)	Xylenes (total) (ug/kg)
		Industrial PRG	5,600	29,000	46,000,000	NA	NA	2,600,000
		LARWQCB MSSL	11	700	300	1000	500000	1750
135550-B01-20	02/02/09	20.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<500)	ND (<5.0)
135550-B02-10	02/02/09	10.0	ND (<500)	ND (<500)	ND (<500)	15	ND (<50000)	ND (<500)
135550-B03-20	02/02/09	20.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<500)	ND (<5.0)
135550-B04-40	02/02/09	40.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<500)	ND (<5.0)
135550-B06-40	02/02/09	40.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<500)	ND (<5.0)
135550-B07-20	02/02/09	20.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<500)	ND (<5.0)

Notes:
ND = Not detected above laboratory reporting limit.
NA = Not Available
Industrial PRG = EPA Industrial Soil Preliminary Remediation Goal 2008
LARWQCB MSSL = Los Angeles Regional Water Quality Control Board Maximum Soil Screening Levels (MSSL) Above Drinking Water Aquifers.
ug/kg = micrograms per kilogram
mg/kg = milligrams per kilogram

Diesel Range Organics per EPA Method 8015M
TPPH = Total Purgeable Petroleum Hydrocarbons per LUFT GC/MS
Benzene, Toluene, Ethylbenzene, Xylenes per EPA Method 8260B

TABLE 2
SUMMARY OF SOIL ANALYTICAL RESULTS - FUEL OXYGENATES, ADDITIVES, AND ETHANOL
Shell Service Station 135550
1410 S Soto St
Los Angeles, California

Sample ID	Sample Date	Sample Depth (feet)	1,2-Dibromoethane (ug/kg)	1,2-Dichloroethane (ug/kg)	Diisopropyl Ether (DIPE) (ug/kg)	Ethanol (ug/kg)	Ethyl-t-Butyl Ether (ETBE) (ug/kg)	Methyl-t-Butyl Ether (MTBE) (ug/kg)	Tert-Amyl-Methyl Ether (TAME) (ug/kg)	Tert-Butyl Alcohol (TBA) (ug/kg)
		Industrial PRG	170	2,200	NA	NA	NA	190,000	NA	NA
	LARWQCB MSSL		NA	NA	NA	NA	NA	13	NA	NA
135550-B01-20	02/02/09	20.0	ND (<5.0)	ND (<5.0)	ND (<10)	ND (<500)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
135550-B02-10	02/02/09	10.0	ND (<500)	ND (<500)	ND (<1000)	ND (<50000)	ND (<1000)	ND (<500)	ND (<1000)	ND (<5000)
135550-B03-20	02/02/09	20.0	ND (<5.0)	ND (<5.0)	ND (<10)	ND (<500)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
135550-B04-40	02/02/09	40.0	ND (<5.0)	ND (<5.0)	ND (<10)	ND (<500)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
135550-B06-40	02/02/09	40.0	ND (<5.0)	ND (<5.0)	ND (<10)	ND (<500)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
135550-B07-20	02/02/09	20.0	ND (<5.0)	ND (<5.0)	ND (<10)	ND (<500)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)

Notes:
ND = Not detected above laboratory reporting limit.
NA = Not Available
Industrial PRG = EPA Industrial Soil Preliminary Remediation Goal 2008
LARWQCB MSSL = Los Angeles Regional Water Quality Control Board Maximum Soil Screening Levels (MSSL) Above Drinking Water Aquifers.
ug/kg = micrograms per kilogram

Fuel Oxygenate Compounds, 1,2-Dibromoethane, 1,2-Dichloroethane per EPA Method 8260B

ATTACHMENT A
SHELL SAFETY FIELD FORMS

BOREHOLE CLEARANCE CHECKLIST
Shell Oil Products US - Environmental Services

1. If "NO" is answered on any of the items below, the consultant should contact the appropriate Shell Project Management Staff (PM) and discuss the issue(s) before proceeding with the subsurface investigation.
2. Document the reason for a "NO" answer on a second sheet and attach to this form.
3. Contact your supervisor for instructions and document instructed actions and results of actions documented.

Site Address: 1410 S. Soto St Contractor Project #: 49194400 Date: 1/28/04

Borehole #s Reviewed: B1, B2, B4, ~~~~B6, B7, B3~~~~ Clearance Performed By: Joe Mantoya
B5 - Eliminated may be relocated.

Project Manager

PRE-MOBILIZATION

YES	NO	N/A	
X			Does each borehole location allow for clear entry and exit, adequate workspace, and sufficient clearance (vertical and horizontal) for raising the mast and operating the drill rig and are all proposed boring locations and associated areas of pavement cutting clear of pavement joints, curbs, crash posts, or other engineered structures?
X			Have borehole locations been reviewed and approved by the appropriate Regulatory Agency, PM, Engineering & Maintenance personnel, fueling contractors or facility managers?
X			Are all of the proposed borehole locations and associated areas of pavement cutting at least 5 feet from any subsurface utilities shown on client's building plans, shown on public right-of-way street improvement or other public property engineering plans and/or identified during a geophysical survey?
	X		Are any proposed boring locations within 10-feet of a marked natural gas line and/or a straight line from the meter to the gas main in the utility corridor?
X			Have all appropriate underground utility companies been notified with required lead time (typically 48 hours) and marked out their utilities in the vicinity of the borehole locations or otherwise notified us that they do not have any utilities near the proposed borehole locations?
X			Was a private utility locator contacted?
X			Are all proposed borehole locations and associated areas of pavement cutting at least 5 feet from a visual line connecting any two similar looking manhole covers and at least 5 feet from a visual line perpendicular to the street from the water, gas, and electrical meters?
X			Does the pavement in the vicinity of each proposed borehole location lack signs of previous excavation (e.g. no pavement subsidence, no differences in pavement texture or relief, no pavement patching)?

PRE-DRILLING

YES	NO	N/A	
			Have all underground utilities been marked by a utility locating service, or, given notification that they do not have any utilities near the proposed borehole locations?
			If a boring location is within 10-feet of a marked gas line or a straight line drawn from the meter to the gas main in a utility corridor, does the driller have a casing present for drilling?
			Has the Facility/Station Manager indicated no knowledge of any subsurface utilities within 5 feet of the proposed borehole locations? (Review locations with the Facility/Station Manager).
			Has a tailgate safety meeting been conducted with all site personnel documenting the identification of potential hazards, the location of fuel shut-off valves, and the reviewing and signing of the Site Specific Health and Safety Plan?
			Before drilling in a Non-Critical or Critical Area (excluding areas within 10 feet of an UST Pit), has a hole been hand dug or air knifed a hole to 5 feet below grade and is the diameter of the hole at least 3 inches greater than the outer diameter of the lead drilling auger?
			Before drilling in a Critical Area (including areas within 10 feet of an UST Pit), has a hole been hand dug or air knifed a hole to 10 feet below grade and is the diameter of the hole at least 3 inches greater than the outer diameter of the lead drilling auger?
			Does the soil encountered in the hand-dug or air knifed hole appear to be native material (i.e., free of clean gravel, clean sand, aggregate base [gravelly sand with ~10% fines], or other non-native looking material)?

While this checklist must be followed, adherence to it does not relieve Contractor of liability or modify any of contractor's obligations in its agreement with the Company.

BOREHOLE CLEARANCE CHECKLIST
Shell Oil Products US - Environmental Services

1. If "NO" is answered on any of the items below, the consultant should contact the appropriate Shell Project Management Staff (PM) and discuss the issue(s) before proceeding with the subsurface investigation.
2. Document the reason for a "NO" answer on a second sheet and attach to this form.
3. Contact your supervisor for instructions and document instructed actions and results of actions documented.

Site Address: 1410 S Soto St Contractor Project #: 40194400 Date: 1/29/2009

Borehole #s Reviewed: ______ Clearance Performed By: Joe Montoya
Project Manager

YES	NO	N/A	PRE-MOBILIZATION
X			Does each borehole location allow for clear entry and exit, adequate workspace, and sufficient clearance (vertical and horizontal) for raising the mast and operating the drill rig and are all proposed boring locations and associated areas of pavement cutting clear of pavement joints, curbs, crash posts, or other engineered structures?
X			Have borehole locations been reviewed and approved by the appropriate Regulatory Agency, PM, Engineering & Maintenance personnel, fueling contractors or facility managers?
X			Are all of the proposed borehole locations and associated areas of pavement cutting at least 5 feet from any subsurface utilities shown on client's building plans, shown on public right-of-way street improvement or other public property engineering plans and/or identified during a geophysical survey?
	X		Are any proposed boring locations within 10-feet of a marked natural gas line and/or a straight line from the meter to the gas main in the utility corridor?
X			Have all appropriate underground utility companies been notified with required lead time (typically 48 hours) and marked out their utilities in the vicinity of the borehole locations or otherwise notified us that they do not have any utilities near the proposed borehole locations?
X			Was a private utility locator contacted?
X			Are all proposed borehole locations and associated areas of pavement cutting at least 5 feet from a visual line connecting any two similar looking manhole covers and at least 5 feet from a visual line perpendicular to the street from the water, gas, and electrical meters?
X			Does the pavement in the vicinity of each proposed borehole location lack signs of previous excavation (e.g. no pavement subsidence, no differences in pavement texture or relief, no pavement patching)?

YES	NO	N/A	PRE-DRILLING
X			Have all underground utilities been marked by a utility locating service, or, given notification that they do not have any utilities near the proposed borehole locations?
		X	If a boring location is within 10-feet of a marked gas line or a straight line drawn from the meter to the gas main in a utility corridor, does the driller have a casing present for drilling?
			Has the Facility/Station Manager indicated no knowledge of any subsurface utilities within 5 feet of the proposed borehole locations? (Review locations with the Facility/Station Manager).
			Has a tailgate safety meeting been conducted with all site personnel documenting the identification of potential hazards, the location of fuel shut-off valves, and the reviewing and signing of the Site Specific Health and Safety Plan?
			Before drilling in a Non-Critical or Critical Area (excluding areas within 10 feet of an UST Pit), has a hole been hand dug or air knifed a hole to 5 feet below grade and is the diameter of the hole at least 3 inches greater than the outer diameter of the lead drilling auger?
			Before drilling in a Critical Area (including areas within 10 feet of an UST Pit), has a hole been hand dug or air knifed a hole to 10 feet below grade and is the diameter of the hole at least 3 inches greater than the outer diameter of the lead drilling auger?
			Does the soil encountered in the hand-dug or air knifed hole appear to be native material (i.e., free of clean gravel, clean sand, aggregate base [gravelly sand with ~10% fines], or other non-native looking material)?

While this checklist must be followed, adherence to it does not relieve Contractor of liability or modify any of contractor's obligations in its agreement with the Company.

BOREHOLE CLEARANCE CHECKLIST
Shell Oil Products US - Environmental Services

SAP# 135550

1. **If "NO" is answered on any of the items below, the consultant should contact the appropriate Shell Project Management Staff (PM) and discuss the issue(s) before proceeding with the subsurface investigation.**
2. **Document the reason for a "NO" answer on a second sheet and attach to this form.**
3. **Contact your supervisor for instructions and document instructed actions and results of actions documented.**

Site Address: 1410 S. Soto St. Los Angeles, CA Contractor Project #: 49194400 Date: 2/2/07

Borehole #s Reviewed: 7 Clearance Performed By: ______________________

Project Manager

YES	NO	N/A	PRE-MOBILIZATION
X			Does each borehole location allow for clear entry and exit, adequate workspace, and sufficient clearance (vertical and horizontal) for raising the mast and operating the drill rig and are all proposed boring locations and associated areas of pavement cutting clear of pavement joints, curbs, crash posts, or other engineered structures?
X			Have borehole locations been reviewed and approved by the appropriate Regulatory Agency, PM, Engineering & Maintenance personnel, fueling contractors or facility managers?
X			Are all of the proposed borehole locations and associated areas of pavement cutting at least 5 feet from any subsurface utilities shown on client's building plans, shown on public right-of-way street improvement or other public property engineering plans and/or identified during a geophysical survey?
	X		Are any proposed boring locations within 10-feet of a marked natural gas line and/or a straight line from the meter to the gas main in the utility corridor?
X			Have all appropriate underground utility companies been notified with required lead time (typically 48 hours) and marked out their utilities in the vicinity of the borehole locations or otherwise notified us that they do not have any utilities near the proposed borehole locations?
X			Was a private utility locator contacted?
X			Are all proposed borehole locations and associated areas of pavement cutting at least 5 feet from a visual line connecting any two similar looking manhole covers and at least 5 feet from a visual line perpendicular to the street from the water, gas, and electrical meters?
X			Does the pavement in the vicinity of each proposed borehole location lack signs of previous excavation (e.g. no pavement subsidence, no differences in pavement texture or relief, no pavement patching)?

YES	NO	N/A	PRE-DRILLING
X			Have all underground utilities been marked by a utility locating service, or, given notification that they do not have any utilities near the proposed borehole locations?
		X	If a boring location is within 10-feet of a marked gas line or a straight line drawn from the meter to the gas main in a utility corridor, does the driller have a casing present for drilling?
		X	Has the Facility/Station Manager indicated no knowledge of any subsurface utilities within 5 feet of the proposed borehole locations? (Review locations with the Facility/Station Manager).
X			Has a tailgate safety meeting been conducted with all site personnel documenting the identification of potential hazards, the location of fuel shut-off valves, and the reviewing and signing of the Site Specific Health and Safety Plan?
X			Before drilling in a Non-Critical or Critical Area (excluding areas within 10 feet of an UST Pit), has a hole been hand dug or air knifed a hole to 5 feet below grade and is the diameter of the hole at least 3 inches greater than the outer diameter of the lead drilling auger?
X		X	Before drilling in a Critical Area (including areas within 10 feet of an UST Pit), has a hole been hand dug or air knifed a hole to 10 feet below grade and is the diameter of the hole at least 3 inches greater than the outer diameter of the lead drilling auger?
X			Does the soil encountered in the hand-dug or air knifed hole appear to be native material (i.e., free of clean gravel, clean sand, aggregate base [gravelly sand with ~10% fines], or other non-native looking material)?

While this checklist must be followed, adherence to it does not relieve Contractor of liability or modify any of contractor's obligations in its agreement with the Company.

1/28/09

SAP # 135550

ES Pre-Construction/Pre-Job Planning Checklist

HSE	Information Discussed
X	Environmental Services HSE Policies and Procedures
X	HSE Responsibilities for Contractor
X	Accident/Incident Reporting and Investigation Procedures and Forms
X	HSE Meetings
X	Emergency Plan & Procedure
X	Security and Access Procedures
X	Housekeeping
X	Powered Equipment (Trucks, Cranes, Forklifts, etc.) Inspection
X	HSE Inspections
X	Industrial Hygiene Monitoring
X	PPE Requirements
X	Work Authorization / Permitting (agency permits, building, etc.)
X	Substance Abuse/Drug/Alcohol/Firearm Prohibitions
X	Chemical & Material Hazards
X	Electrical Safety (Grounding plan, classification areas, tool/equipment condition, site wiring, lock out/tag out)
X	Traffic Control Guidelines
X	Excavation, Trenching and Shoring Procedures
N/A	Confined Space Entry Procedures and Permitting
X	Underground Services Alert
X	Site Specific HSE Issues
X	Subsurface Investigation Procedures
X	Health and Safety Plan Review by all employees
X	Advise Contractor to alert ES rep immediately about any HSE concerns

1/29/09

135550

ES Pre-Construction/Pre-Job Planning Checklist

HSE Information Discussed

- X Environmental Services HSE Policies and Procedures
- X HSE Responsibilities for Contractor
- X Accident/Incident Reporting and Investigation Procedures and Forms
- X HSE Meetings
- X Emergency Plan & Procedure
- ___ Security and Access Procedures
- X Housekeeping
- ✓ Powered Equipment (Trucks, Cranes, Forklifts, etc.) Inspection
- X HSE Inspections
- ___ Industrial Hygiene Monitoring
- X PPE Requirements
- X Work Authorization / Permitting (agency permits, building, etc.)
- X Substance Abuse/Drug/Alcohol/Firearm Prohibitions
- X Chemical & Material Hazards
- ___ Electrical Safety (Grounding plan, classification areas, tool/equipment condition, site wiring, lock out/tag out)
- X Traffic Control Guidelines
- ___ Excavation, Trenching and Shoring Procedures
- ___ Confined Space Entry Procedures and Permitting
- X Underground Services Alert
- X Site Specific HSE Issues
- ___ Subsurface Investigation Procedures
- X Health and Safety Plan Review by all employees
- X Advise Contractor to alert ES rep immediately about any HSE concerns

SAP# 135550

8/2/09

ES Pre-Construction/Pre-Job Planning Checklist

HSE Information Discussed

____ Environmental Services HSE Policies and Procedures
____ HSE Responsibilities for Contractor
X Accident/Incident Reporting and Investigation Procedures and Forms
X HSE Meetings
X Emergency Plan & Procedure
____ Security and Access Procedures
X Housekeeping
____ Powered Equipment (Trucks, Cranes, Forklifts, etc.) Inspection
____ HSE Inspections
____ Industrial Hygiene Monitoring
X PPE Requirements
____ Work Authorization / Permitting (agency permits, building, etc.)
X Substance Abuse Drug/Alcohol, Firearm Prohibitions
X Chemical & Material Hazards
____ Electrical Safety (Grounding plan, classification areas, tool/equipment condition, site wiring, lock out/tag out)
X Traffic Control Guidelines
/ Excavation, Trenching and Shoring Procedures
____ Confined Space Entry Procedures and Permitting
X Underground Services Alert
____ Site Specific HSE Issues
X Subsurface Investigation Procedures
X Health and Safety Plan Review by all employees
X Advise Contractor to alert ES rep immediately about any HSE concerns

Job Clearance Form

Station: 135550
Station Address: 1410 S. 5th St Los Angeles
URS Corp
Reginald Agwand
Date: 1-26-09

- [x] SAFETY VEST
- [x] PROTECTIVE CLOTHING
- [ ] HARD HAT
- [ ] GLOVES
- [x] SHOES & BOOTS
- [x] SAFETY GLASSES/GOGGLES
- [ ] HEARING PROTECTION
- [ ] WELDING PPE
- [ ] RESPIRATOR
- [ ] OTHER

SIGN IN

URS
Reginald Agwand
Tomas Gaucejo

SIGN OUT

Joseph Yammin

Job Clearance Form

Station #: 135550
Location Address: 1410 S Soto
Work Order Number: 49194400
Date: 1/28/09
Problem/Work Description: Replace Air Knife

Start Time:
End Time:

Return Call: yes no
Damage Claim: yes no

- [x] SAFETY VEST
- [x] PROTECTIVE CLOTHING
- [x] HARD HAT
- [x] GLOVES
- [x] SHOES & BOOTS
- [x] SAFETY GLASSES/GOGGLES
- [x] HEARING PROTECTION
- [ ] WELDING PPE
- [ ] RESPIRATOR
- [ ] OTHER

Hazards not covered by JSA

See JSA

This form must be completed for each job and updated and re-signed if circumstances change or additional hazards identified.

SIGN IN

Contractor representative name: Joseph Muntad
Signature:
Site representative name: Laura Gomez
Signature:

SIGN OUT

Contractor representative name:
Signature:
Site representative name: Jose Yarian
Signature:

Job Clearance Form

[illegible]

Station#	Station Address			Work Order Number:			Date:
135550	1410 S Soto St			49194400			1/29/2009
Contractor Company Name:					Start Time: 0700	End Time: 1200	

Problem/Work Description: Air Knife

Return Call: yes / no

Damage Claims: yes / no

PPE REQUIRED (CHECK AND/OR FILL BLANK SPACE)

- [x] SAFETY VEST
- [x] PROTECTIVE CLOTHING
- [x] HARD HAT
- [x] GLOVES
- [x] SHOES & BOOTS
- [x] SAFETY GLASSES/GOGGLES
- [x] HEARING PROTECTION
- [ ] WELDING PPE
- [ ] RESPIRATOR
- [ ] OTHER ____________

TASK STEP	Hazards not covered by JSA	How to reduce or eliminate risk - Include PPE to be Worn
See JSA		

Lower Risk - no JSA required | Medium Risk - JSA required | Higher Risk - JSA required & appropriate check list completed

This form must be completed for each job and updated and re-signed if circumstances change or additional hazards identified.

SIGN IN

Contractor representative name	Signature
Katherine Slape	K Slape

GENERAL SAFETY CHECKS

- Is fuel delivery due? NO

Site representative name	Signature
Miguel Cardona	Miguel Cardona

SIGN OUT

GENERAL SAFETY CHECKS

Contractor signature: K Slape

Site representative name	Signature
Joseph Yannini	Joseph Yannini

The contractor through its authorized representative shall sign, issue and be solely responsible for all job clearance forms and the obligations arising there under applicable to the work.

This form covers important reminders and is not intended to relieve the contractor from safely performing the work in compliance with all applicable laws and regulations.
The Site Representative may require the contractor to stop work if it appears that the contractor or any of its workers are failing to comply with the requirements in the applicable items of this form or other applicable safety requirements.

Job Clearance Form

Station Address: 1410 S Santa St Los Angeles CA

URS Corporation

Regional Agency

Work Description: Drilling 7 Borings

Date: 3-2-07

Start Time: 0630

☒ SAFETY VEST ☒ PROTECTIVE CLOTHING ☒ HARD HAT ☒ GLOVES ☒ SHOES & BOOTS ☒ SAFETY GLASSES/GOGGLES ☒ HEARING PROTECTION ☐ WELDING PPE ☐ RESPIRATOR ☐ OTHER

See Health and Safety Plan

SIGN IN

Regional Agency

Trees Consulting

SIGN OUT

MBI CHECKLIST

SITE: 135550

- [x] Include non-interference as part of the Work Plan
- [x] Identify site activity as High, Medium, or Low
- [x] Identify and list appropriate stakeholders for notification
- [x] Make appropriate notifications (30, 10, or 2 days)
- [x] Keep copy of MBI Program at the work site
- [x] Schedule work around islands or traffic flow areas during off peak hours
- [x] Perform Field Activities in a manner that minimizes interference to station operations
- [x] Introduce yourself every time on site to operator
- [x] Install "Open For Business" sign at the site (if high or medium activity)
- [x] No Smoking on site
- [ ] Keep borings, wells, and vehicles out of traffic pattern (if technically possible)
- [x] Park non-essential vehicles off site
- [x] Mark out site with utilities (and geophysical surveying when applicable)
- [ ] Make markings as inconspicuous as possible
- [ ] Cookie or saw cut borings through asphalt, don't overlap sawcuts
- [x] Hand dig or vacuum 5 feet before drilling
- [ ] Steel plate holes and trenches as applicable, tape off open trenches
- [ ] Use proper tools and personnel for professional concrete work
- [x] Finish and protect concrete work until cured
- [ ] Keep drill cuttings off the pavement
- [ ] Clean drill rigs at drillers facilities
- [ ] Label drums and soil, store out of way, and discuss requirements with operator
- [x] Prepare drum tally sheet for the Equiva Engineer
- [x] Track and remove drums and or soil from site ASAP (coordinate with CRMT)
- [x] Clean site (swept and trash collected)
- [ ] Leave job receipt with operator

Signed:

Date: 1/28/09

MBI CHECKLIST

SITE: 135550

- [x] Include non-interference as part of the Work Plan
- [x] Identify site activity as High, Medium, or Low
- [x] Identify and list appropriate stakeholders for notification
- [x] Make appropriate notifications (30, 10, or 2 days)
- [x] Keep copy of MBI Program at the work site
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- [x] Perform Field Activities in a manner that minimizes interference to station operations
- [x] Introduce yourself every time on site to operator
- [x] Install "Open For Business" sign at the site (if high or medium activity)
- [x] No Smoking on site
- [ ] Keep borings, wells, and vehicles out of traffic pattern (if technically possible)
- [x] Park non-essential vehicles off site
- [x] Mark out site with utilities (and geophysical surveying when applicable)
- [ ] Make markings as inconspicuous as possible
- [ ] Cookie or saw cut borings through asphalt, don't overlap sawcuts
- [x] Hand dig or vacuum 5 feet before drilling
- [ ] Steel plate holes and trenches as applicable, tape off open trenches
- [ ] Use proper tools and personnel for professional concrete work
- [x] Finish and protect concrete work until cured
- [ ] Keep drill cuttings off the pavement
- [ ] Clean drill rigs at drillers facilities
- [ ] Label drums and soil, store out of way, and discuss requirements with operator
- [x] Prepare drum tally sheet for the Equiva Engineer
- [x] Track and remove drums and or soil from site ASAP (coordinate with CRMT)
- [x] Clean site (swept and trash collected)
- [ ] Leave job receipt with operator

Signed: [signature]

Date: 1/29/09

MBI CHECKLIST

SITE: 135550

- [x] Include non-interference as part of the Work Plan
- [x] Identify site activity as High, Medium, or Low
- [x] Identify and list appropriate stakeholders for notification
- [x] Make appropriate notifications (30, 10, or 2 days)
- [x] Keep copy of MBI Program at the work site
- [x] Schedule work around islands or traffic flow areas during off peak hours
- [x] Perform Field Activities in a manner that minimizes interference to station operations
- [x] Introduce yourself every time on site to operator
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- [x] Finish and protect concrete work until cured
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- [x] Clean drill rigs at drillers facilities
- [x] Label drums and soil, store out of way, and discuss requirements with operator
- [x] Prepare drum tally sheet for the Equiva Engineer
- [ ] Track and remove drums and or soil from site ASAP (coordinate with CRMT)
- [x] Clean site (swept and trash collected)
- [ ] Leave job receipt with operator

Signed: [signature]

Date: 2/2/09

Safe Work System
HOT WORK PERMIT

Permit # ____________

OSHA 1926.352(a,b,c) When practical, objects to be welded, cut, or heated shall be moved to a designated safe location or, if the objects to be welded, cut, or heated cannot be readily moved, all movable fire hazards in the vicinity shall be taken to a safe place, or otherwise protected. If the object to be welded, cut, or heated cannot be moved and if all the fire hazards cannot be removed, positive means shall be taken to confine the heat, sparks, and slag, to protect the immovable fire hazards from them. No welding, cutting, or heating shall be done where the application of flammable paints, or the presence of other flammable compounds, or heavy dust concentrations creates a hazard.

- ☐ **Site Address** 1410 S. Soto St **Cost Center** 135556
- ☐ **Contractor Company** BC2 **Work Order/PO #** 49194400
- ☐ **Name of the authorized Permit Holder** Alex Alvarez **Phone** 714-760-0487
- ☐ **Name of Permit Issuer** Katherine Slape **Phone** 805-679-3177
- ☐ **Name of fire watch, if applicable** Katherine Slape
- ☐ **The purpose and exact location of the Hot Work** Air Knifing / 1410 S Soto St
- ☐ **List the type of Hot Work being performed** asphalt coring, Air vac
  (Such as welding, cutting, drilling, grinding, sandblasting, concrete sawing, other)
- ☐ **List the hazards of the Hot Work being performed** Traffic, fuel delivery, extreme noise hydrocarbon liquid/vapor
  (Such as electrical, atmospheric, combustible, chemical, mechanical, radiation, design defects, nearby vent stacks, hydrocarbon liquid or vapor, fuel delivery, omission of protective features, extreme temperature, extreme noise, high pressures, structures, other)
- ☐ **List the measures used to isolate the space and to eliminate, or control hazards before work** Snow fencing, delineators w/caution tape
  (Such as barricades, purging, blocking, inerting, ventilating, spark containment, correct extinguishers nearby, intrinsically safe tools, ventilation, bonding, grounding, fire watch, work stoppage during fuel delivery, other)
- ☐ **Sources of energy in the area of Hot Work are locked and tagged out** YES ____ NO X
- ☐ **The means to contact emergency services are operable** YES X NO ____
- ☐ **List the safety equipment to be provided by contractor** (such as PPE, protective equipment/clothing, face and eye protection, spark and direct ray protective screens, testing equipment, communications equipment, alarm systems, and rescue equipment): Level D PPE, fire extinguisher, face/eye protection, first AID kit
- ☐ **All components of the tools have been inspected and are adequate for use** YES X NO ____
- ☐ **Any other information necessary, in order to ensure employee safety** Spotter

The acceptable Hot Work conditions:
Test conditions in the permit space to determine if acceptable conditions exist before work is authorized to begin. Conditions shall be continuously monitored in the areas where authorized work is performed. Record at least every 30 minutes:

Initial Readings:

Oxygen 19.5% - 23.5%	Combustible Gas 0% LEL	Toxic Gas - Type and Levels CO-35PPM/H2S-10PPM/Other)
20.9	0	H2S 0 CO 1

background PID - 0.2

Authorized Tester Name Katherine Slape Date 1/28/09 Time 0800

Continuous (alarmed) atmosphere Monitoring: (Record at least every 30 minutes)	Test	PEL	Initials	Time: 0840	Time: 0910	Time: 0940	Time: 1010	Time: 1040
	Oxygen	19.5%-23.5%	KS	Value: 20.9	Value: 20.9	Value: 20.9	Value: 20.9	Value: 20.9
	LEL PID	0%	KS	Value: 0	Value: 0	Value: 0	Value: 0	Value: 0
	Other H2S		KS	Value: 0.3	Value: 0.5	Value: 0.3	Value: 0.5	Value: 0.2

Gas Tester Make/Model: MiniRae2000 / QRAE+ Instrument Serial Number: 56081 Calibration Date: ~~56081~~ KS

H2S 0 0 R6333C 0 ~~R6333~~ C 1/28/09/ 1/27/09

PERMIT VALIDATION

This Permit is valid from 0800 am/pm TO 0500 am/pm on 1/28/09 (Note: Permit must not exceed 1 day)

Contractor is solely responsible for the understanding, training and execution of OSHA regulations relative to this activity. Permit forms must be retained for a minimum of two years.

I ensure this permit has been filled out completely and in accordance with all applicable OSHA requirements to provide a safe workplace. I will take action to control hazardous conditions associated with this work.

Permit Acceptance (print name): Alex Alvarez Permit Holder Signature: Alex Al Date: 1/28/09 Time: 0800	Permit Authorization (Print Name): Katherine Slape Permit Issuer Signature: K Slape Date: 1/28/09 Time: 0800

PERMIT CLOSE OUT

All work has been completed in accordance with this Permit and the site has been left in a safe and satisfactory condition.

Permit Holder Signature: Alex Al Date: 1-28-09 Time: 4:00	Permit Issuer Signature: K Slape Date: 1/28/09 Time: 1600

1200-1300 NO AIRKNIFE/JACKHAMMER

TIME	1110	1140	1300	1325	1345	1420	1440	1505	1520
O_2	20.9	20.9	20.9	20.9	20.9	20.9	21.1	20.9	20.9
LEL	0	0	0	0	0	0	0	0	0
PID	0.6	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0
H_2S	0	0	0	0	0	0	0	0	0

Contractor is solely responsible for the understanding, training and execution of OSHA regulations relative to this activity. Permit forms must be retained for a minimum of two years.

Safe Work System
HOT WORK PERMIT

Permit # ____________

OSHA 1926.352(a,b,c) When practical, objects to be welded, cut, or heated shall be moved to a designated safe location or, if the objects to be welded, cut, or heated cannot be readily moved, all movable fire hazards in the vicinity shall be taken to a safe place, or otherwise protected. If the object to be welded, cut, or heated cannot be moved and if all the fire hazards cannot be removed, positive means shall be taken to confine the heat, sparks, and slag, to protect the immovable fire hazards from them. No welding, cutting, or heating shall be done where the application of flammable paints, or the presence of other flammable compounds, or heavy dust concentrations creates a hazard.

- ☐ **Site Address** 1410 S Soto St **Cost Center** 135550
- ☐ **Contractor Company** BC2 **Work Order/PO #** 49194406
- ☐ **Name of the authorized Permit Holder** Alexis Alvarez ~~Katherine Slape~~ **Phone** 714-760-0847 ~~805-679-3177~~
- ☐ **Name of Permit Issuer** Katherine Slape **Phone** 805-679-3177
- ☐ **Name of fire watch, if applicable** Katherine Slape
- ☐ **The purpose and exact location of the Hot Work** Air Knife / 1410 S Soto St
- ☐ **List the type of Hot Work being performed** asphalt curing, air vac
  (Such as welding, cutting, drilling, grinding, sandblasting, concrete sawing, other)
- ☐ **List the hazards of the Hot Work being performed** traffic, fuel delivery, extreme noise, HC born liquid/vapor
  (Such as electrical, atmospheric, combustible, chemical, mechanical, radiation, design defects, nearby vent stacks, hydrocarbon liquid or vapor, fuel delivery, omission of protective features, extreme temperature, extreme noise, high pressures, structures, other)
- ☐ **List the measures used to isolate the space and to eliminate, or control hazards before work** snow fencing, delineators, caution tape, shut-off switch
  (Such as barricades, purging, blocking, inerting, ventilating, spark containment, correct extinguishers nearby, intrinsically safe tools, ventilation, bonding, grounding, fire watch, work stoppage during fuel delivery, other)
- ☐ **Sources of energy in the area of Hot Work are locked and tagged out** **YES** ____ **NO** X
- ☐ **The means to contact emergency services are operable** **YES** X **NO** ____
- ☐ **List the safety equipment to be provided by contractor** (such as PPE, protective equipment/clothing, face and eye protection, spark and direct ray protective screens, testing equipment, communications equipment, alarm systems, and rescue equipment): Level D PPE, fire extinguisher, face/eye protection, first aid kit
- ☐ **All components of the tools have been inspected and are adequate for use** **YES** X **NO** ____
- ☐ **Any other information necessary, in order to ensure employee safety** spotter

The acceptable Hot Work conditions:
Test conditions in the permit space to determine if acceptable conditions exist before work is authorized to begin. Conditions shall be continuously monitored in the areas where authorized work is performed. Record at least every 30 minutes:

Initial Readings:

Oxygen 19.5% - 23.5%	Combustible Gas 0% LEL	Toxic Gas - Type and Levels CO-35PPM/H2S-10PPM/Other)
20.9	0	CO - 1 / H2S - 0

Authorized Tester Name Katherine Slape Date 1/29/09 Time 0700

Continuous (alarmed) atmosphere Monitoring: (Record at least every 30 minutes)	Test	PEL	Initials	Time: 0735	Time: 0745	Time: 0800	Time: 0825	Time: 0845
	Oxygen	19.5%-23.5%		Value: 20.9	Value: 20.9	Value: 20.9	Value: 20.9	Value: 20.9
	LEL	0%		Value: 0	Value: 0	Value: 0	Value: 0	Value: 0
	Other H2S			Value: 0	Value: 0	Value: 0	Value: 0	Value: 0

Gas Tester Make/Model: PID 0.4	Instrument Serial Number: 0.9	Calibration Date: 0.5
MiniRae 2000 QRae+	5608 R6333	0.6 1/29/09 1/27/09

PERMIT VALIDATION

This Permit is valid from 0700 am/pm TO 0500 am/pm on 1/29/09 (Note: Permit must not exceed 1 day)

Contractor is solely responsible for the understanding, training and execution of OSHA regulations relative to this activity. Permit forms must be retained for a minimum of two years.

