REMEDIAL INVESTIGATION WORK PLAN UPDATE AND ADDENDUM TO THE 2010 REMEDIAL INVESTIGATION WORK PLAN JCI JONES CHEMICALS, INC. 1401 WEST DEL AMO BOULEVARD TORRANCE, CALIFORNIA

Prepared for

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September 20, 2018

Project Number S040.001.001

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ACRONYMS AND ABBREVIATIONS

CHEMICALS AND UNITS OF MEASURE

1,1-DCE	1,1-dichloroethene
1,2-DCA	1,2-dichloroethane
1,4-DCB	1,4-dichlorobenzene
1,1,2-TCA	1,1,2-trichloroethane
cis-1,2-DCE	cis-1,2-dichloroethene
DDT	dichlorodiphenyltrichloroethane
PCE	tetrachloroethene
TCE	trichloroethene
µg	micrograms
$\mu g/m^3$	micrograms per cubic meter
cm	centimeter
cm^2	square centimeter
cm^2/second	square centimeters per second
ft/ft	vertical feet per horizontal foot
m^3/kg	cubic meters per kilogram
mg/kg	milligrams per kilogram

STANDARD ACRONYMS AND ABBREVIATIONS

2010 RIW	Remedial Investigation Work Plan prepared by LFR, Inc., January 11, 2010
AOC	September 2008 Administrative Settlement Agreement and Order on Consent
ARCADIS	ARCADIS US Inc.
ASTM	American Society for Testing and Materials
BFS	Bellflower Sand Aquifer
bgs	below ground surface
Cal-EPA	California Environmental Protection Agency
CHHSL	California Human Health Screening Level
COPC	chemical of potential concern
CSF	cancer slope factor
CSM	conceptual site model

DNAPL	dense nonaqueous-phase liquid
DOT	Department of Transportation
DTSC	California Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentrations
FID	flame ionization detector
FSP	Field Sampling Plan
Gage	Gage Aquifer
HHRA	Human Health Risk Assessment
HI	hazard index
HQ	hazard quotient
JCI	JCI Jones Chemicals, Inc.
Kearney	Kearney Foundation of Soil Science
LADWP	Los Angeles Department of Water and Power
LFR	LFR, Inc.
LOE	lines of evidence
Lynnwood	Lynnwood Aquifer
MBFC	Middle Bellflower C Sand
Montrose	Montrose Chemical Corporation of California
NAVD88	North American Vertical Datum of 1988
OSHA	Occupational Safety and Health Administration
PAH	polycyclic aromatic hydrocarbon
PEA	Preliminary Endangerment Assessment
PID	photoionization detector
the Property	JCI facility located at 1401 West Del Amo Boulevard in Torrance, California
QA/QC	quality assurance and quality control
QAPP	Quality Assurance Project Plan
RAGS	Risk Assessment Guidance for Superfund
RfD	reference dose
RI	Remedial Investigation
RIW	Remedial Investigation Work Plan

ROW	right-of-way
RSL	Regional Screening Level
the Site	Montrose Chemical and Del Amo Superfund Site in Torrance, California
SoundEarth	SoundEarth Strategies California, Inc.
Stauffer	Stauffer Chemical Company
Terraphase	Terraphase Engineering Inc.
UBA	Upper Bellflower Aquitard
UCL	upper confidence limit
USDA	U.S. Department of Agriculture
VISL	Vapor Intrusion Screening Level
VOC	volatile organic compound
Work Plan	Remedial Investigation Work Plan

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CERTIFICATION

All geologic information, conclusions, and recommendations in this document have been prepared under the supervision of and reviewed by a California Professional Geologist.

September 19, 2018

Melissa C. Schuetz, PG
Principal Geologist

Date

September 19, 2018

James P. Bryson, PG
Principal Geologist

Date

All engineering information, conclusions, and recommendations in this document have been prepared under the supervision of and reviewed by a California Professional Engineer.

September 19, 2018

Charles E. Robinson, PE
Principal Engineer

Date

A professional engineer or geologist's certification of conditions comprises a declaration of the engineer or geologist's professional judgment. It does not constitute a warranty or guarantee, expressed or implied, nor does it relieve any other party of its responsibility to abide by contract documents or other applicable government rules or regulations. The opinion is limited to the interpretation based on data available at the time of the evaluation

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1.0 INTRODUCTION

On behalf of JCI Jones Chemicals, Inc. (JCI), Terraphase Engineering Inc. (Terraphase) has prepared this Remedial Investigation Work Plan (2018 RIW Update and Addendum) for the JCI facility in Torrance, California (the Property; Figure 1). The Property is Operable Unit 7 of the Montrose Chemical Superfund Site (the Site). This 2018 RIW Update and Addendum, which provides a scope of work for delineating the off-Property extent of tetrachloroethene (PCE) in soil gas and groundwater, is an update and addendum to the January 2010 Remedial Investigation Work Plan (2010 RIW) prepared by LFR, Inc. (LFR) for the Property (LFR 2010) and incorporates the procedures and protocols described in the 2010 RIW. At the request of the U.S. Environmental Protection Agency (EPA), a Quality Assurance Project Plan Addendum (QAPP) was prepared for the scope of work outlined in this 2018 RIW Update and Addendum.

The 2010 RIW was prepared in accordance with the September 2008 Administrative Settlement Agreement and Order on Consent (AOC) for Remedial Investigation/Feasibility Study, Comprehensive Environmental Response, Compensation and Liability Act entered into by JCI and the EPA Region 9 (EPA 2008). The 2010 RIW was approved by EPA in a letter dated February 18, 2010 (EPA 2010). This 2018 RIW Update and Addendum was prepared in response to EPA's November 16, 2016, letter (EPA 2016b), March 17, 2017 comment letters (EPA 2017a, CB&I Federal Services LLC 2017a and 2017b), and March 23, 2018 Conditional Approval (EPA 2018a). Earlier drafts of the RIW Update and Addendum were prepared by SoundEarth Strategies California Inc., a wholly owned subsidiary of SoundEarth Strategies Inc. SoundEarth Strategies California Inc. was purchased by Terraphase in July 2018. The Engineer in Responsible Charge and Geologist of Record have not changed and remain Charles E. Robinson, P.E., and Melissa Schuetz, P.G. and James Bryson, P.G.

1.1 Purpose and Scope

The purpose of the 2018 RIW Update and Addendum is to provide an updated scope of work for completing the tasks described in the 2010 RIW, as well as additional tasks requested by EPA in their November 16, 2016, letter. As described in the EPA letter, these tasks include the following:

- Defining the extent of PCE in offsite soil gas above residential and commercial screening levels.
- Evaluating the mechanisms of PCE soil gas migration.
- Evaluate possible migration of constituents of potential concern (COPCs) in underground utility lines.
- Installing groundwater monitoring wells to determine the extent of elevated PCE in the Middle Bellflower C Sand (MBFC).

- Conducting a human health risk assessment to evaluate potential residential and commercial exposures to PCE vapors.

- Completing the Remedial Investigation (RI) report.

In addition, a work plan for periodic monitoring of soil gas, groundwater, and indoor air has been prepared as a separate document for submittal to EPA (Terraphase 2018a).

1.2 Work Plan Organization

The 2018 RIW Update and Addendum is organized as follows:

- **Section 2.0, Site Background and Physical Setting.** Updates the Property investigation history presented in the 2010 RIW and presents the physical site setting.

- **Section 3.0, Field Sampling Plan**. Describes the rationale and procedures for the off-Property soil gas investigation and updates the rationale and procedures for the off-Property groundwater monitoring well installation.

- **Section 4.0, Update Conceptual Site Model**. Describes the conceptual site model update that will be conducted using the results from the off-Property soil gas, utility air, and groundwater investigation.

- **Section 5.0, Human Health Risk Assessment Work Plan**. Provides an updated work plan describing the approach to evaluating potential residential and commercial exposures to PCE vapors.

- **Section 6.0, Remedial Investigation Report.** Describes the preparation of the RI report.

- **Section 7.0, Schedule**. Describes the anticipated schedule for the activities outlined in this 2018 RIW Update and Addendum.

- **Section 8.0, References**. This section provides a list of the references used in preparing this 2018 RIW Update and Addendum.

2.0 PROPERTY BACKGROUND AND PHYSICAL SETTING

This section presents background information on the history and physical characteristics of the Property and updates the investigation history since the submittal of the 2010 RIW.

2.1 Physical Setting

The Property occupies approximately 5.5 acres in an unincorporated area of Los Angeles County (Figure 1). JCI manufactures two products: sodium hypochlorite (Sunny Sol “150”) and sodium bisulfite at the Site, and repackages chlorine, sulfur dioxide, and sodium hydroxide for distribution.

Properties in the immediate vicinity of the JCI facility consist of residential neighborhoods (southeast and southwest) and industrial facilities (north, south, east, and west). The Property has been paved, except for some areas located south of the railroad tracks on the southern portion of the Property. The main offices and warehouse are located on the western side of the Property. Manufacturing, distribution, and repackaging of chemicals occur on the southern portion of the Property, near the railroad spur. The valve reconditioning shop and storage areas are located on the northern part of the Property. A containment channel stretches along the south side of the railroad tracks to direct stormwater runoff away from the facility. A 6-foot-high chain-link fence topped with barbed wire surrounds the Property. All gates are locked and the facility is manned 24 hours a day, every day of the year, by a contract security company with a security guard stationed at the main entrance gate. The areas to the west and east of the Property are zoned for industrial use, and are currently occupied by oil refineries and manufacturing facilities. Land up to 1 mile north of the Property (where the San Diego Freeway is located) is zoned for heavy industrial use, while the land north of the freeway is zoned for residential use. The area south of the Property is zoned for industrial and residential uses, with commercial land use primarily limited to the major streets.

The Property is bordered to the north and east by Montrose and to the west by Boeing. A Los Angeles Department of Water and Power (LADWP) right-of-way (ROW) is located immediately south of the Property, with the former Farmer Brothers Coffee Company facility south of the LADWP ROW (Figure 2). Multiple oil and gas pipelines are located on the southern portion of the Property and within the LADWP ROW.

2.2 Property Geology and Hydrogeology

The Property is situated within the Torrance Plain, a physiographic province within the Los Angeles Coastal Plain. Sediments underlying the Property consist of a sequence of relatively thick deposits of fine to coarse sand interbedded with layers of finer-grained silt and clay. The finer-grained sediment intervals constitute significant aquitards separated by major aquifers in the Property vicinity (Levine·Fricke 1995a).

2.2.1 Geology

The geology of the Property consists of Playa Deposits, Palos Verdes Sand, and Upper Bellflower Aquitard. The native Playa Deposits consist of a dark brown to light olive-brown silt, sandy/clayey silt or silty clay, as well as clayey sand. The Playa Deposits are relatively flat, appear to be laterally continuous across the Property, and average approximately 25 feet in thickness.

The predominant soil type association that occurs is the Ramona-Placentia Association (U.S. Department of Agriculture [USDA] 1969). This soil type generally describes the top 5 feet of soil. Ramona soils are typically reddish brown loam underlain by reddish brown clay loam or clay. Placentia soils are characterized by reddish brown loam or sandy loam underlain by a dark reddish brown clay loam subsoil (Montrose 1998). The Ramona-Placentia Association consists of 80 percent Ramona soil and 20 percent Placentia soil (USDA 1969). The Ramona soil extends to a depth greater than 60 inches, and the Placentia soil extends to a depth greater than 18 inches (Levine·Fricke, Inc. 1995a).

2.2.2 Hydrogeology

The main hydrogeologic units recognized from investigations in the vicinity of the Property are summarized below (from shallowest to deepest).

- Bellflower Aquitard, subdivided into the following:
  - Upper Bellflower Aquitard (UBA). Typically occurs from approximately 55 to 100 feet below ground surface (bgs) and consists of interbedded fine-grained sands and silt. The UBA is the uppermost water-bearing unit and is also called the Water Table Unit. Groundwater flow in the UBA is toward the south at an approximate gradient of 0.0005 to 0.001 vertical feet per horizontal foot (ft/ft).
  - Bellflower Sand Aquifer (BFS). Typically occurs from approximately 100 to 130 feet bgs and consists of fine to coarse sand. The BFS is a confined aquifer with water levels only slightly deeper than in the UBA. The horizontal hydraulic gradient in the BFS is typically less than 0.001 ft/ft and in a southeasterly direction. The BFS is further divided into the "B" Sand and the "C" Sand. The MBFC is present in the area of the Property.
- Gage Aquifer (Gage). Typically occurs from 140 to 200 feet bgs and consists of fine-grained sand. The Gage is a confined aquifer unit with water levels typically 1 to 2 feet deeper than in the BFS. The horizontal hydraulic gradient in the Gage is also typically less than 0.001 ft/ft and in a southeasterly direction.
- Lynwood Aquifer (Lynwood). Typically occurs from approximately 230 to 280 feet bgs and consists of fine- to coarse-grained sand, silt, and gravelly sand. The Lynwood is a confined aquifer with water levels approximately 10 feet deeper than in the Gage. The horizontal hydraulic gradient in the Lynwood is typically only 0.0002 ft/ft and in a northeasterly direction.

First groundwater in the vicinity of the Property is typically encountered in the UBA unit at depths of 55 to 70 feet. Near surface unsaturated-zone sediments consist of approximately 25 feet of silt and clay Playa Deposits overlying approximately 40 feet of fine sand.

2.2.3 Surface Hydrology

The Coastal Plain is drained primarily by the Los Angeles and Rio Hondo-San Gabriel River Systems (California Department of Water Resources 1961). Historically, these river systems have meandered across the Coastal Plain and have entered the ocean at various locations, from the Ballona Gap in the north to the Santa Ana Gap near Huntington Beach in the south. Steams within the Coastal Plain have typically flowed intermittently, carrying large flows only after winter storms (Montrose 1998).

The Torrance Plain was historically drained primarily by Dominguez Creek, which drained an area called the Dominguez Slough located east of the City of Torrance. By 1930, the creek was channelized from the slough to the bay and was renamed the Dominguez Channel. In the 1970s, the Dominguez Channel was completed as a flood control channel which is concrete-lined upstream and changes to a clay-lined bottom approximately 3 miles north of the Property (Montrose 1998). Standing surface water is present in the clay-lined portion of the channel and water levels are affected by tides. The Dominguez Channel flows into the Consolidated Slip located approximately 5 miles downstream from the confluence of the Dominguez Channel and the Torrance Lateral. The Consolidated Slip is part of the Los Angeles Harbor and is used as a recreational marina and commercial port (Montrose 1998).

There is no natural surface water on the Property. Surface runoff on the Property flows south to a containment channel along the south side of the railroad tracks, which then flows toward the east.

2.3 Property History

2.3.1 Operational History

In 1943, Stauffer Chemical Company (Stauffer) purchased 18 acres of land along Normandie Avenue in Los Angeles (near Torrance, California), which included what are now the Montrose Superfund Site and the JCI Property. This property had previously been used for a paint plant and a sulfuric acid plant, which reportedly involved burning or roasting sulfide ore in the production of sulfuric acid. From 1943 until approximately 1952, Stauffer continued to operate the sulfuric acid plant on what is currently the JCI Property, but may have switched to producing sulfuric acid by burning sulfur, which would have generated limited ash. The sulfuric acid plant was dismantled in the early 1960s.

From 1947 to 1982, Montrose operated a dichlorodiphenyltrichloroethane (DDT) manufacturing plant on 13 acres of land leased from Stauffer. Beginning in approximately 1955, Stauffer leased the remaining 5 acres of the Stauffer property to JCI. In December 1968, JCI purchased the land from Stauffer.

Water treatment chemicals and other chemicals used by the public and industry have historically been stored, manufactured, repackaged, and distributed at the Property. Historically, the JCI facility manufactured sodium hypochlorite, sodium bisulfite, and ammonium hydroxide and repackaged chlorine, sulfur dioxide, anhydrous ammonia, sodium hydroxide, potassium hydroxide, hydrochloric acid, acetic acid, nitric acid, hydrofluosilicic acid, phosphoric acid, and various solvents into smaller Department of Transportation (DOT)-approved containers. The facility has not handled organic chemicals or solvents in more than 25 years. The only chemicals currently handled or manufactured at the Property are sodium hypochlorite, sodium bisulfite, chlorine, sulfur dioxide, and sodium hydroxide.

2.3.2 Previous Investigations

Numerous investigations and compliance evaluation inspections have been conducted at the Property. The results of these investigations and facility inspections, which date back to 1981, are summarized in the 2010 RIW. Investigations conducted in accordance with the AOC since the submittal of the RIW are briefly described below.

2.3.2.1 Soil

In May 2010, ARCADIS US, Inc. (ARCADIS) collected soil samples for metals and volatile organic compound (VOC) analysis (ARCADIS 2012a). Seventy-seven soil samples collected from depths of 1, 5, and 10 feet bgs were analyzed for metals, and 243 soil samples collected from depths of 1, 10, 20, and 35 feet bgs were analyzed for VOCs (Figure 3).

Metals concentrations were below EPA Regional Screening Levels (RSLs), with the exception of arsenic and lead.

- Elevated lead concentrations (greater than the RSL) ranging from 1,070 to 3,570 milligrams per kilogram (mg/kg) were detected in the 1-foot soil samples collected from soil borings J-SB-74, J-SB-75, and J-SB-77, and the 1- and 5-foot soil samples collected from soil boring J-SB-82. These soil borings are located along the northern property boundary with Montrose.

- Arsenic concentrations were compared to the maximum background arsenic concentration for southern California soils reported in Kearney (Kearney 1996) of 11 mg/kg. Twelve soil samples from seven soil borings (J-SB-74, J-SB-75, J-SB-77, J-SB-82, J-SB-83, J-SB-90, and J-SB-113) had arsenic concentrations exceeding 11 mg/kg. The concentrations ranged from 12.5 mg/kg in the 5-foot soil sample from J-SB-75 to 109 mg/kg in the 1-foot soil sample from J-SB-75. These borings are also located along the property boundary with Montrose, with the exception of J-SB-113, which is located in the southwestern corner of the Property.

VOC concentrations were below RSLs, with the exception of PCE and ethylbenzene.

- PCE was detected above the industrial RSL in the 1-foot soil samples from 4 soil borings locations, the 5-foot soil samples from 3 soil boring locations, the 10-foot soil samples from

2 soil boring locations, and the 20-foot soil sample from 3 soil boring locations. PCE was not detected above the industrial RSL in any of the 35-foot soil samples.

- Ethylbenzene was detected above the industrial RSL in the 5-foot soil sample from 1 soil boring location. Ethylbenzene was not detected above the industrial RSL in any of the 1-, 10-, 20-, or 35-foot soil samples.

Complete soil analytical results are discussed and presented in the Soil and Soil-Gas Data Report (ARCADIS 2012a). PCE concentrations in soil are shown on Figure 4 of this report.

2.3.2.2 Soil Gas

In May 2010, ARCADIS conducted an on-Property soil gas investigation in accordance with the 2010 RIW (ARCADIS 2012a). In October 2014, SoundEarth Strategies California Inc. (SoundEarth) conducted an off-Property soil gas investigation in accordance with the Revised Off-Property Soil Gas Delineation Work Plan Addendum (SoundEarth 2014).

<u>2010 On-Property Soil Gas Investigation</u>

ARCADIS collected soil gas samples from 44 locations at depths of approximately 5, 15, and 35 feet bgs (Figure 3). Samples were collected from the 5-foot sampling depths to evaluate potential off-gassing to the surface. Soil gas data from the 5- and 15-foot-deep samples were used to evaluate potential on-Property shallow dense nonaqueous-phase liquid (DNAPL) sources, such as surface spills and shallow sumps. The 35-foot-deep probes were set in the fine-grained Palos Verdes Sand unit because the interval was expected to exhibit the highest permeability to soil gas in the vicinity of the Property and to represent the greatest potential for lateral vapor migration.

As described in the ARCADIS Soil and Soil-Gas Data Report, ten analytes (benzene; carbon tetrachloride; chloroform; cis-1,2-dichloroethene [cis-1,2-DCE]; 1,1-dichloroethane; ethylbenzene; PCE; 1,1,2-trichloroethane [1,1,2-TCA]; trichloroethene [TCE]; and vinyl chloride) were detected in soil gas at concentrations above their respective California Human Health Screening Levels (CHHSLs) and/or EPA soil gas screening levels (screening levels at the time of the investigation). In addition, 1,4-dichlorobenzene (1,4-DCB) and chlorobenzene were detected above screening levels in the duplicate samples analyzed using EPA TO-14. ARCADIS concluded that the detected analytes were defined laterally within the southern and/or southwestern boundaries of the Property, with the exceptions of chloroform (at 35 feet bgs), PCE (at 5 feet bgs, 15 feet bgs, and 35 feet bgs), and TCE (at 5 feet bgs and 35 feet bgs).

It should be noted that the detection limits for the ARCADIS soil gas investigation ranged from 5 to 40 micrograms per liter (µg/L), which is equivalent to 5,000 to 40,000 micrograms per cubic meter (µg/m^3). These detection limits were higher than the screening levels for many of the contaminants. However, ten percent of the samples were analyzed using EPA Method TO-14 with a detection limit of 1 µg/L (1,000 µg/m^3), which was below the screening levels for the compounds analyzed. EPA TO-14 analysis yielded two additional compounds (1,4-DCB and chlorobenzene) that were not detected in the EPA 8260 analyses. However, the extent of contaminant vapors may not have been adequately characterized due to the elevated detection limits.

2014 Off-Property Soil Gas Investigation

SoundEarth collected soil gas samples from 14 locations south of the Property (J-SG-118 through J-SG-131) at depths of approximately 5, 15, and 35 feet bgs (SoundEarth 2015; Figure 3). Six analytes—benzene, carbon tetrachloride, chloroform, PCE, TCE, and 1,2,4-Trimethylbenzene—were reported at concentrations above their respective EPA Vapor Intrusion Screening Levels (VISLs).

PCE concentrations were detected at significantly lower concentrations than in the on-Property soil gas sampling locations. However, PCE was consistently present above the VISL and generally increased with depth.

Complete soil gas results from the JCI investigations are presented and discussed in the Soil and Soil-Gas Data Report (ARCADIS 2012a) and the Draft Off-Property Soil Gas Data Report (SoundEarth 2015).

2016 EPA Soil Gas Investigation

In 2016, EPA conducted soil gas sampling in the neighborhood south of the Montrose and Del Amo sites.

Communications with EPA indicated the following:

- The soil gas investigation showed that a thick clay layer in the soil appears to act as a barrier for vapor intrusion and helps protect the residential area. EPA found this thick clay layer in the soil, about 15 to 30 feet below ground, throughout the study area—specifically east of Normandie Ave. EPA did not consistently find chemicals in the soil gas in patterns that suggested a vapor intrusion pathway.
- EPA found higher levels of PCE in soil gas in the area west of Normandie Avenue and south of the Property. The highest concentrations were detected in areas beneath industrial facilities. EPA also conducted indoor air sampling to make sure the nearby residents are not currently being affected.

Known on- and off-Property soil gas sampling locations are shown on Figure 6. PCE concentrations in soil gas are shown on Figures 10 through 12.

2.3.2.3 Groundwater and Nonaqueous-Phase Liquid

In August and September 2010, 6 DNAPL investigation borings (JSBD-01, JSBD-02, JSBD-03, JMWD-01, JMWD-02, and JMWD-03) were advanced. Three of the DNAPL borings were subsequently constructed into long-term groundwater monitoring wells.

A total of 38 soil samples and 4 duplicate samples were collected from the 6 DNAPL investigation borings. Soil samples were collected and analyzed using EPA Method 5035/8260B. Chloroform and vinyl chloride were the only constituents reported at concentrations above their respective EPA RSLs (EPA 2016a) in soil samples.

A total of 18 depth-discrete groundwater samples and 2 duplicate samples were collected from the 6 DNAPL investigation borings. Depth-discrete groundwater samples were collected at intervals of 61 to 67 feet bgs, 77 to 79 feet bgs, and 92 to 94 feet bgs. Benzene; carbon tetrachloride; chlorobenzene; 1,1,2-TCA; 1,1-dichloroethene (1,1-DCE); 1,2-dichloroethane (1,2-DCA); 1,4-DCB; cis-1,2-DCE; methylene chloride; PCE; TCE; and vinyl chloride were reported at concentrations above their respective maximum contaminant levels in discrete groundwater samples.

Baseline monitoring well sampling was conducted for JMWD-01, JMWD-02, and JMWD-03 on September 14 and September 29, 2010. One sample was collected from each well, and one duplicate sample was collected during each monitoring event. Benzene; carbon tetrachloride; chlorobenzene; 1,1,2-TCA; 1,1-DCE; 1,2-DCA; 1,4-DCB; cis-1,2-DCE; methylene chloride; PCE; TCE; and vinyl chloride were reported at concentrations above their respective maximum contaminant levels in monitoring well groundwater samples.

Based upon the lines of evidence agreed upon with the EPA, DNAPL was not observed in the 6 borings drilled at the Property. The complete results of the DNAPL investigation are included in the DNAPL Reconnaissance Investigation Data Report (ARCADIS 2012b).

Groundwater samples were collected from the 3 on-Property groundwater monitoring wells again in September 2015 and September 2016 as part of the Dual Site Baseline Monitoring and Aquifer Compliance reporting (de maximus, inc. 2016 and AECOM 2017). PCE concentrations in groundwater in 2016 are shown on Figure 14 for the UBA and Figure 15 for the MBFC.

2.3.2.4 Air

Three rounds of indoor air sampling have been conducted at the Property. Results of the indoor air sampling events are presented in the following reports:

- *Indoor Air Sample Results, JCI Jones Chemicals, Inc., 1401 West Del Amo Boulevard, Torrance, CA*, prepared by ARCADIS for JCI, dated December 6, 2011, revised by ARCADIS April 17, 2013, and submitted final by SoundEarth October 8, 2013 (SoundEarth 2013a).

- *Final Revised Winter 2012 Indoor Air Sample Results, JCI Jones Chemicals, Inc., 1401 West Del Amo Boulevard, Torrance, CA*, prepared by ARCADIS for JCI, dated April 18, 2012, revised by ARCADIS April 24, 2013, and submitted final by SoundEarth October 9, 2013 (SoundEarth 2013b).

- Revised Winter 2013 Indoor Air Sample Results, JCI Chemicals Inc., 1401 West Del Amo Boulevard, Torrance, California, prepared by ARCADIS on April 24, 2013, and submitted final by SoundEarth November 22, 2013 (SoundEarth 2013c).

Sample results were compared to corresponding CHHSLs (Cal-EPA DTSC 2005b) and EPA RSLs (EPA 2016a) for industrial air quality criteria, in accordance with the RIW and the screening for the Property at the time of the investigation. Sample locations and PCE results for the 3 sampling events are shown on Figure 5. The following 4 chemicals were detected above screening levels in each of the 3 events:

Carbon tetrachloride. Carbon tetrachloride was detected at concentrations ranging from 0.38 micrograms per cubic meter (µg/m^3) in the ambient air sample collected in Summer 2011 to 0.91 µg/m^3 in AUS-IA-5 in Winter 2012. These concentrations are above the CHHSL of 0.097 µg/m^3 but below the RSL of 2.0 µg/m^3. For reference, the 2018 DTSC screening level for carbon tetrachloride in commercial/industrial air is 0.29 µg/m^3 and the EPA RSL remains at 2.0 µg/m^3.

PCE. PCE was detected at concentrations ranging from nondetect in the ambient air samples collected in Summer 2011 to 1.8 µg/m^3 at locations AUS-1A-1 and AUS-1A-2 in the Winter 2012 sampling event. Of the 21 indoor air samples, 12 exceeded the CHHSL for PCE of 0.693 µg/m^3. None of the samples exceeded the RSL of 47 µg/m^3. For reference, the 2018 DTSC screening level for PCE in commercial/industrial air is 2 µg/m^3 and the EPA RSL remains at 47 µg/m^3. None of the 2011/2012 indoor air samples exceed current screening levels.

Benzene. Benzene was detected at concentrations ranging from 0.35 µg/m^3 at location AUS-1A-4 in the Summer 2011 sampling event to 3.0 µg/m^3 in the duplicate sample collected from location AUS-1A-6 in the Winter 2011 sampling event. Benzene was detected at concentrations above the CHHSL of 0.141 µg/m^3 in all of the sampling locations and events and above the RSL of 1.6 µg/m^3 in the ambient air samples collected during the Winter 2011 event, all 6 of the indoor air samples (plus the duplicate) collected during the Winter 2011 event, and 1 of the 6 indoor air samples collected during the Winter 2012 event. For reference, the 2018 DTSC screening level for benzene in commercial/industrial air is 0.42 µg/m^3 and the EPA RSL remains at 1.6 µg/m^3.

Chloroform. Chloroform was detected at concentrations ranging from nondetect in one of the ambient air samples collected in the Summer 2011 sampling event to 1.6 µg/m^3 at location AUS-1A-5 in the Winter 2011 sampling event. One of the ambient air samples collected in the Winter 2011 sampling event exceeded the RSL of 0.53 µg/m^3 for chloroform. Of the 21 indoor air samples, 15 exceeded the RSL. No CHHSL was available for chloroform. For reference, the 2018 EPA RSL remains at 0.53 µg/m^3.

3.0 FIELD SAMPLING PLAN

The following sections present the scope of work and field procedures for conducting the off-Property soil gas and groundwater investigations. For purposes of this RIW, the off-Property area being investigated is referred to as the "study area" and generally includes the area from the northern property boundary on the north, to Western Avenue on the west, to Torrance Boulevard on the south, and to New Hampshire Avenue on the east as defined in the QAPP.

3.1 Off-Property Soil Gas Sampling

The scope of work for the off-Property soil gas sampling was prepared in response to EPA's November 16, 2016, letter regarding: *Approach to Completing the Remedial Investigation for the JCI Jones facility in Los Angeles, California* (EPA 2016b), and is an update and addendum to the procedures in the 2010 RIW. As requested by EPA, the scope of work is intended to investigate the extent of PCE in soil gas near the Property in the residential areas to the southwest and southeast, and the potential mechanisms for PCE migration from the Property and other possible source areas toward the residential areas, including the industrial area to the south of the Property.

The Soil Gas Field Sampling Plan (FSP) was prepared in accordance with EPA guidelines and state guidance documents, including the document titled *Advisory, Active Soil Gas Investigations* (the Soil Gas Advisory), developed jointly by the California Environmental Protection Agency (Cal-EPA), Department of Toxic Substances Control (DTSC), the Los Angeles Regional Water Quality Control Board, and the San Francisco Regional Water Quality Control Board Advisory (Cal-EPA DTSC et al., 2015a). Other EPA and DTSC guidance documents that will be followed or were considered during the development and implementation of the Soil Gas FSP include the *Office for Solid Waste and Emergency Response (OSWER) Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Source to Indoor Air* (EPA 2015) and *Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air* (Cal-EPA DTSC 2011).

Details regarding the rationale for the preliminary selection of sampling locations, collection and analysis of soil gas samples, and reporting requirements are described in the following sections.

3.1.1 Objectives

The objectives of the off-Property soil gas sampling investigation are as follows:

1. Evaluate the extent of PCE in off-Property soil gas at concentrations above established screening levels.
2. Evaluate the PCE sources and mechanisms of PCE soil gas migration for inclusion in an updated conceptual site model (CSM).
3. Provide data on vapor concentration and distribution to inform future remedial actions, including the evaluation of the soil vapor extraction remedial alternative.

4. Provide soil gas data of sufficient quality to support a future indoor air vapor intrusion risk evaluation.

3.1.2 Scope of Work

As part of the RI conducted in accordance with the AOC, soil gas sampling has been conducted both on-Property and off-Property to the south, in the City of Los Angeles property south of the LADWP ROW (ARCADIS 2012a, SoundEarth 2015). In summer 2016, EPA collected additional soil gas and indoor air samples from areas south, southeast, and southwest of the Property (EPA 2016b). Previous soil gas sampling locations are shown on Figure 6. Based on EPA's recent sampling, EPA has indicated that the data suggests the presence of preferred pathways, including the pipeline tract south of the Property, which could provide a mechanism for PCE in soil gas to travel from the Property and other possible source areas to areas south, southeast, and southwest. The potential presence of other possible source areas of volatile organic compounds, including PCE, south of the Property at the former Farmer Brothers property and neighboring industrial properties will be considered and evaluated as part of the scope of work.

The following scope of work is proposed to identify and investigate potential preferential pathways for PCE migration in soil gas (Objectives 2 and 4) and the lateral extent of PCE migration in the south, southeast, and southwest directions (Objectives 1, 3, and 4).

3.1.2.1 Task 1: Identify Current and Historical Potential Migration Pathways

Terraphase will review records from available sources including NavigateLA, City of Los Angeles Department of Water and Power, City of Torrance, National Pipeline Mapping System, and other potential records sources that may be identified later. The records will be used to identify and map the locations of existing and former pipeline corridors, storm drains, sewers, and other below-ground features that could behave as potential preferential migration pathways for PCE in soil gas. The proposed soil gas and utility sampling locations have been based on a preliminary review of available utility maps. The final off-Property sampling locations may be modified based on additional information identified as part of this task. Revised locations will be discussed with EPA.

Three types of sampling are proposed to evaluate potential migration pathways: (1) permanent soil gas sampling probes installed along utility pathways, (2) temporary soil gas samples collected from within the utility backfill adjacent to selected permanent probes, and (3) utility gas samples collected from within sewer manholes. Safe work practices in proximity to below-ground utilities may limit the ability to locate sample probes in utility backfill. All locations will be hand-augered to the depth of the deepest utility. The locations of currently known belowground utilities in the area of the Property are shown on Figure 7. Preliminary off-Property soil gas and utility gas locations are shown on Figures 9 and are based on the current information available. Utility maps are included in Appendix A.

3.1.2.2 Task 2: Conduct Access Negotiations and Obtain Permits

The proposed soil gas sampling locations will be located in public streets and/or private properties and will require EPA assistance in gaining legal access to the properties to conduct sampling. Efforts will be made to locate samples on public streets adjacent to the potential pathways (sewer or storm drains, etc.). Probe installation and sampling activities in the public streets will require permits from the City of Los Angeles Bureau of Engineering. Activities conducted on private property will require an access agreement. Access permits will be obtained for the entire study area, including contingency soil gas probe locations, to allow rapid mobilization and installation of additional contingency locations, if necessary. It is anticipated that EPA can assist with obtaining access to local businesses for the purpose of the soil gas sampling, if required.

3.1.2.3 Task 3: Install Nested Soil Gas Probes

Based on EPA's off-Property soil gas sampling results provided to SoundEarth (now Terraphase) and the results of the records review conducted in Task 1, approximately 23 nested soil gas probes (J-SG-132 through J-SG-154) will be installed in the industrial area south of the Property and the residential areas to the southeast and southwest of the Property. Three nested probes will be installed at 18 of the 23 locations at depths of 5, 15, and 35 feet bgs, and 2 nested probes will be installed at the remaining 5 locations at depths of 5 and 15 feet bgs. The soil gas probes will be installed in accordance with the Soil Gas Advisory (Cal-EPA DTSC 2015a). The initial proposed locations of the soil vapor monitoring probes are shown on Figure 8. These locations may be modified based on access constraints or information gathered in Task 1. Modified locations will be discussed with EPA.

Contingency soil gas probes may be installed for delineation of COPC concentrations above screening levels. Decisions to install contingency soil gas probe locations will be an iterative process, working with EPA. Results from the initial soil vapor probes will be reviewed against screening levels. If COPCs are reported above screening levels, additional step-out probes will be installed in an attempt to delineate COPCs to screening levels. Locations of contingency soil gas probes are shown on Figure 8. The initial results of the soil gas sampling will be presented to the EPA in tabular form and graphically on figures within 5 days of receipt of the laboratory data. The locations and probe depths of recommended contingency soil gas locations to be installed, based on the soil gas results, will be included for review and approval by the EPA.

A geophysical utility survey will be conducted at the area of each proposed and contingency soil gas probe location prior to commencing drilling activities at the Property. The survey will be conducted by a private geophysical contractor employing electromagnetic detection and ground penetrating radar techniques, at a minimum. In addition, each location will be cleared to a minimum of 5 feet bgs using a hand auger. DigAlert will be notified of drilling activities a minimum of 48 hours prior to commencing field work.

