TABLE OF CONTENTS

FIGURES

TABLES

4.13 PUBLIC HEALTH AND SAFETY

4.13.1 INTRODUCTION

The following is an evaluation of potential impacts to public health and safety as a result of the proposed project. This evaluation was based on environmental conditions of the project site set forth in several reports that documented site soil, soil gas, and groundwater investigations and health risk evaluations. These reports included:

- *Draft Geotechnical Evaluation in Support of Conceptual Design and Environmental Impact Report (EIR), Long Beach Sports Park, South and West of Spring Street and Orange Avenue, Long Beach, California*; prepared by AMEC Earth and Environmental, Inc., August 4, 2003;
- *Final Report, Preliminary Site Characterization, Long Beach Auto Mall, for the Redevelopment Agency, City of Long Beach*, Dames and Moore, May 18, 1988;
- *Proposed Long Beach Sports Park, Response to LA County DHS Letter dated December 3, 1999*, prepared by Mearns Consulting Corp., March 10, 2003;
- *Results of Subsurface Soil Sampling during a Geophysical Investigation at the Proposed Two-acre Lomita Site*, prepared by ESE, October 28, 1993;
- *Site Characterization Report, Proposed Retention Basin within the South Block of the LB/405 Retail Center in Long Beach, California*, prepared by ESE, February 22, 1994;
- *Health Risk Assessment for Soil and Vadose Zone within the Proposed Hilltop Sports Park, City of Long Beach, Long Beach, California*; prepared by QST Environmental, Inc., August 6, 1998; and
- *Site Assessment Summary and Cost Estimate to Perform Demolition and Soil Remediation at the Exxon Property in Long Beach, California*, prepared by ESE, November 11, 1999.

These reports are available for review at the City of Long Beach. The Existing Setting portion of this section includes a summary of the methodologies and results of previous investigations conducted on the proposed project site.

Additionally, a *Draft Human Health Risk Assessment, Proposed Long Beach Sports Park, Long Beach California,* Volume 1 of 6, was prepared by Mearns Consulting Corp in August 2003. For this report, 168 soil borings at varying depths, were placed on site in 2002 and 2003. Figure 4.13.1 provides the location of soil borings placed on site as part of the Human Health Risk Assessment prepared for the proposed project. Over 330 soil samples were collected from these borings. The analytical results were assessed in a Human Health Risk Assessment (HRA). The HRA evaluated the potential for human health to be affected due to exposure to residual concentrations of chemicals detected in site soils under existing site conditions. The HRA assessed potential risk via three possible exposure routes: ingestion, dermal contact, and inhalation.

The soil sampling was done in accordance with a Sampling and Analysis Plan approved by the U.S. Environmental Protection Agency (U.S. EPA), which provided funding for and oversight of the soil sampling through its Brownfield Assessment Grant program. Additional information on the methodology used in the HRA for the proposed project is found in the Existing Setting portion of this section.

Potential fire hazards as a result of the operation of active oil wells, while considered separately from the HRA, are also addressed in this section.

4.13.2 EXISTING ENVIRONMENTAL SETTING

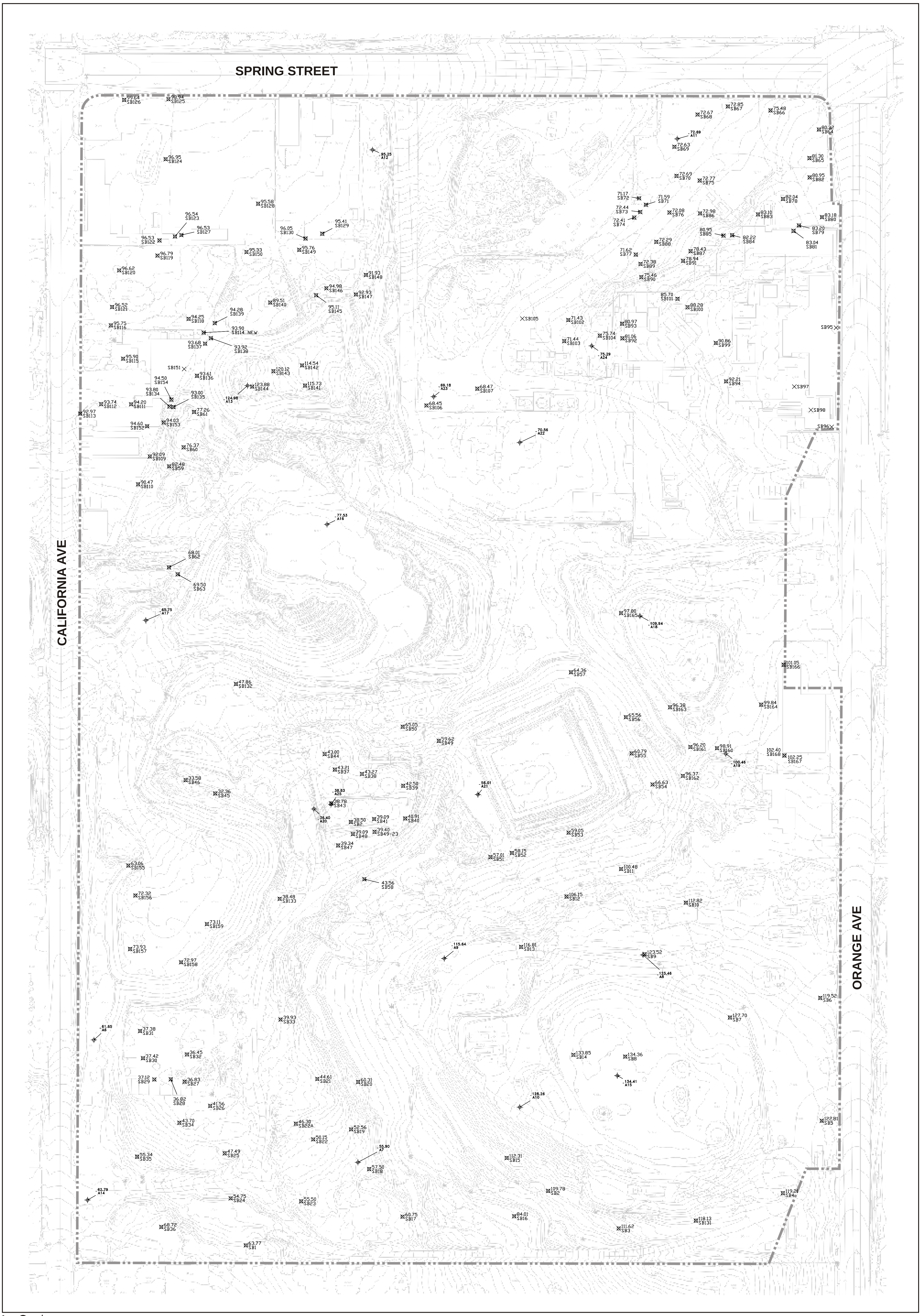
Historic Environmental Setting

A review of historic files, topographic maps, and aerial photographs was performed by AMEC Earth and Environmental, Inc. (AMEC), a geotechnical consulting firm. The following information is summarized from the *Draft Geotechnical Evaluation in Support of Conceptual Design and Environmental Impact Report (EIR), Long Beach Sports Park, South and West of Spring Street and Orange Avenue, Long Beach, California*; dated August 4, 2003; (prepared by AMEC Earth and Environmental, Inc.)

AMEC, the geotechnical consultant for the proposed project, provided information regarding historic on-site grading and fill placement after a review of historic files, topographic maps, and aerial photographs (AMEC 2003). AMEC determined that the first significant grading of the site occurred in conjunction with construction of the Los Angeles Terminal Railway prior to 1896. AMEC reviewed a 1925 topographic map of the site and determined that this grading was accomplished by cutting an approximately 100-foot-wide slot through the topographic high area in the northwestern portion of the site and constructing a narrow fill embankment to support the tracks along the southwest side of the site, adjoining California Avenue. It was determined that the fill embankment for the railway is still present along the southwesterly portion of the site, but the original railway excavation has been obscured by subsequent fill.

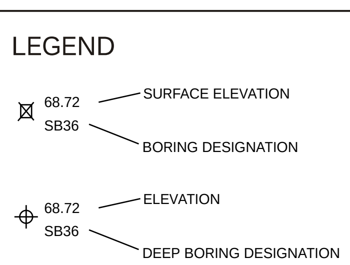
AMEC reviewed historic engineering documentation available on microfiche at the City of Long Beach and determined that prior to 1921 a water reservoir was constructed at the current location of the existing detention basin near the center of the site. The reservoir structure is located at the bottom of the natural drainage course that formerly traversed the central portion of the site and has essentially the same footprint as the existing detention basin.

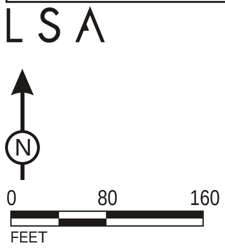
Construction of the reservoir was determined by AMEC to have consisted primarily of placing two fill embankments across the drainage course, probably using soils excavated from the intervening basin area. Excavation of the basin area also appears to have included grading of an ascending cut slope on the south side of the basin area. AMEC interpreted the topographic contours to indicate that the structure would have impounded surface drainage to the north, along the upstream portion of the previously existing drainage course. Small local marsh areas and stands of willow trees are noted on the 1921 map in the upstream area. A small dam or wall is shown on the 1925 USGS topographic map at the location of the downstream side of the reservoir. The covered reservoir is clearly visible in the 1927 and 1928–29 aerial photographs. In the next available historic aerial photograph, dated 1945, the reservoir is no longer covered and presumably had been converted to the existing storm water



LSA

FIGURE 4.13.1





SOURCE: PBS&J

Long Beach Sports Park

Boring Location Map

I:\CLB231\G\Borings.cdr (7/22/04)

This page intentionally left blank

detention basin. These aerial photographs are reproduced in the Geotechnical Evaluation, available for review at the City of Long Beach, Community Development Department.

AMEC determined that grading associated with oil field activities, which began in the early 1920s, included construction of roads, drill pads, building pads, sumps, and the installation of numerous pipelines. This grading affected essentially the entire site to some degree, but the associated depth of excavation and thickness of fill does not appear to typically exceed about 10 to 20 feet. This observation is based primarily on a comparison of the USGS topographic maps of the area dated 1925, 1949, and 1968 and a review of the more current topographic plots and boring logs available for the site.

Producing wells were completed in Huntington Beach, Long Beach/Signal Hill, Dominguez, Rosecrans, Seal Beach, and Inglewood after the oil-producing potential of the Newport-Inglewood structural/fault zone was discovered in the early 1920s (AMEC 2003). There are 48 existing oil wells on site. Currently 15 of these wells are active. An additional four wells will be reactivated during project implementation, resulting in 19 active wells on or adjacent to the project site (see Section 4.1 for more information). Essentially the entire site was affected by grading and construction associated with the on-site oil field operations that have continued for approximately 80 years.

Existing Environmental Setting

There were nine tenant business on the site at the time the Notice of Preparation (NOP) was issued in January 2004 (seven legitimate tenants and two unapproved sublessees), four of which remain on site at the time of publication of the Draft EIR (see Section 4.1 for more information). Many of the structures and other improvements associated with the businesses remain on the site and will be demolished prior to project grading. The building materials have not been tested for the presence of lead-based paint, asbestos, polychlorinated biphenyls in fluorescent light fixtures or mercury vapor light fixtures. Additionally, there are several aboveground storage tanks on site that are the property of Signal Hill Petroleum, Inc. (SHPI) that contain rainwater and residual oil.

Previous Environmental Investigations: Soil and Soil Vapor (including methane)

The soil and vapor conditions on site have been documented through multiple sampling efforts over the past 13 years. Table 4.13.A provides a summary of previous soil and soil vapor investigations.

Table 4.13.A: Previous Soil and/or Soil Vapor Investigations

Year	Firm	
1988	D&M	Auto mall
1993	ESE	Retail center: approx. 7.9-acre site Petrolane-Lomita project
1993	ESE	Approx. 2-acre Lomita site
1994	ESE	Proposed retention basin for LB/405 retail center
1994	ESE	30-acre retail center
1998	QST	HRA based on 1993 and 1994 investigations
1999	ESE	Exxon Property/9 acres

1981. Converse Consultants (Converse) performed a site characterization of the site in 1981 for Marlex Petroleum Company as cited in the Dames and Moore *Final Report Preliminary Site Characterization, Long Beach Auto Mall, for the Redevelopment Agency, City of Long Beach*, dated May 18, 1988. Converse provided unsubstantiated, anecdotal information relative to the source of fill materials on site, alleging the sources were debris from the 1933 Long Beach earthquake and the 1958 Hancock Oil Refinery fire. This site characterization was based on a review of past uses of the site and did not involve any soil or soil vapor sampling and analysis. Mearns Consulting Corp. (Mearns) sought clarification regarding the sources of the fill on site; however, neither Converse nor URS, the firm that acquired Dames and Moore, were able to locate a copy of the 1981 Converse report.