I ensure this permit has been filled out completely and in accordance with all applicable OSHA requirements to provide a safe workplace.
I will take action to control hazardous conditions associated with this work.

Permit Acceptance (print name): Alex Alvarez Permit Holder Signature: Alex Alvarez Date: ~~[illegible]~~ 1-29-SC Time: 700	Permit Authorization (Print Name): Katherine Slape Permit Issuer Signature: K Slane Date: 1/29/09 Time: 0700

PERMIT CLOSE OUT

All work has been completed in accordance with this Permit and the site has been left in a safe and satisfactory condition.

Permit Holder Signature: [illegible] Date: 1-29-09 Time: 12:00	Permit Issuer Signature: Katherine Slane Date: 1/29/09 Time: 1200

TIME	0905	0930	0940	0955	1000	1035	1050	1110
O_2	20.9	20.9	20.9	20.9	20.9	20.9	20.6	20.9
LEL	0	0	0	0	0	0	0	0
H_2S	0	0	0	0	0	0	0	0
PID	0.6	0.5	0.4	0.4	0.5	0.6	0.5	0.5

ATTACHMENT B
BORING LOGS

Project: Shell Retail Due Diligence Program Project Location: Shell Retail Stations in Southern California Project Number: 49194400	Key to Log of Borings Sheet 1 of 1

Elevation, feet MSL	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6"	SAMPLES Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample time	REMARKS
1	2	3	4	5	6	7	8	9	10	11	12

COLUMN DESCRIPTIONS

1 Elevation: Elevation in feet referenced to mean sea level (MSL) or site datum.

2 Depth: Depth in feet below the ground surface.

3 Sample Type: Type of soil sample collected at depth interval shown; sampler symbols are explained below.

4 Sample Number: Sample identification number.

5 Blows per 6": Number of blows required to advance driven sampler 6 inches using a 140-lb hammer with a 30-inch drop.

6 Inches Recovered Inches recovered in sampler over inches driven.

7 Graphic Log: Graphic depiction of subsurface material encountered; typical symbols are explained below.

8 Material Description: Description of material encountered; may include color, moisture, grain size, and density/consistency.

9 Headspace PID: Photo Ionization Detector field sample headspace reading in parts per million (ppm)

10 Background PID: Photo Ionization Detector background reading in parts per million (ppm)

11 Sample Time: Time in 24-hour clock during downhole advance recorded when samples collected and other field activities performed.

12 Remarks: Comments and observations regarding drilling or sampling made by driller or field personnel.

TYPICAL MATERIAL GRAPHIC SYMBOLS

SAND (SP)

Sand with silt (SP-SM)

Silty SAND (SM)

CLAY (CL)

Clayey SAND (SC)

SILT (ML)

Clayey GRAVEL (GC)

GRAVEL (GP)

Silty GRAVEL (GM)

TYPICAL SAMPLER GRAPHIC SYMBOLS

California Modified Split Spoon

Sample Run

No Recovery

OTHER GRAPHIC SYMBOLS

Inferred contact between strata or gradational change in lithology

Visually identifiable change in lithology

First water encountered at time of drilling

Static water level measured in well

GENERAL NOTES

1. Soil Classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive; actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2. Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

Project: Shell Retail Due Diligence Program Phase II - SAP#135550	Log of Boring B01
Project Location: 1410 South Soto Street, Los Angeles, CA	
Project Number: 49194400	Sheet 1 of 1

Date(s) Drilled	1/29/2009 / 2/2/2009	Logged By	K. Slape (0-7') R. Agunwah (7-21.5')	Checked By	J. Montoya
Drilling Method	Hollow Stem Auger	Drilling Contractor	WDC	Total Depth of Borehole ft bgs	21.5
Drill Rig Type	CME 75	Borehole Diameter (inches)	8"	Approx. Surface Elevation ft msl	Not Measured
Approx. Depth Groundwater Encountered	Not Encountered	Sampler Type	California Modified Split Spoon	Borehole Backfill	Cement Bentonite Grout
Comments					

Feet MSL	Depth, feet	SAMPLES Type	Number	Blows per 6"	Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
	0						6 inches Asphalt				
							Air Knife to 7' bgs.				
							Dark brown, Silty fine to medium SAND (SM), no staining or unusual odor				
	5										
							Yellowish brown (10YR 5/4), fine SAND (SP), dense, moist, trace silt, no staining or unusual odor				
	10		135550-B01-10	13 20 21	18/18			0.0	0.0	1430	
	15		135550-B01-15	20 50	12/18		Becomes very dense, slight unusual odor, silt no longer present	21.2	0.0	1435	
	20		135550-B01-20	17 27 40	18/18		Becomes very pale brown (10YR 7/3)	24.7	0.0	1438	
							Completed boring to 21.5 feet bgs.				
	25										
	30										

URS

Project: Shell Retail Due Diligence Program Phase II - SAP#135550 **Project Location:** 1410 South Soto Street, Los Angeles, CA **Project Number:** 49194400	**Log of Boring B02** Sheet 1 of 1

Date(s) Drilled	1/29/2009 / 2/2/2009	Logged By	K. Slape (0-7') R. Agunwah (7-21.5')	Checked By	J. Montoya
Drilling Method	Hollow Stem Auger	Drilling Contractor	WDC	Total Depth of Borehole ft bgs	21.5
Drill Rig Type	CME 75	Borehole Diameter (inches)	8"	Approx. Surface Elevation ft msl	Not Measured
Approx. Depth Groundwater Encountered	Not Encountered	Sampler Type	California Modified Split Spoon	Borehole Backfill	Cement Bentonite Grout
Comments					

Feet MSL	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6"	SAMPLES Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
	0						2 inches Asphalt Concrete Base				
							Air Knife to 7 ft bgs.				
							Dark brown, Silty medium to coarse SAND with Gravel (SM), gravel to 1/4-inch diameter, no staining, slight hydrocarbon odor				
	5						Decrease in gravel				
	10		135550-B02-10	16 17 22	18/18		Becomes greenish gray (GLEY 1 5/1), dense, fine grained, staining and slight unusual odor	20.2	0.0	1521	
	15		135550-B02-15	35 50	12/18		Pale brown (10YR 6/2), fine SAND (SP), very dense, moist, no staining or unusual odor	0.0	0.0	1525	
	20		135550-B02-20	16 22 35	18/18		Light yellowish brown (10YR 6/4), fine to medium SAND (SW), very dense, moist, trace coarse sand, no staining, slight unusual odor	0.0	0.0	1527	
							Completed boring to 21.5 feet bgs.				
	25										
	30										

Project: Shell Retail Due Diligence Program Phase II - SAP#135550	**Log of Boring B03**
Project Location: 1410 South Soto Street, Los Angeles, CA	Sheet 1 of 1
Project Number: 49194400	

Date(s) Drilled	1/28/2009 / 2/2/2009	Logged By	K. Slape (0-7') R. Agunwah (7-21.5')	Checked By	J. Montoya
Drilling Method	Hollow Stem Auger	Drilling Contractor	WDC	Total Depth of Borehole ft bgs	21.5
Drill Rig Type	CME 75	Borehole Diameter (inches)	8"	Approx. Surface Elevation ft msl	Not Measured
Approx. Depth Groundwater Encountered	Not Encountered	Sampler Type	California Modified Split Spoon	Borehole Backfill	Cement Bentonite Grout
Comments					

Feet MSL	Depth, feet	SAMPLES Type	Number	Blows per 6"	Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
	0						Asphalt				
							Base				
							Air Knifed to 7 ft bgs.				
							Dark brown, SILT (ML), dry, no staining or unusual odor				
	5						Becomes brown, sandy silt				
	10		135550-B03-10	13 20 26	18/18		Yellowish brown (10YR 5/8), fine SAND (SP), dense, moist, trace medium sand, trace silt, no staining or unusual odor	0.0	0.0	1335	
	15		135550-B03-15	28 50	12/18		Becomes brown (10YR 5/3), very slight unusual odor	1.1	0.0	1340	
	20		135550-B03-20	16 22 34	18/18			7.4	0.0	1345	
							Completed boring to 21.5 feet bgs.				
	25										
	30										

Project: Shell Retail Due Diligence Program Phase II - SAP#135550 **Project Location:** 1410 South Soto Street, Los Angeles, CA **Project Number:** 49194400	**Log of Boring B04** Sheet 1 of 2

Date(s) Drilled	1/28/2009 / 2/2/2009	Logged By	K. Slape (0-7') R. Agunwah (7-41.5')	Checked By	J. Montoya
Drilling Method	Hollow Stem Auger	Drilling Contractor	WDC	Total Depth of Borehole ft bgs	41.5
Drill Rig Type	CME 75	Borehole Diameter (inches)	8"	Approx. Surface Elevation ft msl	Not Measured
Approx. Depth Groundwater Encountered	Not Encountered	Sampler Type	California Modified Split Spoon	Borehole Backfill	Cement Bentonite Grout
Comments					

Feet MSL	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6"	SAMPLES Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
	0						Asphalt Concrete Base Air Knife to 7' bgs.				
							Fine Sandy SILT (ML), trace gravel to 1/4-inch diameter, slightly moist, no staining or unusual odor				
	5										
	10		135550-B04-10	28 29 31	10/18		Dark yellowish brown (10YR 4/6), Silty fine SAND (SM), very dense, moist, trace medium sand, no staining or unusual odor	0.0	0.0	1100	
	15		135550-B04-15	22 36 44	18/18		Very pale brown (10YR 7/3), fine SAND (SP), very dense, moist, no staining or unusual odor	0.0	0.0	1105	
	20		135550-B04-20	40 50	12/18		Trace silt and gravel to 3/4-inch diameter	0.0	0.0	1110	
	25		135550-B04-25	11 33 50	18/18		Yellowish brown (10YR 5/4), fine to medium SAND (SW), very dense, moist, trace coarse sand, no staining or unusual odor	0.0	0.0	1115	
	30										

Project: Shell Retail Due Diligence Program Phase II - SAP#135550
Project Location: 1410 South Soto Street, Los Angeles, CA
Project Number: 49194400

Log of Boring B04

Feet MSL	Depth, feet	SAMPLES Type	Number	Blows per 6"	Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
	30		135550-B04-30	30 50	12/18			0.0	0.0	1120	
	35		135550-B04-35	27 50	12/18			0.0	0.0	1125	
	40		135550-B04-40	18 28 35	18/18		Very pale brown (10YR 7/3), fine SAND (SP), very dense, moist, trace medium sand, no staining, slight unusual odor	11.8	0.0	1130	
							Completed boring to 41.5 feet bgs.				
	45										
	50										
	55										
	60										
	65										

Project: Shell Retail Due Diligence Program Phase II - SAP#135550 **Project Location:** 1410 South Soto Street, Los Angeles, CA **Project Number:** 49194400	# Log of Boring B05 Sheet 1 of 1

Date(s) Drilled	1/29/2009 / 2/2/2009	Logged By	K. Slape (0-7')	Checked By	J. Montoya
Drilling Method	Air Knife	Drilling Contractor	BC^2 Environmental	Total Depth of Borehole ft bgs	7.0
Drill Rig Type	Air Knife	Borehole Diameter (inches)	NA	Approx. Surface Elevation ft msl	Not Measured
Approx. Depth Groundwater Encountered	Not Encountered	Sampler Type	California Modified Split Spoon	Borehole Backfill	Cement Bentonite Grout
Comments					

Feet MSL	Depth, feet	SAMPLES Type	Number	Blows per 6"	Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
	0						Asphalt Concrete				
							Air Knife to 7' bgs.				
							Dark brown, Gravelly Silty fine to medium SAND (SP-SM), gravel to 1/4-inch diameter, no staining or hydrocarbon odor				
	5						Dark brown, Silty medium to coarse SAND (SM), no staining or hydrocarbon odor				
							Completed boring to 7 ft bgs.				
	10										
	15										
	20										
	25										
	30										

Project: Shell Retail Due Diligence Program Phase II - SAP#135550	# Log of Boring B06
Project Location: 1410 South Soto Street, Los Angeles, CA	Sheet 1 of 2
Project Number: 49194400	

Date(s) Drilled	1/28/2009 / 2/2/2009	Logged By	K. Slape (0-7') R. Agunwah (7-41.5')	Checked By	J. Montoya
Drilling Method	Hollow Stem Auger	Drilling Contractor	WDC	Total Depth of Borehole ft bgs	41.5
Drill Rig Type	CME 75	Borehole Diameter (inches)	8"	Approx. Surface Elevation ft msl	Not Measured
Approx. Depth Groundwater Encountered	Not Encountered	Sampler Type	California Modified Split Spoon	Borehole Backfill	Cement Bentonite Grout
Comments					

Feet MSL	Depth, feet	SAMPLES Type	Number	Blows per 6"	Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
	0						Asphalt Base Air Knifed to 7 ft bgs.				
							Dark brown, Silty fine to medium SAND (SM), slightly moist, trace gravel, no staining or hydrocarbon odor				
	5										
	10		135550-B06-10	19 20 30	18/18		Becomes dark yellowish brown (10YR 3/4), fine sand, moist, no staining, very slight unusual odor	0.0	0.0	0930	
	15		135550-B06-15	28 50	12/15		Brown (10YR 4/3), fine SAND (SP), very dense, moist, trace medium sand, trace gravel to 3/4-inch diameter, no staining or unusual odor	0.0	0.0	0935	
	20		135550-B06-20	29 32 50	18/18		Trace coarse sand, gravel no longer present	0.0	0.0	0940	
	25		135550-B06-25	39 50	12/18		Becomes yellowish brown (10YR 5/4), fine to medium sand	0.0	0.0	0945	
	30										

Project: Shell Retail Due Diligence Program Phase II - SAP#135550
Project Location: 1410 South Soto Street, Los Angeles, CA
Project Number: 49194400

Log of Boring B06

Feet MSL	Depth, feet	Type	Number	Blows per 6"	Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
	30		135550-B06-30	14 20 23	18/18		Dark yellowish brown (10YR 4/6) to brownish yellow (10YR 6/6), fine SAND with SILT (SP-SM), dense, moist, trace clay, no staining or unusual odor	0.6	0.0	0950	
	35		135550-B06-35	10 27 37	18/18		Clay no longer present	0.0	0.0	0955	
							Yellowish brown (10YR 3/6), Clayey SILT (ML), hard, moist, medium plasticity, no staining or unusual odor				
	40		135550-B06-40	12 18 26	18/18			0.0	0.0	1000	
							Completed boring to 41.5 feet bgs.				
	45										
	50										
	55										
	60										
	65										

Project: Shell Retail Due Diligence Program Phase II - SAP#135550	**Log of Boring B07**
Project Location: 1410 South Soto Street, Los Angeles, CA	Sheet 1 of 2
Project Number: 49194400	

Date(s) Drilled	1/28/2009 / 2/2/2009	Logged By	K. Slape (0-7') R. Agunwah (7-41.5')	Checked By	J. Montoya
Drilling Method	Hollow Stem Auger	Drilling Contractor	WDC	Total Depth of Borehole ft bgs	41.5
Drill Rig Type	CME 75	Borehole Diameter (Inches)	8"	Approx. Surface Elevation ft msl	Not Measured
Approx. Depth Groundwater Encountered	Not Encountered	Sampler Type	California Modified Split Spoon	Borehole Backfill	Cement Bentonite Grout
Comments					

Feet MSL	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6"	SAMPLES Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
	0						Asphalt				
							Base				
							Air Knifed to 7 ft bgs.				
							Dark brown, Silty fine SAND (SM), dry, trace gravel to 1/2-inch diameter, no staining or unusual odor				
	5										
	10		135550-B07-10	12 15 30	18/18		Light brownish gray (10YR 6/2), fine SAND (SP), dense, moist, trace silt, no staining or unusual odor	0.0	0.0	0800	
	15		135550-B07-15	22 33 38	18/18		Becomes very dark grayish brown (10YR 3/2), very dense, no staining, slight unusual odor	19.0	0.0	0805	
	20		135550-B07-20	28 38 45	18/18		Becomes light yellowish brown (10YR 6/4), trace medium sand	23.1	0.0	0810	
	25		135550-B07-25	40 50	12/18		Unusual odor no longer present	0.0	0.0	0815	
							Dark yellowish brown (10YR 4/4), Silty fine SAND (SM), very dense, moist, no staining or unusual odor				
	30										

URS

Project: Shell Retail Due Diligence Program Phase II - SAP#135550	Log of Boring B07
Project Location: 1410 South Soto Street, Los Angeles, CA	Sheet 2 of 2
Project Number: 49194400	

Feet MSL	Depth, feet	SAMPLES Type	Number	Blows per 6"	Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
	30		135550-B07-30	25 25 28	18/18			0.0	0.0	0820	
	35		135550-B07-35	23 25 37	18/18			0.0	0.0	0830	
	40		135550-B07-40	15 26 30	18/18		Yellowish brown (10YR 5/4), Clayey SILT (ML), hard, moist, medium plasticity, no staining or unusual odor	0.0	0.0	0835	
							Completed boring to 41.5 feet bgs.				
	45										
	50										
	55										
	60										
	65										

ATTACHMENT C
WASTE DISPOSAL MANIFESTS

AMERICAN REMEDIAL TECHNOLOGIES

2680 E. Imperial Hwy. • Lynwood, California 90262
Tel (323) 357-1900 • Fax (310) 604-1603

NON-HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No.	2. Manifest Document No. **22109002**

3. Generator's Name and Mailing Address **Shell Oil Products US Northborough Office** **12700 Northbrough Dr.** **Houston TX 77067** Generator's Phone No.	4. Site Address **Shell Oil Products US** **1410 S. Soto** **Los Angeles, CA**

5. Transporter 1 Company Name	6. US EPA ID Number	7 Transporter's Phone No.
8. Designated Facility Name and Site Address American Remedial Technologies Inc. 2680 E. Imperial Hwy. Lynwood, California 90262	9. US EPA ID Number CAL000131034	10. Facility's Phone No. (323) 357-1900

11. Waste Shipping Name and Description	Containers No.	Containers Type	Total Quantity	Unit Wt. / Vol.
Non-Hazardous waste, solid. Soil contaminated with hydrocarbons.	12	D	2.99	TONS

12. Special Handling Instructions and Additional Information Wear appropriate P.P.E. Wear gloves and goggles. **Is the soil subject to 1166 monitoring?** **yes ( ) no ( )** Weight Ticket ______	ART Approval No. **4706**	ART Job No. **20073706**

13. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting disposal of Hazardous Waste.

Printed · Typed Name	Signature	Month	Day	Year
Jerry V	[signature]	2	23	9

14. Transporter 1 Acknowledgement of Receipt of Materials

Printed / Typed Name	Signature	Month	Day	Year
Jesus	Jesus	2	23	9

15. Discrepancy Indication Space

16. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in item 15

Printed · Typed Name	Signature	Month	Day	Year
Jerry V	[signature]	2	23	9

ORIGINAL-RETURN TO GENERATOR

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	NOT REQUIRED
2. Page 1 of	1
3. Emergency Response Phone	888-423-6060
4. Waste Tracking Number	025703

GENERATOR

5. Generator's Name and Mailing Address
Shell Oil Products US
12700 Northborough Drive, Houston, TX 77067
Generator's Phone:

Generator's Site Address (if different than mailing address)
1410 S. Soto
Los Angeles, CA 90023

6. Transporter 1 Company Name: American Integrated Services, Inc.
U.S. EPA ID Number: CAR000146333

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address
Crosby & Overton, Inc.
1630 W. 16th Street
Long Beach, CA. 90813 562-432-5445
Facility's Phone:
U.S. EPA ID Number: CAD028409019

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.
1.	Non-Hazardous Waste Liquid	1	~~DM~~ TT	55	G
2.					
3.					
4.					

13. Special Handling Instructions and Additional Information

Wear protective equipment while handling. Weights or volumes are approximate. 24 hour emergency number (888) 423-6060 (AIS Dispatcher).

RIPR 76102
SAP# 135550
incident# 97781622
Profile #: 27578
Project #: 29028-18

1 drum

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Offeror's Printed/Typed Name: AIS on behalf of SOPUS - J Sherman
Signature:
Month 02 Day 20 Year 09

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S.
Port of entry/exit:
Transporter Signature (for exports only):
Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Will Allen
Signature: W. Allen
Month 02 Day 20 Year 09

Transporter 2 Printed/Typed Name:
Signature:
Month Day Year

DESIGNATED FACILITY

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:

17c. Signature of Alternate Facility (or Generator)
Month Day Year

H135

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name: Emilio Cabrera
Signature:
Month 2 Day 23 Year 09

169-BLC-O 5 11977 (Rev. 8/05)

TRANSPORTER #1

ATTACHMENT D
CERTIFIED LABORATORY ANALYTICAL REPORTS

Calscience Environmental Laboratories, Inc.

February 11, 2009

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

Subject: **Calscience Work Order No.: 09-02-0054**
Client Reference: 1410 S. Soto St., Los Angeles, CA

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 2/2/09 and analyzed in accordance with the attached chain-of-custody.

Unless otherwise noted, all analytical testing was accomplished in accordance with the guidelines established in our Quality Systems Manual, applicable standard operating procedures, and other related documentation. The original report of subcontracted analysis, if any, is provided herein, and follows the standard Calscience data package. The results in this analytical report are limited to the samples tested and any reproduction thereof must be made in its entirety.

If you have any questions regarding this report, please do not hesitate to contact the undersigned.

Sincerely,

Danielle Gonsman

Calscience Environmental
Laboratories, Inc.
Danielle Gonsman
Project Manager

Calscience Environmental Laboratories, Inc.

Analytical Report

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

Date Received: 02/02/09
Work Order No: 09-02-0054
Preparation: EPA 3050B / EPA 7471A Total
Method: EPA 6010B / EPA 7471A
Units: mg/kg

Project: 1410 S. Soto St., Los Angeles, CA

Page 1 of 1

Client Sample Number	Lab Sample Number	Date /Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
135550-Waste-020209	09-02-0054-31-A	02/02/09 15:40	Solid	ICP 5300	02/03/09	02/03/09 22:58	090203L01

Comment(s): -Mercury was analyzed on 2/3/09 6:07:17 PM with batch 090203L02A

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Antimony	ND	0.750	1		Mercury	ND	0.0835	1	
Arsenic	1.16	0.750	1		Molybdenum	ND	0.250	1	
Barium	94.1	0.500	1		Nickel	6.58	0.250	1	
Beryllium	0.366	0.250	1		Selenium	3.26	0.750	1	
Cadmium	ND	0.500	1		Silver	ND	0.250	1	
Chromium	16.1	0.250	1		Thallium	ND	0.750	1	
Cobalt	6.20	0.250	1		Vanadium	25.9	0.250	1	
Copper	12.0	0.500	1		Zinc	59.2	1.00	1	
Lead	8.40	0.500	1						

Client Sample Number	Lab Sample Number	Date /Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-04-007-6,106	N/A	Solid	Mercury	02/03/09	02/03/09 17:38	090203L02A

Parameter	Result	RL	DF	Qual
Mercury	ND	0.0835	1	

Client Sample Number	Lab Sample Number	Date /Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	097-01-002-12,031	N/A	Solid	ICP 5300	02/03/09	02/03/09 17:42	090203L01

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

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

Calscience Environmental Laboratories, Inc.

Analytical Report

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

Date Received:	02/02/09
Work Order No:	09-02-0054
Preparation:	EPA 3550B
Method:	EPA 8015B

Project: 1410 S. Soto St., Los Angeles, CA

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
135550-B07-20	09-02-0054-3-A	02/02/09 08:10	Solid	GC 46	02/03/09	02/03/09 21:15	090203B08

Parameter	Result	RL	DF	Qual	Units
Diesel Range Organics	ND	5.0	1		mg/kg
Surrogates:	REC (%)	Control Limits		Qual	
Decachlorobiphenyl	102	61-145			

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
135550-B06-40	09-02-0054-14-A	02/02/09 10:00	Solid	GC 46	02/03/09	02/03/09 21:30	090203B08

Parameter	Result	RL	DF	Qual	Units
Diesel Range Organics	ND	5.0	1		mg/kg
Surrogates:	REC (%)	Control Limits		Qual	
Decachlorobiphenyl	105	61-145			

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
135550-B04-40	09-02-0054-21-A	02/02/09 11:30	Solid	GC 46	02/03/09	02/03/09 21:46	090203B08

Parameter	Result	RL	DF	Qual	Units
Diesel Range Organics	ND	5.0	1		mg/kg
Surrogates:	REC (%)	Control Limits		Qual	
Decachlorobiphenyl	101	61-145			

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
135550-B03-20	09-02-0054-24-A	02/02/09 13:45	Solid	GC 46	02/03/09	02/03/09 22:01	090203B08

Parameter	Result	RL	DF	Qual	Units
Diesel Range Organics	ND	5.0	1		mg/kg
Surrogates:	REC (%)	Control Limits		Qual	
Decachlorobiphenyl	105	61-145			

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

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

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation	Date Received: 02/02/09
915 Wilshire Blvd., Suite 700	Work Order No: 09-02-0054
Los Angeles, CA 90017-3437	Preparation: EPA 3550B
	Method: EPA 8015B

Project: 1410 S. Soto St., Los Angeles, CA

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
135550-B01-20	**09-02-0054-27-A**	**02/02/09 14:38**	**Solid**	**GC 46**	**02/03/09**	**02/03/09 22:17**	**090203B08**

Parameter	Result	RL	DF	Qual	Units
Diesel Range Organics	ND	5.0	1		mg/kg
Surrogates:	REC (%)	Control Limits		Qual	
Decachlorobiphenyl	103	61-145			

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
135550-B02-10	**09-02-0054-28-A**	**02/02/09 15:20**	**Solid**	**GC 46**	**02/03/09**	**02/04/09 00:51**	**090203B08**

Parameter	Result	RL	DF	Qual	Units
Diesel Range Organics	15	5.0	1		mg/kg
Surrogates:	REC (%)	Control Limits		Qual	
Decachlorobiphenyl	105	61-145			

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	**099-12-025-618**	**N/A**	**Solid**	**GC 46**	**02/03/09**	**02/03/09 18:57**	**090203B08**

Parameter	Result	RL	DF	Qual	Units
Diesel Range Organics	ND	5.0	1		mg/kg
Surrogates:	REC (%)	Control Limits		Qual	
Decachlorobiphenyl	109	61-145			

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

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Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation		Date Received:	02/02/09
915 Wilshire Blvd., Suite 700		Work Order No:	09-02-0054
Los Angeles, CA 90017-3437		Preparation:	EPA 5030B
		Method:	LUFT GC/MS / EPA 8260B
		Units:	ug/kg

Project: 1410 S. Soto St., Los Angeles, CA — Page 1 of 4

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
135550-B07-20	09-02-0054-3-A	02/02/09 08:10	Solid	GC/MS PP	02/09/09	02/10/09 06:25	090209L01

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Benzene	ND	5.0	1		Tert-Butyl Alcohol (TBA)	ND	50	1	
1,2-Dibromoethane	ND	5.0	1		Diisopropyl Ether (DIPE)	ND	10	1	
1,2-Dichloroethane	ND	5.0	1		Ethyl-t-Butyl Ether (ETBE)	ND	10	1	
Ethylbenzene	ND	5.0	1		Tert-Amyl-Methyl Ether (TAME)	ND	10	1	
Toluene	ND	5.0	1		Ethanol	ND	500	1	
Xylenes (total)	ND	5.0	1		TPPH	ND	500	1	
Methyl-t-Butyl Ether (MTBE)	ND	5.0	1						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
Dibromofluoromethane	105	73-139		1,2-Dichloroethane-d4	107	73-145	
Toluene-d8	102	90-108		1,4-Bromofluorobenzene	97	71-113	
Toluene-d8-TPPH	101	88-112					

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
135550-B06-40	09-02-0054-14-A	02/02/09 10:00	Solid	GC/MS PP	02/09/09	02/10/09 06:50	090209L01

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Benzene	ND	5.0	1		Tert-Butyl Alcohol (TBA)	ND	50	1	
1,2-Dibromoethane	ND	5.0	1		Diisopropyl Ether (DIPE)	ND	10	1	
1,2-Dichloroethane	ND	5.0	1		Ethyl-t-Butyl Ether (ETBE)	ND	10	1	
Ethylbenzene	ND	5.0	1		Tert-Amyl-Methyl Ether (TAME)	ND	10	1	
Toluene	ND	5.0	1		Ethanol	ND	500	1	
Xylenes (total)	ND	5.0	1		TPPH	ND	500	1	
Methyl-t-Butyl Ether (MTBE)	ND	5.0	1						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
Dibromofluoromethane	105	73-139		1,2-Dichloroethane-d4	110	73-145	
Toluene-d8	101	90-108		1,4-Bromofluorobenzene	97	71-113	
Toluene-d8-TPPH	100	88-112					

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

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Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation		Date Received:	02/02/09
915 Wilshire Blvd., Suite 700		Work Order No:	09-02-0054
Los Angeles, CA 90017-3437		Preparation:	EPA 5030B
		Method:	LUFT GC/MS / EPA 8260B
		Units:	ug/kg

Project: 1410 S. Soto St., Los Angeles, CA

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
135550-B04-40	09-02-0054-21-A	02/02/09 11:30	Solid	GC/MS PP	02/09/09	02/10/09 07:15	090209L01

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Benzene	ND	5.0	1		Tert-Butyl Alcohol (TBA)	ND	50	1	
1,2-Dibromoethane	ND	5.0	1		Diisopropyl Ether (DIPE)	ND	10	1	
1,2-Dichloroethane	ND	5.0	1		Ethyl-t-Butyl Ether (ETBE)	ND	10	1	
Ethylbenzene	ND	5.0	1		Tert-Amyl-Methyl Ether (TAME)	ND	10	1	
Toluene	ND	5.0	1		Ethanol	ND	500	1	
Xylenes (total)	ND	5.0	1		TPPH	ND	500	1	
Methyl-t-Butyl Ether (MTBE)	ND	5.0	1						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
Dibromofluoromethane	109	73-139		1,2-Dichloroethane-d4	111	73-145	
Toluene-d8	102	90-108		1,4-Bromofluorobenzene	98	71-113	
Toluene-d8-TPPH	102	88-112					

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
135550-B03-20	09-02-0054-24-A	02/02/09 13:45	Solid	GC/MS PP	02/09/09	02/10/09 07:40	090209L01

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Benzene	ND	5.0	1		Tert-Butyl Alcohol (TBA)	ND	50	1	
1,2-Dibromoethane	ND	5.0	1		Diisopropyl Ether (DIPE)	ND	10	1	
1,2-Dichloroethane	ND	5.0	1		Ethyl-t-Butyl Ether (ETBE)	ND	10	1	
Ethylbenzene	ND	5.0	1		Tert-Amyl-Methyl Ether (TAME)	ND	10	1	
Toluene	ND	5.0	1		Ethanol	ND	500	1	
Xylenes (total)	ND	5.0	1		TPPH	ND	500	1	
Methyl-t-Butyl Ether (MTBE)	ND	5.0	1						

Surrogates:	REC (%)	Control Limits	Qual	Surrogates:	REC (%)	Control Limits	Qual
Dibromofluoromethane	108	73-139		1,2-Dichloroethane-d4	107	73-145	
Toluene-d8	101	90-108		1,4-Bromofluorobenzene	97	71-113	
Toluene-d8-TPPH	101	88-112					

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

Calscience Environmental Laboratories, Inc.

Analytical Report

URS Corporation	Date Received: 02/02/09
915 Wilshire Blvd., Suite 700	Work Order No: 09-02-0054
Los Angeles, CA 90017-3437	Preparation: EPA 5030B
	Method: LUFT GC/MS / EPA 8260B
	Units: ug/kg

Project: 1410 S. Soto St., Los Angeles, CA

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
135550-B01-20	09-02-0054-27-A	02/02/09 14:38	Solid	GC/MS PP	02/09/09	02/10/09 08:05	090209L01

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Benzene	ND	5.0	1		Tert-Butyl Alcohol (TBA)	ND	50	1	
1,2-Dibromoethane	ND	5.0	1		Diisopropyl Ether (DIPE)	ND	10	1	
1,2-Dichloroethane	ND	5.0	1		Ethyl-t-Butyl Ether (ETBE)	ND	10	1	
Ethylbenzene	ND	5.0	1		Tert-Amyl-Methyl Ether (TAME)	ND	10	1	
Toluene	ND	5.0	1		Ethanol	ND	500	1	
Xylenes (total)	ND	5.0	1		TPPH	ND	500	1	
Methyl-t-Butyl Ether (MTBE)	ND	5.0	1						
Surrogates:	REC (%)	Control Limits		Qual	**Surrogates:**	REC (%)	Control Limits		Qual
Dibromofluoromethane	105	73-139			1,2-Dichloroethane-d4	107	73-145		
Toluene-d8	103	90-108			1,4-Bromofluorobenzene	97	71-113		
Toluene-d8-TPPH	102	88-112							

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
135550-B02-10	09-02-0054-28-A	02/02/09 15:20	Solid	GC/MS PP	02/09/09	02/10/09 03:32	090209L02

Comment(s): -The reporting limit is elevated resulting from matrix interference.