Soil gas sampling points will be installed using direct-push drilling methods. At each vapor probe location, a truck-mounted hydraulic direct-push rig will be used to advance 4-foot lengths of stainless steel sample probe rods with acetate sample liners to the deepest desired probe depth. The rods will be removed and soil samples recovered for field screening for VOCs using a photoionization detector (PID) and a flame ionization detector (FID), and for lithologic soil descriptions.

At EPA's request and to assist in the evaluation of soil vapor intrusion, soil samples for physical parameter analyses will be collected from fourteen soil-gas probe borings at target depths of 5, 15, and 35 feet bgs. Soil samples will be collected at locations J-SG-132, J-SG-135, J-SG-137, J-SG-140, J-SG-142, J-SG-143, J-SG-145, J-SG-146, J-SG-148, J-SG-150, J-SG-151, J-SG-152, J-SG-153, and J-SG-154) and analyzed using the following analytical methods:

- Air permeability (native and specific) using API RP40
- Porosity (total, effective, air-filled, water-filled) using API RP40
- Volumetric air and water using ASTM D2216
- Moisture content using ASTM D2216
- Intrinsic permeability/hydraulic conductivity using API RP40
- Grain density using API RP40
- Dry bulk density using API D2937
- Total organic carbon using the Walkley-Black Method
- Soil classification (grain size + Atterberg Limits) using ASTM D2487

Soil samples will be collected in acetate sleeves. The sleeve will be removed from the sampler, capped with Teflon sheets and sealed with plastic end caps. The samples will be labelled, recorded on a chain-of-custody, and placed in cold storage pending delivery to the laboratory for analysis. Physical parameter soil samples collected during the investigation will be submitted to PTS Laboratories in Santa Fe Springs, California.

Soil gas sampling points will be placed at the desired depths using the direct push rods or clean schedule 40 PVC pipe as a conductor casing to ensure the borehole remains open during placement of the probes, filter sand, and seals. Each soil gas sampling point will be a Geoprobe permanent implant, which is a 6-inch-long, double-woven, stainless steel wire screen with a pore diameter of 0.145 millimeters. The soil gas sampling points will be connected to the surface using 0.25-inch-outside-diameter, chemically inert tubing. The sand pack for each point will consist of approximately 1 foot of #3 sand, with the screen centered on that interval. Three to six inches of dry granular bentonite will be placed on top of each sand pack. After placement of the bentonite, the remainder of the annulus between each sand pack will be filled with a neat-cement/bentonite grout with approximately 5 percent bentonite by weight. The grout will be placed using a tremie pipe at depths below the shallowest probe. After completion, an airtight valve will be attached to the end of the probe tubing. Each soil gas sampling probe will be labeled with a stamped metal identification tag that indicates: sample ID (with probe depth). The soil gas sampling installations will be completed at the ground surface with a traffic-rated well box set in concrete slightly above the existing grade, to prevent surface runoff from entering the well box. A typical soil gas sampling point construction schematic is shown on Figure 13. Probe construction details are shown on Table 3.

If a soil-gas probe cannot be sampled due to a high purge-induced vacuum, a new probe location will be installed within approximately 20 to 30 feet from the original probe location.

3.1.2.4 Task 4: Install Temporary Soil Gas Probes in Utility Backfill

Based on review of data discussed for Task 3, approximately 5 soil gas probes (J-SGB-01 through J-SGB-05) will be installed in the residential areas to the southeast and southwest of the Property within sanitary sewer and stormwater sewer backfill material. The installation depths will vary with the depth of the backfill material; however, attempts will be made to install the probes and filter sand solely within the utility backfill. The soil gas probes will be installed using hand auger installation only, in accordance with the Soil Gas Advisory (Cal-EPA DTSC 2015a). The initial proposed locations of the utility backfill soil vapor monitoring probes are shown on Figure 8. These locations may be modified based on access constraints or information gathered in Task 1.

The hand auger boring will be advanced to approximately 1 foot into the upper portion of the utility backfill material. Soil cuttings from the hand augered borings will be field screened for VOCs using a PID and a FID, and for lithologic soil descriptions.

Soil gas sampling points will be installed at the target depths into the open boreholes using a clean length of measured 1-inch-diameter, schedule 40 PVC pipe to place the Geoprobe permanent implant at the target depth. After placement of the implant at the target depth, the PVC pipe will be removed and approximately 1 foot of sand will be placed around the probe implant. The soil gas sampling points will be connected to the surface using 0.125-inch-outside-diameter, chemically inert tubing. The sand pack for each point will consist of approximately 1 foot of #3 sand, with the screen centered on that interval. Three to six inches of dry granular bentonite will be placed on top of each sand pack and hydrated with approximately 1/2 liter of potable water. After hydration of the bentonite, the remainder of the annulus will be filled with hydrated granular bentonite. After completion, an airtight valve will be attached to the end of the probe. Each temporary backfill soil gas sampling probe will be labeled with a temporary identification tag that indicates the sample ID (with probe depth).

The temporary utility backfill soil gas sampling installations will be completed at the ground surface by packing the probe tubing in a plastic bag and placing the bag with tubing in the upper foot of the borehole, covered by soil. The remainder of the borehole will be temporarily patched with concrete that will be broken at least 48 hours after probe installation to access the tubing at the time of sampling. Following sample collection, the temporary backfill soil gas sampling points will be abandoned by removing the sample tubing and filling the remaining void with fluid bentonite slurry until slightly below grade. The remaining depression will be filled with concrete patch material and finished flush with grade, in accordance with the Soil Gas Advisory (Cal-EPA DTSC et al. 2015a).

3.1.2.5 Task 5: Conduct Soil Gas Sampling and Analysis

Soil gas samples will be collected from the soil gas monitoring probes in accordance with the Soil Gas Advisory (Cal-EPA DTSC et al., 2015a). New soil gas probes will be allowed to equilibrate a minimum of 48 hours prior to sampling. Soil gas samples will be collected from the soil gas monitoring probes using batch-certified 1-litre, passivated stainless steel canisters. Soil gas sampling and analysis procedures are described in detail in the Monitoring and Reporting Work Plan (Terraphase 2018a), provided under separate cover.

Quality Assurance/Quality Control Sampling
In accordance with the QAPP, duplicate samples will be collected at a frequency of 10 percent (1 in 10 samples) to evaluate sample reproducibility. A total of 6 duplicate samples will be collected from the planned 53 discrete samples: 3 duplicates from the 5-foot depth (including one from the utility backfill sample locations), 2 from the 15-foot depth, and 1 from the 35-foot depth. Duplicate samples will be collected sequentially, following the collection of the primary sample. Duplicate samples will be handled in the same manner as the primary samples. Proposed duplicate sample identifications are presented in Table 1.

Analytical Methods and Data Validation
The soil gas samples collected in the field will be analyzed for VOCs by a stationary laboratory using EPA Method TO-15. The reporting limits and VOC list are shown on Table 2.

Following Section 4.2, Verification and Validation Methods, in the QAPP Addendum (Terraphase 2018b), 100 percent of the data will undergo a limited data validation in accordance with EPA Tier 2 guidance and an additional 10 percent of the data will undergo full data validation (including raw data) in accordance with EPA Region 9, Tier 3 guidance.

3.1.2.6 Task 6: Prepare an Off-Property Soil Gas Data Report

Upon completion of the soil gas sampling, a data report will be prepared and submitted to EPA and DTSC. The data report will be incorporated in the final RI report at the conclusion of the RI activities. At a minimum, the data report will include the following items:

- Introduction and background
- Summary of soil gas sampling point installation
- Summary of soil gas sampling and analysis results
- Data evaluation and conclusions/recommendations
- Updated CSM
- Summary of field quality assurance/quality control (QA/QC) activities including leak tests
- Summary of laboratory data validation and QA/QC activities
- Summary of waste management activities
- Table of soil gas analytical results

- Table of QA/QC sample results
- Soil gas sampling point location map
- Isoconcentration maps for PCE for each depth
- Copies of laboratory reports and chain-of-custody forms
- Laboratory QA/QC data
- Copies of waste profiles, manifests, and disposal certificates

The report will document the extent of VOC contamination in the study area. The results of the sampling will be evaluated relative to each of the study objectives, and conclusions/recommendations will be made regarding the need, if any, for additional off-Property soil gas investigation.

3.1.3 Surveying

A licensed land surveyor will survey each soil gas sampling location and elevation tied to a benchmark of known elevation above mean sea level. Survey coordinates will be provided in real-world coordinates using the North American Vertical Datum of 1988 (NAVD88).

3.1.4 Decontamination

Prior to each use, the drive rods will be decontaminated using a standard triple-rinse method consisting of distilled water and a non-phosphate detergent. At the end of each workday, the accumulated soil cuttings and decontamination water will be placed in DOT-approved, 55-gallon drums, pending transportation from the study area. The drums will be labeled, sealed, and stored at the JCI facility prior to proper disposal.

3.1.5 Waste Management

All waste material generated during the investigation will be secured and placed in interim storage on the JCI Property in a designated area. All waste materials stored at the Property will be logged and each container labeled.

Decontamination fluids will be secured in 55-gallon drums or other appropriate containers. All containment drums will be labeled as to the date and contents. An inventory of drums will be maintained.

The contents of the drums will be sampled at the end of the field program or earlier, if full, to characterize the contents for disposal. A composite sample will be collected and analyzed for VOCs using EPA Method 8260B and any other constituents required for waste characterization for disposal. The final disposition of all stored materials will be carried out in accordance with federal, state, and local regulations.

3.1.6 Schedule

It is estimated that the soil gas sampling field activities will take approximately 40 working days to complete including time for utility locations, traffic control, probe construction, equilibration time, and sample collection, and demobilization. EPA will be notified a minimum of 10 days in advance of initiating soil gas sampling field activities.

It should be noted that because the proposed soil gas sampling locations are located off Property, access for installation and sampling may take weeks to months. Cooperation and assistance from EPA in gaining access to off-Property locations will be required to shorten this to reasonable time frames.

3.2 In-Utility Air Sampling

The scope of work for the in-utility air sampling was prepared in response to EPA's November 16, 2016, letter regarding: *Approach to Completing the Remedial Investigation for the JCI Jones facility in Los Angeles, California* (EPA 2016b), and is an update and addendum to the procedures in the 2010 RIW. As requested by EPA, the scope of work is intended to evaluate possible preferential pathways for COPC vapor migration in utility pipes within the study area.

3.2.1 Objectives

Evaluate potential COPC vapor migration in underground sanitary sewer and storm sewer lines.

3.2.2 Identify Sampling Locations

Using the information obtained in Task 3.1.2.1 above, Terraphase selected 12 sanitary sewer and 5 storm sewer manholes for access to sampling vapor inside the respective utilities. The proposed locations of manhole access to collect grab air samples from the sanitary sewer and storm sewer are shown on Figure 9.

3.2.2.1 Conduct Access Negotiations and Obtain Permits

The storm sewer and sanitary sewer manhole sampling locations chosen for sampling are located in public streets and/or private properties and will require EPA assistance in gaining legal access to the properties to conduct sampling (Figure 9). Access to sample the manholes will be coordinated with the utilities owners concurrently with the access for the installation and sampling of the soil gas probes.

3.2.2.2 In-Utility Vapor Sampling and Analysis

Grab air samples will be collected from selected portions of storm drains and sanitary sewers south of the Property. The depth of the laterals shown on the utility as-built drawings will be confirmed in the field using a tape measure prior to mobilizing for sampling. Grab samples will be collected at manhole access locations by inserting sample collection tubing through manhole vents, or by opening the manhole slightly if vent access is not available, and lowering sample collection tubing to the depth of the pipe lateral. Sample tubing will be lowered to the approximate top of the uppermost lateral for sample collection. The tubing will be purged of one tubing volume before samples are collected in batch-certified 1-liter passivated steel canisters. Samples will be collected at a flow rate of approximately 200 milliliters per minute.

Results of the in-utility vapor sampling will be compared against the soil gas and in-utility air screening levels listed in the QAPP Addendum (Terraphase 2018b). If COPCs are detected above screening levels, additional samples will be collected to evaluate temporal changes in concentrations. If screening levels in sanitary sewers are exceeded by two orders of magnitude, the EPA will be consulted regarding the possibility of additional sampling in nearby sewer cleanouts to evaluate migration pathways.

QA/QC Sampling

In accordance with the QAPP, duplicate samples will be collected at a frequency of 10 percent (1 in 10 samples) to evaluate sample reproducibility. A total of 2 duplicate samples will be collected from the planned 17 discrete samples (one from a storm drain manhole and one from a sewer manhole). The duplicate samples will be handled in the same manner as the primary samples. Proposed duplicate sample identifications are presented in Table 1.

Analytical Methods and Data Validation

The air samples collected from inside the utilities in the field will be analyzed for VOCs by a stationary laboratory using EPA Method TO-15. The reporting limits and VOC list are shown on Table 2.

Following Section 4.2, Verification and Validation Methods, in the QAPP Addendum (Terraphase 2018b), 100 percent of the data will undergo a limited data validation in accordance with EPA Tier 2 guidance and an additional 10 percent of the data will undergo full data validation (including raw data) in accordance with EPA Region 9, Tier 3 guidance.

3.2.2.3 Surveying

A licensed land surveyor will survey the manhole access location for each in-utility air sample. The location and elevation will be tied to a benchmark of known elevation above mean sea level. Survey coordinates will be provided in real-world coordinates using NAVD88. The sample collection depth, from the surveyed ground surface, will be recorded in the field sampling notes.

3.2.2.4 Reporting

The results of the in-utility air sampling will be included in the soil gas data report.

3.3 Groundwater Monitoring Well Installation

The Groundwater FSP provides field methods for groundwater well installation, sample collection, and field testing to be followed during the implementation of the Remedial Investigation/Feasibility Study at the Property, including the installation and monitoring of groundwater monitoring wells in the UBA and the MBFC both on and off Property.

To better delineate the VOC groundwater plume downgradient or south of the Property, EPA requested the installation of 3 off-Site groundwater monitoring wells: 1 monitoring well to be completed in the UBA unit and 2 monitoring wells to be completed in the MBFC Sand. The FSP for the installation of the 3 off-Site monitoring wells was included in the 2010 RIW (Section 3.4). Due to access issues, the 3 monitoring wells have yet to be installed. However, since 2010, we understand that other UBA groundwater wells have been installed by Montrose (de maximus, inc. 2016) and that access to the former Farmer Brothers facility south of the Site may be more favorable. Based on this information, the locations of the proposed wells have been modified. This Groundwater FSP updates and replaces Section 3.4 of the 2010 RIW. Figures 14 and 15 show the locations of the proposed groundwater monitoring wells in the UBA and MBFC Sand, respectively. Figure 16 shows the generalized well schematic.

3.3.1 Objectives

The objectives of the groundwater investigation are as follows:

1. Evaluate PCE concentrations in the UBA southwest and downgradient of the Property between existing wells MW-16 and MW-17.
2. Obtain characterization and monitoring control for PCE concentrations in the UBA southwest and downgradient of the Property.
3. Evaluate PCE concentrations in the MBFC immediately south of the Property.

3.3.2 Scope of Work

The following groundwater monitoring wells are proposed to meet the objectives:

- J-UBA-01. One groundwater monitoring well will be screened in the UBA and located downgradient of the Montrose water table wells MW-06 and MW-07, and between Montrose water table wells MW-16 and MW-17. The objective of this well is to define the southwestern extent of PCE contamination in the UBA (Objectives 1 and 2).
- J-MBFC-01. One groundwater monitoring well will be screened in the MBFC Sand and located approximately 200 feet south of the Montrose water table well MW-06. This well will be used to evaluate and verify the width and vertical extent of the VOC plume in the MBFC Sand at the approximate location of MW-06 (Objective 3).
- J-MBFC-02. A second groundwater monitoring well will be screened in the MBFC Sand and will be located approximately 200 feet southeast of Montrose water table well MW-07. This well will be used to evaluate and verify the width and vertical extent of the VOC plume in the MBFC Sand at the approximate location of MW-07 (Objective 3).

The following scope of work is proposed to investigate PCE contamination laterally downgradient in the UBA and vertically in the MBFC beneath the Site and downgradient of the Property.

3.3.2.1 *Task 1: Conduct Access Negotiations and Permitting*

Groundwater monitoring well installation permits will be obtained through the Los Angeles County Department of Environmental Health. With the exception of J-MBFC-02, the proposed groundwater monitoring well locations will be located in public streets and/or private properties and will require gaining legal access to the properties to conduct installation and sampling. Well installation and sampling activities for J-MBFC-01, in the City of Los Angeles public street ROW, will require a permit from the City of Los Angeles Bureau of Engineering.

Well installation and sampling activities for J-UBA-01 proposed for the former Farmer Brothers property will require an access agreement. It is requested that EPA assist with obtaining access to the former Farmer Brothers property for the purpose of the groundwater well installation and sampling. If access cannot be obtained, J-UBA-01 is proposed to be installed in Denker Avenue, as requested by EPA.

3.3.2.2 *Task 2: Install One Groundwater Monitoring Well in the Upper Bellflower Aquitard*

The monitoring well constructed in the UBA will be screened across the water table and will be drilled and constructed using hollow-stem auger drilling methods. One off-Site UBA monitoring well is proposed downgradient of the Montrose water table wells MW-06 and MW-07, and between Montrose water table wells MW-16 and MW-17 (Figure 14). This monitoring well is located in the parking lot of the former Farmer Brothers facility and will require an access agreement with the property owner.

- The well will be constructed using 4-inch-diameter, Schedule 40 PVC blank well casing with 15 feet of 0.020-inch-slotted screen, unless subsurface conditions warrant a different screen slot size. The screen will be placed with the approximate bottom 10 feet of screen below the static water level.

- A filter pack consisting of #2/16 Lonestar sand (unless a different size is required due to geologic conditions) will be installed in the annulus between the borehole and the well screen to between 3 to 5 feet above the top of the screen. Fine-grained sand (#60) grout filter and a 2- to 3-foot bentonite seal will be placed in the annulus above the top of the filter pack. Granular bentonite or bentonite pellets will be used for the seal. The bentonite seal will be hydrated with potable water prior to grouting the remainder of the annular space. Sufficient time will be allowed for the bentonite to hydrate prior to grouting the remaining annulus.

- The annulus between the borehole and well casing will be grouted from the top of the bentonite seal to approximately 2 to 3 feet bgs using a neat cement/bentonite grout. The grout will be placed using a tremie pipe to ensure a competent seal.

The well will be completed with a locking cap installed inside a traffic-rated subsurface utility vault or monument cover, unless the Site conditions warrant alternate completion.

3.3.2.3 Task 3: Install Two Middle Bellflower C Sand Monitoring Wells

The MBFC wells will be drilled using sonic drilling methods. A lithologic log will be prepared, based on the core material obtained from the sonic drill rig. Two monitoring wells are proposed in the MBFC. One monitoring well is proposed in the southwestern corner of the Site. The other monitoring well is located downgradient of the Site in the City of Los Angeles ROW and will require a permit from the City of Los Angeles, Department of Public Works, Bureau of Engineering (Figure 15).

Preliminary well construction specifications for the proposed MBFC monitoring wells are provided in Table 8 and shown on Figure 16. The monitoring well rationale is provided in Table 4. The two proposed MBFC Sand groundwater monitoring wells will be installed in proximity to, and one aquifer unit below, existing Montrose wells MW-06 and MW-07. Since groundwater contamination is present in the UBA, these wells will be installed using a bentonite plug above the MBFC Sand to prevent cross-contamination of the deeper units. The wells will be constructed as follows:

- Lithologic logs will be prepared based on the core materials obtained during drilling. The lithologic logs will be used to finalize the well construction, including the depth of conductor casing, screened interval, screen slot, and filter pack.

- The well borehole will be drilled from land surface to just above the depth of the MBFC Sand. The bottom 5 to 10 feet of the borehole inside the sonic drive casing will be filled with a bentonite plug. After the bentonite plug has been allowed to fully hydrate, the water remaining in the drive casing will be pumped out and the water level in the casing will be monitored to ensure that the plug is competent and water does not enter the casing. A smaller sonic drive casing will then be placed inside the outer drive casing, and the well will be completed into the MBFC Sand.

- A smaller-diameter borehole will then be drilled from the base of the larger boring, through the bentonite plug, to the targeted well depth. The borehole will be reamed, if necessary, for the installation of a 4-inch-diameter, Schedule 80 PVC blank well casing and 0.020- to 0.040-inch-slotted screen. The slot size will be determined based on the geologic conditions within the targeted screened interval.

- Monitoring wells will be completed using stainless steel centralizers above and below the screened interval and at 40-foot intervals along the blank casing. A filter pack consisting of Lonestar sand (e.g., Lonestar #2/16 for 0.020-inch well screen or Lonestar #3 for 0.040-inch well screen) will be installed in the annulus between the borehole and the well screen, from the total depth of the well to approximately 3 to 5 feet above the top of the screened interval. A 2- to 3-foot-thick bentonite seal will be placed in the annulus above the filter pack using granular bentonite or bentonite pellets. The annulus between the borehole and well casing will be grouted from the top of the bentonite seal to approximately 2 to 3 feet bgs using a neat cement/bentonite grout. The grout will be placed using a tremie pipe to ensure a competent seal.

The wells will be completed with a locking cap installed inside a steel and concrete utility vault or monument cover, depending on the well location, unless regulatory requirements or site conditions warrant alternate completion.

3.3.2.4 Task 4: Lithologic Logging and Field Screening

At this time, Terraphase does not intend to collect discrete, depth-specific soil samples for VOC analysis from off-Site groundwater monitoring well locations. However, based on soil conditions observed in the field, a decision may be made to collect soil samples for laboratory analysis of VOCs. Soil samples collected for VOC analysis (including depth-specific soil samples or samples of waste for waste characterization) will be collected following the procedures outlined in the soil FSP in the RIW, including methodology applicable to EPA Method 5035 (e.g., EnCore samplers). Drill cuttings will also need to be sampled for VOCs and pesticides prior to disposal.

Soils will be lithologically described and classified using the American Society for Testing and Materials (ASTM) *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure*, ASTM D2488; ASTM 1993). A lithologic log will be prepared for each boring. The lithologic logs will present descriptions of the geologic materials encountered, sampling and recovery intervals, and monitoring well construction details. Drilling and logging will be performed under the direction of a Terraphase Professional Geologist.

If soil samples are to be submitted for chemical analysis, the bottom portions of the liners will be used for laboratory analysis. The remaining soil will be used to describe the soil (including lithology, color, stratification, and condition) following the ASTM Visual-Manual Procedure, and to field screen for potential contaminants. Table 5 lists the analytes and reporting limits for soil samples.

Remaining discrete soil sample material will be screened with both a PID and an FID for the presence of organic vapors. Organic vapor readings will be collected by placing a portion of the sample within a sealable plastic bag for 10 to 20 minutes and then monitoring the vapors inside the bag. The vapor readings will be recorded in the dedicated field book or on the lithology log. Organic vapor measurements are considered survey values that provide relative concentrations of volatile organic concentrations present in the soil. If soil cuttings exhibit a sheen, or if PID/FID readings exceed 1,500 parts per million, indicating the potential presence of DNAPL, soil samples will be submitted for VOC analysis. Remaining soil sample material will be disposed of on Site, along with the drill cuttings.

3.3.2.5 Task 5: Develop Monitoring Wells

Development of groundwater monitoring wells prior to sampling will be conducted to remove sediments from the well boring and enhance communication with the surrounding formation. Monitoring wells will be developed no sooner than 2 days following completion of each well and within approximately 2 weeks of well completion. Monitoring wells will first be bailed to remove sand and fines that may have accumulated in the bottom of the well. Development will be conducted using one or a combination of the following techniques: overpumping, surging, swabbing, and bailing. The groundwater temperature, specific conductivity, turbidity, and pH will be monitored during the development process until these field parameters stabilize and the pumped groundwater is free of substantial sediment. Development pumping of monitoring wells will be conducted until turbidity is reduced to the target of 5 nephelometric turbidity units, if attainable. Development procedures may be modified due to conditions encountered at the Site. The total volume of water purged, water quality parameters measured, sand content, water levels, and the development methods used will be recorded in the field notebook.

3.3.2.6 Task 6: Conduct Groundwater Sampling and Analysis

Groundwater samples will be collected at least 72 hours following development of new monitoring wells. One groundwater sample will be collected from each of the newly installed groundwater monitoring wells and submitted to the analytical laboratory for VOC analysis. In addition, periodic monitoring will be conducted in accordance with the Monitoring and Reporting Work Plan (Terraphase 2018a). Groundwater sampling and analysis procedures are described in detail in the Monitoring and Reporting Work Plan.

QA/QC Sampling

In accordance with the 2018 QAPP Addendum (Terraphase 2018b), duplicate samples will be collected at a frequency of 10 percent (1 in 10 samples) to evaluate sample reproducibility. Duplicate samples will be handled in the same manner as the primary samples.

- One trip blank sample containing organic-free water for VOC analysis to accompany each ice chest shipped each day for these analyses. The trip blanks will be prepared by the primary analytical laboratory, using organic-free water.
- Duplicate groundwater samples for VOCs at a rate representing 10 percent of the number of primary groundwater samples.

Split samples for EPA or other agencies during groundwater sampling, if required.

The new groundwater monitoring wells are anticipated to be monitored periodically along with the three existing groundwater monitoring wells, in accordance with the Monitoring and Reporting Work Plan submitted to EPA under separate cover. Table 6 lists the analytes and reporting limits for groundwater samples.

3.3.2.7 Task 7: Prepare an Off-Site Groundwater Data Report

Following completion of the field activities, a report will be prepared and submitted to EPA. The data report will be incorporated in the final RI report at the conclusion of the RI activities. At a minimum, the report will include the following items:

- Locations of monitoring wells with surveyed coordinates and a map showing locations relative to the Property and the study area
- Well construction details, including construction materials

- Diagrams of well construction, including well depth, casing depths, annular spacing, packing and screened interval
- Geologic logs from well drilling and installation
- Well development logs for each well
- Initial water levels and water quality data for each monitoring well
- The objectives of the investigation
- A description of the field activities documenting well drilling and construction and sampling and analysis methods and procedures
- Results of any sampling or measurements
- Graphics depicting hydrostratigraphic cross-sections
- Other information necessary to document the installation and sampling of the new monitoring wells

This report will be provided to EPA within 30 business days after receipt of analytical results and completion of data validation.

Data collected during this program including water level data, parameter data collected during purging, and laboratory analytical data will be entered into the project database. Data will be managed in accordance with the 2018 QAPP Addendum and this 2018 RIW Update and Addendum.

3.3.3 Surveying

After the wells are completed, a permanent datum (measuring point) for each well will be established by a California-licensed surveyor. After the groundwater monitoring wells are installed, the top of each well casing will be surveyed for vertical and horizontal control by a licensed California surveyor. Elevation will be surveyed to the nearest 0.01-foot mean sea level. Horizontal control will be tied to a U.S. Geological Survey bench mark. Survey coordinates will be provided in real-world coordinates using NAVD88.

3.3.4 Decontamination

Prior to the start of work, all reusable, non-dedicated equipment will be decontaminated. All equipment that comes into contact with soil and/or groundwater during the collection of environmental samples for monitoring or analysis will be unused, clean, and disposable or thoroughly decontaminated prior to its use at each drilling or sampling location. Downhole equipment will not be lubricated with substances that contain VOCs.

Disposable, single-use equipment, such as disposable bailers, sampling spigots, and nylon string, will be disposed of after use at a single sampling location.

All reusable equipment that comes into contact with soil and/or groundwater will be thoroughly cleaned (decontaminated). This includes the drill pipe, bits, samplers, core barrel, well screen, well casing, bailers, cables, and any other equipment brought on Site. The following decontamination procedures will be followed:

- A decontamination area will be set up at the Property. The decontamination area will be covered with plastic and designed so that rinsate water will be held. Following decontamination, the equipment will be used or stored in a clean area until its next use. Cleaned equipment will not lie on any uncovered (without plastic) ground surface. Equipment can be kept clean by covering it with clean plastic or aluminum foil, or placing it in a clean plastic zipper sealed bag.

- Large equipment, such as drill pipe, augers, drilling tools, well screen, and well casing, will be thoroughly cleaned (decontaminated) using a high-pressure, hot-water spray washer. The equipment will be thoroughly flushed with water to remove all visible sediment. Special attention will be given to threaded sections of drill rods and samplers. The equipment will be inspected by field personnel prior to use.

- Sampling equipment, including water level meters, split spoon samplers, core barrels, and sampling trowels, will be cleaned prior to use at each sampling location/interval. Equipment will be washed and scrubbed in a solution of laboratory-grade, non-phosphate detergent and potable water to remove all visible dirt; rinsed with clean potable water, then rinsed with a dilute (1 percent) solution of nitric acid if sampling for metals; rinsed with distilled water, then rinsed with a pesticide-grade hexane (or other approved solvent) if sampling for VOCs; rinsed twice with distilled/deionized water; and allowed to air dry or be dried with a clean towel. If possible, the final rinse water should also be organic-free (if sampling is being conducted for VOCs) or metal-free (if sampling for metals).

- Larger sampling equipment, such as pumps for purging wells, will be thoroughly cleaned by rinsing, inside and out, with a high-pressure, hot-water washer, first with a nonphosphate detergent wash, then a potable water rinse, followed by a final distilled/deionized organic-free spray rinse.

All personnel will be decontaminated as required prior to leaving the study area. At a minimum, personnel will wash their faces and hands with clean water prior to eating and drinking during breaks, and prior to leaving the Property or study area. Field personnel will remove dirt and mud from boots or footwear prior to leaving the study area. Decontamination procedures and exclusion zones for controlling employee exposure may also be addressed in the Health and Safety Plan, if necessary.

3.3.5 Waste Management

All waste material generated during the investigation will be secured and placed in interim storage in a designated area at the Property. All waste materials stored at the Property will be logged and each container will be labeled.

Decontamination fluids will be secured in 55-gallon drums or other appropriate containers. All containment drums will be labeled as to the date and contents. An inventory of drums will be maintained.

The contents of the drums will be sampled at the end of the field program or earlier, if full, to characterize the liquids for disposal. A composite sample will be collected and analyzed for VOCs using EPA Method 8260B and any other constituents required for waste characterization for disposal. The final disposition of all stored materials will be carried out in accordance with applicable federal, state, and local regulations.

3.3.6 Schedule

It is estimated that the proposed off-Property monitoring well installations will take approximately 2 weeks to complete. EPA and DTSC will be notified in advance of initiating field activities within the study area. A preliminary schedule is included in Appendix B.

4.0 UPDATE CONCEPTUAL SITE MODEL

Data collected will be compiled with other existing data to create plan and cross-sectional mapping to depict the distribution of study area features, geologic strata, locations of underground utilities/pipelines/and backfill, and measured chemical distribution. The CSM will be updated to include the results from the off-Property soil gas, utility air, and groundwater investigation.

5.0 HUMAN HEALTH RISK ASSESSMENT WORK PLAN

As part of the RI, a human health risk assessment (HHRA) will be performed. This section presents the methodology for performing the HHRA. It is noted that this section presents the HHRA work plan, modified to address comments received from EPA (CB & I Federal Services LLC 2017b) and additional regulatory updates where applicable, references data collected as part of the RI, and information requested in EPA's November 2016 letter (EPA 2016b).

The HHRA will consider current and potential future on-Property commercial uses. Additionally, as requested in EPA's November 2016 letter (EPA 2016b), the HHRA will evaluate potential off-Property residential and commercial exposures to PCE and related COPCs potentially present in indoor air due to subsurface vapor intrusion. Current EPA and Cal-EPA DTSC HHRA methodologies will be used to estimate potential health effects under current and likely future use conditions. Data from the RI and subsequent investigations will be used to evaluate potential human exposures to residual chemicals in soil and/or indoor air. Historical investigations are summarized in Section 2 of this document.

5.1 Objectives

The goal of the HHRA is to identify complete exposure pathways under current and potential future conditions and to quantify the potential human health risks associated with exposure to residual COPCs in these media. The specific objectives of this HHRA are as follows:

1. Evaluate whether residual concentrations of VOCs in the subsurface could pose a vapor intrusion health risk to current or future on-Property workers, current on-Property visitors, or future on-Property construction workers.

2. Evaluate whether residual concentrations of COPCs in soil could pose a health risk to a current or future on-Property worker populations or future construction workers.

3. As requested by EPA, evaluate whether concentrations of PCE and related COPCs in the nearby off-Property subsurface could pose as a vapor intrusion health risk to nearby residents or commercial workers.

As appropriate, the HHRA will be performed in accordance with, or in consideration of, the following guidance documents or reference materials (or the versions that follow them):

- Risk Assessment Guidance for Superfund (RAGS), Volume I—Human Health Evaluation Manual, Part A, Interim Final (EPA 1989a)

- Risk Assessment Guidance for Superfund (RAGS), Volume I—Human Health Evaluation Manual, Part C, Risk Evaluation of Remedial Alternatives (EPA 1991)

- Risk Assessment Guidance for Superfund (RAGS), Volume I—Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment, Interim (EPA 2004)

- Risk Assessment Guidance for Superfund (RAGS), Volume I—Human Health Evaluation Manual, Part F, Supplemental Guidance for Inhalation Risk Assessment (EPA 2009)
- Guidance for Data Usability in Risk Assessment (EPA 1992a, EPA 1992b)
- Exposure Factors Handbook (EPA 2011a)
- Supplemental Guidance for Developing Soil Screening Levels at Superfund Sites (EPA 2002a)
- Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (EPA 2005)
- Preliminary Endangerment Assessment Guidance Manual (PEA; Cal/EPA 2015b; Interim Final – revised October)
- Human Health Risk Assessment Note Number 1: Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Hazardous Waste Sites and Permitted Facilities (Cal/EPA 2014)
- Human Health Risk Assessment Note Number 3: DTSC-modified Screening Levels (DTSC-SLs; Cal/EPA 2017a)
- Human Health Risk Assessment Note Number 4: Screening Level Human Health Risk Assessments. Department of Toxic Substances Control, Office of Human and Ecological Risk (Cal/EPA 2016a)
- Human Health Risk Assessment Note Number 7: Updated OEHHA Inhalation Cancer Toxicity Criteria for Tetrachloroethylene (PCE) and DTSC Recommended Ambient Air and Soil Gas Screening Levels (DTSC-SLs; Cal/EPA 2016b)
- OEHHA Toxicity Criteria Database (Cal/EPA 2017b)
- EPA Integrated Risk Information System database (EPA 2017b)
- EPA Regional Screening Levels (EPA 2018b)

The risk assessment process begins with the development of a Property-specific CSM. The CSM is a descriptive and graphical presentation of the physical, chemical, and biological relationships between sources of chemical contaminants and potentially exposed populations. The CSM describes the nature of contaminant sources, human receptors that may be present, and the potential for complete exposure pathways between contaminant sources and receptors (EPA 1989). As such, the CSM incorporates information on contaminant sources, migration and fate processes, complete and incomplete exposure pathways, and potentially exposed populations under current and future exposure scenarios. The CSM presenting exposure pathways and receptors is presented on Figure 17.

The CSM for the Property identifies and evaluates the following information:

- Sources of contaminants
- Contaminant fate and transport pathways
- Potentially exposed populations
- Potentially complete exposure pathways between contaminated media and receptors

5.2 Contaminated Media

5.2.1 Soil

Soil investigations date back to 1995. However, as discussed in Section 2.3.2.1, soil samples for analyses of metals and VOCs were collected on the Property in 2010 (Arcadis 2012a). Only the 2010 VOC data will be considered in this HHRA (e.g., used in the COPC selection risk quantification processes) since these data are representative of current conditions and were collected in accordance with the 2010 RIW to be utilized for this HHRA. For pesticides and semivolatile organic compounds, only soil data collected in 1995 are available and will be included in the HHRA. The historical metals data will be combined with the metal analytical results from sampling conducted in 2010 for inclusion in the HHRA dataset.

With respect to potential human exposure, 0 to 10 feet bgs is the soil horizon of concern. Generally, soil data on the Property have been collected from 1, 5, and 10 feet bgs (Arcadis 2012a). Consistent with EPA background guidance (2002b), metals determined to be within background levels will be retained in the quantitative HHRA but the risk characterization will distinguish risks attributable to background from the total estimated soil-related risks. Similarly, the risks attributable to other COPCs within anthropogenic background levels (e.g., polycyclic aromatic hydrocarbons [PAHs]) will be discussed in the risk characterization and/or uncertainties sections.

