California Integrated
Waste Management Board

Gas Investigation
Final Report
Disposal Gardens, Torrance, CA

SWIS 19-AA-5233

Prepared By:
California Integrated Waste Management Board
P.O. Box 4025
(1001 “I” Street)
Sacramento, California 95812-4025

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1. Introduction

The California Integrated Waste Management Board (CIWMB) Closed, Illegal and Abandoned Site (CIA) program investigates solid waste disposal sites and provides site data and documentation to quantify requirements for both enforcement and potential clean-up activities by the CIWMB Solid Waste Cleanup Program (AB 2136). Depending on the types of wastes at the site, landfill gas sampling may be necessary to determine gas concentrations and lateral gas migration for the purpose of scoping enforcement and remediation work or referral to the local Air Quality Management District (AQMD).

Typically, landfill gas constituents contain, by volume, 50% methane gas (CH4), 0.2-1% oxygen(O2), 2-10% nitrogen(N), 50% carbon dioxide (CO2), 0-1% hydrogen and <1% Non-methane organic carbons (NMOCs). A landfill gas characterization study performed by the CIWMB, indicated that the most common NMOCs for landfill gas include: benzene, ethyl benzene, toluene, vinyl chloride, dichloromethane, trichloroethylene, 1,2 -cis-dichloroethylene and tetrachloroethylene.

Statutory authority for investigating solid waste disposal sites is in California Public Resources Code (PRC) Section 45013, et seq.

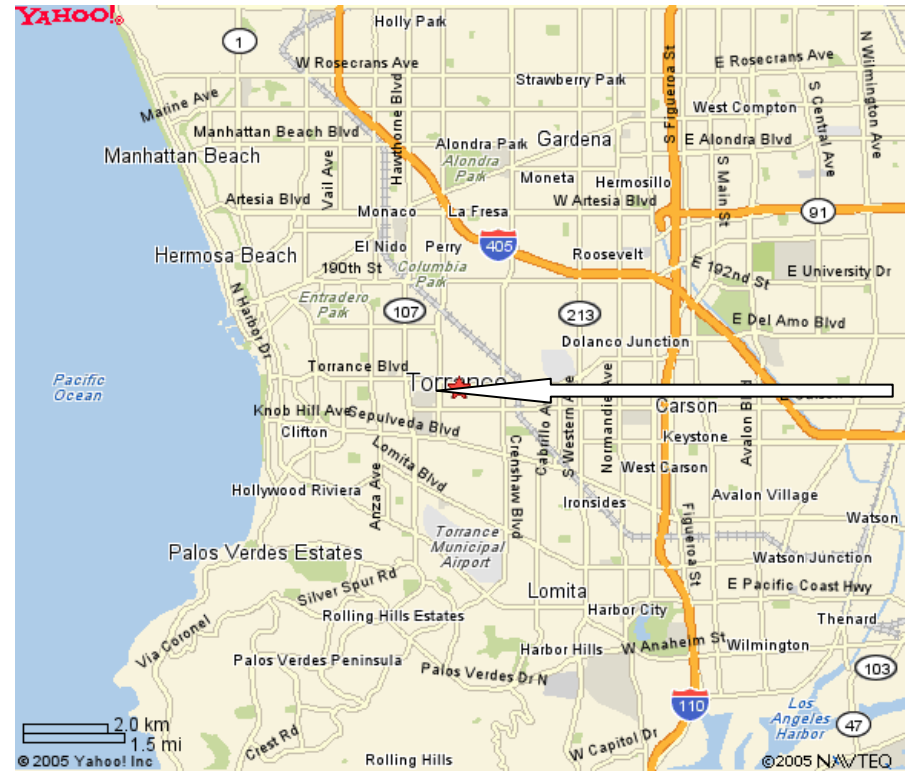
1.1 Site Location

Disposal Gardens also known as Torrance Sand and Gravel is located in the city of Torrance California. The approximate center of the site is at latitude N 33.79411 and longitude W 118.34404. The site is approximately 125 acres and extends northwest to Hawthorne Boulevard, and southeast to Crenshaw Boulevard The northeastern and southwestern boundaries are not clearly defined but at this time are assumed to extend northeast to Pacific Coast Highway and southwest to the city limits of Torrance (Figures 1 and 2)

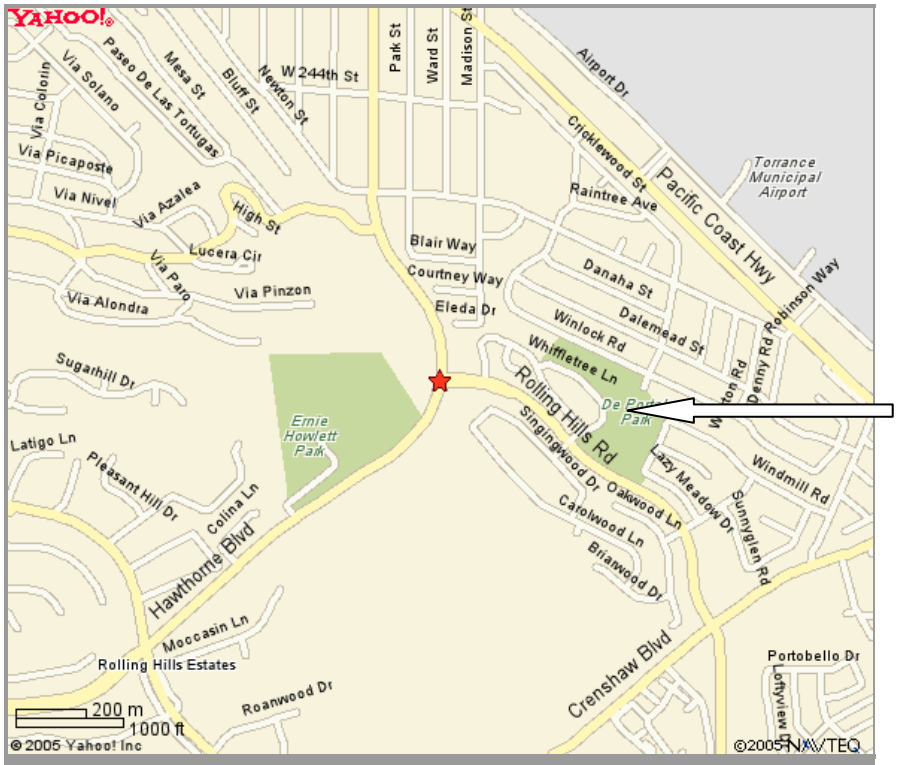
The site is located northeast of the Palos Verdes Landfill (PVLF) that operated as a Class I and Class II disposal site under permit by the County Sanitation Districts of Los Angeles (Sanitation District) from May 1957 to December 1980. The PVLF is under the jurisdiction of The Department of Toxic Substances Control (DTSC) and is not the focus of this investigation. However, the Sanitation District has constructed off site monitoring wells at the Disposal Gardens site to evaluate whether the PVLF has adversely impacted this area. The information contained in this report does not indicate the Disposal Gardens has been impacted by the PVLF.

The Disposal Gardens site has been developed into a residential community, between Rolling Hills road and Newton. The site also includes a park and smaller open space/park areas. A commercial retail center is located north of the intersection of Crenshaw Boulevard and Rolling Hills Road.

Torrance, CA (Figure 1)



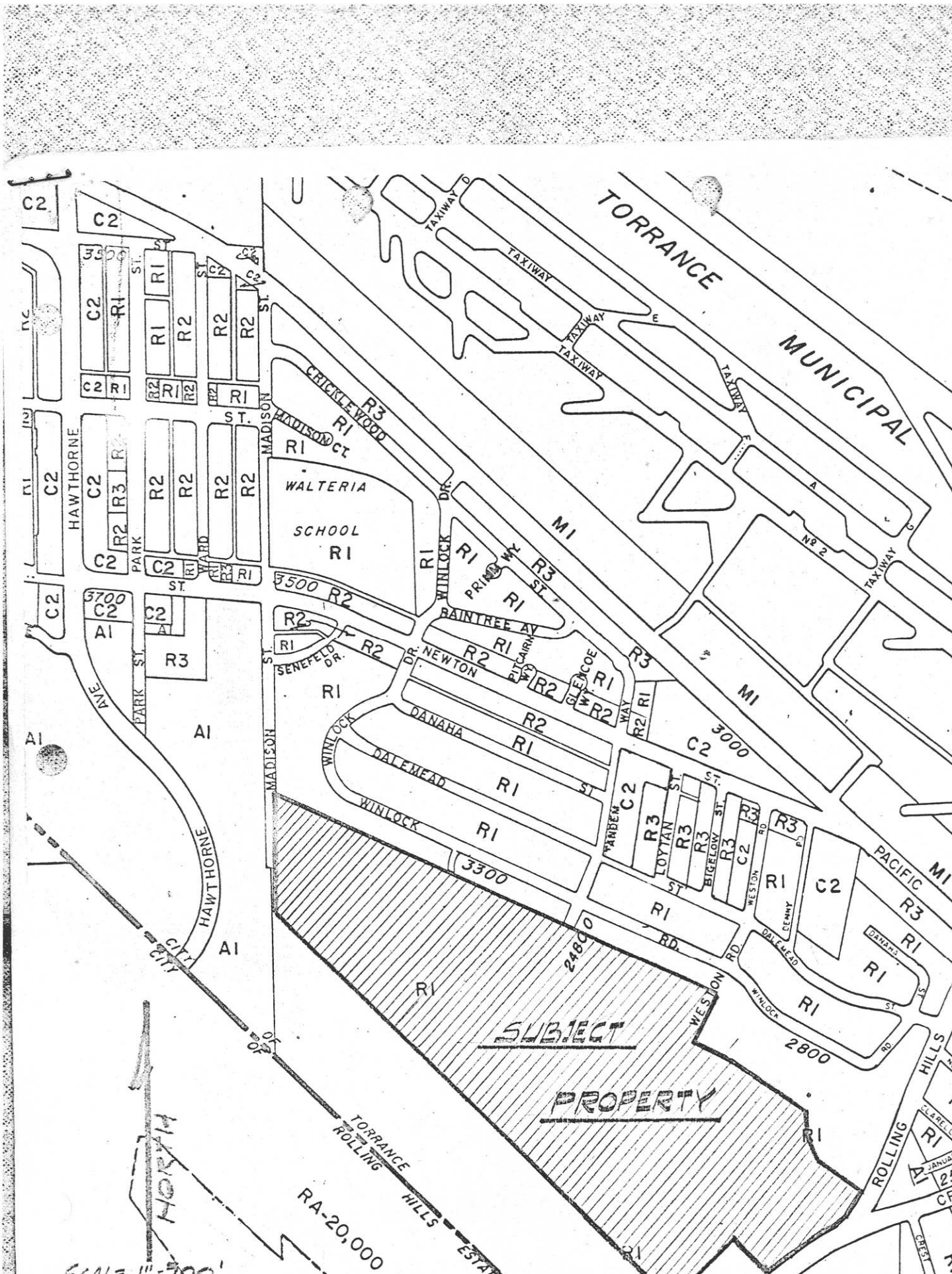
Site Location Map



Site Location

Figure 1 Site Location Maps

Figure 2 zoning map



1.2 Site History

The following abbreviated summary of the site is based on available background data, of which many documents were incomplete and other documents known to have existed in the past were not available for review. Available data indicated the site was initially utilized for sand and gravel operations that reportedly began in the early 1920's and continued sporadically until the early 1960's at which time Torrance Sand and Gravel Company began large scale mining operations that lasted until the early 1970's Reportedly, mining began just northeast of the PVLF and progressed in a northeastern direction with operations creating larger and deeper pits and stopping just short of the residences on Winlock Road in the City of Torrance. Reportedly the mine tailings were placed just beyond the City of Rolling Hills Estates boundary line and into the older pits as they were abandoned. The quarried pits immediately to the northeast of the City of Rolling Hills Estates were also used by the Torrance Sand and Gravel Company for the disposal of oil wastes and crude oil sludge associated with oil exploration drilling at the site and possibly at adjacent locations. The pits reportedly were up to 120 feet deep and at the time referred to as the large and small pits.