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Benzene	ND	500	100		Tert-Butyl Alcohol (TBA)	ND	5000	100	
1,2-Dibromoethane	ND	500	100		Diisopropyl Ether (DIPE)	ND	1000	100	
1,2-Dichloroethane	ND	500	100		Ethyl-t-Butyl Ether (ETBE)	ND	1000	100	
Ethylbenzene	ND	500	100		Tert-Amyl-Methyl Ether (TAME)	ND	1000	100	
Toluene	ND	500	100		Ethanol	ND	50000	100	
Xylenes (total)	ND	500	100		TPPH	ND	50000	100	
Methyl-t-Butyl Ether (MTBE)	ND	500	100						
Surrogates:	REC (%)	Control Limits		Qual	**Surrogates:**	REC (%)	Control Limits		Qual
Dibromofluoromethane	101	73-139			1,2-Dichloroethane-d4	102	73-145		
Toluene-d8	100	90-108			1,4-Bromofluorobenzene	103	71-113		
Toluene-d8-TPPH	100	88-112							

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

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

Calscience Environmental Laboratories, Inc.

Analytical Report

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

Date Received:	02/02/09
Work Order No:	09-02-0054
Preparation:	EPA 5030B
Method:	LUFT GC/MS / EPA 8260B
Units:	ug/kg

Project: 1410 S. Soto St., Los Angeles, CA

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-12-798-267	N/A	Solid	GC/MS PP	02/09/09	02/10/09 00:37	090209L01

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Benzene	ND	5.0	1		Tert-Butyl Alcohol (TBA)	ND	50	1	
1,2-Dibromoethane	ND	5.0	1		Diisopropyl Ether (DIPE)	ND	10	1	
1,2-Dichloroethane	ND	5.0	1		Ethyl-t-Butyl Ether (ETBE)	ND	10	1	
Ethylbenzene	ND	5.0	1		Tert-Amyl-Methyl Ether (TAME)	ND	10	1	
Toluene	ND	5.0	1		Ethanol	ND	500	1	
Xylenes (total)	ND	5.0	1		TPPH	ND	500	1	
Methyl-t-Butyl Ether (MTBE)	ND	5.0	1						
Surrogates:	REC (%)	Control Limits		Qual	**Surrogates:**	REC (%)	Control Limits		Qual
Dibromofluoromethane	102	73-139			1,2-Dichloroethane-d4	102	73-145		
Toluene-d8	101	90-108			1,4-Bromofluorobenzene	97	71-113		
Toluene-d8-TPPH	101	88-112							

Client Sample Number	Lab Sample Number	Date/Time Collected	Matrix	Instrument	Date Prepared	Date/Time Analyzed	QC Batch ID
Method Blank	099-12-798-268	N/A	Solid	GC/MS PP	02/09/09	02/10/09 01:02	090209L02

Parameter	Result	RL	DF	Qual	Parameter	Result	RL	DF	Qual
Benzene	ND	500	100		Tert-Butyl Alcohol (TBA)	ND	5000	100	
1,2-Dibromoethane	ND	500	100		Diisopropyl Ether (DIPE)	ND	1000	100	
1,2-Dichloroethane	ND	500	100		Ethyl-t-Butyl Ether (ETBE)	ND	1000	100	
Ethylbenzene	ND	500	100		Tert-Amyl-Methyl Ether (TAME)	ND	1000	100	
Toluene	ND	500	100		Ethanol	ND	50000	100	
Xylenes (total)	ND	500	100		TPPH	ND	50000	100	
Methyl-t-Butyl Ether (MTBE)	ND	500	100						
Surrogates:	REC (%)	Control Limits		Qual	**Surrogates:**	REC (%)	Control Limits		Qual
Dibromofluoromethane	96	73-139			1,2-Dichloroethane-d4	98	73-145		
Toluene-d8	101	90-108			1,4-Bromofluorobenzene	99	71-113		
Toluene-d8-TPPH	101	88-112							

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

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

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

Date Received: 02/02/09
Work Order No: 09-02-0054
Preparation: EPA 3050B
Method: EPA 6010B

Project 1410 S. Soto St., Los Angeles, CA

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
09-02-0089-5	Solid	ICP 5300	02/03/09	02/03/09	090203S01

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Antimony	29	28	50-115	2	0-20	3
Arsenic	100	112	75-125	8	0-20	
Barium	4X	4X	75-125	4X	0-20	Q
Beryllium	99	100	75-125	1	0-20	
Cadmium	99	101	75-125	3	0-20	
Chromium	95	119	75-125	8	0-20	
Cobalt	98	113	75-125	9	0-20	
Copper	112	110	75-125	1	0-20	
Lead	94	99	75-125	3	0-20	
Molybdenum	85	86	75-125	1	0-20	
Nickel	101	344	75-125	46	0-20	4,3
Selenium	86	94	75-125	9	0-20	
Silver	103	104	75-125	1	0-20	
Thallium	85	90	75-125	5	0-20	
Vanadium	103	100	75-125	1	0-20	
Zinc	84	85	75-125	0	0-20	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

URS Corporation		Date Received:	02/02/09
915 Wilshire Blvd., Suite 700		Work Order No:	09-02-0054
Los Angeles, CA 90017-3437		Preparation:	EPA 3550B
		Method:	EPA 8015B

Project 1410 S. Soto St., Los Angeles, CA

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
135550-B07-20	Solid	GC 46	02/03/09	02/03/09	090203S08

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Diesel Range Organics	105	110	64-130	5	0-15	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

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

Date Received: 02/02/09
Work Order No: 09-02-0054
Preparation: EPA 7471A Total
Method: EPA 7471A

Project 1410 S. Soto St., Los Angeles, CA

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
09-02-0151-1	Solid	Mercury	02/03/09	02/03/09	090203S02

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Mercury	105	107	71-137	2	0-14	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - Spike/Spike Duplicate

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

Date Received:	02/02/09
Work Order No:	09-02-0054
Preparation:	EPA 5030B
Method:	LUFT GC/MS / EPA 8260B

Project 1410 S. Soto St., Los Angeles, CA

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
09-02-0445-10	Solid	GC/MS PP	02/09/09	02/10/09	090209S01

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Benzene	91	90	79-115	1	0-13	
Carbon Tetrachloride	89	91	55-139	2	0-15	
Chlorobenzene	85	86	79-115	1	0-17	
1,2-Dibromoethane	91	89	70-130	2	0-30	
1,2-Dichlorobenzene	70	71	63-123	2	0-23	
1,1-Dichloroethene	97	95	69-123	2	0-16	
Ethylbenzene	89	89	70-130	0	0-30	
Toluene	91	90	79-115	1	0-15	
Trichloroethene	92	92	66-144	1	0-14	
Vinyl Chloride	93	94	60-126	1	0-14	
Methyl-t-Butyl Ether (MTBE)	99	96	68-128	2	0-14	
Tert-Butyl Alcohol (TBA)	94	94	44-134	1	0-37	
Diisopropyl Ether (DIPE)	98	98	75-123	1	0-12	
Ethyl-t-Butyl Ether (ETBE)	99	97	75-117	2	0-12	
Tert-Amyl-Methyl Ether (TAME)	95	93	79-115	2	0-12	
Ethanol	22	17	42-138	28	0-28	3

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

nelac — ACCREDITED IN ACCORDANCE WITH

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

Date Received:	N/A
Work Order No:	09-02-0054
Preparation:	EPA 3050B
Method:	EPA 6010B

Project: 1410 S. Soto St., Los Angeles, CA

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
097-01-002-12,031	Solid	ICP 5300	02/03/09	02/04/09	090203L01

Parameter	LCS %REC	LCSD %REC	%REC CL	ME CL	RPD	RPD CL	Qualifiers
Antimony	95	95	80-120	73-127	0	0-20	
Arsenic	93	94	80-120	73-127	1	0-20	
Barium	108	109	80-120	73-127	0	0-20	
Beryllium	101	101	80-120	73-127	0	0-20	
Cadmium	104	103	80-120	73-127	1	0-20	
Chromium	102	102	80-120	73-127	0	0-20	
Cobalt	106	106	80-120	73-127	0	0-20	
Copper	103	104	80-120	73-127	0	0-20	
Lead	105	107	80-120	73-127	2	0-20	
Molybdenum	101	103	80-120	73-127	2	0-20	
Nickel	106	108	80-120	73-127	1	0-20	
Selenium	92	93	80-120	73-127	1	0-20	
Silver	106	107	80-120	73-127	1	0-20	
Thallium	99	102	80-120	73-127	3	0-20	
Vanadium	100	100	80-120	73-127	0	0-20	
Zinc	104	104	80-120	73-127	0	0-20	

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

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

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

Date Received:	N/A
Work Order No:	09-02-0054
Preparation:	EPA 3550B
Method:	EPA 8015B

Project: 1410 S. Soto St., Los Angeles, CA

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-025-618	Solid	GC 46	02/03/09	02/03/09	090203B08

Parameter	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Diesel Range Organics	113	108	75-123	5	0-12	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

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

Date Received:	N/A
Work Order No:	09-02-0054
Preparation:	EPA 7471A Total
Method:	EPA 7471A

Project: 1410 S. Soto St., Los Angeles, CA

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-04-007-6,106	Solid	Mercury	02/03/09	02/03/09	090203L02A

Parameter	LCS %REC	LCSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Mercury	99	100	85-121	1	0-10	

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

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

Date Received: N/A
Work Order No: 09-02-0054
Preparation: EPA 5030B
Method: LUFT GC/MS / EPA 8260B

Project: 1410 S. Soto St., Los Angeles, CA

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-798-267	Solid	GC/MS PP	02/09/09	02/09/09	090209L01

Parameter	LCS %REC	LCSD %REC	%REC CL	ME_CL	RPD	RPD CL	Qualifiers
Benzene	92	92	84-114	79-119	1	0-7	
Carbon Tetrachloride	90	92	66-132	55-143	2	0-12	
Chlorobenzene	94	94	87-111	83-115	0	0-7	
1,2-Dibromoethane	99	101	80-120	73-127	2	0-20	
1,2-Dichlorobenzene	93	95	79-115	73-121	2	0-8	
1,1-Dichloroethene	96	96	73-121	65-129	0	0-12	
Ethylbenzene	94	94	80-120	73-127	0	0-20	
Toluene	94	94	78-114	72-120	0	0-7	
Trichloroethene	105	106	84-114	79-119	1	0-8	
Vinyl Chloride	91	91	63-129	52-140	1	0-15	
Methyl-t-Butyl Ether (MTBE)	97	100	77-125	69-133	3	0-11	
Tert-Butyl Alcohol (TBA)	95	97	47-137	32-152	2	0-27	
Diisopropyl Ether (DIPE)	97	99	76-130	67-139	2	0-8	
Ethyl-t-Butyl Ether (ETBE)	96	99	76-124	68-132	3	0-12	
Tert-Amyl-Methyl Ether (TAME)	95	98	82-118	76-124	3	0-11	
Ethanol	96	92	59-131	47-143	5	0-21	
TPPH	74	77	65-135	53-147	4	0-30	

Total number of LCS compounds : 17
Total number of ME compounds : 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Quality Control - LCS/LCS Duplicate

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

Date Received:	N/A
Work Order No:	09-02-0054
Preparation:	EPA 5030B
Method:	LUFT GC/MS / EPA 8260B

Project: 1410 S. Soto St., Los Angeles, CA

Quality Control Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	LCS/LCSD Batch Number
099-12-798-268	Solid	GC/MS PP	02/09/09	02/09/09	090209L02

Parameter	LCS %REC	LCSD %REC	%REC CL	ME CL	RPD	RPD CL	Qualifiers
Benzene	92	92	84-114	79-119	1	0-7	
Carbon Tetrachloride	90	92	66-132	55-143	2	0-12	
Chlorobenzene	94	94	87-111	83-115	0	0-7	
1,2-Dibromoethane	99	101	80-120	73-127	2	0-20	
1,2-Dichlorobenzene	93	95	79-115	73-121	2	0-8	
1,1-Dichloroethene	96	96	73-121	65-129	0	0-12	
Ethylbenzene	94	94	80-120	73-127	0	0-20	
Toluene	94	94	78-114	72-120	0	0-7	
Trichloroethene	105	106	84-114	79-119	1	0-8	
Vinyl Chloride	91	91	63-129	52-140	1	0-15	
Methyl-t-Butyl Ether (MTBE)	97	100	77-125	69-133	3	0-11	
Tert-Butyl Alcohol (TBA)	95	97	47-137	32-152	2	0-27	
Diisopropyl Ether (DIPE)	97	99	76-130	67-139	2	0-8	
Ethyl-t-Butyl Ether (ETBE)	96	99	76-124	68-132	3	0-12	
Tert-Amyl-Methyl Ether (TAME)	95	98	82-118	76-124	3	0-11	
Ethanol	96	92	59-131	47-143	5	0-21	
TPPH	74	77	65-135	53-147	4	0-30	

Total number of LCS compounds : 17
Total number of ME compounds : 0
Total number of ME compounds allowed : 1
LCS ME CL validation result : Pass

RPD - Relative Percent Difference , CL - Control Limit

Calscience Environmental Laboratories, Inc.

Glossary of Terms and Qualifiers

Work Order Number: 09-02-0054

Qualifier	Definition
*	See applicable analysis comment.
1	Surrogate compound recovery was out of control due to a required sample dilution, therefore, the sample data was reported without further clarification.
2	Surrogate compound recovery was out of control due to matrix interference. The associated method blank surrogate spike compound was in control and, therefore, the sample data was reported without further clarification.
3	Recovery of the Matrix Spike (MS) or Matrix Spike Duplicate (MSD) compound was out of control due to matrix interference. The associated LCS and/or LCSD was in control and, therefore, the sample data was reported without further clarification.
4	The MS/MSD RPD was out of control due to matrix interference. The LCS/LCSD RPD was in control and, therefore, the sample data was reported without further clarification.
5	The PDS/PDSD associated with this batch of samples was out of control due to a matrix interference effect. The associated batch LCS/LCSD was in control and, hence, the associated sample data was reported with no further corrective action required.
A	Result is the average of all dilutions, as defined by the method.
B	Analyte was present in the associated method blank.
C	Analyte presence was not confirmed on primary column.
E	Concentration exceeds the calibration range.
H	Sample received and/or analyzed past the recommended holding time.
J	Analyte was detected at a concentration below the reporting limit and above the laboratory method detection limit. Reported value is estimated.
ME	LCS Recovery Percentage is within LCS ME Control Limit range.
N	Nontarget Analyte.
ND	Parameter not detected at the indicated reporting limit.
Q	Spike recovery and RPD control limits do not apply resulting from the parameter concentration in the sample exceeding the spike concentration by a factor of four or greater.
U	Undetected at the laboratory method detection limit.
X	% Recovery and/or RPD out-of-range.
Z	Analyte presence was not confirmed by second column or GC/MS analysis.

SHELL Chain Of Custody Record

LAB:
- ☐ TA - Irvine, California
- ☐ TA - Morgan Hill, California
- ☐ TA - Sacramento, California
- ☐ TA - Nashville, Tennessee
- ☑ Calscience
- ☐ Other________

NAME OF PERSON TO BILL: Charles O'Neil

- ☑ ENVIRONMENTAL SERVICES
- ☐ NETWORK DEV / FE
- ☐ BILL CONSULTANT
- ☐ COMPLIANCE
- ☐ RMT/CRMT

☐ CHECK BOX TO VERIFY IF NO INCIDENT # APPLIES

INCIDENT # (ES ONLY):

PO #: [redacted] 4 9 1 9 4 4 0 0

SAP or CRMT #: 1 3 5 5 5 0

DATE: 2/2/09

PAGE: 1 of 4

SAMPLING COMPANY:	URS Corporation
LOG CODE:	
ADDRESS:	915 Wilshire Blvd, Suite 700, Los Angeles, CA 90017
PROJECT CONTACT (Hardcopy or PDF Report to):	Alexis Bahou } Joseph Montoya
TELEPHONE:	213.996.2448
FAX:	213.996.2456
E-MAIL:	Joseph_Montoya@urscorp.com; alexis_bahou@urscorp.com
SITE ADDRESS: Street and City	1410 S. Soto St, Los Angeles
State	CA
GLOBAL ID NO.:	
EDF DELIVERABLE TO (Name, Company, Office Location):	Steve Cole, URS Corporation, Los Angeles
PHONE NO.:	213-996-2398
E-MAIL:	steve_cole@urscorp.com
CONSULTANT PROJECT NO.:	
SAMPLER NAME(S) (Print):	Carole Bartel
LAB USE ONLY	09-02-0054

TAT (STD IS 10 BUSINESS DAYS / RUSH IS CALENDAR DAYS): ☑ STD ☐ 5 DAY ☐ 3 DAY ☐ 2 DAY ☐ 24 HOURS ☑ RESULTS NEEDED ON WEEKEND

☐ LA - RWQCB REPORT FORMAT ☐ UST AGENCY:

SPECIAL INSTRUCTIONS OR NOTES:
- ☐ EDD NOT NEEDED
- ☑ SHELL CONTRACT RATE APPLIES
- ☐ STATE REIMB RATE APPLIES
- ☐ RECEIPT VERIFICATION REQUESTED

Where boring is indicated from near waste oil tank, please run most impacted sample for PCBs, PAHs, Metals, TPH-G and D. If no detections please run the 10' sample for the additional analyses.

REQUESTED ANALYSIS

FIELD NOTES: Container/Preservative or PID Readings or Laboratory Notes

LAB USE ONLY	Field Sample Identification	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH - Purgeable (8260B) TPH-G	TPH - Extractable (8015M)	BTEX (8260B)	5 Oxygenates (8260B) (MTBE, TBA, DIPE, TAME, ETBE)	MTBE (8260B)	TBA (8260B)	DIPE (8260B)	TAME (8260B)	ETBE (8260B)	1,2 DCA (8260B)	EDB (8260B)	Ethanol (8260B)	Methanol (8015M)	TPH - D (8015 M)	EDC	TEMPERATURE ON RECEIPT C°
1	135550-B07-10	2/2/09	8:00	solid	1																Hold
2	135550-B07-15	2/2	8:05	solid	1																Hold
3	135550-B07-20	2/2	8:10	solid	1	X		X	X							X	X		X	X	PID hit of 23.1 ppm
4	135550-B07-25	2/2	8:15	solid	1																Hold
5	135550-B07-30	2/2	8:20	solid	1																Hold
6	135550-B07-35	2/2	8:30	solid	1																Hold
7	135550-B07-40	2/2	9:35	solid	1																Hold
8	135550-B06-10	2/2	9:30	solid	1																Hold
9	135550-B06-15	2/2	9:35	solid	1																Hold
10	135550-B06-20	2/2	9:40	solid	1																Hold

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
[signature]	[signature] CEL	2/2/9	16:00
[signature]	Dannyle CEL	2/2/09	16:50

05/02/06 Revision

SHELL Chain Of Custody Record

LAB:
- ☐ TA - Irvine, California
- ☐ TA - Morgan Hill, California
- ☐ TA - Sacramento, California
- ☐ TA - Nashville, Tennesee
- ☑ Calscience
- ☐ Other________

NAME OF PERSON TO BILL: Charles O'Neil

☑ ENVIRONMENTAL SERVICES ☐ NETWORK DEV / FE ☐ BILL CONSULTANT ☐ COMPLIANCE ☐ RMT/CRMT

☐ CHECK BOX TO VERIFY IF NO INCIDENT # APPLIES

INCIDENT # (ES ONLY):

PO #: 4 9 1 9 4 4 0 0

SAP or CRMT #: 1 3 5 5 5 0

DATE: 2/2/09

PAGE: 2 of 4

SAMPLING COMPANY: URS Corporation

LOG CODE:

ADDRESS: 915 Wilshire Blvd, Suite 700, Los Angeles, CA 90017

PROJECT CONTACT (Hardcopy or PDF Report to): Alexis Bahou / Joe Montoya

TELEPHONE: 213.996.2448 /2300

FAX: 213.996.2456

E-MAIL: alexis_bahou@urscorp.com Joseph-Montoya@urscorp.com

SITE ADDRESS: Street and City: 1410 S. Soto St. Los Angeles

State: CA

GLOBAL ID NO.:

EDF DELIVERABLE TO (Name, Company, Office Location): Steve Cole, URS Corporation, Los Angeles

PHONE NO.: 213-996-2398

E-MAIL: steve_cole@urscorp.com

CONSULTANT PROJECT NO.:

SAMPLER NAME(S) (Print): Carole Bartel

LAB USE ONLY: 09-02-0054

TAT (STD IS 10 BUSINESS DAYS / RUSH IS CALENDAR DAYS): ☑ STD ☐ 5 DAY ☐ 3 DAY ☐ 2 DAY ☐ 24 HOURS ☑ RESULTS NEEDED ON WEEKEND

☐ LA - RWQCB REPORT FORMAT ☐ UST AGENCY:

SPECIAL INSTRUCTIONS OR NOTES:
- ☐ EDD NOT NEEDED
- ☑ SHELL CONTRACT RATE APPLIES
- ☐ STATE REIMB RATE APPLIES
- ☐ RECEIPT VERIFICATION REQUESTED

Where boring is indicated from near waste oil tank, please run most impacted sample for PCBs, PAHs, Metals, TPH-G and D. If no detections please run the 10' sample for the additional analyses.

REQUESTED ANALYSIS

LAB USE ONLY	Field Sample Identification	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH - Purgeable (8260B) TPH-G	TPH - Extractable (8015M)	BTEX (8260B)	5 Oxygenates (8260B) (MTBE, TBA, DIPE, TAME, ETBE)	MTBE (8260B)	TBA (8260B)	DIPE (8260B)	TAME (8260B)	ETBE (8260B)	1,2 DCA (8260B)	EDB (8260B)	Ethanol (8260B)	Methanol (8015M)	TPH - D (8015 M)	EDC					FIELD NOTES: Container/Preservative or PID Readings or Laboratory Notes
11	135550-B06-25	2/2	9:45	solid	1																				Hold
12	135550-B06-30	2/2	9:50	Solid	1																				Hold
13	135650-B06-35	2/2	9:55	solid	1																				Hold
14	135550-B06-40	2/2	10:00	Solid	1	X		X	X							X	X		X	X					
—																~~X~~	~~X~~		~~X~~	~~X~~					
15	135550-B04-10	2/2	11:00	Solid	1																				Hold
16	135550-B04-15	2/2	11:05	Solid	1																				Hold
17	135550-B04-20	2/2	11:10	Solid	1																				Hold
18	135550-B04-25	2/2	11:15	solid	1																				Hold
19	135550-B04-30	2/2	11:20	solid	1																				Hold

TEMPERATURE ON RECEIPT C°:

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
[signature]	[signature]	2/2/9	16:00
[signature]	Dannyle CEL	2/2/09	16:50

SHELL Chain Of Custody Record

LAB:
- ☐ TA - Irvine, California
- ☐ TA - Morgan Hill, California
- ☐ TA - Sacramento, California
- ☐ TA - Nashville, Tennesee
- ☑ Calscience
- ☐ Other

NAME OF PERSON TO BILL: Charles O'Neil

- ☑ ENVIRONMENTAL SERVICES
- ☐ NETWORK DEV / FE
- ☐ BILL CONSULTANT
- ☐ COMPLIANCE
- ☐ RMT/CRMT

☐ CHECK BOX TO VERIFY IF NO INCIDENT # APPLIES

INCIDENT # (ES ONLY):

PO #: [redacted] 4 9 1 9 4 4 0 0

SAP or CRMT #: 1 3 5 5 5 0

DATE: 2/2/09

PAGE: 3 of 4

SAMPLING COMPANY: URS Corporation

LOG CODE:

ADDRESS: 915 Wilshire Blvd, Suite 700, Los Angeles, CA 90017

PROJECT CONTACT (Hardcopy or PDF Report to): Alexis Bahou / Joe Montoya

TELEPHONE: 213.996.2448 /2800

FAX: 213.996.2456

E-MAIL: alexis_bahou@urscorp.com Joseph_Montoya@urscorp.com

SITE ADDRESS: Street and City: 1410 S. Soto St. Los Angeles

State: CA

GLOBAL ID NO.:

EDF DELIVERABLE TO (Name, Company, Office Location): Steve Cole, URS Corporation, Los Angeles

PHONE NO.: 213-996-2398

E-MAIL: steve_cole@urscorp.com

CONSULTANT PROJECT NO.:

SAMPLER NAME(S) (Print): Carole Bartel

LAB USE ONLY: 09-02-0054

TAT (STD IS 10 BUSINESS DAYS / RUSH IS CALENDAR DAYS):
☑ STD ☐ 5 DAY ☐ 3 DAY ☐ 2 DAY ☐ 24 HOURS ☑ RESULTS NEEDED ON WEEKEND

☐ LA - RWQCB REPORT FORMAT ☐ UST AGENCY:

SPECIAL INSTRUCTIONS OR NOTES:
- ☐ EDD NOT NEEDED
- ☑ SHELL CONTRACT RATE APPLIES
- ☐ STATE REIMB RATE APPLIES
- ☐ RECEIPT VERIFICATION REQUESTED

Where boring is indicated from near waste oil tank, please run most impacted sample for PCBs, PAHs, Metals, TPH-G and D. If no detections please run the 10' sample for the additional analyses.

REQUESTED ANALYSIS

LAB USE ONLY	Field Sample Identification	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH - Purgeable (8260B) TPHG	TPH - Extractable (8015M)	BTEX (8260B)	5 Oxygenates (8260B) (MTBE, TBA, DIPE, TAME, ETBE)	MTBE (8260B)	TBA (8260B)	DIPE (8260B)	TAME (8260B)	ETBE (8260B)	1,2 DCA (8260B)	EDB (8260B)	Ethanol (8260B)	Methanol (8015M)	TPH - D (8015 M)	[illegible]						FIELD NOTES: Container/Preservative or PID Readings or Laboratory Notes / TEMPERATURE ON RECEIPT C°
20	135550 - B04 - 35	2/2/09	11:25	Soil	1																					Hold
21	135550 - B04 - 40	2/2	11:30	Soil	1	X		X	X							X	X		X	X						
22	135550 - B03 - 10	2/2	13:35	Soil	1																					Hold
23	135550 - B03 - 15	2/2	13:40	Soil	1																					Hold
24	135550 - B03 - 20	2/2	13:45	Soil	1	X		X	X							X	X		X	X						7.4 ppm
25	135550 - B01 - 10	2/2	14:30	Soil	1																					Hold
26	135550 - B01 - 15	2/2	14:35	Soil	1																					Hold
27	135550 - B01 - 20	2/2	14:38	Soil	1	X		X	X							X	X		X	X						24.7 ppm
28	135550 - B02 - 10	2/2	15:20	Soil	1	X		X	X							X	X		X	X						20.2 ppm
29	135550 - B02 - 15	2/2	15:25	Soil	1																					Hold

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
[signature]	[signature]	2/2/9	16 °C
[signature]	Dannyle CEL	2/2/09	16:50

SHELL Chain Of Custody Record

LAB:
- ☐ TA - Irvine, California
- ☐ TA - Morgan Hill, California
- ☐ TA - Sacramento, California
- ☐ TA - Nashville, Tennesee
- ☑ Calscience
- ☐ Other________

NAME OF PERSON TO BILL: Charles O'Neil

☑ ENVIRONMENTAL SERVICES ☐ NETWORK DEV / FE ☐ BILL CONSULTANT ☐ COMPLIANCE ☐ RMT/CRMT

INCIDENT # (ES ONLY)

☐ CHECK BOX TO VERIFY IF NO INCIDENT # APPLIES

PO #

SAP or CRMT #: 1 3 5 5 5 0

DATE: 2/2/09

PAGE: 4 of 4

SAMPLING COMPANY: URS Corporation

LOG CODE:

ADDRESS: 915 Wilshire Blvd, Suite 700, Los Angeles, CA 90017

PROJECT CONTACT (Hardcopy or PDF Report to): Alexis Bahou / Joe Montoya

TELEPHONE: 213.996.2448 /2200

FAX: 213.996.2456

E-MAIL: Joseph-Montoya alexis_bahou@urscorp.com

SITE ADDRESS: Street and City: 1410 S. Soto St., Los Angeles

State: CA

GLOBAL ID NO.:

EDF DELIVERABLE TO (Name, Company, Office Location): Steve Cole, URS Corporation, Los Angeles

PHONE NO.: 213-996-2398

E-MAIL: steve_cole@urscorp.com

CONSULTANT PROJECT NO.:

SAMPLER NAME(S) (Print):

LAB USE ONLY: 09-02-0054

TAT (STD IS 10 BUSINESS DAYS / RUSH IS CALENDAR DAYS): ☑ STD ☐ 5 DAY ☐ 3 DAY ☐ 2 DAY ☐ 24 HOURS ☑ RESULTS NEEDED ON WEEKEND

☐ LA - RWQCB REPORT FORMAT ☐ UST AGENCY: ________

SPECIAL INSTRUCTIONS OR NOTES:

- ☐ EDD NOT NEEDED
- ☑ SHELL CONTRACT RATE APPLIES
- ☐ STATE REIMB RATE APPLIES
- ☐ RECEIPT VERIFICATION REQUESTED

Where boring is indicated from near waste oil tank, please run most impacted sample for PCBs, PAHs, Metals, TPH-G and D. If no detections please run the 10' sample for the additional analyses.

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LAB USE ONLY	Field Sample Identification	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH - Purgeable (8260B)	TPH - Extractable (8015M)	BTEX (8260B)	5 Oxygenates (8260B) (MTBE, TBA, DIPE, TAME, ETBE)	MTBE (8260B)	TBA (8260B)	DIPE (8260B)	TAME (8260B)	ETBE (8260B)	1,2 DCA (8260B)	EDB (8260B)	Ethanol (8260B)	Methanol (8015M)	TPH - D (8015 M)	title 22 metals	FIELD NOTES: Container/Preservative or PID Readings or Laboratory Notes / TEMPERATURE ON RECEIPT C°
30	135550-B02-20	2/2/09	15:2?	soil	1																Hold
31	135550-waste-020209	2/2	15:40	soil	1															X	

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
[signature]	[signature]	2/2/9	16:00
[signature]	Dannyle CEL	2/2/09	16:50

Calscience Environmental Laboratories, Inc.

WORK ORDER #: 09-02-0054

SAMPLE RECEIPT FORM

Cooler 1 of 1

CLIENT: URS

DATE: 2/2/09

TEMPERATURE: (Criteria: 0.0 °C – 6.0 °C, not frozen)

Temperature 2.2 °C - 0.2 °C (CF) = 2.0 °C ☑ Blank ☐ Sample

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

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

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

Ambient Temperature: ☐ Air ☐ Filter ☐ Metals Only ☐ PCBs Only Initial: [signature]

CUSTODY SEALS INTACT:

☐ Cooler ☐______ ☐ No (Not Intact) ☑ Not Present ☐ N/A Initial: [signature]

☐ Sample ☐______ ☐ No (Not Intact) ☑ Not Present Initial: PS

SAMPLE CONDITION:	Yes	No	N/A
Chain-Of-Custody (COC) document(s) received with samples	☑	☐	☐
COC document(s) received complete	☑	☐	☐
Sampler's name indicated on COC	☑	☐	☐
Sample container label(s) consistent with COC	☑	☐	☐
Sample container(s) intact and good condition	☑	☐	☐
Correct containers and volume for analyses requested	☑	☐	☐
Analyses received within holding time	☑	☐	☐
Proper preservation noted on COC or sample container	☐	☐	☑
Volatile analysis container(s) free of headspace	☐	☐	☑
Tedlar bag(s) free of condensation	☐	☐	☑

CONTAINER TYPE:

Solid: ☐4ozCGJ ☐8ozCGJ ☐16ozCGJ ☑Sleeve ☐EnCores® ☐TerraCores® ☐______

Water: ☐VOA ☐VOAh ☐VOAna$_2$ ☐125AGB ☐125AGBh ☐125AGBpo$_4$ ☐1AGB ☐1AGBna$_2$ ☐1AGBs ☐500AGB ☐500AGBs ☐250CGB ☐250CGBs ☐1PB ☐500PB ☐500PBna ☐250PB ☐250PBn ☐125PB ☐125PBznna ☐100PBsterile ☐100PBna$_2$ ☐______ ☐______ ☐

Air: ☐Tedlar® ☐Summa® ☐______

Checked/Labeled by: PS

Reviewed by: [signature]

Scanned by: PS

Container: C:Clear A:Amber P:Poly/Plastic G:Glass J:Jar B:Bottle

Preservative: h:HCL n:HNO_3 na$_2$:$Na_2S_2O_3$ na:NaOH po$_4$:H_3PO_4 s:H_2SO_4 znna:$ZnAc_2$+NaOH

SOP T100_090 (12/10/08)

ATTACHMENT E
DATA VALIDATION MEMORANDUM

URS

Data Validation Memorandum

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

TO: Alexis Bahou   **SITE:** Shell Los Angeles 135550

FROM: Lily Bayati, Ontario QA/QC Group   **DATE:** February 16, 2009

SUBJECT: Summary of Limited Data Validation for Calscience Report: 09-02-0054

Introduction
This report summarizes the findings of the limited validation (completeness check) of the samples collected as part of the Shell Los Angeles 135550 Site Investigation. Calscience Environmental Laboratories, Inc. in Garden Grove, California, analyzed the samples. The samples are listed in Table 1 included at the end of this document. The data were reviewed in accordance with URS Standard Operating Procedures and the principles presented in *USEPA National Functional Guidelines for Laboratory Data Review, Organics* (EPA, 1999) and *USEPA National Functional Guidelines for Laboratory Data Review, Inorganics* (EPA, 2004).