As discussed above, most of the grading prior to the late 1960s appears to have involved redistribution of materials present on site, and significant areas of imported fill are not apparent from the available historic documentation, i.e., from the historic aerial photos and topographic maps.

Copies of the historic topographic and aerial photographs on which the above conclusions are based are included in the letter report, *Proposed Long Beach Sports Park, Response to LA County DHS Letter dated December 3, 1999* (Mearns Consulting Corp., March 10, 2003).

As previously stated, 168 soil borings were placed on site in December 2002 through January 2003 as part of the investigations for the proposed project. A map depicting the boring locations and soil boring logs is included in the *Draft Human Health Risk Assessment, Proposed Long Beach Sports Park, Long Beach California*, Volume 1 of 6, dated August 15, 2003, prepared by Mearns Consulting (available for review at the City of Long Beach, Community Development Department). None of these borings hit debris, concrete, brick, asphalt metal, or trash, which would have been included in debris from the 1933 earthquake and the oil refinery fire.

The historic files, topographic maps and aerial photographs, and recently collected soil samples do not support the alleged on-site disposal of debris from the 1933 Long Beach earthquake and 1958 Hancock Oil Refinery fire. Therefore, in the absence of any evidence to support claims that fill on the site is from either the earthquake or the fire, these allegations are considered to be unsubstantiated. Further, the County of Los Angeles, Department of Health Services, Bureau of Environmental Protection, Solid Waste Management Program/LA County LEA agreed with the conclusion that debris from the 1933 Long Beach earthquake and the 1958 Hancock Oil Refinery fire was not disposed of on site and issued a letter stating this in October 2003 (County of LA, DHS).

1988. Dames and Moore conducted site investigations of portions of the site in 1988 when the property was being considered as part of the future site of the City of Long Beach Auto Mall (Dames and Moore 1988). Dames and Moore submitted a limited number of soil samples collected in 1988 for analysis of fuel hydrocarbons (via USEPA Method 8015 modified [8015m]), total petroleum hydrocarbons (TPH) (via USEPA Method 418.1), halogenated volatile organics (via USEPA Method 8010), volatile aromatics (via USEPA Method 8020), semivolatile organic compounds (SVOCs), primarily polynuclear aromatics (PNAs) (via USEPA Method 8270), and CAM metals, and organochlorine pesticides (via USEPA Method 8080). Dames and Moore also conducted field screening with an organic vapor analyzer (OVA), soil vapor testing for methane, and collected two groundwater samples from perched groundwater encountered during investigations conducted in 1988.

Methane is a colorless, odorless gas with a wide distribution in nature. Anaerobic bacterial decomposition of plant and animal matter, such as occurs under water, produces marsh gas, which is also methane. Methane occurs in reservoirs beneath the surface of the earth and is often found in conjunction with petroleum deposits. As the project has been the site of oil field operations for the past 80 years and as active oil wells remain on the property, several consultants, including Dames and Moore, performed methane assessments during the course of their previous investigations.

Dames and Moore installed 48 soil vapor probes, collected five samples for analysis of methane, and determined the concentrations of methane detected ranging from 8 percent to 79 percent, which were attributable to an abandoned oil well, Exxon City 39 (Dames and Moore 1988). Dames and Moore took organic vapor analyzer (OVA) readings from most of these soil vapor probes and reported that concentrations ranged from 10 ppm to 1,000 ppm.

Dames and Moore placed soil borings to depths 15 feet below ground surface (bgs), 20 feet bgs, 30 feet bgs, 35 feet bgs, 40 feet bgs, 60 feet bgs and 80 feet bgs (Dames and Moore 1988).

Dames and Moore determined that most metal concentrations in at least 24 soil samples collected on site were comparable to background concentrations present in the surrounding area. Comparable concentrations between the project site and surrounding areas indicate that the sampled portions of the project site have not been adversely impacted for those constituents by past oil extraction or other activities on the site. The exception was lead, which was detected at concentrations that ranged from 46 to 1,960 parts per million (ppm).

At least 99 soil samples were collected and submitted for analysis of TPH via Method 418.1 and had concentrations ranging from not detected in concentrations greater than the reporting limit (ND) to 750,000 ppm. At least three soil samples collected and submitted for analysis for TPH via Method 8015m had concentrations ranging from ND to 10 ppm. At least 26 soil samples were collected and submitted for analysis of halogenated volatile organic and volatile aromatic compounds. Concentrations of benzene ranged from ND to 30 parts per billion (ppb), of toluene ranged from ND to 400 ppb, of ethylbenzene ranged from ND to 300 ppb and of total xylenes ranged from ND to 500 ppb. At least three soil samples were submitted for analysis of SVOCs and PCBs and the results were ND (Dames and Moore 1988).

Dames and Moore determined that the two perched groundwater samples that were collected and submitted for analysis of halogenated and aromatic volatile organic compounds and SVOCs were ND (Dames and Moore 1988).

The results of Dames and Moore's investigations indicated that the primary constituents in site soils were TPH and lead, and that perched groundwater was not impacted by residual concentrations of chemicals detected in site soils.

1993. Environmental Science and Engineering, Inc. (ESE) conducted a site investigation of a 7.9-acre portion of the site for a proposed Retail Center for the City of Long Beach Redevelopment Agency

(*Site Characterization Report for the Petrolane-Lomita Project in the Proposed Long Beach I-405 Retail Center, Long Beach, California*, Volume I of 2, dated October 28, 1993, and Volume II of 2, dated February 11, 1993).

ESE installed 21 soil vapor probes on this 7.9-acre portion of the site. Ten soil gas samples were collected and submitted for analysis of methane. ESE reported that methane concentrations ranged from 782 ppm to 244,530 ppm (ESE 1993).

ESE drilled 27 soil borings that ranged in depth from 9 feet to 95 feet bgs on this portion of the site. ESE placed 12 hand-auger samples that ranged in depth from 3.5 feet to 20.5 feet bgs on this 7.9-acre portion of the site. Eighty-one soil samples were submitted for analysis of TPH via Method 418.1; 74 soil samples were submitted for analysis of TPH via Method 8015; 39 soil samples were submitted for analysis of VOCs via Method 8240; eight soil samples were submitted for analysis of VOCs via Method 8020; nine soil samples were submitted for analysis of SVOCs via Method 8270; 14 soil samples were submitted for total threshold limit concentrations (TTLC) metals via Method 6010 (ESE 1993).

ESE reported that concentrations of TPH ranged from 5.1 to 26,000 milligrams per kilogram (mg/kg). ESE reported that concentrations of benzene ranged from ND to 71 mg/kg; concentrations of toluene ranged from ND to 170 mg/kg; concentrations of ethylbenzene ranged from ND to 31 mg/kg and concentrations of total xylenes ranged from ND to 120 mg/kg (ESE 1993). ESE reported that the greatest detected concentrations of these constituents were detected at 70 feet bgs.

ESE reported the following SVOCs were detected: chrysene at 24 mg/kg at 10 feet bgs and 33 mg/kg at 15 feet bgs; phenanthrene at 24 mg/kg at 15 feet bgs; and naphthalene at 3.6 mg/kg at 10 feet bgs, and 0.28 mg/kg at 70 feet bgs (ESE 1993).

ESE reported the following metals were detected: arsenic from ND to 300 mg/kg; barium from 37 to 190 mg/kg; cadmium from ND to 14 mg/kg; total chromium from 12 mg/kg to 910 mg/kg; cobalt from 3.5 mg/kg to 11 mg/kg; copper from 9.7 mg/kg to 940 mg/kg; lead from 3.1 mg/kg to 460 mg/kg; mercury from ND to 650 mg/kg; molybdenum from ND to 1.2 mg/kg; nickel from 6.7 to 34 mg/kg; silver from ND to 0.6 mg/kg; vanadium from 20 to 46 mg/kg; and zinc from 26 to 1,700 mg/kg (ESE 1993).

The results of ESE's investigations indicate that the primary constituents in site soils were TPH, metals (arsenic, lead, and mercury), and benzene. Due to the depth at which the greatest concentration of benzene was detected, 70 feet bgs, ESE subsequently installed five groundwater monitoring wells. The results of ESE's groundwater investigations are discussed under the subject heading "Groundwater" in this section.

1993. Environmental Science and Engineering, Inc. (ESE) conducted a site investigation of a 1.963-acre portion of the site for the City of Long Beach Redevelopment Agency (*Results of Subsurface Soil Sampling during a Geophysical Investigation at the Proposed Two-acre Lomita Site*, dated October 28, 1993).

ESE reported that United Environmental Technologies (UET) conducted a site assessment of this 1.963-acre portion of the site in December 1991 and January 1992, including the collection of 25 soil samples from 23 hand auger borings with depths ranging from 2 feet to 5 feet bgs. Soil samples were submitted for analysis of TPH via Method 418.1, TPH via 8015m; benzene, toluene, ethylbenzene and total xylenes (BTEX) were analyzed via Method 8020 and PCBs were analyzed via 8080. ESE reported that benzene, ethylbenzene and PCBs were ND in all soil samples. ESE reported that concentrations of toluene ranged from 0.01 ppm to 0.08 ppm and concentrations of total xylenes ranged from 0.006 ppm to 0.17 ppm. TPH was reportedly detected at concentrations ranging from 46 mg/kg to 83,400 mg/kg (ESE 1993).

ESE excavated eight potholes, five to identify pipelines and three to identify abandoned oil wells. ESE collected five soil samples from these eight potholes and submitted them for analysis of VOCs via Method 8020, TTLC metals via 6010, SVOCs via Method 8270 and TPH via Method 8015. ESE reported that benzene, ethylbenzene, total xylenes, and SVOCs were ND in all samples. Toluene was detected once at a concentration of 0.72 mg/kg. ESE reports that metals were detected at comparable concentrations to background. TPH concentrations ranged from 2,800 mg/kg to 4,600 mg/kg (ESE 1993).

1994. ESE conducted a site investigation of a portion of the site for a proposed Retail Center for the City of Long Beach Redevelopment Agency in 1994 (*Site Characterization Report−Proposed Retention Basin within the South Block of the LB/405 Retail Center in Long Beach, California,* dated February 22, 1994).

As part of the investigation, ESE installed 28 temporary soil vapor probes on a nine-acre portion of the site. Nine soil vapor samples were submitted for analysis of methane. ESE reported that methane was detected at concentrations ranging from 2.8 to 46,331 ppm (ESE 1994).

ESE placed 27 soil borings on a nine-acre portion of the site. The installation of these probes was via drill rig and hand auger. The depths of these probes were 5 feet, 7 feet, 10 feet, 15 feet, 20 feet, 21 feet, 26 feet, and 30 feet bgs.

ESE submitted 62 soil samples for analysis of TPH via method 418.1; 16 soil samples for analysis of TPH via method 8015m; six soil samples for analysis of VOCs via method 8240; and two soil samples for analysis of SVOCs via method 8270 (ESE 1994).

ESE reported that concentrations of TPH ranged from 6 mg/kg to 140,000 mg/kg. ESE reported that benzene concentrations ranged from ND to 0.002 mg/kg; toluene, ethylbenzene and total xylenes were ND; and naphthalene ranged from ND to 15 mg/kg (ESE 1994).

ESE placed an additional six borings on a 0.47-acre portion of the site. The depths of these borings ranged from 25 feet to 31.5 feet bgs. ESE reported that TPH ranged from 11 mg/kg to 950 mg/kg (ESE 1994).

1994. ESE also conducted a site investigation of a 30-acre portion of the site for a proposed Retail Center for the City of Long Beach Redevelopment Agency in 1994 (*Site Characterization Report*

Proposed Retail Center within the South Block of the LB/405 Retail Center in Long Beach, California, Volume I of II, dated September 7, 1994). Table 4.13.B provides information on the ESE Site Investigation.