Reportedly, requests by Disposal Gardens Inc. to use the site as a dump in 1966 was denied, a similar 1967 request was withdrawn and a subsequent 1967 request was denied in 1969. A 1969 Regional Water Quality Control Board (RWQCB) letter indicated the site could be used as a disposal site for inert wastes only however, it is not known whether the site was used for disposal of inert wastes prior to plans to develop it for residential use in 1971.

In 1972, Sunnyglen Construction Company proposed to develop tentative tract 9765 lot 5, (Battram Tract, aka Disposal Gardens). The company proposed to mix the oil from the old sumps with sand to use as fill to for the existing pits. Background information indicates that some of the oil waste was mixed to a 10-20% sand and oil mixture and used as fill. However, it is not clear whether all of the oil sump waste was removed or utilized on site as fill It also is not known whether inert solid wastes were ever disposed of at the site (letter from Sunnyglen Construction Co. to LA Sanitation District January, 1973).

The following is a more comprehensive, generally chronological description of the background history of the site based on available documents and information provided by various knowledgeable persons.

Based on information obtained from the Los Angeles Regional Water Quality Control Board (RWQCB), their file FN 51-126 is identified as the South Torrance Dump [aka - Disposal Gardens, or Torrance Sand and Gravel] at the north flank of the Palos Verdes Hills). Reportedly in 1951, the RWQCB issued Waste Discharge Requirements (WDRs) for oil sump waste disposal for an existing sump area that had been operating for approximately 10 years (document not available for review). The WDRs reportedly were for consolidating sump wastes from the City of Torrance. According to the RWQCB, "there is "no" additional information" in their files to indicate whether the sump(s) continued to be operated after the WDRs were issued.

Fill was dumped around the north half of the pit to form dikes, increase the capacity and prevent spilling into lower areas. While excavating the sands and gravel around the pit, slides occurred weakening the dikes that were retaining the oils. In 1963, the slope of the large pit failed and the waste oil contaminated much of the property. An evaluation was propagated in 1963 by Michael Clements who wished to purchase 50 acres of the property to develop a cut and fill municipal dump. He felt that due to the contamination from the slope failure, the land was not usable for mining by Torrance Sand and Gravel.

In a document entitled *Proposal for the Selection of Subsurface Soil Boring Sites Northeasterly of the Palos Verdes Landfill*, (untitled, undated) information is summarized from a previous November 1963 Converse Foundation Engineers Report entitled *Geological and Soils Investigations, Torrance Sand and Gravel Pits Crenshaw Boulevard and Rolling Hills Road, Torrance, California*. Reportedly, there was a failure of the north and east sides of the large gravel pit in the summer of 1963. The report indicated the resulting release of oil and subsequent attempts to contain it spread the waste oil over large areas. Although recommendations were made at the time to investigate further containment of the waste oil, no additional information is available about the waste oil until the area was proposed for residential development

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In November 1966, Charles Praddy of Landfill Inc., filed an application with the RWQCB to construct a landfill on 85 of the 125 acres mined by Torrance Sand and Gravel. The application letter indicated that the land had been leased from private individuals named as Mrs. Elizabeth Senness, Peter Del Re, and Agnes Del Re and they have full knowledge of the proposal (letter dated November 7, 1966). In a February 28, 1967 city council session, addressing the request of a variance to create a landfill to dispose of household waste and rubbish, Mr. Henry, a representative of Landfill Inc. reported to the council *"A refuse fill is not new to the land. (In 1948 a variance for the extraction of sand by the Water Pollution Control Board on March 17, 1952, the residue of sumps in Torrance was deposited and still remains on this property. Through the early 1950's the property received more waste paid each year through 1966, although the property was not used as a dump that time (Council Minutes, February 28, 1967)".* Mr. Henry indicated that the site had been taking waste and paying for a permit.

The early documents and resolutions alluded to waste disposal but there is no indication that a permitted waste disposal company or solid waste site was ever developed for disposal of wastes on land for the property between Crenshaw Boulevard and Madison Street, southerly of Winlock Road in Torrance California (File 66-133). The document indicated that in November 1966 Land fill Incorporated filed a report on waste discharge with the RWQCB proposing to dispose of combustible and non combustible liquid and solid waste materials on approximately 85 acres of land in the City of Torrance described as a portion of lot 5, Tract 9765, lying between Crenshaw Boulevard and Madison Street, 500 feet northeasterly from the City boundary and 105 feet southerly of Winlock Road. The report was amended on February 6, 1967 to delete liquid wastes and to propose installation of a mudstone liner. In a May 10, 1969 letter, Disposal

Gardens Incorporated proposed to utilize the same site for disposal of solid inert waste materials, and to compact the filled area where possible to provide structural support for building construction.

The RWQCB found that the proposed site encompassed two major excavations producing sand and gravel and that the pits had been excavated to depths of about 100 feet below ground surface (bgs) and had a combined void capacity in October 1966 of one million cubic yards. The RWQCB indicated the following requirements with respect to the proposed waste discharge by Disposal Gardens Incorporated to the subject site: Materials to be disposed of the site must consist of non-water soluble, non-decomposable inert solids of the following nature: earth, rock, gravel, brick and concrete, paving fragments, glass, plaster and plaster board, manufactured rubber products, steel mill slag, clay and clay products, asbestos fiber and products. The City of Torrance denied the application to issue a permit to operate, due to public objections.

A portion of an undated document (probably around 1972) that begins as section *IV The Existing Environment* provided information regarding the history of the site. Chandlers Palos Verdes Sand and Gravel Company were working an open pit sand extraction operation on the northern half of the proposed development site. The operation at the time reportedly consisted of two large pits, a three-acre settling pond, associated buildings, service roads and equipment. The lease for pit operations reportedly extended until 1984. Fill material associated with an old oil well sump was located next to the west pit and reportedly oil residue was at the surface. The southern half of the site had been covered with irregular hills scarred by previous fill-grading operations, and was traversed by service roads and trails. The permit to extract sand and gravel reportedly was granted in 1948. Requests in 1966 and 1967 to use the area as a dump site were denied by the RWQCB to protect groundwater quality.

A portion of a document, author unknown, prepared in what appears to be 1971, entitled *Outline ZC 71-8*, provided a chronological brief history of the site (property line between Rolling Hills Road and Crenshaw “Boulevard, the southerly City boundary line, Madison Street and its extension, and approximately 105 feet southerly of Winlock Road.

Portions of the chronological site history relevant to this study were as follows:

- 1948 zone variance to permit extracting sand and gravel on 50 acres.
- 1953 variance to permit gravel extraction on another 15 acres.
- 1957 variance to permit oil and gas well drilling in a 150-foot strip on the southerly property line.
- 1966 request for use as a dump site (DENIED)
- 1967 request zone change to allow for dump site (WITHDRAWN)
- 1967 request to permit use as a disposal site (DENIED 1969)

In October, 1971, Sunnyglen Construction Company hired Western Laboratories to prepare an engineering geologic report for the area south of Winlock Road between Crenshaw Boulevard and Madison Street with regard to the proposed residential development. Mr. Emil DiMatteo was the registered geologist/certified engineering

geologist that conducted the assessment. The investigation included drilling 19, 24-inch diameter borings referred to as B-1 through B-19 by Western Laboratories or Test Holes by DiMatteo. The DiMatteo report indicated that he only prepared geologic logs for six (borings B-1, B-2, B-3, B-4, B-6, and B-9) of the 19 borings because they were the only ones that were logged or closely supervised by Mr. DiMatteo. Based on review and comparison of the available boring logs, it appears that Western Laboratories personnel prepared logs for all 19 borings. In addition, 10 rotary wash borings were drilled to greater depths and exploratory test pits were excavated using a backhoe or bulldozer. Test pit logs were not located; however the boring logs for the 10 rotary wash borings were available for review. The available boring logs will be included in the final report.

A comparison of boring logs (see Appendix G) B-1 through B-19 by Western Laboratories with the six test hole borings by DiMatteo suggests that the six borings logged by DiMatteo were part of the 19 drilled by Western Laboratories. This is based on the date's drilled and general correlation of depths drilled and subsurface materials encountered. There are however some inconsistencies in drilling depths and subsurface materials. Based on the available logs, Test Hole No. 6 (DiMatteo) encountered black clayey sludge to a depth of approximately 20 feet bgs and the boring was reported to have been drilled in an apparent former oil waste pond. DiMatteo reported a strong H_2S odor at about 59 feet bgs in bedrock in Test Hole B-9. Boring logs B-1 through B-19 by Western Laboratories indicated heavy caving at about 20 feet bgs in boring B-2 and in boring B-5 at about 8 feet bgs. Boring B-7 encountered uncompacted oil waste and debris from an old oil sump to 8 feet at which depth the boring was abandoned. Boring W-4 drilled in the same area encountered oil sump material and debris with some sand to a depth of about 40 feet bgs. Borings B-8 and B-9 also encountered oil sand with debris, oil sump materials, and mixed sand to depths of about 26 and 42 feet bgs, respectively. Both borings W-5 and W-7 encountered oil sump material and debris to depths of approximately 36 feet bgs the available boring logs and a site location map is located in (Appendix G) historical site investigation.

The following information was obtained from the 1971 DiMatteo engineering report. At the time of the study, the site exhibited the rugged, constantly changing, topography of an active sand and gravel quarry. Reportedly at the time, the two pits were being mined and were about 100 feet deep, the locations of which were shown on the geologic map that accompanied the report in (Appendix G) Reportedly, the mining resulted in extensive stripping in the higher southerly half of the site and very little of the native topographic forms survived. An uneven distribution of man-placed fill was present due to the backfilling of abandoned quarry pits and sumps, grading of temporary roads, earth-dam construction and stockpiling of mine tailings. The site was reported to be underlain by fill soil, unconsolidated recent and Pleistocene Deposits, and the Malaga mudstone and Valmonte diatomite members of the Monterey Shale. Reportedly, the Malaga mudstone at depth exhibits shears, slickensides and emits a strong gas odor which seemed to be H_2S. Evidence from oil wells, surface exposures, and boring logs indicated the presence of a shear zone in the Miocene-age rocks. The following conclusions applicable to this study were provided in the subject report. Other conclusions, more applicable to the geotechnical aspects of the proposed development

were presented and the reader should refer to the report for additional information. Several conclusions in the report were as follows:

- the perched groundwater encountered in several borings will need to be engineer controlled,
- disposition of sediments in the waste water pond will require soil and engineering attention in the field since these materials could not be examined in the field. The east edge of the pond is known to be underlain by at least 59 feet of fill,
- the inferred shear zone does not appear to affect the proposed development,
- the planned slope along the southwest property line planned in excess of 100 feet could cause temporary runoff concentrated along the common property line and needs to be evaluated by a soil engineer.