Data Review Narratives
The analytical data were reviewed in order to evaluate the usability of the data for meeting project objectives. The data review process performed involved evaluating the following parameters: sample receipt, holding times, laboratory blank results, laboratory control sample results, surrogate recoveries, and matrix spike/matrix spike duplicate results. After evaluating these parameters, an overall assessment with respect to the quantitative and qualitative data quality assurance parameters of accuracy, precision, completeness, comparability, and representativeness was formulated.

The table below lists the QA/QC parameters that were evaluated. A check mark (✓) indicates an area of review in which all data were acceptable. A crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

DATA REVIEW MATRIX

QC Parameter	**DRO** EPA8015B	**BTEX, Ethanol, Fuel Oxygenates 1,2-DCA, EDB, TPPH** EPA 8260B/ LUFT GC/MS	**Total Metals** EPA 6010B/7471A
Chain-of-custody (COC)	✓	✓	✓
Sample Receipt	✓	✓	✓
Holding Times	✓	✓	✓
Method Blank	✓	✓	✓
Surrogate Recovery	✓	✓	NA
LCS/LCSD	✓	✓	✓
MS/MSD	✓ (1)	NPS	NPS
Spike Duplicate	✓	✓	✓

NPS = Non Project Sample was utilized for the MS/MSD analyses.   NA= Not Applicable
LCS/LCSD = Laboratory Control Sample/ Laboratory Control Sample Duplicate
MS/MSD = Matrix Spike/ Matrix Spike Duplicate

Note:

1. Sample 135550-B07-20 was utilized for DRO MS/MSD analyses. All results were within acceptance criterion.

Overall Assessment

The data reported in this package are considered to be usable for meeting project objectives. All results are considered to be valid; the analytical completeness defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for analysis, for the project is 100%. Additionally, because all samples in this data set were collected and analyzed under similar prescribed conditions, the data within this set are considered to be comparable.

Table 1
Calscience Environmental Laboratories, Inc.

Field ID	Lab ID	Field ID	Lab ID
135550-B07-20	09-02-0054-3	135550-B01-20	09-02-0054-27
135550-B06-40	09-02-0054-14	135550-B02-10	09-02-0054-28
135550-B04-40	09-02-0054-21	135550-Waste-020209	09-02-0054-31
135550-B03-20	09-02-0054-24		

Notes:
Date Sampled = 02/02/09
Matrix = Soil
Samples were collectively analyzed for:
EPA 6010B/7471A = Total Metals
EPA 8015B = Diesel Range Organics (DRO)
EPA 8260B/ LUFT GC/MS = Fuel Oxygenates [Methyl Tertiary Butyl Ether (MTBE), t-Butyl Alcohol (TBA), t-Amyl Methyl Ether (TAME), Di - Isopropyl Ether (DIPE), Ethyl-t-Butyl Ether (ETBE)], Ethanol, BTEX (Benzene, Toluene, Ethylbenzene, and Xylenes), TPPH (Total Purgeable Petroleum Hydrocarbons), 1,2-Dichloroethane (1,2-DCA), and 1,2-Dibromoethane (EDB)

ATTACHMENT A
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by URS's Data Review Team

DATA QUALIFIER DEFINITIONS FOR ORGANIC ANALYES

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."

NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

DATA QUALIFIER DEFINITIONS FOR INORGANIC ANALYSES

U The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.

J The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J+ The result is an estimated quantity, but the result may be biased high.

J- The result is an estimated quantity, but the result may be biased low.

UJ The analyte was analyzed for, but was not detected. The reported sample quantitation limit is approximate and may be inaccurate or imprecise.

R The data are unusable. The sample results are rejected due to serious deficiencies in meeting quality control (QC) criteria. The analyte may or may not be present in the sample.

URS DATA QUALIFIER DEFINITIONS — REASON CODE DEFINITIONS

a Analytical sequence deficiency or omission.
b Gross compound breakdown (4,4'-DDT/Endrin).
c Calibration failure; poor or unstable response.
d Laboratory duplicate imprecision.
e Laboratory duplicate control sample imprecision.
f Field duplicate imprecision.
g Poor chromatography.
h Holding time violation.
i Internal standard failure.
j Poor mass spectrographic performance.
k Serial dilution imprecision.
l Laboratory control sample recovery failure.
m Matrix spike/matrix spike duplicate recovery failure.
n Interference check sample recovery failure.
o Calibration blank contamination (metals/inorganics only).
p Preparation blank contamination (metals/inorganics only).
q Quantitation outside linear range.
r Linearity failure in initial calibration.
s Surrogate spike recovery failure (GC organics and GC/MS organics only).
t Instrument tuning failure.
u No valid confirmation column (GC Organics only).
v Value is estimated below the MDA (Rads only).
w Retention time (RT) outside of RT window.
x Field blank contamination.
y Trip blank contamination.

INTERPRETATION KEY

The following example shows how an analytical result which includes qualifiers assigned by both the URS data review team and the analytical laboratory could be displayed in the data tables:

<5.20 Uz | JB

The qualifier assigned by the URS data review team precedes the "|"; the qualifier assigned by the laboratory follows it. In this example, the result is qualified as a non-detection data to the bias introduced by contamination of the associated method blank. Presence of the analyte in the method blank is indicated by the laboratory qualifier (B). The qualifier assigned by the URS data review team (Uz) indicates that the analyte concentration is considered to be below the adjusted detection limit (quantitation limit) based on the level of contamination in the method blank.

z Method blank contamination.

ATTACHMENT F
SENSITIVE RECEPTOR SURVEY DOCUMENTATION

Shell 135550
1410 South Soto Street
Los Angeles, CA 90023

Inquiry Number: 2409679.12s
January 29, 2009

The EDR GeoCheck® Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

SECTION | **PAGE**

GEOCHECK ADDENDUM

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

GEOCHECK® - PHYSICAL SETTING SOURCE REPORT

TARGET PROPERTY ADDRESS

SHELL 135550
1410 SOUTH SOTO STREET
LOS ANGELES, CA 90023

TARGET PROPERTY COORDINATES

Latitude (North):	34.02390 - 34˚ 1' 26.0"
Longitude (West):	118.2198 - 118˚ 13' 11.3"
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	387379.9
UTM Y (Meters):	3765282.2
Elevation:	271 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	34118-A2 LOS ANGELES, CA
Most Recent Revision:	1994

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

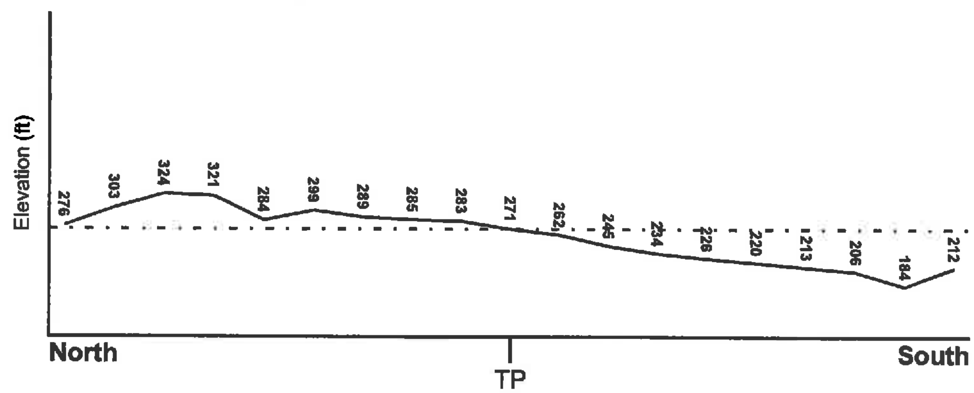
TOPOGRAPHIC INFORMATION

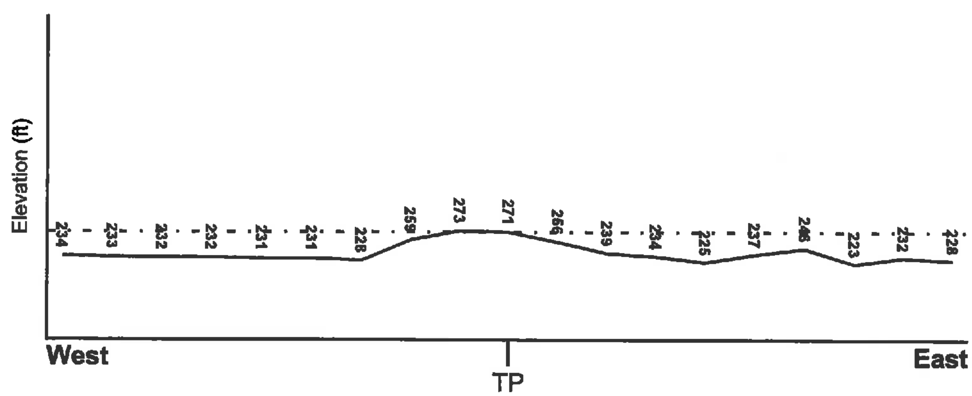
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General South

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





Target Property Elevation: 271 ft.

0 1/2 1 Miles

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
LOS ANGELES, CA	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 0601370082C

Additional Panels in search area: 0601370075C
0601370074C
0601370081C
0601660000A

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
LOS ANGELES	Not Available

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius:	1.25 miles
Location Relative to TP:	1/2 - 1 Mile SE
Site Name:	Stauffer Chem Co
Site EPA ID Number:	CAD982360166
Groundwater Flow Direction:	NWN.
Inferred Depth to Water:	115 feet.
Hydraulic Connection:	Aquitards separate aquifers underlying the site.
Sole Source Aquifer:	No information about a sole source aquifer is available
Data Quality:	Information is inferred in the CERCLIS investigation report(s)

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
1	1/2 - 1 Mile WNW	Not Reported

For additional site information, refer to Physical Setting Source Map Findings.

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

Era:	Cenozoic
System:	Quaternary
Series:	Quaternary
Code:	Q *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratifed Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps. The following information is based on Soil Conservation Service STATSGO data.

Soil Component Name:	URBAN LAND
Soil Surface Texture:	variable
Hydrologic Group:	Not reported
Soil Drainage Class:	Not reported

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel:	Not Reported
Depth to Bedrock Min:	> 10 inches
Depth to Bedrock Max:	> 10 inches

Soil Layer Information							
	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
1	0 inches	6 inches	variable	Not reported	Not reported	Max: 0.00 Min: 0.00	Max: 0.00 Min: 0.00

OTHER SOIL TYPES IN AREA

Based on Soil Conservation Service STATSGO data, the following additional subordinant soil types may appear within the general area of target property.

Soil Surface Textures: sandy loam
gravelly - sandy loam
silt loam
clay
fine sand
gravelly - sand
sand
fine sandy loam

Surficial Soil Types: sandy loam
gravelly - sandy loam
silt loam
clay
fine sand
gravelly - sand
sand
fine sandy loam

Shallow Soil Types: fine sandy loam
gravelly - loam
sandy clay
sandy clay loam
clay
silty clay
sand

Deeper Soil Types: gravelly - sandy loam
sandy loam
very gravelly - sandy loam
stratified
very fine sandy loam
weathered bedrock
sand
gravelly - fine sandy loam
silty clay loam
clay loam

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	0.500
Federal FRDS PWS	0.500
State Database	0.500

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

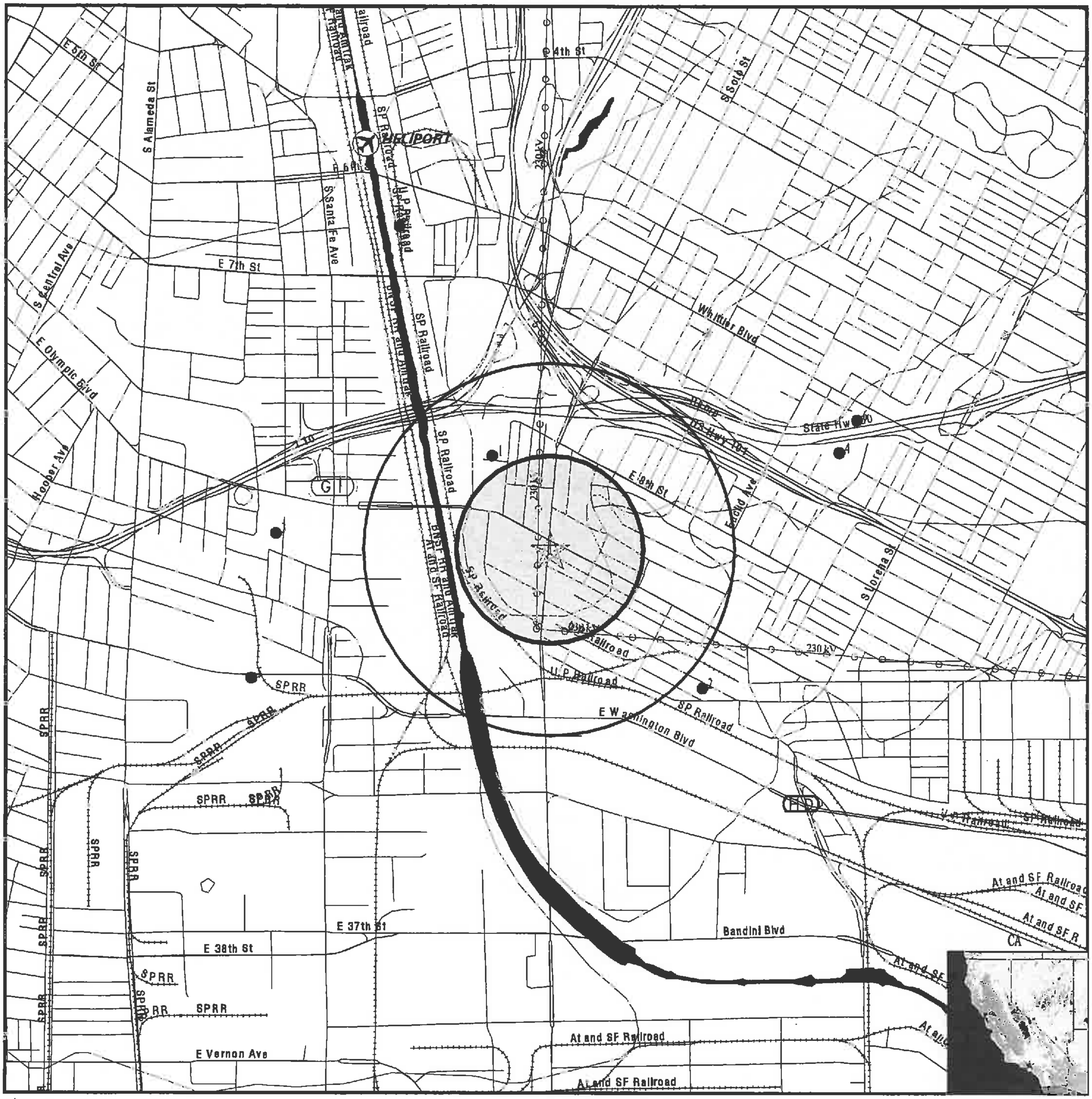
MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

OTHER STATE DATABASE INFORMATION

STATE OIL/GAS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
1	CAOG50000027167	1/4 - 1/2 Mile NNW
2	CAOG50000026656	1/2 - 1 Mile SE
3	CAOG50000026956	1/2 - 1 Mile West
4	CAOG50000027178	1/2 - 1 Mile ENE
5	CAOG50000026674	1/2 - 1 Mile WSW
6	CAOG50000027264	1/2 - 1 Mile ENE
7	CAOG50000027602	1/2 - 1 Mile NNW

PHYSICAL SETTING SOURCE MAP - 2409679.12s



County Boundary
Major Roads
Contour Lines
Power transmission lines
Earthquake Fault Lines
Airports
Earthquake epicenter, Richter 5 or greater
Water Wells
Public Water Supply Wells
Cluster of Multiple Icons

Groundwater Flow Direction
(G I) Indeterminate Groundwater Flow at Location
(G V) Groundwater Flow Varies at Location
(HD) Closest Hydrogeological Data
Oil, gas or related wells
100-year flood zone
500-year flood zone

SITE NAME: Shell 135550 ADDRESS: 1410 South Soto Street Los Angeles CA 90023 LAT/LONG: 34.0239 / 118.2198	CLIENT: URS Corporation CONTACT: Joanna Zarakowski INQUIRY #: 2409679.12s DATE: January 29, 2009 4:50 pm

Map ID Direction Distance Elevation			Database	EDR ID Number
1 **WNW** **1/2 - 1 Mile** **Lower**	Site ID: Groundwater Flow: Shallow Water Depth: Deep Water Depth: Average Water Depth: Date:	900570061 Not Reported 8.37 12 Not Reported 08/07/1996	**AQUIFLOW**	**55190**

Map ID
Direction
Distance | Database | EDR ID Number

1
NNW
1/4 - 1/2 Mile | **OIL_GAS** | **CAOG50000027167**

Apinumber:	03705484	Operator:	D. Herbert Hostetter
Lease:	Not Reported	Well no:	1
Field:	LOS ANGELES COUNTY	Cagasoil m2 area:	Not Reported
Map:	119	Status cod:	006
Source:	hud		
Latitude:	34.027543		
Longitude:	-118.221597		
Td:	0		
Sec:	3		
Twn:	2S	Rge:	13W
Bm:	SB		
X coord:	0		
Y coord:	0		
Zone:	Not Reported	Spuddate:	12/12/1968 00:00:00
Abanddate:	12/30/1899 00:00:00	Comments:	Not Reported
District:	1	Site id:	CAOG50000027167

2
SE
1/2 - 1 Mile | **OIL_GAS** | **CAOG50000026656**

Apinumber:	03720287	Operator:	Phillips Petroleum Co.
Lease:	Signal-Union-Budd E.H.	Well no:	1
Field:	LOS ANGELES COUNTY	Cagasoil m2 area:	Not Reported
Map:	119	Status cod:	007
Source:	hud		
Latitude:	34.018488		
Longitude:	-118.211706		
Td:	0		
Sec:	2		
Twn:	2S	Rge:	13W
Bm:	SB		
X coord:	0		
Y coord:	0		
Zone:	Not Reported	Spuddate:	12/12/1968 00:00:00
Abanddate:	12/30/1899 00:00:00	Comments:	Not Reported
District:	1	Site id:	CAOG50000026656

3
West
1/2 - 1 Mile | **OIL_GAS** | **CAOG50000026956**

Apinumber:	03725218	Operator:	Dynamic Builders Inc.
Lease:	Unknown	Well no:	4
Field:	LOS ANGELES CITY	Cagasoil m2 area:	Not Reported
Map:	119	Status cod:	006
Source:	hud		
Latitude:	34.024519		
Longitude:	-118.231725		
Td:	0		
Sec:	3		
Twn:	2S	Rge:	13W

Bm:	SB		
X coord:	0		
Y coord:	0		
Zone:	Not Reported	Spuddate:	12/12/1968 00:00:00
Abanddate:	12/30/1899 00:00:00	Comments:	P
District:	1	Site id:	CAOG50000026956

4
ENE
1/2 - 1 Mile **OIL_GAS** **CAOG50000027178**

Apinumber:	03720944	Operator:	Chevron U.S.A. Inc.
Lease:	Fresno Recreation Center C.H.	Well no:	1
Field:	LOS ANGELES COUNTY	Cagasoil m2 area:	Not Reported
Map:	119	Status cod:	007
Source:	hud		
Latitude:	34.027677		
Longitude:	-118.205188		
Td:	0		
Sec:	2		
Twn:	2S	Rge:	13W
Bm:	SB		
X coord:	0		
Y coord:	0		
Zone:	Not Reported	Spuddate:	12/12/1968 00:00:00
Abanddate:	12/30/1899 00:00:00	Comments:	Not Reported
District:	1	Site id:	CAOG50000027178

5
WSW
1/2 - 1 Mile **OIL_GAS** **CAOG50000026674**

Apinumber:	03721126	Operator:	Chevron U.S.A. Inc.
Lease:	Blue Diamond	Well no:	1
Field:	LOS ANGELES COUNTY	Cagasoil m2 area:	Not Reported
Map:	119	Status cod:	007
Source:	hud		
Latitude:	34.018887		
Longitude:	-118.232858		
Td:	0		
Sec:	3		
Twn:	2S	Rge:	13W
Bm:	SB		
X coord:	0		
Y coord:	0		
Zone:	Not Reported	Spuddate:	12/12/1968 00:00:00
Abanddate:	12/30/1899 00:00:00	Comments:	Not Reported
District:	1	Site id:	CAOG50000026674

6
ENE
1/2 - 1 Mile **OIL_GAS** **CAOG50000027264**

Apinumber:	03700512	Operator:	Union Oil Co. of California
Lease:	San Antonio E.H.	Well no:	1
Field:	LOS ANGELES COUNTY	Cagasoil m2 area:	Not Reported
Map:	119	Status cod:	006
Source:	hud		
Latitude:	34.028937		
Longitude:	-118.204359		
Td:	0		
Sec:	2		
Twn:	2S	Rge:	13W
Bm:	SB		
X coord:	0		
Y coord:	0		
Zone:	Not Reported	Spuddate:	12/12/1968 00:00:00
Abanddate:	12/30/1899 00:00:00	Comments:	Not Reported
District:	1	Site id:	CAOG50000027264

7
NNW
1/2 - 1 Mile

OIL_GAS **CAOG50000027602**

Apinumber:	03705160	Operator:	ARCO Western Energy
Lease:	L.A. River Community	Well no:	1-1
Field:	LOS ANGELES COUNTY	Cagasoil m2 area:	Not Reported
Map:	119	Status cod:	007
Source:	hud		
Latitude:	34.03649		
Longitude:	-118.225916		
Td:	0		
Sec:	34		
Twn:	1S	Rge:	13W
Bm:	SB		
X coord:	0		
Y coord:	0		
Zone:	Not Reported	Spuddate:	12/12/1968 00:00:00
Abanddate:	12/30/1899 00:00:00	Comments:	Not Reported
District:	1	Site id:	CAOG50000027602

AREA RADON INFORMATION

State Database: CA Radon

Radon Test Results

Zip	Total Sites	> 4 Pci/L	Pct. > 4 Pci/L
90023	4	0	0.00

Federal EPA Radon Zone for LOS ANGELES County: 2

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for LOS ANGELES COUNTY, CA

Number of sites tested: 63

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.711 pCi/L	98%	2%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	0.933 pCi/L	100%	0%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW[R] Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map. USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Well Database
Source: Department of Water Resources
Telephone: 916-651-9648

California Drinking Water Quality Database
Source: Department of Health Services
Telephone: 916-324-2319
The database includes all drinking water compliance and special studies monitoring for the state of California since 1984. It consists of over 3,200,000 individual analyses along with well and water system information.

OTHER STATE DATABASE INFORMATION

California Oil and Gas Well Locations
Source: Department of Conservation
Telephone: 916-323-1779

RADON

State Database: CA Radon
Source: Department of Health Services
Telephone: 916-324-2208
Radon Database for California

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

California Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary fault lines, prepared in 1975 by the United State Geological Survey. Additional information (also from 1975) regarding activity at specific fault lines comes from California's Preliminary Fault Activity Map prepared by the California Division of Mines and Geology.

STREET AND ADDRESS INFORMATION

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J-145 - Crown Coach, 2429 Washington Boulevard

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CALIFORNIA ENVIRONMENTAL QUALITY ACT
NOTICE OF DETERMINATION

To: Office of Planning and Research
State Clearinghouse
P.O. Box 3044, 1400 Tenth Street, Room 212
Sacramento, CA 95812-3044

From: Department of Toxic Substances Control
Brownfield and Environmental Restoration Program
9211 Oakdale Avenue
Chatsworth, California 91311

Subject: FILING OF NOTICE OF DETERMINATION IN COMPLIANCE WITH SECTION 21108 OR 21152 OF THE PUBLIC RESOURCES CODE

Project Title: Crown Coach Clean-Up Plan

State Clearinghouse No.: 2000111125

Project Location: 2455 and 2425 Washington Boulevard, Los Angeles, California 90023

County: Los Angeles

Project Description: The project is the approval of a Clean-Up Plan by the Department of Toxic Substances Control (DTSC) for the Crown Coach Site (Site) under a CLRRA (California Land Reuse and Revitalization Act of 2004) Agreement. DTSC is overseeing cleanup at the Site pursuant to the regulatory authority granted under Chapter 6.8., Section 25355.5 (a)(1)(C) of the California Health and Safety Code. The purpose of the Clean-up Action is to mitigate potential risk to human health and the environment by the Contaminants of Concern.

In 2004 a soil vapor extraction system was installed along the eastern boundary of the site with the Amtrak property. This system was later expanded to cover additional areas west of the boundary. This project involves the operation of a soil vapor extraction system that was previously installed and operated as a pilot test. Since 2011 the system has been shut down except for a 7-week period in 2013 to check for leaks. The compounds to be extracted are tetrachloroethene, trichloloethene, 1,2-dichloroethene and chloroform. There are 25 soil vapor extraction wells and 15 soil vapor monitoring probes and soil vapor sampling from these soil vapor monitoring probes indicates additional operation of the SVE system is required. It is estimated the SVE System will operate for approximately 2 additional years. The SVE system will require monitoring to comply with South Coast Air Quality Management District site specific permit requirements and granular activated carbon change.

Activities to be conducted pursuant to the approved Clean-Up Plan include:

- The operation of a previously installed soil vapor extraction system (SVE)
- The periodic monitoring to determine clean-up progress and changing out of granular activated carbon of the SVE
- The decommissioning of the SVE once cleanup goals have been obtained

As ☒ Lead Agency ☐ a Responsible Agency under the California Environmental Quality Act (CEQA), DTSC approved the above-described project on December 3, 2015 and has made the following determinations:

1. The project ☐ will ☒ will not have a significant effect on the environment.
2. A ☐ Negative Declaration ☐ Mitigated Negative Declaration ☒ Environmental Impact Report was prepared for this project pursuant to the provisions of CEQA.
3. Mitigation measures ☐ were ☒ were not made a condition of project approval.
4. A Statement of Overriding Considerations ☐ was ☒ was not adopted for this project.
5. Findings ☒ were ☐ were not made pursuant to the provisions of CEQA.

This is to certify that the final environmental document, comments and responses, and the record of project approval are available to the public at the following location: Benjamin Franklin Branch Library, 2200 East First Street, Los Angeles 90033

Richard Allen
Contact Person Name

Hazardous Substances Engineer
Contact Person Title

(818) 717-6607
Phone #

Sayareh Amir

Branch Chief Signature

12/7/2015

Date

Sayareh Amirabrahimi
Branch Chief Name

Supervising Hazardous Substances Engineer II
Branch Chief Title

(818) 717-6534
Phone #

TO BE COMPLETED BY OPR ONLY

Date Received For Filing and Posting at OPR:

COMMUNITY UPDATE

The mission of DTSC is to protect California's people and environment from harmful effects of toxic substances through the restoration of contaminated resources, enforcement, regulation and pollution prevention.

You may Review the Cleanup Plan for Soil Gas at the Former Crown Coach Facility in Los Angeles

Public Comment Period: September 24 to October 23, 2015

The California Department of Toxic Substances Control (DTSC) invites you to review and comment on a proposed environmental remedy. DTSC calls this remedy a draft Clean Up Plan. This plan will be to clean up soil gas contamination at the former Crown Coach facility in Los Angeles, California, 90021. A successful pilot study for the soil gas cleanup finished earlier this year. The draft clean up option proposes to clean up solvents in soil gas that could pose an unacceptable risk to future site users. Please see the map on page 3 for the Project Site.

Facility History and Description

The Crown Coach site is located at 2425 East Washington Boulevard, Los Angeles, California 90021. The site is about 21 acres in size and is located in an area zoned for commercial and industrial uses.

The Atchison, Topeka and Santa Fe Railway Company (now the Burlington Northern Santa Fe Railroad) owned the land where the former Crown Coach facility was located from 1898 to 1988. From the 1950s to 1984, Essick Manufacturing Company operated on the Site. Their operations included producing air conditioning equipment, construction equipment and electrical supplies.

In December, 1988, the State of California purchased the property for use as a prison facility for the State Department of Corrections. The State Department of Corrections found the Site heavily contaminated with varous chemicals. DTSC approved a Remedial Action Plan in 1990. The State Department of Corrections did extensive activities in 1992 resulting in removal of over 40,000 tons of soil. Further investigation revealed additional areas needing more cleanup work. From 1998 to 1999, the new owners, the Los Angeles Redevelopment Agency, removed about 6000 tons of soil.

Public Comment Period

September 24 to October 23, 2015

You may send written comments on the Draft Clean Up Plan to:

Richard Allen
DTSC Project Manager
Department of Toxic Substances Control
9211 Oakdale Avenue,
Chatsworth, CA 91311

E-mail at
Rihcard.Allen@dtsc.ca.gov

Si desea información en español, comuníquese con Jesus Cruz o número gratis 1-866-495-5651.

In 1997, the Los Angeles Community Redevelopment Agency agreed to purchase the property. In early 2003, the Agency completed an Investigation Report and Focused Feasibility Study looking at groundwater problems. From 2003 to 2013, the Agency conducted a pilot study to try to remove solvents in the shallow soil gas on Site.

Pilot Test Results

The principal groundwater contaminants at the former Crown Coach site are a class of chemicals called volatile organic compounds (VOCs) formerly used for cleaning metal parts, primarily trichloroethene (TCE) and tetrachloroethene (PCE). DTSC found the TCE and PCE at and above 80 feet below ground surface. The pilot study found that the existing 19 soil gas extraction wells will pull the vapors out and capture them.

The Draft Clean Up plan

The draft Clean Up Plan proposes to use the existing 19 soil gas extraction wells to continue pulling the solvent vapors out of the soil gas pockets and deposit them in charcoal filters. Workers will replace these filters as needed and workers will ship the contaminated ones to an authorized and permitted State disposal facility. This Plan predicts that it will take another two years to draw out all of the soil gas contamination for disposal.

California Environmental Quality Act (CEQA)

As a Responsible Agency under CEQA, DTSC reviewed the environmental documents prepared by the Community Redevelopment Agency for the City of Los Angeles, the lead agency for the related Crown Coach project. DTSC prepared Statement of Findings showing that the lead agency's environmental review and the mitigation measures established are sufficient to avoid, reduce or substantially lessen project impacts. A Notice of Determination will be filed at the Office of Planning and Research/State Clearinghouse once the public review period ends and if DTSC approves the Clean Up Plan.

Next Steps

At the end of the comment period, DTSC will evaluate and address all comments received prior to approving the proposed clean-up measures. DTSC will respond to all comments received with a Response to Comments document. This document will be available at the locations listed below and on the DTSC web site, *www. envirostor.dtsc.ca.gov*.

Once on Envirostor, in the dialogue box, you can type "2429 East Washington Boulevard, Los Angeles CA", scroll down to Crown Coach, and click on that entry to get the reports.

Where to Find Site Documents

You can review the soil gas cleanup plan known as the draft Clean Up Plan, CEQA Statement of Findings and other related documents at:

Benjamin Franklin Branch Library
2200 E First Street
Los Angeles, California 90033
Phone: (323) 263-6901

These documents are also available on our web site at: *www.envirostor.dtsc.ca.gov*.
You may review the full administrative record at:

Department of Toxic Substances Control
9211 Oakdale Avenue, Chatsworth, CA 91311
Please contact: Regional File Coordinators at
(818) 717-6521.