Table 4.13.B: 1994 ESE Site Investigation

ESE Action	Acreage Affected	Reported Concentrations
7 soil vapor probes	1.2-acre	ESE reported that concentrations of methane ranged from 1.7 ppm to 17,794 ppm
5 soil borings	1.2-acre	The depths of these soil borings ranged from 30 feet to 75 feet bgs. ESE reported that concentrations of TPH ranged from 2.8 mg/kg to 12,000 mg/kg. Benzene was detected once at a concentration of 0.002 mg/kg; toluene was detected at a concentration of 0.024 mg/kg; ethylbenzene was detected at a concentration of 0.026 mg/kg; and total xylenes were detected at a concentration of 0.13 mg/kg
28 temporary soil vapor probes	10-acre	ESE reported that concentrations of methane ranged from 2.8 ppm to 114,270 ppm.
10 soil borings	10-acre	The depths of these soil borings ranged from 9 feet to 95 feet bgs. ESE reported that concentrations of TPH ranged from 9 mg/kg to 4,000 mg/kg. BTEX was ND and naphthalene was detected at a concentration of 2.9 mg/kg.
3 temporary soil vapor probes	0.5-acre	ESE reported that concentrations of methane ranged from 7.2 ppm to 79,446 ppm.
12 temporary soil vapor probes	2.15-acre	ESE reported that concentrations of methane ranged from 3.7 ppm to 667 ppm.
5 soil borings	2.15-acre	ESE reported that concentrations of TPH ranged from 5.4 mg/kg to 2,500 mg/kg.
8 temporary soil vapor probes	3.0-acre	ESE reported that concentrations of methane ranged from ND to 23.4 ppm.
4 soil borings	3.0-acre	The depths of these soil borings ranged from 26.5 feet to 36.5 feet bgs. ESE reported that concentrations of TPH ranged from 8 mg/kg to 32,000 mg/kg
4 temporary soil vapor probes	3.23-acre	ESE reported that concentrations of methane ranged from 22.8 to 25.8 ppm.
1 soil boring	3.23-acre	ESE reported that TPH was detected at 280 mg/kg in a composite soil sample from 5/10 feet bgs.
3 temporary soil vapor probes	0.28-acre	Temporary soil vapor probe was installed near abandoned oil well Exxon City No. 7. ESE reported that maximum vapor readings ranged from 2 ppm to 5 ppm.
3 temporary soil vapor probes	0.24-acre	Temporary soil vapor probe was installed near abandoned oil well Exxon City No. 27. ESE reported that maximum vapor readings ranged from 3 ppm to 48 ppm
3 temporary soil vapor probes	0.29-acre	Temporary soil vapor probe was installed near abandoned oil well Texaco B-15. ESE reported that concentrations of methane ranged from ND ppm to 2.5 ppm
3 temporary soil vapor probes	0.8-acre	ESE reported that methane was detected at 2.8 ppm.
4 soil borings	0.8-acre	ESE reported that concentrations of TPH ranged from 6.8 mg/kg to 7.9 mg/kg.
1 soil boring	0.8-acre	ESE reported that TPH was detected at a maximum concentration of 990 mg/kg.
5 temporary soil vapor probes	3.1-acre	ESE reported that concentrations of methane ranged from 1,301 ppm to 6,168 ppm.
8 soil borings	3.1-acre	ESE reported that concentrations of TPH ranged from 5.5 mg/kg to 4,100 mg/kg.

ESE concluded, based on the soil vapor survey they conducted, that methane vapors exceeding the lower explosive limit of 50,000 ppm (5 percent methane) at depths of 5 feet bgs or less were present in a 1.8-acre area of the site. Based on the soil vapor survey conducted by ESE, they concluded that methane concentrations greater than 1,000 ppm had been measured in an area approximately 13.7-acres of the site (ESE 1994).

Methane is not considered toxic to human health but is explosive if concentrations of 5 percent by volume (5 percent v/v) in air are reached when exposed to temperatures above 650 ^{o}C. In structures, regulatory agencies commonly consider concentrations of methane above 25 percent of the lower explosive limit of 50,000 parts per million (ppm), i.e., concentrations of methane greater than 12,500 ppm to be action levels warranting mitigation (City of Los Angeles Building Code, Article 1, Division 71, "Methane Seepage District Regulations").

Methane concentrations on site in *in situ* soils at depth in previous investigations were less than the lower explosive level (LEL) of 5 percent except for a 1.8-acre area of the 56-acre site. Issues regarding methane concentrations in the context of the proposed project and related site grading are addressed in Section 4.13.6.

1998. QST Environmental, Inc. prepared a human health risk evaluation for the site, (*Health Risk Assessment for Soil and Vadose Zone within the Proposed Hilltop Sports Park, City of Long Beach, Long Beach, California*; dated August 6, 1998) to assess the potential health risks posed by the chemicals detected in site soils and soil vapor in the environmental investigations conducted in 1993 and 1994.

The risk evaluation followed the approach in the American Society for Testing and Materials (ASTM) Standard Guide E-1379, *Risk-based Corrective Action Applied at Petroleum Release Sites* (ASTM 1995) (QST 1998).

In essence, this risk evaluation employed a phased approach to assessing risk for specific parcels of the site (QST 1998):

1. a qualitative screening evaluation was used to assess potential health risks due to exposure to chemicals detected at portions of the site occupied by the following tenants:
    - John & Bob's Body and Paint Shop
    - Exxon Company USA
    - Compatibles Plus
    - Eversoft Water Products
    - McEachern Company, Inc.
    - Petrolane Gas Service
    - Pet Lodge of Long Beach
    - Guardian Fence Company
2. a qualitative and quantitative screening evaluation was used to assess potential health risks due to exposure to chemicals detected at portions of the site occupied by the following tenants:
    - Ray's Trashbox Service

- Long Beach Water Department
- MacPherson Sandblasting
- Union Pacific Resources Co. Railroad Right-of-way
- Sully-Miller Company
- Flickinger Company
- Long Beach Spring and Forge, Inc.
- Hill Crane Services, Inc.

3. a refined evaluation, qualitative and quantitative was used to assess potential health risks due to exposure to chemicals detected at the portion of the site occupied by Petrolane-Lomita Gasoline Company.

QST presented the following conclusions based on their risk evaluation of 17 parcels on site (QST 1998):

- They could (1) determine parcel-specific chemical of concern, (2) identify complete and incomplete exposure pathways and (3) know enough about the risks to human health associated with surface and subsurface soils to design and build a sports park.
- They determined that risk management steps should be implemented to control methane emissions for safety reasons based on the presence of TPH in soil samples and low molecular weight hydrocarbons detected in soil vapor samples.
- They determined the landscaping plan for the proposed sports park should consider specific analytical findings.

QST followed the ASTM guidelines, which are less rigorous than either USEPA, OEHHA, or DTSC guidelines, for their risk evaluation and performed a qualitative evaluation of risk. The HRA for the proposed project applies more conservative methodology as prescribed by DTSC. Therefore, the health risk conclusions for the proposed project are based on the 2004 HRA and do not rely on the results of the QST study.

1999. ESE conducted a site investigation of a 9-acre portion of the site for the City of Long Beach in 1999 (*Site Assessment Summary and Cost Estimate to Perform Demolition and Soil Remediation at the Exxon Property in Long Beach, California*, dated November 11, 1999).

ESE placed 15 trenches on this 9-acre portion of the site. The depths of the trenches ranged from 1 foot to 15 feet bgs. Soil samples were collected and submitted for analysis of TPH via Methods 418.1 and 8015m, VOCs via Method 8260, SVOCs via Method 8270, TTLC metals via Method 6010, and PCBs via Method 8082.

ESE reported that concentrations of TPH ranged from 5.4 mg/kg to 14,000 mg/kg. ESE reported that detected concentrations of metals and PCBs did not exceed regulatory limits. SVOCs were ND, and the following VOCs were detected: p-isopropyltoluene at a concentration of 28 µg/kg; naphthalene at a concentration of 280 µg/kg; n-propylbenzene at a concentration of 32 µg/kg, and 1,2,4-trimethylbenzene at a concentration of 50 µg/kg (ESE 1999).

Summary of Previous Soil and Vapor Investigations

At least 534 soil samples and at least 112 soil vapor samples were collected in these previous investigations conducted in 1988, 1993, 1994 and 1999. The results of these investigations indicated that TPH was the primary constituent of concern and methane concentrations exceeded the lower explosive limit on 1.8 acres of the 56-acre site.

Groundwater

Groundwater samples were collected at the project site in 1999 and 2000. ESE installed five groundwater monitoring wells in 1999. SHPI collected samples from two wells in 2000 in compliance with a California Regional Water Quality Control Board order. The results of the groundwater sampling and analysis are summarized below.

1999. ESE installed five groundwater monitoring wells on site in August 1999 as reported in the *Site Assessment and Groundwater Monitoring Report, Sports Park Project, City of Long Beach, California*; dated February 21, 2000.

ESE installed monitoring wells ESE-MW-1 through ESE-MW-4 at the periphery and monitoring well ESE-MW-5 in the center of the site. ESE reported the wells were drilled to depths ranging from 95 feet to 183.5 feet bgs. ESE collected soil samples at 5-foot intervals (ESE, 2000).

The soil types at wells ESE-MW-1 through ESE-MW-3 and ESE-MW-5 were reported to consist of interbedded sandy silt, silty sand and clayey silt from ground surface to approximately 60 feet to 110 feet bgs. Below this finer-grained layer, the soil reported consists of primarily fine- to coarse-grained sand. Groundwater was found to be unconfined at depths between 126 feet and 163.5 feet bgs. The soil types in ESE-MW-4 reportedly also consist of interbedded sandy silt, silty sand and clayey silt from ground surface to approximately 78 feet bgs. ESE reported the soil was more stratified in ESE-MW-4 and numerous water bearing zones were identified. Below 78 feet bgs, the soil in ESE-MW-4 reportedly consisted of fine-grained sand with varying amounts of silt. Groundwater was determined to be semi-confined in ESE-MW-4 (ESE, 2000).

ESE collected soil samples during the drilling of these monitoring wells and submitted them for analysis of TPH, BTEX, VOCs and SVOCs (ESE, 2000). ESE reported that TPH-gasoline range (TPH-g), TPH-diesel range (TPH-d), BTEX, VOCs and SVOCs were ND in the soil samples collected from ESE-MW-1, ESE-MW-3, ESE-MW-4 and ESE-MW-5, with the following exceptions: acetone was detected at a concentration of 27 µg/kg at 50 feet bgs in soil collected from ESE-MW-1; benzene was detected at 5.1 µg/kg at 80 feet bgs and toluene was detected at 9.8 µg/kg at 80 feet bgs and at 8.4 µg/kg at 120 feet bgs in soil collected from ESE-MW-3. ESE reported that TPH-g was ND; TPH-d was detected at 1300 mg/kg at 15 feet bgs and at 28 mg/kg at 90 feet bgs; BTEX was detected at concentrations as great as 1600 µg/kg at 20 feet, 60 feet, 80 feet and 90 feet bgs; acetone was detected at 20 µg/kg at 20 feet bgs and at 78 µg/kg at 60 feet bgs in soil collected from ESE-MW-2 (ESE, 2000).

Groundwater was collected from these monitoring wells and submitted for analysis of TPH-g, TPH-d, BTEX, VOCs, pH, general minerals and inorganic parameters (ESE, 2000). TPH-g was detected at concentrations ranging from 0.18 milligrams per liter (mg/L) to 0.51 mg/L in groundwater collected from monitoring wells ESE-MW-2, ESE-MW-4 and ESE-MW-5. TPH-d was detected at concentrations ranging from 2.91 mg/L to 4.32 mg/L in groundwater collected from monitoring wells ESE-MW-1, ESE-MW-3, ESE-MW-4 and ESE-MW-5 (ESE, 2000).

Although total xylenes were detected in groundwater collected from monitoring wells ESE-MW-4 and ESE-MW-5 at concentrations of 46 micrograms per liter (µg/L) and 55 µg/L, the field blank[1] also had detected concentrations of total xylenes (ESE, 2000).

Lastly, methylene chloride was detected in groundwater collected from monitoring wells ESE-MW-2, ESE-MW-4 and ESE-MW-5 at concentrations of 1 µg/L to 3 µg/L (ESE, 2000).

ESE reported the groundwater gradient was 0.001 and the direction of groundwater flow was towards the northwest (ESE, 2000).

2000. SHPI collected groundwater samples from two on-site monitoring wells as part of their quarterly monitoring requirements of a land farm bioremediation project to satisfy a waste discharge requirement order (WDR Order No. 90-148-128) issued by the California Regional Water Quality Control Board (*Quarterly Monitoring Report, Land Treatment of Petroleum Hydrocarbon-Contaminated Soil, Harlow-Kent Site* report; submitted to the California Regional Water Quality Control Board; prepared by Global Solutions, Inc.; dated July, 2000).

Groundwater was collected from ESE-MW-1, located on the southwest corner of Orange Avenue and 28th Street, and from ESE-MW-3, located on the southeast corner of California Avenue and Spring Street, and submitted for analysis of TPH via Method 418.1, volatile and extractable fuel hydrocarbons via Method 8015m, priority pollutants via Methods 601/602, total dissolved solids and pH on March 31, 2000 (Enviro-Chem, 2000).

TPH, volatile and extractable fuel hydrocarbons were ND in groundwater collected from ESE-MW-1 and ESE-MW-3 (Enviro-Chem, 2000).

Groundwater was collected from ESE-MW-1, located on the southwest corner of Orange Avenue and 28th Street, and from ESE-MW-3, located on the southeast corner of California Avenue and Spring Street, and submitted for analysis of TPH via Method 418.1, volatile and extractable fuel hydrocarbons via Method 8015m, priority pollutants via Methods 601/602, total dissolved solids and pH on July 17, 2000 (Global Solutions, 2000).

---

[1] A field blank is prepared by the laboratory and shipped with the sample containers. It is a sample container that contains a substance known by the laboratory. The objective of the field blank is to determine whether contamination could have been introduced through the sampling procedures or ambient conditions. The analytical results of a field blank should be ND.