With respect to the inorganic background evaluation, no local (Del Amo) background dataset has been identified. Therefore, background levels of metals in soil will evaluated based on the Cal/EPA recommended approach for determining the presence/absence of multiple populations of a chemical at a site (Cal/EPA 1997 and 2009a). The determination of background will be based on multiple lines of evidence, including the use of probability plots/inflection point method to identify background levels of metals in soil, which is consistent with the approach taken for select metals at the neighboring Montrose site (Exponent 2016).

5.2.2 Indoor Air

Indoor air data have been collected from the Property, as summarized in Section 2.3.2.4. Therefore, the results from the monitoring events conducted between 2011 and 2013 (SoundEarth 2013a-c) will be the primary line of evidence for the vapor intrusion pathway for current indoor employees for two of the existing structures on the Property – the warehouse and the break room. Because they are not commonly occupied by office workers, indoor air samples have not been collected from the storage and valve reconditioning buildings. In the absence of indoor air data, potential short-term use of these structures will be evaluated in the HHRA based on soil gas data collected in the vicinity of these structures.

5.2.3 Soil Gas

In 1994, Levine·Fricke, Inc. conducted a PEA at the Property (Levine·Fricke, Inc. 1995b, 1995c). As part of the PEA investigation, soil gas samples were collected from 69 locations at depths ranging from 4 to 15 feet bgs between November 28 and December 2, 1994. As discussed in Section 2.3.2.2, additional soil gas sampling was conducted in 2010 (Arcadis 2012a). A total of 214 samples, from 44 locations at depths ranging from 5 to 35 feet bgs, were collected in May 2010. Given that the 2010 soil gas data are more representative of current Property conditions and provide adequate coverage (Figure 6), only these data will be included in the HHRA dataset and will be used to evaluate only potential future indoor air exposure via subsurface vapor intrusion (anywhere on the Property) and current/future construction worker exposure to trench vapors.

Potential downgradient off-Property commercial exposures to PCE and related COPCs via the vapor intrusion pathway will be evaluated based on the soil gas samples collected in the City of Los Angeles ROW by SoundEarth in October 2014 (SoundEarth 2015; see also Section 2.3.2.2 herein). However, it is noted that exposures to future commercial users of the former Farmer Brothers site would be better characterized using the soil gas data collected on that property.

Potential exposures to PCE and related COPCs via the vapor intrusion pathway in residential areas south of the Property will be evaluated based on the soil gas data proposed to be collected in Section 3.1 of this report (Figure 8).

Overall, soil gas data have been collected from depths ranging from 5 to 35 feet bgs. Consistent with Montrose Baseline HHRA (Exponent 2016), soil gas COPCs will be selected based on samples collected from 5 and 15 feet bgs.

5.2.4 Groundwater

Section 2.3.2.3 discusses groundwater quality. However, the depth to the water table at the Property is approximately 56 feet bgs (AECOM 2017; see also Section 2.2.2 herein). Therefore, incidental contact with groundwater is not anticipated. Further, because soil gas data provide a more direct measure of vapor migration, and soil gas has been characterized adequately (adequate spatial coverage), there are no areas where groundwater data are needed to provide additional information with respect to potential subsurface vapor impacts.

5.2.5 Data Evaluation

As appropriate and discussed above, new data will be incorporated into the HHRA dataset for COPC selection. All data collected during the remedial investigation will be validated in accordance with the most current project QAPP. The data suitable for human health risk assessment will be used in the HHRA.

5.3 Human Health Risk Assessment Methods

This section presents the methods and assumptions to be used during the preparation of the HHRA for the Property. Risks to public health will be evaluated in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act remedial response process, as amended by the Superfund Amendments and Reauthorization Act. The HHRA will evaluate potential public health risks associated with chemicals associated with historic releases at the Property.

The general framework for conducting HHRAs is provided in EPA's Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Part A. Baseline Risk Assessment (EPA 1989). Consistent with this guidance document, the HHRA consists of the following five steps:

1. Exposure Assessment
2. Exposure Quantification
3. Toxicity Assessment
4. Risk Characterization
5. Uncertainty Analysis

These five steps are described in the following sections, as they relate to future baseline HHRA activities.

5.3.1 Exposure Assessment–Conceptual Site Model

The exposure assessment begins with development of a Property-specific CSM. The CSM is a descriptive and graphical presentation of relationships between chemical contaminants and potentially exposed populations. As previously discussed, the CSM (Figure 17) identifies complete exposure pathways and receptors based on current and potential future land uses.

Currently, the Property is paved, except for some isolated areas located south of the railroad tracks. The main offices and warehouse are located on the western side of the Property and this is where the current on-Property workers spend most of their time. Based on the nature of contaminant sources and impacted media, facility characteristics and operations, and the availability of receptors and exposure pathways, potential current and future on-Property human receptors are as follows:

- Current and future on-Property workers
- Current on-Property visitors
- Future on-Property construction workers

Future on-Property residential use will not be evaluated in the HHRA. The Property currently operates as a chemical manufacturing facility, and no change in use is anticipated for the foreseeable future. In addition, the Property is located in a heavy industrial area and is zoned for industrial use, with residential use prohibited under the current zoning. Therefore, since the Property is zoned for industrial use and will continue to be used for industrial purposes for the foreseeable future, the HHRA will not include the evaluation of on-Property residential receptors. If the zoning and/or uses change to include on-Property residential receptors, an unrestricted use HHRA will be conducted at that time. However, as requested in EPA's November 2016 letter (EPA 2016b), the HHRA will include the evaluation of potential off-Property residential and commercial receptor exposures to PCE (and related COPCs) in indoor air via subsurface migration of vapors. For this evaluation, the potential current and future human receptors are as follows:

- Current/future off-Property residents
- Current/future off-Property commercial workers

5.3.1.1 Sources and Transport Mechanisms

Primary, secondary, and tertiary sources of contaminants are listed in the CSM (Figure 17). COPCs may migrate from their primary sources (via leaks or spills) to secondary sources, including shallow and subsurface soils. From these secondary sources, COPCs can migrate further to tertiary sources, such as dust in outdoor air, groundwater, and vapors in indoor air. These sources of potential COPC exposure are discussed further in the following sections.

5.3.1.2 Soil Exposure Pathways

Historically, contaminants may have been released to soil through spills, leaks, or disposal practices. Shallow and subsurface soils serve not only as potential sources for direct exposure (direct contact with soil such as ingestion and dermal contact), but also as potential sources for release of COPCs to dust in outdoor air and vapors in indoor air. Specifically, compounds adsorbed to surface soil particles may be entrained into the air as dust and inhaled. Subsurface volatile contamination may migrate upward and accumulate in enclosed spaces. Contaminants in subsurface soils also may percolate and/or leach into the groundwater.

Because the Property currently is paved, soil does not represent a complete exposure pathway to current on-Property workers or visitors. However, future use may involve the removal of the pavement, significant movement of soil, and subsequent construction anywhere on the Property. As such, future on-Property commercial employees or construction workers could have direct contact with soil via incidental ingestion and/or dermal contact. Consistent with the Montrose Baseline HHRA future commercial and construction worker soil exposures will be evaluated using soil data collected from 0 to 10 feet bgs.

5.3.1.3 Air Exposure Pathways

Chemicals in soil can become airborne through the disturbance of soil by wind or mechanical means and the subsequent entrainment of soil particles in the air. Airborne particulates, (i.e., dust), are available for exposure through inhalation when a receptor is outdoors. COPCs also can be released to outdoor and indoor air via vapor migration of volatile compounds from shallow or subsurface sources.

Exposures via inhalation pathways occur when COPCs transported in air as vapor and/or suspended particulates are inhaled by a receptor. The following inhalation exposure pathways were considered for inclusion in this risk assessment:

- Inhalation of particle-associated COPCs in outdoor air
- Inhalation of volatile COPCs in outdoor air
- Inhalation of COPC vapors in indoor and trench air (via migration from COPCs in the subsurface)

Because the Property currently is paved, no employees could be exposed to chemicals via inhalation of outdoor air. Further, the migration of VOCs from the subsurface to outdoor air is considered an insignificant pathway with respect to future use and will not be evaluated quantitatively (outdoor air sampling is representative of regional air quality). Therefore, inhalation of particle-associated contaminants (fugitive dust) in outdoor air will be evaluated in the HHRA only for future users spending time outdoors: outdoor employees and construction worker. Construction worker potential exposures to soil-associated volatiles in trench vapors will be modeled using shallow soil gas data (5 feet bgs).

Indoor air vapor inhalation applies only to people who spend time inside buildings (i.e., indoor commercial employees, Property visitors, and off-Property residents). As discussed in Section 5.2.2, current on-Property indoor employees and visitors will be evaluated based on indoor air data collected between 2011 and 2013. Given that future construction could occur anywhere on the Property, future on-Property user exposures to potential COPCs in indoor air resulting from vapor intrusion will be based on soil gas data. Similarly, off-Property evaluation of current/future commercial workers and residents indoor air exposures will be based on soil gas collected from the City of Los Angeles ROW (SoundEarth 2015) and the residential area sampling proposed in Section 3.1 herein, respectively. Consistent with Montrose Baseline HHRA (Exponent 2016), the indoor air pathway for future on-Property use and current/future off-Property use will be evaluated based on samples collected from 5 and 15 feet bgs.

5.3.1.4 Groundwater Exposure Pathways

Direct exposure to groundwater is not a complete pathway for any receptor, as groundwater in the vicinity is not potable and the water table is located greater than 10 feet bgs, the horizon of concern for risk assessment. Further, migration of COPC vapors emanating from groundwater will be characterized via the soil gas data, which integrates soil gas concentrations due to either migration from soil or groundwater up through the soil column. However, while no indoor receptors are expected to occupy the LADWP substation area, to address USEPA concerns with respect to the absence of soil-gas data in the vicinity of offsite groundwater monitoring wells MW-06 and MW-07 the uncertainty section of the HHRA will include an evaluation of hypothetical commercial indoor air exposures based on VOCs detected in groundwater samples recently collected from these two wells, chemical-specific Henry’s law constants, and the default groundwater attenuation factor of 0.001 recommended by EPA (2015).

5.3.1.5 Summary of Complete Exposure Scenarios

The following exposure scenarios will be quantitatively evaluated in the risk assessment:

1. The current on-Property indoor employee (adult) who is exposed to:
   - indoor air vapors, resulting from subsurface vapor migration, via inhalation of indoor air.
2. The current on-Property visitor (adult) who is exposed to:
   - indoor air vapors, resulting from subsurface vapor migration, via inhalation of indoor air.
3. The future on-Property indoor employee (adult) who is exposed to:
   - soil (0 to 10 feet bgs) via incidental ingestion of soil.
   - indoor air vapors, resulting from subsurface vapor migration, via inhalation of indoor air.
4. The future on-Property outdoor commercial employee (adult) who is exposed to:
   - soil (0 to 10 feet bgs) soil via direct ingestion and dermal contact.
   - particles from shallow and subsurface soil (0 to 10 feet bgs) via inhalation of outdoor air.
5. The future on-Property construction worker (adult) who is exposed to:
   - soil (0 to 10 feet bgs) via direct ingestion and dermal contact.
   - particles from shallow and subsurface soil (0 to 10 feet bgs) via inhalation of outdoor air.
   - trench vapors, resulting from subsurface vapor migration.
6. The current/future off-Property resident (adult and child) who is exposed to:
   - PCE and related COPC indoor air vapors, resulting from subsurface vapor migration, via inhalation of indoor air.
7. The current/future off-Property indoor employee (adult) who is exposed to:
   - PCE and related COPC indoor air vapors, resulting from subsurface vapor migration, via inhalation of indoor air.

5.3.2 Exposure Quantification

Potential exposures and risks associated with the complete exposure pathways identified in the CSM will be quantified in the HHRAs. Methods to be used in the derivation of media exposure point concentrations (EPCs), and procedures for quantifying exposure doses for current and future human receptors, are described in the following subsections.

5.3.2.1 Deriving Exposure Point Concentrations

An EPC describes the level of a chemical in media to which a receptor is exposed (EPA 1989). As such, the EPC serves as the basis for quantifying pathway-specific exposure doses.

5.3.2.2 Soil EPCs

Consistent with EPA guidance (EPA 2002c), exposure to soil COPCs will be based on the 95 percent upper confidence limit (95UCL) of the arithmetic mean, as the data permit. The 95 percent UCLs will be calculated when the COPC sample size is at least six and the number of detections is at least five. For COPCs with greater than 5 percent detects but still insufficient detects to calculate a 95 percent UCL, or if the calculated 95 percent UCL is greater than the maximum value, the maximum detected value will be used as an estimate of the EPC. Many factors will be considered in determining the best 95 percent UCL estimation method, including sample size, frequency of nondetects, distribution, and skewness of the data. For most soil COPCs there will be nondetect observations and/or multiple reporting limits. The 95 percent UCLs and distributions will be calculated using EPA software ProUCL (currently version 5.1; EPA 2016a). ProUCL recommends the use of the Kaplan-Meier (KM) method to censor nondetects; therefore, when a COPC is not detected in a sample, the reporting limit will be substituted for the value used in the UCL calculation and the Kaplan-Meier estimation method will be used to censor these nondetects (EPA 2016c). For normal and symmetric datasets with nondetects, the nonparametric Kaplan-Meier Students-t (KM(t)) UCL will be the primary method of UCL estimation. For skewed data, the Kaplan-Meier Bias-corrected bootstrap (KM(BCA)) and Kaplan-Meier Percentile Bootstrap (KM%) methods generally will be used, depending on the percentage of nondetects. Since these three 95 percent UCL methods provide good coverage under a wide range of conditions, they will be the primary methods used in UCL calculations. Additionally, in cases where ProUCL recommends and unreasonably conservative or low-biased UCL (e.g., 95 percent Chebyshev or 95 percent H-UCL [KM-Log], respectively), the most conservative of the three methods above will be used to calculate the 95 percent UCL.

It is noted that the potency/toxicity equivalency factors (P/TEFs; Cal/EPA 2015) will be used to calculate toxic equivalency (TEQ) values for PAHs or other COPCs, as appropriate and necessary.

5.3.2.3 Outdoor Air EPCs

Inhalation of particle-associated contaminants (fugitive dust) in outdoor air will be evaluated in the HHRA for future users spending time outdoors: outdoor employees and construction worker. The concentrations of particle-associated chemicals in outdoor air (soil-associated particulates) will be calculated using the approach outlined in EPA's RSLs (EPA 2017b) and soil screening guidance (EPA 2002a). In this approach, inhalation of non-volatile chemicals adsorbed to respirable particles is assessed using a particulate emission factor (PEF). The PEF relates the chemical concentration in soil with the concentration of respirable particles in outdoor air due to emissions from contaminated soil based on the following relationship:

Ca = Cs * 1/PEF

Where:

C_a	=	exposure point concentration of COPC in air (mg/m^3)
C_s	=	exposure point concentration of COPC in soil (mg/kg)
PEF	=	particulate emission factor (non-volatile chemicals; m^3/kg)

The default PEF values of 1.36x10^9 m^3/kg (future outdoor employees; USEPA 2017b) and 1x10^6 m^3/kg (future construction workers; Cal/EPA 2014) will be used.

For future construction workers, potential exposure to vapors in a trench will be evaluated using shallow (5 feet bgs) soil gas data (as opposed to the VF-based approach identified above). When vapor flux from the ground is known, a box model can be used to estimate the outdoor air concentration in a particular area (see, for example, ASTM Standard E-1739-95 (reapproved 2002): *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites*). Trench air concentration estimates based on soil gas measurements will be derived using the following equation from ASTM E-1739 guide, which is based on Fick's Law of diffusion. The flux of COPC concentrations within the trench resulting from soil gas that disperse into the trench air can be estimated:

$$Flux\ (\mu g/m^2 \cdot sec) = D_i \times \frac{C_{v,eq}}{d} \times CF$$

Where:

$Flux$	=	maximum diffusive air flux from surface trench vapors (µg/m^3·sec)
D_i	=	chemical specific diffusivity in air (cm^2/sec), see Attachment 5
$C_{v,eq}$	=	equilibrium vapor concentration of chemical in soil gas (µg/m^3)
d	=	diffusion distance (m)
CF	=	conversion factor (1 m^2/10,000 cm^2)

The shallow soil gas concentrations will provide a conservative estimate of the equilibrium concentration in trench air as soils are removed. A simple box model then will be used to estimate the trench air concentration as a function of the flux across the source area within the trench, the trench air exchange rate and trench volume, as follows:

$$C_{tr} = \frac{Flux \times SA \times f}{AER \times L \times W \times D}$$

Where:

C_{tr}	=	trench air concentration from VOC in soil gas (µg/m^3)
Flux	=	chemical specific soil vapor flux (µg/m^2·sec)
SA	=	surface area exposed, area of sides and area of bottom (m^2)
f	=	fraction of surface area exposed (unitless)
AER	=	trench air exchange rate, equal to the ratio of wind speed to trench depth (sec^{-1})
L	=	length of trench (m)
W	=	width of trench (m)
D	=	depth of trench (m)

Trench dimensions will be based on the Occupational Safety and Health Administration (OSHA) regulations for trench activities. Specifically, a value of 4 feet (or 1.22 m) will be used as the depth and width of the trench. At depths greater than 4 feet, "the atmospheres in the excavation shall be tested before employees enter excavations" (29 CFR 1926.651(g)(1)(i)), and the OSHA permissible exposure limit would be used to determine whether or not a hazardous atmosphere has resulted from the presence of vapors. A trench length of 10 meters is considered reasonable. The fraction of surface area exposed represents the proportion of the trench wall and base area, which is open to air diffusion from contaminated soil gas. For example, a default value of 0.5 represents a situation where 50% of the trench sidewalls are either covered (i.e. by shoring), or uncontaminated surface soils are present (CCME 2011). A conservative value of 1.0 (or 100%) will be used to represent a potential source area that includes all of the trench sidewalls and floor. The standard approach to calculate the air exchange rate in a trench was used by dividing the average wind speed in excavations of 0.45 m/sec by the trench depth (USEPA 1999 and CCME 2011).

5.3.2.4 Indoor Air EPCs

For current on-Property indoor employees and visitors, building- and event-specific risks will be calculated using the indoor air data from the three monitoring events.

For future on-Property indoor employees and off-Property residents and indoor employees, indoor air concentrations will be estimated from soil gas data using the EPA's recommended generic attenuation factor of 0.03 for the evaluation of sub-slab and near source exterior soil gas (EPA 2015), with the indoor air concentration calculated as follows:

Indoor Air COPC (µg/m^3) = attenuation factor (α; unitless) x Soil Gas COPC (µg/m^3)

5.3.2.5 Calculating Exposure Doses

Complete and potentially significant exposure pathways between human receptors and Property- related COPCs include direct soil contact pathways (i.e., incidental ingestion, dermal contact, and inhalation of particulates) and inhalation of vapors. The dose equations to be used in the quantification of exposure pathways are consistent with EPA guidance for conducting exposure assessments (EPA 1989).

Equations for quantifying incidental ingestion, dermal contact, and inhalation of COPCs are presented below.

5.3.2.6 Air Exposure–Inhalation of Outdoor Particulates or Outdoor and Indoor Air Vapors Exposure

Equations 6 (carcinogens) and 8 (noncarcinogens) from the EPA's *Risk Assessment Guidance for Superfund RAGS F* (EPA 2009) will be used to quantify exposure concentrations for each receptor potentially exposed to contaminants via inhalation of outdoor air:

$$EC_a = (C_a)(ET)(EF)(ED) / (AT)$$

Where:

EC_a	=	exposure concentration of a COPC in air (mg/m^3 or µg/m^3)
C_a	=	concentration of COPC in air, particulate (mg/m^3) or vapor (or µg/m^3)
ET	=	exposure time (hours/day)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (year)
AT	=	averaging time (hours)

For carcinogens, these exposure concentrations include the age-dependent adjustment factors for mutagenic chemicals for off-Property residents to address early life exposure as described in Section 5.3.3.1. The resulting chemical-specific ECs will be used to quantify risk.

5.3.2.7 Soil Exposure–Incidental Ingestion

Equation 6-14 from the RAGS (EPA 1989) will be used to quantify intake from the ingestion pathway:

$$IF_{si} = (IngR)(CF)(FI)(EF)(ED)(BF) / (BW)(AT)$$

Where:

IF_{si}	=	Intake from incidental ingestion of soil (kg soil/kg bw-day)
IngR	=	ingestion rate (mg/day)
CF	=	conversion factor, 10^{-6} kg/mg
FI	=	fraction ingested from COPC source (unitless)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (years)
BF	=	COPC-specific bioavailability factor (unitless)
BW	=	body weight (kg)
AT	=	averaging time (days)

These intake factors are combined with COPC concentrations in soil (mg/kg) to estimate the chronic daily intake from incidental ingestion of soil for a COPC (mg/kg-day).

5.3.2.8 Soil Exposure–Dermal Contact

Equation 6-15 from the RAGS (EPA 1989) will be used to quantify intake from the dermal contact pathway:

$$IF_{sd} = (SA)(CF)(AF)(ABS)(EF)(ED) / (BW)(AT)$$

Where:

IF_{sd}	=	chronic daily intake from dermal contact with soil (kg soil/kg bw-day)
SA	=	skin surface area in contact with soils (cm^2/day)
CF	=	conversion factor, 10^{-6} kg/mg
AF	=	soil-to-skin adherence factor (mg/cm^2)
ABS	=	COPC-specific dermal absorption factor (unitless)
EF	=	exposure frequency (days/year)
ED	=	exposure duration (year)
BW	=	body weight (kg)
AT	=	averaging time (days)

These intake factors are combined with COPC concentrations in soil (mg/kg) to estimate the chronic daily intake from dermal contact with soil for a COPC (mg/kg-day).

Receptor-specific exposure parameters are presented in Table 7.

5.3.3 Toxicity Assessment

Toxicity assessment involves a critical review and interpretation of toxicology data from epidemiological, clinical, animal, and in vitro studies. A review of toxicology data ideally determines both the nature of health effects associated with a particular chemical and the probability that a given dose of a chemical could result in an adverse health effect.

Relevant carcinogenic and noncarcinogenic dose-response values will be obtained from the following sources (in descending order of preference), consistent with Cal/EPA guidance (2018b):

1. OEHHA Toxicity Criteria Database (TCDB; Cal/EPA 2017b)
2. Other California EPA sources, such as OEHHA Table of Reference Exposure Levels DTSC's HHRA Notes and (Cal/EPA 2016b, 2016c, and 2017a)
3. EPAIRIS database (EPA 2017b)
4. EPARSLs (EPA 2017c)

It is noted while the Cal/EPA toxicity criteria database includes values for TCE, the inhalation unit risk factor for this chemical was developed in the early 1990s. The EPA, however, as part of its ongoing updates to the IRIS assessments, completed a new cancer risk assessment for TCE in 2011 (EPA 2011b). This decade-long effort included draft versions of the risk assessments reviewed by the National Academy of Sciences (NAS 2006). Further, DTSC has adopted the EPA toxicity values for TCE (Cal/EPA 2017a).

5.3.3.1 Carcinogenic Effects of COPCs

The incremental lifetime cancer risk (ILCR) attributed to a carcinogen is calculated as a product of the daily intake (mg/kg-day) or a time-weighted exposure concentration (µg/m^3) and the cancer slope factor (CSF) or inhalation unit risk (IUR). EPA's model of carcinogenesis assumes the relationship between exposure to a carcinogen and cancer risk is linear over the entire dose range, except at very high doses (EPA 1989). This linearity assumes there is no threshold-of-exposure dose below which harmful effects will not occur. Because of this, carcinogenic effects are considered to be cumulative across age groups when considering lifetime exposures, and the basis for the carcinogenic slope factors used in cancer risk calculations is either lifetime exposure, or a significant portion of a lifetime. No dermal CSFs are available, but EPA has devised a method for making route-to-route (oral-to-dermal) extrapolations for systemic effects (EPA 2004a).

In April 2014, OEHHA revised many entries in its TCDB to include route-extrapolated values, including the extrapolation of inhalation potency factors to oral values (e.g., IURs to CSFs). These extrapolations will be applied to both organic and inorganic chemicals (Cal/EPA 2016b; see for example the COPCs nickel and naphthalene). A key assumption of route-to-route extrapolation include is that the health effect of concern is related to systemic, as opposed to local effects.

However, factors that govern absorption through the lungs can be very different than through the gastro-intestinal tract, and compounds that are well absorbed by the lungs may not be absorbed as well orally. DTSC notes that significant portal entry effects are not anticipated for organics (Cal/EPA 2016b).

For receptors that include childhood exposures, age-dependent adjustment factors (ADAFs), which account for the increased susceptibility of infants and children compared to adults, will be applied to mutagens carried forward as COPCs in the risk assessment (EPA 2005).

5.3.3.2 Noncarcinogenic Effects of COPCs

For the noncarcinogenic effects, EPA assumes a dose exists below which no adverse health effects will be seen (EPA 1989). Below this "threshold" it is believed that exposure to a chemical can be tolerated without adverse effects. Adverse effects manifest only when physiologic protective mechanisms are overcome by exposure to doses above the threshold. For all exposure routes, a chemical-specific reference value (e.g. reference dose [RfD] or reference concentration [RfC]) is derived. The RfD, expressed in units of milligrams per kilogram-day (mg/kg-d), represents the daily oral intake of a constituent (averaged over a year) per kilogram of body weight that is below the effect threshold for the constituent. The RfC, expressed in units of milligrams per cubic meter (mg/m3), is "an estimate of continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects during a lifetime" (EPA 2009). The EPA assumes noncarcinogenic exposure doses are not cumulative from age group to age group over a lifetime of exposure (EPA 1989). However, when calculating potential noncarcinogenic hazards, both the exposure and toxicity criteria must refer to exposures of similar duration (e.g., chronic, sub chronic, or fewer than two weeks). In this risk assessment, long-term activities and all of the exposure scenarios will be assessed using chronic RfD values.

Dermal RfDs will be derived from oral RfDs. Following Cal/EPA guidance, when an inhalation RfC is unavailable for an organic COPC, the oral RfD will be used and vice versa (converted from dose as appropriate). For inorganic chemicals, inhalation-to-oral extrapolations are not appropriate (Cal/EPA 2017a). When reference values are not available, values for surrogate compounds will selected based on structure-activity relationships. Uncertainties associated with route-extrapolated and surrogate-based noncancer toxicity values will be discussed.

If necessary, the noncarcinogenic health effects of lead will be assessed separately from other COPCs. The health effects associated with lead typically are estimated on the basis of blood-lead concentrations (i.e. micrograms per deciliter [µg/dL]). In 2009 the Cal/EPA revised the approach for evaluating lead: instead of using an action level of 10 µg/dL, the lead California Human Health Screening Levels (CHHSLs) were based on changes in child or fetal (pregnant commercial worker) blood leads of 1 µg/dL, irrespective of background levels (Cal/EPA 2009b). The resultant lead soil CHHSLs of 80 and 320 mg/kg for residential and commercial use, respectively, have since been incorporated into the Cal/EPA DTSC screening levels (Cal/EPA 2017a). The results of the soil lead EPA-DTSC SL comparisons will be discussed separately from the HQs derived for the noncarcinogenic component of the other COPCs.

5.3.4 Risk Characterization

The human health risk characterization will integrate the results of exposure and toxicity assessments to derive a quantitative evaluation of potential risks to current and potential future human receptors. Methods to be used in the characterization of baseline human health risks are described below.

Health risk assessments use two different values to evaluate potential health impacts: the ILCR and the noncancer hazard index (HI). The EPA currently uses an ILCR of 1 in 1,000,000 ($1x10^{-6}$) to 1 in 10,000 ($1x10^{-4}$) as the risk management range (EPA 1990 and 1991), with $1x10^{-6}$ as the point of departure. The risk that is acceptable is very much dependent on site-specific characteristics that include: the number of people potentially exposed, the likelihood of exposure, the chemicals driving the risk, the uncertainties driving risk, the future use(s) of the Property, public concerns, and the decisions of local risk managers. The HI is compared to a threshold level of 1.0 (Cal/EPA 2005a, Cal/EPA 2005b, Cal/EPA 2005c). If the HI is greater than 1.0, there may be concern for potential noncarcinogenic health effects. The level of concern increases as the HI increases above unity, although the two are not linearly related (EPA 1989). As noted below, HIs will be calculated assuming dose additivity for all COPCs, regardless of the type of toxic effect (e.g., the hazard from chemicals causing effects on the kidney is added to the hazard from chemicals causing effects on the liver; EPA 1986 and 1989). However, when receptor-specific total noncancer hazards exceed 1.0, hazards based on target organ will be calculated (as appropriate).

Some COPCs may pose both a noncarcinogenic hazard and a carcinogenic risk to receptors; risks from these COPCs will be characterized for both types of health effects. Receptor-specific discussions of carcinogenic risk and noncarcinogenic hazard will include the identification of risk drivers and, where appropriate, background contributions to the totals discussed.

5.3.4.1 Carcinogenic Effects

At low doses, the risk of developing cancer (the ILCR) is calculated as follows (EPA 1989):

$$Risk = (CDI_i)(CSF_i)$$

Where:

CDI_i = chronic lifetime average daily intake for $COPC_i$ (mg/kg-day)

CSF_i = cancer slope factor for $COPC_i$ $(mg/kg\text{-}day)^{-1}$

For inhalation exposure, the excess risk of cancer is estimated with the following equation (EPA 2009):

$$Risk = (EC_i)(IUR_i)$$

Where:

EC_i = chronic time-weighted exposure concentration for $COPC_i$ in air ($\mu g/m^3$)

IUR_i = inhalation unit risk for $COPC_i$ $(\mu g/m^3)^{-1}$

The calculation of chronic daily intake (CDI) values and ECs will be estimated per Section 5.3.2 and the source of CSFs and IURs presented in Section 5.3.3. If a receptor may be exposed to several carcinogens via one pathway, the following equation will be used to sum cancer risks:

$$Risk_t = Risk\ (COPC_1) + Risk\ (COPC_2) + \ldots\ Risk\ (COPC_n)$$

Where:

$Risk_t$ = total risk of cancer incidence for a given pathway

Risk ($COPC_n$) = individual carcinogenic COPC risk

Similarly, if a receptor may be exposed via multiple pathways, the total ILCR is calculated by summing the pathway-specific risks (EPA 1986).

5.3.4.2 Noncarcinogenic Effects

The potential for health effects resulting from exposure to a noncarcinogenic COPC is evaluated by comparing a receptor's estimated upper-bound exposure or intake level to the RfD or RfC of that COPC (EPA 1989 and 2009). The ratio of intake to the RfD or RfC is termed the Hazard Quotient (HQ). The oral/dermal HQ is calculated as follows:

$$HQ_i = CDI_i/RfD_i$$

Where:

HQ_i = hazard quotient for $COPC_i$ (unitless)

CDI_i = chronic average daily intake of $COPC_i$ (mg/kg-d)

RfD_i = reference dose of $COPC_i$ (mg/kg-d)

For inhalation exposure, the HQ compares a receptor's exposure concentration of a given COPC to the RfC of the COPC (EPA 2009) and is defined as:

$$HQ_i = EC_i/RfC_i$$

Where:

HQ_i = hazard quotient for $COPC_i$ (unitless)

EC_i = chronic time-weighted exposure concentration of $COPC_i$ (mg/m^3)

RfC_i = reference concentration of $COPC_i$ (mg/m^3)

When receptors are exposed to more than one COPC via one pathway or via multiple pathways, it is useful to develop a total HI. The HI is the sum of HQs across COPCs and pathways (EPA 1986). In the case of simultaneous exposure of a receptor to several COPCs, the HI is calculated as the sum of the HQs by:

$$HI_t = HQ(COPC_1) + HQ(COPC_2) + \ldots HQ(COPC_n)$$

Where:

HI_t = total hazard index for a given pathway

$HQ(COPC_n)$ = individual noncarcinogenic COPC hazard

Pathway HIs will be summed, as appropriate and possible, to calculate a total HI specific to the receptor. The only receptor likely to be exposed to both soil and soil gas is the future indoor employee. However, future risks associated with vapor intrusion will be based on individual soil gas sampling locations and may include multiple depths, which may make aggregating the risks difficult. However, either a sum including the worst-case estimate or a range will be provided.

5.3.5 Health Risks from Lead

If lead is retained as a soil COPC, its noncarcinogenic health effects will be assessed separately from other COPCs. The HHRA will evaluate lead based on receptor-specific soil EPC comparisons to the commercial soil lead DTSC-SL of 320 mg/kg.

5.3.6 Uncertainty Analysis

Potential uncertainties in the HHRA will be described in an Uncertainty Section. This section of the HHRA will include a discussion of uncertainties that will address both measurement and informational uncertainties in the site characterization and COPC selection process, exposure assessment, and toxicity values. Some of the specific uncertainties likely to be included in the HHRA are the adequacy of site characterization data including absence of soil gas data within the off-Site LADWP substation area,, the use of probability plots/inflection points to identify inorganic background levels, the derivation of exposure point concentrations, the use of models (including default alphas) to estimate outdoor and indoor air concentrations, exposure parameter assumptions, route extrapolation for the derivation of some toxicity values, and the use of surrogate compounds for toxicity values.

6.0 REMEDIAL INVESTIGATION REPORT

An RI report will be prepared after completion and approval by EPA of field investigations and the final characterization data reports. The RI report will summarize the activities conducted to characterize the Property, the sources of contamination, the nature and extent of contamination, and the transport and fate of contaminants, as necessary. In addition to the information collected during implementation of the tasks described herein, the RI report will include the information presented in the data reports to EPA including the Soil and Soil-Gas Data Report (ARCADIS 2012a), the DNAPL Reconnaissance Investigation Data Report (ARCADIS 2012b), Summer 2011, Winter 2012, and Winter 2013 Air Sampling Results (SoundEarth 2013a, 2013b, and 2013c), and the Off-Property Soil Gas Data Report (SoundEarth 2015).

7.0 SCHEDULE

The duration of the RI tasks described herein will be determined by the nature of the studies undertaken (including constraints such as permitting and access to off-Property locations and private property), the complexity of the analyses required, and the decisions that are made based on the results of the completed investigations.

The anticipated schedule for planning and implementation of the RI is shown in Appendix B. EPA and Terraphase will periodically review and update the schedule as the field investigation progresses. The schedule provides estimates of the time required for review and approval of deliverables. This schedule will be updated periodically and additional tasks will be shown as the tasks and sequence are refined.