The RWQCB issued Waste Discharge Requirements for Sunnyglen Construction Company, Inc. in association with the grading and development of tentative Tract No. 26507. (72-72) Grading was to begin January 1973 and take approximately 2 years to complete. The property at the time was under mining lease to Chandler's Palos Verdes Sand and Gravel Company. The northeasterly portion of the site was being utilized as a sand and gravel pit and southerly portion of the site was more or less stripped by previous mining operations. It was indicated that Sunnyglen Construction Company Inc. proposed to mix material from an oil sump on the proposed tract with on site cut materials and fill the existing pit. The mixture was to consist of approximately 10 percent straight crude oil and 90 percent sandy soils. The materials, after being brought to proper moisture content were to be compacted to not less than 90 percent of the maximum dry density. The oil sump was adjacent to and approximately 200 feet higher than the bottom of the existing pit. After compaction, the mixed fill was to be 20 to 100 feet below the finished grade and at least 100 feet above sea level. The groundwater table in the area was reported to be at approximately sea level.
The waste discharge requirements relevant to the subject study were as follows:

- Waste materials were to be disposed of at the site were limited to the proposed oil-soil material from the site itself. No other wastes were to be imported to the site,
- the mixed on site oil sump material and onsite cut material shall not exceed 10 percent straight crude oil, as proposed,
- the bottom elevation of mixed soil and oil fill shall be at least 100 feet above sea level,
- No pollution of nuisance shall be caused by the handling, storage or disposal of these wastes.

A portion of the January 1972 document between the city of Torrance and Palos Verdes Sand & Gravel Company, discussed the interpretation of conditions and modifications of the gravel pit since there were some discrepancies regarding what the sand and Gravel Company was willing to promise and what the City of Torrance had prepared in the draft memorandum regarding the site. The document indicated that it was true that the city of Torrance made it a condition of the oil well drilling variance that the sumps were to be

drained and backfilled. Aside from that no other conditions were imposed with regard to the oil soaked earth which would remain. There was never a requirement that the earth be moved from the site or that it be mixed in any certain way. The letter stated that the city was not seeking to require them to work that oil soaked earth to a considerable extent over what they presently do. Reportedly, the company mixed the oil soaked earth with sand as they excavated it, but that material was then merely moved out of the quarrying site to unused portions of the property. The letter stated that therefore to require now that the oil soaked earth be mixed and spread so that it will dry was increasing the condition over what was originally required. The proposed modification was provided *"all soil soaked earth and earth containing other emulsions and residues form the original oil well drilling operations as they are uncovered in the routine excavations for sand and gravel, will be mixed with native earth in such proportions that it can be moved easily and it will be moved to unused portions of the 90+ acres. "*

A portion of a subsequent related document dated February 1972 regarding interpretation of conditions of Chandlers Palos Verdes Sand and Gravel Company indicated that the disposition of the oil soaked earth was now being handled and moved as part of the gravel pit operations; however, it was not entirely clear whether the oil sumps that were drained and backfilled were removed or covered up.

An August 28, 1972 letter from Western Laboratories to Sunnyglen Construction Company describes a blending proposal to mix waste oil and sand deposits; this mixture was used extensively to dilute the concentrated pockets of the remaining sump pits. The concentration of oil to sand in the pit areas were reported to be 40 percent oil and 60 percent sand. The proposal and recommendation was to obtain a dilute mix of 10 percent oil with 90 percent sandy soils. These blended fills were to be placed to no more than 20 feet below the finished grade of the proposed residential development.

A February 1973 interoffice communication by the city of Torrance indicated Building and Safety Department concurs in the recommendation of their consultants Converse-Davis and Associates that the proposed development of Tract No. 26507 is conditionally approved for construction.

In a June 1975 letter from Emil DiMatteo to Watt Industries, Inc. it was indicated that the pre-grading environment left by the earlier mining of sand and gravel as applicable to tracts 31331, 31332, and 31333 for residential construction consisted largely of placing tested fill in the cavities and sculpting an artificial landscape of long rows of narrow level terraces, separated by small (mostly fill) slopes. The land upon which this process took place was underlain almost entirely by the so-called San Pedro Sand, a coarse-graded, marine deposit of Lower Pleistocene age, Prior to placement of tested fill, existing deleterious earth materials were removed: for example: an old oil well sump in Tract No. 31332; a deep wastewater pond in Tract No. 31333; a wide area of thin fill in the just mentioned tracts. The letter report concluded that grading of the subject tracts was therefore accomplished under appropriate geologic control and that geologic conditions disclosed during the work were not significantly different form those disclosed by the

original investigation and that that in their opinion, the site is adequate for the intended use.

In June 1975 letter from Western Laboratories to Sunnyglen Construction Company, it was indicated that the site was previously used as sand and gravel pits, and also present were fills resulting from desilting ponds and foundations from buildings. Reportedly, prior to placement of fill soils, all vegetation and debris were stripped and removed from the site and existing fill soils were excavated to competent natural ground. The required removals ranged up to 102 feet in depth. Fill materials reportedly consisting of soil types 1-80 were placed in lifts not exceeding 6 inches and compacted in place to a minimum of 90 percent of the laboratory standard.

In a document entitled *Proposal for the Selection of Subsurface Soil Boring Sites Northeasterly of the Palos Verdes Landfill*, prepared in the late 1980's for the PVLF on behalf of, or by the Sanitation District (see Appendix L), a subsurface soil boring study was presented as an alternate to the installation of three, off-site down gradient monitoring wells associated with the PVLF. During mining operations many of the tributaries and deeper canyon bottoms were either completely or partially filled with mine tailings with some canyons having multiple layers. Mining started just northeast of the PVLF property line and progressed in a northeastern direction with operations becoming larger and deeper until stopping just short of the residences on Winlock Road. Tailings were placed just beyond the landfill property line and in the older pits as they were abandoned. A review of various geologic reports by the author(s) indicated the quarried pit areas immediately northeast of the main landfill property were also used by the adjacent property owner for the disposal of oil wastes and crude oil sludge and reportedly these operations continued until the early 1970's just prior to the area being constructed as a residential development. The document concluded that proposed monitoring wells M27A, M28A, and M29A that were to be drilled in the area northeasterly of the PVLF would not provide reliable down gradient monitoring points for the landfill because of the potential for in-place contamination from waste oil activities unrelated the to Sanitation Districts PVLF operations. The RWQCB did not necessarily concur with the Sanitation Districts allegations regarding off site oil waste and sludge disposal activities but agreed that the Sanitation District could select alternate locations for the proposed detection monitoring wells by conducting a subsurface soil investigation to find locations which might be outside the influence of the [oil] disposal areas. It was subsequently decided by the author(s) to proceed with the detection monitoring program as originally proposed and approved. On June 24, 1987, the Sanitation Districts contractor drilled an investigative boring at the proposed location of monitoring well M29A. This boring went to a depth of approximately 65 feet bgs and indicated the presence of oil waste based primarily on the detection of strong petroliferous odors emanating from the samples. This document also contained an August 1972 analytical report from Smith-Emery Company of two soil and oil mixture samples collected from the site. The report indicated oil at concentrations of 10.88 and 31.90 percent, volatile matter at 10.35 and 17.30 percent and elevated metal concentrations.

Historical aerial photographs were reviewed for the years 1927 to 2005. The earliest available photographs, from 1927 to 1972 generally a gravel pit. Aerial photos taken from 1928, show the large pit and a second smaller pit adjoining to the west. The smaller pit at the time contained water and there are remnant type deposits in the area of this pit. The large pit was still in operation in 1928. Aerial photos taken in 1945 indicate that both pits had been abandoned and the dumping of oil sludge had not begun. The largest pit on the site was utilized for the disposal of waste oil and drilling mud's. The pit became full and dikes were constructed to prevent spillage.
Photographs from 1960 to 1966 generally show the changing topography of the site as a result of the on-going sand and gravel mining activities. The photographs show two large pits and what appear to be settling ponds, mine tailings, access roads, conveyor belts, buildings and what may be oil sumps. Aerial photograph from 1975 to 1980 document the construction of the subject residential development as a result of mass grading and construction and changes to the adjacent PVLF. A Terra Server aerial photograph when over-laid on the historic aerials place the two major sand and gravel pits generally at the center of De Portola Park. Based on information provided in the geologic engineering report (DiMatteo, 1971), it appears the pits underlay the area of Winlock Road, Whiffletree Lane, Candlewood Drive, Brandey Wine Way, Fallen Leaf Drive, Softwind and Windmill Road areas.

In summary, available background information does not clearly indicate that the site operated as a permitted landfill. If it did accept wastes, it appears that they were restricted to inert materials as required by the RWQCB Resolution 69-24. However, available data indicates previously prepared boring logs indicated the presence at some locations of some debris and oil laden fill, consistent with available background data and likely associated with the former gravel and mining operations as well as the previous oil exploration. It is likely based on the presence of relatively large pits and ponds associated with mining, and the former oil exploration activities that there could have been some minor amounts of illegal dumping and therefore some buried wastes exist at the site. However, it appears that the majority of the buried wastes were probably generated on site.