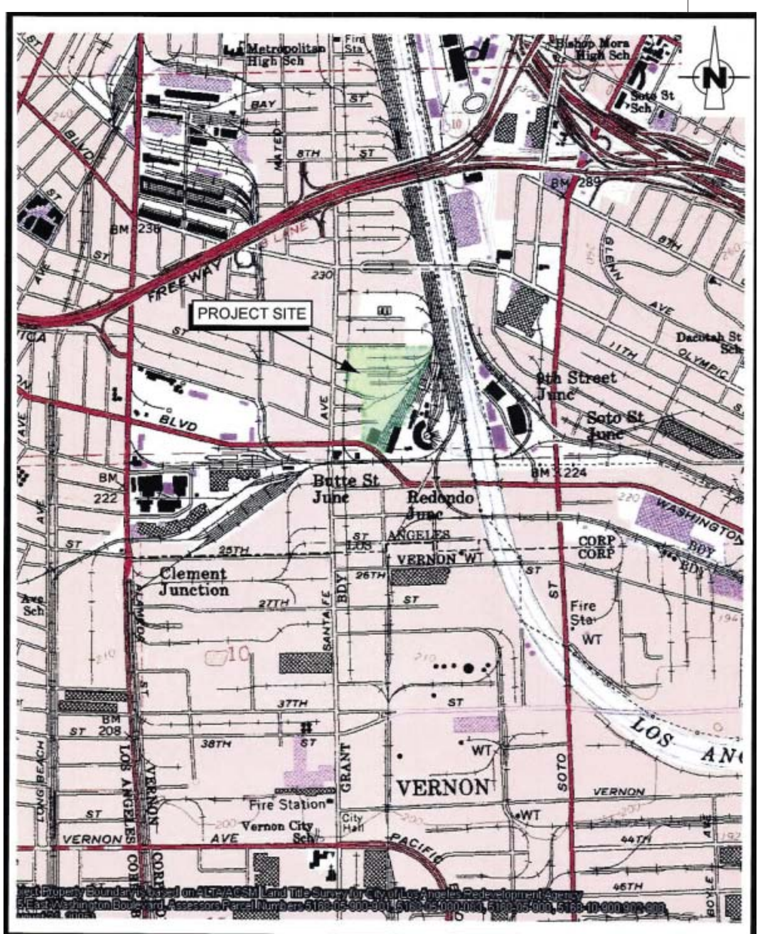
Who to Contact for Information

If you have any questions about the project or cleanup activities, please contact the following DTSC staff:

Richard Allen
Project Manager
(818) 717-6607
Richard.Allen@dtsc.ca.gov

Nathan Schumacher
Public Participation Specialist
Toll-free 1 (866) 495-5651
Nathan.Schumacher@dtsc.ca.gov

For news media inquiries only, please contact:
Jorge Moreno
DTSC Public Information Officer
(916) 327-4383 or Jorge.Moreno@dtsc.ca.gov



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J-150 - Amtrak Building 18, 2435 E Washington Boulevard

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Draft Final Report

Human Health Risk Assessment

Amtrak's Los Angeles Yards

Building 18

Prepared for:

National Railroad Passenger Corporation (Amtrak)

Prepared by:

AMEC Earth and Environmental

3049 Ualena Street, Suite 1100

Honolulu, Hawaii 96819

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GLOSSARY OF ACRONYMS, TECHNICAL TERMS AND MEASUREMENTS

ADD - Average Daily Dose. A compound- and facility-specific value generated by an equation designed to estimate a receptor's potential daily intake from exposure to compound with potential noncarcinogenic effects.

COPC - Compounds of Potential Concern - Those site-related compounds examined in detail in the quantitative risk assessment.

CSF - Cancer Slope Factor - A numerical estimate of the carcinogenic potency of a compound. CSFs are developed by the United States Environmental Protection Agency's Human Health Assessment Group for both oral and inhalation routes of exposure.

Dose - Concentration of a compound to which a receptor may be exposed. Dose is usually expressed in units of milligrams of compound per kilogram of body weight per day.

Dose-Response Evaluation - The process of quantitatively evaluating toxicity information and characterizing the relationship between the dose of the compound and the likelihood and magnitude of adverse health effects in the exposed population. From the quantitative dose-response relationship, toxicity values are identified and used in the risk characterization step to estimate the potential for adverse effects occurring in the receptors evaluated in the risk assessment.

DTSC – Department of Toxic Substances Control, California EPA.

F - Temperature in Degrees Fahrenheit.

HI - Hazard Index - The sum of the compound-specific hazard quotients for a particular exposure pathway.

HQ - Hazard Quotient - The ratio of the calculated Chronic Average Daily Dose to the Reference Dose for a particular compound. A Hazard Quotient of less than one indicates that the Reference Dose for that compound has not been exceeded. Therefore, it can be assumed with a high degree of certainty that no adverse noncarcinogenic health effects are expected to occur as a result of exposure to that particular compound via that particular route. Because the reference dose is derived using multiple safety factors, a Hazard Quotient greater than one does not indicate that health effects are expected but rather that further analysis is warranted.

IRIS - Integrated Risk Information System - A computerized database of toxicological information maintained by the United States Environmental Protection Agency.

K - Temperature in Kelvin.

LADD - Lifetime Average Daily Dose - A compound- and facility-specific value generated by an equation designed to estimate a receptor's potential daily intake from exposure to potentially carcinogenic compounds.

LOAEL - Lowest Observed Adverse Effect Level - The lowest experimental dose above the NOAEL at which a statistically significant difference in response between the control and exposed group is discernable.

mg/kg - Milligrams of compound per kilogram of medium.

mg/kg-day - Milligrams of compound per kilogram of body weight per day.

mg/l - Milligrams of compound per liter of water.

NOAEL - No Observed Adverse Effect Level - An experimental dose greater than zero at which no statistically significant difference in response can be detected between the control and exposed groups.

Noncarcinogenic Effects - Category of adverse health effects that does not include cancers (e.g., liver effects, changes in blood enzyme levels, variances in body weight).

NTP - National Toxicology Program.

OEHHA – Office of Environmental Health Hazard Assessment, California EPA.

PELs – Occupational Safety and Health Administration Permissible Exposure Limits

PELCR – Potential Excess Lifetime Cancer Risk - An estimate of the increased probability of developing cancer given exposure to particular doses of particular compounds via specific exposure scenarios. The likelihood, over and above the background cancer rate, that a receptor will develop cancer in his or her lifetime as a result of facility-related exposures to compounds in various environmental media.

Quantitative Risk Assessment - The mathematical and scientific procedure by which compounds present in environmental media are evaluated for their potential to adversely impact the health of individuals who may contact them.

Response - Carcinogenic or noncarcinogenic health effect associated with exposure to a compound.

RfC - Reference Concentration - An experimentally derived level of a compound in air modified by multiple safety factors of ten. It is the air concentration at which no statistical difference in response is expected to occur for an exposed population. The RfC is a toxicity value for compounds with noncarcinogenic effects via the inhalation route of exposure, and is usually expressed in units of milligrams of compound per cubic meter of air.

RfD - Reference Dose - An experimentally derived level of exposure, modified by multiple safety factors. The RfD is the dose predicted to produce no statistical difference in response for an exposed population. The RfD is a toxicity value for compounds with noncarcinogenic effects via the oral and inhalation routes of exposure, and is expressed in units of milligrams of compound per kilogram of body weight per day.

RSL – United States Environmental Protection Agency, Region 9, Regional Screening Levels

SPHEM - Superfund Public Health Evaluation Manual.

Threshold - The level of exposure below which no adverse noncarcinogenic health effects are known or expected to occur.

Total Excess Lifetime Cancer Risk - The sum of all pathway-specific Excess Lifetime Cancer Risks for a given receptor.

Total Hazard Index - The sum of all pathway-specific Hazard Indices for a given receptor.

µg/m^3 - Micrograms of compound per cubic meter of air.

Uncertainty Factor - An empirically-derived factor that is applied to a NOAEL or LOAEL in order to derive an RfD. Uncertainty factors account for some of the uncertainties associated with extrapolating information in a dose-response study to the general population.

URF – Unit Risk Factor - The upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of 1 µg/m^3 in air.

U.S. EPA - United States Environmental Protection Agency.

EXECUTIVE SUMMARY

BUILDING 18 RISK ASSESSMENT RESULTS

REDONDO JUNCTION, LOS ANGELES CALIFORNIA

A human health risk assessment was prepared for the Amtrak Redondo Junction Site to determine if chlorinated solvents and other volatile chemicals released at SSL-497 (AMEC 2008) are posing an unacceptable indoor air human health risk to Amtrak workers in Building 18 located at Amtrak's Los Angeles Yards (Figure 1). Workers in Building 18 were evaluated for exposures to volatile chemicals resulting from subsurface vapor intrusion. Data assessed in the quantitative analysis included soil vapor data collected in a February 15, 2010 soil vapor investigation. In total, 9 soil vapor samples (8 primary samples and 1 duplicate) were collected at the perimeter of Building 18 and analyzed for the EPA TO-15 Super suite of compounds and Gasoline Range Total Petroleum Hydrocarbons (TPH). 21 constituents were detected in soil vapor at the Site. These chemicals include, TPH-Gasoline, BTEX, 1,1,1-Trichloroethane, PCE, and TCE.

Potential estimated lifetime cancer risks were compared to the USEPA and DTSC regulatory level of concern of 10^{-6} to 10^{-4}. Estimated noncarcinogenic risks are presented as total site Hazard Indices that sum the Hazard Quotients of each Chemical of Potential Concern at the site. A total Hazard Index of 1 was considered to be the regulatory level of concern.

An industrial worker scenario was evaluated in this assessment. The industrial workers were assumed to work inside Building 18, 8 hours a day, 250 days a year, for 25 years and inhale volatile constituents for the entire duration of exposure. This risk assessment conservatively assumed receptors were exposed to maximum soil vapor concentrations detected at any sampling depth. Carcinogenic and noncarcinogenic risks assuming the inhalation of volatiles in an indoor setting were 3E-06 and 6E-02 respectively.

Summary Conclusions

The Amtrak Redondo Junction Site is highly industrial in nature and it is expected to remain industrial in perpetuity. Although potential cancer risk from inhalation exposures to site chemicals to the current and future industrial worker does exceed the USEPA and DTSC point of departure risk value of 10^{-6}, the risk is within the acceptable regulatory range of 10^{-4} to 10^{-6}. Under current and future industrial Site use, health risks to industrial workers assumed to work in Building 18 are within acceptable levels for both carcinogenic and noncarcinogenic effects.

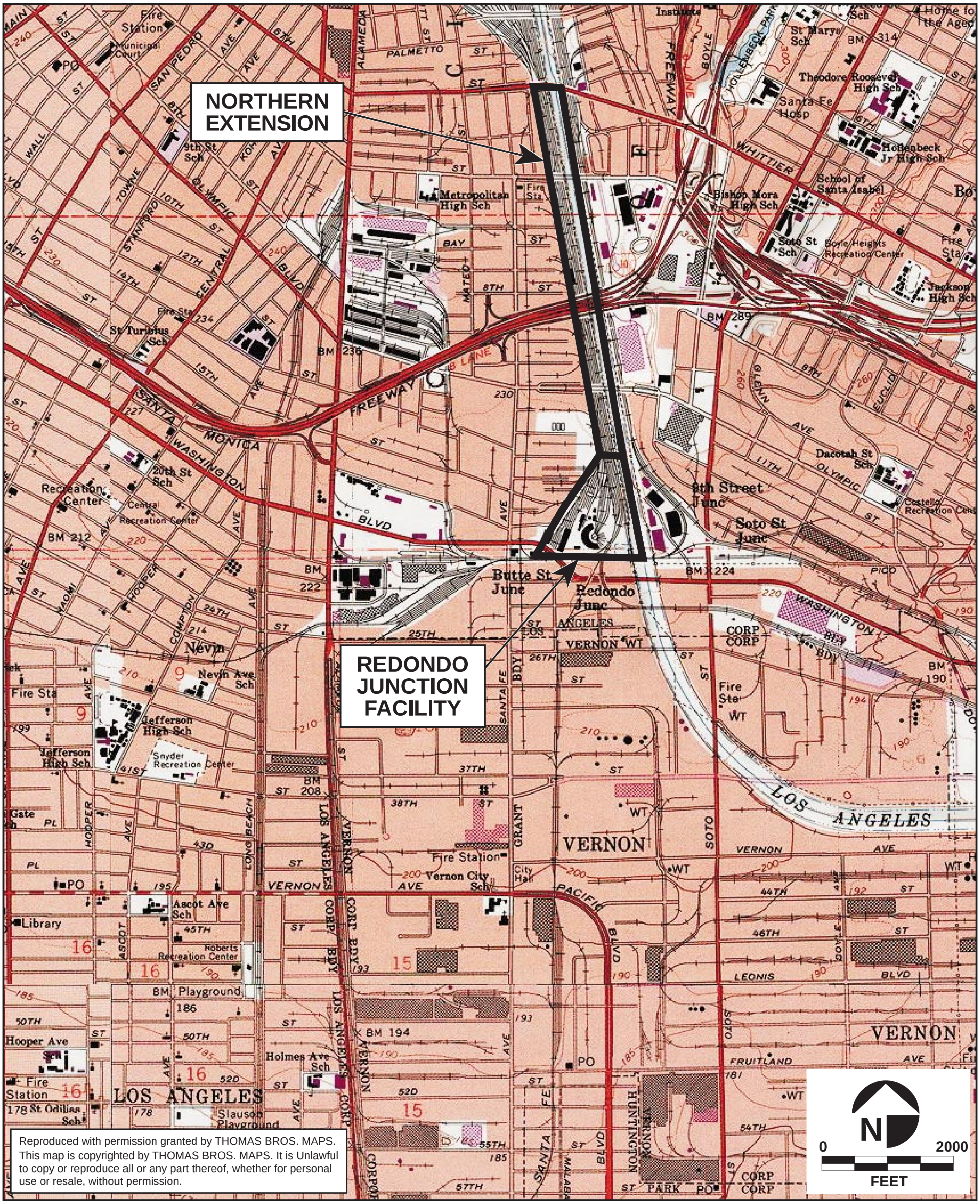
1.0 INTRODUCTION

This report presents a site-specific human health risk assessment for Building 18 located at the Amtrak Redondo Junction located in Los Angeles, California (hereafter referred to as the Site). The purpose of this human health risk evaluation is to determine if chlorinated solvents and other volatile chemicals released at SSL-497 are posing an unacceptable indoor air human health risk to Amtrak workers in Building 18. This investigation was conducted in accordance with agreements made during an August 12, 2009 meeting between Amtrak, DTSC, and AMEC representatives. The meeting determined that the Potential Responsible Party (PRP) for the offsite chlorinated plume that extends onto Amtrak property should be responsible for investigating and remediating contaminant plumes migrating onto the Amtrak property. The meeting also came to resolution regarding Amtrak's existing Remedial Action Order (RAO). Amtrak and DTSC agreed to close Amtrak's RAO if Amtrak demonstrates that site workers are adequately protected (i.e., risks levels are below industrial worker thresholds). Agreements resulting from the August 12, 2009 meeting were documented in meeting minutes (AMEC, 2009) attached in Appendix C.

The basic approach to the risk assessment follows human health risk assessment guidance provided in U.S. EPA's Risk Assessment Guidance for Superfund, Volume I Part A - Human Health Evaluation Manual (EPA, 1989a), the California EPA DTSC Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air (DTSC, 2004), DTSC Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities (DTSC, 1996), and the California EPA Preliminary Endangerment Assessment Guidance Manual (DTSC, 1994). The approach follows the four-step process of hazard identification, toxicity assessment, exposure assessment, and risk characterization defined by the National Academy of Sciences (NRC, 1983). A qualitative uncertainty analysis is also included. Each of these steps is described in the following sections.

1.1 Site Setting

The site is a 50-acre parcel located on East Washington Boulevard in Los Angeles, California. The specific area evaluated in this risk assessment is a single building located on the western property boundary. The site location is presented on Figure 1.



amec

Site Location Map
Amtrak Redondo Junction and Northern Extension
2435 East Washington Boulevard
Los Angeles, California 90021

FIGURE

1

Graphics/Hazmat/Amtrak/AmtrakSiteLocation_A.fh8

2.0 HAZARD IDENTIFICATION

In the Hazard Identification step, analytical data are evaluated and constituents of potential concern (COPCs) are selected for quantitative risk assessment. Data used in this risk analysis was collected in a soil vapor investigation conducted at Building 18 in February of 2010 (AMEC, 2010). The soil vapor probes were installed and sampled in accordance with the joint DTSC/Los Angeles Regional Water Quality Control Board (California DTSC and LARWQCB 2003) “Advisory – Active Soil Gas Investigations” and in accordance with the DTSC “Interim Guidance – Evaluating Human Health Risks from Total Petroleum Hydrocarbons (TPH) (DTSC, 2009).

2.1 Summary of Available Site Data

Nine (9) soil vapor samples (8 primary and 1 duplicate) were collected by AMEC on February 15, 2010. A site map of the Redondo Junction displaying the soil vapor sampling locations is provided in Figure 2. In accordance with DTSC guidance 5 soil vapor samples (4 primary and 1 duplicate) were collected at 5 ft. bgs, and 4 were collected at 15 ft. bgs.

Soil vapor samples were analyzed for the EPA TO-15 Super suite of compounds and Gasoline Range Total Petroleum Hydrocarbons (TPH). 21 constituents were detected in soil vapor at the Site. These chemicals include, TPH-Gasoline, BTEX, 1,1,1-Trichloroethane, PCE, and TCE. All constituents evaluated and their frequencies of detection are provided in Appendix A.

2.2 Selection of COPCs

In total seventy-seven (77) VOC compounds were analyzed. All VOCs analyzed were considered for quantitative evaluation. COPCs selected for quantitative analysis were based on the following criteria:

1. Chemical must be detected using validated laboratory analyses
2. Chemicals must occur above a 5 percent detection frequency and/or were historically used at the unit
3. Chemicals must be present in excess of the MDL with a "J" qualifier or are above their PQL

Based on these criteria, a total of 17 constituents were identified as COPCs in soil vapor at the Site. COPCs are listed in Table 1.

Four constituents, Cyclohexane, Tetrahydrofuan, 1,1-Difluoroethane, and Isopropanol, met the above criteria for inclusion in this assessment, but were eliminated due to limited toxicity data and regulatory correspondence. Isopropanol was used as a leak check compound during sampling activities and there are no known historical uses at the site. Cyclohexane, 1,1-Difluorethane, and Tetrahydrofuran do not have sufficient toxicological studies to quantitatively assess their effects on human health in an indoor air scenario. Concentrations detected were infrequent and below all applicable screening levels including EPA Region 9 RSLs for Residential Air (USEPA, 2010b), and OSHA PELs (OSHA, 2006). Agency correspondence can be found in Appendix C.

2.3 Treatment of TPH

Samples were analyzed for the gasoline fraction (C4-C12) of TPH. As recommended by DTSC (DTSC, 2009), AMEC conservatively assumed that the gasoline range analyzed by the lab is completely within the most volatile carbon range (C5-C8). The Total Petroleum Hydrocarbon Criteria Working Group, Composition of Petroleum Mixtures (1998) breaks down typical Gasoline fuel oil into its individual carbon fractions, and the majority of the gasoline mixture exists in the C5-C8 carbon range. As the analytical methods used in the soil vapor samples did not provide speciation into aromatic versus aliphatic fraction, it was conservatively assumed that the entirety of the detected TPH-Gasoline exists in the aliphatic fraction (DTSC 2009a). The aromatic fraction was assessed as individual hydrocarbons. In order to convert from units in parts per million by volume (ppmv) to ug/m^3, the average molecular weight of gasoline of 108 g/mol (ATSDR) was used. Actual molecular weight of gasoline varies by composition and amount volatilized.

Table 1

Chemicals of Potential Concern

COPCs		
TPH as Gasoline	Dichlorodifluoromethane	p/m-Xylene
Acetone	c-1,2-Dichloroethene	Tetrachloroethene
Bromodichloromethane	t-1,2-Dichloroethene	Toluene
2-Butanone	Ethylbenzene	Trichloroethene
Chloroform	o-Xylene	1,1,1-Trichloroethane
Dibromochloromethane		Chloromethane

FILE: 277731001A_T10119-003_SVE PLOT DATE: 7/29/2010

REFERENCE: AERIAL PHOTO FROM GOOGLE EARTH PRO, 2009.

NOTE: WELL LOCATIONS ON COMMUNITY REDEVELOPMENT AGENCY ARE OF APPROXIMATE SCALE.

SSL VAPOR EXTRACTION WELL LOCATION

AMTRAK LOS ANGELES YARDS

IMMINENT AND SUBSTANTIAL ENDANGERMENT & REMEDIAL ACTION ORDER (RAO 02/03-012)

2481 EAST OLYMPIC BOULEVARD

LOS ANGELES, CALIFORNIA 90021

AMEC Earth & Environmental
510 SUPERIOR AVENUE, SUITE 200
NEWPORT BEACH, CA 92633-3627
www.amec.com/earthandenvironmental

DWN BY: JBD	DATE:	PROJECT NO: 277731001A.1019
CHK'D BY: M.M	SCALE: As Shown	FIGURE No. FIGURE 2

ANAHEIM R:\Drawings\AMEC-Misc-offices\277731001A_AMTRAK\277731001A_T10119-003_SVE.dwg, Bor Loc 7/29/2010 8:35:19 AM

3.0 DOSE-RESPONSE ASSESSMENT

The purpose of the Dose-Response Assessment is to identify both the types of adverse health effects a COPC may potentially cause, as well as the relationship between the amount of COPCs to which receptors may be exposed (dose) and the likelihood of an adverse health effect (response). DTSC and the USEPA characterize adverse health effects as either carcinogenic or noncarcinogenic and dose-response relationships are defined for oral and inhalation routes of exposure. The results of the toxicity assessment, when combined with the results of the exposure assessment (Section 4.0), provide an estimate of potential risk.

This section provides dose-response information for COPCs evaluated in the risk assessment for the Site. Section 3.1 describes the USEPA approach for developing noncarcinogenic dose-response values. The carcinogenic dose-response relationships developed by USEPA are discussed in Section 3.2. Noncarcinogenic and carcinogenic dose-response values used in this risk assessment are presented in Table 2. Dose-response information used in this risk assessment was obtained from the following sources:

California EPA Office of Environmental Health Hazard Assessment Toxicity Criteria Database (DTSC, 2010);
California EPA DTSC HERD Interim Guidance, Evaluating Human Health Risks from Total Petroleum Hydrocarbons (DTSC, 2009)
USEPA Integrated Risk Information System (IRIS) (USEPA, 2010a);
USEPA Region 9's Region Screening Level (RSL) Table (USEPA, 2010b).

3.1 Noncarcinogenic Dose-Response

Constituents with known or potential noncarcinogenic effects are assumed to have a dose below which no adverse effect occurs or, conversely, above which an effect may be seen. This dose is called the “threshold dose”. In laboratory experiments, this dose is known as the “no observed adverse effects level” (NOAEL). The lowest dose at which an adverse effect is seen is called the lowest observed adverse effects level (LOAEL). By applying uncertainty factors to the NOAEL or the LOAEL, the USEPA (and other regulatory agencies) derived Inhalation Reference Concentrations (RfCs) according to the Interim Methods for Development of Inhalation Reference Doses (EPA/600/8-88/066F August 1989) and subsequently, according to Methods for Derivation of Inhalation Reference Concentrations and Application of Inhalation Dosimetry (EPA/600/8-90/066F October 1994), to quantify chronic exposures to constituents with potential noncarcinogenic effects (USEPA, 2002a). The RfC is based on the assumption that thresholds exist for certain toxic effects to the respiratory system. The RfC is an estimate of a daily inhalation exposure of the human population that is likely to be without an appreciable risk of deleterious effects during a lifetime. It is expressed in units of mg/m^3.

3.2 Carcinogenic Dose-Response

The underlying assumption of regulatory risk assessment for constituents with known or assumed potential carcinogenic effects is that no threshold dose exists. In other words, it is assumed that a finite level of risk is associated with any dose above zero. For carcinogenic effects, USEPA uses a two-step evaluation in which the constituent is assigned a weight-of-evidence classification, and then derivation of a unit risk factor (URF).

The weight-of-evidence classification summarizes the evidence about the likelihood of the constituent being a human carcinogen. Group A constituents are classified as human carcinogens, Group B constituents are probable human carcinogens, Group C constituents are possible human carcinogens, Group D constituents are not classifiable as to human carcinogenicity, and, for Group E constituents, there is evidence of noncarcinogenicity for humans.

In the second part of the evaluation, URFs are derived for constituents that are known or probable human carcinogens. URFs are the upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of 1 $\mu g/m^3$ in air.

4.0 EXPOSURE ASSESSMENT

The risk assessment process requires the creation of exposure scenarios to assess the potential for adverse health effects from constituents at or near the Site. While these scenarios represent hypothetical people and activities, they reflect the physical description of the Site and the surrounding industrial and commercial areas, as well as the activities that may typically occur in these areas. Both current and reasonably foreseeable future potential exposures are evaluated.

This section is divided into seven subsections. Section 4.1 describes the potential receptors and exposure scenarios selected for evaluation in the risk assessment. Section 4.2 presents the potential exposure pathways evaluated for the Site. Section 4.3 describes the data used to estimate potential exposure concentrations. Section 4.4 describes the methods used to estimate exposure-point concentrations. Section 4.5 describes exposure factors used in the risk assessment. Average Daily Doses are described in Section 4.6.

4.1 Potential Exposure Scenarios

In creating potential exposure scenarios for evaluation in the risk assessment, the likelihood of potential exposure to Site-related constituents via many pathways was considered. Some pathways were excluded from further analysis because the route of exposure was physically impossible or highly unlikely given the conditions of the Site. Based on information about land use, topography, and current Site conditions, current and future exposure scenarios were developed for the Site.

Current and Future Exposure Scenarios

Likely current and future exposure scenarios evaluated include adult industrial workers. These workers are assumed to work indoors without significant excavation duties 8 hours per day, 250 days per year for 25 years. They are assumed to breathe volatiles emanating from soil vapor into the building.

4.2 Identification of Potential Exposure Pathways

As described in the Superfund Public Health Evaluation Manual (EPA, 1986), four elements must be present in order for a potential human exposure pathway to be complete:

1. a source and mechanism of constituent release to the environment;
2. an environmental transport medium (e.g., soil, water or soil vapor);
3. an exposure point, or point of potential contact with the potentially affected medium; and
4. a receptor (e.g., human) with a route of exposure at the point of contact.

Potential exposure pathways are the mechanisms by which potential receptors may be exposed to constituents. The potential exposure pathway included in this assessment was selected based on the most likely mechanisms of exposure and observations of the building being evaluated. The most likely potential exposure pathway evaluated for the building is the inhalation of volatile chemicals emanating from soil.

4.3 Methodology for Estimating Exposure Point Concentrations

Exposure point concentrations for constituents detected in media at the Site were estimated using all relevant analytical data collected by AMEC (as representative of current site conditions) from field investigations conducted at the Site. As noted in Section 2.1 of this report, the assessment evaluated data from an investigation conducted during February 2010.

Soil vapor samples were used to estimate exposure point concentrations for inhalation exposure to indoor air. Sample locations of the data used to calculate the EPCs for this assessment were presented in Figure 2. Depth of soil vapor samples evaluated (5 and 15 ft. bgs.) were based on recommendation provided by DTSC. Appendix A presents the analytical results for constituents sampled for in the soil vapor samples collected from the site. Table 2 provides a summary of estimated exposure point concentrations used in the quantitative risk assessment. The methodology for estimating exposure point concentrations is presented in Section 4.4.

4.4 Derivation of EPCs

For the exposure point concentration used in the air models, the maximum soil vapor concentration detected for each constituent at both the 5 and 15 ft. bgs. sampling depths was used as a site wide concentration surrogate to conservatively estimate the concentration in air through volatilization. Using a maximum value is generally considered overly conservative, but due to limited sample size and elevated concern regarding vapor intrusion, the maximum detected value was deemed to be a health protective value to be used as a site wide EPC.

Table 2

Exposure Point Concentrations

COPC	CAS	EPC (ppmv)
TPH as Gasoline	8006619	5.9
Acetone	67641	0.026
Bromodichloromethane	75274	0.0013
2-Butanone	78933	0.0033
Chloroform	67663	0.0023
Dibromochloromethane	124481	0.00087
Dichlorodifluoromethane	75718	0.0015
c-1,2-Dichloroethene	156592	0.00077
t-1,2-Dichloroethene	156605	0.00125
Ethylbenzene	100414	0.0033
o-Xylene	95476	0.0027
p/m-Xylene	179601231	0.0094
Tetrachloroethene	127184	0.82
Toluene	108883	0.0052
Trichloroethene	79016	0.084
1,1,1-Trichloroethane	71556	0.0047
Chloromethane	74873	0.0008

4.5 Exposure Factors

The exposure factors used in the quantitative risk assessment were generally default exposure factors within the DTSC modified Johnson and Ettinger model. Individual exposure factors are discussed below.

Duration of Exposure

Exposure duration (ED) for the industrial worker scenario was assumed to be 25 years. The expose duration was taken from DTSC Office of the Science Advisor Guidance (1992), Human Health Evaluation Manual: Supplemental Guidance: *Standard Default Exposure Factors* (EPA, 1991) and Exposure Factors Handbook (EPA, 1997). It is important to note that EPA (1997) states that the average occupation job tenure is 6.6 years, which contrasts significantly from the standard default worker duration of 25 years. This value is the upper bound occupation job tenure, which is consistent with a Reasonable Maximum Exposure (RME) scenario. For the industrial worker scenario, it is reasonable to assume that an industrial worker could logically be exposed to environmental media at a single site for multiple years albeit for short periods of time.

<u>Exposure Frequency</u>

The exposure frequency (EF) for the on-site worker was modified from the standard DTSC default value assumed by DTSC Office of the Science Advisor Guidance (1992), and additional guidance provided by the Human Health Evaluation Manual: Supplemental Guidance: *Standard Default Exposure Factors* (EPA, 1991a) and Exposure Factors Handbook (EPA, 1997). For the Industrial Worker in this risk assessment, the default frequency of 250 days per year is assumed. The DTSC default exposure time (as noted in the DTSC J&E model) is 24 hours per day. The exposure frequency for the worker scenario evaluated in this assessment was reduced to 83.33 days per year to reflect a standard 8 hour work day.

4.6 Method to Estimate Average Daily Dose

Reasonable maximum exposure (RME) scenarios are evaluated in this risk assessment. Conservative exposure assumptions are used to construct a reasonable maximum exposure scenario. Most individuals will not be subject to all the conditions that comprise the RME scenario. Individuals who do not meet all conditions in the RME scenario have lower potential exposures to constituents, and therefore, lower potential risks associated with those exposures.

The Chronic Average Daily Dose (CADD) is an estimate of a receptor's potential daily intake from exposure to constituents with potential noncarcinogenic effects. According to EPA (1989a), the exposure dose should be calculated by averaging over the period of time for which the receptor is assumed to be exposed. The CADD for each constituent via each route of exposure is compared to the RfD for that constituent to estimate the potential hazard index due to exposure to that constituent via that route of exposure. For constituents with potential carcinogenic effects, the Lifetime Average Daily Dose (LADD) is an estimate of potential daily intake over the course of a lifetime. In accordance with EPA (1989a), the LADD is calculated by averaging the assumed exposure over the receptor's entire lifetime (assumed to be 70 years). The LADD for each constituent via each route of exposure is combined with the cancer slope factor for that constituent in order to estimate the excess lifetime cancer risk due to exposure to that constituent via that route of exposure.

For inhalation exposures, CADDs and LADDs are not required, because estimated ambient or indoor air concentrations of volatile chemicals are multiplied by a receptor-specific exposure factor and then compared to the chemical-specific Reference Concentration (RfC) in ug/m^3 for noncarcinogenic chemicals and the Unit Risk Factor (URF) in $(ug/m^3)^{-1}$ for potentially carcinogenic chemicals.

5.0 RISK CHARACTERIZATION

Risk characterization is the step in the risk assessment process that combines the results of the exposure assessment and the toxicity assessment for each COPC to estimate the potential for carcinogenic and noncarcinogenic human health effects from chronic exposure to that constituent.

Potential exposure to volatilized chemicals indoor was modeled using Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings. In September 1998, EPA developed a series of models for estimating indoor air concentrations and associated health risks from subsurface vapor intrusion into buildings. These models were based on the analytical solutions of Johnson and Ettinger (2001) for contaminant partitioning and subsurface vapor transport into buildings (USEPA). The Johnson and Ettinger model is a fate and transport model that calculates an attenuation factor (ratio of indoor air concentrations to subsurface soil gas concentrations). The Johnson and Ettinger model simulates the transport of soil vapors in the subsurface by both diffusion and advection into indoor air. Hence, by inputting the soil gas concentration, the model estimates the associated indoor air concentration (DTSC, 2005). The California EPA Human and Ecological Risk Division has taken this model and incorporated human health criteria specific to California, as developed by the Cal/EPA Office of Environmental Health Hazard Assessment (OEHHA). These models produce health risk component that calculates the risk from inhaling the specific chemical at the concentration estimated in indoor air and were utilized to calculate both PELCRs and noncancer Hazard Quotients from site specific Soil Vapor EPCs that pose a health risk in relation to exposure to inhalation of volatiles. Calculation of the Carcinogenic and Noncarcinogenic Risks are discussed in the sections below.

5.1 Noncarcinogenic Risk Characterization

The potential for exposures to COPCs in soil vapor at or near the Site to result in adverse noncarcinogenic health effects is estimated by comparing the calculated concentration for each constituent with the Reference Concentration (RfC) for that constituent. The resulting ratio, which is unitless, is known as the Hazard Quotient (HQ) for that constituent. The HQ is calculated using the following formula:

$$HQ = \frac{\frac{C_{building}}{RfC} \times EF \times ED}{AT_{NC} \times 365}$$

where:

HQ = Hazard Quotient (unitless)

$C_{building}$ = Vapor concentration in the building, mg/m^3

RfC = Reference concentration, mg/m3

EF = Exposure frequency, days/yr

ED = Exposure duration, yr

AT_{NC} = Averaging time for noncarcinogens, yr (ED x 365 days/yr)

When the Hazard Quotient for a given constituent and pathway does not exceed 1, the Reference Concentration has not been exceeded, and no adverse noncarcinogenic health effects are expected to occur as a result of exposure to that constituent via that pathway. The HQs for each constituent are summed to yield the Hazard Index (HI) for that pathway. A Total HI is then calculated for each exposure medium by summing the pathway-specific HIs. A Total HI that does not exceed 1 indicates that no adverse noncarcinogenic health effects are expected to occur as a result of that receptor's potential exposure to the environmental medium evaluated.