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TABLES

Table 1
Sampling Schedule - Soil Gas Field Sampling Plan
JCI Jones Chemicals, Inc.
Torrance, California

Probe ID	Location	Boring Type	Sample Depths (feet bgs) 5 P	5 D	15 P	15 D	35 P	35 D	Planned Analyses EPA TO-15	Purpose and Rationale for Sampling Location	Objectives Met
Permanent Soil Gas Probe Locations											
J-SG-132	Northwest of J-SG-131, behind the Boys and Girls Club	Soil Gas Direct Push	1	--	1	--	1	--	3	Evaluate the extent that PCE has migrated laterally west of the Jones property and in the direction of the oil pipeline corridor. Evaluate PCE vapors at depth (35 feet).	1, 3, 4
J-SG-C	On the Boeing property west of the Boys and Girls Club	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location in the western direction if J-SG-132 exceeds screening levels.	1, 3, 4
J-SG-133	West of J-SG-132 at the end of Harvard Boulevard, north of Del Amo Boulevard	Soil Gas Direct Push	1	--	1	--	1	--	3	Evaluate the extent that PCE has migrated laterally west of J-SG-132 and in the direction of the oil pipeline corridor. Evaluate PCE vapors at depth (35 feet).	1, 3, 4
J-SG-134	West of J-SG-131 on the south side of Del Amo Boulevard	Soil Gas Direct Push	1	--	1	--	1	--	3	Evaluate the extent that PCE has migrated laterally west of J-SG-131 and in the direction of the oil pipeline corridor. Evaluate PCE vapors at depth (35 feet).	1, 3, 4
J-SG-135	West of J-SG-134 on the south side of Del Amo Boulevard	Soil Gas Direct Push	1	--	1	--	1	--	3	Evaluate the extent that PCE has migrated laterally west of J-SG-134 and in the direction of the oil pipeline corridor. Evaluate PCE vapors at depth (35 feet).	1, 3, 4
J-SG-136	West of J-SG-135 on the south side of Del Amo Boulevard	Soil Gas Direct Push	1	--	1	--	--	--	2	Evaluate the extent that PCE has migrated laterally west of J-SG-135 and in the direction of the oil pipeline corridor.	1, 3, 4
J-SG-C	West of J-SG-136, along Del Amo Boulevard near Western Avenue	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location if J-SG-136 exceeds screening levels.	1, 3, 4
J-SG-137	At the intersection of W. 204th Street and S. Denker Avenue	Soil Gas Direct Push	1	--	1	--	1	--	3	Evaluate the extent that PCE has migrated laterally southwest of the Site. Evaluate PCE vapors at depth (35 feet).	1, 3, 4
J-SG-138	South of SG-69 and west of SG-62 on W. 204th Street	Soil Gas Direct Push	1	1	1	--	1	--	4	southwest of the Site (south of SG-69 and west of SG-62, where 5-foot PCE concentrations were at or above the screening level). Evaluate PCE vapors at depth (35 feet).	1, 3, 4
J-SG-C	West of J-SG-138 on W. 204th Street	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location no. 1 if J-SG-138 exceeds screening levels.	1, 3, 4

Table 1
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JCI Jones Chemicals, Inc.
Torrance, California

Probe ID	Location	Boring Type	Sample Depths (feet bgs) 5 P	5 D	15 P	15 D	35 P	35 D	Planned Analyses EPA TO-15	Purpose and Rationale for Sampling Location	Objectives Met
J-SG-C	West of J-SG-138 on W. 204th Street	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location no. 2 if first contingency location for J-SG-138 exceeds screening levels.	1, 3, 4
J-SG-C	West of J-SG-138 on W. 204th Street	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location no. 3 if second contingency location for J-SG-138 exceeds screening levels.	1, 3, 4
J-SG-139	West of SG-63 on W. 205th Street	Soil Gas Direct Push	1	--	1	--	--	--	2	Evaluate the extent that PCE has migrated laterally southwest of the Site.	1, 3, 4
J-SG-C	West of J-SG-139 on W. 205th Street	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location if J-SG-139 exceeds screening levels.	1, 3, 4
J-SG-C	West of J-SG-139 on W. 205th Street	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location no. 2 if first contingency location for J-SG-139 exceeds screening levels.	1, 3, 4
J-SG-C	West of J-SG-139 on W. 205th Street	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location no. 3 if second contingency location for J-SG-139 exceeds screening levels.	1, 3, 4
J-SG-140	At the intersection of W. 206th Street and S. Denker Avenue	Soil Gas Direct Push	1	--	1	--	1	--	3	Evaluate the extent that PCE has migrated laterally southwest of the Site. Evaluate PCE vapors at depth (35 feet).	1, 3, 4
J-SG-141	West of J-SG-140 on W. 206th Street	Soil Gas Direct Push	1	--	1	--	--	--	2	Evaluate the extent that PCE has migrated laterally southwest of the Site.	1, 3, 4
J-SG-C	West of J-SG-141 on W. 206th Street	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location if J-SG-141 exceeds screening levels.	1, 3, 4
J-SG-C	West of J-SG-141 on W. 206th Street	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location no. 2 if first contingency location for J-SG-141 exceeds screening levels.	1, 3, 4
J-SG-C	West of J-SG-141 on W. 206th Street	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location no. 3 if second contingency location for J-SG-141 exceeds screening levels.	1, 3, 4

Table 1
Sampling Schedule - Soil Gas Field Sampling Plan
JCI Jones Chemicals, Inc.
Torrance, California

Probe ID	Location	Boring Type	Sample Depths (feet bgs)						Planned Analyses	Purpose and Rationale for Sampling Location	Objectives Met
			5		15		35		EPA TO-15		
			P	D	P	D	P	D			
J-SG-C	South of J-SG-141 on W. 207th Street	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location to the southwest if J-SG-140 exceeds screening levels.	1, 3, 4
J-SG-C	Near intersection of Harvard Boulevard and 207th Street	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location to the southwest if J-SG-141 exceeds screening levels. Evaluate the extent that PCE has migrated laterally southwest of the Site.	1, 3, 4
J-SG-C	Along 207th Street between Harvard Boulevard and Western Avenue	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Further contingency to the southwest along 207th Street.	1, 3, 4
J-SG-C	Near intersection of 207th Street and Western Avenue	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Further contingency to the southwest along 207th Street.	1, 3, 4
J-SG-142	At the intersection of Torrance Boulevard and Halldale Avenue	Soil Gas Direct Push	1	--	1	1	1	--	4	Evaluate the extent that PCE has migrated laterally south of the Site. Evaluate PCE vapors at depth (35 feet).	1, 3, 4
J-SG-143	In the container storage area east of Normandie and north of Del Amo Alley	Soil Gas Direct Push	1	--	1	1	1	--	4	Evaluate the extent that PCE has migrated laterally east of the Site. Evaluate PCE vapors at depth (35 feet).	1, 3, 4
J-SG-C	East of J-SG-143	Soil Gas Direct Push	--	--	--	--	--	--	--	Contingency location if J-SG-143 exceeds screening levels.	1, 3, 4
J-SG-C	Southwest of J-SG-140 and SG-64 on W. 207th Street	Soil Gas Direct Push	--	--	--	--	--	--	--	Contingency step-out in the southwestern direction if J-SG-140 and J-SG-142 exceed screening levels. Evaluate the extent that PCE has migrated laterally southwest of the Site.	1, 3, 4
J-SG-144	East side of Normandie Avenue, between W. 204th Street and W. Milton Street	Soil Gas Direct Push	1	1	1	--	1	--	4	Evaluate the extent that PCE has migrated laterally south of Site along Normandie Avenue and south of SG-14, where PCE concentrations were at or above screening levels.	1, 3, 4
J-SG-145	East side of Normandie Avenue north of W. Milton Street	Soil Gas Direct Push	1	--	1	--	1	1	4	Evaluate the extent that PCE has migrated laterally south of the Site along Normandie Avenue and south of J-SG-144, to delineate the extent of PCE concentrations above screening levels. Evaluate PCE vapors at depth (35 feet).	1, 3, 4
J-SG-C	Along Normandie Avenue between Torrance Boulevard and Milton Street	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location to the south if J-SG-145 exceeds screening levels.	1, 3, 4

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Sampling Schedule - Soil Gas Field Sampling Plan
JCI Jones Chemicals, Inc.
Torrance, California

Probe ID	Location	Boring Type	Sample Depths (feet bgs) 5		15		35		Planned Analyses	Purpose and Rationale for Sampling Location	Objectives Met
			P	D	P	D	P	D	EPA TO-15		
J-SG-C	Intersection of Torrance Boulevard and Normandie Avenue	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Further contingency to the south of J-SG-145 along Normandie Avenue.	1, 3, 4
J-SG-146	South of SG-33 on the west side of Raymond Avenue, south of W. Milton Street	Soil Gas Direct Push	1	--	1	--	--	--	2	southeast direction, south of EPA Study Area 1-3 and south of SG-33, where PCE concentrations were above screening levels at 5 and 15 feet bgs.	1, 3, 4
J-SG-C	West of J-SG-146 on Kenwood Avenue	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location in the western direction if J-SG-146 exceeds screening levels.	1, 3, 4
J-SG-C	Intersection of Kenwood Avenue and Torrance Boulevard	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location to the southwest if J-SG-146 exceeds screening levels.	1, 3, 4
J-SG-C	Intersection of Budlong Avenue and Torrance Boulevard	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location to the southeast if J-SG-146 exceeds screening levels.	1, 3, 4
J-SG-C	Along Budlong Avenue east of J-SG-146	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location in the eastern direction if J-SG-146 exceeds screening levels.	1, 3, 4
J-SG-C	Intersection of Raymond Avenue and Torrance Boulevard	Soil Gas Direct Push	Depths to be determined based on exceedances in nearby locations						--	Contingency location in the southern direction if J-SG-146 exceeds screening levels.	1, 3, 4
J-SG-147	Approximately 125 feet north of he north end of Berendo Street, 250 feet north of SG-25	Soil Gas Direct Push	1	--	1	--	--	--	2	Evaluate the extent that PCE has migrated laterally in the southeast direction, delineater PCE vapors above screening levels north of SG-25.	1, 3, 4
J-SG-148	Approximately 50-75 feet north of EPA probe SG-01	Soil Gas Direct Push	1	--	1	--	1	--	3	utilities at depths of 15 feet bgs, evlauate PCE vapors between the JCI facility and residential area to the southeast.	1, 3, 4
J-SG-149	Approximately 200-300 feet east of DSG-02	Soil Gas Direct Push	1	--	1	--	1	--	3	Evaluate preferential pathways associated with below grad utilities at depths of 15 feet bgs, evaluate PCE vapors at the north end of the residential area.	1, 3, 4
J-SG-150	Approximatley 100 feet west of the JCI facility on the Frito-Lay Property	Soil Gas Direct Push	1	--	1	--	1	--	3	Evaluate the presence of PCE vapor in the commercial area west of the JCI facility.	1, 3, 4

Table 1
Sampling Schedule - Soil Gas Field Sampling Plan
JCI Jones Chemicals, Inc.
Torrance, California

Probe ID	Location	Boring Type	Sample Depths (feet bgs) 5 P	5 D	15 P	15 D	35 P	35 D	Planned Analyses EPA TO-15	Purpose and Rationale for Sampling Location	Objectives Met
J-SG-151	On the industrial property south of the Former Farmer Brothers property	Soil Gas Direct Push	1	--	1	--	1	--	3	Evaluate PCE vapors in the industrial area south of the Former Farmer Brothers and north of Torrance Blvd.	1, 3, 4
J-SG-152	On the industrial property south of the Former Farmer Brothers property	Soil Gas Direct Push	1	--	1	--	1	--	3	Evaluate PCE vapors in the industrial area south of the Former Farmer Brothers and north of Torrance Blvd.	1, 3, 4
J-SG-153	On the Sanko Electronics property between the Former Farmer Brothers property and Torrance Avenue	Soil Gas Direct Push	1	--	1	--	1	--	3	Evaluate PCE vapors in the industrial area south of the Former Farmer Brothers and north of Torrance Blvd.	1, 3, 4
J-SG-154	On the former Salson Logistics property near the railroad tracks.	Soil Gas Direct Push	1	--	1	--	1	--	3	Evaluate PCE vapors in the industrial area south of the Former Farmer Brothers and north of Torrance Blvd.	1, 3, 4
Temporary Soil Gas Probe Locations (in utility backfill)											
J-SGB-01	West of J-SG-132 at the corner of Denker Avenue and Del Amo Boulevard	Hand Auger	1	--	--	--	--	--	1	Evaluate the existence of a preferential pathway through utility backfill.	2
J-SGB-02	West of J-SG-135 at the intersection of Harvard Boulevard and Del Amo Boulevard	Hand Auger	1	--	--	--	--	--	1	Evaluate the existence of a preferential pathway through utility backfill.	2
J-SGB-03	Southeast of J-SG-137 at the intersection of Denker Boulevard and 205th Street	Hand Auger	1	--	--	--	--	--	1	Evaluate the existence of a preferential pathway through utility backfill.	2
J-SGB-04	East of J-SG-142 along Torrance Boulevard, east of Halldale Avenue	Hand Auger	1	1	--	--	--	--	2	Evaluate the existence of a preferential pathway through utility backfill.	2
J-SGB-05	North of J-SG-144 along Normandie Avenue between Milton Street and 204th Street	Hand Auger	1	--	--	--	--	--	1	Evaluate the existence of a preferential pathway through utility backfill.	2

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Sampling Schedule - Soil Gas Field Sampling Plan
JCI Jones Chemicals, Inc.
Torrance, California

Probe ID	Location	Boring Type	Sample Depths (feet bgs) 5 P	5 D	15 P	15 D	35 P	35 D	Planned Analyses EPA TO-15	Purpose and Rationale for Sampling Location	Objectives Met
In-Utility Gas Sampling Locations											
J-SSG-01	Intersection of Denker Avenue and Del Amo Boulevard. South of Boys and Girls Club property	--	Within sanitary sewer manhole						2	Evaluate the existence of a preferential pathway in sewers.	2
J-SSG-02	Intersection of Harvard Boulevard and Del Amo Boulevard	--							1	Evaluate the existence of a preferential pathway in sewers.	2
J-SSG-03	Intersection of Harvard Boulevard and 205th Street	--							1	Evaluate the existence of a preferential pathway in sewers.	2
J-SSG-04	West of J-SG-137, along 204th Street near Denker Avenue	--							1	Evaluate the existence of a preferential pathway in sewers.	2
J-SSG-05	West of J-SG-140, along 206th Street near Denker Avenue	--							1	Evaluate the existence of a preferential pathway in sewers.	2
J-SSG-06	Southwest of the intersection of Normandie Avenue and Del Amo Boulevard	--							1	Evaluate the existence of a preferential pathway in sewers.	2
J-SSG-07	Intersection of Kenwood Avenue and 204th Street	--							1	Evaluate the existence of a preferential pathway in sewers.	2
J-SSG-08	On Normandie Avenue between 204th Street and Milton Street	--							1	Evaluate the existence of a preferential pathway in sewers.	2
J-SSG-09	Intersection of Kenwood Avenue and Milton Street	--							1	Evaluate the existence of a preferential pathway in sewers.	2
J-SSG-10	On Site, southwest portion of Site.	--							1	Evaluate the existence of a preferential pathway in sewers.	2

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Sampling Schedule - Soil Gas Field Sampling Plan
JCI Jones Chemicals, Inc.
Torrance, California

Probe ID	Location	Boring Type	Sample Depths (feet bgs) 5 P	5 D	15 P	15 D	35 P	35 D	Planned Analyses EPA TO-15	Purpose and Rationale for Sampling Location	Objectives Met
J-SSG-11	West of J-SSG-10, behind (north) of Boys and Girls Club property	--	Within sanitary sewer manhole						1	Evaluate the existence of a preferential pathway in sewers.	2
J-SSG-12	West of J-SSG-11, behind (north) of residences	--							1	Evaluate the existence of a preferential pathway in sewers.	2
J-SWG-01	On Denker Avenue between Del Amo Boulevard and 205th Street	--	Within storm sewer manhole						2	Evaluate the existence of a preferential pathway in sewers.	2
J-SWG-02	East of the intersection of Halldale Avenue and Torrance Boulevard	--							1	Evaluate the existence of a preferential pathway in sewers.	2
J-SWG-03	On Normandie Avenue between Del Amo Boulevard and 204th Street	--							1	Evaluate the existence of a preferential pathway in sewers.	2
J-SWG-04	Intersection of Kenwood Avenue and 204th Street	--							1	Evaluate the existence of a preferential pathway in sewers.	2
J-SWG-05	Intersection of Kenwood Avenue and Milton Street	--							1	Evaluate the existence of a preferential pathway in sewers.	2
Total Soil Gas Samples		--	28	3	23	2	18	1	75	--	--
Total In-Utility Air Samples									19	--	--
Total Soil Gas and In-Utility Air Samples									94	--	--

NOTES:

Yellow shading indicates a contingent location.

-- = not applicable

C = Contingency Sample Location - step out locations to be installed based on the results of the initial sampling

D = Duplicate Sample

EPA = U.S. Environmental Protection Agency

P = Primary Sample

PCE = tetrachloroethene

Table 2
Analyte List and Reporting
Limits for Soil Gas and Indoor Air
JCI Jones Chemicals, Inc.
Torrance, California

Analyte	CAS No.	EPA Method	ALS Environmental Soil Gas 1-Liter SUMMA RL µg/m^3	ALS Environmental Indoor Air 6-Liter SUMMA RL µg/m^3
1,1,1-Trichloroethane	71-55-6	TO-15	1.4	0.54
1,1,2,2-Tetrachloroethane	79-34-5	TO-15	1.3	0.53
1,1,2-Trichloroethane	79-00-5	TO-15	1.3	0.53
1,1-Dichloroethane	75-34-3	TO-15	1.3	0.51
1,1-Dichloroethene	75-35-4	TO-15	1.3	0.53
1,2,4-Trichlorobenzene	120-82-1	TO-15	1.4	0.55
1,2,4-Trimethylbenzene	95-63-6	TO-15	1.3	0.53
1,2-Dibromo-3-chloropropane	96-12-8	TO-15	1.3	0.53
1,2-Dibromoethane	106-93-4	TO-15	1.3	0.53
1,2-Dichloro-1,1,2,2-tetrafluoroethane (CFC 114)	76-14-2	TO-15	1.3	0.51
1,2-Dichlorobenzene	95-50-1	TO-15	1.4	0.54
1,2-Dichloroethane	107-06-2	TO-15	1.3	0.53
1,2-Dichloropropane	78-87-5	TO-15	1.3	0.52
1,3,5-Trimethylbenzene	108-67-8	TO-15	1.3	0.53
1,3-Butadiene	106-99-0	TO-15	1.4	0.54
1,3-Dichlorobenzene	541-73-1	TO-15	1.3	0.53
1,4-Dichlorobenzene	106-46-7	TO-15	1.3	0.53
1,4-Dioxane	123-91-1	TO-15	2.8	1.1
2-Butanone (MEK)	78-93-3	TO-15	1.3	0.53
2-Hexanone	591-78-6	TO-15	5.3	2.1
2-Propanol (Isopropyl Alcohol)	67-63-0	TO-15	1.3	0.53
3-Chloro-1-propene (Allyl Chloride)	107-05-1	TO-15	1.3	0.52
4-Ethyltoluene	622-96-8	TO-15	1.3	0.53
4-Methyl-2-pentanone	108-10-1	TO-15	13	5.3
Acetone	67-64-1	TO-15	1.3	0.53
Acetonitrile	75-05-8	TO-15	2.8	1.1
Acrolein	107-02-8	TO-15	1.3	0.53
Acrylonitrile	107-13-1	TO-15	1.3	0.52
alpha-Pinene	80-56-8	TO-15	1.3	0.53
Benzene	71-43-2	TO-15	2.8	1.1
Benzyl Chloride	100-44-7	TO-15	1.3	0.53
Bromodichloromethane	75-27-4	TO-15	1.3	0.53
Bromoform	75-25-2	TO-15	1.3	0.50
Bromomethane	74-83-9	TO-15	2.8	1.1
Carbon Disulfide	75-15-0	TO-15	1.3	0.53
Carbon Tetrachloride	56-23-5	TO-15	1.3	0.53

Table 2
Analyte List and Reporting
Limits for Soil Gas and Indoor Air
JCI Jones Chemicals, Inc.
Torrance, California

Analyte	CAS No.	EPA Method	ALS Environmental	
			Soil Gas	Indoor Air
			1-Liter SUMMA	6-Liter SUMMA
			RL	RL
			µg/m^3	µg/m^3
Chlorobenzene	108-90-7	TO-15	1.3	0.51
Chloroethane	75-00-3	TO-15	1.3	0.53
Chloroform	67-66-3	TO-15	1.3	0.50
Chloromethane	74-87-3	TO-15	1.3	0.53
cis-1,2-Dichloroethene	156-59-2	TO-15	1.4	0.56
cis-1,3-Dichloropropene	10061-01-5	TO-15	1.3	0.53
Cumene	98-82-8	TO-15	2.8	1.1
Cyclohexane	110-82-7	TO-15	1.3	0.52
Dibromochloromethane	124-48-1	TO-15	1.3	0.53
Dichlorodifluoromethane (CFC 12)	75-71-8	TO-15	1.3	0.52
d-Limonene	5989-27-5	TO-15	1.3	0.50
Ethanol	64-17-5	TO-15	13	5.3
Ethyl Acetate	141-78-6	TO-15	2.8	1.1
Ethylbenzene	100-41-4	TO-15	1.3	0.53
Hexachlorobutadiene	87-68-3	TO-15	1.3	0.53
m,p-Xylenes	179601-23-1	TO-15	2.8	1.1
Methyl Methacrylate	80-62-6	TO-15	2.8	1.1
Methyl tert-Butyl Ether	1634-04-4	TO-15	1.4	0.54
Methylene Chloride	75-09-2	TO-15	1.3	0.53
Naphthalene	91-20-3	TO-15	1.3	0.53
n-Butyl Acetate	123-86-4	TO-15	1.3	0.53
n-Heptane	142-82-5	TO-15	1.3	0.53
n-Hexane	110-54-3	TO-15	1.3	0.53
n-Nonane	111-84-2	TO-15	1.3	0.53
n-Octane	111-65-9	TO-15	1.3	0.53
n-Propylbenzene	103-65-1	TO-15	1.3	0.53
o-Xylene	95-47-6	TO-15	1.3	0.53
Propene	115-07-1	TO-15	1.3	0.52
Styrene	100-42-5	TO-15	1.3	0.53
Tetrachloroethene	127-18-4	TO-15	1.3	0.53
Tetrahydrofuran (THF)	109-99-9	TO-15	1.3	0.53
Toluene	108-88-3	TO-15	1.3	0.53
trans-1,2-Dichloroethene	156-60-5	TO-15	1.4	0.54
trans-1,3-Dichloropropene	10061-02-6	TO-15	1.3	0.53

Table 2
Analyte List and Reporting
Limits for Soil Gas and Indoor Air
JCI Jones Chemicals, Inc.
Torrance, California

Analyte	CAS No.	EPA Method	ALS Environmental	
			Soil Gas	Indoor Air
			1-Liter SUMMA	6-Liter SUMMA
			RL	RL
			µg/m^3	µg/m^3
Trichloroethene	79-01-6	TO-15	1.3	0.53
Trichlorofluoromethane (CFC 11)	75-69-4	TO-15	1.3	0.53
Trichlorotrifluoroethane (CFC 113)	76-13-1	TO-15	1.3	0.53
Vinyl Acetate	108-05-4	TO-15	13	5.3
Vinyl Chloride	75-01-4	TO-15	1.3	0.52
Helium	7440-59-7	TO-3	25[(1)]	25[(1)]

NOTES:

[(1)]Helium is reported in parts per million.

µg/m^3 = micrograms per cubic meter

CAS = Chemical Abstracts Service

EPA = U.S. Environmental Protection Agency

RL = Reporting Limit

Table 3
Probe Construction Details for Soil Gas Monitoring Probes
JCI Jones Chemicals, Inc.
Torrance, California

Soil Gas Probe ID	Total Depth (feet bgs)	Borehole Diameter (inches)	Tubing type/Diameter*	Screen Interval[(2)] (feet bgs)	Screen Slot Size[(3)] (inches)	Filter Pack Size[(4)]	Filter Pack Interval[(1)] (feet bgs)
J-SG-74-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-74-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-74-35	35.3	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-75-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-75-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-75-35	35.3	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-76-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-76-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-76-35	35	1.5	1/4-inch Nylaflow	34.5-35	0.0057	#3 Sand	34-35
J-SG-77-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-77-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-77-35	35.3	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.3
J-SG-78-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-78-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-78-35	35.3	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-79-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-79-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-79-35	35.3	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.3
J-SG-80-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-80-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-80-35	35.3	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.3
J-SG-81-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-81-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-81-35	35.3	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-82-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-82-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-82-35	35.3	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.3
J-SG-83-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-83-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-83-35	35.3	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-84-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-84-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-84-35	35.5	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.5
J-SG-85-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-85-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-85-35	35.3	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-86-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-86-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-86-35	35.3	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.3
J-SG-87-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-87-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-87-35	35.3	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-88-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-88-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-88-35	35.3	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-89-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-89-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-89-35	35.3	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-90-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-90-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-90-35	35.5	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.5
J-SG-91-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-91-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-91-35	35.3	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3

Table 3
Probe Construction Details for Soil Gas Monitoring Probes
JCI Jones Chemicals, Inc.
Torrance, California

Soil Gas Probe ID	Total Depth (feet bgs)	Borehole Diameter (inches)	Tubing type/Diameter*	Screen Interval[(2)] (feet bgs)	Screen Slot Size[(3)] (inches)	Filter Pack Size[(4)]	Filter Pack Interval[(1)] (feet bgs)
J-SG-92-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-92-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-92-35	35.3	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-93-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-93-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-93-35	35.3	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-94-5	5	1.5	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-94-15	15	1.5	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-94-35	35.3	1.5	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-95-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-95-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14-15.5
J-SG-95-35	33	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	30.5-33
J-SG-96-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-96-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-96-35	35.5	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.5
J-SG-97-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-97-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-97-35	35.3	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-98-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-98-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-98-35	35.3	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.3
J-SG-99-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-99-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-99-35	35.3	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-100-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.75-5.75
J-SG-100-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-100-35	35.5	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.5
J-SG-101-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-101-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-101-35	35.3	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.3
J-SG-102-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-102-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-102-35	35.3	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.3
J-SG-103-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-103-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-103-35	35	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35
J-SG-104-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-104-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-104-35	35.3	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-105-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-105-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-105-35	35.3	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-106-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-106-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-106-35	36	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	33.5-36
J-SG-107-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-107-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-107-35	35.5	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5
J-SG-108-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-108-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-108-35	35.5	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.5
J-SG-109-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-109-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-109-35	35	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35

Table 3
Probe Construction Details for Soil Gas Monitoring Probes
JCI Jones Chemicals, Inc.
Torrance, California

Soil Gas Probe ID	Total Depth (feet bgs)	Borehole Diameter (inches)	Tubing type/Diameter*	Screen Interval[2] (feet bgs)	Screen Slot Size[3] (inches)	Filter Pack Size[4]	Filter Pack Interval[1] (feet bgs)
J-SG-110-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-110-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-110-35	35.5	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5
J-SG-111-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-111-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-111-35	35.5	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.5
J-SG-112-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-112-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-112-35	35.5	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.5
J-SG-113-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-113-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-113-35	35.3	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-114-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-114-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-114-35	35.3	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-115-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-115-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-115-35	35.3	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-116-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-116-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-116-35	35.3	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-117-5	5	2.25	1/4-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-117-15	15	2.25	1/4-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-117-35	35.3	2.25	1/4-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.3
J-SG-118-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-118-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-118-35	35.3	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35.3
J-SG-119-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-119-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-119-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35
J-SG-120-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-120-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-120-35	36	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-36
J-SG-121-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-121-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-121-35	37	2.25	1/8-inch Nylaflow	34.5-35	0.0057	#3 Sand	34-37
J-SG-122-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-122-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-122-35	34	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-34
J-SG-123-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-123-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-123-35	39	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-39
J-SG-124-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-124-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-124-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35
J-SG-125-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-125-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-125-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35
J-SG-126-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-126-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-126-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35
J-SG-127-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-127-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-127-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35

Table 3
Probe Construction Details for Soil Gas Monitoring Probes
JCI Jones Chemicals, Inc.
Torrance, California

Soil Gas Probe ID	Total Depth (feet bgs)	Borehole Diameter (inches)	Tubing type/Diameter*	Screen Interval[(2)] (feet bgs)	Screen Slot Size[(3)] (inches)	Filter Pack Size[(4)]	Filter Pack Interval[(1)] (feet bgs)
J-SG-128-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-128-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-128-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35
J-SG-129-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-129-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-129-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35
J-SG-130-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-130-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-130-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35
J-SG-131-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-131-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-131-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34-35
Proposed Soil Gas Probes							
J-SG-132-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-132-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-132-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5
J-SG-133-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-133-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-133-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5
J-SG-134-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-134-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-134-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5
J-SG-135-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-135-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-135-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5
J-SG-136-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-136-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-137-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-137-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-137-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5
J-SG-138-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-138-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-138-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5
J-SG-139-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-139-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-140-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-140-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-140-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5
J-SG-141-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-141-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-142-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-142-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-142-35	35	2.25	1/8-inch Nylaflow	34.75-15.25	0.0057	#3 Sand	34.5-35.5
J-SG-143-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-143-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-143-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5
J-SG-144-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-144-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-144-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5
J-SG-145-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-145-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-145-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5
J-SG-146-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-146-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5

Table 3
Probe Construction Details for Soil Gas Monitoring Probes
JCI Jones Chemicals, Inc.
Torrance, California

Soil Gas Probe ID	Total Depth (feet bgs)	Borehole Diameter (inches)	Tubing type/Diameter*	Screen Interval(2) (feet bgs)	Screen Slot Size(3) (inches)	Filter Pack Size(4)	Filter Pack Interval(1) (feet bgs)
J-SG-147-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-147-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-148-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-148-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-148-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5
J-SG-149-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-149-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-149-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5
J-SG-150-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-150-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-150-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5
J-SG-151-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-151-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-151-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5
J-SG-152-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-152-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-152-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5
J-SG-153-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-153-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-153-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5
J-SG-154-5	5	2.25	1/8-inch Nylaflow	4.75-5.25	0.0057	#3 Sand	4.5-5.5
J-SG-154-15	15	2.25	1/8-inch Nylaflow	14.75-15.25	0.0057	#3 Sand	14.5-15.5
J-SG-154-35	35	2.25	1/8-inch Nylaflow	34.75-35.25	0.0057	#3 Sand	34.5-35.5

NOTES:

*Outside diameter (OD)

(1)Depths are approximate and will be adjusted in the field based on the lithology encountered.

(2)Stainless Steel.

(3)Screen slot size is approximate and may be adjusted based the lithology of the sand interval.

(4)Filter pack size is approximate and may be adjusted based on the screen slot size that is selected for the well. Filter pack consists of #3 kiln dried Lonestar sand.

bgs = below ground surface

NA = not applicable

Table 4
Sampling Schedule - Groundwater Sampling Plan
JCI Jones Chemicals, Inc.
Torrance, California

Well ID	Location	Unit	Planned Analyses[1]	Rationale	Objectives Met
			VOCs[2]		
J-UBA-01	Off-Site downgradient on former Farmer Brothers property	Upper Bellflower Aquitard	x	Define the southwestern extent of VOCs between MW-16 and MW-17	1, 2
J-MBFC-01	South of Southeastern LADWP ROW	Middle Bellflower Sand - C Unit	x	Evaluate VOC concentrations in the MBFC downgradient of the Site	3
J-MBFC-02	Southwestern corner of JCI property	Middle Bellflower Sand - C Unit	x	Evaluate the width and vertical extent of VOCs in the MBFC sand near MW-6	3

NOTES:

[1]A minimum 10 percent per sampling event will be analyzed for VOCs as duplicate samples, a trip blank and equipment blank will also be sampled each event.

[2]Analyzed by U.S. Environmental Protection Agency Method 8260B.

JCI = Jones Chemicals, Inc.

LADWP = Los Angeles Department of Water and Power

MBFC = Middle Bellflower C Sand

ROW = right of way

UBA = Upper Bellflower Aquitard

VOC = volatile organic compound

Table 5
Analyte List and Reporting Limits for Soil
JCI Jones Chemicals, Inc.
Torrance, California

EPA 8260B Volatile Organics + Oxygenates Soil 5035			
Analyte	CAS No.	MDL (µg/kg)	RL (µg/kg)
1,1,1,2-Tetrachloroethane	630-20-6	0.24	1
1,1,1-Trichloroethane	71-55-6	0.23	1
1,1,2,2-Tetrachloroethane	79-34-5	0.35	2
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	0.35	10
1,1,2-Trichloroethane	79-00-5	0.35	1
1,1-Dichloroethane	75-34-3	0.21	1
1,1-Dichloroethene	75-35-4	0.35	1
1,1-Dichloropropene	563-58-6	0.33	2
1,2,3-Trichlorobenzene	87-61-6	0.91	2
1,2,3-Trichloropropane	96-18-4	0.83	2
1,2,4-Trichlorobenzene	120-82-1	0.31	2
1,2,4-Trimethylbenzene	95-63-6	0.59	2
1,2-Dibromo-3-Chloropropane	96-12-8	1.7	5
1,2-Dibromoethane	106-93-4	0.26	1
1,2-Dichlorobenzene	95-50-1	0.23	1
1,2-Dichloroethane	107-06-2	0.31	1
1,2-Dichloropropane	78-87-5	0.44	1
1,3,5-Trimethylbenzene	108-67-8	0.55	2
1,3-Dichlorobenzene	541-73-1	0.18	1
1,3-Dichloropropane	142-28-9	0.25	1
1,4-Dichlorobenzene	106-46-7	0.22	1
2,2-Dichloropropane	594-20-7	0.33	5
2-Butanone	78-93-3	3.8	20
2-Chlorotoluene	95-49-8	0.23	1
2-Hexanone	591-78-6	1.8	20
4-Chlorotoluene	106-43-4	0.21	1
4-Methyl-2-Pentanone	108-10-1	4.3	20
Acetone	67-64-1	6.2	50
Benzene	71-43-2	0.13	1
Bromobenzene	108-86-1	0.21	1
Bromochloromethane	74-97-5	0.69	2
Bromodichloromethane	75-27-4	0.23	1
Bromoform	75-25-2	0.79	5
Bromomethane	74-83-9	9.4	20
c-1,2-Dichloroethene	156-59-2	0.28	1
c-1,3-Dichloropropene	10061-01-5	0.25	1
Carbon Disulfide	75-15-0	0.31	10
Carbon Tetrachloride	56-23-5	0.28	1
Chlorobenzene	108-90-7	0.22	1
Chloroethane	75-00-3	1.5	2
Chloroform	67-66-3	0.24	1
Chloromethane	74-87-3	0.3	20

Table 5
Analyte List and Reporting Limits for Soil
JCI Jones Chemicals, Inc.
Torrance, California

EPA 8260B Volatile Organics + Oxygenates Soil 5035			
Analyte	CAS No.	MDL (µg/kg)	RL (µg/kg)
Dibromochloromethane	124-48-1	0.57	2
Dibromomethane	74-95-3	0.77	1
Dichlorodifluoromethane	75-71-8	0.44	2
Diisopropyl Ether	108-20-3	0.48	1
Ethanol	64-17-5	84	500
Ethylbenzene	100-41-4	0.15	1
Ethyl-t-Butyl Ether	637-92-3	0.51	1
Isopropylbenzene	98-82-8	0.55	1
Methylene Chloride	75-09-2	1.3	10
Methyl-t-Butyl Ether	1634-04-4	0.3	2
Naphthalene	91-20-3	0.81	10
n-Butylbenzene	104-51-8	0.16	1
n-Propylbenzene	103-65-1	0.5	2
o-Xylene	95-47-6	0.56	1
p/m-Xylene	179601-23-1	0.27	2
p-Isopropyltoluene	99-87-6	0.63	1
sec-Butylbenzene	135-98-8	0.58	1
Styrene	100-42-5	0.6	1
t-1,2-Dichloroethene	156-60-5	0.51	1
t-1,3-Dichloropropene	10061-02-6	0.61	2
Tert-Amyl-Methyl Ether	994-05-8	0.35	1
Tert-Butyl Alcohol	75-65-0	5.2	20
tert-Butylbenzene	98-06-6	0.15	1
Tetrachloroethene	127-18-4	0.21	1
Toluene	108-88-3	0.52	1
Trichloroethene	79-01-6	0.3	2
Trichlorofluoromethane	75-69-4	0.38	10
Vinyl Acetate	108-05-4	4.7	10
Vinyl Chloride	75-01-4	0.5	1

NOTES:

µg/kg = micrograms per kilogram

CAS = Chemical Abstracts Service

EPA = U.S. Environmental Protection Agency

MDL = Method Detection Limit

RL= Reporting Limit

Table 6
Analyte List and Reporting Limits for Groundwater
JCI Jones Chemicals, Inc.
Torrance, California

EPA 8260B Volatile Organics + Oxygenates Water			
		MDL	RL
Analyte	CAS No.	(µg/L)	(µg/L)
1,1,1,2-Tetrachloroethane	630-20-6	0.4	1
1,1,1-Trichloroethane	71-55-6	0.3	1
1,1,2,2-Tetrachloroethane	79-34-5	0.41	1
1,1,2-Trichloro-1,2,2-Trifluoroethane	76-13-1	3.9	10
1,1,2-Trichloroethane	79-00-5	0.38	1
1,1-Dichloroethane	75-34-3	0.28	1
1,1-Dichloroethene	75-35-4	0.43	1
1,1-Dichloropropene	563-58-6	0.46	1
1,2,3-Trichlorobenzene	87-61-6	0.51	1
1,2,3-Trichloropropane	96-18-4	0.64	5
1,2,4-Trichlorobenzene	120-82-1	0.5	1
1,2,4-Trimethylbenzene	95-63-6	0.36	1
1,2-Dibromo-3-Chloropropane	96-12-8	1.2	5
1,2-Dibromoethane	106-93-4	0.36	1
1,2-Dichlorobenzene	95-50-1	0.46	1
1,2-Dichloroethane	107-06-2	0.24	0.5
1,2-Dichloropropane	78-87-5	0.42	1
1,3,5-Trimethylbenzene	108-67-8	0.28	1
1,3-Dichlorobenzene	541-73-1	0.4	1
1,3-Dichloropropane	142-28-9	0.3	1
1,4-Dichlorobenzene	106-46-7	0.43	1
2,2-Dichloropropane	594-20-7	0.36	1
2-Butanone	78-93-3	4.4	10
2-Chlorotoluene	95-49-8	0.24	1
2-Hexanone	591-78-6	4.2	10
4-Chlorotoluene	106-43-4	0.13	1
4-Methyl-2-Pentanone	108-10-1	4.4	10
Acetone	67-64-1	10	20
Benzene	71-43-2	0.14	0.5
Bromobenzene	108-86-1	0.3	1
Bromochloromethane	74-97-5	0.48	1
Bromodichloromethane	75-27-4	0.21	1
Bromoform	75-25-2	0.5	1
Bromomethane	74-83-9	3.9	10
c-1,2-Dichloroethene	156-59-2	0.48	1
c-1,3-Dichloropropene	10061-01-5	0.25	0.5
Carbon Disulfide	75-15-0	4.1	10
Carbon Tetrachloride	56-23-5	0.23	0.5
Chlorobenzene	108-90-7	0.17	1

