APPENDIX E

GEOLOGY AND SOILS BACKGROUND INFORMATION

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ENVIRONMENTAL SETTING

INTRODUCTION

The project area lies within the western Los Angeles Basin, about 11 miles west-southwest of downtown Los Angeles and less than 1 mile from the Pacific Ocean. This area includes Marina del Rey (MDR), located between the Ballona Lagoon and Dockweiler State Beach on the Pacific Ocean, and Playa del Rey (PDR), located on a dissected coastal terrace approximately one mile inland from the shore at Playa del Rey. MDR is northwest of Ballona Creek and the Marina del Rey Harbor entrance and PDR is located to the south of Ballona Creek.

The geologic conditions overlying the Playa del Rey gas storage facility (PDRGSF) can affect conditions at the 36 proposed sale lot sites. The geologic and seismic setting of the proposed project could expose people and property to geologic hazards associated with the underlying geology and seismicity of this portion of Los Angeles. Particular to the proposed project is the affect that underlying geologic conditions have on controlling the upward migration of residual petroleum gases that are associated with the underlying oil reservoir and the PDRGSF. Mitigation would be required to detect and control any adverse gas migration or their affects on urban uses and activities.

GEOLOGIC SETTING

Surface geologic features include the Playa del Rey Bluff, a prominent topographic feature in the project area. It is about five miles south of the Santa Monica Mountains and about five miles north of Palo Verde Peninsula hills to the south. The Bluff is a westerly extension of the Baldwin Hills and Fox Hills, three miles to the east. The Bluff represents the southern flank of the ancestral of the Los Angeles River (now Ballona Creek) valley, which formerly flowed through this area (its current course is through Long Beach and San Pedro).

Geologically, the Los Angeles basin is a deep, sediment filled structural depression with recent sedimentary deposits overlying older sedimentary rocks. Beneath the sedimentary rocks are much older crystalline basement rocks, consisting of schists (shales that are altered by heat and pressure). Tectonic forces (those related to faults and earthquakes) beneath the earth uplifted, tilted, and folded the sedimentary rocks. These tectonic forces along both surface faults (e.g., the Newport-Inglewood and related faults) and buried (so-called “blind”) thrust faults (e.g., Torrance-Wilmington, Elysian Park-Puente Hills, Las Cienegas-Coyote Hills, Los Angeles Basin, and Compton-Los Alamitos) formed the chain of hills extending northwest-southeast from north of Los Angeles to the Long Beach.

Many subsurface geologic features within the Los Angeles Basin, such as folds and faults in the rocks, produced geological structures that trapped and accumulated oil and gas, resulting in numerous oil and gas fields. One of these fields is Playa del Rey Field, which underlies most of the proposed project area. Initially, it was the site for oil development, and then later gas storage in this western location of the Los Angeles metropolitan region. In the PDR project area, the Compton blind thrust fault is about 20,000 to 30,000 feet below the site, well below the gas storage zone. Faults can form potential direct or indirect pathways for subsurface oil or gas to move upward into shallower geological formations.

GEOLOGICAL UNITS

At the surface, younger alluvium (Qal) covers areas generally north of the Ballona escarpment (a cliff formed by erosion). South of the escarpment (bluffs), older sand dunes represent an old marine terrace (Qm/Qpu). Active sand dunes are present along the immediate coast. Other geologic units (formations) are not exposed at the surface.