5.2 Potential Carcinogenic Risk Characterization

The purpose of carcinogenic risk characterization is to estimate the potential likelihood, over and above the background cancer rate, that a receptor will develop cancer in his or her lifetime as a result of potential Site-related exposures to COPCs. For inhalation exposures, this likelihood is a function of the concentration of a constituent and the URF for that constituent. The relationship between the Potential Excess Lifetime Cancer Risk (PELCR) and the estimated air concentration of a constituent may be expressed by the following equation:

$$PELCR = \frac{C_{building} \times URF \times EF \times ED}{AT_C \times 365}$$

where:

PELCR = Potential Excess Lifetime Cancer Risk, unitless

$C_{building}$ = Vapor concentration in the building, ug/m^3

URF = Unit risk factor, (ug/m^3)$^{-1}$

EF = Exposure frequency, days/yr

ED = Exposure duration, yr

AT_C = Averaging time for carcinogens, yr (75 yr. x 365 days/yr)

PELCRs are calculated for each potentially carcinogenic constituent. The PELCRs for each pathway by which the receptor is assumed to be exposed are calculated by summing the potential risks derived for each constituent. A Total PELCR is then calculated for each exposure medium by summing the pathway-specific PELCRs. Under baseline conditions, regulatory level of concern for the total potential carcinogenic risk associated with the inhalation of soil vapor from all future use scenarios is a range between 10^{-06} and 10^{-04}.

Table 3 presents the PELCRs and Hazard Indices associated with the site-specific potential exposures to soil vapor. The vapor intrusion models and derivations of all calculation can be found in Appendix B.

Table 3
Risk Assessment Results
Building 18 - Amtrak Redondo Junction

COPC	CAS	EPC (ppmv)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
TPH as Gasoline	8006619	5.9	NA	1.2E-02
Acetone	67641	0.026	NA	7.1E-07
Bromodichloromethane	75274	0.0013	1.9E-08	2.1E-05
2-Butanone	78933	0.0033	NA	5.8E-07
Chloroform	67663	0.0023	7.1E-09	1.3E-05
Dibromochloromethane	124481	0.00087	8.7E-09	1.3E-05
Dichlorodifluoromethane	75718	0.0015	NA	1.0E-05
c-1,2-Dichloroethene	156592	0.00077	NA	2.5E-05
t-1,2-Dichloroethene	156605	0.00125	NA	2.3E-05
Ethylbenzene	100414	0.0033	3.7E-09	4.1E-06
o-Xylene	95476	0.0027	NA	3.6E-05
p/m-Xylene	1.8E+08	0.0094	NA	1.2E-04
Tetrachloroethene	127184	0.82	3.3E-06	4.5E-02
Toluene	108883	0.0052	NA	2.0E-05
Trichloroethene	79016	0.084	9.6E-08	2.2E-04
1,1,1-Trichloroethane	71556	0.0047	NA	1.5E-06
Chloromethane	74873	0.0008	3.8E-10	6.6E-06
		Total	**3.E-06**	**6.E-02**

6.0 UNCERTAINTY ANALYSIS

Within any of the four steps of the risk assessment process, assumptions must be made due to a lack of absolute scientific knowledge. Some of the assumptions are supported by considerable scientific evidence, while others have less support. Every assumption introduces some degree of uncertainty into the risk assessment process. Conservative assumptions are made throughout the risk assessment to ensure that public health is protected. Therefore, when all of the assumptions are combined, it is much more likely that actual risks, if any, are overestimated rather than underestimated.

The assumptions that introduce the greatest amount of uncertainty in this risk assessment are discussed in this section. They are discussed in general terms, because, for most of the assumptions, there is not enough information to assign a numerical value that can be factored into the calculation of risk.

6.1 Hazard Identification

During the Hazard Identification step, media and constituents are selected for inclusion in the quantitative risk assessment. Soil vapor was selected as potential media of concern with a potentially complete exposure pathway. Other media were eliminated as a potential exposure pathway due to the improbability of exposure. Exclusion of these media introduces some uncertainty, but this uncertainty was determined to be low.

Selection of constituents of concern could also introduce uncertainty. As noted above, COPCs were selected via several criteria:

1. Chemical must be detected using validated laboratory analyses
2. Chemicals must occur above a 5 percent detection frequency and/or were historically used at the unit
3. Chemicals must be present in excess of the MDL with a "J" qualifier or are above their PQL

The laboratory analysis included the majority of known volatile constituents with potential carcinogenic and noncarcinogenic human health hazards. As such, the level of uncertainty in selecting COPCs is also assumed low. Accordingly, little uncertainty is introduced by the Hazard Identification step.

6.2 Dose-Response Assessment

Dose-response values are usually based on limited toxicological data. For this reason, a margin of safety is built into estimates of both carcinogenic and noncarcinogenic risk, and actual risks are lower than those estimated. The two major areas of uncertainty introduced in the dose-response assessment are: (1) animal to human extrapolation; and (2) high to low dose extrapolation. These are discussed below.

Human dose-response values are often extrapolated, or estimated, using the results of animal studies. Extrapolation from animals to humans introduces a great deal of uncertainty in the risk assessment because in most instances, it is not known how differently a human may react to the constituent compared to the animal species used to test the constituent. The procedures used to extrapolate from animals to humans involve conservative assumptions and incorporate several uncertainty factors that overestimate the adverse effects associated with a specific dose. As a result, overestimation of the potential for adverse effects to humans is more likely than underestimation.

Predicting potential health effects from the exposure to media on-Site requires the use of models to extrapolate the observed health effects from the high doses used in laboratory studies to the anticipated human health effects from low doses experienced in the environment. The models contain conservative assumptions to account for the large degree of uncertainty associated with this extrapolation (especially for potential carcinogens) and therefore, tend to be more likely to overestimate than underestimate the risks.

6.3 Exposure Assessment

During the exposure assessment, average daily doses of COPCs to which receptors are potentially exposed are estimated, which involves assumptions about how often exposure occurs. Such assumptions include location, accessibility, and use of an area. With this in mind, the receptor, or person who may potentially be exposed, and the location of exposure, were both defined for this risk assessment. The locations where certain activities were assumed to take place have been purposely selected to be consistent with the use of the Site.

The potential intake rates and exposure frequencies and durations assumed in the risk assessment were conservative. For example, the industrial worker scenario assumed an 8-hour workday, 250 days per year, for 25 years, which more than likely overestimated occupational tenure. Such assumptions almost certainly overestimate actual exposures, if any, that may occur at the Site. If more realistic and reasonable potential exposure assumptions had been employed in the risk assessment, the estimated risks would have been lower.

Exposure point concentrations are estimated values of what is a Reasonable Maximum Exposure across the entire site. Given that these are estimates, a significant amount of uncertainty can be introduced into the assessment. For the inhalation pathway evaluated in the assessment, the maximum detected concentration at any depth was used as the exposure point concentration. Volatilization modeling parameters conservatively assumed that the exposure point concentration was at the 5ft demarcation, which is the shallowest recommended sampling depth used for soil vapor and the most conservative assumption when calculating risk. These assumptions therefore introduce significant uncertainty as it relates to the true risk and almost certainly overestimates both site concentrations and risk.

Inhalation risks were evaluated assuming exposures to volatile site chemicals in an indoor building scenario. Most industrial workers at the site may in fact be exposed to site volatiles via a combination of inhalation of indoor and outdoor air. As the indoor air scenario is almost always more conservative, it was assumed that the industrial workers would contact site volatiles indoors for the entire duration of their exposure. True risk would likely be between the indoor and outdoor calculated risks.

6.4 Risk Characterization

The risk of adverse human health effects depends on estimated levels of exposure and on dose-response relationships. Once exposure to, and risk from, each of the selected constituents is calculated, the total risk posed by exposure to Site-related COPCs is determined by combining the health risk contributed by each constituent. Where COPCs do not interact, do not affect the same target organ or do not have the same mechanism of action, summing the risks for multiple COPCs results in an overestimate of risk posed by the Site. However, in order not to understate the risk, it was initially assumed that the effects of different constituents may be added together.

7.0 SUMMARY AND CONCLUSIONS

This report has presented the results of the site-specific risk assessment at Building 18 located at Amtrak's Redondo Junction. The risk assessment is a companion document to the site-wide human health risk assessment conducted for the Site in 2008 (AMEC 2008a). This risk assessment supplements the site-wide risk assessment by addressing specific concerns regarding volatile chemical exposures to Building 18 occupants. The human health risk assessment evaluated risks to onsite industrial workers in the enclosed building. The potential exposure pathway evaluated in this risk assessment was inhalation of indoor air containing volatiles. Table 3 presents the cumulative hazard indices and potential carcinogenic risks for site-specific receptors.

The Amtrak Redondo Junction Site is highly industrial in nature and it is expected to remain industrial in perpetuity. Although the risk from inhalation exposures to site chemicals to the potential industrial worker does exceed the point of departure value of 10^{-6}, the risk is within the regulatory range of 10^{-4} to 10^{-6}. Generally industrial scenarios are regulated at a target risk value of 10^{-5}; therefore, under current and future industrial Site use, health risks to industrial workers assumed to be present in Building 18 are within USEPA and DTSC acceptable levels. This determination was made assuming exposures to volatile chemicals exist at its maximum detected concentration.

This risk assessment has been developed using data collected while remediation activities are ongoing at the SSL-497 property. Depending on the success of the current SSL-497 remediation activities, the risk posed to industrial worker may change in the future. As such, AMEC provides the following recommendations:

- Amtrak vapor wells potentially impacted by chemicals originating from the SSL-497 property should be included in future soil vapor extraction remediation performance and rebound vapor monitoring activities conducted by the SSL-497 PRP
- following completion of ongoing SSL-497 soil vapor extraction remediation activities, the SSL-497 PRP should evaluate risks posed to industrial workers on Amtrak's property from inhalation of chemical originating from the SSL-497 property
- consideration should be given to inclusion of Amtrak vapor wells located near SSL-497 in any post remediation long term monitoring activities conducted by the SSL-497 PRP.

These recommendations align with agreement made between DTCS and Amtrak during August 12, 2009 meeting.

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APPENDIX A

Analytical Data Tables

Appendix A
Building 18 - Amtrak Redondo Junction

Analytical Data Tables

SAMPLE NUMBER	DATE COLLECTED	METHOD	CAS NUMBER	COMPOUND NAME	CONCENTRATION	DETECTION LIMIT	MDL	UNITS
A4-BLDG18-04-V5	02/15/10	EPA TO-3M	8006-61-9	TPH as Gasoline	5.9	2.4	0.26	ppm (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-3M	8006-61-9	TPH as Gasoline	ND	2.2	0.25	ppm (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-3M	8006-61-9	TPH as Gasoline	ND	2.5	0.28	ppm (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-3M	8006-61-9	TPH as Gasoline	ND	2.3	0.25	ppm (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-3M	8006-61-9	TPH as Gasoline	ND	2.2	0.25	ppm (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-3M	8006-61-9	TPH as Gasoline	ND	2.4	0.27	ppm (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-3M	8006-61-9	TPH as Gasoline	ND	2.4	0.26	ppm (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-3M	8006-61-9	TPH as Gasoline	ND	2.3	0.25	ppm (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-3M	8006-61-9	TPH as Gasoline	ND	2.4	0.26	ppm (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	91-20-3	Naphthalene	ND	16	3.3	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	67-64-1	Acetone	26	3.1	0.30	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	71-43-2	Benzene	ND	0.78	0.15	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	100-44-7	Benzyl Chloride	ND	2.4	0.62	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	75-27-4	Bromodichloromethane	ND	0.78	0.16	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	75-25-2	Bromoform	ND	3.1	0.24	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	74-83-9	Bromomethane	ND	0.78	0.15	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	106-99-0	1,3-Butadiene	ND	2.4	0.18	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	78-93-3	2-Butanone	ND	2.4	0.16	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	75-15-0	Carbon Disulfide	ND	3.1	0.16	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	56-23-5	Carbon Tetrachloride	ND	0.78	0.15	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	108-90-7	Chlorobenzene	ND	0.78	0.17	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	75-00-3	Chloroethane	ND	0.78	0.24	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	67-66-3	Chloroform	ND	0.78	0.14	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	74-87-3	Chloromethane	0.80	0.78	0.15	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	110-82-7	Cyclohexane	ND	0.78	0.24	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	124-48-1	Dibromochloromethane	ND	0.78	0.18	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	75-71-8	Dichlorodifluoromethane	1.5	0.78	0.23	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	108-20-3	Diisopropyl Ether (DIPE)	ND	3.1	0.21	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	75-34-3	1,1-Dichloroethane	ND	0.78	0.16	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	75-35-4	1,1-Dichloroethene	ND	0.78	0.17	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	106-93-4	1,2-Dibromoethane	ND	0.78	0.17	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	76-14-2	Dichlorotetrafluoroethane	ND	3.1	0.17	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	95-50-1	1,2-Dichlorobenzene	ND	0.78	0.17	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	107-06-2	1,2-Dichloroethane	ND	0.78	0.15	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	78-87-5	1,2-Dichloropropane	ND	0.78	0.18	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	541-73-1	1,3-Dichlorobenzene	ND	0.78	0.20	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	106-46-7	1,4-Dichlorobenzene	ND	0.78	0.21	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	123-91-1	1,4-Dioxane	ND	16	5.0	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	10061-01-5	c-1,3-Dichloropropene	ND	0.78	0.22	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	156-59-2	c-1,2-Dichloroethene	ND	0.78	0.21	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	156-60-5	t-1,2-Dichloroethene	ND	0.78	0.29	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	10061-02-6	t-1,3-Dichloropropene	ND	1.6	0.16	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	64-17-5	Ethanol	ND	7.8	0.72	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	141-78-6	Ethyl Acetate	ND	16	0.81	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	637-92-3	Ethyl-t-Butyl Ether (ETBE)	ND	3.1	0.52	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	100-41-4	Ethylbenzene	ND	0.78	0.18	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	622-96-8	4-Ethyltoluene	ND	0.78	0.29	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	142-82-5	Heptane	ND	3.1	0.97	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	87-68-3	Hexachloro-1,3-Butadiene	ND	2.4	0.28	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	110-54-3	Hexane	ND	3.1	0.81	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	591-78-6	2-Hexanone	ND	2.4	0.81	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND	3.1	0.19	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	75-09-2	Methylene Chloride	ND	7.8	0.29	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	108-10-1	4-Methyl-2-Pentanone	ND	2.4	0.24	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	95-47-6	o-Xylene	ND	0.78	0.19	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	179601-23-1	p/m-Xylene	ND	3.1	1.2	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	115-07-1	Propene	ND	16	5.4	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	100-42-5	Styrene	ND	2.4	0.28	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	994-05-8	Tert-Amyl-Methyl Ether (TAME)	ND	3.1	0.28	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	75-65-0	Tert-Butyl Alcohol (TBA)	ND	3.1	0.41	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	127-18-4	Tetrachloroethene	5.3	0.78	0.17	ppb (v/v)

Analytical Data Tables

A4-BLDG18-04-V5	02/15/10	EPA TO-15	109-99-9	Tetrahydrofuran	5.3	2.4	0.25	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	108-88-3	Toluene	2.5	0.78	0.18	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	79-01-6	Trichloroethene	1.1	0.78	0.17	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	75-69-4	Trichlorofluoromethane	ND	1.6	0.12	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	76-13-1	1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	2.4	0.16	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	71-55-6	1,1,1-Trichloroethane	ND	0.78	0.16	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	79-00-5	1,1,2-Trichloroethane	ND	0.78	0.19	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	96-18-4	1,2,3-Trichloropropane	ND	7.8	0.20	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	107-02-8	Acrolein	ND	7.8	0.38	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	107-13-1	Acrylonitrile	ND	1.6	0.18	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	80-62-6	Methyl Methacrylate	ND	0.78	0.058	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	74-98-6	Propane	ND	24	7.9	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	106-97-8	Butane	ND	7.8	0.17	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	540-84-1	2,2,4-Trimethyl Pentane	ND	0.78	0.26	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	75-28-5	Isobutane	ND	7.8	0.89	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	811-97-2	1,1,1,2-Tetrafluoroethane	ND	3.1	0.19	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	108-67-8	1,3,5-Trimethylbenzene	ND	0.78	0.26	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	79-34-5	1,1,2,2-Tetrachloroethane	ND	1.6	0.17	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	95-63-6	1,2,4-Trimethylbenzene	ND	2.4	0.51	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	120-82-1	1,2,4-Trichlorobenzene	ND	3.1	1.1	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	108-05-4	Vinyl Acetate	ND	3.1	0.71	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	75-01-4	Vinyl Chloride	ND	0.78	0.16	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	75-37-6	1,1-Difluoroethane	ND	3.1	0.87	ppb (v/v)
A4-BLDG18-04-V5	02/15/10	EPA TO-15	67-63-0	Isopropanol	11000	1600	100	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	91-20-3	Naphthalene	ND	15	3.1	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	67-64-1	Acetone	17	3.0	0.29	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	71-43-2	Benzene	ND	0.74	0.14	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	100-44-7	Benzyl Chloride	ND	2.2	0.59	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	75-27-4	Bromodichloromethane	ND	0.74	0.15	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	75-25-2	Bromoform	ND	3.0	0.23	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	74-83-9	Bromomethane	ND	0.74	0.14	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	106-99-0	1,3-Butadiene	ND	2.2	0.17	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	78-93-3	2-Butanone	ND	2.2	0.15	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	75-15-0	Carbon Disulfide	ND	3.0	0.15	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	56-23-5	Carbon Tetrachloride	ND	0.74	0.15	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	108-90-7	Chlorobenzene	ND	0.74	0.16	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	75-00-3	Chloroethane	ND	0.74	0.23	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	67-66-3	Chloroform	1.0	0.74	0.13	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	74-87-3	Chloromethane	ND	0.74	0.15	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	110-82-7	Cyclohexane	ND	0.74	0.23	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	124-48-1	Dibromochloromethane	ND	0.74	0.17	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	75-71-8	Dichlorodifluoromethane	ND	0.74	0.21	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	108-20-3	Diisopropyl Ether (DIPE)	ND	3.0	0.20	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	75-34-3	1,1-Dichloroethane	ND	0.74	0.15	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	75-35-4	1,1-Dichloroethene	ND	0.74	0.16	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	106-93-4	1,2-Dibromoethane	ND	0.74	0.17	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	76-14-2	Dichlorotetrafluoroethane	ND	3.0	0.16	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	95-50-1	1,2-Dichlorobenzene	ND	0.74	0.16	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	107-06-2	1,2-Dichloroethane	ND	0.74	0.14	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	78-87-5	1,2-Dichloropropane	ND	0.74	0.17	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	541-73-1	1,3-Dichlorobenzene	ND	0.74	0.19	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	106-46-7	1,4-Dichlorobenzene	ND	0.74	0.20	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	123-91-1	1,4-Dioxane	ND	15	4.8	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	10061-01-5	c-1,3-Dichloropropene	ND	0.74	0.21	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	156-59-2	c-1,2-Dichloroethene	ND	0.74	0.20	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	156-60-5	t-1,2-Dichloroethene	ND	0.74	0.28	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	10061-02-6	t-1,3-Dichloropropene	ND	1.5	0.15	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	64-17-5	Ethanol	ND	7.4	0.68	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	141-78-6	Ethyl Acetate	ND	15	0.76	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	637-92-3	Ethyl-t-Butyl Ether (ETBE)	ND	3.0	0.49	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	100-41-4	Ethylbenzene	1.4	0.74	0.17	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	622-96-8	4-Ethyltoluene	ND	0.74	0.27	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	142-82-5	Heptane	ND	3.0	0.92	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	87-68-3	Hexachloro-1,3-Butadiene	ND	2.2	0.27	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	110-54-3	Hexane	ND	3.0	0.77	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	591-78-6	2-Hexanone	ND	2.2	0.77	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND	3.0	0.18	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	75-09-2	Methylene Chloride	ND	7.4	0.28	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	108-10-1	4-Methyl-2-Pentanone	ND	2.2	0.23	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	95-47-6	o-Xylene	1.5	0.74	0.18	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	179601-23-1	p/m-Xylene	4.3	3.0	1.1	ppb (v/v)

Analytical Data Tables

A4-BLDG18-03-V5	02/15/10	EPA TO-15	115-07-1	Propene	ND	15	5.1	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	100-42-5	Styrene	ND	2.2	0.27	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	994-05-8	Tert-Amyl-Methyl Ether (TAME)	ND	3.0	0.27	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	75-65-0	Tert-Butyl Alcohol (TBA)	ND	3.0	0.39	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	127-18-4	Tetrachloroethene	240	3.0	0.66	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	109-99-9	Tetrahydrofuran	7.4	2.2	0.24	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	108-88-3	Toluene	3.6	0.74	0.18	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	79-01-6	Trichloroethene	8.6	0.74	0.16	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	75-69-4	Trichlorofluoromethane	ND	1.5	0.12	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	76-13-1	1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	2.2	0.15	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	71-55-6	1,1,1-Trichloroethane	ND	0.74	0.15	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	79-00-5	1,1,2-Trichloroethane	ND	0.74	0.18	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	96-18-4	1,2,3-Trichloropropane	ND	7.4	0.19	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	107-02-8	Acrolein	ND	7.4	0.36	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	107-13-1	Acrylonitrile	ND	1.5	0.17	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	80-62-6	Methyl Methacrylate	ND	0.74	0.055	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	74-98-6	Propane	ND	22	7.5	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	106-97-8	Butane	ND	7.4	0.16	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	540-84-1	2,2,4-Trimethyl Pentane	ND	0.74	0.24	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	75-28-5	Isobutane	ND	7.4	0.84	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	811-97-2	1,1,1,2-Tetrafluoroethane	ND	3.0	0.18	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	108-67-8	1,3,5-Trimethylbenzene	ND	0.74	0.25	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	79-34-5	1,1,2,2-Tetrachloroethane	ND	1.5	0.16	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	95-63-6	1,2,4-Trimethylbenzene	ND	2.2	0.49	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	120-82-1	1,2,4-Trichlorobenzene	ND	3.0	1.1	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	108-05-4	Vinyl Acetate	ND	3.0	0.68	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	75-01-4	Vinyl Chloride	ND	0.74	0.15	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	75-37-6	1,1-Difluoroethane	ND	3.0	0.83	ppb (v/v)
A4-BLDG18-03-V5	02/15/10	EPA TO-15	67-63-0	Isopropanol	93	7.4	0.48	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	91-20-3	Naphthalene	ND	17	3.5	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	67-64-1	Acetone	26	3.4	0.32	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	71-43-2	Benzene	ND	0.84	0.16	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	100-44-7	Benzyl Chloride	ND	2.5	0.66	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	75-27-4	Bromodichloromethane	ND	0.84	0.17	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	75-25-2	Bromoform	ND	3.4	0.26	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	74-83-9	Bromomethane	ND	0.84	0.16	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	106-99-0	1,3-Butadiene	ND	2.5	0.19	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	78-93-3	2-Butanone	3.3	2.5	0.17	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	75-15-0	Carbon Disulfide	ND	3.4	0.17	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	56-23-5	Carbon Tetrachloride	ND	0.84	0.17	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	108-90-7	Chlorobenzene	ND	0.84	0.18	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	75-00-3	Chloroethane	ND	0.84	0.26	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	67-66-3	Chloroform	ND	0.84	0.15	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	74-87-3	Chloromethane	ND	0.84	0.16	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	110-82-7	Cyclohexane	ND	0.84	0.26	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	124-48-1	Dibromochloromethane	ND	0.84	0.19	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	75-71-8	Dichlorodifluoromethane	ND	0.84	0.24	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	108-20-3	Diisopropyl Ether (DIPE)	ND	3.4	0.22	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	75-34-3	1,1-Dichloroethane	ND	0.84	0.17	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	75-35-4	1,1-Dichloroethene	ND	0.84	0.18	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	106-93-4	1,2-Dibromoethane	ND	0.84	0.19	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	76-14-2	Dichlorotetrafluoroethane	ND	3.4	0.18	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	95-50-1	1,2-Dichlorobenzene	ND	0.84	0.18	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	107-06-2	1,2-Dichloroethane	ND	0.84	0.16	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	78-87-5	1,2-Dichloropropane	ND	0.84	0.19	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	541-73-1	1,3-Dichlorobenzene	ND	0.84	0.22	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	106-46-7	1,4-Dichlorobenzene	ND	0.84	0.23	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	123-91-1	1,4-Dioxane	ND	17	5.4	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	10061-01-5	c-1,3-Dichloropropene	ND	0.84	0.23	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	156-59-2	c-1,2-Dichloroethene	ND	0.84	0.22	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	156-60-5	t-1,2-Dichloroethene	ND	0.84	0.31	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	10061-02-6	t-1,3-Dichloropropene	ND	1.7	0.17	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	64-17-5	Ethanol	ND	8.4	0.77	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	141-78-6	Ethyl Acetate	ND	17	0.86	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	637-92-3	Ethyl-t-Butyl Ether (ETBE)	ND	3.4	0.55	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	100-41-4	Ethylbenzene	3.3	0.84	0.19	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	622-96-8	4-Ethyltoluene	ND	0.84	0.31	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	142-82-5	Heptane	ND	3.4	1.0	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	87-68-3	Hexachloro-1,3-Butadiene	ND	2.5	0.30	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	110-54-3	Hexane	ND	3.4	0.87	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	591-78-6	2-Hexanone	ND	2.5	0.87	ppb (v/v)

Analytical Data Tables

A4-BLDG18-03-V15	02/15/10	EPA TO-15	1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND	3.4	0.20	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	75-09-2	Methylene Chloride	ND	8.4	0.31	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	108-10-1	4-Methyl-2-Pentanone	ND	2.5	0.25	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	95-47-6	o-Xylene	2.7	0.84	0.20	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	179601-23-1	p/m-Xylene	9.4	3.4	1.3	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	115-07-1	Propene	ND	17	5.8	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	100-42-5	Styrene	ND	2.5	0.30	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	994-05-8	Tert-Amyl-Methyl Ether (TAME)	ND	3.4	0.30	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	75-65-0	Tert-Butyl Alcohol (TBA)	ND	3.4	0.44	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	127-18-4	Tetrachloroethene	310	3.4	0.74	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	109-99-9	Tetrahydrofuran	45	2.5	0.27	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	108-88-3	Toluene	5.2	0.84	0.20	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	79-01-6	Trichloroethene	13	0.84	0.18	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	75-69-4	Trichlorofluoromethane	ND	1.7	0.13	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	76-13-1	1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	2.5	0.17	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	71-55-6	1,1,1-Trichloroethane	0.88	0.84	0.17	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	79-00-5	1,1,2-Trichloroethane	ND	0.84	0.20	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	96-18-4	1,2,3-Trichloropropane	ND	8.4	0.21	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	107-02-8	Acrolein	ND	8.4	0.41	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	107-13-1	Acrylonitrile	ND	1.7	0.19	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	80-62-6	Methyl Methacrylate	ND	0.84	0.062	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	74-98-6	Propane	ND	25	8.5	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	106-97-8	Butane	ND	8.4	0.18	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	540-84-1	2,2,4-Trimethyl Pentane	ND	0.84	0.27	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	75-28-5	Isobutane	ND	8.4	0.95	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	811-97-2	1,1,1,2-Tetrafluoroethane	ND	3.4	0.20	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	108-67-8	1,3,5-Trimethylbenzene	ND	0.84	0.28	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	79-34-5	1,1,2,2-Tetrachloroethane	ND	1.7	0.18	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	95-63-6	1,2,4-Trimethylbenzene	ND	2.5	0.55	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	120-82-1	1,2,4-Trichlorobenzene	ND	3.4	1.2	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	108-05-4	Vinyl Acetate	ND	3.4	0.76	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	75-01-4	Vinyl Chloride	ND	0.84	0.17	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	75-37-6	1,1-Difluoroethane	ND	3.4	0.93	ppb (v/v)
A4-BLDG18-03-V15	02/15/10	EPA TO-15	67-63-0	Isopropanol	140	8.4	0.54	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	91-20-3	Naphthalene	ND	15	3.2	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	67-64-1	Acetone	20	3.1	0.30	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	71-43-2	Benzene	ND	0.77	0.14	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	100-44-7	Benzyl Chloride	ND	2.3	0.61	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	75-27-4	Bromodichloromethane	ND	0.77	0.16	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	75-25-2	Bromoform	ND	3.1	0.23	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	74-83-9	Bromomethane	ND	0.77	0.14	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	106-99-0	1,3-Butadiene	ND	2.3	0.17	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	78-93-3	2-Butanone	ND	2.3	0.15	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	75-15-0	Carbon Disulfide	ND	3.1	0.15	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	56-23-5	Carbon Tetrachloride	ND	0.77	0.15	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	108-90-7	Chlorobenzene	ND	0.77	0.17	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	75-00-3	Chloroethane	ND	0.77	0.24	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	67-66-3	Chloroform	1.2	0.77	0.14	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	74-87-3	Chloromethane	ND	0.77	0.15	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	110-82-7	Cyclohexane	ND	0.77	0.24	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	124-48-1	Dibromochloromethane	ND	0.77	0.17	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	75-71-8	Dichlorodifluoromethane	ND	0.77	0.22	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	108-20-3	Diisopropyl Ether (DIPE)	ND	3.1	0.21	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	75-34-3	1,1-Dichloroethane	ND	0.77	0.16	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	75-35-4	1,1-Dichloroethene	ND	0.77	0.17	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	106-93-4	1,2-Dibromoethane	ND	0.77	0.17	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	76-14-2	Dichlorotetrafluoroethane	ND	3.1	0.17	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	95-50-1	1,2-Dichlorobenzene	ND	0.77	0.17	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	107-06-2	1,2-Dichloroethane	ND	0.77	0.15	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	78-87-5	1,2-Dichloropropane	ND	0.77	0.18	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	541-73-1	1,3-Dichlorobenzene	ND	0.77	0.20	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	106-46-7	1,4-Dichlorobenzene	ND	0.77	0.21	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	123-91-1	1,4-Dioxane	ND	15	4.9	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	10061-01-5	c-1,3-Dichloropropene	ND	0.77	0.21	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	156-59-2	c-1,2-Dichloroethene	ND	0.77	0.20	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	156-60-5	t-1,2-Dichloroethene	ND	0.77	0.29	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	10061-02-6	t-1,3-Dichloropropene	ND	1.5	0.16	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	64-17-5	Ethanol	ND	7.7	0.71	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	141-78-6	Ethyl Acetate	ND	15	0.79	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	637-92-3	Ethyl-t-Butyl Ether (ETBE)	ND	3.1	0.51	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	100-41-4	Ethylbenzene	1.8	0.77	0.18	ppb (v/v)

A4-BLDG18-01-V5	02/15/10	EPA TO-15	622-96-8	4-Ethyltoluene	ND	0.77	0.28	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	142-82-5	Heptane	ND	3.1	0.95	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	87-68-3	Hexachloro-1,3-Butadiene	ND	2.3	0.28	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	110-54-3	Hexane	ND	3.1	0.80	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	591-78-6	2-Hexanone	ND	2.3	0.80	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND	3.1	0.18	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	75-09-2	Methylene Chloride	ND	7.7	0.29	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	108-10-1	4-Methyl-2-Pentanone	ND	2.3	0.23	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	95-47-6	o-Xylene	1.4	0.77	0.19	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	179601-23-1	p/m-Xylene	4.2	3.1	1.2	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	115-07-1	Propene	ND	15	5.3	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	100-42-5	Styrene	ND	2.3	0.28	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	994-05-8	Tert-Amyl-Methyl Ether (TAME)	ND	3.1	0.28	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	75-65-0	Tert-Butyl Alcohol (TBA)	ND	3.1	0.40	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	127-18-4	Tetrachloroethene	240	3.8	0.85	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	109-99-9	Tetrahydrofuran	31	2.3	0.25	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	108-88-3	Toluene	4.0	0.77	0.18	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	79-01-6	Trichloroethene	30	0.77	0.16	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	75-69-4	Trichlorofluoromethane	ND	1.5	0.12	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	76-13-1	1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	2.3	0.15	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	71-55-6	1,1,1-Trichloroethane	1.2	0.77	0.15	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	79-00-5	1,1,2-Trichloroethane	ND	0.77	0.19	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	96-18-4	1,2,3-Trichloropropane	ND	7.7	0.20	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	107-02-8	Acrolein	ND	7.7	0.38	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	107-13-1	Acrylonitrile	ND	1.5	0.17	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	80-62-6	Methyl Methacrylate	ND	0.77	0.056	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	74-98-6	Propane	ND	23	7.8	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	106-97-8	Butane	ND	7.7	0.17	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	540-84-1	2,2,4-Trimethyl Pentane	ND	0.77	0.25	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	75-28-5	Isobutane	ND	7.7	0.87	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	811-97-2	1,1,1,2-Tetrafluoroethane	ND	3.1	0.18	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	108-67-8	1,3,5-Trimethylbenzene	ND	0.77	0.26	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	79-34-5	1,1,2,2-Tetrachloroethane	ND	1.5	0.16	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	95-63-6	1,2,4-Trimethylbenzene	ND	2.3	0.50	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	120-82-1	1,2,4-Trichlorobenzene	ND	3.1	1.1	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	108-05-4	Vinyl Acetate	ND	3.1	0.70	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	75-01-4	Vinyl Chloride	ND	0.77	0.16	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	75-37-6	1,1-Difluoroethane	ND	3.1	0.86	ppb (v/v)
A4-BLDG18-01-V5	02/15/10	EPA TO-15	67-63-0	Isopropanol	48	7.7	0.50	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	91-20-3	Naphthalene	ND	15	3.2	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	67-64-1	Acetone	17	3.0	0.29	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	71-43-2	Benzene	ND	0.75	0.14	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	100-44-7	Benzyl Chloride	ND	2.2	0.59	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	75-27-4	Bromodichloromethane	1.3	0.75	0.15	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	75-25-2	Bromoform	ND	3.0	0.23	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	74-83-9	Bromomethane	ND	0.75	0.14	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	106-99-0	1,3-Butadiene	ND	2.2	0.17	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	78-93-3	2-Butanone	ND	2.2	0.15	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	75-15-0	Carbon Disulfide	ND	3.0	0.15	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	56-23-5	Carbon Tetrachloride	ND	0.75	0.15	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	108-90-7	Chlorobenzene	ND	0.75	0.16	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	75-00-3	Chloroethane	ND	0.75	0.23	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	67-66-3	Chloroform	2.3	0.75	0.13	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	74-87-3	Chloromethane	ND	0.75	0.15	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	110-82-7	Cyclohexane	ND	0.75	0.23	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	124-48-1	Dibromochloromethane	0.87	0.75	0.17	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	75-71-8	Dichlorodifluoromethane	ND	0.75	0.22	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	108-20-3	Diisopropyl Ether (DIPE)	ND	3.0	0.20	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	75-34-3	1,1-Dichloroethane	ND	0.75	0.15	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	75-35-4	1,1-Dichloroethene	ND	0.75	0.16	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	106-93-4	1,2-Dibromoethane	ND	0.75	0.17	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	76-14-2	Dichlorotetrafluoroethane	ND	3.0	0.16	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	95-50-1	1,2-Dichlorobenzene	ND	0.75	0.17	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	107-06-2	1,2-Dichloroethane	ND	0.75	0.14	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	78-87-5	1,2-Dichloropropane	ND	0.75	0.17	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	541-73-1	1,3-Dichlorobenzene	ND	0.75	0.20	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	106-46-7	1,4-Dichlorobenzene	ND	0.75	0.20	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	123-91-1	1,4-Dioxane	ND	15	4.8	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	10061-01-5	c-1,3-Dichloropropene	ND	0.75	0.21	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	156-59-2	c-1,2-Dichloroethene	ND	0.75	0.20	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	156-60-5	t-1,2-Dichloroethene	ND	0.75	0.28	ppb (v/v)