Table 6
Analyte List and Reporting Limits for Groundwater
JCI Jones Chemicals, Inc.
Torrance, California

EPA 8260B Volatile Organics + Oxygenates Water			
		MDL	RL
Analyte	CAS No.	(µg/L)	(µg/L)
Chloroethane	75-00-3	2.3	5
Chloroform	67-66-3	0.46	1
Chloromethane	74-87-3	3.5	10
Dibromochloromethane	124-48-1	0.25	1
Dibromomethane	74-95-3	0.46	1
Dichlorodifluoromethane	75-71-8	0.46	1
Diisopropyl Ether	108-20-3	0.33	2
Ethanol	64-17-5	50	100
Ethylbenzene	100-41-4	0.14	1
Ethyl-t-Butyl Ether	637-92-3	0.44	2
Isopropylbenzene	98-82-8	0.58	1
Methylene Chloride	75-09-2	3.8	10
Methyl-t-Butyl Ether	1634-04-4	0.31	1
Naphthalene	91-20-3	5	10
n-Butylbenzene	104-51-8	0.23	1
n-Propylbenzene	103-65-1	0.17	1
o-Xylene	95-47-6	0.23	1
p/m-Xylene	179601-23-1	0.3	1
p-Isopropyltoluene	99-87-6	0.16	1
sec-Butylbenzene	135-98-8	0.25	1
Styrene	100-42-5	0.17	1
t-1,2-Dichloroethene	156-60-5	0.37	1
t-1,3-Dichloropropene	10061-02-6	0.25	0.5
Tert-Amyl-Methyl Ether	994-05-8	0.22	2
Tert-Butyl Alcohol	75-65-0	4.6	10
tert-Butylbenzene	98-06-6	0.28	1
Tetrachloroethene	127-18-4	0.39	1
Toluene	108-88-3	0.24	1
Trichloroethene	79-01-6	0.37	1
Trichlorofluoromethane	75-69-4	3.3	10
Vinyl Acetate	108-05-4	5.6	10
Vinyl Chloride	75-01-4	0.3	0.5

NOTES:

µg/L = micrograms per Liter

CAS = Chemical Abstracts Service

EPA = U.S. Environmental Protection Agency

MDL = Method Detection Limit

RL= Reporting Limit

Table 7
Summary of Receptor-Specific Exposure Parameters
JCI Jones Chemicals, Inc.
Torrance, California

Parameter	Acronym	Units	Population: On-property Indoor Employe	Current On-property Visitor	On-property Construction	On-property Indoor Employe	On-property Outdoor Employe	Current/Future Off-property Resident		Future Off-property Indoor	Source
								Adult	Child		
Soil Ingestion											
Soil Ingestion rate	IngR-soil	mg/day	NA	NA	330	50	100	NA	NA	NA	USEPA 2017b; Cal/EPA 2014
Fraction Soil Contaminated	FI	unitless	NA	NA	1	1	1	NA	NA	NA	Health protective assumption
Exposure Frequency Outdoors	EF	days/year	NA	NA	250	250	225	NA	NA	NA	USEPA 2002a and 2017b; Cal/EPA 2014
Particulate Inhalation[a]											
Exposure Time	ET	hr/day	NA	NA	8	NA	8	NA		NA	USEPA 2009 and 2017b
Particulate Emission Factor	PEF	unitless	NA	NA	$1.0x10^6$	NA	$1.36x10^9$	NA		NA	USEPA 2002a and 2017b; Cal/EPA 2014
Dermal Soil Contact											
Surface Area - soil[b]	SA-soil	cm^2	NA	NA	6032	NA	6032	NA	NA	NA	Cal/EPA 2014 (assumes head, hands, forearms, and lower legs are exposed)
Adherence Factor	AF	mg/cm^2	NA	NA	0.8	NA	0.2	NA	NA	NA	Cal/EPA 2014
Inhalation of Indoor Intrusion Vapor[a]											
Exposure Time Indoors	ET	hours	8	2	NA	8	NA	24		8	Cal/EPA 2014; USEPA 2011a and 2017b; Best professional judgment
Exposure Frequency Indoors	EF	days	250	50	NA	250	NA	350		250	USEPA 2002a
Common Parameters											
Body Weight	BW	kg	80	80	80	80	80	80	15	80	USEPA 2017b; Cal/EPA 2014
Exposure Duration	ED	years	25	10	1	25	25	20	6	25	USEPA 2017b; Cal/EPA 2014
Averaging Time, Carcinogen	$AT_{carcinogens}$	days	25550	25550	25550	25550	25550	25550	25550	25550	USEPA 2017b; Cal/EPA 2014 (70 years)
Averaging Time, Noncarcinogen	$AT_{nonarcinogens}$	days	9125	3650	365	9125	9125	7300	2190	9125	Based on Exposure Duration

Notes:
NA = Not Applicable
[a]Risk from inhaled chemicals evaluated according to RAGS Part F (USEPA 2009), which is consistent with agency's inhalation dosiometry methodology, and recommends using the concentration of the chemical in air as the exposure metrice (e.g., mg/m^3) rather than the chemical inhalation intake based on inhalation rate and body weight (e.g., mg/kg-day). Therefore, the adult and child exposures are evaluated as a single "adult" receptor, using an exposure duration of 26 years.
kg = kilogram(s)
m3 = cubic meter(s)
mg = milligram(s)
RAGS = Risk Assessment Guidance for Superfund
USEPA = United Sates Environmental Protection Agency

Table 8
Well Construction Details for Proposed Monitoring Wells
JCI Jones Chemicals, Inc.
Torrance, California

Well ID	Total Depth Drilled[1] (feet bgs)	Borehole Diameter (inches)	Well Casing/Screen Diameter Type	9-inch Steel Conductor Casing Interval (feet bgs)	Screen Interval[2] (feet bgs)	Screen Slot Size[3] (inches)	Filter Pack Size[4]	Filter Pack Interval[1] (feet bgs)	Fine Sand Interval[1][5] (feet bgs)	Bentonite Seal Interval[1][6] (feet bgs)	Grout Seal[1][7] (feet bgs)
J-UBA-01	90	12	4-inch PVC	--	68–83	0.02	#2/16	65–85	63–65	60–63	0–60
J-MBFC-01	130	10/6[8]	4-inch PVC	0–100	108–128	0.020–0.030	#2/16–#3	105–130	103–105	100–103	0–100
J-MBFC-02	130	10/6[8]	4-inch PVC	0–100	108–128	0.020–0.030	#2/16–#3	105–130	103–105	100–103	0–100

NOTES:

[1]Depths are approximate and will be adjusted in the field based on the lithology encountered.

[2]Schedule 40 PVC.

[3]Screen slot size is approximate and may be adjusted based the lithology of the sand interval.

[4]Filter pack size is approximate and may be adjusted based on the screen slot size that is selected for the well. Filter pack consists of Monterey sand. Filter pack sizes are Lone Star Lapis Lustre size designations.

[5]No. 60 silica sand.

[6]Granular bentonite or pellets.

[7]Volclay grout or equivalent.

[8]Conductor casing for MBFC monitoring wells will be installed in a 13-inch-diameter borehole, and well casing and screen will be installed in a 8-inch-diameter borehole.

-- = not applicable

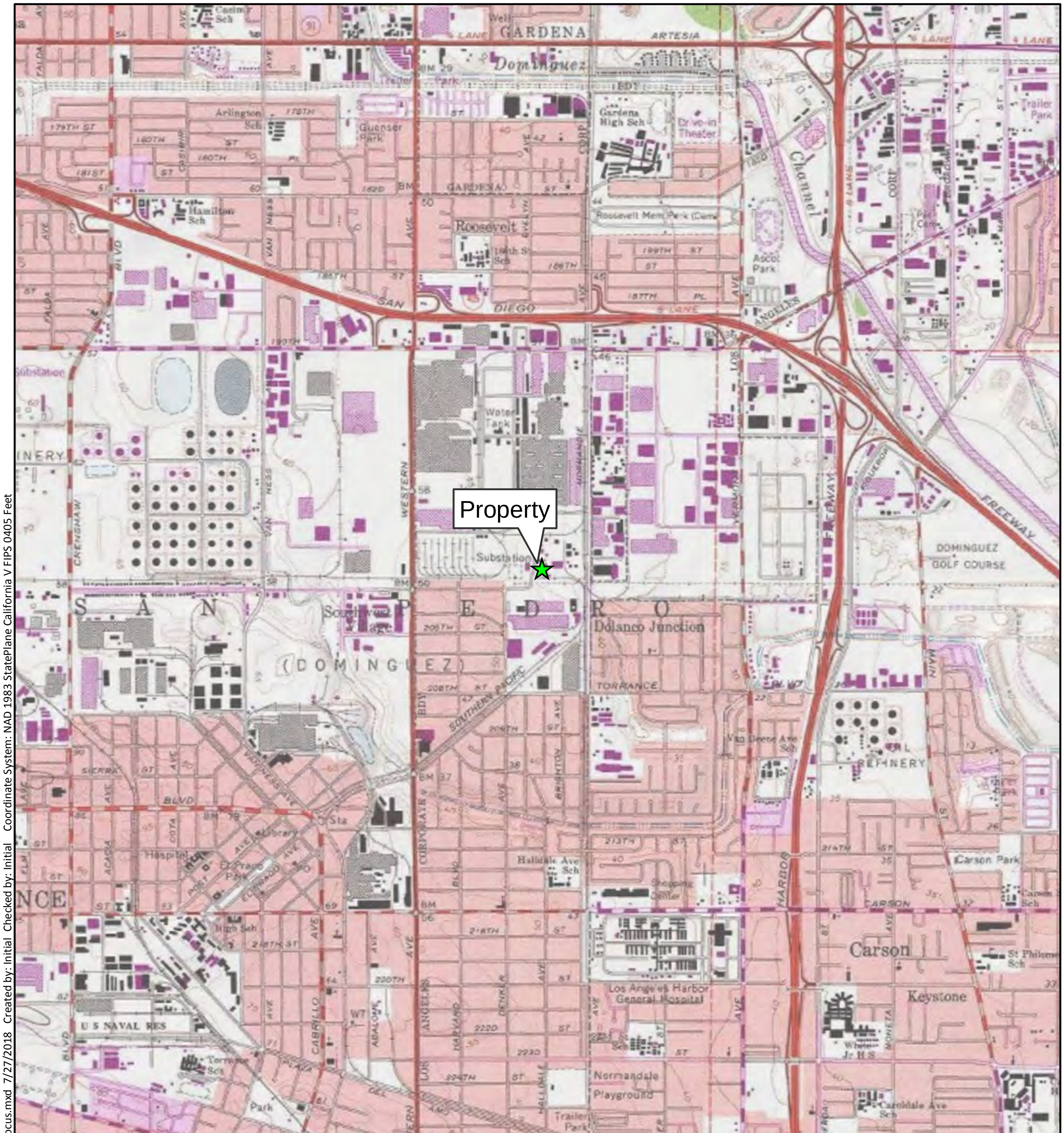
bgs = below ground surface

MBFC = Middle Bellflower C Sand

PVC = polyvinyl chloride

UBA = Upper Bellflower Aquitard

FIGURES



0 2,500 5,000 Feet

1 inch = 2,500 feet

N

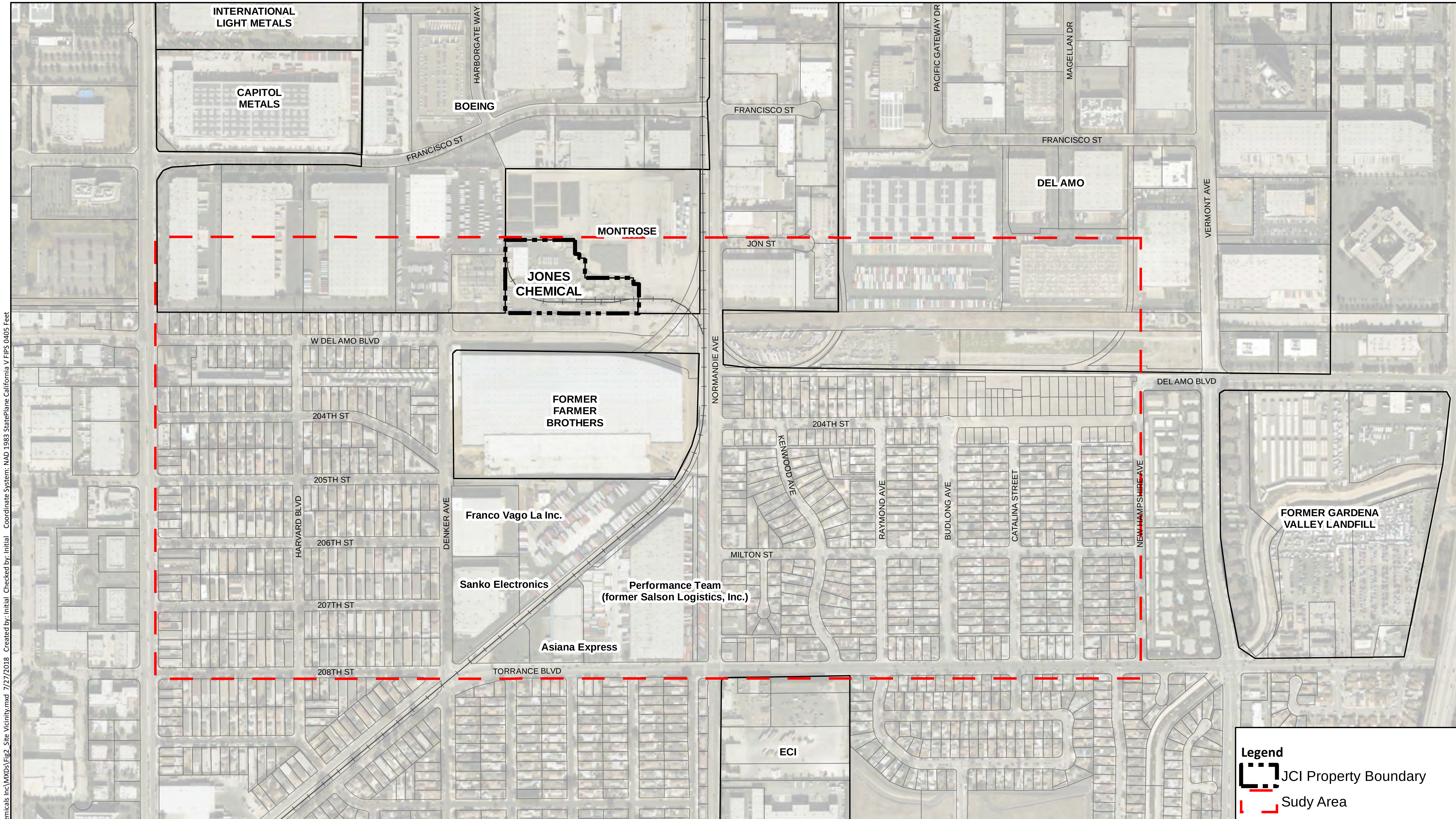
Legend

★ Property Location

Base Map: USGS Torrance, CA 7.5 Minute Quadrangle.

SAFETY FIRST	CLIENT: JCI Jones Chemicals	**Property Location**
terraphase engineering	PROJECT: 1401 West Del Amo Blvd Torrance, CA	
	PROJECT NUMBER: S040.001.001	**FIGURE 1**

File: K:\GIS\Prj\S040 - JCI Jones Chemicals Inc\MXDs\Fig1_Site Locus.mxd 7/27/2018 Created by: Initial Checked by: Initial Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



File: K:\GIS\Prj\S040 - JCI Jones Chemicals Inc\MXDs\Fig2_Site Vicinity.mxd 7/27/2018 Created by: Initial Checked by: Initial Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

0 250 500 750 1,000 Feet

1 inch = 500 feet

N

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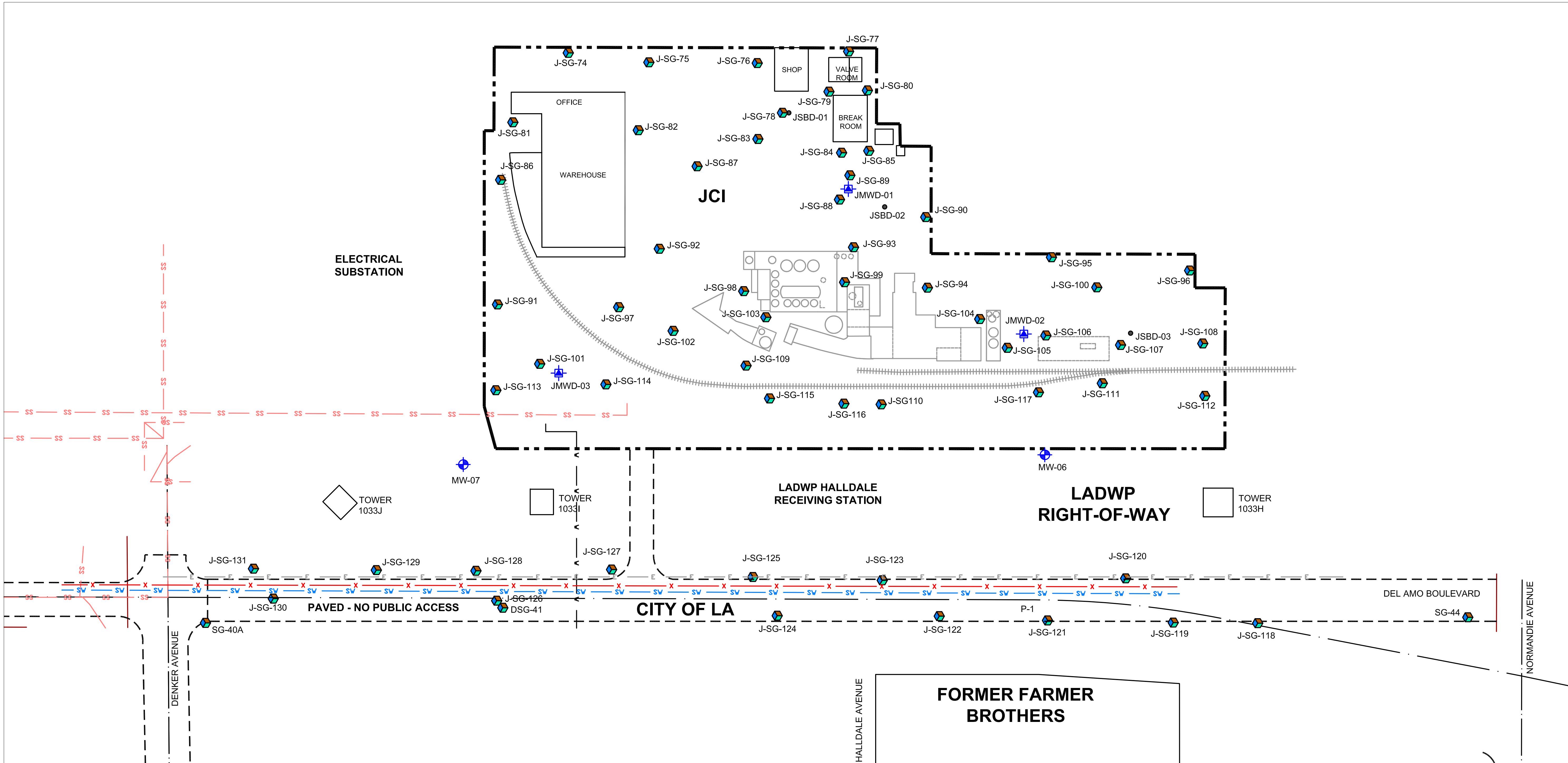
terraphase engineering

CLIENT:	JCI Jones Chemicals
PROJECT:	1401 West Del Amo Blvd Torrance, CA
PROJECT NUMBER:	S040.001.001

Project Vicinity Showing Surrounding Properties

FIGURE 2

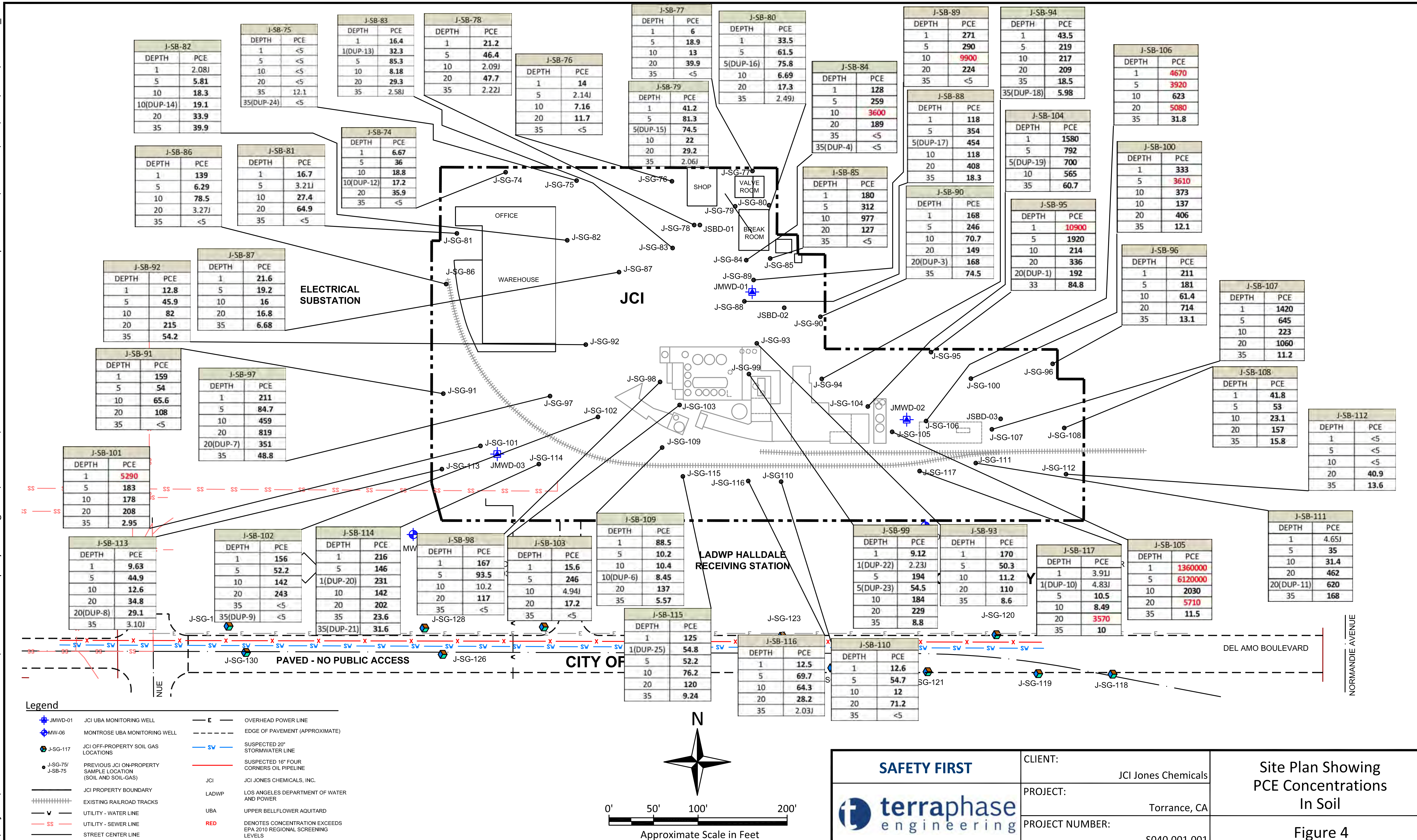
R:\Projects\S040 - JCI Jones Chemicals Inc\Torrance Off-Property Investigation\References\S114-001 JCI Jones Chemicals - EPA Response Tasks\Technical\CAD\2017\RIWP\S114-001_SP.dwg



Legend

JMWD-01	JCI UBA MONITORING WELL	SS	UTILITY - SEWER LINE
MW-06	MONTROSE UBA MONITORING WELL		STREET CENTER LINE
J-SG-117	JCI SOIL GAS LOCATIONS	E	OVERHEAD POWER LINE
	5-FOOT SOIL GAS SAMPLE 15-FOOT SOIL GAS SAMPLE 35-FOOT SOIL GAS SAMPLE		EDGE OF PAVEMENT (APPROXIMATE)
		SW	SUSPECTED 20" STORMWATER LINE
J-SBD-03	DEEP SOIL BORING LOCATION		SUSPECTED 16" FOUR CORNERS OIL PIPELINE
	JCI PROPERTY BOUNDARY	JCI	JCI JONES CHEMICALS, INC.
	EXISTING RAILROAD TRACKS	LADWP	LOS ANGELES DEPARTMENT OF WATER AND POWER
W	UTILITY - WATER LINE	UBA	UPPER BELLFLOWER AQUITARD

SAFETY FIRST	CLIENT: JCI Jones Chemicals	Site Plan
terraphase engineering	PROJECT: Torrance, CA	
	PROJECT NUMBER: S040.001.001	Figure 3



J-SB-82

DEPTH	PCE
1	2.08J
5	5.81
10	18.3
10(DUP-14)	19.1
20	33.9
35	39.9

J-SB-75

DEPTH	PCE
1	<5
5	<5
10	<5
20	<5
35	12.1
35(DUP-24)	<5

J-SB-83

DEPTH	PCE
1	16.4
1(DUP-13)	32.3
5	85.3
10	8.18
20	29.3
35	2.58J

J-SB-78

DEPTH	PCE
1	21.2
5	46.4
10	2.09J
20	47.7
35	2.22J

J-SB-76

DEPTH	PCE
1	14
5	2.14J
10	7.16
20	11.7
35	<5

J-SB-77

DEPTH	PCE
1	6
5	18.9
10	13
20	39.9
35	<5

J-SB-79

DEPTH	PCE
1	41.2
5	81.3
5(DUP-15)	74.5
10	22
20	29.2
35	2.06J

J-SB-80

DEPTH	PCE
1	33.5
5	61.5
5(DUP-16)	75.8
10	6.69
20	17.3
35	2.49J

J-SB-84

DEPTH	PCE
1	128
5	259
10	3600
20	189
35	<5
35(DUP-4)	<5

J-SB-89

DEPTH	PCE
1	271
5	290
10	9900
20	224
35	<5

J-SB-94

DEPTH	PCE
1	43.5
5	219
10	217
20	209
35	18.5
35(DUP-18)	5.98

J-SB-106

DEPTH	PCE
1	4670
5	3920
10	623
20	5080
35	31.8

J-SB-88

DEPTH	PCE
1	118
5	354
5(DUP-17)	454
10	118
20	408
35	18.3

J-SB-104

DEPTH	PCE
1	1580
5	792
5(DUP-19)	700
10	565
35	60.7

J-SB-100

DEPTH	PCE
1	333
5	3610
10	373
10	137
20	406
35	12.1

J-SB-85

DEPTH	PCE
1	180
5	312
10	977
20	127
35	<5

J-SB-90

DEPTH	PCE
1	168
5	246
10	70.7
20	149
20(DUP-3)	168
35	74.5

J-SB-95

DEPTH	PCE
1	10900
5	1920
10	214
20	336
20(DUP-1)	192
33	84.8

J-SB-96

DEPTH	PCE
1	211
5	181
10	61.4
20	714
35	13.1

J-SB-107

DEPTH	PCE
1	1420
5	645
10	223
20	1060
35	11.2

J-SB-108

DEPTH	PCE
1	41.8
5	53
10	23.1
20	157
35	15.8

J-SB-112

DEPTH	PCE
1	<5
5	<5
10	<5
20	40.9
35	13.6

J-SB-86

DEPTH	PCE
1	139
5	6.29
10	78.5
20	3.27J
35	<5

J-SB-81

DEPTH	PCE
1	16.7
5	3.21J
10	27.4
20	64.9
35	<5

J-SB-74

DEPTH	PCE
1	6.67
5	36
10	18.8
10(DUP-12)	17.2
20	35.9
35	<5

J-SB-92

DEPTH	PCE
1	12.8
5	45.9
10	82
20	215
35	54.2

J-SB-87

DEPTH	PCE
1	21.6
5	19.2
10	16
20	16.8
35	6.68

J-SB-91

DEPTH	PCE
1	159
5	54
10	65.6
20	108
35	<5

J-SB-97

DEPTH	PCE
1	211
5	84.7
10	459
20	819
20(DUP-7)	351
35	48.8

J-SB-101

DEPTH	PCE
1	5290
5	183
10	178
20	208
35	2.95

J-SB-113

DEPTH	PCE
1	9.63
5	44.9
10	12.6
20	34.8
20(DUP-8)	29.1
35	3.10J

J-SB-102

DEPTH	PCE
1	156
5	52.2
10	142
20	243
35	<5
35(DUP-9)	<5

J-SB-114

DEPTH	PCE
1	216
5	146
1(DUP-20)	231
10	142
20	202
35	23.6
35(DUP-21)	31.6

J-SB-98

DEPTH	PCE
1	167
5	93.5
10	10.2
20	117
35	<5

J-SB-103

DEPTH	PCE
1	15.6
5	246
10	4.94J
20	17.2
35	<5

J-SB-109

DEPTH	PCE
1	88.5
5	10.2
10	10.4
10(DUP-6)	8.45
20	137
35	5.57

J-SB-115

DEPTH	PCE
1	125
1(DUP-25)	54.8
5	52.2
10	76.2
20	120
35	9.24

J-SB-116

DEPTH	PCE
1	12.5
5	69.7
10	64.3
20	28.2
35	2.03J

J-SB-110

DEPTH	PCE
1	12.6
5	54.7
10	12
20	71.2
35	<5

J-SB-99

DEPTH	PCE
1	9.12
1(DUP-22)	2.23J
5	194
5(DUP-23)	54.5
10	184
20	229
35	8.8

J-SB-93

DEPTH	PCE
1	170
5	50.3
10	11.2
20	110
35	8.6

J-SB-117

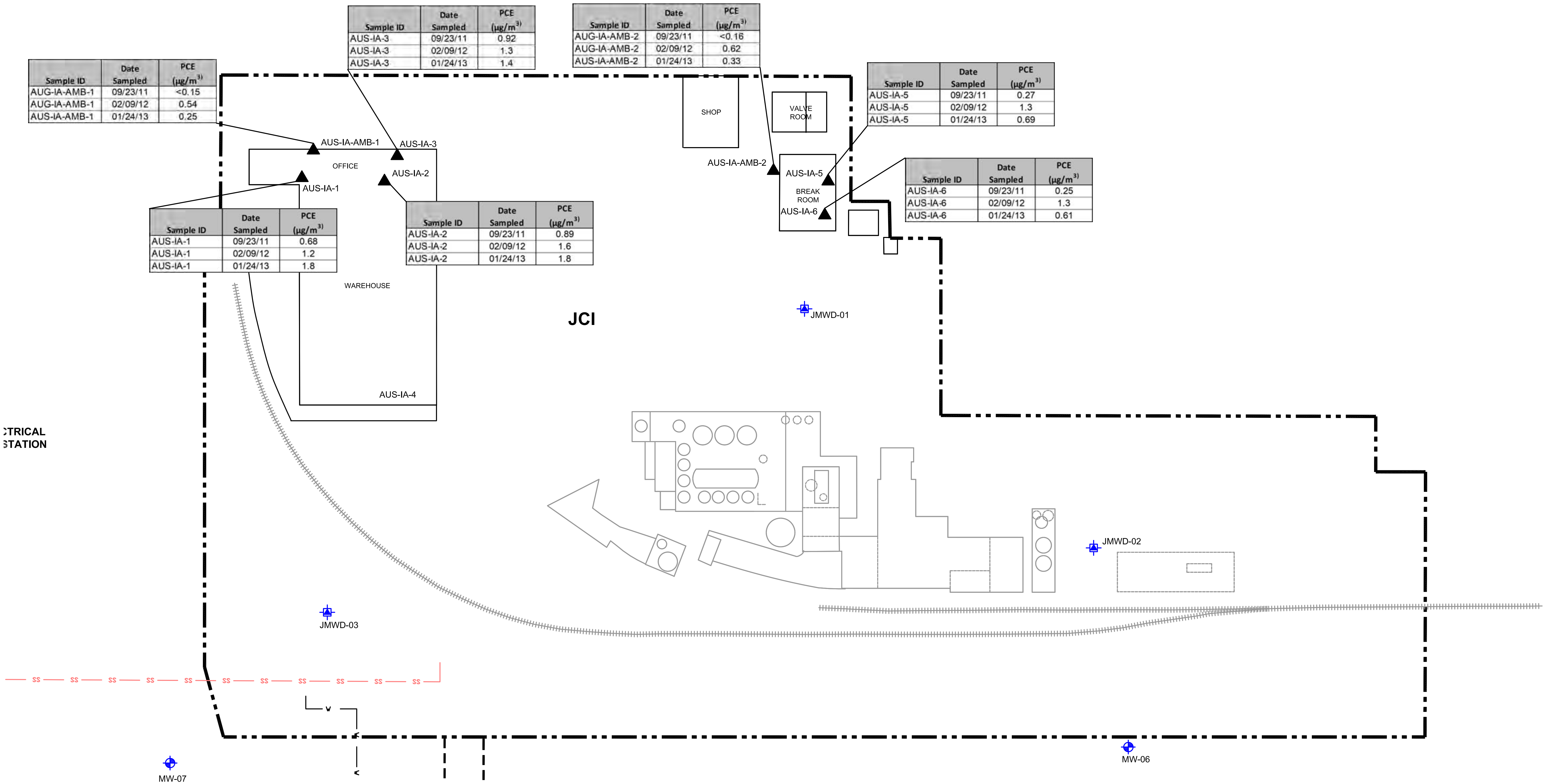
DEPTH	PCE
1	3.91J
1(DUP-10)	4.83J
5	10.5
10	8.49
20	3570
35	10

J-SB-105

DEPTH	PCE
1	1360000
5	6120000
10	2030
20	5710
35	11.5

J-SB-111

DEPTH	PCE
1	4.65J
5	35
10	31.4
20	462
20(DUP-11)	620
35	168



Sample ID	Date Sampled	PCE (µg/m³)
AUG-IA-AMB-1	09/23/11	<0.15
AUG-IA-AMB-1	02/09/12	0.54
AUS-IA-AMB-1	01/24/13	0.25

Sample ID	Date Sampled	PCE (µg/m³)
AUS-IA-3	09/23/11	0.92
AUS-IA-3	02/09/12	1.3
AUS-IA-3	01/24/13	1.4

Sample ID	Date Sampled	PCE (µg/m³)
AUG-IA-AMB-2	09/23/11	<0.16
AUG-IA-AMB-2	02/09/12	0.62
AUS-IA-AMB-2	01/24/13	0.33

Sample ID	Date Sampled	PCE (µg/m³)
AUS-IA-5	09/23/11	0.27
AUS-IA-5	02/09/12	1.3
AUS-IA-5	01/24/13	0.69

Sample ID	Date Sampled	PCE (µg/m³)
AUS-IA-6	09/23/11	0.25
AUS-IA-6	02/09/12	1.3
AUS-IA-6	01/24/13	0.61

Sample ID	Date Sampled	PCE (µg/m³)
AUS-IA-1	09/23/11	0.68
AUS-IA-1	02/09/12	1.2
AUS-IA-1	01/24/13	1.8

Sample ID	Date Sampled	PCE (µg/m³)
AUS-IA-2	09/23/11	0.89
AUS-IA-2	02/09/12	1.6
AUS-IA-2	01/24/13	1.8