Figure 3: Boring Locations and Topo Map created by Emil Dimateo for Western Laboratory

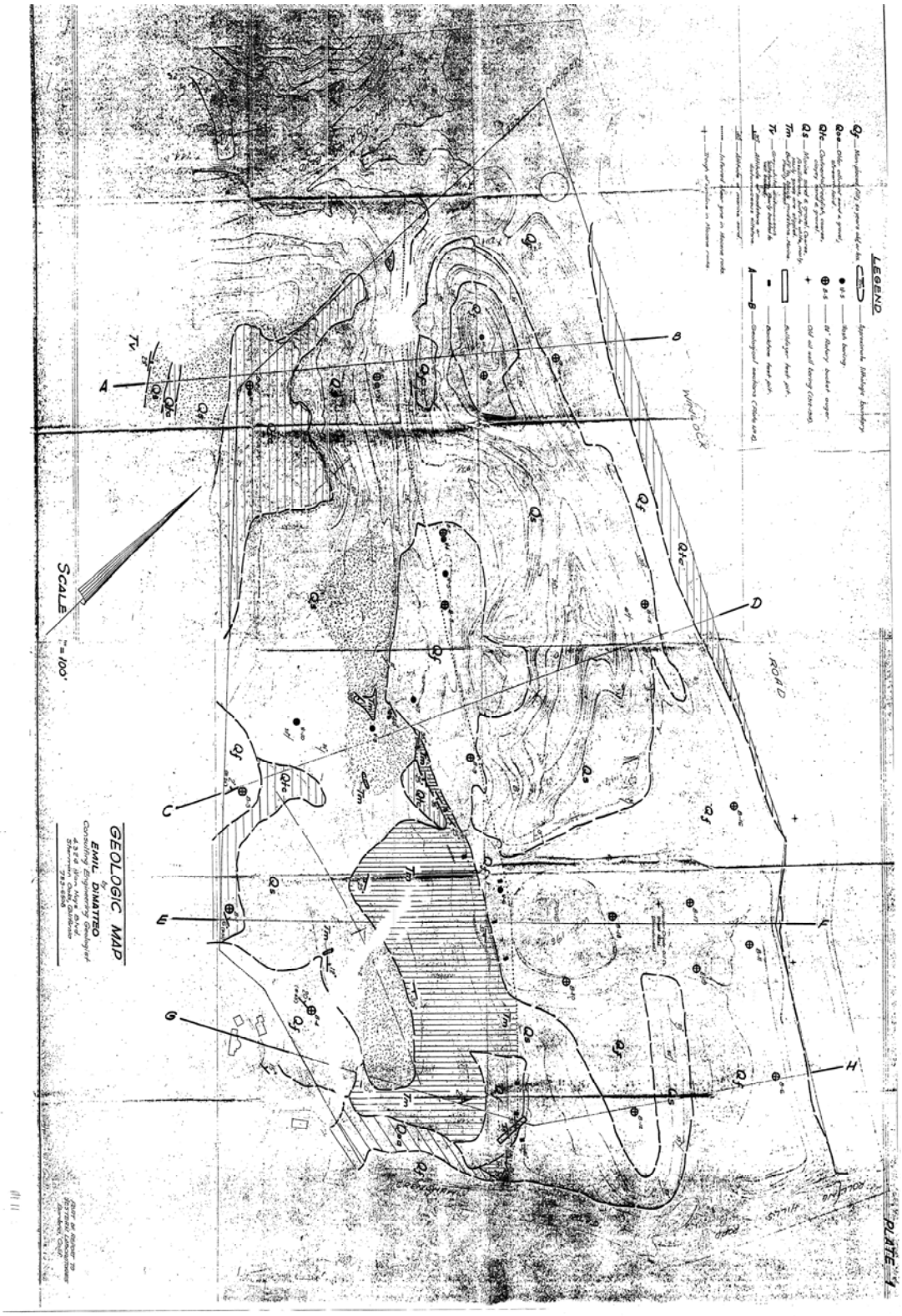

Figure 4: Residential Community Map over Topo Map Created for The Los Angeles County Sanitation District

1.3 Project Background

The Remediation, Closure & Technical Services (RCTS) Branch, was requested by Los Angeles County Local Enforcement Agency (LEA) to perform a phase I office investigation and a phase II field investigation, which would include intrusive investigation (borings), waste and soil sampling and characterization, installation and sampling of gas monitoring probes. and to install gas monitoring probes, collect soil samples during drilling, conduct analytical testing of select samples, and to evaluate appropriate remedial measures necessary to protect public health and safety and the environment.

1.4 Project Purpose

The main objective of this limited assessment has been to generally evaluate by conducting investigative work at specific areas, whether this site is producing methane gas and if this gas is migrating up to the surface. To help make a determination, the installed probes will be monitored monthly for a period of one year to account for temporal variations in the gas production (if any) from the site. The historic documentation indicates fill was placed at various times at the site in association with sand and gravel mining activities and subsequent grading of the site for residential development. However, the composition of the fill is not entirely known and it is also not known if inert solid wastes were also disposed of at the site. From 1951-1963 the RWQCB permitted disposal of fill materials at the site, but there was little to no information describing the consistency of the fill and how much fill was placed at the site. A copy of the 1951 permit could not be located and, it appears that it may have been misfiled or lost. The second objective of this investigation was to conduct a limited characterization of this site by obtaining soil samples during drilling and submitting them for analytical testing. The samples were sent to the CIWMB's contracted certified analytical testing laboratory, ExcelChem Laboratories, Inc. and analyzed for constituents of potential concern (COPC).

1.5 Site Geology

Although a geologic investigation was not a part of the limited landfill gas investigation scope of work, the general geology of the site is provided based on results of previous geologic investigations conducted at the site, information from correspondence letters regarding site grading and development, and results of this limited investigation.

A 1971 geologic investigation of the site titled "Engineering Geologic Report, 120 Acres in the City of Torrance, South of Winlock Road, between Crenshaw Blvd. and Madison Street, was conducted by Emil DiMatteo, engineering geologist, at the time the site was a sand and gravel operation (DiMatteo, 1971). At the time of his geologic investigation, the site was described as rugged, with constantly changing topography of an active sand and gravel quarry, and two gravel pits were being mined and were about 100 feet deep. Man made fill was noted due to the backfilling of abandoned quarry pits and sumps, grading of temporary roads, earth-dam construction, and stockpiling of tailings.

According to the DiMatteo report, geologic units at the site include unconsolidated, Recent and Pleistocene deposits that are further subdivided into three units as follows: Qoa referred to a fine to

coarse grained gravelly, slightly cohesive, brown sand; Qtc denoted the thin continental terrace deposits which reportedly once capped the entire site consisting of coarse, rusty-brown, massive, slightly consolidated, clayey gravelly sand; and, Qs referred to coarse-grained, non cohesive, buff to white, marine sand and gravel also known as the San Pedro Sand and often includes the Lomita Marl. The San Pedro Sand is reported to be the material that was being quarried at the time of the 1971 investigation. The Miocene-age rock formations include the Malaga mudstone member of the Monterey Shale described as a fine-grained, grey-brown, clay-rich poorly to indistinctly bedded, marine rock (Tm). A boring log from his investigation indicated the presence of a strong gas odor which seemed like H_2S. A diatomaceous siltstone (Tv) underlies the Malaga mudstone and is referred to as the Valmonte diatomite member of the Monterey Shale (DiMatteo, 1971).

The geologic map and cross sections that accompany the 1971 DiMatteo report indicate a northeast trending, inferred shear zone in the Miocene-age rocks, possibly a splay of the Palos Verdes fault zone, in the vicinity of, and traversing Rolling Hills Road. A residential map created by the districts which superimposed the earlier DiMatteo geologic map onto a plate, also shows more recent drilling activities at the site associated with the adjacent Palos Verdes Landfill. This map indicates the presence of what appears to be a similarly trending shear zone (explanation of feature is not provided on the plate), a little further north. An oil well reportedly was drilled at the property around 1912-1914 and some amount of oil exploration reportedly occurred at the site. As described in a Remedial Investigation report for the adjacent Palos Verdes Landfill, the Monterey Formation is described as intensely fractured, but fractures are typically filled with clay, secondary mineralization, or naturally occurring hydrocarbon deposits (tar) (Sanitation Districts of Los Angeles, 1995).

A January 1972 interoffice communication to John Robertson of Chandler's Palos Verdes Sand & Gravel Company from William Quale Sr., Zoning Enforcement officer, regarding modifications to the gravel pit refers to the presence of oil soaked earth . The communication indicates that during quarrying, oil soaked earth was mixed with sand as it is excavated and then is moved out of the quarrying site onto an unused portion of the property. The letter requested all soil soaked earth and earth containing other emulsions and residues from the original oil well drilling operations, as they are uncovered during routine excavations for sand and gravel, be mixed with native earth in such proportions that it can be moved easily and that it will be moved to unused portions of the site (City of Torrance, 1972).

The California Regional Water Quality Control Board, Los Angeles Region in Order No 72-72 Waste Discharge Requirements (WDR) for Sunnyglen Construction Company, Inc. indicated grading of the site would commence in January 1973 and take about two years to complete. The WDR further indicated that Sunnyglen Construction Company, Inc. proposed to mix material from an old oil sump on the proposed tract with onsite cut materials and fill the existing pit. The mixture would consist of approximately 10 percent straight crude oil and 90 percent sandy soils and be compacted to not less than 90 percent maximum dry density. The WDR indicated that the existing excavation revealed unconsolidated Recent and Pleistocene age deposits consisting mainly of marine sand and gravel (San Pedro Sand), clayey-gravelly sand, and fine to coarse grained brown sand; and, Miocene rock formation consisting mainly of the clay-rich, marine Malaga mudstone member of the Monterey Shale and diatomaceous siltstone (Valmonte diatomite member of the Monterey shale) (CRWQCB, 1972).

In a January 1973 letter from Sunnyglen Construction Company to the Los Angeles Sanitation District proposed to develop tentative tract 9765, lot 5, Battram Tract by mixing the oil from the old sumps with sand to use as fill for the existing pits, Background information indicated some of the oil wastes were mixed to a 10 to 20 percent sand and oil mixture and used as fill (reference).

At the locations drilled as part of this investigation, fill soil was observed to generally consist of silty and/or clayey, fine to medium sand and dark brown to black and often highly mottled black brown and grey green, silty clay, often containing gravel. At some locations, this fill had a petroleum

hydrocarbon odor. Geologic formation, when encountered, generally consists of light brown, weakly cemented, silty, fine to coarse grained sandstone interpreted to be the San Pedro Sand, and at one location, a dark brown silty claystone was encountered, possibly part of the Monterey Formation. At the locations drilled, buried and/or burned wastes and/or inert debris suggestive of the presence of a former disposal site were not encountered to the depths drilled.

2. Investigation

2.1 Objective

The Primary objective of this investigation was to determine if landfill gas exists and if it does, to determine through the installation of 13 gas monitoring wells if there is gas and if the gas is migrating to the surface, possibly affecting the community. To obtain this information, a work plan was developed to install 13 multi-depth gas monitoring probes in selected locations throughout the community. The locations were chosen based on historic topographic maps, aerials, previous investigations and other historic documents. These documents showed the presence of two historic pits under the residences. An attempt was made to place three of these wells on top of and into these pits by drilling down 50 feet in the areas that these pits appeared to be. However, due to the residences seemingly to be on top of these pits, access was limited.

2.2 SCOPE OF WORK

Geophysical Investigation

Disposal Gardens is located in a residential community riddled with subsurface utilities, water lines, sewer, storm drains, gas lines, cable and phones. Due to the complexities of locating wells in these types of communities, it is necessary to chose locations while conducting a utility clearance. The CIWMB's consultant Ninyo and Moore subcontracted with Southwest Geophysical to conduct a utility clearance on November 26, 2005. 13 well locations were cleared and sited. A second clearance event was performed on March 15, 2006 to relocate 2 wells (P1 and P3). Under Ground Service Alert (USA) was called to confirm the locations previously marked. A total of 13 wells were marked and cleared 5 in Deportolla Park (P4, P5, P7, P8 and P9), 8 of the probes (P1, P2, P3, P6, P10, P11, P12 and P13) were sited in the streets marked with white paint. (See appendix G Site Map)

2.3 Scope of Work Completed

In general, the project objectives were accomplished by completing the following tasks:

- Drilled a total of 13 borings, the depths of these borings are as followed:
  5 borings to maximum depths of 16.5 feet bgs,
  3 borings to maximum depths of 51.5 feet bgs,

1 at 18.5 feet bgs, 1 at 20.5 feet bgs,
1 at 31.5 feet bgs
1 at 33 feet bgs.