Only the deeper bedrock formations contain the commercial oil or gas producing zones and the Southern California Gas (SCG) Gas Storage Zone. Thickness of these units varies widely across the PDR area. Average thickness reported below is representative of the overall area. The PDR project area includes the following geologic units (from youngest to oldest):

- Surface soils
- Younger alluvium (Qal; poorly to unconsolidated alluvial deposits), including the Ballona Aquifer ("50-Foot Gravel")
- Active sand dunes (Qsr/Qs) along the coast
- Upper Pleistocene Older Sand Dunes (Qso or Qm/Qpu) and Lakewood Formation (Qlw)
- Lower Pleistocene San Pedro Formation (consolidated alluvium to indurated rock units)
- Tertiary (Pliocene and Miocene) bedrock formations (shales with some oil sands), including Pico and Repetto (Pliocene) Formations, along with Puente and Topanga Formations (Miocene)
- Mesozoic Schist (possibly Jurassic) metamorphosed shale; either of the Santa Monica or Catalina formation

Soils

The only semi-natural soils remaining in the area lie along the exposed undeveloped bluffs and adjacent lowlands between the Bluffs and Ballona Creek. Earthmoving associated with early development of the oil fields and subsequent roads and residential, commercial, and industrial developments have altered the natural soil profiles in the project area. In addition, major earth moving activities (dredging, channelizing, and filling) for Ballona Creek and MDR altered large areas not now designated as wetlands.

Due to the past disruption of natural soil profiles, most, if not all lots are not overlain by intact, native soil profiles. Natural soil profiles where observed along the Bluffs are less than two feet thick, consisting of a clearly identifiable dark black A-horizon (probably clayey silt, clayey sand, and silty clay in composition) over a thin B-horizon overlying alluvial materials.

Recent Alluvium

The northern part of the PDR project is located in the MDR area. Recent alluvial and near-shore deposits associated with Ballona Creek underlie this area. Recent alluvium includes the Ballona Aquifer, also known as the "50-Foot Gravel," found north of the Ballona escarpment. Recent alluvium overlies the San Pedro Formation. Thickness of alluvium varies from several to about 60 feet. These deposits occur as poorly consolidated and have a moderate to high permeability.

Active Dune Sand

Active sand dunes parallel the coast from the Ballona Escarpment southward to Redondo Beach forming a narrow strip along the coast, 0.2 to 0.5 mile wide. These eolian deposits (deposited by wind), consisting of fine white poorly consolidated, permeable sand, are lenticular in shape, and overlie the older sand dune deposits. Thickness of the dune deposits reaches 70 feet.

Older Dune Sand

Most of the PDR project area is situated largely on the bluffs south of the Ballona escarpment. This elevated area is an ancient marine terrace (Qm/Qpu) covered by older dune sand sedimentary deposits. These sand dunes consist of sand, with silt, clay and gravel lenses. They overlie the Lakewood Formation and range in thickness from several feet to as much as 70 feet. In general, these deposits are poorly consolidated and have a moderate to high permeability.

Lakewood Formation

The Lakewood Formation underlies the Bluffs area. Due to erosion from Ballona Creek (ancestral Los Angeles River) the Lakewood Formation is not present north of the Ballona escarpment. The Lakewood Formation overlies the San Pedro Formation. In the Bluffs area, the Lakewood Formation is approximately 100 feet thick. Lakewood Formation deposits consist of sand, silt, and gravel and may include the Gage Aquifer in the project vicinity. Fine-grained sediments comprise from 40 to 80 percent of the total Lakewood Formation deposits (DWR, 1961).

San Pedro Formation

The San Pedro Formation overlies the Pico Formation in the project vicinity. This geologic unit is found at a depth of approximately 50 feet (MDR area) to 150 feet (Bluffs area) below the surface. It reaches a thickness ranging from about 100 to 150 feet (depth about 150 to 300 feet to top of the Pico Formation).

The San Pedro Formation consists of well-graded sand with gravel interbeds, along with some beds containing fine gravel, sand, and silt. These sands and gravel contain varying amounts of silt and clay. In the project area, the Silverado Aquifer forms the base of the San Pedro Formation.