TPH, volatile and extractable fuel hydrocarbons and priority pollutants were ND in groundwater collected from ESE-MW-1. TPH and priority pollutants were ND, volatile fuel hydrocarbons were detected at a concentration of 250 µg/L and extractable fuel hydrocarbons were detected at a concentration of 0.90 µg/L in groundwater collected from ESE-MW-3 (Global Solutions, 2000).

Summary of Groundwater Sampling

Groundwater was sampled from the five ESE installed monitoring wells. Additionally, several quarters of groundwater monitoring were completed at two SHPI monitoring wells. The analytical results indicate that TPH, volatile fuel hydrocarbons, extractable fuel hydrocarbons and USEPA priority pollutants were either ND or were below agency thresholds. These groundwater monitoring wells were closed per Los Angeles Regional Water Quality Control Board (LARWQCB) standards with a City permit on October 7 and 8, 2002.

The results of the previous soil and groundwater investigations (1999 and 2000) indicate that groundwater underlying the site has not been impacted by the residual concentrations of chemicals detected in soils from 5 feet to 90 feet bgs.

Recent Investigations

Soil samples were collected from on-site soils in 2002 and 2003 as part of the investigation for the proposed project. The purpose of the soil sampling and analysis was to characterize surficial site soils and those areas where a topographic change in elevation was anticipated based on the site plan for the proposed Sports Park and to provide data for use in a site-wide human health risk assessment as part of the proposed project EIR. All field work was performed according to the USEPA approved Sampling and Analysis Plan (Mearns Consulting Corp. December 3, 2002).

The first phase of field work commenced on December 13, 2002 and was completed on January 24, 2003. A total of 168 soil borings were placed on site during this phase. Due to the site topography and limited access, a Little Beaver, i.e., a mechanized hand auger, was primarily used to collect the samples. When site access allowed, and for the five deeper borings that extended to 25 feet bgs, a hollow stem auger was used. Soil samples were collected in 6-inch stainless steel sleeves with Teflon liners and plastic end caps. Soil samples submitted for analysis of volatile organic compounds were collected using USEPA Method 5035, the Encore sampling methodology. The soil samples were labeled, logged onto a chain-of-custody form, and stored in a cooler at 4^{o}C until delivered to the laboratory for analysis.

The locations of the soil samples were determined based on the historic use of the site and visual observations for a biased, deterministic sampling strategy. The purpose of conducting biased sampling is to ensure that the areas of greatest potential concern on the site, based on past uses, are sampled. Soil samples were collected from 1 foot bgs, 5 feet bgs and 10 feet bgs from within the same boring. Samples collected from 1 foot and 5 feet bgs were submitted to Sierra Analytical Labs, Inc. (a State of California Department of Health Services [DOHS] ELAP accredited laboratory; ELAP No. 2320) for analysis of total petroleum hydrocarbons, gasoline range (TPH-g) and diesel range (TPH-d) and speciated carbon chains via USEPA Method 8015 modified (8015m), volatile organic compounds via USEPA Method 8260B (collection via USEPA Method 5035), semivolatile organic compounds via USEPA Method 8270C and California Code of Regulations (CCR) Title 22 total threshold limit concentration (TTLC) metals via USEPA Method 6010B (preparation via USEPA Method 3050B), mercury via USEPA Method 7471, cyanide via USEPA Method 9010 and hexavalent chromium via USEPA Method 7196A (preparation via USEPA Method 3060A).

Soil samples collected from 10 feet bgs were extracted and held by the laboratory, upon receipt. Several 10 feet soil samples were subsequently analyzed for specific constituents based on the analytical results from the 1 foot and 5 feet soil samples within the same boring. Soil samples were collected at 5-foot increments from the five 25 feet bgs borings placed on fill that will subsequently be cut in the grading activities and submitted for analysis of all constituents.

Duplicate soil samples were collected every 30 samples at the 1 foot bgs depth. Additionally, approximately 10 percent of the soil samples were split with and submitted to a USEPA Contract Laboratory Program (CLP) laboratory. The purpose of the split sampling was to provide an additional layer of quality control. The split samples were collected from the same boring, in a 6-inch stainless steel sleeve, either directly above or directly below the 6-inch sleeve that contained the soil sample submitted to the State of California Department of Health Services certified laboratory for analysis. The selection of the soil samples submitted to the CLP laboratory was based on visual observations and historic use of the properties that comprise the site, i.e., a biased approach. These analytical results were then compared to the laboratory analytical results generated for the project from the State-certified private laboratory for quality assurance confirmation.

The second phase of field work commenced on April 25, 2003, and was completed on April 29, 2003. The purpose of the second sampling effort was to collect soil samples at depths anticipated to be encountered during the grading activities. A total of 20 soil borings were placed on site during this phase of field work. The depths of these borings varied from 20 feet bgs to 90 feet bgs and were determined by the depths at which native soil were encountered in the each boring and by the anticipated depths the grading contractor would need to cut the soils to achieve elevations necessary for the proposed Sports Park. Soil samples were collected from these borings at 10-foot increments and submitted for analysis of arsenic and speciated carbon chains. These two constituents were the predominant constituents detected during the first phase of field work.

A boring to 40 feet bgs was placed in the municipal cemetery, adjacent, south of the south. Soil samples were collected a 1 foot bgs, 5 feet bgs, 10 feet bgs, 15 feet bgs, 20 feet bgs, 25 feet bgs, 30 feet bgs and 40 feet bgs and submitted for analysis of metals. The data generated from this boring was used as site-specific background metals data. The exposure point concentrations of metals detected with a frequency greater than 5 percent in soils at 1 foot bgs, 5 feet bgs and 10 feet bgs or deeper were compared to the background metals data collected from corresponding depths. Metals were eliminated from further assessment in the human health risk assessment if their exposure point concentrations were less than their background concentrations.

All field work was conducted under the supervision of a State of California registered geologist.

Hexavalent chromium was ND in concentrations greater than its reporting limit (RL) in any of the soil samples submitted for analysis. Trace concentrations, only, of VOCs and SVOCs were detected in 27 soil samples out of 333 soil samples collected from 1 foot bgs and 5 feet bgs. Heavy end carbon chains were primarily detected, indicative of oil field related activities.

Human Health Risk Assessment

A site-wide human HRA was prepared for the site. This HRA followed the approach in the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) Preliminary Endangerment Assessment (PEA) Guidance Manual, (DTSC 1999), the DTSC LeadSpread 7.0 Model, U.S. Environmental Protection Agency (USEPA) Risk Assessment Guidance for Superfund, Volume 1 - Human Health (RAGs) (USEPA 1989), and the Massachusetts Department of Environmental Protection (MADEP) guidance manual for characterizing risks posed by petroleum contaminated sites (June, 2001). The City of Long Beach submitted a request to have the HRA reviewed by the California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (OEHHA), on June 30, 2004.

The LARWQCB is the Responsible Agency under CEQA charged with approving the HRA for the site. LARWQCB is the regulatory agency that has been acting in this capacity since at least 1993. There is an existing Memorandum of Understanding (MOU) between LARWQCB and OEHHA that facilitates review of HRAs by OEHHA when LARWQCB is the Lead or Responsible Agency for an HRA. In order to facilitate review of the HRA for the proposed project site, however, LARWQCB advised the City to contract directly with OEHHA. The City’s request for review of the HRA and the accompanying contract was forwarded from OEHHA’s Integrated Risk Assessment section to OEHHA’s contract office on July 7, 2004, for processing. Once the contract is reviewed and approved, OEHHA will review the HRA and submit comments to both the City of Long Beach and LARWQCB. As an enforcement agency, LARWQCB will issue a letter of closure (no further action required) for the project site if it concurs with the comments and findings provided by OEHHA.

The risks and hazards to human health due to exposure to the metals: beryllium, cadmium, copper, chromium, mercury, molybdenum, nickel, lead, and selenium in soils collected from 1 foot bgs; the metals beryllium, cadmium, mercury, and lead detected in soils collected from 5 feet bgs; and the metals arsenic, barium, beryllium, cadmium, copper, mercury, lead, selenium, antimony, and zinc and TPH-g in soils collected from 10 feet bgs on site were estimated using the 95 percent upper confidence level (95UCL) as the exposure point concentration (EPC) in Equations 2.3, 2.4 and 2.8 in the PEA Manual (DTSC 1999). The hazards to human health due to exposure to the 95UCL of lead detected in soils at 1 foot bgs, 5 feet bgs and 10 feet bgs were estimated using DTSC's LeadSpread 7.0 Model.

DTSC’s LeadSpread 7.0 Model was used to evaluate the potential health impacts due to exposure to lead in on-site soils via the ingestion and inhalation exposure routes. The LeadSpread Model estimates the blood lead levels, expressed as micrograms per deciliter (µg/dl), in the blood of adults and children potentially exposed to the residual concentrations of lead. The Model assumes these receptors will be exposed to the residual concentrations of lead in the air, through the ingestion of soil and particulates, in water and in home-grown produce, overly conservative, i.e., health protective assumptions.

DTSC’s LeadSpread 7.0 Model estimates the hazard due to exposure to lead in air, on-site soils/dust, water and homegrown produce for adults and children within the residential exposure scenario.

Typically lead concentrations in air, water and home-grown produce are not measured on site. Therefore the Model extrapolates these concentrations from the measured concentrations of lead in on-site soils.

The following information contained within the Model is Model-derived values that represent the percent contribution for each exposure scenario evaluated when the EPC is 647 mg/kg. The percent contributions of each exposure pathway will change as the EPCs change, because they are Model-derived.

Residential Exposure Scenario

Adults:

Soil Contact - 1%

Soil Ingestion - 33%

Background Inhalation - 3%

Site Inhalation - 0%

Drinking Water Ingestion from an on-site source impacted by concentrations of lead detected in on-site soils - 49%

Background Ingestion of Homegrown Produce - 14%

Ingestion of Homegrown Produce planted in on-site soils impacted by concentrations of lead - 0%

Children:

Soil Contact - 1%

Soil Ingestion - 74%

Background Inhalation - 1%

Site Inhalation - 0%

Drinking Water Ingestion from an on-site source impacted by concentrations of lead detected in on-site soils - 16%

Background Ingestion of Homegrown Produce - 9%

Ingestion of Homegrown Produce planted in on-site soils impacted by concentrations of lead - 0%

Occupational Exposure Scenario

Adults:

Soil Contact - 1%

Soil Ingestion - 27%

Background Inhalation - 2%

Site Inhalation - 0%

Drinking Water Ingestion from an on-site source impacted by concentrations of lead detected in on-site soils - 55%

Background Ingestion of Homegrown Produce - 15%

Ingestion of Homegrown Produce planted in on-site soils impacted by concentrations of lead - 0%

Exposure Parameters

The following information contained within the Model are default values for the exposure parameters for both residential and occupational exposure scenarios.

Adults:

Days per Week - 7 (residential); 5 (occupational)

Geometric Standard Deviation - 1.6

Blood Lead Level of Concern - 10 micrograms per deciliter of blood (µg/dl)

Skin Area - 5700 square centimeters (cm^2) (residential); 2900 cm^2 (occupational)

Soil Adherence - 70 micrograms per square centimeter (µg/ cm^2)

Dermal Uptake constant - 0.0001 µg/dl

Soil ingestion - 50 milligrams per day (mg/day)

Ingestion constant - 0.04 µg/dl

Bioavailability - 0.44

Breathing rate - 20 cubic meters per day (m^3/day)

Inhalation constant - 0.08 µg/dl

Water ingestion - 1.4 liters per day (L/day)

Food ingestion - 1.9 kilograms per day (kg/day)

Lead in Store purchased produce - 3.1 micrograms per kilogram (µg/kg)

Lead in Homegrown Produce - Model-derived value

Children:

Days per Week - 7

Geometric Standard Deviation - 1.6

Blood Lead Level of Concern - 10 µg/dl

Skin Area - 2900 cm^2

Soil Adherence - 200 µg/ cm^2

Dermal Uptake constant - 0.0001 µg/dl

Soil ingestion - 100 mg/day

Ingestion constant - 0.16 µg/dl

Bioavailability - 0.44

Breathing rate - 6.8 m^3/day

Inhalation constant - 0.19 µg/dl

Water ingestion - 0.4 L/day

Food ingestion - 1. kg/day

Lead in Store purchased produce - 3.1 µg/kg

Lead in Homegrown Produce - Model-derived value

As the USEPA and the State of California Office of Environmental Health Hazard Assessment (OEHHA) have not published toxicity values, i.e., Reference Doses (RfDs), for TPH-g, the guidance in the Massachusetts Department of Environmental Protection (MADEP) approach to characterizing risks posed by petroleum contaminated sites was used to obtain a surrogate RfD for TPH-g (MADEP, 2001). The potential adverse health impacts due to exposure to TPH-g in on-site soils was then assessed by following the appropriate equations in DTSC's PEA manual.