- The gas monitoring probes were constructed in general accordance with applicable portions of CCR Title 27 to generally evaluate the vertical distribution of suspected landfill gas. However, the probe locations are not intended to conform to spacing requirements as indicated in sections included in CCR Title 27.

- Collected soil/waste samples during drilling from 13 borehole locations for laboratory analysis. Soil/waste samples have been analyzed for constituents of potential concern (COPC) to chemically characterize these subsurface materials (see Appendix F Lab results).

- Prepared boring logs during drilling to evaluate the types/thicknesses of the fill/cover at locations drilled (see appendix C Well Logs). Based on reviews of historical data, the proposed three deeper borings/probes will not extend to the assumed depths of the former sand and gravel pits reportedly backfilled with mine tailings, mixture of fill and oil, and reportedly debris because the former pits reportedly attained depths in excess of 100-120 feet bgs. The lateral extent of the pits is generally known as a result of information obtained from reviewing historical aerial photographs and previously prepared documents and reports.

- Collected and analyzed selected soil gas samples from the 13 wells approximately 24 hours after their construction and will be conducting subsequent monitoring for a period of at least one year (see Appendix F Lab results).

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2.4 The Investigation

The investigation began March 27 and lasted until March 31, 2006. A total of 13 multi-depth gas monitoring wells were installed. During the boring of the wells, soil samples were collected in brass sleeves and sent to the lab for analysis of constituents of concern. Previous investigations sponsored by The Los Angeles Sanitation Districts show background levels to be similar to those obtained in previous reports (see Appendix K for back-ground information). It was expected that there was a possibility of elevated levels of hydrocarbons would be found in the soil samples due to a mixture of petroleum and sand that was used as fill when the site was first graded in the early 1970's. Total Petroleum Hydrocarbons were found in the soils at various levels and depths, a statistical analysis shows ranges from 0-183 mg/kg (parts per million), 0-507 mg/kg (ppm) and 0-414 mg/kg (ppm). The integrated Waste Management Board and Department of Toxic Substances Control does not regulate TPH, the results and the report has been forwarded to the Regional Water Quality Control Board for review. Well locations (see Figure 5) were chosen using previous site investigation reports and well logs that showed the subsurface soil conditions with any evidence of waste or debris. (See Appendix L Historic site investigations).

Day 1 March 27, 2006:

A Health and Safety Tail-gate meeting was held at Deportolla Park on Whiffle Tree Ln., attending was CIWMB, Ninyo and Moore, Layne Drilling Co. Los Angeles County Solid Waste (LEA) and a inspector for the City of Torrance. A Health and Safety Tail Gate meeting was held at location P10 on Candlewood Drive to go over the details of the Health and Safety Plan. Drilling commenced at 10am. The well was completed as a dual completion. The well was originally designed to be a triple completion and drilled to a depth of 51 feet but due to ground water being encountered at 34 feet the decision was made to complete this well as a dual. The shallow probe was screened from 5-15 feet. The Deep probe was screened from 20-30 feet below ground surface (bgs) (see Appendix D for well design). There was no waste encountered in the drilling of this probe.

Day 2 March 28, 2006:

Well P11 is located at the end of the cul-de-sac of Brandywine court. The well was drilled to 51 feet (bgs) and set as a triple completion. The shallow probe was screened from 5-15 feet (bgs). The medium probe was screened from 20-30 feet (bgs). The deep probe was screened from 35-50 feet (bgs). According to the boring logs no solid waste was encountered.

Well P2 is located in the street on Fallenleaf Drive near the back entrance to the Ralphs parking lot. The well was drilled to 51 feet (bgs) and set as a triple completion. The shallow probe was screened from 5-15 feet (bgs). The medium probe was screened from 20-30 feet (bgs). The deep probe was screened from 35-50 feet (bgs). According to the boring logs no solid waste was encountered.

Day 3 March 29, 2006:

Well P1 is located directly across from 2921 Oakwood Lane, on the southern side of the street about 2 feet from the curb. The well was drilled to 16.5 feet (bgs) and set as a single completion. Ground water was encountered at 13 feet (bgs). The probe was screened from 5-10 feet (bgs). According to the boring logs no solid waste was encountered.

Well P6 is located next to 3113 Singing Wood Drive, approximately 10 feet from the curb to the west. The well was completed as a single construction and drilled to 16.5 feet. Water was encountered at approximately 13 feet (bgs). The probe was screened from 5-15 feet, according to the boring logs no solid waste was encountered.

Well P13 is located next to 25602 Amber leaf drive, The corner of Amber Leaf and Windmill about 5 feet west of the curb. The well was completed as a single construction and drilled to 16.5 feet. Water was encountered at approximately 13 feet (bgs). The probe was screened from 5-15 feet; according to the boring logs no solid waste was encountered.

Well P3 is located in the cul-de-sac of Softwind Way across from 3002 approximately 600 feet down Softwind Way and 600 feet from Fallenleaf Drive. The well was drilled to a depth of 16.5 feet and completed as a single completion. The probe was screened from 5-15 feet, according to the boring logs no solid waste was encountered

Day 4 March 30, 2006

Well P9 is located across from 3244 Whiffle Tree lane about 50 feet north of the street on the grassy hill. The well was drilled to 18.5 feet and completed as a single completion. The probe was screened from 5-15 feet, according to the boring logs no solid waste was encountered.

Well P8 is located across from 3216 Whiffle tree in the grass approximately 3-4 feet from the curb towards the park. The well was drilled to 20.5 feet (bgs). Perched groundwater was encountered during drilling at approximately 2-3 feet (bgs). The probe was screened from 9-19 feet bgs due to the water that was encountered (see appendix D well logs), according to the boring logs no solid waste was encountered.

Well P7 is located In front of the Deportolla park sign, in the grass, approximately 12 feet north of the curb on the corner of Rolling Hills Drive and Whiffletree Lane. The well was drilled to 31.5 feet (bgs) and was completed as a dual completion. The shallow probe was screened from 5-15 feet (bgs) and the deep probe was screened from 20-30 feet (bgs). There was no ground water encountered and according to the well logs, no waste encountered either.

Well P5 In the corner of the park, 12 feet north-west of the curb in the grass on Rolling Hills Road. The well was drilled to 16.5 feet (bgs) and completed as a single completion probe. The probe was screened from 5-15 feet (bgs). There was no ground water encountered and according to the well logs, no waste encountered either.

Day 5 March 31, 2006

Well P4 is located in the north-east corner of the park. On the corner of Lazy Meadow Drive and Windmill Road approximately 16 ft, north- west of the sidewalk in the grass. The well was drilled to 16.5 feet (bgs) and completed as a single completion. The probe was screened from 5-15 feet (bgs). There was no ground water encountered and according to the well logs, no waste encountered either.

Well P12 is located on the north-east Corner of Rolling Hills Road and Madison, approximately 50 feet NE of rolling hills in the grass. The well was drilled to 33 feet (bgs) and completed as a dual completion. The shallow probe was screened from 5-15 feet (bgs) and the deep probe was screened from 20-30 feet (bgs). There was no ground water encountered and according to the well logs, no waste encountered either. For more information on the construction of the gas wells (see Appendix D well construction)

2.5 Data Collection

Gas sampling was conducted in the 13 gas monitoring wells using a Gas Detection instrument (GEM 2000, capable of measuring methane, carbon dioxide, oxygen and organic vapor up to 1,000 ppm) and gas sampling containers (Summa Canisters and Tedlar Bags) provided by CIWMB's Environmental Laboratory Accreditation Program (ELAP)-certified laboratory contractor. Field screening was conducted in accordance with the gas sampling and analysis plan and sample collection and analysis conducted in accordance with EPA technical order 15 (TO-15).

Collected gas samples have been analyzed for typical landfill gas constituents such as methane, carbon dioxide, nitrogen and hydrogen sulfide taken at selected probes. Due to a history of oil production and the historical information indicating the site to be a sump, it was necessary to fingerprint the gas using EPA TO3 (hydro-carbon speciation), EPA 15/16 (hydrogen sulfide) and EPA TIO-15 (VOC's). Ttrace gases (also referred to as Non-methane organic compounds NMOC) have been analyzed for a suite of Volatile Organic Compounds including trichloroethylene, perchloroethylene, dichloromethane, tetrachloroethane, benzene, toluene, xylene and ethyl benzene (see appendix Lab results).

Soil samples that were taken during the construction of the gas monitoring probes were analyzed for CAM 17 metals, total petroleum hydro-carbons (TPH), dioxin and PCB's/Pesticides and BTEX. Sample collection and analysis procedures for landfill gas followed the requirements outlined in the gas sampling and analysis plan (see Appendix a Work Plan).

Figure 5 Well Locations

3. Gas Sampling and Laboratory Results

This gas-sampling plan is intended to document the procedural and analytical requirements for this and any subsequent sampling events performed to collect gas samples and to characterize areas exceeding regulatory thresholds. This plan was compiled after reviewing the US Environmental Protection Agency's, Region 9, guidance document "Instructions for the One-time Sampling Event Sampling and Analysis Plan" dated March 1998. 13 gas monitoring wells were constructed, monitored and sampled during this investigation.

3.1 Landfill Gas Monitoring Well Installation

The gas monitoring wells were constructed pursuant to applicable portions of CCR Title 27, Section 20925 specifications. The well materials were plastic wrapped or kept on plastic sheeting to avoid potential contamination until they are lowered down the boring. Monitoring probe casing was constructed of flush-jointed, threaded, 1/2-inch inside-diameter (I.D.), schedule 80, polyvinyl chloride (PVC) pipe. probe screens were constructed of flush threaded, machine slotted (0.020-inch), ½ inch schedule 80.,

schedule 40, PVC casing. A copy of the as built well construction schematic is provided in (Appendix D Gas Well Construction) of this plan.

Prior to constructing the gas well, the bottom of each borehole was filled with approximately 1foot of sand. The screen/casing was placed in the hollow-stem auger to center the well casing. The well slotted screen intervals are 10 feet (except 1 (P1)) which is 5 feet in length. Solid PVC was attached and extended to or above ground surface. After installation of the casing, the filter pack, consisting of No. 3 sized Monterey sand, was placed in the annulus between the well casing and the boring wall to approximately 6 inches above the top of the screened interval. The filter pack was measured to monitor the depth and to avoid bridging between the well casing and the boring wall. Before placing the bentonite seal, the depth to the filter pack was confirmed and additional sand added, as necessary. After the filter pack was placed, a 2-foot thick bentonite seal (granular form) was placed in the annulus above the filter pack. The bentonite was saturated and allowed to hydrate; the remaining annulus was filled with 1 foot of Class “A” cement. A 1-foot diameter area of cement will surround the flush-mounted well boxes.