Bedrock – Pico Formation

The Pico Formation occurs at a depth of about 400 to 500 feet below the surface and is not exposed at the surface within the project vicinity. In the project area, it consists of over 2,000 feet of marine sandstone, siltstone and shale, interbedded with marine gravels (DWR, 1961). Pico Formation shale units form impervious caps or barriers to upward movement of water, oil, and gas, trapping the hydrocarbon deposits within underlying more porous and permeable sandstone beds. High-pressure gas zones encountered during drilling through this sequence of geologic beds are very dense and consolidated.

Bedrock – Repetto Formation

The Repetto Formation is approximately 3,000 feet below the surface and not exposed at the surface within the project vicinity. In the project area, it consists of over 2,000 feet of siltstone and shale, interbedded with layers of sandstone and conglomerate. Sandstone beds within the upper and middle Repetto Formation form the oil productive upper zone found in the MDR (Venice) area. The amount of shale increases with depth. Shale intervals form caps or seals to these productive zones, as well as secondary seals for the deeper gas storage zone.

Bedrock – Puente Formation

The top of the Puente Formation is generally over 5,000 ft deep. It is about 800 feet thick and forms the primary cap rock to the oil producing and gas storage zone. The base of this 7 million year old formation, known as the Nodular Shale, overlies the older oil and gas-producing zone and gas storage zone.

The mostly deep marine formation consists of black to dark gray, and dark brown shale. This clay-rich formation is devoid of any major sand-bearing units (Davis, 2000). Some thin sand lenses and pockets are present in the shale. The thick shale interval is impermeable and forms the primary cap or seal for the PDR oil field and the gas storage zone. Caprock material is composed of hard to medium hard, massive to platy shale.

Bedrock – Topanga Formation

The Schist Conglomerate is part of the Topanga Formation (Davis, 2000). This is the primary reservoir for the PDR oil field and the gas storage zone at a depth of about 6,000 feet. The Topanga Formation is sandstone and conglomerate of terrestrial origin, overlying the Catalina Schist basement complex. Since the Schist Conglomerate was deposited in low areas atop the eroded basement rock, is does not underlie the entire project area.

Basement Rock – Santa Monica or Catalina Schist

Santa Monica Schist or Catalina Schist are names applied to basement rock underlying the project area and most of the Los Angeles Basin. In the project area, basement occurs at depths greater than 6,000 feet. The overlying Topanga Formation deposited on the schist is an irregular erosional surface.

STRUCTURE AND SEISMICITY

Compression between the North American and Pacific plates creates tectonic forces that shape many of the surface features we see today. When forces along the plate boundary increase to the point of failure, earthquakes occur and often times, the displacement experienced deep in the earth where the failure occurs translates at the surface as surface fault rupture. Several active and potentially active faults are located within the project vicinity. Regional tectonic stresses also uplifted, tilted, and folded sedimentary rock units in the project area, creating hills and related geologic structures. A chain of hills formed by these tectonic forces extends from north of Los Angeles, southeast to the Santa Ana River. Geologic structures underlying many hills are often elongated domes or anticlines, similar to those underlying Fox Hills and Baldwin Hills.

Folding

In the PDR project area, the thick sedimentary sequence of sedimentary rock layers is gently folded into a broad anticline (elongated dome or convex upward folded geologic structure). Some minor faults may be associated with this structure (Davis, 2000). Along with stratigraphic (depositional) confinement, the anticline forms a structural trap for oil and gas accumulation within the PDR oil field.

Faulting

Faults are fractures or lines of weakness in the earth's crust. Faults that allow landmasses to move horizontally past each other are strike-slip faults (e.g. San Andreas, San Jacinto, Elsinore, and Newport-Inglewood). In contrast, vertical movement occurs along normal, reverse and thrust faults. Buried low angle thrust faults that do not rupture the surface are known as blind thrusts, for example the Elysian Park Thrust Fault (also known as the Elysian Park Fold and Thrust Fault, the Elysian Park blind thrust fault) and Torrance-Wilmington Fold and Thrust Belt. Faults exhibiting both vertical and horizontal movement are oblique faults (e.g. Santa Monica-Hollywood, Cucamonga, Palos Verdes, and Raymond Faults and Fault Zones). Major fault zones in Southern California within approximately 50 miles of the site are summarized in Table E-1. Other faults defined within a 5 mile radius of the site include the northwesterly-trending Newport-Inglewood, Palos Verdes, Overland Avenue, and Charnock faults. Within the PDRGSF area and the Storage Zone Area of Influence (within one mile of the Main Facility), two sets of minor faults extend through in the following units:

- Catalina Schist and Schist Conglomerate, southeast corner of Section 27, T2S R15W, at depths greater than 4,000 ft below ground surface,
- Catalina Schist and Schist Conglomerate, northwest corner of Section 27, T2S R15W, at depths greater than 4,000 ft below ground surface.

The Charnock fault, the nearest documented fault in the project vicinity, is located about 1.5 miles east of the proposed project area, near the San Diego Freeway (Interstate 405). It extends southeast from near Venice Boulevard toward the City of Gardena (DWR, 1961). This fault is vertical, trending approximately N35W, with the northeast side downthrown relative to the southwest side. The documented length of this fault is about six miles (10 kilometers). The Charnock fault displaces lower aquifers and acts as a partial barrier to groundwater movement (DWR, 1961). It is classified as a

TABLE E-1
DETERMINISTIC EARTHQUAKE SITE PARAMETERS

		Estimated Maximum Earthquake		
			Mean Values	
Abbreviated Fault Name	**Approximate Distance** Miles (Kilometers)	**Maximum Earthquake Magnitude** (Mw)	**Peak Ground Acceleration** (g.)	**Estimated Site Intensity** [a]
Palos Verdes	4.1 (6.6)	7.1	0.424	X
Newport-Inglewood (L. A. Basin)	5.9 (9.5)	6.9	0.340	IX
Compton Thrust	6.2 (9.9)	6.8	0.591	X
Santa Monica	6.3 (10.2)	6.6	0.362	IX
Malibu Coast	7.2 (11.6)	6.7	0.346	IX
Hollywood	8.6 (13.8)	6.4	0.272	IX
Elysian Park Thrust	14.1 (22.7)	6.7	0.307	IX
Anacapa-Dume	14.8 (23.8)	7.3	0.260	IX
Raymond	16.6 (26.7)	6.5	0.156	VIII
Verdugo	18.0 (28.9)	6.7	0.161	VIII
Northridge (E. Oak Ridge)	18.0 (29.0)	6.9	0.270	IX
Sierra Madre	21.4 (34.5)	7.0	0.160	VIII
Sierra Madre (San Fernando)	22.6 (36.4)	6.7	0.126	VIII
Whittier	24.1 (38.8)	6.8	0.102	VII
Santa Susana	24.2 (39.0)	6.6	0.109	VII
San Gabriel	26.2 (42.2)	7.0	0.106	VII
Clamshell-Sawpit	29.2 (47.0)	6.5	0.080	VII
Holser	30.2 (48.6)	6.5	0.077	VII
Simi-Santa Rosa	30.7 (49.4)	6.7	0.087	VII
San Jose	32.3 (52.0)	6.5	0.070	VI
Oak Ridge (Onshore)	32.4 (52.2)	6.9	0.095	VII
Chino-Central Ave. (Elsinore)	37.3 (60.1)	6.7	0.068	VI
San Cayetano	37.7 (60.7)	6.8	0.073	VII
Newport-Inglewood (Offshore)	39.5 (63.5)	6.9	0.061	VI
Cucamonga	41.9 (67.5)	7.0	0.075	VII
San Andreas – 1857 Rupture	44.8 (72.1)	7.8	0.101	VII
San Andreas – Mojave	44.8 (72.1)	7.1	0.061	VI
Oak Ridge (Blind Thrust Offshore)	46.1 (74.2)	6.9	0.092	VII
Elsinore-Glen Ivy	46.5 (74.8)	6.8	0.045	VI
Channel Islands Thrust (Eastern)	47.6 (76.6)	7.4	0.131	VIII
Ventura – Pitas Point	48.2 (77.6)	6.8	0.053	VI

[a] Modified Mercalli Intensity

SOURCE: EQFAULT Computer Program (Blake, 2000) potentially active fault by both the Los Angeles County Seismic Element (1990, Plate 1) and the state fault map (Jennings, 1995).