To provide an evaluation of chronic risk along the ingestion and dermal contact pathways the following equations (Equation 2.3) for risk and hazard were used consistent with PEA guidance (page 2-23, DTSC 1999).

$$Risk_{soil} = (SF_o \times C_s \times (1\ .57\times10^{-6})) + (SF_o \times C_s \times (1.87\times10^{-5}) \times ABS)$$

$$Hazard_{soil} = (C_s/RfD_o) \times (128\times10^{-5})) + (C_s/RfD_o) \times (1.20\times10^{-4}) \times ABS)$$

Where:

SF_o = oral cancer slope factor $(mg/kg\text{-}day)^{-1}$

C_s = concentration in soil (mg/kg)

RfD_o = oral reference dose (mg/kg-day)

ABS = absorption fraction (dimensionless)

These equations incorporate the following default exposure factors for estimating chronic risk or hazard via the ingestion and dermal contact pathways:

Default Exposure Factors: Risk Assessment

Exposure Duration - 24 years (adults), 6 years (children)

Exposure Frequency (ingestion) - 350 days/year

Exposure Frequency (dermal contact) - 100 days/year (adults) and 350 days/year (children)

Body Weight - 70 kg (adults), 15 kg (children)

Incidental Soil Ingestion Rate - 100 mg/day (adults) and 200 mg/day (children)

Exposed Skin Area - 5,800 cm^2 (adult) and 2,000 cm^2 (children)

Soil to Skin Adherence Factor - 1.00 mg/cm^2

Averaging Time - 70 years

Default Exposure Factors: Hazard Assessment

Exposure Duration - 6 years for children (birth to six years);

Exposure Frequency (ingestion and dermal contact) - 350 days/year,

Incidental Soil Ingestion Rate - 200 mg/day (children)

Body Weight - 15 kg (children)

Exposed Skin Area - 2,000 cm2 (children)

Soil to Skin Adherence Factor - 1.00 mg/cm^2

Averaging Time - 6 years

Chemical specific values for the absorption fractions (ABS) parameter were obtained from Table 2 (page A-6, DTSC 1999). The default exposure factors provide a conservative estimate (i.e., a very health-protective estimate) of chronic risk to human health due to exposure to the metals and TPH-g via the ingestion and dermal contact routes of exposure.

To provide an evaluation of chronic risk and hazard along the inhalation pathway the following equations (Equations 2.4 and 2.8) for risk and hazard were used consistent with PEA guidance (pages 2-24 and 2-30, DTSC 1999).

Equations 2.4

$$Risk_{air} = SF_i \times C_a \times 1.49$$

$$Hazard_{air} = C_a/RfD_i \times 0.639$$

Where:

SF_i = inhalation cancer slope factor $(mg/kg\text{-}day)^{-1}$
C_a = concentration in air (mg/m^3), derived from Equation 2.8
RfD_i = inhalation reference dose (mg/kg-day)

These equations incorporate the following default exposure factors for estimating chronic risk or hazard via the inhalation pathway:

<u>Default Exposure Factors: Risk Assessment</u>

Exposure Duration - 24 years (adults), 6 years (children)
Exposure Frequency - 350 days/year
Inhalation rate - 20 m^3/day (adults), 10m^3/day (children)
Body Weight - 70 kg (adults), 15 kg (children)
Averaging Time - 70 years

<u>Default Exposure Factors: Hazard Assessment</u>

Exposure Duration - 6 years for children (birth to six years);

Exposure Frequency (inhalation) - 350 days/year,

Inhalation Rate - 10 m^3/day (children)

Body Weight - 15 kg (children)

Averaging Time - 6 years

These default exposure factors provide a conservative estimate (i.e., a very health-protective estimate) of chronic risk to human health due to exposure to metals via the inhalation route of exposure.

The potential adverse health impacts due to exposure via inhalation to metals were evaluated using Equations 2.4 and 2.8. The potential adverse health impacts due to exposure via inhalation to TPH-g was not estimated, as a RfD_i for TPH-g in units of mg/kg-day was not available in the MADEP guidance (Table 4-12, page 34, MADEP, 2001).

Equation 2.8

$$C_a = C_s \times (5 \times 10^{-8}\ kg/m^3)$$

Where:

C_a = concentration in air (mg/m^3)

C_s = concentration in soil (mg/kg)

The results of the HRA indicate that the estimated hazard index of the noncarcinogenic metals, beryllium, cadmium, copper, chromium, mercury, molybdenum, nickel and selenium detected at 1 foot bgs, via the ingestion, dermal contact and inhalation exposure routes, is 0.654, less than the threshold of 1.0. The results of DTSC's LeadSpread 7.0 Model indicate the estimated hazard due to exposure to the noncarcinogenic compound, lead, detected at 1 foot bgs is less than the threshold of 10 µg/dl of blood for both children and adult receptors. The results of the HRA indicate that the estimated summation of risks of the carcinogenic metals, beryllium, cadmium and nickel detected at 1 foot bgs, via the ingestion, dermal contact and inhalation exposure routes, is 2.73×10^{-6}. This estimated risk value is within USEPA's "safe and protective of public health" risk range of 1×10^{-4} to 1×10^{-6} (Federal Register 56(20):3535, 1991). A quantitative estimation of risks due to exposure to residual concentrations of chemicals is expressed as 1×10^{-4} to 1×10^{-6}, or a probability of one in 10,000 to one in 1 million that an individual may be at an increased risk of developing an adverse health impact that is attributable to the exposure.

The results of the HRA indicate that the estimated hazard index of the noncarcinogenic metals beryllium, cadmium, and mercury detected at 5 feet bgs via the ingestion, dermal contact, and inhalation exposure routes, is 0.011, less than the threshold of 1.0. The results of DTSC's LeadSpread 7.0 Model indicate the estimated hazard due to exposure to the noncarcinogenic compound, lead, detected at 5 feet bgs is less than the threshold of 10 µg/dl of blood for both children and adult receptors. The results of the HRA indicate that the estimated summation of risks of the carcinogenic metals beryllium, cadmium, and nickel detected at 5 feet bgs, via the ingestion, dermal contact, and inhalation exposure routes is 2.17×10^{-7}. This estimated risk value is less than 1×10^{-6}, or a probability of one in 1 million that an individual may be at an increased risk of developing an adverse health impact that is attributable to the exposure.

The results of the HRA indicate that the estimated hazard index of the noncarcinogenic metals, arsenic, barium, beryllium, cadmium, copper, mercury, selenium, antimony and zinc and the noncarcinogenic compound, TPH-g, detected at 10 feet and deeper bgs, via the ingestion, dermal contact and inhalation exposure routes, is 0.84, less than the threshold of 1.0. The results of DTSC's LeadSpread 7.0 Model indicate the estimated hazard due to exposure to the noncarcinogenic compound, lead, detected at 10 feet or greater bgs is less than the threshold of 10 µg/dl of blood for both children and adult receptors. The results of the HRA indicate that the estimated summation of risks of the carcinogenic metals, arsenic, beryllium and cadmium detected at 10 feet and deeper bgs, via the ingestion, dermal contact and inhalation exposure routes, is 7.32×10^{-6}. This estimated risk value is within USEPA's "safe and protective of public health" risk range of 1×10^{-4} to 1×10^{-6} (Federal Register 56(20):3535, 1991), or a probability of one in 10,000 to one in one million that an individual may be at an increased risk of developing an adverse health impact that is attributable to the exposure.

Based on these estimated risks and hazards, the site in its existing condition does not pose an adverse impact to the current site users, (i.e., trespassers, oil well monitors) the construction workers associated with project site preparation and construction of the Sports Park project, including grading contractors, that will be extensively grading the site to realize the future intended use of the site, or to the future recreational users, including children. In sum, all estimated risks and hazards are either below thresholds or within an acceptable risk range. Risks were estimated for the current condition of the property.

Existing Oil Wells

There are 46 existing oil wells on the project site and two immediately adjacent to the project site. Currently 15 of these wells are active. An additional four wells will be reactivated as part of project implementation, resulting in 19 active wells on or adjacent to the project site (see Section 4.1 for more information). The remaining 29 wells will be legally abandoned or reabandoned if necessary. Please see Figure 4.1.2 for the location and status of existing wells and Figure 3.10 for the proposed operational status of the wells.

Oil wells—also known as producing wells—pump petroleum, often mixed with water and gas, from the ground. Producing wells separate the petroleum and gas from the water. The water is transferred to an injection well for reuse. The main components of a completed well are a pumping unit, several lengths of steel pipe known as casing, and cement to hold the casing in place. The depth of the casing into the ground generally ranges from one-quarter to one-half mile although it can extend farther. None of the wells on site are injection wells. The purpose of an injection well is to inject water into petroleum reservoirs to increase pressure, thereby increasing oil production.

The existing oil wells are typical aboveground pumps. The pumping procedure is accomplished by placing a down-hole pump at the bottom of the well connected to the surface by tubing. The down-hole pump is activated by a pump jack located at grade. The pump jack is powered by an engine that is attached to one end of a walking beam. The walking beam consists of a long steel beam mounted on a center pivot. The engine causes the ends of the walking beam to rise and fall. At the end of the walking beam opposite the engine is a sucker-rod string constructed of solid pipe that is placed down the well through the tubing to the down-hole pump. The rising and falling of the sucker-rod string activates the pump, which pumps the crude oil mixture to the surface. The crude oil mixture is then placed in a tank that separates the oil from the natural gas and water. Storage tanks serving the well in question are located off site. The oil wells are owned and operated by SHPI, which provided specific well characteristics for the on-site wells.

4.13.3 REGULATORY REQUIREMENTS

Standard Regulatory Requirement—Health and Safety Plan

The project applicant (City of Long Beach through an assigned contractor/developer) must prepare a Health and Safety Plan for all workers in accordance with federal, State, and local regulations for use during construction, subject to review and approval by the City of Long Beach Project Development Bureau Manager**,** Community Development Department. Federal regulations include the following:

- Occupational Safety and Health, Title 29, Code of Federal Regulations (CFR), Regulations for General Industry (Part 1910) and Construction (Part 1926).
- Environmental Protection Agency (EPA), Title 40 CFR, National Emissions Standard for Hazardous Air Pollutants (NESHAPS), (Part 61, Subpart A).
- United States Department of Transportation (USDOT) Regulations, Title 49 CFR.

California State and local regulations include the following:

- Title 8 California Code of Regulations (CCR), California Occupational Safety and Health Administration (Cal-OSHA) Regulations, Chapter 4, Division of Industrial Relations, General Industry Safety Orders and Construction Safety Orders.
- Title 22 CCR, Social Security, Division 2, Department of Social Services - Department of Health Services, and Division 4, Environmental Health.
- South Coast Air Quality Management District (SCAQMD), Rules and Regulations.

The Health and Safety Plan must include a summary of all potential risks to construction workers, monitoring programs, maximum exposure limits for all site chemicals, and emergency procedures. A Site Health and Safety Officer must be identified in the plan. The plan must specify methods of contact, phone number, office location, and responsibilities of the Site Health and Safety Officer. The Health and Safety Plan must specify that the Health and Safety Officer shall be contacted immediately by the contractor should any potentially toxic chemical be detected above the exposure limits, or if evidence of soil contamination is encountered during site preparation and construction. The City of Long Beach Fire Department is to be notified if evidence of soil contamination is encountered (such as unexpected soil stains or odors). The Health and Safety Plan is required to be amended as needed if different site conditions are encountered by the Site Health and Safety Officer.

An on-site monitor will be present to perform monitoring and/or soil and air sampling during grading, trenching, cut or fill operations, to ensure that surface soil conditions, conditions of exposed soils, and air conditions are safe and acceptable for on-site workers, as well as residents and workers of properties adjacent to the site. The monitor will also be responsible for monitoring compliance with mitigation related to dust control, included in Section 4.8, Air Quality. The monitor or other designated entity will be responsible for preparing and submitting weekly activity reports and testing results to the City of Long Beach, Project Development Bureau Manager. The City or the assigned contractor/developer is required by these existing regulations to stop, redirect, or otherwise change the grading work or other subsurface trenching, drilling and/or subsurface disturbance, so as to avoid areas of observed or monitored contamination, including contamination of the air by VOCs.

Standard Regulatory Requirement—Storm Water Pollution Prevention Plan (SWPPP) During Construction

The project applicant is required to prepare a Storm Water Pollution Prevention Plan (SWPPP) for the construction of the proposed project. The SWPPP shall be submitted to the LARWQCB for approval and shall include a surface water control plan and erosion control plan. The SWPPP must specify toxic materials (in significant quantities) known to exist on the site; areas of storing, cleaning, and maintaining construction materials and equipment; Best Management Practices (BMPs) for controlling stormwater and non-stormwater discharges and contact with equipment and materials; and sampling and analysis for key chemicals of concern. The SWPPP must include provisions to control potential impact from off-site discharges of stormwater and non-stormwater that would come into contact with equipment, materials, and chemicals of concern on site during construction. Prior to obtaining a grading permit, the project applicant is required by these regulations to provide documentation that the SWPPP was approved by the LARWQCB, and shall provide a copy of the permit, including all conditions, to the City of Long Beach Director of Public Works. Please refer to Section 4.4, Hydrology and Water Quality, for additional information.