Soil samples were collected with a standard penetration test sampler. The sampler was driven approximately 18 inches in advance of the hollow-stem auger by a 140-pound hammer falling 30 inches. Upon retrieving the sampler from the borehole, the sampler was opened and logged. The borings were continuously logged by the Ninyo & Moore Registered Geologist. Soil cuttings were placed into a 55-gallon steel drum and at the end of each day. The drilling subcontractor moved these cuttings to the southern corner of the park a location prearranged by CIWMB. Soil samples were retrieved, capped, and labeled with project name, number, location and depth, collection date and time and other pertinent information. Soil samples were screened with a photo-Ionization detector (PID). Borings were back-filled with granular bentonite and hydrated, and the surface restored to approximate its original condition. Soil samples were retained at 5-foot intervals.

Gas samples were collected using pneumatic air pumps, GEM 2000, Tedlar Bags and Summa Canisters. All sampling equipment and containers were decontaminated prior to use. Samples were taken from gas monitoring probe sampling cocks or Tygon Tubing, or confined spaces. All sampling locations were screened with a GEM 2000 and a GMI multi-gas analyzer before obtaining sampling for analysis.

After each sample was collected it was labeled, logged on the chain-of-custody document, sealed, and stored in an ice chest that is cooled to 4 degrees Fahrenheit.

At the completion of sampling activities, CIWMB staff delivered (via Fedex) the selected samples to Excelchem, a State of California certified ELAP accredited laboratory for analyses using strict chain-of-custody protocols.

3.2 Results

Gas sampling and monitoring at the newly constructed monitoring occurred on the last day of the investigation. The 13 wells were monitored using a GEM 2000 and a GMI multi-gas analyzer. Probes were connected to a pneumatic sampling pump and pumped into a tedlar bag or directly into a suma canister and a sample collected for laboratory analysis.
The chart below shows the results of the initial gas screening performed March 31, 2006. The results indicate that there is no concentration of methane gas above regulatory thresholds of 5% by volume in any of the wells.

Based on the analytical results obtained from gas and soil samples collected during the field investigation, the following observations and results are noted:

1. Soil Gas Sampling

a) Initial gas sampling results from P1-P13 did not show gas concentrations exceeding the 5% rule for perimeter gas monitoring probes, which is the regulatory threshold prescribed in 27 CCR 20925. The maximum concentrations found were P10 (2.2%), P12d (1.7%) and P13 (1.9%).

b) The only significant result to report from Volatile Organic Compound analysis of gas samples taken from the monitoring probes was the presence of Xylene, which was detected 17 samples. The average concentration of Xylene was 4.17 mg/m3.

c) EPA T.O. 3 analysis of gas samples indicates the presence of straight chain hydrocarbons (C2-C6), which may indicated the presence of petrogenic sources of gas (butane, propane, pentane). The C5 hydrocarbon (Pentane) was detected in all gas samples. C2 (Butane) was detected in 4 of 18 samples; C3 (Propane) was detected in 8 or 18 samples; C4 was detected in 14 or 18 samples.

2. Geologic Logging

a) No disposal debris (glass, wood, metals, etc), was encountered during boring activities conducted. Based on the boring logs from the field investigation, only engineered fill soils were encountered, which based on historical documents, could have been import or onsite fill materials used to grade the site in preparation for development.

3. Soil Sampling

a) Petroleum Hydrocarbons (TPH) were detected in many of the boring samples; however the contaminants did not appear to be at significant levels in shallow soils down to 15 feet. Most of the TPH contaminated soils at concentrations greater

than 5 mg/kg appeared to be at depth (beyond 15 feet; primarily between depths of 20 and 50 feet). Borings containing significant TPH contamination include P2-20, P2-50, P7-20, P7-30, P8-15, P8-19, P10-37, P10-42, P10-50 and P13-05. The TPH contamination of soils at the site is consistent with historical documents for the site use prior to development. The presence of TPH at the site and any health risk posed to residences or comparisons to PRG (Preliminary Remediation Goal concentration levels), would need to be assessed by the Department of Toxic Substances Control (DTSC) and/or the Office of Environmental Health Hazard Assessment. Most of the shallow soils from 1-15 feet meet PRGs (1 mg/kg).

b) Metals analysis from soil samples taken from borings, indicate no concentration levels of metals that exceed regulatory thresholds for Total Threshold Limit Concentration (TTLC) for hazardous substances pursuant 22 CCR Section and are consistent with background levels of metals for the area. Lead levels, generally the primary metal of concern at municipal waste disposal sites and burn dumps, were below 100 mg/kg (avg for 6.52 mg/kg for 38 results)

Initial Monitoring Results

Initial readings for Disposal Gardens Probes					
Probe	**CH4**	**CO2**	**O2**	**Balance**	**Comments**
P1	initial .1%	0%	22.50%	77.40%	15 foot probe Time sample taken was 850am on 3/31/06
P2	0	0	0	0	Shallow probe (closest to the drive way) had water, pulled a tedlar and a Suma
					Medium, some water pulled a tedlar, Deep was dry and we pulled a tedlar and a suma
P3	initial .1%	0.70%	22.70%	76.50%	Sample taken at 10.20am (Suma) 3/31/06
P4	initial, .1%	0.50%	22.40%	77.00%	Sample taken at 10.30am 3/31/06, (suma) single 15 foot completion
P5	initial, .1%	4.20%	15.80%	80.00%	Suma Taken at 110am on 3/31/06, single 15 foot completion
P6	initial, .1%	2.50%	11.90%	86.00%	Suma Taken at 9:12am on 3/31/06, Single 15 foot completion
P7	initial, .1%				
shallow	0.10%	1.00%	17.70%	81.20%	Suma Taken at 9.54am on 3/31/06, This well is dual completion, shallow being set at 5-15ft .
deep	0.10%	0	23.00%	76.90%	Deep probe set at 20-30ft.Deep robe may have water in it at the time of sample.
P8	initial, .1%				
	0.20%	6.40%	6.30%	77.10%	Suma Taken at 9.35am 3/31/06, This well was completed as a single probe set at 20 feet,
					purged water encountered at 3ft, bentonite seal and solid pvc set to 2-8.9 feet, screened from 9-19 feet
P9	initial, .1%	6.40%	19.0&	74.50%	Suma Taken at 9.23am, 3/31/06, This well was completed as a single completion screened at 5-15 feet
P10	0.60%	0%	22.00%	77.30%	Deep Probe is flooded unable to take a reading or a sample Time is 9.30am 3/30/06
					Shallow probe is ok readings were taken, A Suma and a tedlar was taken
P11	0	0	0	0	Pulled a shallow, medium and deep sample (no water) Was able to obtain a tedlar and
P12	initial, .1%				Probe set to a dual. Due to water intrususion on other probes, additional probe added to cover a deeper zone
Shallow	0.10%	0.30%	22.30%	77.40%	Shallow probe set to 5-15 feet of screen. Suma was taken at 209pm 3/31/06
Deep	0	0	22.70%	77.30%	Deep probe set to screen at 20-30 feet. Suma taken
P13	initial, .1%	2.40%	15.70%	81.28%	Single completion well set at 15 feet. Screened at 5-15 feet. Suma taken at 8.35am 3/31/06

3.3 Laboratory Results

The laboratory results reported below are for TO15, ASTM D1946 (fixed gas), TO3 (C2-C10 Hydro carbon chain), and EPA 15/16 Hydrogen Sulfide.

Laboratory Results

ASTM D1946

Fixed Gasses **Probe #**

		P1	P2 (s)	P2 (d)	P3	P4	P5	P6	P7 (s)	P7 (d)	P8	P9
Carbon Dioxide		7.1	0.038	0.96	0.59	0.49	1.5	1.1	1.1	5.6	0.11	5.4
Methane		ND	ND	0.0022	ND	ND	ND	0.005	ND	0.026	ND	ND
Nitrogen		74	75	74	82	77	76	80	79	81	81	78
Oxygen/Argon		19	21	19	23	21	18	16	16	11	22	19

ND Non-Detect
Reported in % v/v

ASTM D1946

Fixed Gasses **Probe #**

Carbon Dioxide		P10 longer	P11 (s)	P11 (m)	P11 (d)	P12 (s)	P12 (d)	P13	Background			
Methane		2.2	0.12	0.19	0.04	0.32	1.7	1.9	0.039			
Nitrogen		0.013	ND	ND	ND	ND	ND	ND	ND			
Oxygen/Argon		79	80	80	80	79	78	83	81			
		19	15	22	23	22	21	17	23			

ND Non-Detect
Reported in % v/v

EPA TO15

Volatile Organics Compounds Found

Analyte	Probe #										
	P1	**P2 (s)**	**P2 (d)**	**P3**	**P4**	**P5**	**P6**	**P7 (s)**	**P7 (d)**	**P8**	**P9**
Acetone	ND	ND	**20.4**	ND	ND	ND	ND	ND	ND	9.5	ND
Carbo disulfide	ND	ND	ND	ND	ND	ND	1	0.9	1	ND	ND
Benzene	ND	ND	ND	ND	ND	3.7	ND	ND	ND	ND	ND
Toluene	ND	1.9	ND	ND	ND	20.2	ND	0.5	ND	ND	ND
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	5.5	ND	ND	0.9	ND	ND
m,p-Xylene	**1.3**	**1.2**	**1**	**1.6**	**1.3**	**49.7**	**1.1**	**1.2**	**1.2**	**1.1**	**1.2**
o-Xylene	**0.5**	ND	ND	**0.6**	**0.5**	**14.8**	ND	**0.5**	**0.5**	**0.5**	ND

Reported in mg/m3 Air
ND non-detect

Volatile Organics Compounds Found

Analyte	Probe #										
	P10 long	**P11 (s)**	**P11 (m)**	**P11 (d)**	**P12 (s)**	**P12 (d)**	**P13**	**background**			
Acetone	ND	ND	ND	ND	ND	ND	**5.1**	ND			
Carbo disulfide	ND	**0.5**	ND	ND	ND	ND	**0.8**	ND			
Benzene	ND	ND	ND	ND	ND	ND	ND	ND			
Toluene	**3.3**	ND	ND	ND	ND	ND	ND	ND			
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND			
m,p-Xylene	**1.8**	ND	**1.9**	**1.6**	**1.2**	**1.3**	**1.2**	ND			
o-Xylene	**0.6**	ND	**0.6**	**0.6**	ND	**0.5**	**0.5**	ND			

Reported in mg/m3 Air
ND non-detect

EPA TO-3 (C2-C10 Carbon Chain)

Analyte	Probe #										
		P1	**P2 (s)**	**P2 (d)**	**P3**	**P4**	**P5**	**P6**	**P7 (s)**	**P7 (d)**	**P8**	**P9**
C2 Hydrocarbons		ND	ND	ND	ND	ND	1.5	ND	ND	ND	3.1	ND
C3 Hydrocarbons		0.23	ND	ND	ND	ND	0.82	ND	ND	0.74	2.5	1.4
C4 Hydrocarbons		0.29	0.3	3.4	ND	ND	0.77	4.6	2.6	2.8	2.2	1.6
C5 Hydrocarbons		1.2	0.88	4.9	0.45	0.54	3	0.73	1.1	1.3	4.4	1
C6 Hydrocarbons		0.22	ND	2	ND	ND	15	0.34	0.27	0.45	1.8	ND
>C6 Hydrocarbons		2.9	8.6	13	5.5	5.9	270	4.4	22	37	6.8	5.8

Reported in ppmv
ND non-detect

EPA TO-3 (C2-C10 Carbon Chain)

Analyte	Probe #								
		P10 long	**P11 (s)**	**P11 (m)**	**P11 (d)**	**P12 (s)**	**P12 (d)**	**P13**	**backgrnd**
C2 Hydrocarbons		ND	ND	ND	ND	0.27	0.98	ND	ND
C3 Hydrocarbons		1	ND	ND	ND	ND	0.53	0.61	ND
C4 Hydrocarbons		0.98	14	0.3	ND	ND	0.49	0.82	ND
C5 Hydrocarbons		3	8.5	1	0.48	0.33	0.68	1.9	ND
C6 Hydrocarbons		0.59	3.9	ND	ND	ND	0.22	ND	ND
>C6 Hydrocarbons		27	12	12	11	6.2	8	4.9	0.49

Reported in ppmv
ND non-detect

EPA 15/16 Hydrogen Sulfide
The results came back non-detect in all 13 wells.