Legend

▲ AUS-IA-AMB-1	INDOOR AIR SAMPLE LOCATION
JMWD-01	JCI UBA MONITORING WELL
MW-06	MONTROSE UBA MONITORING WELL
— · · —	JCI PROPERTY BOUNDARY
++++++	EXISTING RAILROAD TRACKS
— v —	UTILITY - WATER LINE
— SS —	UTILITY - SEWER LINE

JCI	JCI JONES CHEMICALS, INC.
LADWP	LOS ANGELES DEPARTMENT OF WATER AND POWER
UBA	UPPER BELLFLOWER AQUITARD
PCE	TETRACHLOROETHENE
µg/m³	MICROGRAMS PER CUBIC METER

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CLIENT: JCI Jones Chemicals

PROJECT: Torrance, CA

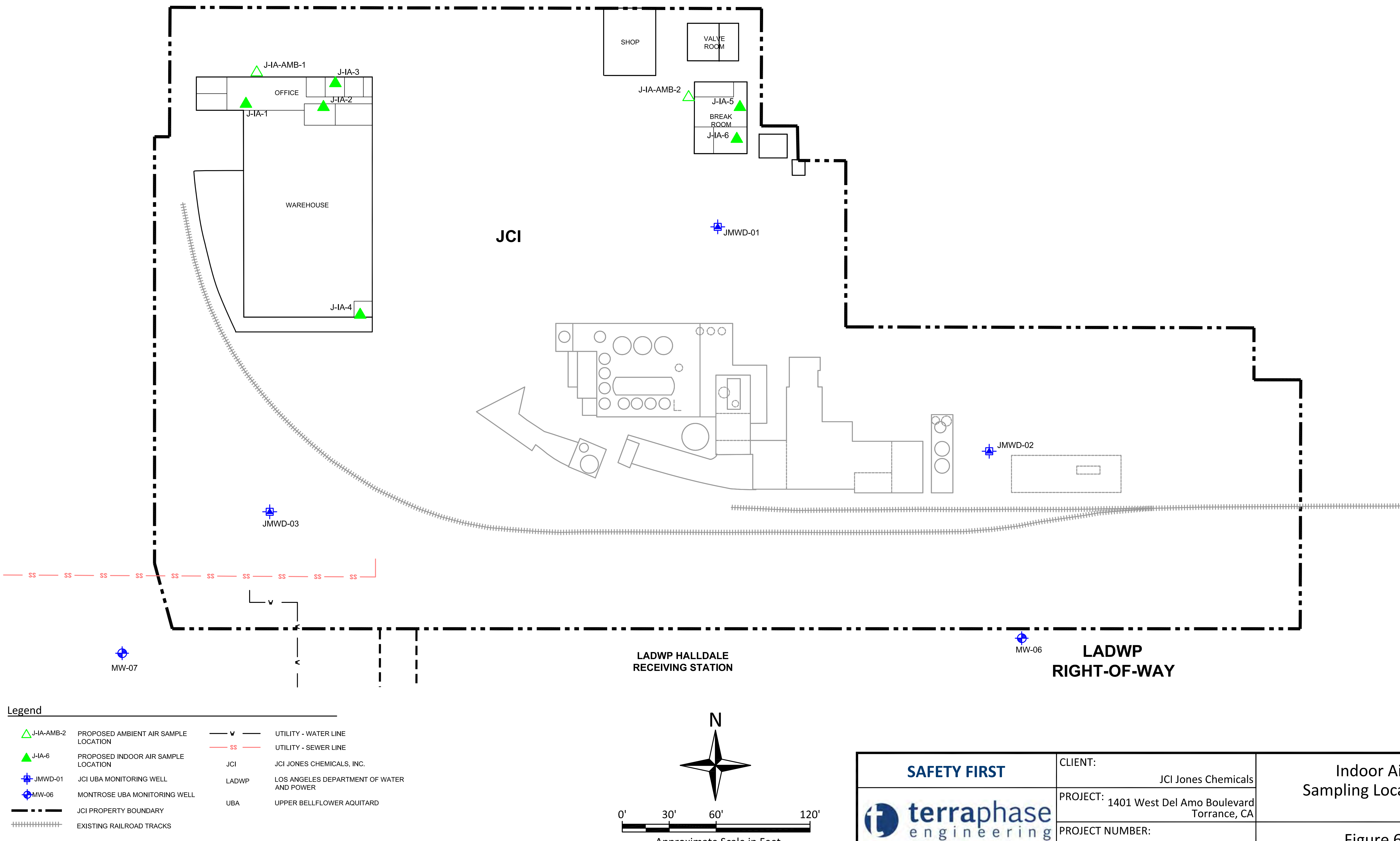
PROJECT NUMBER: S040.001.001

Site Plan Showing PCE Concentrations In Indoor Air

Figure 5

R:\Projects\S040 - JCI Jones Chemicals Inc\Torrance Off-Property Investigation\References\S114-001 JCI Jones Chemicals - EPA Response Tasks\Technical\CAD\2017\RIWP\S114-001_IND.dwg

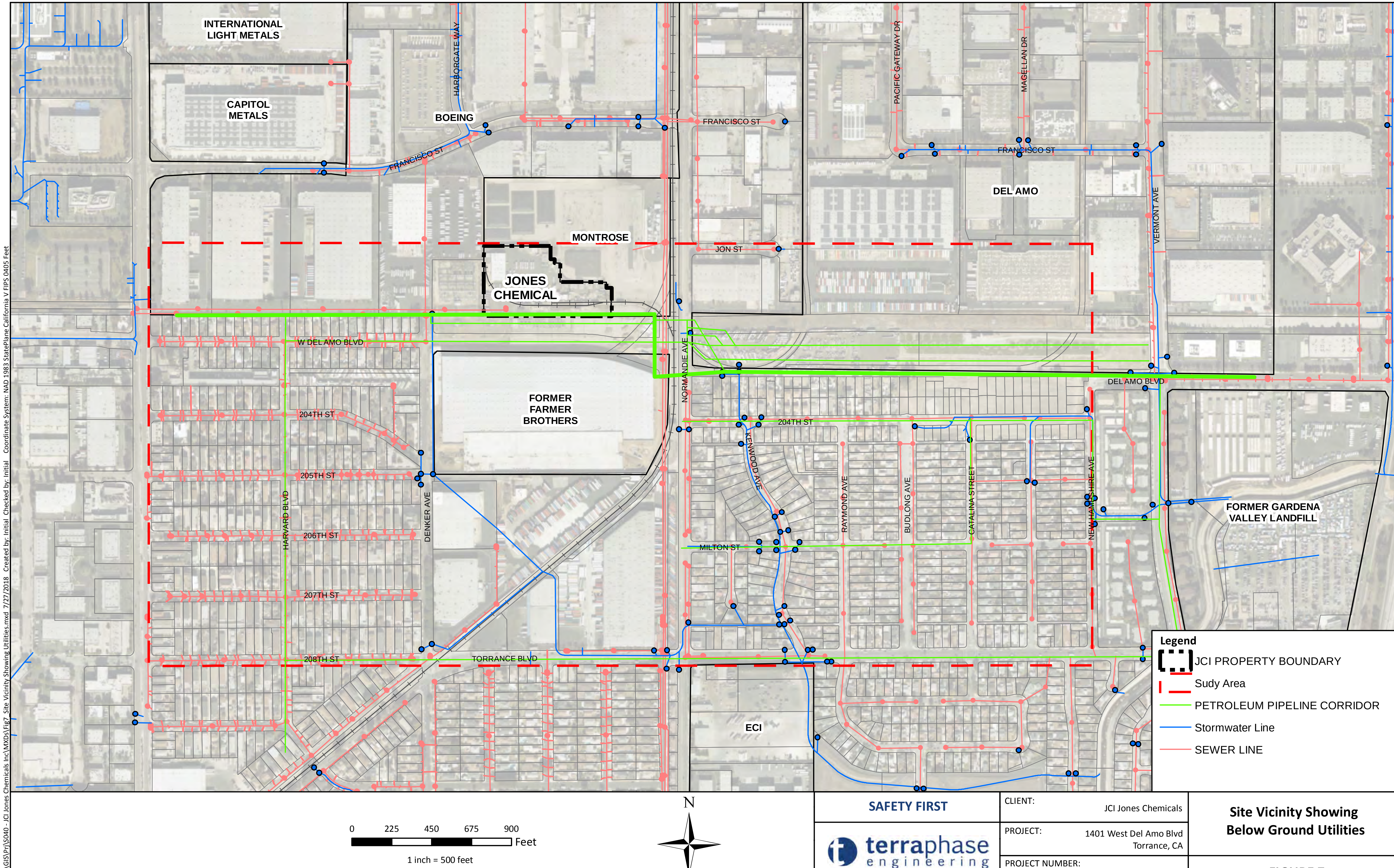
R:\Projects\S040 - JCI Jones Chemicals Inc\Torrance Off-Property Investigation\References\S114-001 JCI Jones Chemicals - EPA Response Tasks\Technical\CAD\2017\PEL\S114-001_IND.dwg



Legend

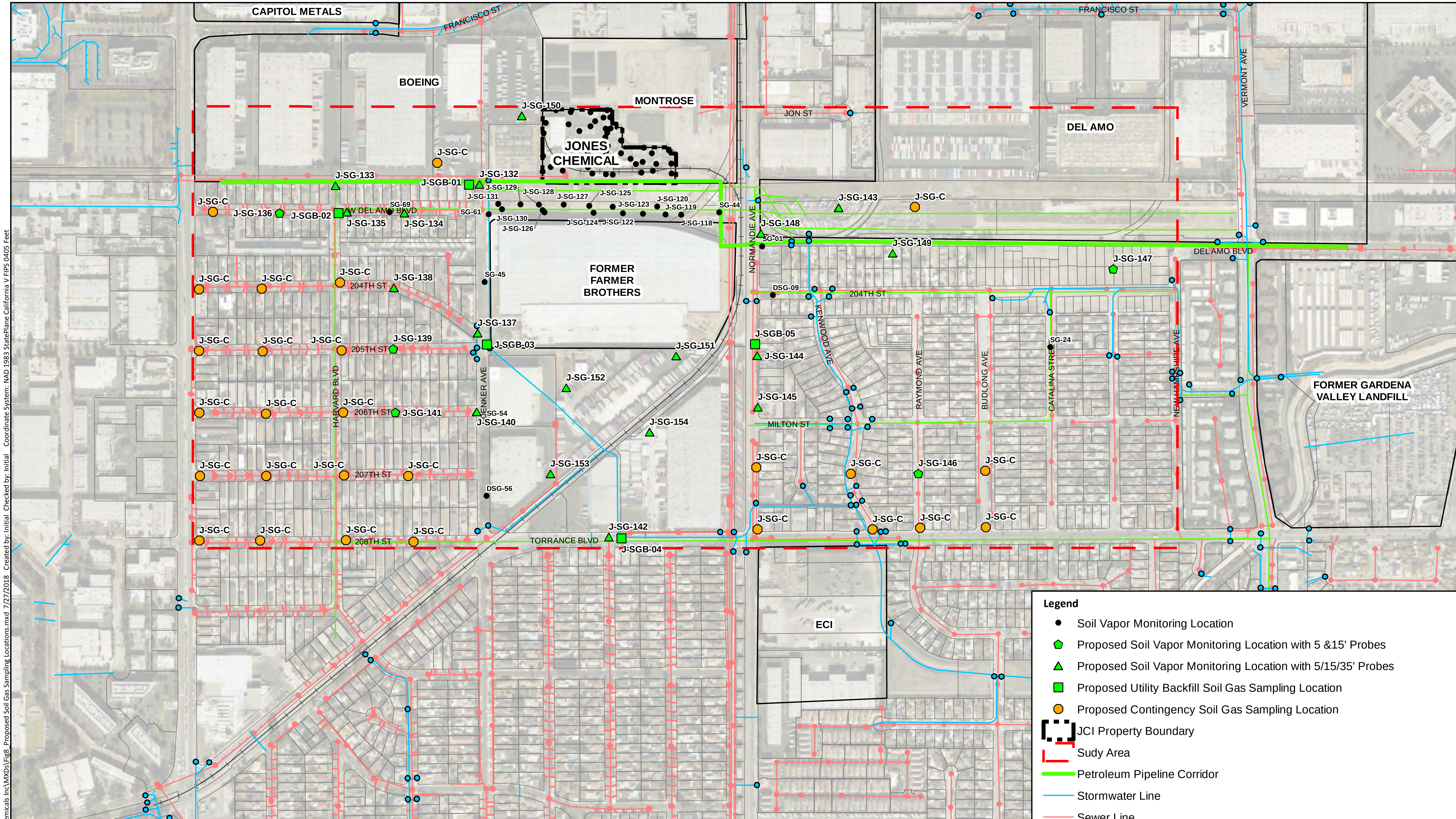
J-IA-AMB-2	PROPOSED AMBIENT AIR SAMPLE LOCATION		UTILITY - WATER LINE
J-IA-6	PROPOSED INDOOR AIR SAMPLE LOCATION		UTILITY - SEWER LINE
JMWD-01	JCI UBA MONITORING WELL	JCI	JCI JONES CHEMICALS, INC.
MW-06	MONTROSE UBA MONITORING WELL	LADWP	LOS ANGELES DEPARTMENT OF WATER AND POWER
	JCI PROPERTY BOUNDARY	UBA	UPPER BELLFLOWER AQUITARD
	EXISTING RAILROAD TRACKS		

SAFETY FIRST	CLIENT: JCI Jones Chemicals	Indoor Air Sampling Locations
terraphase engineering	PROJECT: 1401 West Del Amo Boulevard Torrance, CA	
	PROJECT NUMBER: S040.001.001	Figure 6



File: K:\GIS\Prj\S040 - JCI Jones Chemicals Inc\MXDs\Fig7_Site Vicinity Showing Utilities.mxd 7/27/2018 Created by: Initial Checked by: Initial Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

SAFETY FIRST	CLIENT:	JCI Jones Chemicals	Site Vicinity Showing Below Ground Utilities
terraphase engineering	PROJECT:	1401 West Del Amo Blvd Torrance, CA	
	PROJECT NUMBER:	S040.001.001	FIGURE 7



File: K:\GIS\Prj\S040 - JCI Jones Chemicals Inc\MXDs\Fig8_Proposed Soil Gas Sampling Locations.mxd 7/27/2018 Created by: Initial Checked by: Initial Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

0 250 500 750 1,000 Feet

1 inch = 500 feet

N

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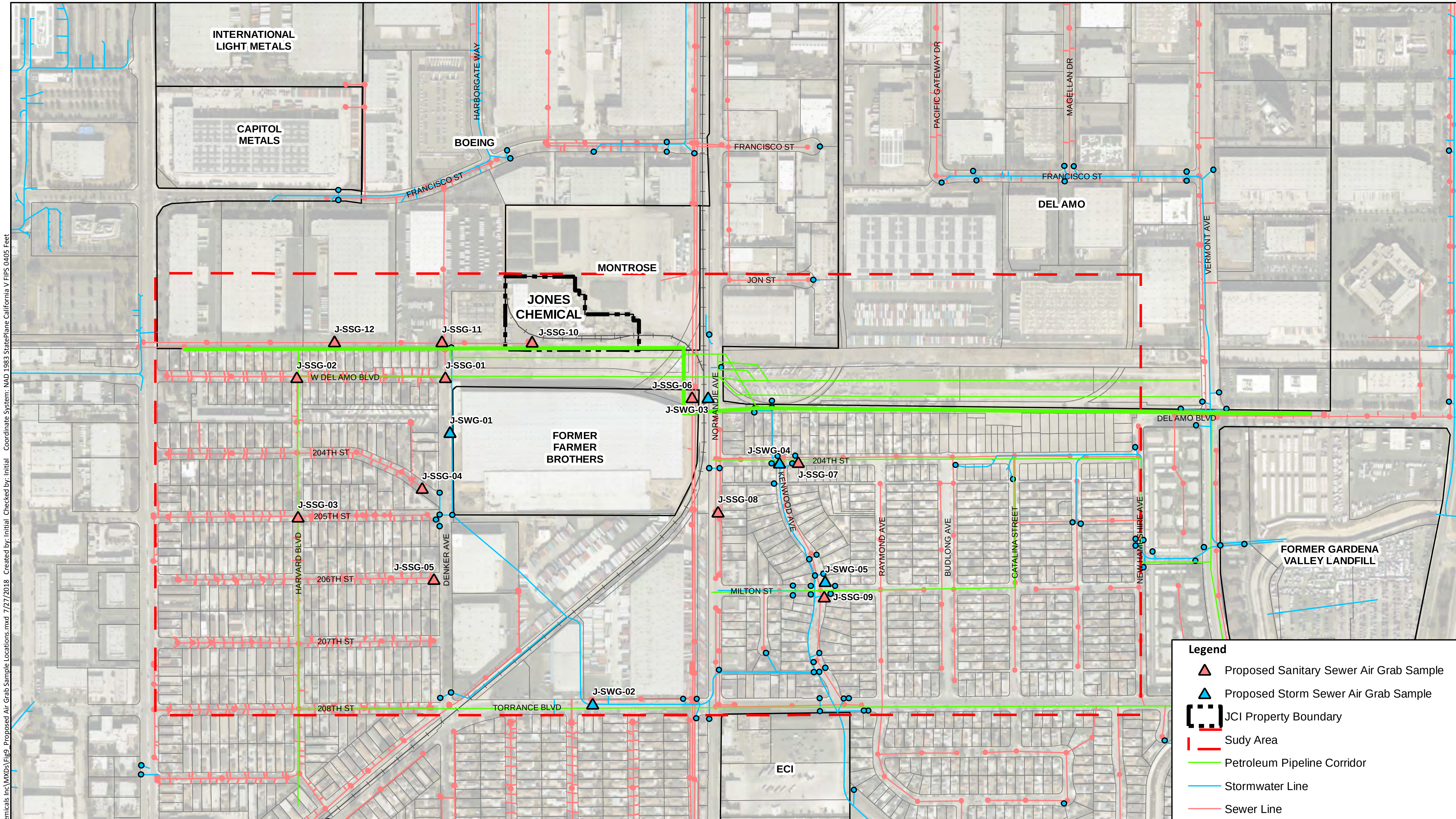
CLIENT:	JCI Jones Chemicals
PROJECT:	1401West Del Amo Blvd Torrance, CA
PROJECT NUMBER:	S040.001.001

Proposed Soil Gas Sampling Locations

FIGURE 8



File: K:\GIS\Prj\S040 - JCI Jones Chemicals Inc\MXDs\Fig9_Proposed Air Grab Sample Locations.mxd 7/27/2018 Created by: Initial Checked by: Initial Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

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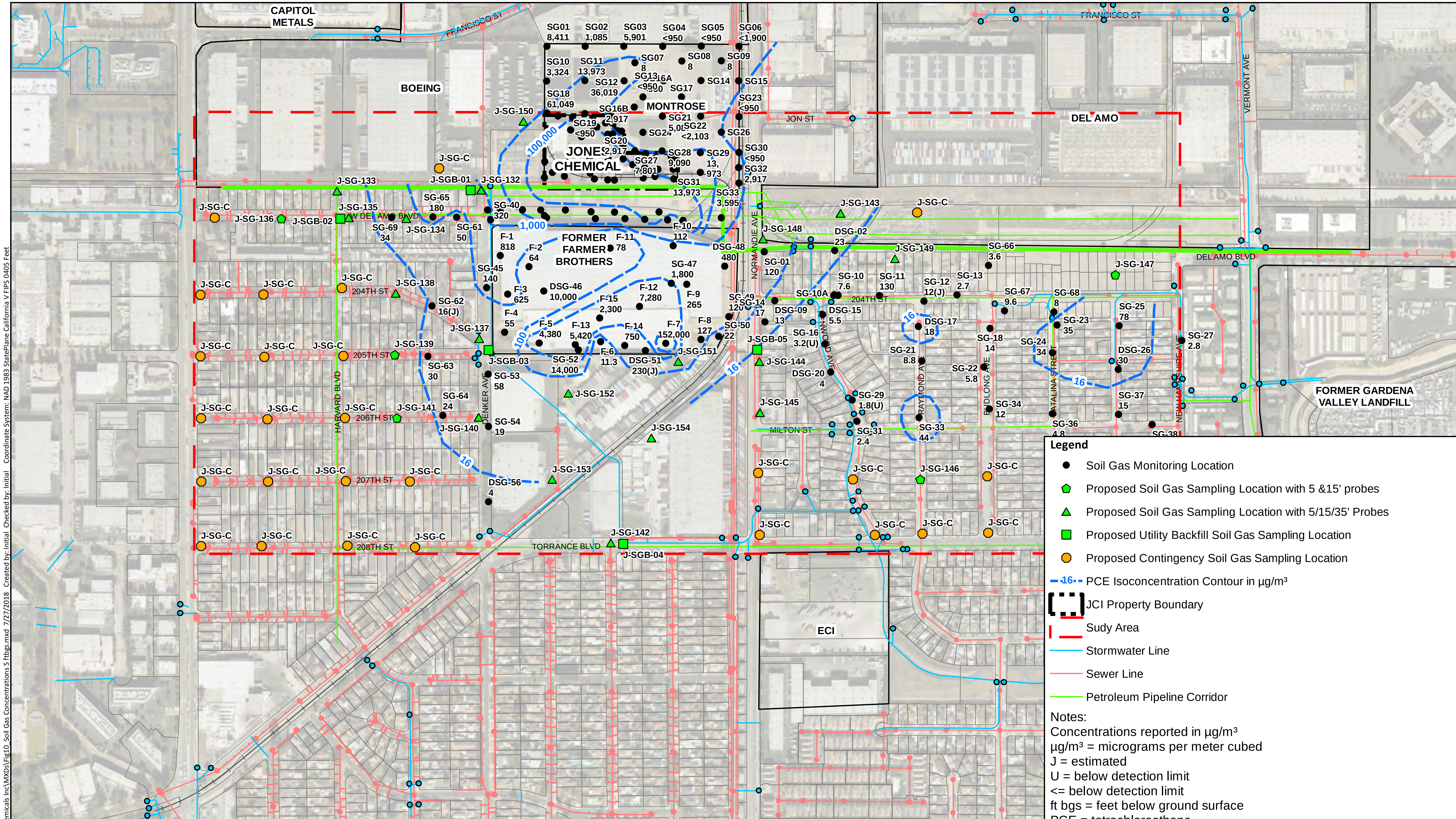
CLIENT:	JCI Jone Chemicals
PROJECT:	1401 West Del Amo Blvd Torrance, CA
PROJECT NUMBER:	S040.001.001

Sewer & Stormwater Infastructure with Proposed Air Grab Sample Locations

FIGURE 9



File: K:\GIS\Prj\S040 - JCI Jones Chemicals Inc\MXDs\Fig10_Soil Gas Concentrations 5 ftbgs.mxd 7/27/2018 Created by: Initial Checked by: Initial Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

Notes: Aerial imagery source <<<ENTER METADATA HERE>>>

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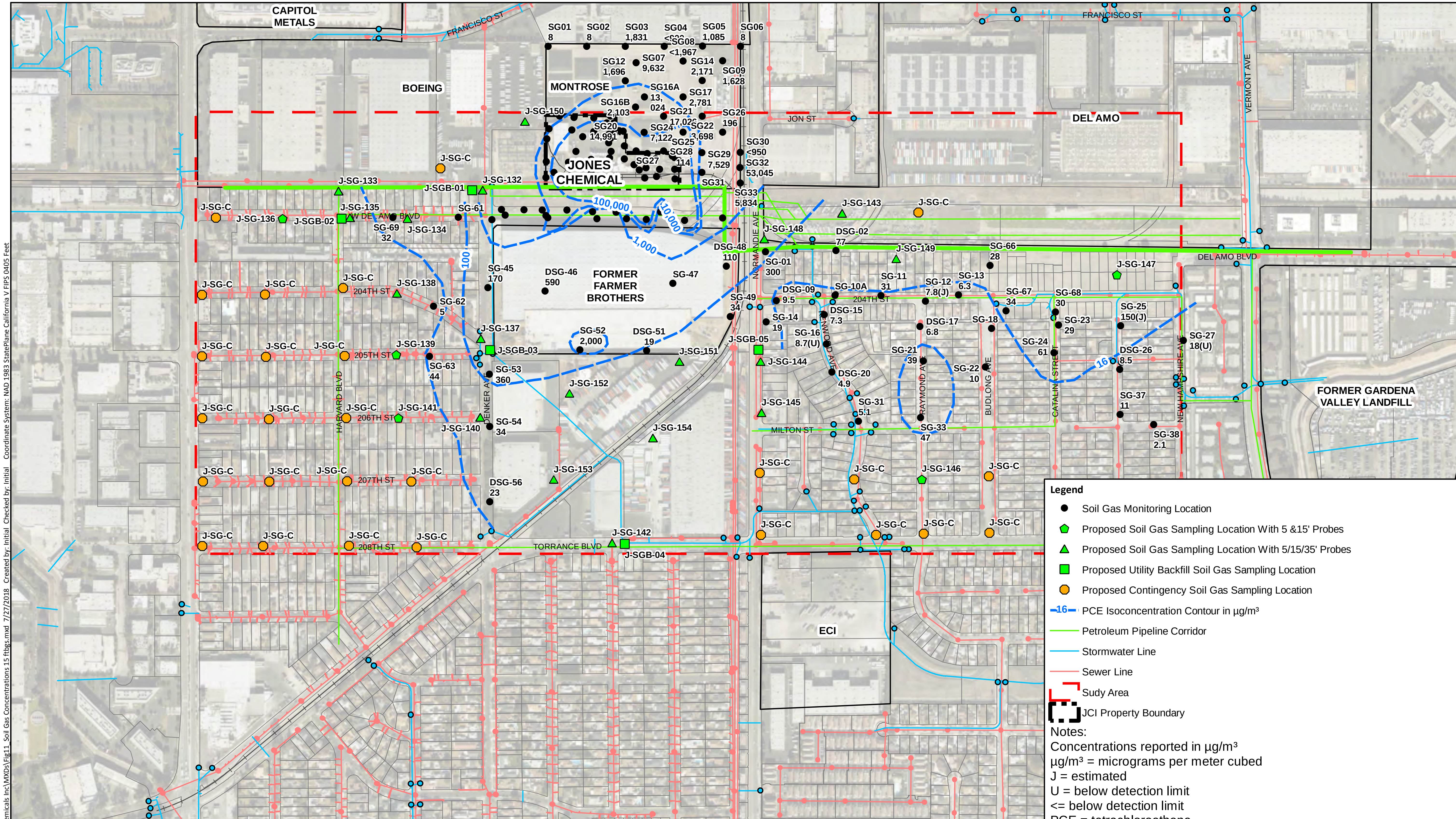
CLIENT:	JCI Jones Chemical
PROJECT:	1401 West Del Amo Blvd Torrance, CA
PROJECT NUMBER:	S040.001.001

Site Plan Showing Concentrations in Soil Gas at 5 ft bgs

FIGURE 10



Notes: Aerial imagery source <<<ENTER METADATA HERE>>>

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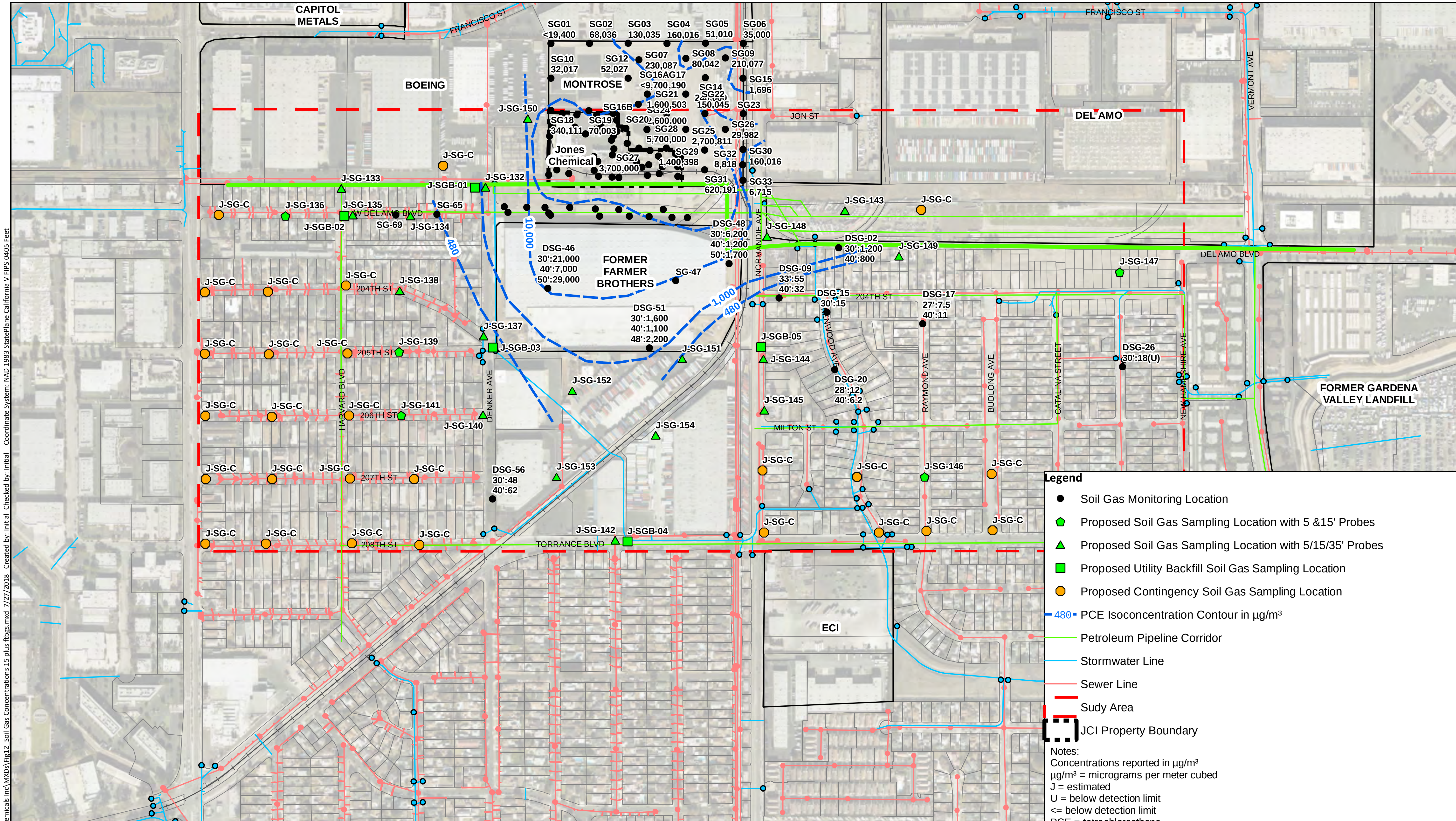
CLIENT:	JCI Jones Chemical
PROJECT:	1401 West Del Amo Blvd Torrance, CA
PROJECT NUMBER:	S040.001.001

Site Plan Showing PCE Concentrations in Soil Gas at 15 ft bgs

FIGURE 11

File: K:\GIS\Prj\S040 - JCI Jones Chemicals Inc\MXDs\Fig11_Soil Gas Concentrations 15 ftbgs.mxd 7/27/2018 Created by: Initial Checked by: Initial Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



File: K:\GIS\Prj\S040 - JCI Jones Chemicals Inc\MXDs\Fig12_Soil Gas Concentrations 15 plus ftbgs.mxd 7/27/2018 Created by: Initial Checked by: Initial Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

Notes: Aerial imagery source <<<ENTER METADATA HERE>>>

0 250 500 750 1,000 Feet

1 inch = 500 feet

N

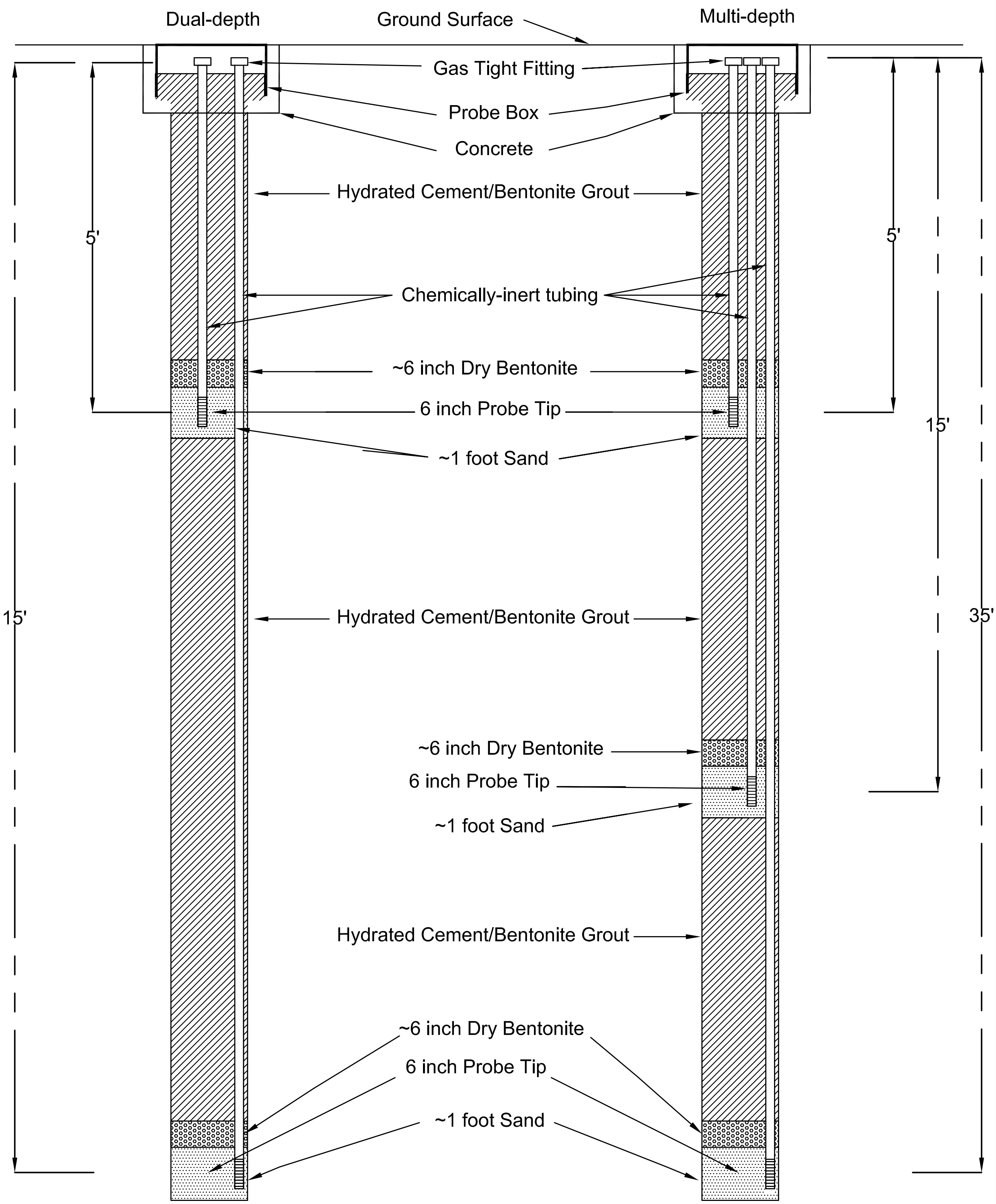
SAFETY FIRST

terraphase engineering

CLIENT:	JCI Jones Chemical
PROJECT:	1401 West Del Amo Blvd Torrance, CA
PROJECT NUMBER:	S040.001.001