Standard Regulatory Requirement—Handling and Storage of Hazardous Substances/SCAQMD Permits for New Air Contamination Source

Federal, State, and local codes for the handling and storage of any hazardous substances, including petroleum hydrocarbons, are to be followed at all times. This requirement shall apply both during construction and throughout the length of the project. These include proper storage and spill containment procedures. Prior to issuance of any building permits, the project applicant shall obtain permits from the City of Long Beach Fire Department and any other applicable regulatory agency for the storage or handling of any hazardous substances. Prior to the issuance of any building permit, the project applicant shall provide documentation to the satisfaction of the City of Long Beach, Project Development Bureau Manager, that all future tenants will likewise be required under their leases to fully comply with the applicable federal, State, and local codes (specific codes are identified below) for the handling and storage of hazardous substances. Compliance with applicable federal, State, and local codes will ensure the safety of workers, and the public is protected from inadvertent exposure to these hazardous substances.

Prior to issuance of a business license and/or occupancy permit, any tenant storing or handling hazardous materials must submit an Emergency Response Business Plan in accordance with 29 CFR Part 1910.1200, 40 CFR Part 302, California Health and Safety Code (HandS Code) Sections 25500 through 25545, and California Labor Code Sections 6382 and 6390 to the City of Long Beach Fire Department for approval and permit. This Business Plan must include an Inventory List, Emergency Action Plan in accordance with the Community Right-to-Know (Proposition 65) notification. Minimum thresholds of hazardous materials requiring preparation of a Business Plan are for businesses storing at least 55 gallons (aggregate total), 500 pounds, or 250 cubic feet of compressed gas. There are additional requirements, including the preparation of a Risk Management and Prevention Program (RMPP) in accordance with HandS Code Section 65850.1, if any business will store or handle Regulated Materials (formerly known as Extremely Hazardous Substances) in quantities above the “Reportable Quantity” list in Appendix A of Part 355 of Subchapter J of Chapter I of Title 40 CFR.

The permit and storage requirements of underground storage tanks (USTs) for petroleum hydrocarbons are covered by regulations in Sections 53 and 55 of the Federal Register, 40 CFR Parts 280 and 281, HandS code 25280 through 25299, and 23 CCR Section 2630 through 2635 and 2805 through 2809. Permits, installation oversight and monitoring will also be required by the City of Long

Beach Fire Department as part of these regulations. A permit to operate will also be required by the SCAQMD for all gasoline storage or retail sales.

Uses that may emit air contaminants or air toxics may also require registration or a permit to operate from the SCAQMD in accordance with Rule 219 for using process material or air contaminant.

Standard Regulatory Requirement: Soil Management Plan

The objective of the Soil Management Plan is to manage any petroleum-impacted soils, in the event that any are uncovered or exposed on site. If during the construction activities discolored and/or odiferous soil is discovered, construction activities will be halted at the specific location at which the suspect soils were discovered, appropriate soil samples will be collected and submitted for analysis and the soil handled appropriately pending the results of the analyses. Whenever feasible, and with LARWQCB approval, potentially impacted soils will be managed such that they have a minimal impact on the construction schedule. This may include, but is not limited to, segregating the potentially impacted soils and transporting these soils to a prepared staging area until the analytical results that would dictate the final disposition of these soils are received. Please note that if VOC-impacted soils are discovered on site during the construction activities the Air Quality Management District (AQMD) Rule 1166 Soil Management Plan should be filed with the South Coast AQMD. The AQMD Rule 1166 Soil Management Plan prohibits on site handling of VOC-impacted soils.

The procedures to be followed in the event discolored and/or odiferous soil is discovered will be provided in a site-specific, LARWQCB-approved Soil Management Plan, required as project mitigation and discussed below.

Standard Regulatory Requirement: Emergency Action Plan/Facilities Impact Plan

The project applicant is required to provide documentation, to the satisfaction of the Project Development Bureau Manager, that the City of Long Beach Fire Department has received the development plans for the proposed project, and that the City of Long Beach Fire Department has not objected thereto, in order to ensure that the project will not hinder full compliance with their requirements for any of the operating oil wells on the project site.

An Emergency Action Plan is required to be prepared by the project applicant addressing responsible actions required in the event of damage to the operating oil wells during site grading activities. This plan is required to be approved by the City of Long Beach Fire Department prior to initiating grading activities.

4.13.4 METHODOLOGY

As described above, soil samples were collected from on-site soils in 2002 and 2003 to characterize surficial site soils and those areas where a topographic change in elevation was anticipated based on the site plan for the proposed Sports Park and to provide data for use in a site-wide human health risk assessment. All field work was performed according to the USEPA approved Sampling and Analysis Plan (Mearns Consulting Corp. December 3, 2002).

The first phase of field work commenced on December 13, 2002 and was completed on January 24, 2003. A total of 169 soil borings were placed on site during this phase. The locations of the soil samples were determined based on the historic use of the site and visual observations for a biased, deterministic sampling strategy. Soil samples were collected from 1-foot bgs, 5 feet bgs and 10 feet bgs from within the same boring. Duplicate soil samples were collected every 30 samples at the 1-foot bgs depth. Additionally, approximately 10 percent of the soil samples were split with and submitted to a USEPA Contract Laboratory Program (CLP) laboratory. The analytical results were then compared to the laboratory analytical results generated for the project from the State-certified private laboratory for quality assurance confirmation.

The second phase of field work commenced on April 25, 2003 and was completed on April 29, 2003. A total of 20 soil borings were placed on site during this phase of field work. The depths of these borings varied from 20 feet bgs to 90 feet bgs and were determined by the depths at which native soil were encountered in the each boring and by the anticipated depths the grading contractor would need to cut the soils to achieve elevations necessary for the proposed Sports Park. Soil samples were collected from these borings at 10-foot increments and submitted for analysis of arsenic and speciated carbon chains.

All field work was conducted under the supervision of a State of California registered geologist.

As previously stated, a site-wide human HRA was prepared for the site following the approach in the California Environmental Protection Agency, DTSC Preliminary Endangerment Assessment (PEA) Guidance Manual, (DTSC 1999), the DTSC LeadSpread 7.0 Model, U.S. Environmental Protection Agency (USEPA) Risk Assessment Guidance for Superfund, Volume 1 - Human Health (RAGs) (USEPA 1989), and the Massachusetts Department of Environmental Protection (MADEP) guidance manual for characterizing risks posed by petroleum contaminated sites (June, 2001).

For detailed information regarding the soil sampling and HRA methodology, please see Section 4.13.2, above.

4.13.5 THRESHOLD OF SIGNIFICANCE CRITERIA

Based on the results of the soil sampling and analysis, health risk impacts to public health and safety were generally assessed using a qualitative approach, with certain impacts assessed using a quantitative approach. The identified impacts have been placed into three categories: less than significant, potentially significant, and significant.

Potential impacts related to public health have to do with the risk of human or environmental exposure to contaminants resulting from project activities. This section addresses the potential impacts of known or suspected environmental contamination within the project area. Impacts resulting from project implementation that would be considered significant include the following:

- Creation of a substantial public health hazard involving the use, production, or disposal of hazardous materials that pose a hazard to people or to animal or plant populations in the area.
- Contamination of a public water supply.

- Public or environmental exposure to chemicals of concern due to a hazardous material release or improper disposal practices.
- Creation of a public health hazard through the release of airborne emissions or substantial risk of upset.

Less than significant health risk impacts are those identified impacts that represent a chemical exposure that would not negatively impact public health due to the implementation of standard requirements and the proposed uses/features of the project. An example of a less than significant impact is storage of small quantities of hazardous materials by the future occupants of the proposed project in accordance with all applicable regulations.

Potentially significant health risk impacts are potential human exposures to chemicals resulting in a health risk greater than 1×10^{-6} (i.e., one in a million), the accepted regulatory criterion used to define risk in relation to human health impacts, that have a relatively low probability of occurrence if properly controlled via current government agency regulations.

Significant health risk impacts are defined herein as those identified impacts that would represent a significant risk to human health greater than the criterion of 1×10^{-4}, even with agency oversight and implementation of the standard requirements identified above.

4.13.6 IMPACTS AND MITIGATION MEASURES

An evaluation of identified potential short-term and long-term impacts to public health and safety was made for the proposed project based on the threshold criteria defined above. The results of the HRA summarized in Section 4.13.2 include estimated hazard indices of noncarcinogenic metals at 3.1 feet, 5 feet, and 10 feet or deeper bgs. The results of this assessment indicate two potentially significant impacts to public health, due to exposure to the residual detected concentrations of the metals beryllium, cadmium and nickel at 1 foot and the metals arsenic, beryllium and cadmium at 10 feet bgs. There are no impacts to public health and safety that are considered less than significant without mitigation due to implementation of the proposed project, even provided that the Standard Regulatory Requirements are followed.

Potentially Significant Impacts

Health Risk. The results of the HRA indicate that the estimated summation of risks for current site conditions of the carcinogenic metals, beryllium, cadmium and nickel detected at 1 foot bgs, via the ingestion, dermal contact and inhalation exposure routes, is 2.73×10^{-6}, and the estimated summation of risks for current site conditions of the carcinogenic metals, arsenic, beryllium and cadmium detected at 10 feet and deeper bgs, via the ingestion, dermal contact and inhalation exposure routes, is 7.32×10^{-6}. These estimated risk values are within USEPA's "safe and protective of public health" risk range of 1×10^{-4} to 1×10^{-6} (Federal Register 56(20):3535, 1991), however they exceed the criterion of 1×10^{-6}. A quantitative estimation of risks due to exposure to residual concentrations of chemicals is expressed as 1×10^{-4} to 1×10^{-6}, or a probability of one in 10,000 to one in 1 million that an individual may be at an increased risk of developing an adverse health impact that is attributable to the exposure. Implementation of standard regulatory requirements reduce these potential health impacts to below a level of significance.

The possibility of potential short-term health risks to construction workers and the adjacent community occurring during demolition of the existing on-site structures could not be ruled out, without implementation of mitigation measures. It is conceivable that some of the existing structures on the project site may contain asbestos containing building materials (ACMs), lead-based paint (LBP), and/or PCBs, which will require air monitoring and control to prevent potential short-term health risks to construction workers and the adjacent community during demolition of these structures.

Numerous environmental investigations have been conducted on site. Based upon available analytical results, residual concentrations of chemicals that are anticipated to be encountered during project construction are believed to represent a less than significant health risk; however, the possibility to encounter some elevated levels of chemicals cannot be entirely ruled out.

Former uses on portions of the site may have involved hazardous materials that possibly resulted in soil contamination, although this is considered unlikely at this time based on extensive soil sampling. It is conceivable that if contamination is subsequently found on portions of the site, it may require remediation and control to prevent potential short-term health risks to construction workers and the adjacent community. Soil vapor investigations indicate that there are existing concentrations of methane above lower explosive risk levels on a 1.8-acre portion of the project site. Methane concentrations at the site surface will be different in pre- and post-grading conditions. Mitigation is included in order to ensure that post-grading methane gas conditions are adequately assessed and methane hazards, if any, are reduced to below a level of significance (within acceptable risk levels). The intent of a methane assessment is to adequately identify gas conditions across the site at proposed hardscape and building footprint areas in order to make an assessment of risk of explosion due to methane accumulation and to require mitigation recommendations if risks are above acceptable levels. The methane assessment should begin 30 days after rough grading activities have been completed. Soil gas probes should extend approximately 5 feet below the cut/interface at each location, and in cut areas the depth of the probes should be 20 feet bgs. Implementation of the Mitigation Measures are required to reduce these identified potential short-term impacts to a less than significant level.

Risk of Oil Well Fire/California Fire Code. The City of Long Beach has adopted the 2001 California Fire Code (CFC) regulations with regard to oil well site layout. Requirements relevant to issues that are set forth in this section of the Code (per Section 7904.3.2.3) are summarized below.

> "Wells shall not be drilled within 100 feet (30,480 millimeters) of buildings not necessary to the operation of the well. Wells shall not be drilled within 300 feet (91,440 millimeters) of buildings used as a place of assembly, institution, or school. When wells are existing, buildings shall not be constructed within the distances set forth in Section 7904.3 for separation of wells and buildings."

Likewise, Section 7904.3.2.1 of the CFC requires that land within 25 feet of the wells or its tanks be kept free at all times of sources of ignition including, but not limited to, dry weeds, grass, rubbish, or other combustible materials. Section 7904.3.2.2 requires that wells not be located within 75 feet of public streets and highways.

The intent of the CFC separation requirements is to limit the exposure to adjacent properties; however, alternate methods to achieve an equivalent level of safety to that prescribed by the California Fire Code (CFC) may be accepted by the Fire Department.