Historic Seismicity

During the past 230 years (1769 to 1999), Southern California experienced about 20 notable earthquakes (Mw 6.0 or greater; where Mw is the moment magnitude). Six of these events equaled or exceeded M7.0. The three largest earthquakes that occurred within the Los Angeles Basin during recent time are the January 17, 1994, Mw 6.7 Northridge earthquake; the October 1, 1987, Mw 5.9 Whittier-Narrows earthquake; and the February 9, 1971, Mw 6.4 San Fernando earthquake. The shortest distance from the site to the energy release zone (site-to-source distance) in these earthquakes is about 18, 22 and 31 miles, respectively.

On 16 June 1920, a magnitude 5.0 earthquake occurred west of Inglewood. The origin of this event was the Newport-Inglewood fault, approximately 13 miles to the east. On 10 March 1933, the 6.3 magnitude Long Beach earthquake occurred about 36 miles to the south near Huntington Beach. Local faults, such as the Charnock and Overland Avenue, could be sources for aftershocks, but would be less likely to generate unique earthquakes than the Newport-Inglewood or Compton blind thrust.

Peak horizontal ground acceleration (PHGA) estimates indicate that the earthquake-induced ground motion would be generated by a Mw 6.9 event on the underlying Compton Thrust fault or an Mw 7+ event on the Newport-Inglewood fault. The California Geological Survey (CGS) prepared the state-planning scenario for a major earthquake on the Newport-Inglewood fault zone assumes a magnitude 7 earthquake that could subject the project area to seismic intensity (Modified Mercalli Intensity) of 8+ to 9 (VIII+ to IX) (Toppozada, et al, 1988). In 1933, the project site area experienced an intensity of VII+ during the 6.3 magnitude Long Beach earthquake. Even though no specific analysis has been conducted to determine actual values, a future earthquake on the buried thrust located directed under the site area may generate higher ground motion intensity than experienced during the 1933 event.

GEOLOGIC AND SEISMIC HAZARDS

Fault Rupture

Surface fault rupture can occur in cases where earthquakes are large or hypocenters location of actual fault failure are shallow. The California Geological Survey (CGS) defines “active” faults as those offsetting materials less than 10,000 to 12,000 years old or exhibiting significant seismic activity. “Potentially active” faults are those offsetting strata within the last 1.6 million years ago. With the exception of the low angle Elysian Park Thrust Fault, which lies at least 5 kilometers deep (8,000 to 10,000 feet beneath the storage zone), no known active faults underlie the Project area and the Storage Zone. Because surface fault rupture is more likely on active faults, the State of California, through Alquist-Priolo Earthquake Zoning Fault Act, places active faults in zones that restrict development. No Alquist-Priolo zones traverse the proposed project area and the potential for surface fault rupture at the site is considered very low.

Presently, documentation indicates that the storage zone contains no fault offsets although mapping has inferred two potential fault offsets in Section 27, T2S, R15W. Old reports infer various faults in other areas of the field, but these reports do not provide evidence of their presence. With the exception of the possible faults in Section 27, recent geologic reviews (Davis, 2000) did not provide evidence for the other faults inferred by various reports. The possible faults in Section 27 are not considered active or potentially active. Based on the age of rock formations that may be offset by these faults in Section 27, (Davis, 2000) indicates that they are confined to depths greater than 4,000 feet. Davis (2000) also states that the fault has not displaced in the last 14 million years, and certainly not in the last 3 to 4 million years. A major, near vicinity earthquake could possibly cause minor movement (probably < 1.0ft) at depth within the storage zone, but such offset is unlikely to propagate to within several hundred feet of the surface.