Soil Sample results

EPA 8082 PCB's/Pesticides
All results came back non-detect in all soil samples

EPA 8270 Semi Volatiles
One analyte was detected in the soil samples.
In well P11-45 N-Nitrosodi-n-propylamine was detected at 0.182 mg/kg. All other samples came back non-detect.

EPA 8021 BTEX/TPHG
All results came back non-detect in all soil samples

EPA 8280A Dioxins/Furans
All results came back non-detect in all soil samples analyzed for this analyte.

EPA 8015m TPH (extended range

In an attempt to distinguish between the possibility of naturally occurring petroleum producing shale and other naturally occurring sources which could contribute to any methane that may be produced, A TPH (Total Petroleum Hydrocarbon) 8015m extended range C7-C44 was run for analysis.

Note: The CIWMB does not regulate petroleum or other hydrocarbon sources. This information has been shared with DTSC and RWQCB.
Historical information suggests that a 20% mixture of petroleum and sand was used as fill during the grading of this site in the 1970's (see Appendix A workplan).

Typically, the breakdown of components in TPH is as follows:
C7-12 is Gasoline or Gasoline by products.
C12-24 is Diesel
C24-44 and higher is generally heavier hydrocarbons (petroleum, waste oils, crude oils)
The following Charts reflect the information received.

EPA 8015m Total Petroleum Hydrocarbons Extended Range C7-44

Analyte **Sample Location and Depth**

	P1-05	P1-10	P1-15	P2-05	P2-10	P2-15	P2-20	P2-25	P2-30	P2-35	P2-40	P2-45	P2-50
C7,C8,C9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C10-C11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**3.7**
C12-C13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**14.9**
C14-C15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**20.9**
C16-C17	ND	ND	ND	ND	ND	ND	**8.3**	ND	**1.1**	**1**	**1.4**	**1**	**48.6**
C18-C19	ND	ND	**1.4**	ND	ND	ND	**16.5**	ND	**1.5**	**1.3**	**2**	**1.6**	**61.1**
C20-C21	ND	**1.8**	**2.1**	ND	ND	ND	**34.7**	ND	**2**	**1.8**	**2.4**	**2.4**	**70.3**
C22-C23	ND	**2.1**	**1.9**	ND	ND	**1**	**48.9**	ND	**1.8**	**1.6**	**1.8**	**2.1**	**60.3**
C24-C25	ND	**2.2**	**1.7**	ND	ND	**1.2**	**70**	ND	**1.8**	**2**	**1.8**	**2**	**55.8**
C26-C27	ND	**2.6**	**2.6**	ND	ND	**1.2**	**86.6**	ND	**1**	**3.2**	ND	**1.2**	**49.3**
C28-C29	ND	**3**	**2.8**	ND	ND	**1.3**	**100**	ND	**1.2**	**4.4**	**1.1**	**1.4**	**37.2**
C30-C31	ND	**3**	**2.8**	ND	ND	**1.2**	**98.4**	ND	**1.4**	**5**	**1.3**	**1.5**	**25.6**
C32-C33	ND	**2.5**	**2.6**	ND	ND	ND	**75.3**	ND	**1.4**	**4**	**1.3**	**1.4**	**11.6**
C34-C35	ND	**2.1**	**2.1**	ND	ND	ND	**67.9**	ND	**1.1**	**2.8**	1	**1.1**	**8.4**
C36-C37	ND	**1.8**	**1.5**	ND	ND	ND	**58.3**	ND	ND	**1.6**	ND	ND	**4.9**
C38-C39	**1.8**	**2**	**1.7**	ND	ND	ND	**54.5**	ND	ND	**1.4**	ND	ND	**3.2**
C40-C44	**3**	**2.7**	**2**	ND	ND	**1.2**	**65**	ND	ND	**1.4**	ND	**1**	**1.7**

ND = Non-detect reported in mg/kg

EPA 8015m Total Petroleum Hydrocarbons Extended Range C7-C44

Analyte **Sample Location and Depth**

	P3-05	P3-10	P3-15	P4-05	P4-10	P4-15	P5-05	P5-10	P5-15	P6-05	P6-10	P6-15
C7,C8,C9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C10-C11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C12-C13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C14-C15	ND	ND	ND	ND	ND	ND	**2.3**	ND	ND	ND	ND	1.2
C16-C17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**2.3**	**2.3**
C18-C19	ND	ND	ND	ND	ND	ND	**1**	**1.8**	ND	**1.2**	**1.9**	**3.3**
C20-C21	ND	ND	ND	ND	ND	ND	**1.8**	**3.2**	ND	**1.3**	**3**	**5.1**
C22-C23	ND	ND	ND	ND	ND	ND	**1.4**	**2.3**	ND	**1.1**	**2.5**	**4.1**
C24-C25	ND	ND	ND	ND	ND	ND	**2.4**	**1.5**	ND	**1**	**2**	**3.9**
C26-C27	ND	ND	ND	ND	ND	ND	ND	ND	ND	**1.1**	**1.4**	**3.6**
C28-C29	ND	ND	ND	ND	ND	ND	ND	ND	ND	**1.4**	**1.7**	**4.1**
C30-C31	ND	ND	ND	ND	ND	ND	**1**	ND	ND	**1.5**	**2**	**4.4**
C32-C33	ND	ND	ND	ND	ND	ND	**1.5**	**1.1**	ND	**1.5**	**1.7**	**3.6**
C34-C35	ND	ND	ND	ND	ND	ND	**1.7**	**1.1**	ND	**1.5**	**1.4**	**2.5**
C36-C37	ND	ND	ND	ND	ND	ND	**1.2**	ND	ND	**1.4**	**1**	**1.7**
C38-C39	ND	ND	ND	ND	ND	ND	**1.6**	**1.3**	**1**	**1.6**	**1.1**	**1.8**
C40-C44	ND	ND	ND	ND	ND	ND	**2.5**	**1.6**	**1.8**	**2.2**	**1.3**	**1.5**

ND = Non-detect reported in mg/kg

EPA 8015m Total Petroleum Hydrocarbons Extended Range C7-C44

Analyte **Sample Location and Depth**

	P7-05	P7-11.5	P7-15	P7-20	P7-25	P7-30	P8-05	P8-11.5	P8-15	P8-19	P9-05	P9-10	P9-17.5
C7,C8,C9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C10-C11	**1.4**	ND	ND	**12.6**	ND	**28.3**	ND	ND	**2**	ND	ND	ND	ND
C12-C13	ND	ND	ND	**59.9**	ND	**113**	ND	ND	**5.2**	**1.9**	ND	ND	ND
C14-C15	**2.4**	ND	ND	**92.1**	ND	**183**	ND	ND	**5.7**	**2.5**	ND	ND	ND
C16-C17	**1**	ND	ND	**194**	**1.4**	**422**	ND	**1**	**10.7**	**4.1**	ND	ND	ND
C18-C19	ND	ND	ND	**217**	**2.5**	**493**	ND	**2.3**	**11.4**	**12.5**	ND	**1.6**	ND
C20-C21	**3.2**	ND	ND	**209**	**2.4**	**507**	**1**	**3.8**	**11.6**	**36.5**	**1.4**	**3.5**	ND
C22-C23	**1.8**	ND	ND	**156**	**1.5**	**390**	**1.2**	**3.5**	**8.4**	**41.7**	**1.3**	**3.3**	ND
C24-C25	**1.2**	ND	ND	**112**	**1.1**	**321**	**1.4**	**3.3**	**6.2**	**28.8**	ND	**3.2**	ND
C26-C27	**1.7**	ND	ND	**150**	**1.2**	**414**	**1.3**	**2.9**	**8.6**	**12.7**	ND	**2.8**	ND
C28-C29	**1.6**	ND	ND	**97.6**	**1**	**323**	**1.3**	**2.8**	**7.2**	**6.9**	ND	**2.7**	ND
C30-C31	**1.4**	ND	ND	**58.8**	ND	**237**	**1**	**2.2**	**5.7**	**4.1**	ND	**2.2**	ND
C32-C33	**1.3**	ND	ND	**33**	ND	**155**	ND	**1.7**	**4.2**	**2.4**	ND	**1.8**	ND
C34-C35	**1.5**	ND	ND	**26.1**	ND	**121**	ND	**1.6**	**3.6**	**1.8**	**1**	**1.7**	ND
C36-C37	**1**	ND	ND	**22**	ND	**95**	ND	**1.4**	**2.9**	**1.3**	ND	**1.4**	ND
C38-C39	**1.4**	ND	ND	**20.3**	ND	**82.9**	ND	**1.6**	**3**	**1.1**	ND	**1.7**	ND
C40-C44	**2**	ND	ND	**18.9**	**1.4**	**70.3**	**1.9**	**2.5**	**2.3**	**1.1**	**1.5**	**2.6**	ND