There are potential hazards associated with oil wells include fire and explosion. Potential fire hazards include pool fires resulting from a release of crude oil products, spray fires resulting from the release of crude oil products under pressure, and jet flames resulting from a release of gaseous products. In order to ignite a pool of crude oil, a significant portion of the fuel must be elevated to the fire point. The crude oil recovered at the oil well in question typically consists of approximately 97.5 percent water and 2.5 percent crude oil. The amount of heat required to raise the mixture to the fire point would be significantly higher than for the case of pure crude oil. Such a large amount of heat would be needed for the water/crude oil mixture to reach the fire point that the possibility of a pool fire is remote.

Similarly, an oil spray fire is not expected to occur as a result of the low volatility, high viscosity of the crude-water mixture, as well as the natural extinguishing properties of the water contained in the mixture. Pressures of similar wells are estimated at 60–70 psi. This operating pressure is low and would not support a hazardous condition conducive to a spray fire.

In order for the natural gas jet flame scenario to arise, the following conditions would have to be satisfied:

- Shutdown of the vacuum pump
- Shearing of the gas line
- Subsequent ignition of the gas flow

While all three events occurring simultaneously was deemed unlikely, this type of fire should be quantified so that its relative hazard can be assessed.

There are two types of potential explosions: uncontrolled vapor cloud and confined vapor cloud. Historically, oil wells in the area have produced methane gas. However, due to the lack of a substantial enclosure at the well (limited to perimeter fencing, no roof structure), the confined vapor cloud conditions would not likely arise. While an explosive potential existed for the unconfined vapor cloud explosion phenomena, the likelihood is considered extremely remote. Reported vapor cloud explosions have occurred in semi-confined environments, where the gas was less likely to dissipate. A semi-confined environment is necessary for an unconfined vapor cloud explosion to occur.[1]

There are multiple cases in Long Beach where the distance between the oil well and new development is less than required by the CFC, based on the implementation of additional safety measures as directed by the Fire Department. The Fire Department may allow a nonconforming separation when alternative safety measures provide an equal or greater level of safety, as prescribed by the Code.

[1] SFPE Handbook, 2nd Edition, 3-325

CFC requirements for oil wells are based on oil well conditions in Texas. Operational Texas oil wells are typically more volatile than those in the Long Beach area due to their higher crude-water mixtures and higher operational pressures. Comparatively, the Long Beach oil wells under consideration are less volatile, with very low crude-water mixtures and lower operational pressures. Nevertheless, a potentially significant impact has been identified related to the potential for oil well or pipeline failure and leakage, leading to a fire. This potential impact can be reduced to acceptable levels through implementation of Mitigation Measure 4.13.10.

Oil Extraction and Pipelines

Crude oil is considered a designated waste, not a hazardous waste, under current California regulations. Regulatory agencies consider designated wastes to have the potential to degrade the waters of the State. For sites that are impacted by crude oil or other petroleum hydrocarbons, regulatory agencies in the Los Angeles area operate on a case-by-case basis in determining cleanup requirements. Therefore, once the “designated wastes” and/or “hazardous” constituents on a site are thoroughly identified, the appropriate regulatory agency is contacted to establish the cleanup guidelines for the site. This procedure has been implemented for the site and is further discussed later in this section. In this case, the Lead Agency for site cleanup has been identified as the RWQCB.

During oil well drilling operations, drilling mud is mixed in an unlined pit (sump) excavated adjacent to the well being drilled. The sump serves as a settling basin for the removal of larger particles. After removal of larger particles, the drilling mud is pumped from the sump back down into the boring. After completion of the well, the drilling mud in the sump is typically allowed to dry naturally before being covered with soils and brought back to the original grade. Records of the locations of these sumps are not always maintained, but they are typically found adjacent to each well.

PBS&J has documented numerous subsurface pipelines traversing the site, including crude oil pipelines, sanitary sewer, water, and gas utility pipelines. These lines are generally either shallowly buried or exposed at the surface. There is also an approximately 25-foot-wide pipeline corridor along and parallel to the southern boundary of the site that contains water, gas, gasoline, crude, and natural gas pipelines (refer to Figure 3.4, Proposed Project Site Plan). Although there are no known areas where leaks have occurred, it is not uncommon to encounter petroleum hydrocarbon releases from some of the oil product pipes as a result of deteriorating piping due to age and faulty connections. These releases are generally present in the near surface (upper several feet) soils**.**

The results of the HRA indicate the site does not pose an adverse impact to human health in its existing condition. The primary constituents detected in site soils in over 860 soil samples collected from depths of 1 foot to 120 feet bgs, heavy-end carbon chains and metals, are indicative of oil field uses. The HRA indicated that the site, in its existing condition, does not pose an adverse impact to human health due to exposure to the residual concentrations of constituents detected in site soils. Moreover, a LARWQCB approved Soil Management Plan will be in place prior to the onset of grading operations. This Soil Management Plan will provide detail for the handling and disposition of contaminated soils, if any, potentially uncovered during grading and construction activities.

There is a potential risk associated with a potential oil well spill or pipeline leakage. The product of the wells is crude oil. Crude oil is not a hazardous waste, as described above. Also, the risk to ground water as result of a surface spill or leakage is small as the highest groundwater levels comprising the local groundwater resource were estimated to range from 50 to 80 feet below sea level at the project site. Oil well spills are now, and will continue to be, cleaned in accordance with standard regulatory procedures by SHPI. Any leakage of an underground pipeline would likely be detected as a loss of product, and subsequently the affected soil would be cleaned and the pipeline repaired by the leaseholder. One of the easements in the utility corridor allows for the transportation of "oil, gas, gasoline, waste water, and other gaseous and liquid substances." Therefore, there is the potential for the transportation of a hazardous material through the pipeline corridor (for example, gasoline is flammable and contains benzene, a known carcinogen). All of the pipelines and easements in the pipeline corridor currently exist and are not proposed to be disturbed by the proposed project. The proposed project, will however, result in greater numbers of people on the project site in proximity to the corridor. Therefore, as a result of the potential transport of hazardous materials and the additional people on site, there is a potentially significant impact from pipeline leakage.

NOP Comments

Comments pertaining to health and safety issues were received from members of the public, the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC), and the Los Angeles County Department of Public Works on the NOP for the Draft EIR. These comments are summarized and addressed below.

Site Characterization.

Superfund Site vs. Brownfield.[1,2] The site was mischaracterized at the public scoping meeting as a U.S. EPA Superfund site by members of the public. A Superfund site is one that has been contaminated by hazardous waste and identified by the Environmental Protection Agency (EPA) as a candidate for cleanup because it poses a risk to human health and/or the environment. At the core of the Superfund program is a system of identification and prioritization that allows the most dangerous sites and releases to be addressed within the confines of limited federal funding and human resources. All sites where releases or potential releases have been reported are listed in the Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS). The proposed project site is not an identified Superfund site and is not listed in CERCLIS.

"Toxic dumpsite, contaminated site." The project site was misidentified at the public scoping meeting as a "toxic dumpsite" and a "contaminated site" by members of the public. It appears that it has been presumed to be contaminated solely because it has been identified as a Brownfield site. A toxic waste dump is a location where toxic waste can be or has been disposed of, often illegally.

1 Superfund Amendments and Reauthorization Act (SARA), 1986.
2 The Brownfields site definition is found in Public Law 107-118 (H.R. 2869)—"Small Business Liability Relief and Brownfields Revitalization Act" signed into law January 11, 2002.

The historic use of the project site was as an oilfield. The numerous investigations that have been conducted on site resulted in the collection and analysis of over 867 soil samples and over 112 soil vapor samples. The chemicals detected in site soils and soil vapor are indicative of oilfield uses. Total petroleum hydrocarbon constituents associated with oil field activities are typically heavy-end hydrocarbons or crude oil. The health risk associated with these constituents of crude oil is much smaller than the risk at sites impacted by refined oil products. Refined products typically have additives such as benzene, toluene, ethylbenzene, total xylenes, and methyl tertiary-butyl ether. The potential impacts to human health are much greater with refined products due to exposure to the additives found in processed or refined oil products than to exposure to crude oil. The proposed project site is not a toxic dumpsite and has never been a toxic dumpsite. Additionally, the results of the human health risk assessment performed using DTSC guidelines indicate the residual concentrations of the chemicals detected in site soils do not pose a risk to human health.

Identify all current or historic uses at the project site. It was requested that the Draft EIR should identify all current and historic uses of the project site that may have resulted in a release of hazardous wastes substances.

The current and historic uses of the property were identified above and in Section 4.3, Geology and Soils, Section 4.6, Cultural and Paleontological Resources, and are also described in this section. The numerous investigations that have been conducted on site resulted in the collection and analysis of over 867 soil samples and over 112 soil vapor samples, which thoroughly characterize the property’s current condition.

Regulatory Standards.

Identify the regulatory agency to provide oversight. It was requested that the Draft EIR identify the mechanism to initiate required investigation and/or remediation for any part of the site and that a human health risk assessment be prepared.

As previously mentioned, the LARWQCB is the Responsible Agency under CEQA charged with approving the HRA for the site. LARWQCB is the regulatory agency that has been acting in this capacity since at least 1993. There is an existing MOU between the LARWQCB and OEHHA that facilitates review of HRAs by OEHHA when the LARWQCB is the Lead or Responsible Agency for an HRA. The City of Long Beach is in the process of contracting directly with OEHHA to facilitate review of the HRA for the proposed project site. OEHHA will review the document and submit comments to both the City of Long Beach and LARWQCB. As an enforcement agency, LARWQCB will issue a letter of closure for the project site if it concurs with the comments and findings provided by OEHHA.

In addition to the HRA prepared for the proposed project, a project-specific Health and Safety Plan will be generated prior to construction activities to provide direction for the contractors relative to the applicable federal, State, and local regulations pertaining to potential environmental hazards as well as health and safety codes, as detailed above.

Health and Safety Code 25221. The NOP comments indicated that appropriate precautions should be taken prior to construction if the proposed project is on a border zone property. The term border zone refers to sites that border a landfill as designed by the County of Los Angeles, Department of Health Services (DHS). DHS found that the project site is not a landfill, that Title 27 does not apply, and that the site is not a border zone (County of Los Angeles, DHS, October 3, 2003). Appropriate precautions will be taken pursuant to Health and Safety Code Section 25221.

Los Angeles County Uniform Building Code, Section 110.3. The NOP comments indicated that a building or structure located on or within 1,000 feet of a landfill containing decomposable material must be protected against landfill gas intrusion.

The LA County DHS determined that the site is not located on or within 1,000 feet of a landfill. Additionally, a methane gas assessment will be performed within 30 days after the completion of rough grading to adequately identify gas conditions across the site at proposed hardscape and building footprint areas in order to make methane hazard mitigation recommendations.

Protect off-site receptors during construction and demolition activities. The NOP comments indicated that the health of students and faculty members at the school in the vicinity of the project site should be protected during construction and demolition activities.

Appropriate precautions will be taken pursuant to the applicable federal, State, and local regulations, which may include dust control and air monitoring to protect the health of the construction workers as well as off-site receptors (including any schools in the area) during the demolition and construction activities.

Workplan. DTSC requested that any hazardous substance remediation should be conducted under a work plan approved by a regulatory agency that has jurisdiction to oversee hazardous substance cleanup.

The LARWQCB is the Responsible Agency under CEQA that has jurisdiction to oversee hazardous substance cleanup, if needed. Should the contractor discover previously unknown contaminants in the soil during site preparation, required remediation will be conducted under the regulatory oversight of the LARWQCB.

Generation of Hazardous Wastes. DTSC noted that hazardous wastes generated during the proposed project must be managed in accordance with the California Hazardous Waste Control Law (California Health and Safety Code, Division 20, chapter 6.5) and the Hazardous Waste Control Regulations (California Code of Regulations, Title 22, Division 4.5).

If hazardous wastes are generated during the proposed project, they will be managed in accordance with applicable federal, State, and local regulations. Applicable permits, if any, will be obtained from the appropriate regulatory agency. It is not anticipated that hazardous wastes will be generated as a result of the proposed project.

Los Angeles County Building Code, Section 110.4. The NOP comments indicated that buildings or structures adjacent to or within 200 feet of active, abandoned, or idle oil or gas wells be provided with methane gas protection systems.

A methane gas assessment will be performed after the completion of rough grading to adequately identify methane gas conditions across the site at proposed hardscape and building footprint areas in order to make methane hazard mitigation recommendations (see mitigation in this section).

Project Site Investigation.

Methane and Soil Vapor Testing. Citizen and agency comments requested that methane testing or a methane hazard assessment be completed on site. It was suggested that soil vapor and vadose gases be analyzed for hazardous gases and origin or generation mechanisms identified or mitigated with a soil vapor recovery system.

Soil vapor surveys were conducted for the project site in 1988, 1993, and 1994. These surveys included testing for methane, the results of which and conclusions reached are summarized above. Moreover, when the project site is at rough grade, additional methane testing will be performed. The intent of a methane assessment is to adequately identify gas conditions across the site at proposed hardscape and building footprint areas in order to determine whether there is a risk of methane accumulation and make methane hazard mitigation recommendations, if necessary. Therefore, the methane assessment should begin 30 days after rough grading activities have been completed. Based on the results of this additional methane testing, mitigation, if warranted, will more than likely consist of a passive venting system and will be implemented with construction of the proposed project.