Appendix A
Building 18 - Amtrak Redondo Junction

Analytical Data Tables

A4-BLDG18-01-V15	02/15/10	EPA TO-15	10061-02-6	t-1,3-Dichloropropene	ND	1.5	0.15	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	64-17-5	Ethanol	ND	7.5	0.69	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	141-78-6	Ethyl Acetate	ND	15	0.77	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	637-92-3	Ethyl-t-Butyl Ether (ETBE)	ND	3.0	0.49	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	100-41-4	Ethylbenzene	1.6	0.75	0.17	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	622-96-8	4-Ethyltoluene	ND	0.75	0.27	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	142-82-5	Heptane	ND	3.0	0.93	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	87-68-3	Hexachloro-1,3-Butadiene	ND	2.2	0.27	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	110-54-3	Hexane	ND	3.0	0.77	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	591-78-6	2-Hexanone	ND	2.2	0.78	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND	3.0	0.18	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	75-09-2	Methylene Chloride	ND	7.5	0.28	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	108-10-1	4-Methyl-2-Pentanone	ND	2.2	0.23	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	95-47-6	o-Xylene	1.3	0.75	0.18	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	179601-23-1	p/m-Xylene	4.2	3.0	1.1	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	115-07-1	Propene	ND	15	5.2	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	100-42-5	Styrene	ND	2.2	0.27	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	994-05-8	Tert-Amyl-Methyl Ether (TAME)	ND	3.0	0.27	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	75-65-0	Tert-Butyl Alcohol (TBA)	ND	3.0	0.39	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	127-18-4	Tetrachloroethene	100	0.75	0.17	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	109-99-9	Tetrahydrofuran	24	2.2	0.24	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	108-88-3	Toluene	4.3	0.75	0.18	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	79-01-6	Trichloroethene	7.6	0.75	0.16	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	75-69-4	Trichlorofluoromethane	ND	1.5	0.12	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	76-13-1	1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	2.2	0.15	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	71-55-6	1,1,1-Trichloroethane	ND	0.75	0.15	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	79-00-5	1,1,2-Trichloroethane	ND	0.75	0.18	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	96-18-4	1,2,3-Trichloropropane	ND	7.5	0.19	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	107-02-8	Acrolein	ND	7.5	0.37	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	107-13-1	Acrylonitrile	ND	1.5	0.17	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	80-62-6	Methyl Methacrylate	ND	0.75	0.055	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	74-98-6	Propane	ND	22	7.6	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	106-97-8	Butane	ND	7.5	0.16	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	540-84-1	2,2,4-Trimethyl Pentane	ND	0.75	0.25	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	75-28-5	Isobutane	ND	7.5	0.85	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	811-97-2	1,1,1,2-Tetrafluoroethane	ND	3.0	0.18	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	108-67-8	1,3,5-Trimethylbenzene	ND	0.75	0.25	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	79-34-5	1,1,2,2-Tetrachloroethane	ND	1.5	0.16	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	95-63-6	1,2,4-Trimethylbenzene	ND	2.2	0.49	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	120-82-1	1,2,4-Trichlorobenzene	ND	3.0	1.1	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	108-05-4	Vinyl Acetate	ND	3.0	0.68	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	75-01-4	Vinyl Chloride	ND	0.75	0.15	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	75-37-6	1,1-Difluoroethane	ND	3.0	0.83	ppb (v/v)
A4-BLDG18-01-V15	02/15/10	EPA TO-15	67-63-0	Isopropanol	92	7.5	0.49	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	91-20-3	Naphthalene	ND	16	3.4	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	67-64-1	Acetone	23	3.2	0.31	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	71-43-2	Benzene	ND	0.80	0.15	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	100-44-7	Benzyl Chloride	ND	2.4	0.63	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	75-27-4	Bromodichloromethane	ND	0.80	0.16	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	75-25-2	Bromoform	ND	3.2	0.25	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	74-83-9	Bromomethane	ND	0.80	0.15	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	106-99-0	1,3-Butadiene	ND	2.4	0.18	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	78-93-3	2-Butanone	3.0	2.4	0.16	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	75-15-0	Carbon Disulfide	ND	3.2	0.16	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	56-23-5	Carbon Tetrachloride	ND	0.80	0.16	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	108-90-7	Chlorobenzene	ND	0.80	0.17	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	75-00-3	Chloroethane	ND	0.80	0.25	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	67-66-3	Chloroform	ND	0.80	0.14	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	74-87-3	Chloromethane	ND	0.80	0.16	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	110-82-7	Cyclohexane	ND	0.80	0.25	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	124-48-1	Dibromochloromethane	ND	0.80	0.18	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	75-71-8	Dichlorodifluoromethane	ND	0.80	0.23	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	108-20-3	Diisopropyl Ether (DIPE)	ND	3.2	0.21	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	75-34-3	1,1-Dichloroethane	ND	0.80	0.17	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	75-35-4	1,1-Dichloroethene	ND	0.80	0.18	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	106-93-4	1,2-Dibromoethane	ND	0.80	0.18	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	76-14-2	Dichlorotetrafluoroethane	ND	3.2	0.18	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	95-50-1	1,2-Dichlorobenzene	ND	0.80	0.18	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	107-06-2	1,2-Dichloroethane	ND	0.80	0.15	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	78-87-5	1,2-Dichloropropane	ND	0.80	0.18	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	541-73-1	1,3-Dichlorobenzene	ND	0.80	0.21	ppb (v/v)

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A4-BLDG18-04-V15	02/15/10	EPA TO-15	106-46-7	1,4-Dichlorobenzene	ND	0.80	0.22	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	123-91-1	1,4-Dioxane	ND	16	5.1	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	10061-01-5	c-1,3-Dichloropropene	ND	0.80	0.22	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	156-59-2	c-1,2-Dichloroethene	ND	0.80	0.21	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	156-60-5	t-1,2-Dichloroethene	ND	0.80	0.30	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	10061-02-6	t-1,3-Dichloropropene	ND	1.6	0.16	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	64-17-5	Ethanol	ND	8.0	0.74	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	141-78-6	Ethyl Acetate	ND	16	0.83	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	637-92-3	Ethyl-t-Butyl Ether (ETBE)	ND	3.2	0.53	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	100-41-4	Ethylbenzene	1.6	0.80	0.18	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	622-96-8	4-Ethyltoluene	ND	0.80	0.29	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	142-82-5	Heptane	ND	3.2	1.0	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	87-68-3	Hexachloro-1,3-Butadiene	ND	2.4	0.29	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	110-54-3	Hexane	ND	3.2	0.83	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	591-78-6	2-Hexanone	ND	2.4	0.83	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND	3.2	0.19	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	75-09-2	Methylene Chloride	ND	8.0	0.30	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	108-10-1	4-Methyl-2-Pentanone	ND	2.4	0.24	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	95-47-6	o-Xylene	1.9	0.80	0.19	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	179601-23-1	p/m-Xylene	4.9	3.2	1.2	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	115-07-1	Propene	ND	16	5.5	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	100-42-5	Styrene	ND	2.4	0.29	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	994-05-8	Tert-Amyl-Methyl Ether (TAME)	ND	3.2	0.29	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	75-65-0	Tert-Butyl Alcohol (TBA)	ND	3.2	0.42	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	127-18-4	Tetrachloroethene	570	8.0	1.8	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	109-99-9	Tetrahydrofuran	3.8	2.4	0.26	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	108-88-3	Toluene	4.9	0.80	0.19	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	79-01-6	Trichloroethene	31	0.80	0.17	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	75-69-4	Trichlorofluoromethane	ND	1.6	0.12	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	76-13-1	1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	2.4	0.16	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	71-55-6	1,1,1-Trichloroethane	1.3	0.80	0.16	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	79-00-5	1,1,2-Trichloroethane	ND	0.80	0.20	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	96-18-4	1,2,3-Trichloropropane	ND	8.0	0.20	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	107-02-8	Acrolein	ND	8.0	0.39	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	107-13-1	Acrylonitrile	ND	1.6	0.18	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	80-62-6	Methyl Methacrylate	ND	0.80	0.059	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	74-98-6	Propane	ND	24	8.1	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	106-97-8	Butane	ND	8.0	0.17	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	540-84-1	2,2,4-Trimethyl Pentane	ND	0.80	0.26	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	75-28-5	Isobutane	ND	8.0	0.91	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	811-97-2	1,1,1,2-Tetrafluoroethane	ND	3.2	0.19	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	108-67-8	1,3,5-Trimethylbenzene	ND	0.80	0.27	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	79-34-5	1,1,2,2-Tetrachloroethane	ND	1.6	0.17	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	95-63-6	1,2,4-Trimethylbenzene	ND	2.4	0.53	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	120-82-1	1,2,4-Trichlorobenzene	ND	3.2	1.2	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	108-05-4	Vinyl Acetate	ND	3.2	0.73	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	75-01-4	Vinyl Chloride	ND	0.80	0.16	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	75-37-6	1,1-Difluoroethane	7.6	3.2	0.89	ppb (v/v)
A4-BLDG18-04-V15	02/15/10	EPA TO-15	67-63-0	Isopropanol	70	8.0	0.52	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	91-20-3	Naphthalene	ND	16	3.4	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	67-64-1	Acetone	19	3.2	0.31	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	71-43-2	Benzene	ND	0.80	0.15	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	100-44-7	Benzyl Chloride	ND	2.4	0.63	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	75-27-4	Bromodichloromethane	ND	0.80	0.16	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	75-25-2	Bromoform	ND	3.2	0.24	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	74-83-9	Bromomethane	ND	0.80	0.15	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	106-99-0	1,3-Butadiene	ND	2.4	0.18	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	78-93-3	2-Butanone	3.1	2.4	0.16	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	75-15-0	Carbon Disulfide	ND	3.2	0.16	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	56-23-5	Carbon Tetrachloride	ND	0.80	0.16	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	108-90-7	Chlorobenzene	ND	0.80	0.17	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	75-00-3	Chloroethane	ND	0.80	0.25	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	67-66-3	Chloroform	1.0	0.80	0.14	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	74-87-3	Chloromethane	ND	0.80	0.16	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	110-82-7	Cyclohexane	ND	0.80	0.25	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	124-48-1	Dibromochloromethane	ND	0.80	0.18	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	75-71-8	Dichlorodifluoromethane	ND	0.80	0.23	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	108-20-3	Diisopropyl Ether (DIPE)	ND	3.2	0.21	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	75-34-3	1,1-Dichloroethane	ND	0.80	0.16	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	75-35-4	1,1-Dichloroethene	ND	0.80	0.18	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	106-93-4	1,2-Dibromoethane	ND	0.80	0.18	ppb (v/v)

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A4-BLDG18-02-V5	02/15/10	EPA TO-15	76-14-2	Dichlorotetrafluoroethane	ND	3.2	0.18	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	95-50-1	1,2-Dichlorobenzene	ND	0.80	0.18	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	107-06-2	1,2-Dichloroethane	ND	0.80	0.15	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	78-87-5	1,2-Dichloropropane	ND	0.80	0.18	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	541-73-1	1,3-Dichlorobenzene	ND	0.80	0.21	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	106-46-7	1,4-Dichlorobenzene	ND	0.80	0.22	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	123-91-1	1,4-Dioxane	ND	16	5.1	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	10061-01-5	c-1,3-Dichloropropene	ND	0.80	0.22	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	156-59-2	c-1,2-Dichloroethene	ND	0.80	0.21	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	156-60-5	t-1,2-Dichloroethene	1.2	0.80	0.30	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	10061-02-6	t-1,3-Dichloropropene	ND	1.6	0.16	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	64-17-5	Ethanol	ND	8.0	0.73	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	141-78-6	Ethyl Acetate	ND	16	0.82	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	637-92-3	Ethyl-t-Butyl Ether (ETBE)	ND	3.2	0.53	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	100-41-4	Ethylbenzene	1.7	0.80	0.18	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	622-96-8	4-Ethyltoluene	ND	0.80	0.29	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	142-82-5	Heptane	ND	3.2	0.99	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	87-68-3	Hexachloro-1,3-Butadiene	ND	2.4	0.29	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	110-54-3	Hexane	ND	3.2	0.83	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	591-78-6	2-Hexanone	ND	2.4	0.83	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND	3.2	0.19	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	75-09-2	Methylene Chloride	ND	8.0	0.30	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	108-10-1	4-Methyl-2-Pentanone	ND	2.4	0.24	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	95-47-6	o-Xylene	1.6	0.80	0.19	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	179601-23-1	p/m-Xylene	4.8	3.2	1.2	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	115-07-1	Propene	ND	16	5.5	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	100-42-5	Styrene	ND	2.4	0.29	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	994-05-8	Tert-Amyl-Methyl Ether (TAME)	ND	3.2	0.29	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	75-65-0	Tert-Butyl Alcohol (TBA)	ND	3.2	0.42	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	127-18-4	Tetrachloroethene	490	8.0	1.8	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	109-99-9	Tetrahydrofuran	130	2.4	0.26	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	108-88-3	Toluene	5.4	0.80	0.19	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	79-01-6	Trichloroethene	69	0.80	0.17	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	75-69-4	Trichlorofluoromethane	ND	1.6	0.12	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	76-13-1	1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	2.4	0.16	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	71-55-6	1,1,1-Trichloroethane	4.1	0.80	0.16	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	79-00-5	1,1,2-Trichloroethane	ND	0.80	0.19	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	96-18-4	1,2,3-Trichloropropane	ND	8.0	0.20	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	107-02-8	Acrolein	ND	8.0	0.39	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	107-13-1	Acrylonitrile	ND	1.6	0.18	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	80-62-6	Methyl Methacrylate	ND	0.80	0.059	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	74-98-6	Propane	ND	24	8.1	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	106-97-8	Butane	ND	8.0	0.17	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	540-84-1	2,2,4-Trimethyl Pentane	ND	0.80	0.26	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	75-28-5	Isobutane	ND	8.0	0.91	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	811-97-2	1,1,1,2-Tetrafluoroethane	ND	3.2	0.19	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	108-67-8	1,3,5-Trimethylbenzene	ND	0.80	0.27	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	79-34-5	1,1,2,2-Tetrachloroethane	ND	1.6	0.17	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	95-63-6	1,2,4-Trimethylbenzene	ND	2.4	0.52	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	120-82-1	1,2,4-Trichlorobenzene	ND	3.2	1.2	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	108-05-4	Vinyl Acetate	ND	3.2	0.73	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	75-01-4	Vinyl Chloride	ND	0.80	0.16	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	75-37-6	1,1-Difluoroethane	5.2	3.2	0.89	ppb (v/v)
A4-BLDG18-02-V5	02/15/10	EPA TO-15	67-63-0	Isopropanol	ND	8.0	0.52	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	91-20-3	Naphthalene	ND	15	3.2	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	67-64-1	Acetone	8.6	3.1	0.30	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	71-43-2	Benzene	ND	0.76	0.14	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	100-44-7	Benzyl Chloride	ND	2.3	0.60	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	75-27-4	Bromodichloromethane	ND	0.76	0.16	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	75-25-2	Bromoform	ND	3.1	0.23	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	74-83-9	Bromomethane	ND	0.76	0.14	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	106-99-0	1,3-Butadiene	ND	2.3	0.17	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	78-93-3	2-Butanone	ND	2.3	0.15	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	75-15-0	Carbon Disulfide	ND	3.1	0.15	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	56-23-5	Carbon Tetrachloride	ND	0.76	0.15	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	108-90-7	Chlorobenzene	ND	0.76	0.17	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	75-00-3	Chloroethane	ND	0.76	0.24	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	67-66-3	Chloroform	ND	0.76	0.14	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	74-87-3	Chloromethane	ND	0.76	0.15	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	110-82-7	Cyclohexane	1.4	0.76	0.24	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	124-48-1	Dibromochloromethane	ND	0.76	0.17	ppb (v/v)

Analytical Data Tables

A4-BLDG18-02-V15	02/15/10	EPA TO-15	75-71-8	Dichlorodifluoromethane	ND	0.76	0.22	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	108-20-3	Diisopropyl Ether (DIPE)	ND	3.1	0.20	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	75-34-3	1,1-Dichloroethane	ND	0.76	0.16	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	75-35-4	1,1-Dichloroethene	ND	0.76	0.17	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	106-93-4	1,2-Dibromoethane	ND	0.76	0.17	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	76-14-2	Dichlorotetrafluoroethane	ND	3.1	0.17	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	95-50-1	1,2-Dichlorobenzene	ND	0.76	0.17	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	107-06-2	1,2-Dichloroethane	ND	0.76	0.15	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	78-87-5	1,2-Dichloropropane	ND	0.76	0.17	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	541-73-1	1,3-Dichlorobenzene	ND	0.76	0.20	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	106-46-7	1,4-Dichlorobenzene	ND	0.76	0.21	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	123-91-1	1,4-Dioxane	ND	15	4.9	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	10061-01-5	c-1,3-Dichloropropene	ND	0.76	0.21	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	156-59-2	c-1,2-Dichloroethene	0.77	0.76	0.20	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	156-60-5	t-1,2-Dichloroethene	ND	0.76	0.29	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	10061-02-6	t-1,3-Dichloropropene	ND	1.5	0.16	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	64-17-5	Ethanol	ND	7.6	0.70	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	141-78-6	Ethyl Acetate	ND	15	0.78	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	637-92-3	Ethyl-t-Butyl Ether (ETBE)	ND	3.1	0.50	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	100-41-4	Ethylbenzene	1.1	0.76	0.17	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	622-96-8	4-Ethyltoluene	ND	0.76	0.28	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	142-82-5	Heptane	ND	3.1	0.95	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	87-68-3	Hexachloro-1,3-Butadiene	ND	2.3	0.28	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	110-54-3	Hexane	ND	3.1	0.79	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	591-78-6	2-Hexanone	ND	2.3	0.79	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND	3.1	0.18	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	75-09-2	Methylene Chloride	ND	7.6	0.29	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	108-10-1	4-Methyl-2-Pentanone	ND	2.3	0.23	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	95-47-6	o-Xylene	1.4	0.76	0.18	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	179601-23-1	p/m-Xylene	3.7	3.1	1.2	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	115-07-1	Propene	ND	15	5.3	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	100-42-5	Styrene	ND	2.3	0.27	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	994-05-8	Tert-Amyl-Methyl Ether (TAME)	ND	3.1	0.28	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	75-65-0	Tert-Butyl Alcohol (TBA)	ND	3.1	0.40	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	127-18-4	Tetrachloroethene	820	7.6	1.7	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	109-99-9	Tetrahydrofuran	36	2.3	0.24	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	108-88-3	Toluene	3.2	0.76	0.18	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	79-01-6	Trichloroethene	84	0.76	0.16	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	75-69-4	Trichlorofluoromethane	ND	1.5	0.12	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	76-13-1	1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	2.3	0.15	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	71-55-6	1,1,1-Trichloroethane	4.7	0.76	0.15	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	79-00-5	1,1,2-Trichloroethane	ND	0.76	0.19	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	96-18-4	1,2,3-Trichloropropane	ND	7.6	0.19	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	107-02-8	Acrolein	ND	7.6	0.37	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	107-13-1	Acrylonitrile	ND	1.5	0.17	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	80-62-6	Methyl Methacrylate	ND	0.76	0.056	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	74-98-6	Propane	ND	23	7.7	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	106-97-8	Butane	ND	7.6	0.17	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	540-84-1	2,2,4-Trimethyl Pentane	ND	0.76	0.25	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	75-28-5	Isobutane	ND	7.6	0.87	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	811-97-2	1,1,1,2-Tetrafluoroethane	ND	3.1	0.18	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	108-67-8	1,3,5-Trimethylbenzene	ND	0.76	0.26	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	79-34-5	1,1,2,2-Tetrachloroethane	ND	1.5	0.16	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	95-63-6	1,2,4-Trimethylbenzene	ND	2.3	0.50	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	120-82-1	1,2,4-Trichlorobenzene	ND	3.1	1.1	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	108-05-4	Vinyl Acetate	ND	3.1	0.70	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	75-01-4	Vinyl Chloride	ND	0.76	0.15	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	75-37-6	1,1-Difluoroethane	ND	3.1	0.85	ppb (v/v)
A4-BLDG18-02-V15	02/15/10	EPA TO-15	67-63-0	Isopropanol	100	7.6	0.49	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	91-20-3	Naphthalene	ND	16	3.3	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	67-64-1	Acetone	10	3.1	0.30	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	71-43-2	Benzene	ND	0.78	0.15	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	100-44-7	Benzyl Chloride	ND	2.4	0.62	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	75-27-4	Bromodichloromethane	0.81	0.78	0.16	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	75-25-2	Bromoform	ND	3.1	0.24	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	74-83-9	Bromomethane	ND	0.78	0.15	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	106-99-0	1,3-Butadiene	ND	2.4	0.18	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	78-93-3	2-Butanone	ND	2.4	0.16	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	75-15-0	Carbon Disulfide	ND	3.1	0.16	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	56-23-5	Carbon Tetrachloride	ND	0.78	0.15	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	108-90-7	Chlorobenzene	ND	0.78	0.17	ppb (v/v)

Appendix A
Building 18 - Amtrak Redondo Junction

Analytical Data Tables

A4-BLDG18-02-V50	02/15/10	EPA TO-15	75-00-3	Chloroethane	ND	0.78	0.24	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	67-66-3	Chloroform	1.1	0.78	0.14	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	74-87-3	Chloromethane	ND	0.78	0.15	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	110-82-7	Cyclohexane	ND	0.78	0.24	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	124-48-1	Dibromochloromethane	0.96	0.78	0.18	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	75-71-8	Dichlorodifluoromethane	ND	0.78	0.23	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	108-20-3	Diisopropyl Ether (DIPE)	ND	3.1	0.21	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	75-34-3	1,1-Dichloroethane	ND	0.78	0.16	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	75-35-4	1,1-Dichloroethene	ND	0.78	0.17	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	106-93-4	1,2-Dibromoethane	ND	0.78	0.17	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	76-14-2	Dichlorotetrafluoroethane	ND	3.1	0.17	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	95-50-1	1,2-Dichlorobenzene	ND	0.78	0.17	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	107-06-2	1,2-Dichloroethane	ND	0.78	0.15	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	78-87-5	1,2-Dichloropropane	ND	0.78	0.18	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	541-73-1	1,3-Dichlorobenzene	ND	0.78	0.20	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	106-46-7	1,4-Dichlorobenzene	ND	0.78	0.21	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	123-91-1	1,4-Dioxane	ND	16	5.0	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	10061-01-5	c-1,3-Dichloropropene	ND	0.78	0.22	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	156-59-2	c-1,2-Dichloroethene	0.79	0.78	0.21	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	156-60-5	t-1,2-Dichloroethene	1.3	0.78	0.29	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	10061-02-6	t-1,3-Dichloropropene	ND	1.6	0.16	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	64-17-5	Ethanol	ND	7.8	0.72	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	141-78-6	Ethyl Acetate	ND	16	0.81	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	637-92-3	Ethyl-t-Butyl Ether (ETBE)	ND	3.1	0.52	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	100-41-4	Ethylbenzene	1.1	0.78	0.18	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	622-96-8	4-Ethyltoluene	ND	0.78	0.29	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	142-82-5	Heptane	ND	3.1	0.97	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	87-68-3	Hexachloro-1,3-Butadiene	ND	2.4	0.28	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	110-54-3	Hexane	ND	3.1	0.81	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	591-78-6	2-Hexanone	ND	2.4	0.81	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	1634-04-4	Methyl-t-Butyl Ether (MTBE)	ND	3.1	0.19	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	75-09-2	Methylene Chloride	ND	7.8	0.29	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	108-10-1	4-Methyl-2-Pentanone	ND	2.4	0.24	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	95-47-6	o-Xylene	1.3	0.78	0.19	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	179601-23-1	p/m-Xylene	3.4	3.1	1.2	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	115-07-1	Propene	ND	16	5.4	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	100-42-5	Styrene	ND	2.4	0.28	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	994-05-8	Tert-Amyl-Methyl Ether (TAME)	ND	3.1	0.28	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	75-65-0	Tert-Butyl Alcohol (TBA)	ND	3.1	0.41	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	127-18-4	Tetrachloroethene	840	7.8	1.7	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	109-99-9	Tetrahydrofuran	89	2.4	0.25	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	108-88-3	Toluene	3.4	0.78	0.18	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	79-01-6	Trichloroethene	77	0.78	0.17	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	75-69-4	Trichlorofluoromethane	ND	1.6	0.12	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	76-13-1	1,1,2-Trichloro-1,2,2-Trifluoroethane	ND	2.4	0.16	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	71-55-6	1,1,1-Trichloroethane	4.2	0.78	0.16	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	79-00-5	1,1,2-Trichloroethane	ND	0.78	0.19	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	96-18-4	1,2,3-Trichloropropane	ND	7.8	0.20	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	107-02-8	Acrolein	ND	7.8	0.38	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	107-13-1	Acrylonitrile	ND	1.6	0.18	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	80-62-6	Methyl Methacrylate	ND	0.78	0.058	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	74-98-6	Propane	ND	24	7.9	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	106-97-8	Butane	ND	7.8	0.17	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	540-84-1	2,2,4-Trimethyl Pentane	ND	0.78	0.26	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	75-28-5	Isobutane	ND	7.8	0.89	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	811-97-2	1,1,1,2-Tetrafluoroethane	ND	3.1	0.19	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	108-67-8	1,3,5-Trimethylbenzene	ND	0.78	0.26	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	79-34-5	1,1,2,2-Tetrachloroethane	ND	1.6	0.17	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	95-63-6	1,2,4-Trimethylbenzene	ND	2.4	0.51	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	120-82-1	1,2,4-Trichlorobenzene	ND	3.1	1.1	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	108-05-4	Vinyl Acetate	ND	3.1	0.71	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	75-01-4	Vinyl Chloride	ND	0.78	0.16	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	75-37-6	1,1-Difluoroethane	4.9	3.1	0.87	ppb (v/v)
A4-BLDG18-02-V50	02/15/10	EPA TO-15	67-63-0	Isopropanol	ND	7.8	0.51	ppb (v/v)

APPENDIX B

Volatilization Modeling

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
58			5.90E+00	C5-C8 Aliphatics

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24			1.00E-08

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.66	0.375	0.054	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	83.3333

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
1.00E-01	1.00E-05	8.00E-01	25	7,000	369.00	508.00	0.0E+00	7.0E-01	108.00

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.321	#N/A	#N/A	#N/A	1.00E-08	4,000	2.61E+04	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, $D^{eff}{}_V$ (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	8,304	7.63E-01	3.13E+01	1.80E-04	1.62E-02	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)
15	2.61E+04	1.25	8.33E+01	1.62E-02	5.00E+03	3.00E+04	1.44E-03	3.76E+01

Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
NA	7.0E-01

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.2E-02

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
67641			2.60E-02	Acetone

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24			1.00E-08

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.66	0.375	0.054	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	83.3333

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
1.24E-01	1.14E-05	3.87E-05	25	6,955	329.20	508.10	0.0E+00	3.1E+01	58.08

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.321	#N/A	#N/A	#N/A	1.00E-08	4,000	6.19E+01	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,384	3.71E-05	1.52E-03	1.80E-04	2.00E-02	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
15	6.19E+01	1.25	8.33E+01	2.00E-02	5.00E+03	4.08E+03	1.57E-03	9.70E-02

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	3.1E+01

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	7.1E-07

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based soil concentration is based on a route-to-route extrapolation.

END

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
75274			1.30E-03	Bromodichloromethane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24			1.00E-08

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.66	0.375	0.054	5

Lookup Soil Parameters

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	83.3333

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
2.98E-02	1.06E-05	1.60E-03	25	7,800	363.15	585.85	3.7E-05	7.0E-02	163.83

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.321	#N/A	#N/A	#N/A	1.00E-08	4,000	8.74E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	8,526	1.52E-03	6.24E-02	1.80E-04	4.82E-03	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
15	8.74E+00	1.25	8.33E+01	4.82E-03	5.00E+03	1.06E+15	7.28E-04	6.36E-03

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
3.7E-05	7.0E-02

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
1.9E-08	2.1E-05

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based soil concentration is based on a route-to-route extrapolation.

END

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
78933			3.30E-03	Methylethylketone (2-butanone)

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24			1.00E-08

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.66	0.375	0.054	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	83.3333

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
8.08E-02	9.80E-06	5.58E-05	25	7,481	352.50	536.78	0.0E+00	5.0E+00	72.11

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.321	#N/A	#N/A	#N/A	1.00E-08	4,000	9.76E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	8,244	5.32E-05	2.18E-03	1.80E-04	1.31E-02	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
15	9.76E+00	1.25	8.33E+01	1.31E-02	5.00E+03	3.47E+05	1.31E-03	1.28E-02

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	5.0E+00

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	5.8E-07

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

ENTER Chemical CAS No. (numbers only, no dashes)	Soil Gas Concentration Data: ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
67663			2.30E-03	Chloroform

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24			1.00E-08

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.66	0.375	0.054	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	83.3333

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
1.04E-01	1.00E-05	3.66E-03	25	6,988	334.32	536.40	5.3E-06	3.0E-01	119.38

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.321	#N/A	#N/A	#N/A	1.00E-08	4,000	1.13E+01	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,407	3.51E-03	1.44E-01	1.80E-04	1.68E-02	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
15	1.13E+01	1.25	8.33E+01	1.68E-02	5.00E+03	2.02E+04	1.46E-03	1.65E-02

Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
5.3E-06	3.0E-01

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
7.1E-09	1.3E-05

MESSAGE SUMMARY BELOW:

END

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
124481			8.70E-04	Chlorodibromomethane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24			1.00E-08

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.66	0.375	0.054	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	83.3333

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
1.96E-02	1.05E-05	7.81E-04	25	5,900	416.14	678.20	2.7E-05	7.0E-02	208.28

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.321	#N/A	#N/A	#N/A	1.00E-08	4,000	7.43E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	6,696	7.52E-04	3.08E-02	1.80E-04	3.17E-03	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
15	7.43E+00	1.25	8.33E+01	3.17E-03	5.00E+03	6.97E+22	5.33E-04	3.96E-03

Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
2.7E-05	7.0E-02

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
8.7E-09	1.3E-05

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based soil concentration is based on a route-to-route extrapolation.

END

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
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Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
75718			1.50E-03	Dichlorodifluoromethane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24			1.00E-08

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.66	0.375	0.054	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	83.3333

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
6.65E-02	9.92E-06	3.42E-01	25	9,421	243.20	384.95	0.0E+00	2.0E-01	120.92

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.321	#N/A	#N/A	#N/A	1.00E-08	4,000	7.44E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,961	3.27E-01	1.34E+01	1.80E-04	1.08E-02	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
15	7.44E+00	1.25	8.33E+01	1.08E-02	5.00E+03	5.41E+06	1.19E-03	8.86E-03

Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
NA	2.0E-01

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.0E-05

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
156592			7.70E-04	cis-1,2-Dichloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24			1.00E-08

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.66	0.375	0.054	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	83.3333

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
7.36E-02	1.13E-05	4.07E-03	25	7,192	333.65	544.00	0.0E+00	3.5E-02	96.94

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.321	#N/A	#N/A	#N/A	1.00E-08	4,000	3.06E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,592	3.90E-03	1.60E-01	1.80E-04	1.19E-02	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
15	3.06E+00	1.25	8.33E+01	1.19E-02	5.00E+03	1.21E+06	1.25E-03	3.84E-03

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	3.5E-02

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.5E-05

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based soil concentration is based on a route-to-route extrapolation.

END

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
156605			1.25E-03	trans-1,2-Dichloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24			1.00E-08

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.66	0.375	0.054	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	83.3333

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
7.07E-02	1.19E-05	9.36E-03	25	6,717	320.85	516.50	0.0E+00	6.0E-02	96.94

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. (μg/m^3)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.321	#N/A	#N/A	#N/A	1.00E-08	4,000	4.97E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, $D^{eff}{}_V$ (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	6,986	8.99E-03	3.69E-01	1.80E-04	1.14E-02	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} (μg/m^3)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ (μg/m^3)
15	4.97E+00	1.25	8.33E+01	1.14E-02	5.00E+03	2.15E+06	1.23E-03	6.11E-03

Unit risk factor, URF (μg/m^3)$^{-1}$	Reference conc., RfC (mg/m^3)
NA	6.0E-02

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.3E-05

MESSAGE SUMMARY BELOW:

MESSAGE: Risk/HQ or risk-based soil concentration is based on a route-to-route extrapolation.