Post-1933 earthquakes within the Newport-Inglewood zone reportedly have damaged wells and well casings (Toppozada et al, 1988). The 21 October 1941, M 4.9 earthquake damaged wells at a depth of 5,000 to 6,000 feet in the West Dominguez oil field. On 18 June 1944, two smaller earthquakes in the Dominguez Hills reportedly damaged oil wells at depths of 3,000 to 6,000 feet. A small earthquake (M 2.7) apparently sheared oil well casing at 1,550 feet on 14 December 1947. Similar, though less significant, damages occurred due to low magnitude events in 1949, 1951, and 1955. Deep compaction of substrata in the Wilmington field may have caused these latter four occurrences.

Earthquake Ground Shaking

Estimated peak horizontal ground acceleration (PHGA) generated by earthquakes on the San Andreas Fault, Newport-Inglewood, and Elysian Park Thrust Fault should range from about 0.1 g to 0.7g. These earthquakes would generate enough energy and spectral content, and have a sufficiently long duration, to damage project facilities, adjacent structures, and area residences.

Induced Seismicity

Microseismic activity, with magnitude –1.0 to 1.0 Mw, often occurs during injection and extraction operations (Terralog Technologies, 2000). Activity of this magnitude can be anticipated at PDR during operations, and is not significant relative to natural daily seismicity in the Los Angeles area. Earthquakes in this magnitude range would not cause subsurface fault movement of more than an inch and would not be felt at the surface.

Slope Stability

The MDR area is along the coastline north of the Bluffs. No slope stability problems are expected in this area since it is nearly flat. Five lots in the PDR area have steep slope angles, with slope heights of more than 50 feet in Quaternary marine terrace deposits. Although these slopes could fail under static or seismically-induced movement, there is little potential for slope stability problems due to the distances of the lots from the slopes and the massive nature of the deposits. Any unstable slopes that may be present locally could experience problems with or without proposed project construction.

Subsidence

Removal of oil and gas (or other fluids) from poorly consolidated geologic formations can cause surface subsidence. These fluid withdrawal processes can leave void spaces at depth. Unless refilled with fluids by re-pressurization techniques, poorly consolidated sediments may collapse causing subsidence in the shallower earth layers. The same general process can occur when groundwater is withdrawn from unconsolidated aquifers. There is no indication that groundwater withdrawal is taking place in the proposed project area, therefore the potential for subsidence is low.

In October 2000, the City of Los Angeles, Department of Public Works (LADPW) evaluated surface elevation changes in the Playa Vista project area (City of Los Angeles, 2001). During the period from 1975 to 2000, the maximum surface subsidence observed on one location was 2.66 inches. This occurred at an elevation marker placed in the curb of Manchester Boulevard at the intersection of Hastings Avenue. LA DPW concluded that area surface subsidence identified during their evaluation was probably associated with settlement of curbs, sidewalks and gutters along major streets.

Although the oil storage zone is well-consolidated, complete withdrawal of all storage gas (including cushion gas) may cause minor surface subsidence. No specific studies for the PDR field indicate this level of subsidence. For the Montebello Field (with somewhat similar geology) studies estimate two inches of subsidence distributed over a broad area (Terralog Technologies, 2000). Since the field will remain in operation, measurable surface subsidence is not anticipated. Due to the minor amounts of subsidence, the potential damage to surface structures is low.

Liquefaction and Other Secondary Earthquake Effects

Seismic hazard zone maps outline areas that are considered susceptible to liquefaction and earthquake-induced landslides. Liquefaction susceptible areas are mapped within the MDR project area, but not within the PDR project area. Limited slope areas along the north bluffs of PDR are classified as potential landslide hazards but these areas do not impact planned sale lots.