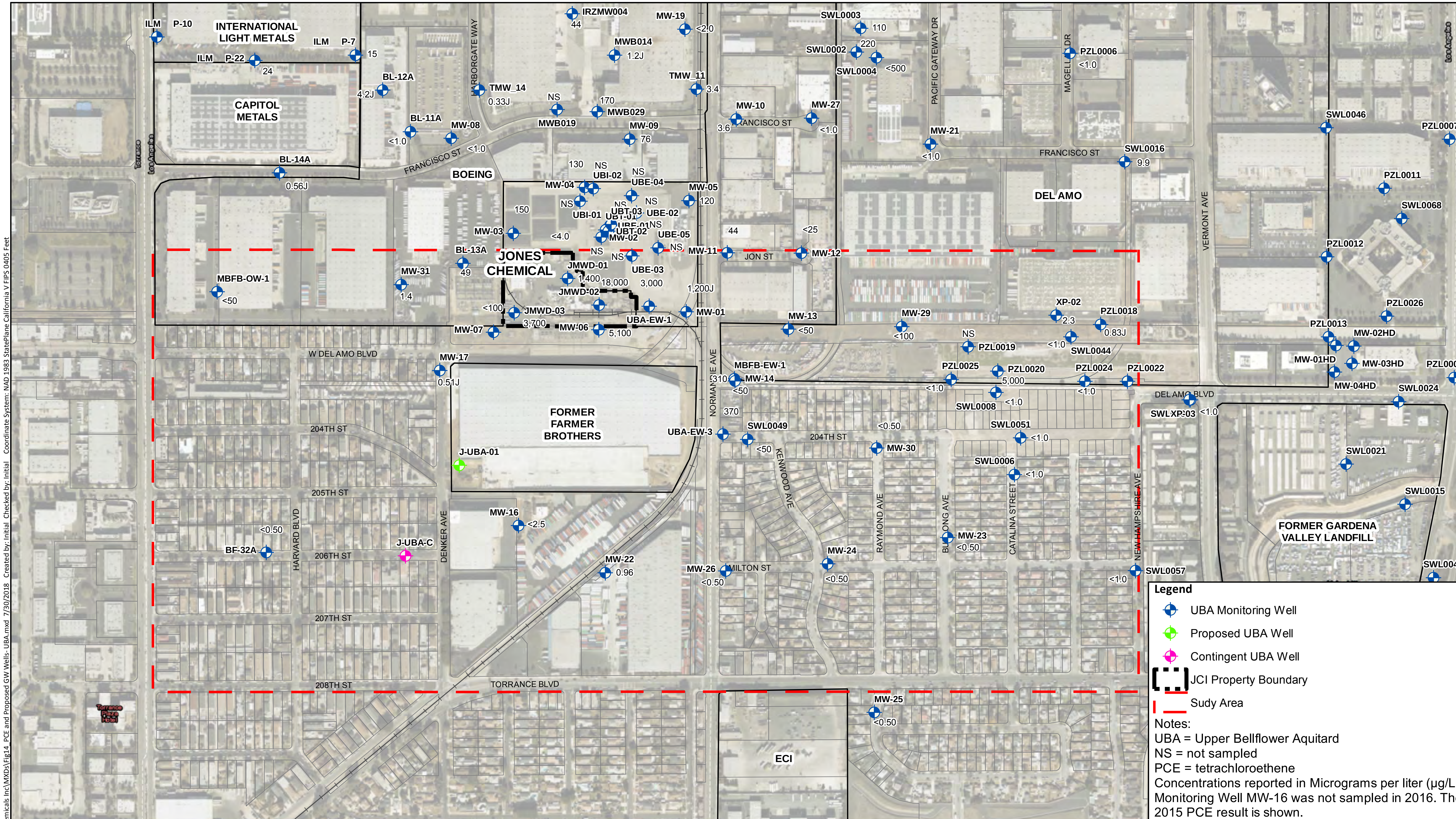
Site Plan Showing PCE Concentrations in Soil Gas at Depths Greater Than 15 ft bgs

FIGURE 12



R:\Projects\S040 - JCI Jones Chemicals Inc\Torrance Off-Property Investigation\References\S114-001 JCI Jones Chemicals - EPA Response Tasks\Technical\CAD\2017\RIWP\S114-001_SG_SCH.dwg

SAFETY FIRST	CLIENT: JCI Jones Chemicals	Soil Gas Sampling Point Schematic
terraphase engineering	PROJECT: 1401 West Del Amo Boulevard Torrance, CA	
	PROJECT NUMBER: S040.001.001	Figure 13



File: K:\GIS\Prj\S040 - JCI Jones Chemicals Inc\MXDs\Fig14_PCE and Proposed GW Wells- UBA.mxd 7/30/2018 Created by: Initial Checked by: Initial Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet

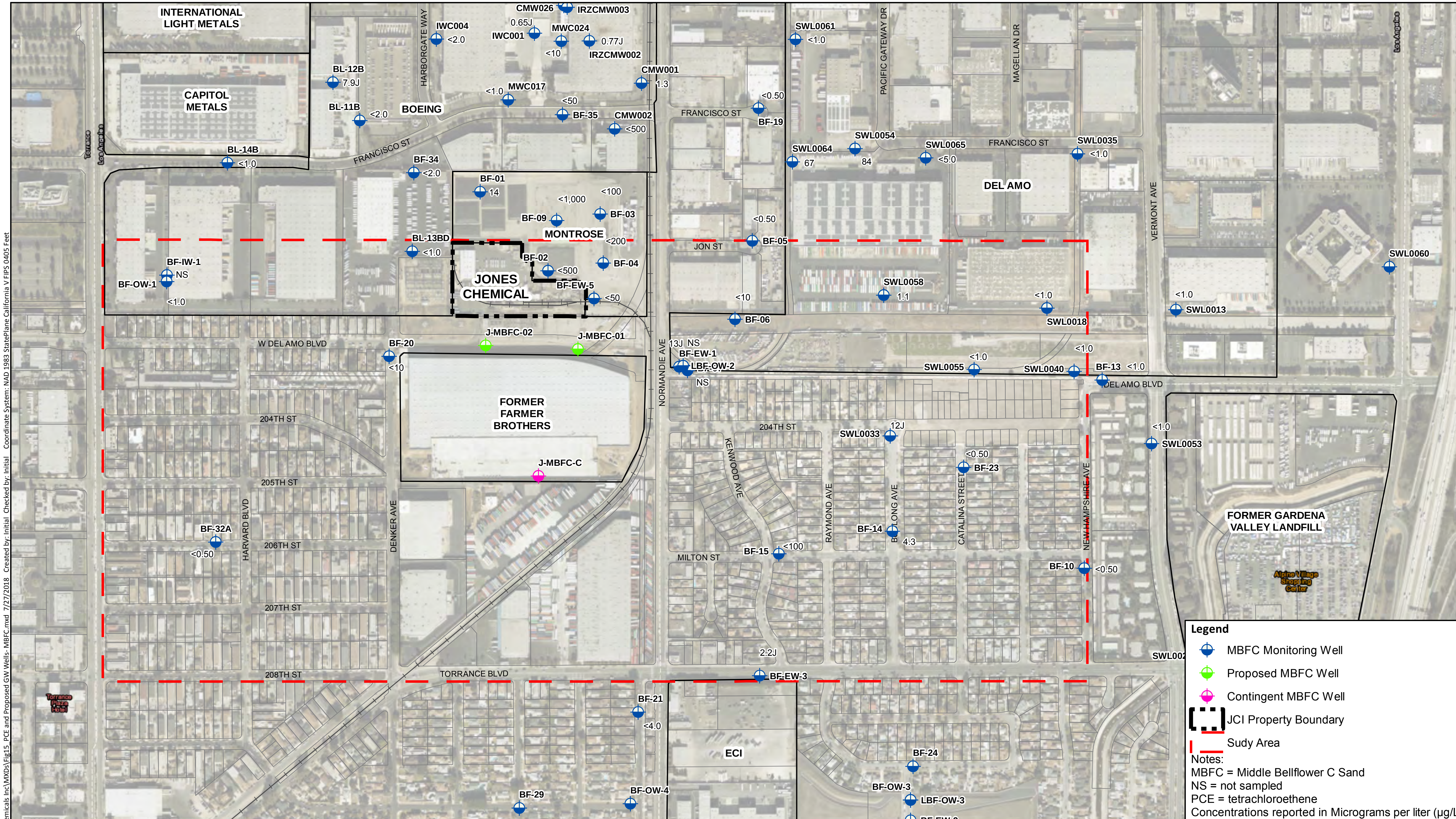
SAFETY FIRST

terraphase engineering

CLIENT:	JCI Jones Chemicals
PROJECT:	1401 West Del Amo Blvd Torrance, CA
PROJECT NUMBER:	S040.001.001

2016 PCE Concentrations & Proposed Groundwater Monitoring Well Location - UBA

FIGURE 14



Notes: Aerial imagery source <<<ENTER METADATA HERE>>>

0 250 500 750 1,000 Feet

1 inch = 500 feet

N

SAFETY FIRST

terraphase engineering

CLIENT: JCI Jones Chemicals

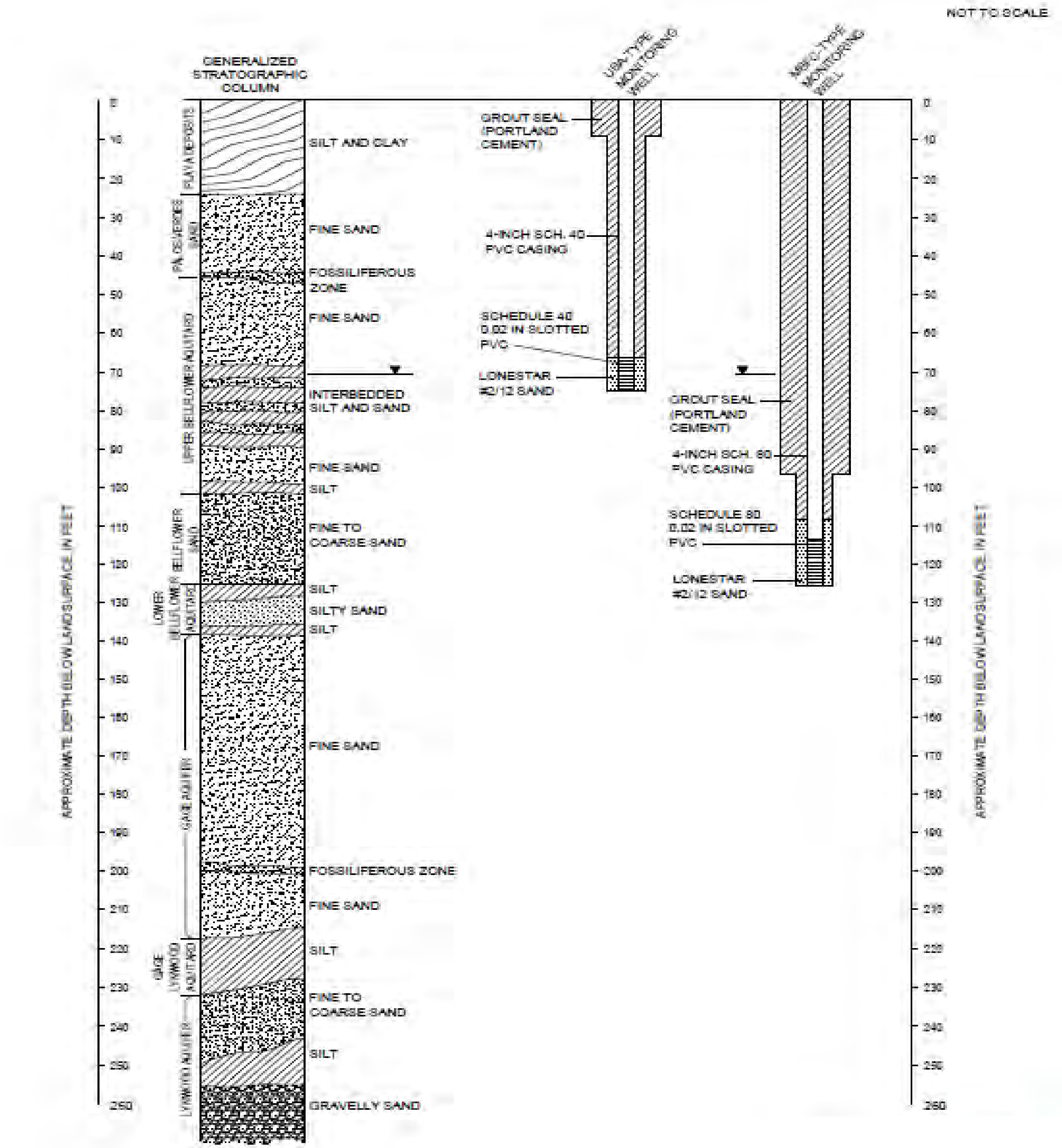
PROJECT: 1401 West Del Amo Blvd Torrance, CA

PROJECT NUMBER: S040.001.001

2016 PCE Concentrations & Proposed Groundwater Monitoring Well Locations- MBFC

FIGURE 15

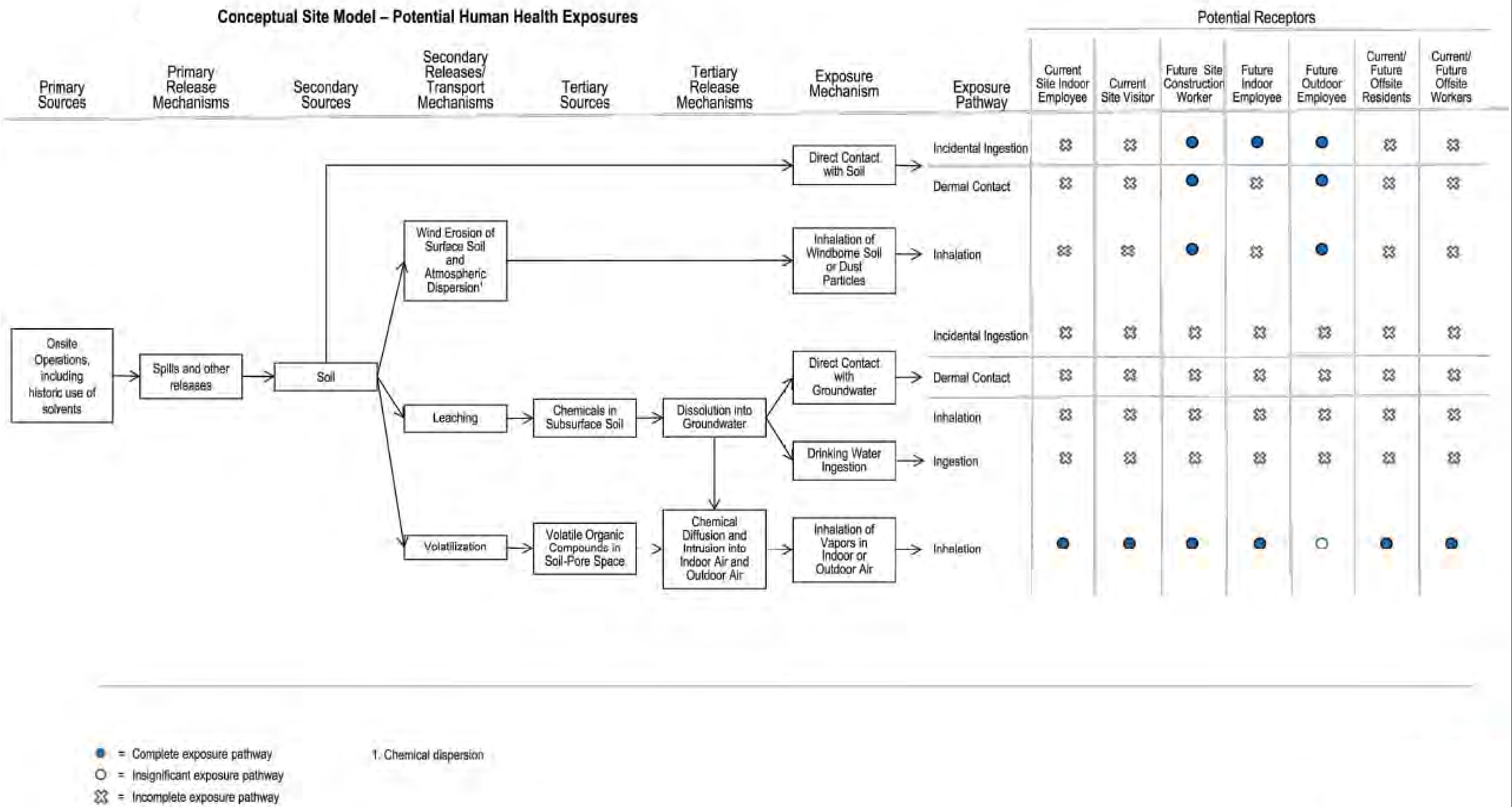
File: K:\GIS\Prj\S040 - JCI Jones Chemicals Inc\MXDs\Fig15_PCE and Proposed GW Wells- MBFC.mxd 7/27/2018 Created by: Initial Checked by: Initial Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet



LEGEND

▼	APPROXIMATE UBA WATER LEVEL
UBA	UPPER BELLFLOWER AQUITARD
MBFC	MIDDLE BELLFLOWER C SAND

SAFETY FIRST	CLIENT: JCI Jones Chemical	**Generalized Monitoring Well Construction Schematic**
terraphase engineering	PROJECT: 1401 West Del Amo Blvd Torrance, CA	
	PROJECT NUMBER: S040.001.001	**FIGURE 16**



SAFETY FIRST

terraphase engineering

CLIENT: JCI Jones Chemicals

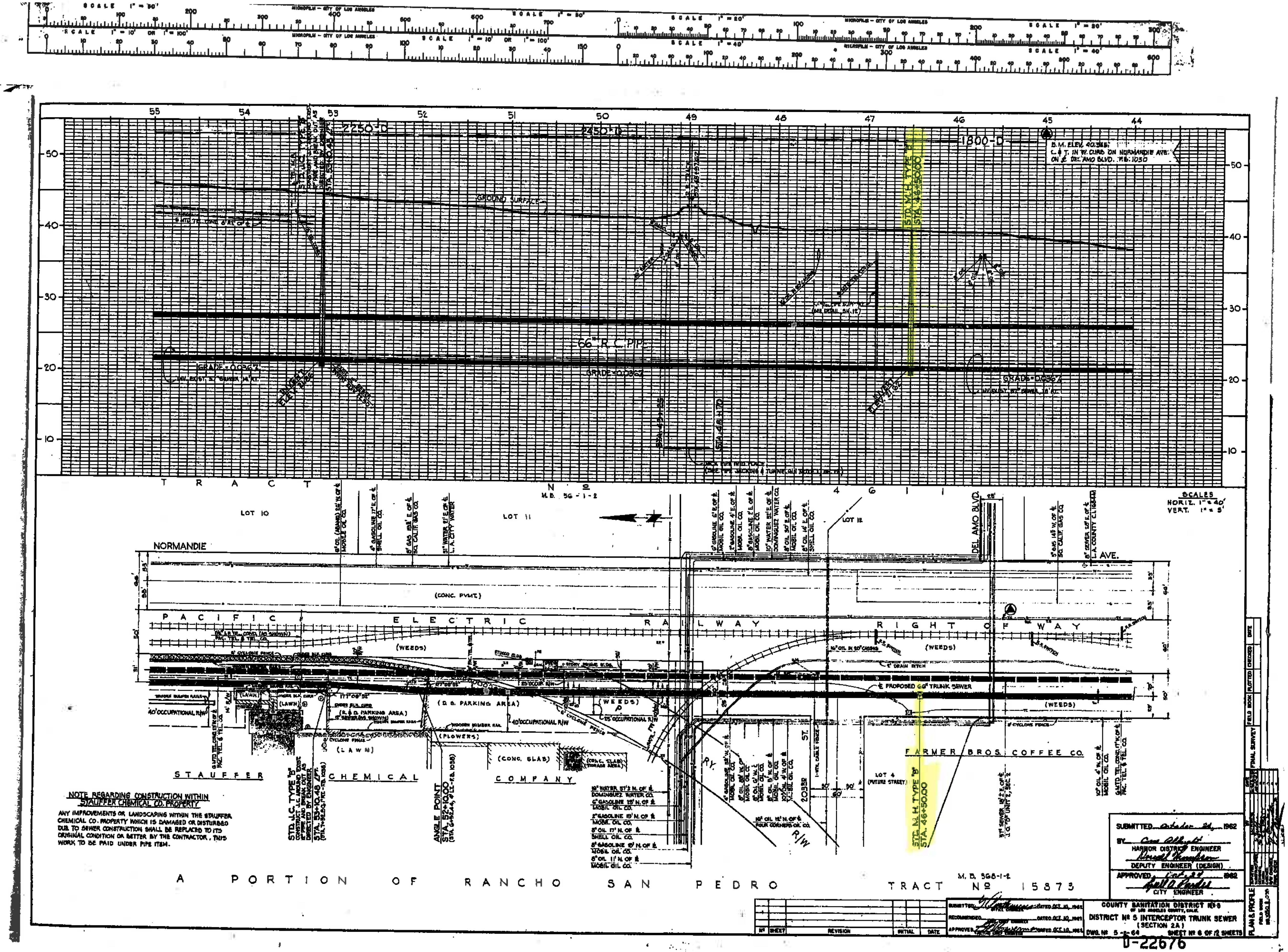
PROJECT: 1401 West Del Amo Blvd Torrance, CA

PROJECT NUMBER: S040.001.001

Conceptual Site Model Diagram

Figure 17

APPENDIX A
UTILITY MAPS



D22676

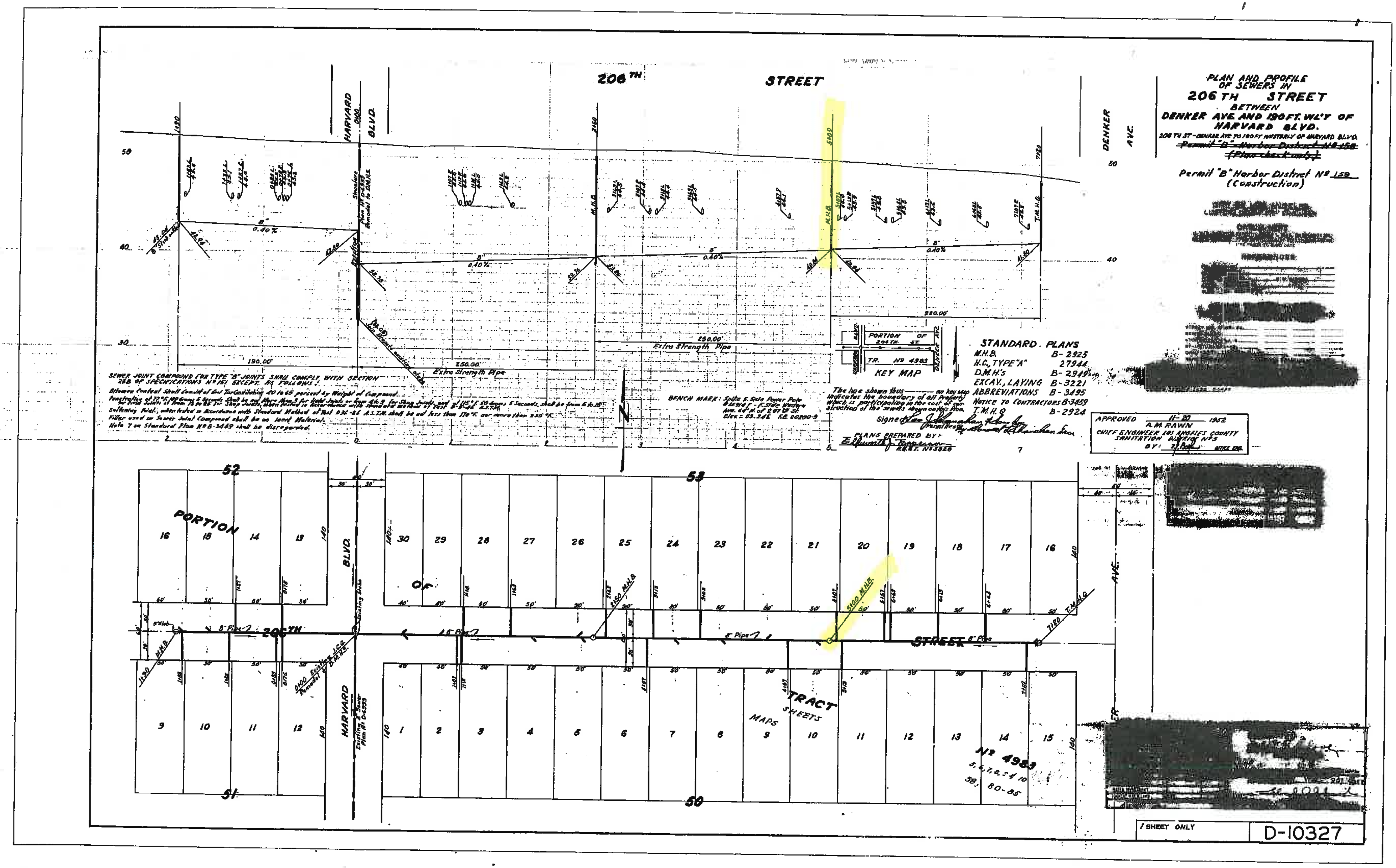
CERTIFICATE

I hereby certify that this is a true and accurate copy of the official city record described there, made in accordance with Section 434 of the Charter of the City of Los Angeles and Section 34090.5 of the Government Code.

REX E. LAYTON, City Clerk

Date 6-28-62

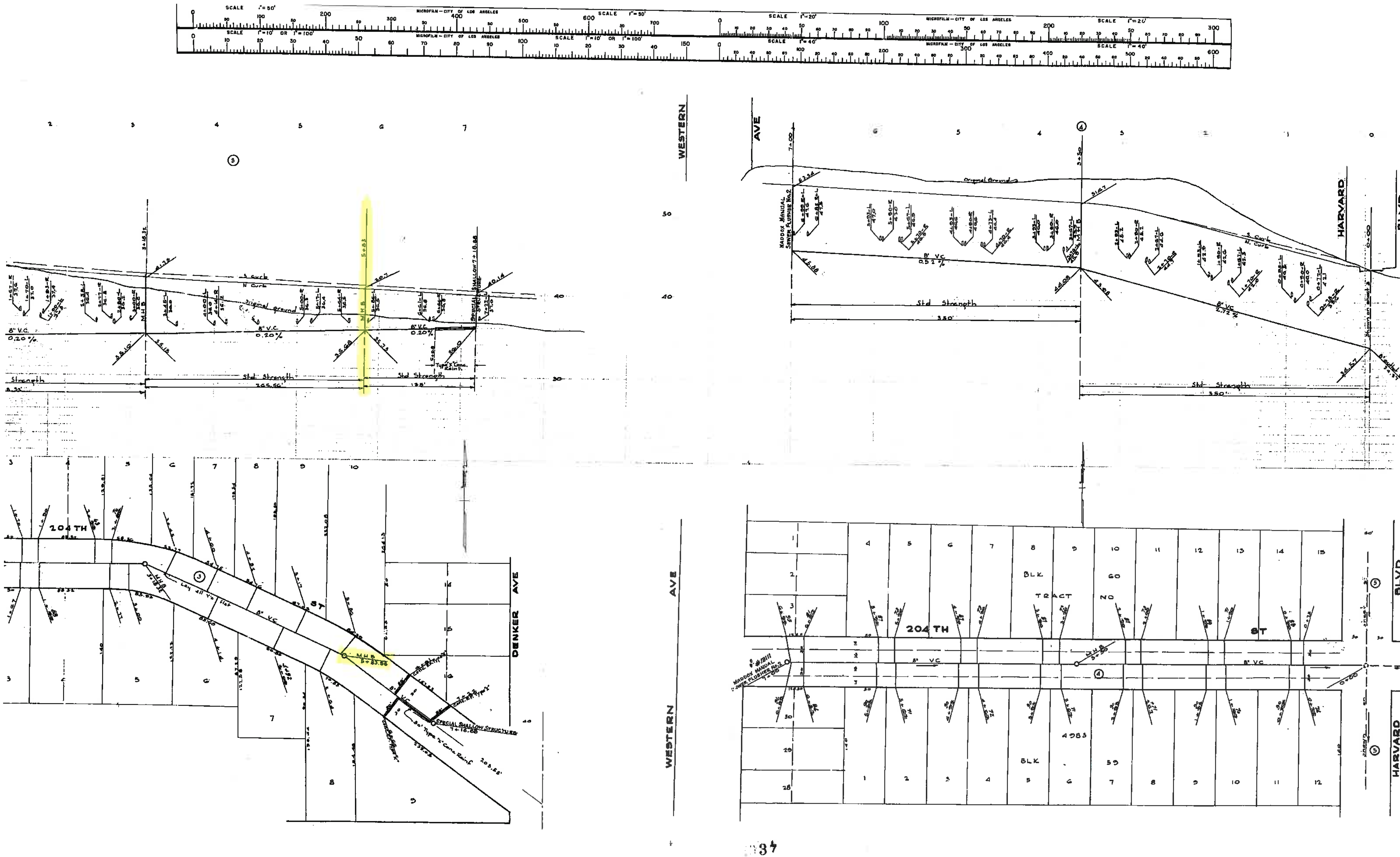
By ______ Deputy



D10327

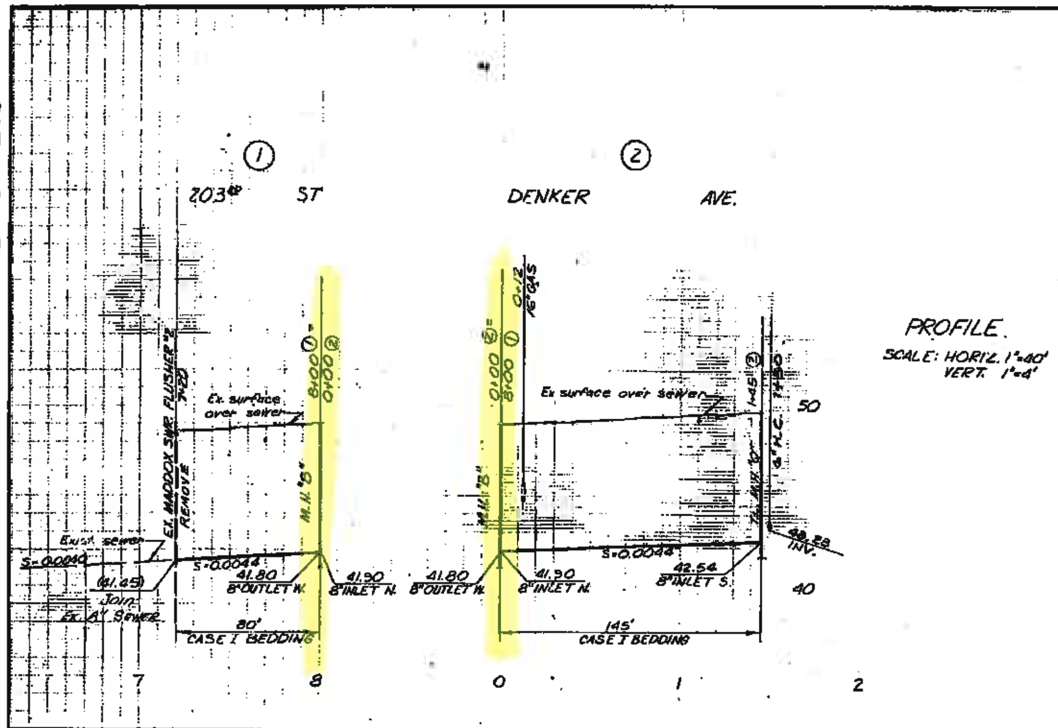
CERTIFICATE

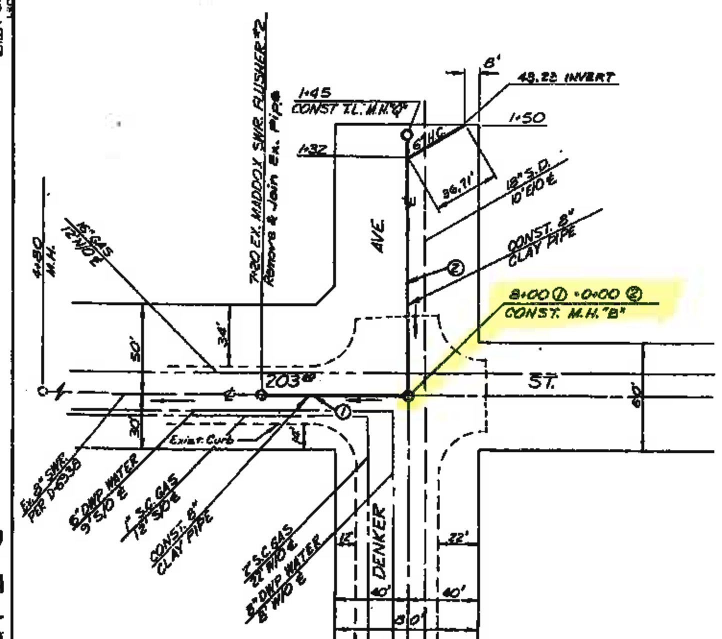
I hereby certify that this is a true and accurate copy of the official City record described there, made in accordance with Section 434 of the Charter of the City of Los Angeles and Section 34090.5 of the
REX E. LAYTON, City Clerk



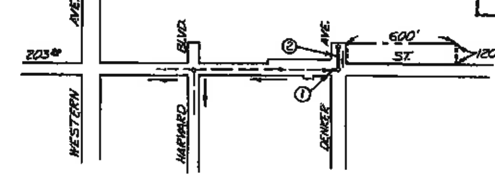
D6937 2

CERTIFICATE
I hereby certify that this is a true and accurate copy of the official city record described there, made in accordance with Section 434 of the Charter of the City of Los Angeles and Section 34090.5 of the Government Code.





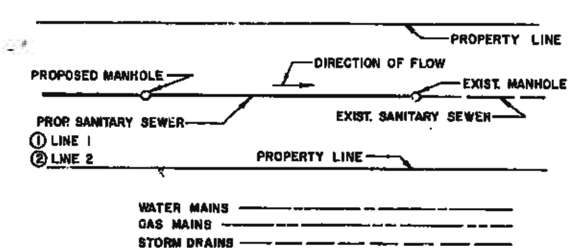
PLAN
SCALE : 1"=40'



KEY MAP

SCALE: 1"=400'

LEGEND



INDEX

SHT. NO.	LINE NO.	PLANS OF	BETWEEN	AND
1		SEWER		
	1	203RD ST.	DENKER AVE.	80' W'LY OF DENKER AVE.
	2	DENKER AVE.	203RD ST.	145' N'LY OF 203RD ST.

LINE SHOWN THUS ——— INDICATES THE BOUNDARY OF THE PROPERTY WHICH HAS PARTICIPATED IN THE COST OF CONSTRUCTION OF SEWERS SHOWN HEREON.

G.R. Spencer — PERMITTEE   Sept. 12, 1973 — DATE

NOTICE TO CONTRACTORS

1. SPECIFICATIONS: ALL WORK DETAILED ON THESE PLANS TO BE PERFORMED UNDER CONTRACT SHALL, EXCEPT AS OTHERWISE STATED OR PROVIDED FOR HEREON, BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 1973 EDITION.
2. SUBSTRUCTURE INFORMATION SHOWN HEREON MAY NOT BE COMPLETE OR EXACT. THE CONTRACTOR SHOULD USE DUE CARE IN MAKING EXCAVATIONS.
3. STANDARD PLANS

NOTICE TO CONTRACTORS — COMPREHENSIVE	S-610-4
STANDARD BRICK MANHOLE	DL-2459
NON-ROCKING MANHOLE FRAME & COVER	B-2655
PIPE LAYING IN TRENCHES	B-3714
SUPPORT ACROSS TRENCHES	B-3289

4. THIS IMPROVEMENT CONSISTS OF WORK CALLED FOR ON THIS PLAN ONLY.
5. ANY DANGEROUS OR HAZARDOUS CONDITION CREATED BY A PERMITTEE OR HIS CONTRACTOR AS FOUND AND DETERMINED BY THE CITY ENGINEER, MUST IMMEDIATELY BE CORRECTED UPON DEMAND BY THE CITY. UPON FAILURE TO CORRECT AS REQUIRED, THE CITY MAY MAKE THE CORRECTION WITHOUT FURTHER NOTICE TO THE PERMITTEE-CONTRACTOR OR SURETY, AND ALL COSTS INCURRED MUST BE PAID TO THE CITY BY THE PERMITTEE-CONTRACTOR OR HIS SURETY.