Location of samples, location of aboveground storage tanks. The comments requested that the location of the sampling performed and the aboveground storage tanks (ASTs) should be identified.

The reports generated by the consultants who performed the soil and soil vapor investigations in 1988, 1993, and 1994 contain figures that depict the sampling locations. The human health risk assessment includes figures depicting the surveyed locations of the borings placed during the site investigations in 2002 and 2003, the locations of the ASTs, and other structures. Soil samples were collected using a deterministic, biased sampling strategy based on visual observations, previous investigations, and historic information, as described above. The collection and analysis, including the method reporting or practical quantitation limits of the samples followed the standard of practice of the time.

The ASTs remaining on site are the property of Signal Hill Petroleum Company and contain a mixture of crude oil and water. Signal Hill Petroleum will remove the contents of these ASTs for processing before dismantling the ASTs for proper disposal.

Groundwater Investigation. The NOP comments indicated that a groundwater investigation may also be necessary based on the nature of the on-site contaminants and the depth to groundwater.

A groundwater investigation was conducted and it was determined that groundwater was not impacted by the historic and current activities on site, as detailed above.

Project Construction. The NOP comments requested that appropriate sampling of soil removed from the project site and imported to the project site be conducted.

Appropriate sampling of soil for disposal and import fill will be conducted, as detailed in the Soil Management Plan.

Investigation of Building Materials. The NOP comments requested that building materials be investigated prior to the demolition of the buildings. If asbestos or lead-based paint is identified, appropriate remediation should occur prior to the demolition of the structures. Remediation should be in compliance with State environmental regulations and policies.

Building material inspections for asbestos-containing building materials and lead-based paint will occur prior to demolition of the structures as specified in Mitigation Measure 4.13.1. Abatement by a licensed contractor will occur, if warranted, prior to demolition of the structures, as detailed in the mitigation measure.

Discovery of previously unidentified soil contamination. It was requested that the Draft EIR identify how any required investigation and/or remediation would be conducted should previously undiscovered soil and/or groundwater contamination be found during construction/demolition activities.

The LARWQCB is the Responsible Agency under CEQA charged with approving the HRA for the proposed project site. Should the contractor discover previously unknown contaminants in the soil during site preparation, required remediation will be conducted under the regulatory oversight of the LARWQCB. Applicable and appropriate federal, State, and local regulations will be followed during any investigation or remedial activities.

Active Oil Wells. The NOP comments indicated that potential health risks from active oil wells remaining on site should be evaluated.

The active oil wells are the property of SHPI. SHPI monitors the wells in compliance with applicable federal, State, and local rules and regulations governing oil well operations and health and safety concerns.

Mitigation Measures

The following mitigation measures have been identified to reduce or eliminate the identified potential short-term impacts resulting from possible existing contamination during demolition of existing structures and project grading:

4.13.1 Pre-Demolition surveys: Prior to issuance of any demolition, grading, or street work permits for the project, pre-demolition surveys for ACMs and LBPs (including sampling and analysis of all suspected building materials) and inspections for PCB-containing electrical fixtures will be performed. All inspections, surveys, and analyses shall be performed by appropriately licensed and qualified individuals in accordance with applicable regulations (e.g., ASTM E 1527-00, and 40 CFR, Subchapter R, Toxic Substances Control Act [TSCA], Part 716). All identified ACMs, LBPs, and PCB-containing electrical fixtures shall be removed, handled, and properly disposed of by appropriately licensed contractors according to all applicable regulations during demolition of structures (40 CFR, Subchapter R, TSCA, Parts 745, 761, 763). Air monitoring shall be completed by appropriately licensed and qualified individuals in accordance with applicable regulations both to ensure adherence to applicable regulations and to provide safety to workers and the adjacent community (e.g., SCAQMD). The City of Long Beach Public Works Department shall provide documentation (including all required waste manifests, sampling and air monitoring analytical results, etc.) to the Department of Human and Health Services that abatement of any ACMs, LBPs, or PCB containing electrical fixtures identified in these structures has been completed in full compliance with all applicable regulations and approved by the appropriate regulatory agency(ies) (40 CFR, Subchapter R, TSCA, Parts 716, 745, 761, 763, 795).

4.13.2 Health and Safety Plan: Prior to issuance of any demolition, grading, or street work permits for the project, a Health and Safety Plan shall be prepared by the City of Long Beach or its contractor in coordination with the LARWQCB for all workers in accordance with federal, State, and local regulations, for use during construction. The Health and Safety Plan shall include:

- A summary of all potential risks to construction workers, monitoring programs, maximum exposure limits for all site chemicals, and emergency procedures
- The identification of a site health and safety officer
- Methods of contact, phone number, office location, and responsibilities of the site health and safety officer
- Specification that the site health and safety officer be contacted immediately by the contractor should any potentially toxic chemical be detected above the exposure limits, or if evidence of soil contamination is encountered during site preparation and construction
- Specification that the City of Long Beach Fire Department is to be notified if evidence of soil contamination is encountered

- Specification that an on-site monitor will be present to perform monitoring and/or soil and air sampling during grading, trenching, or cut or fill operations

The Health and Safety Plan is to be approved by the LARWQCB and provided to all contractors on the project site. The Health and Safety Plan is required to be amended as needed if different site conditions are encountered by the site health and safety officer.

4.13.3 SWPPP: Prior to issuance of a grading permit, the construction contractor shall submit a SWPPP to the City that shall include the BMP types listed in the *California Stormwater BMP Handbook—Construction Activity*. The SWPPP shall be prepared by a civil or environmental engineer and will be reviewed and approved by the Director of Public Works in accordance with Mitigation Measure 4.4.1

4.13.4 Soil Management Plan: Prior to issuance of any demolition, grading, or street work permits for the project, the procedures to be followed in the event discolored and/or odiferous soil is discovered will be provided in a site-specific Soil Management Plan. The Soil Management Plan is to be approved by the LARWQCB and provided to all contractors on the project site.

4.13.5 Emergency Action Plan: Prior to issuance of any demolition, grading, or street work permits for the project, an Emergency Action Plan will be prepared by the City addressing responsible actions required in the event of damage to the operating oil wells during site grading activities. This plan is required to be approved by the City of Long Beach Fire Chief prior to initiating grading activities. The Emergency Action Plan is to be provided to all contractors on the project site.

4.13.6 Methane testing is required to reduce or eliminate the identified potential impacts resulting from the possible presence of methane on the site in the post-grading condition: Prior to issuance of any building permits for the project, but not before 30 days after rough grading, methane testing will be performed when the project site is at final rough grade. Soil gas probes shall extend approximately five feet below the cut/interface at each fill testing location, and in areas of cut, the depth of the probes shall be 20 feet bgs. Prior to issuance of any building permit or authorization to construct hardscape, the Building Official shall review and approve a report by a registered geologist, reporting methane testing results and recommendations. Based on the results of this additional methane testing, mitigation, if warranted to keep the risk of explosion to within acceptable risk parameters (more than likely consisting of a passive venting system), will be required to be implemented prior to construction of each structure and areas of hardscape.

4.13.7 Prior to issuance of grading permits, the project proponent shall demonstrate to the satisfaction of the Building Official and the City of Long Beach Fire Chief that adequate clearance and access to idle and active wells on the project site will be maintained for mobile rigs and well work over equipment, or alternatively that the well operations have been shut down temporarily and in accordance with applicable DOGGR and City regulations in order to allow for safe grading operations.

4.13.8 The City of Long Beach is required to perform soil and air sampling during grading, trenching, and cut or fill operations, and to provide an on-site, third-party monitor of these efforts. The third-party monitor shall be allowed to inspect the monitoring and testing activities on site as well as the records and test results. The purpose of the monitoring and testing activities is to ensure that surface soil conditions, conditions of exposed soils, and air conditions are safe and acceptable for on-site workers as well as for residents and workers of properties adjacent to the site. The third-party monitor is also responsible for monitoring compliance with any mitigation related to dust control, as included in Section 4.8, Air Quality. The third-party monitor will be responsible for preparing and submitting weekly activity reports and testing results to the City of Long Beach Building Official.

4.13.9 Prior to issuance of building permits, the project applicant shall provide plans and specifications to the Building Official and the City of Long Beach Fire Chief demonstrating the following: all active wells shall be provided with safety shutdown devices. All active wells and associated equipment within the project site shall be enclosed by a minimum six-foot-high fence, to be configured to allow necessary servicing. Suitable gates, capable of allowing passage of large workover equipment, shall be provided in the enclosures. Each enclosure shall be graded to ensure containment of potential spills within the enclosure. To restrict access, the use of climbable landscaping around the perimeters of the enclosures shall be avoided. The project proponent shall demonstrate to the satisfaction of the Fire Chief (or his/her representative) that suitable safety and fire protection measures (i.e., setbacks) have been incorporated into the project design (see Mitigation Measure 4.13.11).

4.13.10 Subject to verification by the Building Official, the City shall require that all new or relocated pipelines on or adjacent to the project site be equipped with check valves in a manner that reduces the risk of pipeline leaks on site, prior to the issuance of building permits for the proposed project.

4.13.11 Fire Safety Study: Prior to issuance of grading permits, the City or its contractor will prepare a fire safety study of all of the operating oil wells, proposed building setbacks, and site design to the satisfaction of the Fire Chief and Building Official. The purpose of the study is to determine the base level of protection that the CFC provides and recommend alternative safety measures. The alternative safety measures will provide the nonconforming distance requirements with an equal or greater level of safety as prescribed by the Code. The safety measures may include:

- Install an in-ground concrete cellar box around oil wells in conjunction with the installation and maintenance of one-inch-thick steel plate covers on top of the cellar box with a maximum nine-square-foot opening to permit penetration of the wellhead. The installation of a float-controlled automatic shut-off switch for the well pump is also recommended.
- Use exterior, well-facing walls of rated construction and limited or protected openings to protect the buildings and occupants.
- Openings and/or exterior walls may be protected by an open-head (deluge) water curtain installed in accordance with the requirements of the City of Long Beach (City). Please note that the deluge water curtain system should be installed at the exterior of the building directly beneath the eaves. The sprinkler system should comply with applicable standards and other requirements of the City, and is intended to cool the wall of the

structure to provide protection from an adjacent fire exposure. Sprinklers for this application should be of an open-head (deluge) pendant or sidewall type. The sprinklers should be wax coated to minimize corrosion and should be installed in accordance with the manufacturer's listing, but not to exceed a 6-foot spacing. In addition, the sprinklers should be connected to an approved alarm bell to provide occupant notification. Heat detectors (135° or similar) are required to be installed at the eaves in accordance with manufacturer's requirements to activate the deluge water curtain system. This will require separate submittal(s) to the Long Beach Fire Department by a licensed installing contractor.

- Maintain daily operator surveillance of oil well sites to assist the operator to detect potential problems with the active wells.
    - Code complying clearances of weeds and debris must be maintained for fire prevention, as well as for well maintenance.
    - Shield oil wells with a non-combustible barrier at least six feet in height between the respective oil wells and the structures, if necessary. The barrier may consist of any noncombustible materials including but not limited to concrete masonry unit (CMU) walls, metal panels, or other approved assemblies.
- Maintenance of an area 25 feet from wells that is free of source of ignition, including but not limited to dry weeds, grass, rubbish, or other combustible material.
- All nonactive wells will be abandoned, or reabandoned if necessary, in accordance with DOGGR standards.

The study will quantify the equivalent level of safety offered by the current applicable code (2001 CFC) in order to establish appropriate benchmarks. These benchmarks will be used when determining appropriate mitigation measures for the non-conforming building separation distances. Specifically, it is the intent to provide an equivalent or greater level of safety to that intended by the code for actual hazards associated with the location of the structures.

4.13.7 CUMULATIVE IMPACTS

With mitigation, the project site does not currently pose a health risk as a result of soil contamination or any other health and safety hazards. Other properties within the City with known hazardous waste contamination are required to remediate their contamination in accordance with federal and State regulations. Since the proposed project does not include uses that would generate or use substantial amounts of hazardous waste, and since construction activities or site operation will not cause additional short-term or long-term health risks (after implementation of the measures identified in this section), the project does not contribute to potential cumulative public health and safety impacts. Cumulative health and safety hazards impacts are less than significant.

4.13.8 LEVEL OF SIGNIFICANCE AFTER MITIGATION

The site-wide HRA determined that, with implementation of standard regulatory procedures and mitigation measures, current trespassers and on-site tenants, construction workers, and the end users of the proposed sports park project will not be exposed to a significant health risk. In addition, implementation of well fire safety measures to the satisfaction of the Fire Chief and in accordance with the CFC will reduce fire safety risks to below a level of significance. With implementation of the mitigation measures presented above, the identified potential public health and safety impacts will be reduced to below the level of significance.

This page intentionally left blank