REGULATORY SETTING

This section presents a discussion of regulations that address geologic hazards in California, applicable to the project site. In addition, with a long history of oil production in southern California, dating back to the late 1800s and early 1900s, the need existed for regulations to protect people and the environment from various potential impacts associated with oil and gas operations. Today, operators must comply with numerous safety and environmental laws, regulations and guidelines. Thus, the oil and gas industry, including the SCG gas storage facilities, is highly regulated. Government agencies and regulation issues relevant to this project are discussed below.

SEISMIC HAZARDS MAPPING ACT

The Seismic Hazards Mapping Act was developed to protect the public from the effects of strong ground shaking, liquefaction, landslides, or other ground failure, and from other hazards caused by earthquakes. This act requires the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones. Before a development permit is granted for a site within a seismic hazard zone, a geotechnical investigation of the site must be conducted and appropriate mitigation measures incorporated into the project design. The project site is located within a seismic hazard zone for landslides, as designated by the CGS.

CALIFORNIA DIVISION OF OIL, GAS AND GEOTHERMAL RESOURCES

The California Division of Oil, Gas and Geothermal Resources (DOGGR) regulates production of oil and gas, as well as geothermal resources, within the state of California. DOGGR regulations define well design and construction standards, surface production equipment and pipeline requirements, and well abandonment procedures and guidelines.

(1) DOGGR regulates well abandonment procedures to ensure they are conducted safely and are effective. These regulations require procedures designed to prevent future migration of oil and gas from a producing zone to shallower zones, and to protect groundwater.

(2) DOGGR oversees operations. When an operator ceases well operation or production, state law requires the well is abandoned within a reasonable period of time.

(3) Regulations require operators to maintain detailed records of abandonment operations and file copies with DOGGR

(4) DOGGR also regulates environmentally sensitive pipelines within 300 feet of any public recreational area, or a building intended for human occupancy (residences, schools, hospitals, and businesses) that is not necessary to the production operation

DOGGR regulations are defined in the California Code of Regulations (CCR), Title 14, Chapter 4.

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY (CAL EPA), DEPARTMENT OF TOXIC SUBSTANCE CONTROL (DTSC)

The California Department of Toxic Substance Control (DTSC) oversees the identification, cleanup and removal of hazardous or potentially hazardous materials that may be present on project parcels. DTSC oversight would include remediation of hazardous or potentially hazardous soil contamination caused by past oil field activities. Crude oil is exempt by DTSC, and therefore, is not regulated as a hazardous substance.

COUNTY OF LOS ANGELES, DEPARTMENT OF PUBLIC WORKS

For projects involving site grading and earthmoving, the County of Los Angeles, Department of Public Works (DPW), Building and Safety Division, has jurisdiction to ensure the safety of workers during construction and the public once the project is constructed. DPW, City of Los Angeles grading and earthmoving requirements are specified in the County Building Code (including the latest version of the Uniform Building Code) and the procedures outlined in the County Hydrology Manual.

CITY OF LOS ANGELES

The City of Los Angeles, Building and Safety Department, regulates design and construction of commercial and high occupancy structures located over areas with potential for gas reaching the surface. These areas typically include oil and gas resource areas (active and abandoned oil and gas fields), landfills and other areas where shallow subsurface gas has been documented.

The City of Los Angeles Fire Department prohibits construction of dwellings closer than 50 feet from an oil well. The Fire Commission may grant variances not exceeding 10 percent of the required clearances. Any substantial reduction in clearances should impose additional safeguards from fire and exposure to fire. Upon completion of well abandonment procedures, the Los Angeles Fire Department conducts a final inspection of the well site.

Along with the DPW, the City will issue permits for project related grading activities within the city, monitor project related construction activities if applicable, and ensure compliance with permit requirements. The City will issue final project approvals and a certificate of occupancy (if applicable) when they receive verification of compliance to inspections and requirements.