RESURFACING SCHEDULE

LINE NO.	LOCATION	STATION LIMIT FROM	STATION LIMIT TO	CLASS
1	203RD ST.	7+20	8+00	3" AC-TYPE I-CLASS "C"
2	DENKER	0+00	0+45	OVER 4" BASE TO MATCH ORIGINAL GRADE

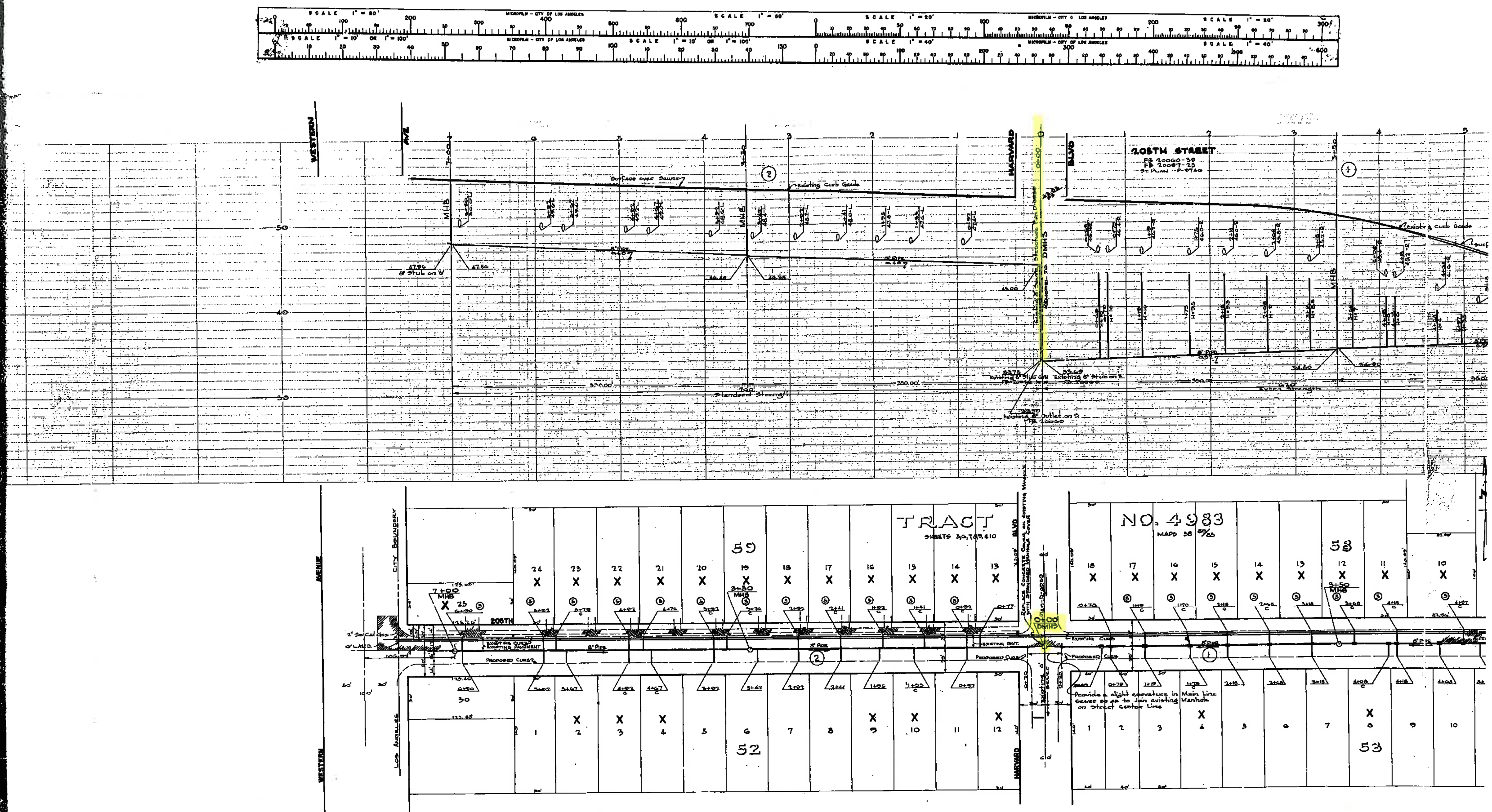
PLANS PREPARED UNDER DIRECTION OF
HAROLD J. McWHIRTER R.E. NO. 10,062
DEPT. OF WATER & POWER, CITY OF LOS ANGELES

DENKER AVE & 203RD ST. SEWER DISTRICT
CHECKING PERMIT BD-0081
CONST. PERMIT

CITY OF LOS ANGELES
DONALD C. TILLMAN CITY ENGINEER

SHEET 1 OF 1 SHEETS INDEX NUMBER D-24513

D24513



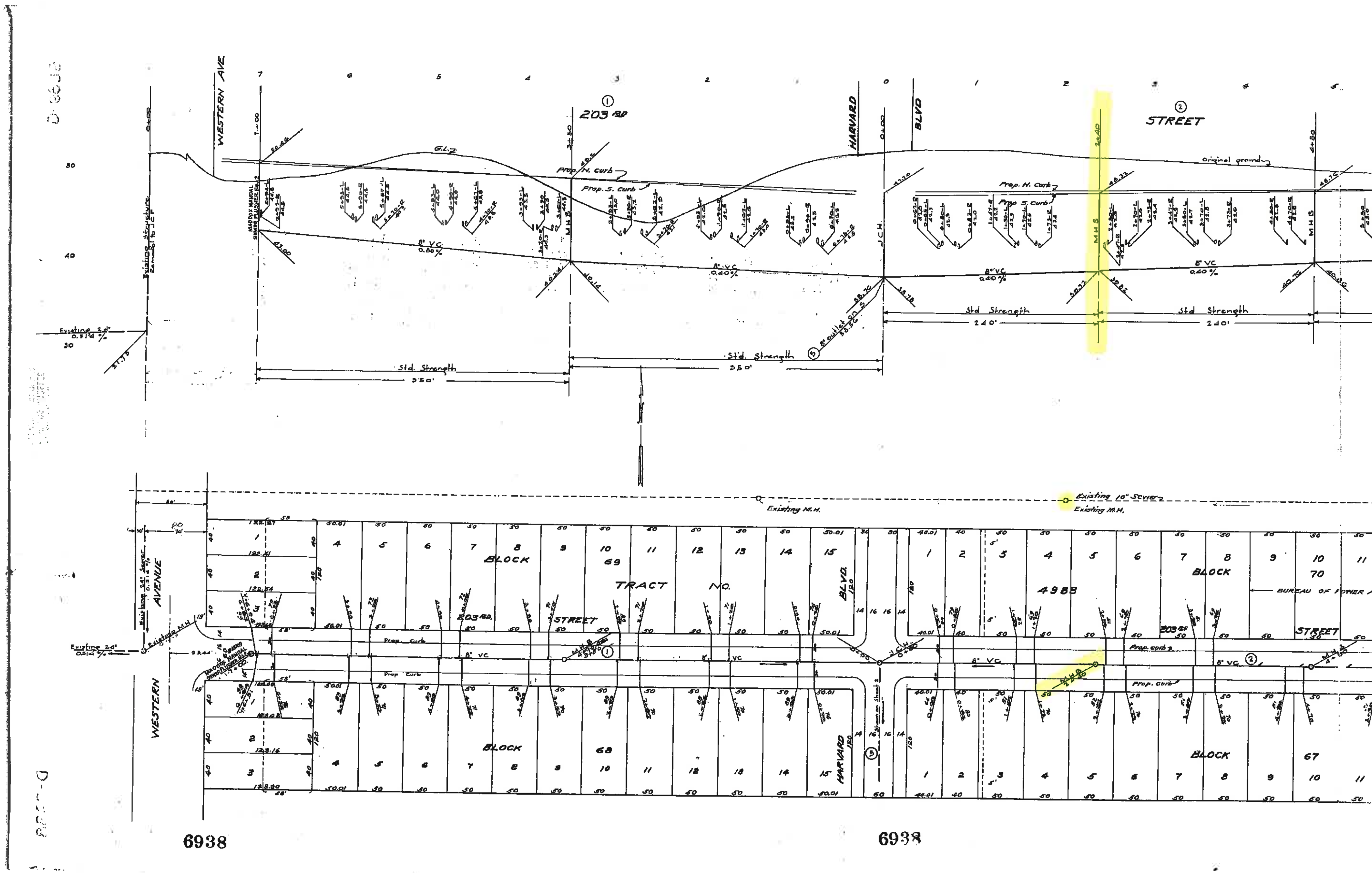
D9297 2

CERTIFICATE

I hereby certify that this is a true and accurate copy of the official ... record described there, made in accordance with Section 434 of the Charter of the City of Los Angeles, and Section 34090.5 of the Government Code.

Date 7-12-71

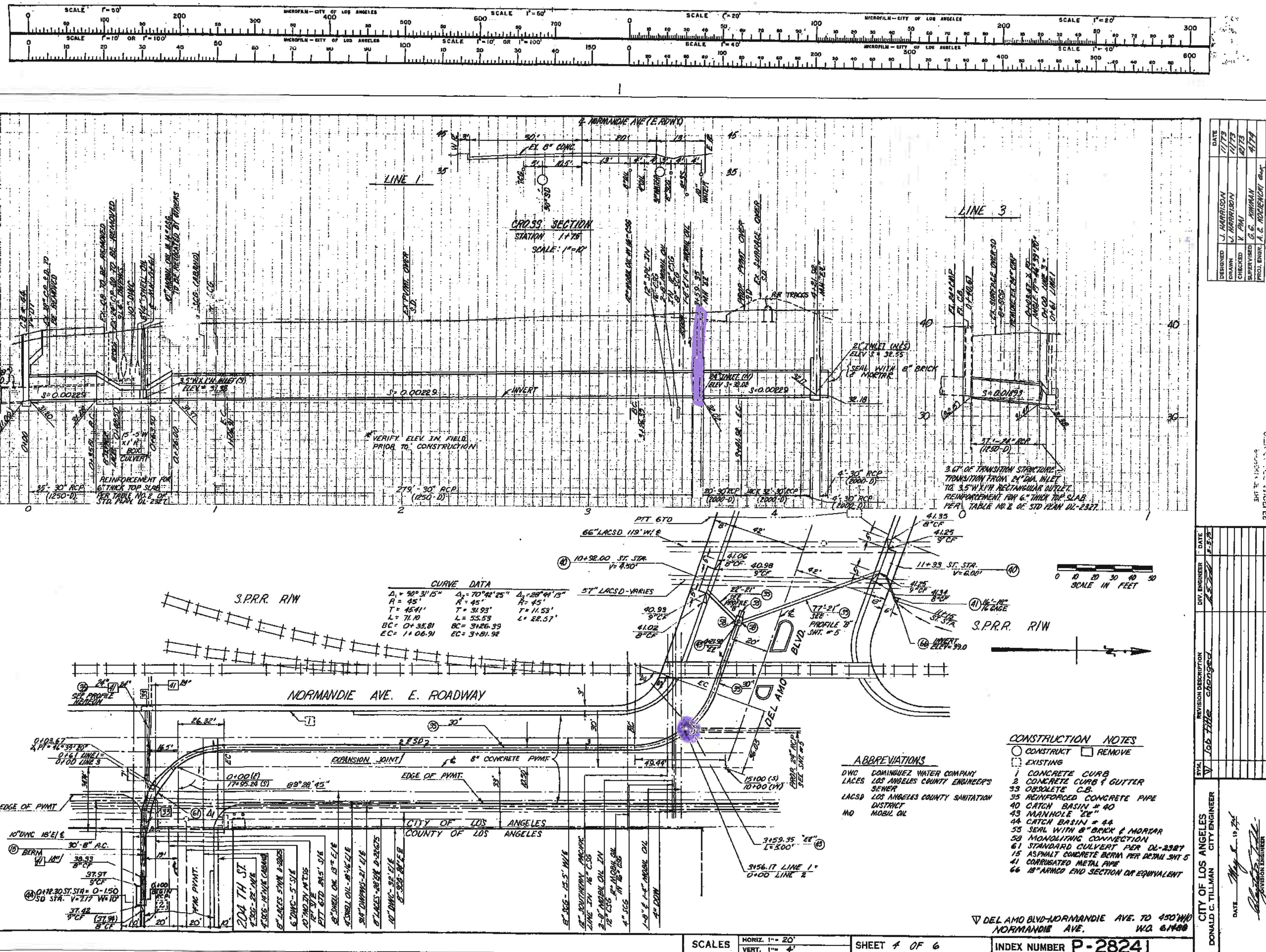
REX E. LAYTON, City Clerk


WESTERN AVE
203 RD
STREET
HARVARD
BLVD
G.L.
Original ground
Prop. N. Curb
Prop. S. Curb
8" VC
0.80%
0.40%
Std. Strength
350'
240'
Existing 20"
Existing 10" Sewer
Existing M.H.
BLOCK
69
TRACT
NO.
4983
70
BUREAU OF POWER AN
68
67
WESTERN
AVENUE
6938
6938

D6938 2

CITY OF LOS ANGELES

9X



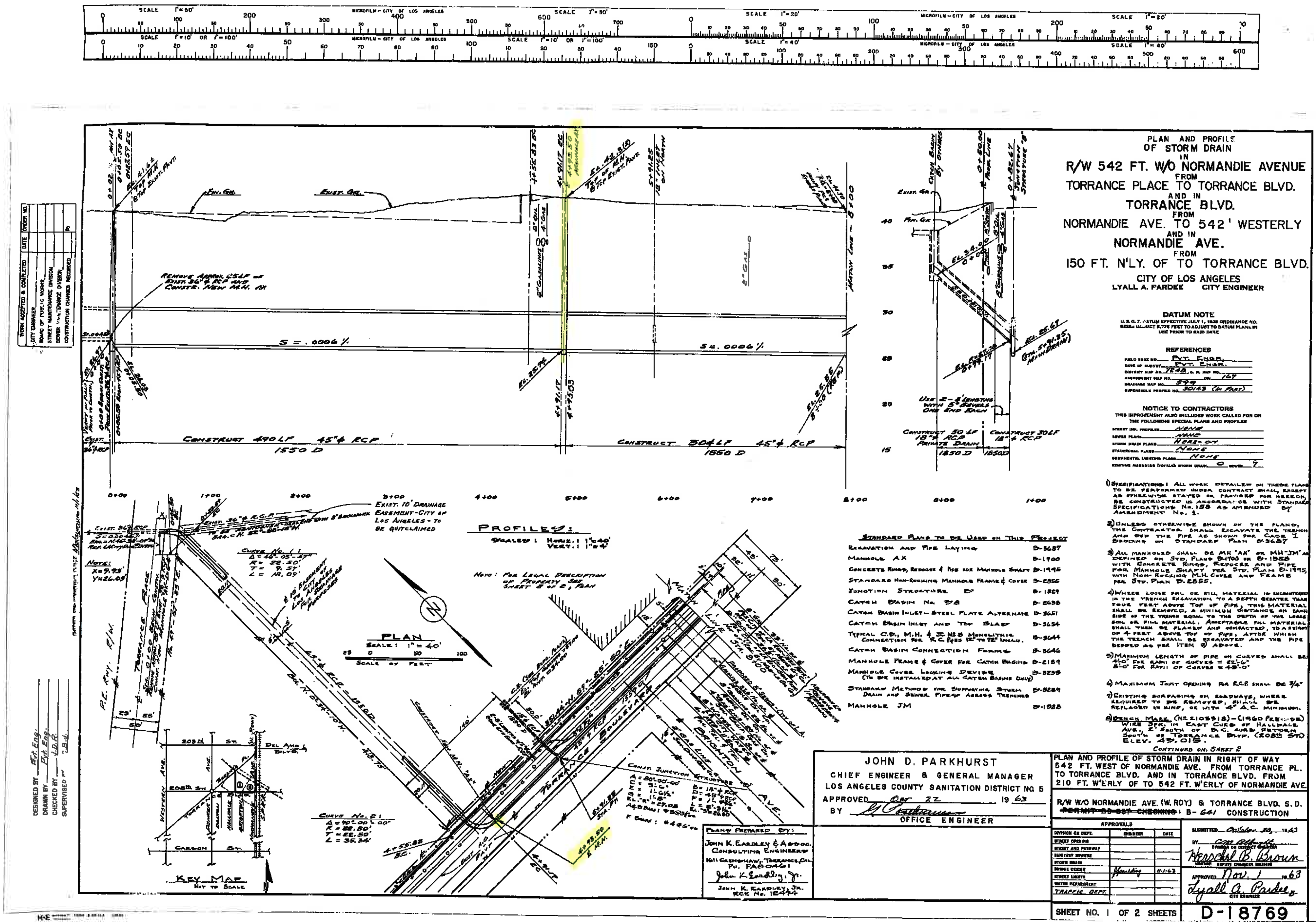
P-28241

CERTIFICATE

I hereby certify that this is a true and accurate copy of the official city record described there, made in accordance with Section 434 of the Charter of the City of Los Angeles, and Section 34090.5 of the Government Code.

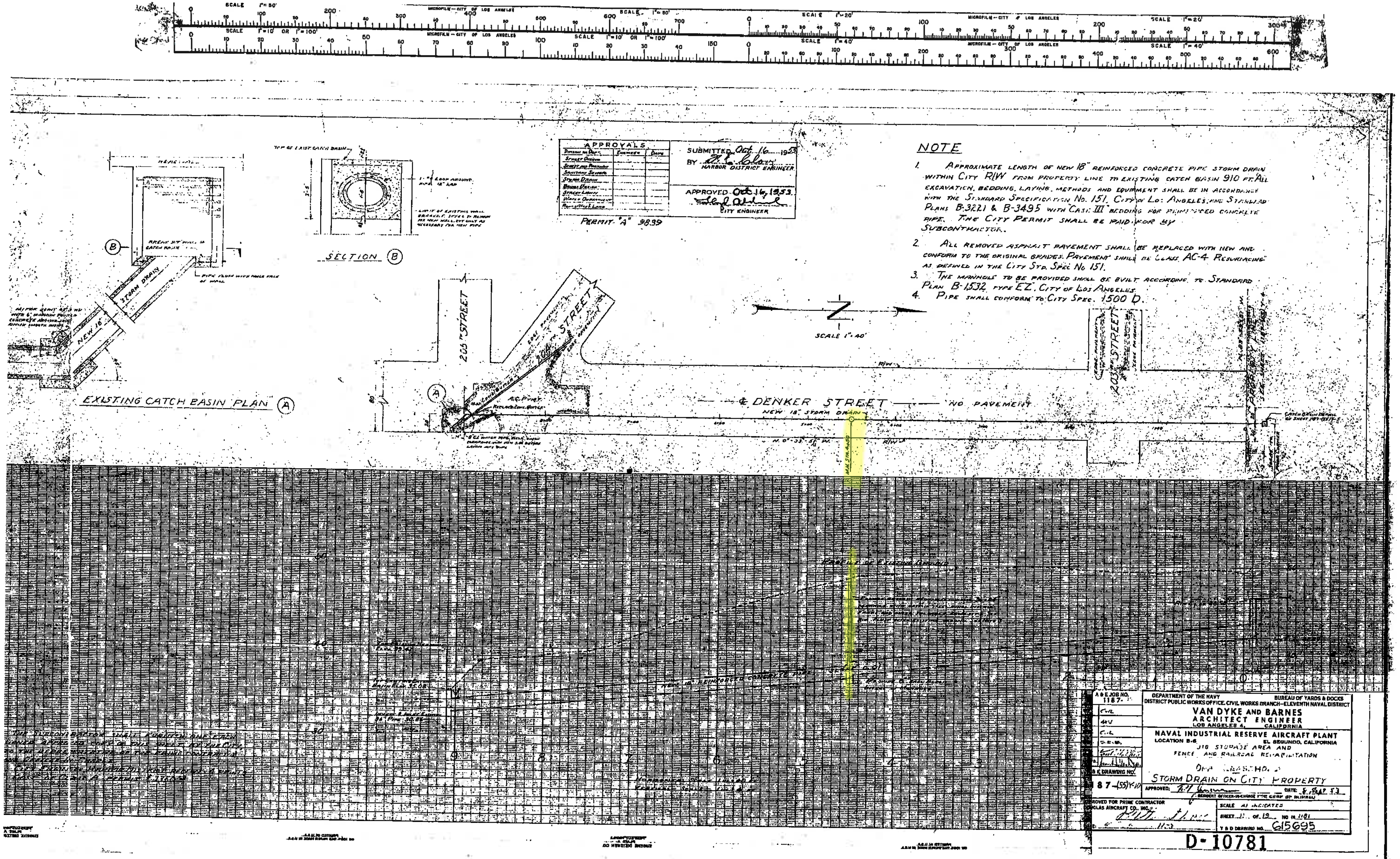
Date

City Clerk



D18769

CERTIFICATE
I hereby certify that this is a true and accurate copy of the official city record described there, made in accordance with Section 434 of the Charter of the City of Los Angeles, and Section 34090.5 of the Government Code.
Date ________ REX E. LAYTON, City Clerk
By ________



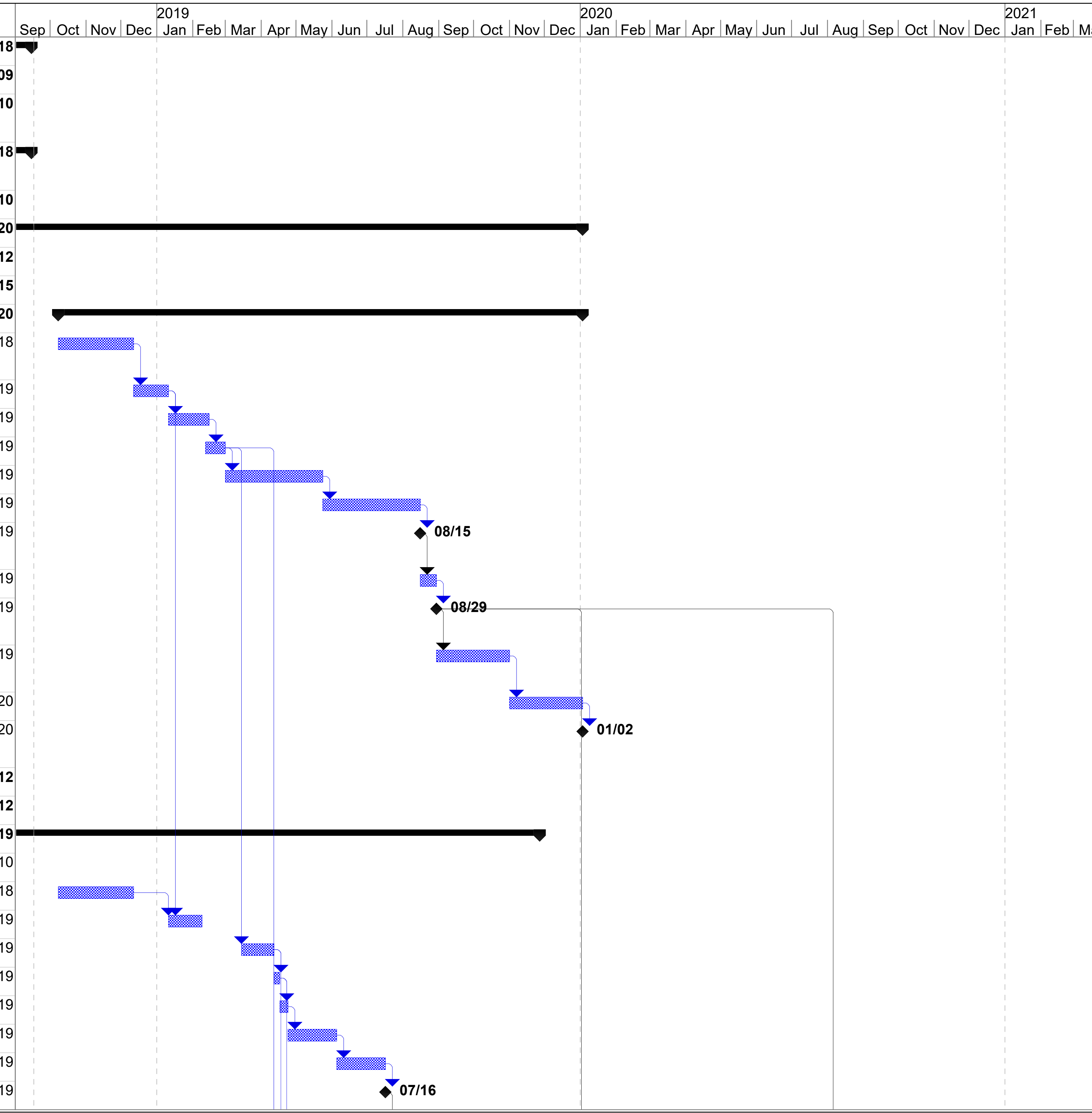
D10781 1

CERTIFICATE

APPENDIX B
PROJECT SCHEDULE

JCI Jones Chemicals, Inc.
Remedial Investigation Project Schedule

ID	Indicators	Task Name	Duration	Start	Finish
1	✓	**Task 1: Remedial Investigation Planning and Field Work**	**2567 days**	**Wed 09/24/08**	**Fri 09/14/18**
2	✓	**Task 1.1: Operational and Contaminant Release History**	**84 days**	**Wed 09/24/08**	**Fri 01/23/09**
10	✓	**Task 1.2: 2010 Remedial Investigation Workplan and Field Sampling Plans**	**358 days**	**Wed 09/24/08**	**Mon 02/22/10**
22	✓	**Task 1.3 2017 Remedial Investigation Work Plan Update and Addendum**	**467 days**	**Wed 11/16/16**	**Fri 09/14/18**
34	✓	**Task 1.4: Field Sampling Plan, QAPP, and HSP**	**358 days**	**Wed 09/24/08**	**Mon 02/22/10**
46		**Task 2: Remedial Investigation**	**2496 days**	**Thu 04/29/10**	**Thu 01/02/20**
47	✓	**Task 2.1: Soil-Gas Investigation**	**546 days**	**Thu 04/29/10**	**Wed 06/20/12**
64	✓	**Task 2.1.1 Off-Site Soil Gas Delineation**	**908 days**	**Tue 01/03/12**	**Thu 06/25/15**
80		**Task 2.1.2 Supplemental Off-Site Soil Gas Delineation**	**319 days**	**Mon 10/08/18**	**Thu 01/02/20**
81		Access Negotiations/Agreements with Off-Site Property Owners	45 days	Mon 10/08/18	Tue 12/11/18
82		Field Scheduling and Coordination	20 days	Wed 12/12/18	Thu 01/10/19
83		Drill and Install Soil Vapor Probes	25 days	Fri 01/11/19	Thu 02/14/19
84		Collect Soil-Vapor and Utility Air Samples	13 days	Tue 02/12/19	Thu 02/28/19
85		Data Reduction, Validation and Analysis	60 days	Fri 03/01/19	Thu 05/23/19
86		Prepare Draft Supplemental Off-Site Soil-Gas Report	60 days	Fri 05/24/19	Thu 08/15/19
87		Submit Draft Supplemental Off-Site Soil-Gas Report to Jones Team	0 days	Thu 08/15/19	Thu 08/15/19
88		Jones Team Review	10 days	Fri 08/16/19	Thu 08/29/19
89		Submit Draft Supplemental Off-Site Soil-Gas Data Report to EPA	0 days	Thu 08/29/19	Thu 08/29/19
90		EPA Review of Draft Supplemental Off-Site Soil-Gas Data Report	45 days	Fri 08/30/19	Thu 10/31/19
91		Address EPA Comments	45 days	Fri 11/01/19	Thu 01/02/20
92		Submit Final Supplemental Off-Site Soil Gas Data Report to EPA	0 days	Thu 01/02/20	Thu 01/02/20
93	✓	**Task 2.2 Soil Investigation**	**546 days**	**Thu 04/29/10**	**Wed 06/20/12**
104	✓	**Task 2.3: DNAPL Reconnaissance Investigation**	**544 days**	**Fri 08/20/10**	**Fri 10/05/12**
119		**Task 2.4: Groundwater Investigation**	**2385 days**	**Fri 08/27/10**	**Tue 11/26/19**
120	✓	Install On-Site DNAPL Reconnaissance Wells	5 days	Fri 08/27/10	Thu 09/02/10
121		Access Negotiations and Permitting	45 days	Mon 10/08/18	Tue 12/11/18
122		Field Scheduling and Coordination	20 days	Fri 01/11/19	Fri 02/08/19
123		Install MBFC Wells Off-Site	20 days	Fri 03/15/19	Thu 04/11/19
124		Install UBA Well Off-Site	3 days	Fri 04/12/19	Tue 04/16/19
125		Initial Monitoring Well Sampling	5 days	Wed 04/17/19	Tue 04/23/19
126		Data Reduction and Analysis	30 days	Wed 04/24/19	Tue 06/04/19
127		Prepare Draft Groundwater Data Report	30 days	Wed 06/05/19	Tue 07/16/19
128		Submit Draft Report to Jones Team	0 days	Tue 07/16/19	Tue 07/16/19

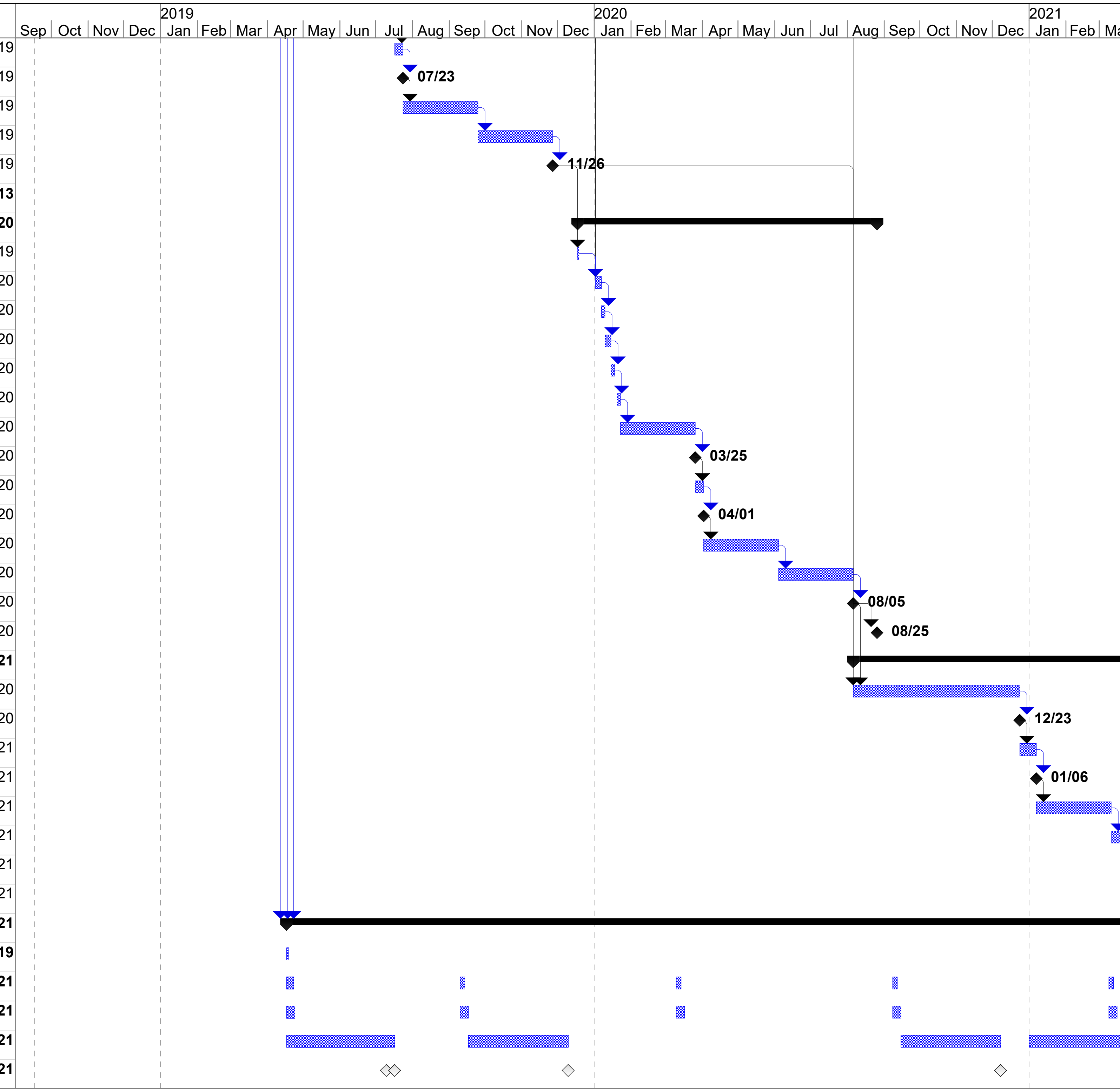


Project: Final RIW Schedule_091418
Date: Mon 09/17/18

Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Progress	
Split		External Tasks		Inactive Summary		Manual Summary		Deadline	
Milestone		External Milestone		Manual Task		Start-only			
Summary		Inactive Task		Duration-only		Finish-only			

JCI Jones Chemicals, Inc.
Remedial Investigation Project Schedule

ID	Task Name	Duration	Start	Finish
129	Jones Team Review	5 days	Wed 07/17/19	Tue 07/23/19
130	Submit Draft Groundwater Data Report to EPA	0 days	Tue 07/23/19	Tue 07/23/19
131	EPA Review of Draft Groundwater Report	45 days	Wed 07/24/19	Tue 09/24/19
132	Address EPA Comments	45 days	Wed 09/25/19	Tue 11/26/19
133	Submit Final Draft Groundwater Data Report to EPA	0 days	Tue 11/26/19	Tue 11/26/19
134	**Task 2.5: Indoor Air Sampling**	**740 days**	**Thu 01/13/11**	**Fri 11/22/13**
180	**Task 3: Risk Assessment**	**180 days**	**Wed 12/18/19**	**Tue 08/25/20**
181	Meet with EPA	1 day	Wed 12/18/19	Wed 12/18/19
182	Refine Site Conceptual Model	3 days	Thu 01/02/20	Mon 01/06/20
183	Exposure Assessment	3 days	Tue 01/07/20	Thu 01/09/20
184	Exposure Quantification	3 days	Fri 01/10/20	Tue 01/14/20
185	Toxicity Assessment	3 days	Wed 01/15/20	Fri 01/17/20
186	Risk Characterization	3 days	Mon 01/20/20	Wed 01/22/20
187	Prepare Draft Risk Assessment Report	45 days	Thu 01/23/20	Wed 03/25/20
188	Submit Draft Risk Assessment Report to Jones Team	0 days	Wed 03/25/20	Wed 03/25/20
189	Jones Team Review	5 days	Thu 03/26/20	Wed 04/01/20
190	Submit Draft Risk Assessment Report to EPA	0 days	Wed 04/01/20	Wed 04/01/20
191	EPA Review of Draft Risk Assessment Report	45 days	Thu 04/02/20	Wed 06/03/20
192	Address EPA Comments	45 days	Thu 06/04/20	Wed 08/05/20
193	Submit Final Draft Risk Assessment Report to EPA	0 days	Wed 08/05/20	Wed 08/05/20
194	EPA Approvial of Final Draft Risk Assessment Report	0 days	Tue 08/25/20	Tue 08/25/20
195	**Task 4: Prepare Remedial Investigation Report**	**215 days**	**Thu 08/06/20**	**Wed 06/02/21**
196	Prepare RI Report using HHRA and Final Data Reports	100 days	Thu 08/06/20	Wed 12/23/20
197	Submit Draft RI Report to Jones Team	0 days	Wed 12/23/20	Wed 12/23/20
198	Jones Team Review	10 days	Thu 12/24/20	Wed 01/06/21
199	Submit Draft RI Report to EPA	0 days	Wed 01/06/21	Wed 01/06/21
200	EPA Review of Draft RI Report	45 days	Thu 01/07/21	Wed 03/10/21
201	Address EPA Comments	45 days	Thu 03/11/21	Wed 05/12/21
202	Submit Final Draft RI Report	0 days	Wed 05/12/21	Wed 05/12/21
203	EPA Approval of Final Draft RI Report	0 days	Wed 06/02/21	Wed 06/02/21
204	**Task 5: Ongoing Monitoring**	**507 days**	**Wed 04/17/19**	**Thu 03/25/21**
205	**Indoor Air Monitoring**	**2 days**	**Wed 04/17/19**	**Thu 04/18/19**
208	**Groundwater Monitoring**	**498 days**	**Wed 04/17/19**	**Fri 03/12/21**
216	**Soil Gas Monitoring**	**499 days**	**Wed 04/17/19**	**Mon 03/15/21**
224	**Prepare Monitoring Reports**	**507 days**	**Wed 04/17/19**	**Thu 03/25/21**
230	**Submit Groundwater Monitoring Report to EPA**	**447 days**	**Tue 07/09/19**	**Thu 03/25/21**



Project: Final RIW Schedule_091418
Date: Mon 09/17/18

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Progress			
Split	External Tasks	Inactive Summary	Manual Summary	Deadline			
Milestone	External Milestone	Manual Task	Start-only				
Summary	Inactive Task	Duration-only	Finish-only				