END

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
100414			3.30E-03	Ethylbenzene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24			1.00E-08

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.66	0.375	0.054	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	83.3333

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
7.50E-02	7.80E-06	7.86E-03	25	8,501	409.34	617.20	2.5E-06	1.0E+00	106.17

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.321	#N/A	#N/A	#N/A	1.00E-08	4,000	1.44E+01	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,994	7.43E-03	3.05E-01	1.80E-04	1.21E-02	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
15	1.44E+01	1.25	8.33E+01	1.21E-02	5.00E+03	9.33E+05	1.26E-03	1.82E-02

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
2.5E-06	1.0E+00

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
3.7E-09	4.1E-06

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
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(last modified 2/4/09)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
95476			2.70E-03	o-Xylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24			1.00E-08

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.66	0.375	0.054	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	83.3333

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
8.70E-02	1.00E-05	5.18E-03	25	8,661	417.60	630.30	0.0E+00	1.0E-01	106.17

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.321	#N/A	#N/A	#N/A	1.00E-08	4,000	1.18E+01	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	10,245	4.88E-03	2.00E-01	1.80E-04	1.41E-02	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
15	1.18E+01	1.25	8.33E+01	1.41E-02	5.00E+03	1.40E+05	1.36E-03	1.59E-02

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	1.0E-01

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	3.6E-05

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
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DTSC
Vapor Intrusion Guidance
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(last modified 2/4/09)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
106423			9.40E-03	p-Xylene

MORE

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24			1.00E-08

MORE

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.66	0.375	0.054	5

MORE

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	83.3333

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
7.69E-02	8.44E-06	7.64E-03	25	8,525	411.52	616.20	0.0E+00	1.0E-01	106.17

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.321	#N/A	#N/A	#N/A	1.00E-08	4,000	4.09E+01	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	10,083	7.22E-03	2.96E-01	1.80E-04	1.24E-02	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
15	4.09E+01	1.25	8.33E+01	1.24E-02	5.00E+03	6.64E+05	1.28E-03	5.24E-02

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	1.0E-01

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.2E-04

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

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DTSC
Vapor Intrusion Guidance
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(last modified 2/4/09)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
127184			8.20E-01	Tetrachloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24			1.00E-08

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.66	0.375	0.054	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	83.3333

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
7.20E-02	8.20E-06	1.84E-02	25	8,288	394.40	620.20	5.9E-06	3.5E-02	165.83

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.321	#N/A	#N/A	#N/A	1.00E-08	4,000	5.58E+03	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,410	1.74E-02	7.14E-01	1.80E-04	1.16E-02	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
15	5.58E+03	1.25	8.33E+01	1.16E-02	5.00E+03	1.65E+06	1.24E-03	6.91E+00

Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)
5.9E-06	3.5E-02

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
3.3E-06	4.5E-02

MESSAGE SUMMARY BELOW:

END

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
108883			5.20E-03	Toluene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24			1.00E-08

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, $\rho_b{}^A$ (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, $\theta_w{}^V$ (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.66	0.375	0.054	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	83.3333

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
8.70E-02	8.60E-06	6.62E-03	25	7,930	383.78	591.79	0.0E+00	3.0E-01	92.14

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.321	#N/A	#N/A	#N/A	1.00E-08	4,000	1.97E+01	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	9,001	6.29E-03	2.58E-01	1.80E-04	1.41E-02	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
15	1.97E+01	1.25	8.33E+01	1.41E-02	5.00E+03	1.40E+05	1.36E-03	2.66E-02

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	3.0E-01

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	2.0E-05

MESSAGE SUMMARY BELOW:

END

SG-SCREEN
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DTSC
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(last modified 2/4/09)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
79016			8.40E-02	Trichloroethylene

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24			1.00E-08

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.66	0.375	0.054	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	83.3333

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	2.0E-06	6.0E-01	131.39

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.321	#N/A	#N/A	#N/A	1.00E-08	4,000	4.53E+02	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	8,382	9.80E-03	4.02E-01	1.80E-04	1.28E-02	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
15	4.53E+02	1.25	8.33E+01	1.28E-02	5.00E+03	4.65E+05	1.30E-03	5.87E-01

Unit risk factor, URF ($\mu g/m^3$)$^{-1}$	Reference conc., RfC (mg/m^3)
2.0E-06	6.0E-01

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
9.6E-08	2.2E-04

MESSAGE SUMMARY BELOW:

END

SG-SCREEN
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Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
71556			4.70E-03	1,1,1-Trichloroethane

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (°C)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24			1.00E-08

MORE ↓

ENTER Vandose zone SCS soil type (Lookup Soil Parameters)	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.66	0.375	0.054	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	83.3333

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
7.80E-02	8.80E-06	1.72E-02	25	7,136	347.24	545.00	0.0E+00	5.0E+00	133.40

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.321	#N/A	#N/A	#N/A	1.00E-08	4,000	2.57E+01	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} ($atm\text{-}m^3/mol$)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	7,732	1.64E-02	6.73E-01	1.80E-04	1.26E-02	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
15	2.57E+01	1.25	8.33E+01	1.26E-02	5.00E+03	5.50E+05	1.29E-03	3.31E-02

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
NA	5.0E+00

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	1.5E-06

MESSAGE SUMMARY BELOW:

END

DATA ENTRY SHEET

SG-SCREEN
PA Version 2.0; 04/

Reset to Defaults

DTSC
Vapor Intrusion Guidance
Interim Final 12/04
(last modified 2/4/09)

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_g ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_g (ppmv)	Chemical
74873			8.00E-04	Methyl chloride (chloromethane)

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_F (15 or 200 cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_S (^oC)	ENTER Vadose zone SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined vadose zone soil vapor permeability, k_v (cm^2)
15	152.4	24			1.00E-08

MORE ↓

ENTER Vandose zone SCS soil type	ENTER Vadose zone soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Vadose zone soil total porosity, n^V (unitless)	ENTER Vadose zone soil water-filled porosity, θ_w^V (cm^3/cm^3)	ENTER Average vapor flow rate into bldg. (Leave blank to calculate) Q_{soil} (L/m)
S	1.66	0.375	0.054	5

Lookup Soil Parameters

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	83.3333

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H ($atm\text{-}m^3/mol$)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Unit risk factor, URF ($(\mu g/m^3)^{-1}$)	Reference conc., RfC (mg/m^3)	Molecular weight, MW (g/mol)
1.26E-01	6.50E-06	8.80E-03	25	5,115	249.00	416.25	1.8E-06	9.0E-02	50.49

END

INTERMEDIATE CALCULATIONS SHEET

Source-building separation, L_T (cm)	Vadose zone soil air-filled porosity, θ_a^V (cm^3/cm^3)	Vadose zone effective total fluid saturation, S_{te} (cm^3/cm^3)	Vadose zone soil intrinsic permeability, k_i (cm^2)	Vadose zone soil relative air permeability, k_{rg} (cm^2)	Vadose zone soil effective vapor permeability, k_v (cm^2)	Floor-wall seam perimeter, X_{crack} (cm)	Soil gas conc. ($\mu g/m^3$)	Bldg. ventilation rate, $Q_{building}$ (cm^3/s)
137.4	0.321	#N/A	#N/A	#N/A	1.00E-08	4,000	1.66E+00	3.39E+04

Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. soil temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. soil temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. soil temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Vadose zone effective diffusion coefficient, D^{eff}_V (cm^2/s)	Diffusion path length, L_d (cm)
1.00E+06	5.00E-03	15	4,578	8.57E-03	3.52E-01	1.80E-04	2.04E-02	137.4

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)
15	1.66E+00	1.25	8.33E+01	2.04E-02	5.00E+03	3.58E+03	1.57E-03	2.61E-03

Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
1.8E-06	9.0E-02

END

RESULTS SHEET

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
3.8E-10	6.6E-06

MESSAGE SUMMARY BELOW:

END

APPENDIX C

Agency Correspondence

August 14, 2009

Meeting Minutes

Re: **Meeting regarding Amtrak's comment to the Draft Human Health Risk Assessment (HHRA) for Redondo Junction Facility Order (RAO 02103-012)**

Location: California Department of Toxic Substances Control, 5796 Corporate Avenue Cypress, CA

Date and Time: August 12, 2009 1300-1530

Attendees: Rita Kamat, DTSC – Unit Chief
Bruce Garbaccio, DTSC – Engineering Geologist
Poonam Acharya, DTSC – Project Manager
Dr. Gerald "Buzz" Chernoff, DTSC – Toxicologist
Bill Bosan, DTSC – ___________
Efren Neuwirth, DTSC – Toxicologist
Craig Caldwell, Amtrak – ___________
Wade Smith, Amtrak – Senior Environmental Coordinator
Chuck Campbell, AMEC – Project Manager
Russell Okoji, AMEC – Senior Toxicologist
Nathan Starr, Windward – Geologist of Record

Handout: Distributed Windward (AMEC's subcontractor) 10 August 2009 memo with subject line: "Summary of Major Milestones in the RI/FS process at Amtrak Los Angeles Yards under Imminent And Substantial Endangerment Determination And Remedial Action Order (RAO 02/03-012)"

NS: Described project milestone history.

PA/RK: Mention that DTSC's oversight role for remediation activities at SSL-497 is limited to review of Completion Report per the Project Environmental Oversight Agreement (PEOA) with Community Redevelopment Agency of the City of Los Angeles (CRA/LA).

PA: Agreed to request remediation progress records and soil vapor monitoring data for SSL-497 from CRA/LA.

GC/BB: Risks related to TPH needs to be evaluated, but aromatics can be excluded.

GC/BB/BG: Risk posed to occupants of Bldg #18 (marked as #6 on RI Figure 2) by VOC vapor intrusion need to be evaluated. The following data sets are acceptable for this risk evaluation (listed in order of data set most preferred to least preferred by DTSC):

1. Soil vapor probes within 5 ft of building laterally and at depths of 5 ft and 15 ft bgs

2. Current SSL-497 soil vapor monitoring data if within 5 ft of the Bldg #18
3. Building crawl space ambient vapor monitoring data

WS/CC: Explained ownership history of both SSL-497 and Amtrak property. Both properties were formerly owned by the Santa Fe Railroad (now merged into BNSF) until 1976. Amtrak acquired the eastern property in 1976 as part of their acquisition of passenger rail operations and facilities nationwide.

BB/RK: The eastern property (SSL-497) was sold to the State of California Department of General Services in the late 1980s for planned State prison, which was never built. The CRA/LA wanted to redevelop the property as an industrial facility and entered into a Voluntary Cleanup agreement with DTSC in the late 1990s.

WS/CC: Asked for DTSC's interpretation of the indemnification clause in the real estate transition between BNSF and State of California.

BB/RK: Agreed that PRP for offsite plume that extends onto Amtrak property should be responsible investigation / remediation of resulting impacts to Amtrak property. This approach has been applied to similar situation previously wherein a public school property was impacted by plume originating from offsite.

RK: Explained that it is acceptable for DTSC to close Amtrak's existing RAO of Amtrak can demonstrate that site workers are adequately protected (i.e., risks levels are below industrial worker thresholds).

Group Discussion:

1. An acceptable closure approach would involve 1) demonstration that risk levels to industrial workers are below acceptable thresholds while SSL-497 SVE operations are ongoing, and 2) Once SSL-497 SVE operations are completed, Amtrak would need to restart vapor monitoring and demonstrate risk to industrial workers remain below acceptable thresholds.
2. Discussed HERD's HHRA comment #1 and agreed that current shallow soil vapor data from SSL-497 should be used for risk evaluation, not the pre-SVE soil vapor data that AMEC excluded from risk evaluation. Also BB agreed that shallow soil vapor data is reasonable to use over deeper soil vapor data since data is available from both depths at the majority of borings.
3. Discussed HERD's HHRA comment #2
   - ✓ GC: AMEC needs to check wording of HHRA text explaining methodology for exposure point concentration calculations. He generally finds AMEC's approach as explained by RO acceptable, but the text as written is open to misinterpretation. AMEC will show results for both maximum concentration at any depth and for the 0-10 ft zone.
4. Discussed HERD's HHRA comment #3: RO agrees to add sample table with details.
5. WS: Summarized path forward:
   - ✓ Amtrak/AMEC to draft responses and submit for DTSC review by September 8.
   - ✓ A Tech Memo of Amtrak's approach for soil vapor monitoring related to Bldg #18 will accompany the draft response to comments.
   - ✓ The two groundwater monitoring wells will be sampled.

- ✓ DTSC will meet with CRA/LA to discuss SSL-497 impacts to Amtrak's property.

6. CC: Requested that DTSC formally clarify that scope of Amtrak RAO is limited to protection of Amtrak employees.

E-mail Correspondence with Efrem Neuwirth of DTSC
Tuesday, March 09, 2010

-----Original Message-----
> From: Efrem Neuwirth [mailto:ENeuwirt@dtsc.ca.gov]
> Sent: Tuesday, March 09, 2010 1:42 PM
> To: Yanagita, Vincent O
> Subject: [CONTENT] RE: [CONTENT] RE: AMTRAK
>
> If those were the max concentrations for cyclohexane and 1,1 DFA,
then
> I would not bother including them in the risk assessment for this
> site.
>
> Efrem
>
>
>>>> "Yanagita, Vincent O" <Vincent.Yanagita@amec.com> 3/9/2010 2:33 PM
>>>> >>>
> Thanks Efrem,
>
> sorry, yes I believe IPA was used as a leak check compounds and
> already has been eliminated. As for cyclohexane and 1,1-
> Difluoroethane, were detected infrequently at pretty low levels,
> 1.4ppb and 7.6ppb respectively. If these are below applicable
> screening criteria, can they be eliminated?
>
> THF was detected in all samples (8 samples). I may have to check
with
> the lab and/or the PM to determine the source of THF.
>
>
> Vincent Yanagita
>
>
>
> Environmental Scientist
> AMEC Earth & Environmental, Inc.
> 3049 Ualena Street Suite 1100
> Honolulu, Hawaii 96819
>
> Office: 808-545-2462
> Mobile: 808-306-4421
>
>
> -----Original Message-----
> From: Efrem Neuwirth [mailto:ENeuwirt@dtsc.ca.gov]
> Sent: Tuesday, March 09, 2010 12:07 PM
> To: Yanagita, Vincent O
> Subject: [CONTENT] RE: AMTRAK
>
> I would not necessarily exclude compounds because they are not on the
> list. I would not want to make a general statement on not including
> the listed compounds. However my guess without out seeing the data is
> that they were low and/or infrequent hits and some may be due to
> cross-contamination in the lab (cyclohexane and THF) or were perhaps

> used as a leak check compound (isopropanol).
>
> What were the max concentrations and the fraction of samples which
> were detects?
> Was there any evidence of a historical release on-site for any of
> them, i.e. a spill from a tank or train car?
>
> Efrem
>
>>>> "Yanagita, Vincent O" <Vincent.Yanagita@amec.com> 3/9/2010 1:29 PM
>>>> >>>
>
> Hi Efrem,
>
> I have been working with Russell Okoji on the Human Health Risk work
> at Amtrak Redondo Junction. AMEC has retained Russell as a private
> consultant to continue to provide guidance with this project. If you
> have any further questions feel free to contact him at the cc'd
> address.
>
> I just had a quick question regarding the DTSC J&E models for Indoor
> Air Intrusion. Generally, if compounds are analyzed for in Soil
Vapor
> Analysis which are not included in the DTSC model, can these be
> removed from further evaluation? Or would we be required to add
these
> compounds to the model? Or would a surrogate compound have to be
> identified?
>
> Specifically I am look at:
> Cyclohexane   (110827)
> Tetrahydrofuran (109999)
> 1,1-Difluoroethane (75376)
> Isopropanol   (67630)
>
> Thanks,
>
> Vincent Yanagita
>
> Environmental Scientist
> AMEC Earth & Environmental, Inc.
> 3049 Ualena Street Suite 1100
> Honolulu, Hawaii 96819
>
> Office: 808-545-2462
> Mobile: 808-306-4421
>
>

Appendix K
Site Photographs

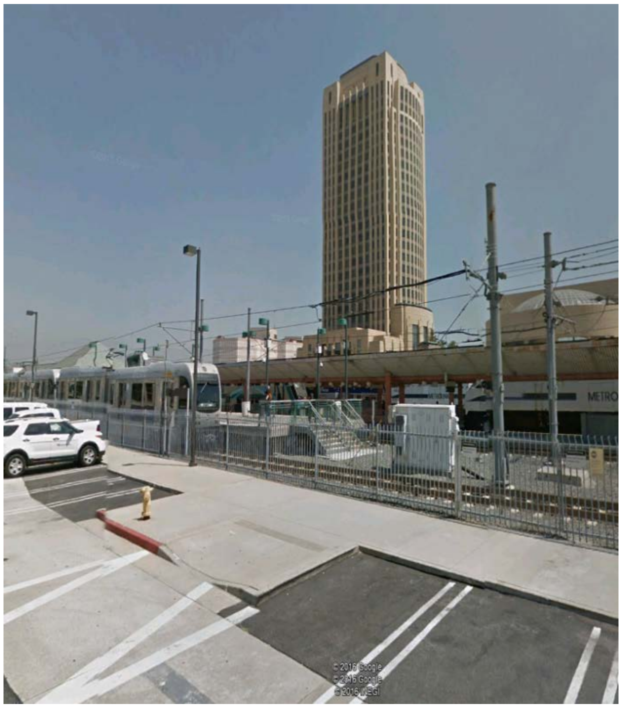

Photo 1: Metro Link railway. The view is toward the northeast.

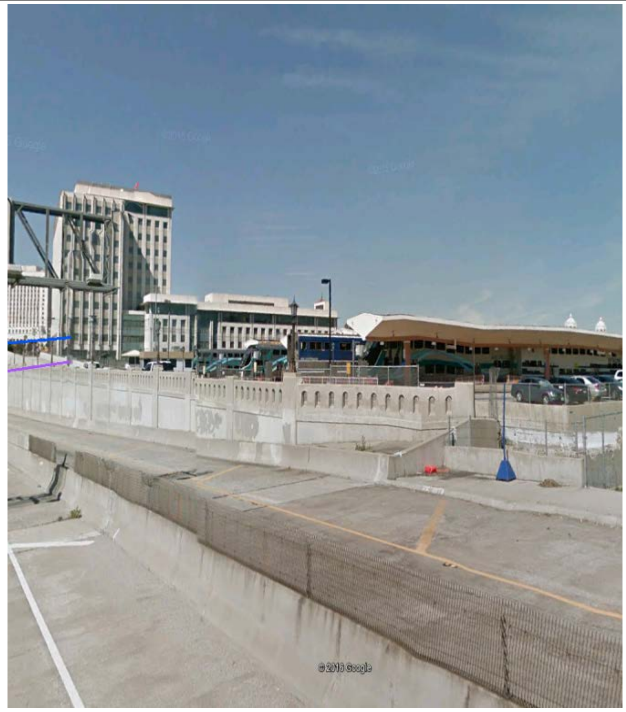

Photo 2: The US-101 busway onramp and the end of the rail tracks. The view is toward the west.

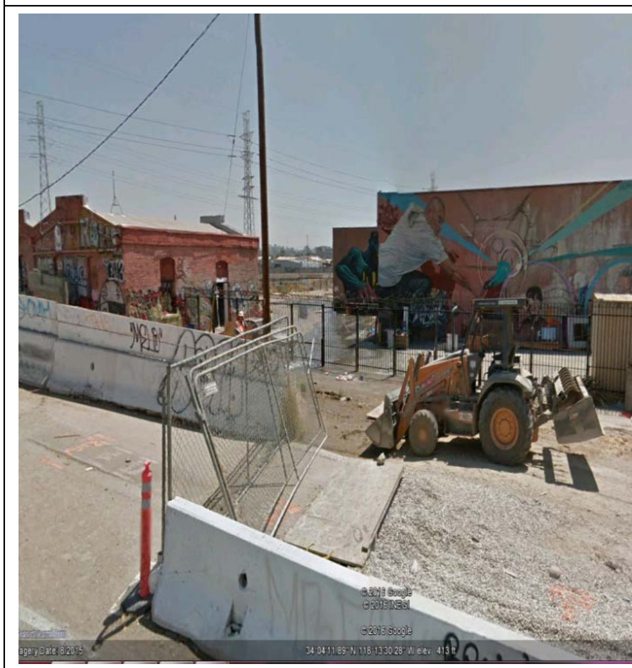

Photo 3: HDR Map Code #5 – 1746 N. Spring Street. Previous location of the Bortz Oil company. The view is toward the south.

Photo 4: HDR Map Code #17 - 1630 N. Main Street. Los Angeles Water Department yard with gasoline pumps. Site has an open LUST case. The view is toward the northeast.

Photo 5: HDR Map Code #22 – 1250 N. Main Street. Witco/Allied Kelite site is noted with groundwater contamination. The view is toward the south.

Photo 6: HDR Map Code #31 - 1300 Cardinal Street. William Mead residential area and playground. Active cleanup site with deed restrictions. The view is toward the northwest.

Photo 7: HDR Map Code #38 - 1033 Alhambra Avenue. Forge Company. Site has a closed LUST case in addition to current business operations. The view is toward the north.

Photo 8: HDR Map Code #40 - 1430 Bolero. BNSF The Mission Tower Site is a closed case, but has heavy hydrocarbons onsite. The view is toward the southeast.

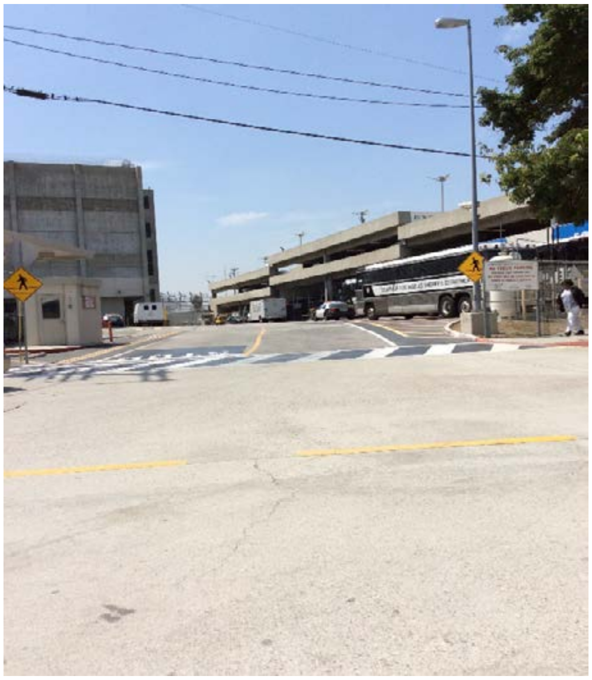

Photo 9: HDR Map Code #43 – 429 and 441 Bauchet Street. Site has an active LUST case with groundwater contamination. The view is toward the northwest.

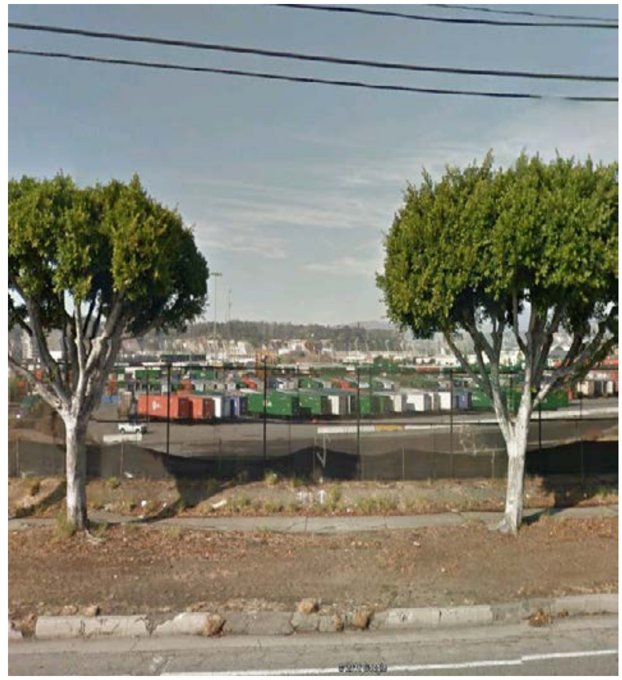

Photo 10: HDR Map Code #47 – 750 Lamar Street. Intermodal facility located east of the Los Angeles River. The view is toward the north.

Photo 11: HDR Map Code # 55 – 501 E. Commercial. Vacant lot with a LUST case. The view is toward the northwest.

Photo 12: HDR Map Code #56 – 510 E. Commercial Street. Site has potential groundwater contamination from an upgradient source. In addition, vagrants are currently onsite with no verification of the current condition. The view is toward the northwest.

Photo 13: # HDR Map Code # 57 – 510 E. Commercial Street. Site has an open LUST case and is currently used as a construction staging area. The view is toward the north.

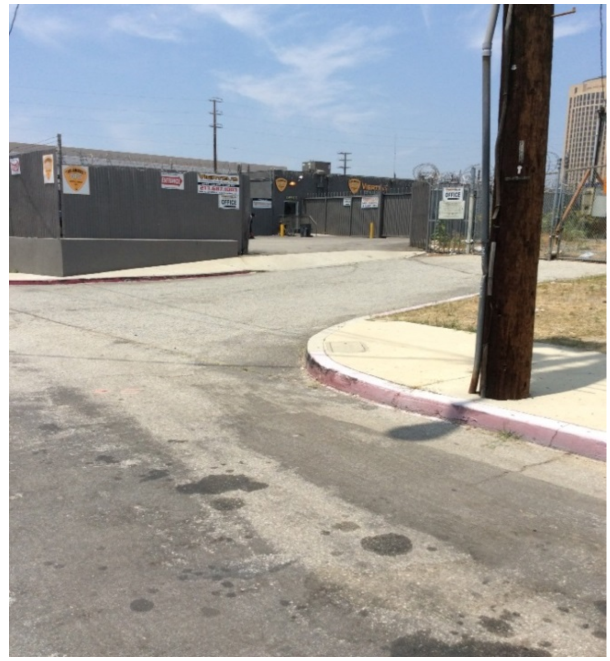

Photo 14: HDR Map Code #59 – 640 Center Street. Viertels Police Impound Garage. The view is toward the northwest.

Photo 15: No HDR Map Code. Railroad tunnel into LAUS at the end of E. Commercial Street.

Photo 16: HDR Map Code #63 - 410 Center Street. Site of the Los Angeles County Metro Transportation Authority. Site has deed restrictions due to the former Aliso Street MGP. The view is toward the north.

Photo 17: HDR Map Code #64 - 820 E. Jackson Street. Site of the former National Cold Storage Company. Site has land use restrictions due to the former Alisson MGP. The view is toward the west.

Photo 18: No HDR Map Code - 411 Center Street. Site of Upper Crust Bakery with three ASTs. View is toward the southwest. Previous site of Manley Oil.

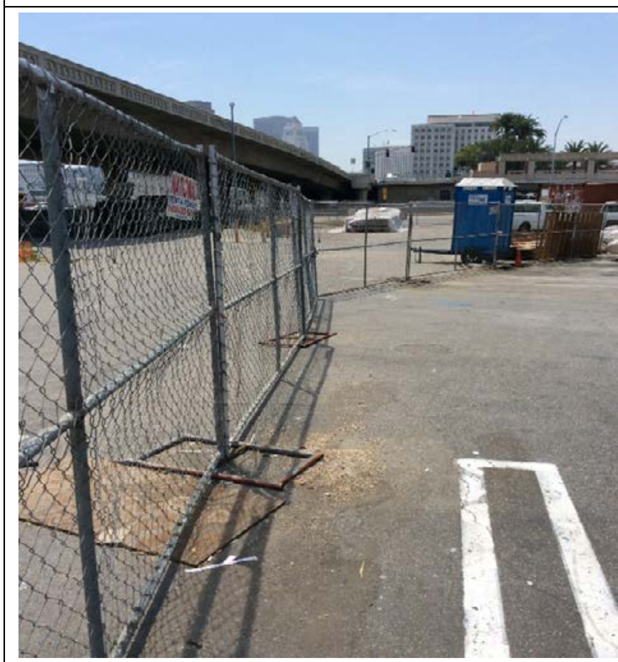

Photo 19: HDR Map Code # 65 – 500 E. Ramirez Street. Temporary construction staging area. The view is toward the west.

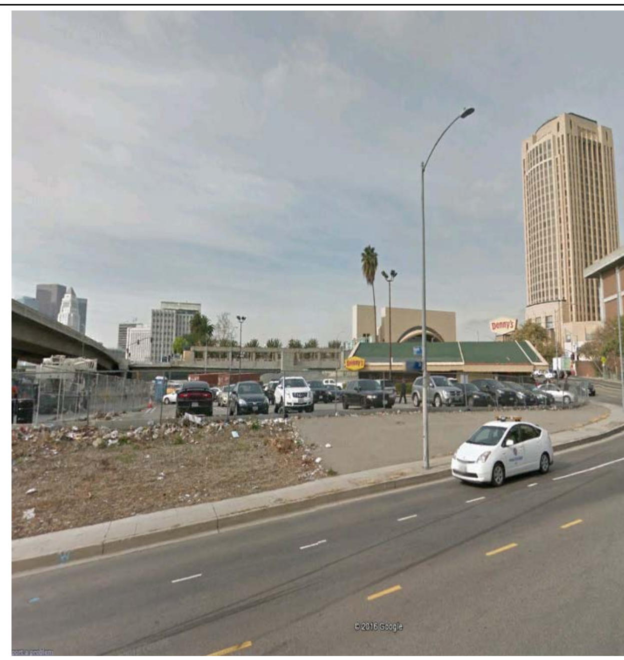

Photo 20: HDR Map Code #66 - 530 E. Ramirez Street. Currently is a Denny's restaurant. The former site of the Aliso Street MGP (Sector A). The view is toward the west.

	
Photo 21: HDR Map Code #67 – 555 E. Ramirez Street. The view is toward the northeast.	Photo 22: Map Code #76 – 800 N. Alameda Street. Potential for petroleum hydrocarbon impacted soil and soil vapor, and naturally occurring petroleum seeps and methane. The view is toward the north.
	
Photo 23: Map Code #76 – 800 N. Alameda Street. Potential for petroleum hydrocarbon impacted soil and soil vapor, and naturally occurring petroleum seeps and methane. The view is toward the west.	Photo 24: Map Code #76 – 800 N. Alameda Street. Potential for petroleum hydrocarbon impacted soil and soil vapor, and naturally occurring petroleum seeps and methane. The view is toward the north.

Photo 25: HDR Map Code #84 – 720 Keller Street. Current Site of the Keller Street Yard. Site has land use restrictions and is a voluntary cleanup site. The view is toward the south.

Photo 26: HDR Map Code #95 – 284 S. Santa Fe Avenue. Site of the MTA Red Line Maintenance facility. The view is toward the east.

Photo 27: No HDR Map Code – Adjacent to the MTA Red Line Maintenance facility. New residential and commercial development adjacent to the MTA Red line Maintenance facility. The view is toward the east.

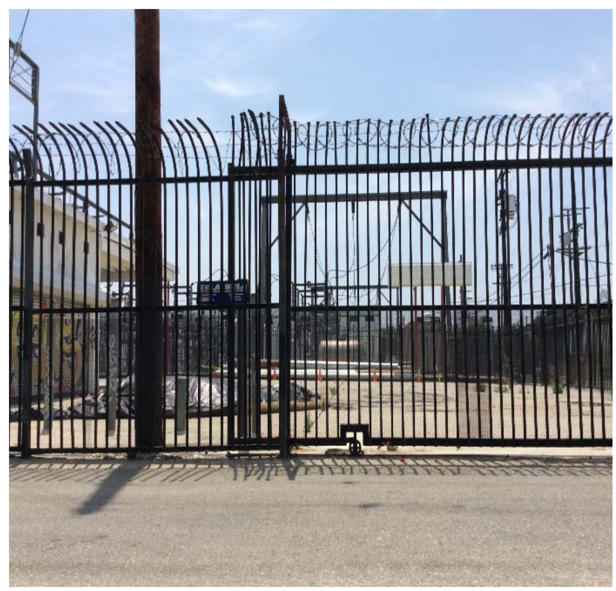

Photo 28: HDR Map Code #104 - 698 Mesquite Road. Site of an electrical substation. The view is toward the south.

Photo 29: HDR Map Code #115 - 930 S. Santa Fe Avenue. Site of an older gas station with old gas pumps. The view is toward the northwest.

Photo 30: HDR Map Code #131 – 2474 Porter Street. Site of Angleus Western Paper recycling facility The view is toward the south.


Photo 31: HDR Map Code #136 – 2484 E. Olympic Blvd. The site contains fueling pumps with USTs. The view is toward the west.


Photo 32: HDR Map Code #150 – 2469 E. Washington Blvd. Northern portion of the central repair yard. The view is toward the south.

Photo 33: No HDR Map Code – Located at the end of Porter Street. Railroad facility with two ASTs located within a containment area.

Photo 34: No HDR Map Code: Los Angeles River with the Cesar Chavez Street bridge in the background. The view is toward the south.

Photo 35: No HDR Map Code. Los Angeles River with the MTS bus facility is in the background. The view is toward the northwest.

Photo 36: No HDR Map Code. Overview of downtown Los Angeles. The view is toward the west.