REPORTED ABANDONMENT PROCEDURES: DIVISION OF OIL, GAS AND GEOTHERMAL RESOURCES

The Division of Oil, Gas and Geothermal Resources (DOGGR) maintains well records and oversees well abandonment procedures. DOGGR (2001) provided information from their records for the wells listed in Table F-1. This information from DOGGR is presented in the following paragraphs.

- Well Number: 29-1 - Well plugged on 5/12/41 by Del Rey Realty Company. Reentered well on 5/21/56 by Southern Cal Gas Co. During reentry, well blew out through 7” @ 713’. 7” eventually cut @ 732’ and relanded new 7” from 732’ to surface. Pressure tested good with 1400 psi for 15 min. Well plugged on 8/4/94. No record of gas test.

- Well Number: Big Ben No. 1 - No mention in DOGGR record of casing repair @ 150 feet nor surface seep during 1991. Well plugged on 10/26/92. Gas test on 3/27/95 - OK.

- Well Number: Blackline No. 1 - Well was plugged on 3/4/37 by Black Line Oil Co. Reentered well on 1/31/57 by Southern Cal Gas Co. During reentry, located hole in 6 5/8” casing below 968’. Also, indication of leaking 4 3/4” casing downhole. The 6 5/8” casing cut and pulled from 1058’. Relanded new 6 5/8” casing from 1058’ to surface. Opened port collar and cemented. Top of cement estimated at 452’. Pressure tested with 2500 psi for 20 minutes - OK. On 12/22/81, notice to repair leak @ 1058’ and holes @ 1065’. Perforated 4 holes @ 1065’ and squeeze with cement. Tested to 600 psi for 30 minutes - OK.

- Well Number: SoCal No. 4 - On 12/9/75, located holes in 8 5/8” casing between 3258’ - 3396’. Bad casing interval cemented across. Pressure tested to 1000 psi for 20 minutes - OK. On 4/5/78, located holes in 8 5/8” casing between 3298’ - 3319’ and 2095’ - 2122’. Both bad spots cemented and pressure tested - OK.

- Well Number: SoCal No. 3 - Only evidence of problem was recorded on 3/16/87, when after running routine inspection and casing log, the tree didn’t hold pressure. “O” ring seals were replaced and everything OK.

- Well Number: 12-1 - On 10/22/75, located leak in 6 5/8" @ 175'. Cut and pull 6 5/8" casing from 481'. Ran 9 5/8" casing to 513' and cemented thru ports at 475 to surface. The 6 5/8" casing was relanded at 481' and pressure tested to 2000 psi for 20 minutes - OK.

- Well Number: 24-2 - On 4/30/75, well reported leaking from cellar thru 7". Found upper portion of 7" corroded. Cut and pulled 7" casing from 172'. Replaced with additional 7" to 172' and pressure tested to 2000 psi for 15 minutes - OK.

- Pomoc No. 1 - Notice to investigate casing and repair leak at 2830'. During inspection, upper part of 7" casing found to be tight. Cut and pulled from 657'. Did not find any holes. Replaced with new 7" casing to 657' and pressure tested to 3000 psi for 20 minutes. Ran casing patch from 2815' to 2845' and pressure tested to 2000 psi for 20 minutes - OK.

- Joyce No. 1 - Well plugged on 3/15/93. No gas test. No recorded leaks.

- Lo Mar No. 1 - Well plugged on 7/14/36 by Lor Mar Development Co. At time of plugged, well had bad 13 3/8" casing @ 572'. Reentered well on 3/15/56 by Southern Cal Gas Co. Cut and pulled 6 5/8" casing from 716'. Replaced with new 6 /58" casing and cemented through ports at 706' to surface, between 13 3/8" and 6 5/8" casings. Top job was required to bring cement to surface. Well plugged on 12/1/92. No gas test.