ND = Non-detect reported in mg/kg

EPA 8015m Total Petroleum Hydrocarbons Extended Range C7-C44

Analyte **Sample Location and Depth**

	P10-05	P10-10	P10-15	P10-20	P10-25	P10-30	P10-37	P10-42	P10-50
C7,C8,C9	ND	ND	ND	ND	ND	ND	**1.2**	ND	ND
C10-C11	ND	ND	ND	ND	ND	ND	**5.8**	**1.8**	ND
C12-C13	ND	ND	ND	ND	ND	ND	**15.3**	**6.1**	**3.5**
C14-C15	ND	ND	**1.8**	ND	ND	ND	**21.9**	**9.5**	**6.4**
C16-C17	ND	ND	**6**	ND	**1**	ND	**47.3**	**22.2**	**14.9**
C18-C19	ND	ND	**6.2**	ND	**1.3**	**1.2**	**55.7**	**27.4**	**18.8**
C20-C21	ND	**1.9**	**8.2**	**1.7**	**2**	**1.9**	**67**	**32.1**	**21.4**
C22-C23	ND	**2.2**	**6.2**	**1.5**	**1.5**	**1.6**	**55.1**	**27.2**	**18**
C24-C25	ND	**2**	**3.2**	**1**	**1.3**	**1.3**	**48.8**	**25**	**14.9**
C26-C27	ND	**2.6**	**4.8**	**1.6**	ND	ND	**52.2**	**22.1**	**19.1**
C28-C29	ND	**2.4**	**3.6**	**1.6**	ND	ND	**37.7**	**16.8**	**14.6**
C30-C31	ND	**2**	**3.7**	**1.6**	ND	**1**	**26.1**	**11.8**	**10.3**
C32-C33	ND	**1.7**	**4.2**	**1.4**	ND	ND	**11.9**	**6.1**	**5**
C34-C35	ND	**1**	**2.8**	**1.4**	ND	ND	**9.1**	**4.1**	**4.4**
C36-C37	ND	**1.1**	**2.1**	**1**	ND	ND	**5.3**	**2.7**	**3.1**
C38-C39	ND	**1.1**	**1.9**	**1.2**	ND	ND	**3.7**	**2**	**2.6**
C40-C44	ND	**2**	**2.6**	**1.6**	**1**	**1**	**2.1**	**1.4**	**1.9**

ND = Non-detect
reported in
mg/kg

EPA 8015m Total Petroleum Hydrocarbons Extended Range C7-C44

Analyte **Sample Location and Depth**

	P11-05	P11-10	P11-15	P11-22	P11-25	P11-30	P11-35	P11-40	P11-45	P11-50
C7,C8,C9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C10-C11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C12-C13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
C14-C15	ND	ND	**2.2**	ND	ND	ND	ND	ND	ND	ND
C16-C17	ND	**1.4**	**5.9**	ND	**1.1**	ND	ND	ND	ND	ND
C18-C19	ND	**2.7**	**8.2**	**1**	**1.2**	ND	ND	ND	ND	ND
C20-C21	**1.1**	**3.9**	**9.8**	**1.7**	**1.7**	**1**	ND	ND	ND	ND
C22-C23	**1.3**	**3.9**	**8.1**	**1.8**	**1.4**	ND	ND	ND	ND	ND
C24-C25	**1.3**	**3.8**	**6.7**	**1.7**	**1.1**	ND	ND	ND	ND	ND
C26-C27	**2.5**	**6.2**	**10.3**	**2.1**	**1.1**	ND	ND	ND	ND	ND
C28-C29	**2.6**	**6.5**	**8.1**	**1.9**	**1**	ND	ND	ND	ND	ND
C30-C31	**2.4**	**5.4**	**5.8**	**1.6**	**1.3**	ND	ND	ND	ND	ND
C32-C33	**2**	**4.1**	**3.7**	**1.1**	**1.2**	ND	ND	ND	ND	ND
C34-C35	**2**	**3.5**	**2.8**	**1.1**	**1.2**	ND	ND	ND	ND	ND
C36-C37	**2**	**3.2**	**2.4**	**1**	ND	ND	**1.1**	ND	ND	ND
C38-C39	**2.2**	**3.2**	**2.2**	**1.3**	**1.3**	ND	**1.5**	ND	ND	ND
C40-C44	**3.8**	**4.6**	**3**	**2.5**	**1.7**	**1.3**	**3.4**	ND	ND	ND

ND = Non-detect reported in mg/kg

EPA 8015m Total Petroleum Hydrocarbons Extended Range C7-C44

Analyte **Sample Location and Depth**

	P12-05	P12-10	P12-15	P12-20	P12-25	P12-30	P13-05	P13-10	P13-15
C7,C8,C9	ND	ND	ND	ND	ND	ND	ND	ND	ND
C10-C11	ND	ND	ND	ND	ND	ND	ND	ND	ND
C12-C13	ND	ND	ND	ND	ND	ND	ND	ND	ND
C14-C15	ND	ND	ND	ND	ND	ND	ND	ND	ND
C16-C17	ND	ND	**1.8**	ND	ND	ND	**5.6**	ND	ND
C18-C19	ND	ND	**3.5**	ND	ND	ND	**8.2**	**1.3**	ND
C20-C21	ND	ND	**6.8**	ND	ND	ND	**12.2**	**1.7**	ND
C22-C23	ND	ND	**8.2**	ND	ND	ND	**13.7**	**1.5**	ND
C24-C25	ND	ND	**7.8**	ND	ND	**1.1**	**17.3**	**1.4**	ND
C26-C27	ND	ND	**5.8**	ND	ND	**1**	**20**	**1.5**	ND
C28-C29	ND	ND	**4.8**	ND	ND	**1.1**	**22.8**	**1.5**	ND
C30-C31	ND	ND	**3.4**	ND	ND	ND	**20.8**	**1.8**	ND
C32-C33	ND	ND	**2**	ND	ND	ND	**13**	**1.6**	ND
C34-C35	ND	ND	**1.4**	ND	ND	ND	**9.8**	**1.6**	ND
C36-C37	ND	ND	**1**	ND	ND	ND	**7**	**1.3**	ND
C38-C39	ND	ND	ND	ND	ND	ND	**5**	**1.7**	ND
C40-C44	ND	ND	**1.2**	ND	ND	ND	**4.6**	**2.9**	ND

ND = Non-detect
reported in
mg/kg

Statistical Analysis

EPA 8015m Total Petroleum Hydrocarbon Extended Range C7-C44 Statistical Analysis

C7-C16 Hydrocarbons generally are constituents of gasoline had an average concentration of 2.4ppm in all 13 wells the range was from 0 to 183ppm .
C16-C24 Hydrocarbons generally are constituents of Diesel and had an average concentration of 13.7ppm in all 13 wells the range went from 0 to 507ppm
C24-C44 Hydrocarbons generally are constituents of Motor and crude oil and had an average concentration of 6.71ppm in all 13 wells the range went from 0 to 414ppm
All tests were run with a 90% confidence level

C7-C15	
Mean	2.380681818
Standard Error	0.925662877
Median	0
Mode	0
Standard Deviation	15.04024152
Sample Variance	226.2088649
Kurtosis	95.07402513
Skewness	9.225472829
Range	183
Minimum	0
Maximum	183
Sum	628.5
Count	264
Confidence Level(90.0%)	1.527962101

C16-C25	
Mean	13.72242424
Standard Error	3.16856296
Median	1.05
Mode	0
Standard Deviation	57.55980461
Sample Variance	3313.131107
Kurtosis	45.89963623
Skewness	6.519597644
Range	507
Minimum	0
Maximum	507
Sum	4528.4
Count	330
Confidence Level(90.0%)	5.226539194

C25-C44	
Mean	6.713636364
Standard Error	1.298405666
Median	1
Mode	0
Standard Deviation	29.83509077
Sample Variance	890.132641
Kurtosis	98.37232295
Skewness	8.941783774
Range	414
Minimum	0
Maximum	414
Sum	3544.8
Count	528
Confidence Level(90.0%)	2.139448132

EPA CAM 17 Metals

Analyte	TTLC	Probe locations									
		P2-05	P2-10	P2-15	P2-20	P2-25	P2-30	P2-35	P2-40	P2-45	P2-50
Antimony	500	ND	3.800	3.100	2.100	1.300	2.500	3.700	1.900	2.400	1.800
Arsenic	500	ND	3.400	3.300	2.200	1.300	4.100	2.600	4.600	2.100	2.700
Barium	10000	180.000	61.500	405.000	125.000	26.800	158.000	138.000	131.000	143.000	89.500
Beryllium	75	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	100	ND	1.000	3.100	2.100	2.700	2.100	2.200	3.400	2.000	1.400
Chromium	500	17.000	46.900	81.200	54.100	44.600	60.900	56.300	81.300	45.100	39.600
Cobalt	8000	ND	6.900	7.300	6.400	ND	7.000	6.700	6.400	5.700	5.700
Copper	2500	8.500	33.800	29.100	42.400	7.800	18.000	41.100	24.400	22.800	12.200
Lead	1000	1.800	2.900	2.500	1.000	ND	ND	3.700	1.300	ND	ND
Mercury	20	0.035	0.046	0.064	0.068	0.041	0.067	0.080	0.072	0.075	0.049
Molybdenum	3500	ND	4.100	6.700	3.500	3.400	2.100	4.600	3.100	2.100	1.000
Nickel	2000	8.800	22.600	30.700	23.400	13.200	25.100	37.500	24.100	20.000	17.900
Selenium	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	500	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thallium	700	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	2400	16.600	43.300	76.500	51.200	42.400	57.600	54.000	79.600	43.000	36.700
Zinc	5000	19.100	72.100	79.800	112.000	56.000	89.700	97.300	94.700	105.000	79.700

ND Non-detect
Above Total Threshold Limit Concentration
Reported in mg/kg

EPA CAM 17 Metals

Analyte	TTLC	Probe locations					
		P5-05	P5-10	P5-15	P6-05	P6-10	P6-15
Antimony	500	1.000	ND	ND	2.400	2.300	6.600
Arsenic	500	ND	ND	ND	3.700	4.600	5.300
Barium	10000	165.000	128.000	383.000	231.000	172.000	173.000
Beryllium	75	ND	ND	ND	ND	ND	ND
Cadmium	100	ND	1.100	ND	1.700	1.900	7.000
Chromium	500	47.500	48.200	57.700	41.600	55.600	54.500
Cobalt	8000	9.500	8.400	8.100	5.400	7.300	7.400
Copper	2500	319.000	35.400	50.500	23.000	33.600	42.300
Lead	1000	ND	ND	ND	2.100	1.200	3.500
Mercury	20	0.079	0.083	0.074	0.045	0.071	0.015
Molybdenum	3500	5.900	5.000	5.600	5.500	3.100	2.100
Nickel	2000	22.500	30.700	42.800	24.900	23.100	27.000
Selenium	100	ND	ND	ND	ND	ND	ND
Silver	500	ND	ND	ND	ND	ND	2.700
Thallium	700	ND	ND	ND	ND	ND	ND
Vanadium	2400	48.000	46.800	57.700	38.600	53.900	52.800
Zinc	5000	392.000	88.800	83.800	68.700	118.000	105.000

ND Non-detect
Above Total Threshold Limit Concentration
Reported in mg/kg

EPA CAM 17 Metals

Analyte	TTLC	Probe locations												
		P7-05	P7-11.5	P7-15	P7-20	P7-25	P7-30	P8-05	P8-11.5	P8-15	P8-19	P9-05	P9-10	P9-17.5
Antimony	500	12.100	7.700	3.300	1.700	ND	1.000	1.400	2.100	2.300	2.900	4.900	1.600	2.300
Arsenic	500	ND	ND	ND	ND	ND	ND	1.600	3.700	4.300	3.500	4.200	5.200	1.300
Barium	10000	665.000	388.000	668.000	319.000	122.000	431.000	218.000	377.000	177.000	217.000	143.000	478.000	151.000
Beryllium	75	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	100	4.300	3.500	2.100	0.800	ND	0.500	0.800	1.000	1.400	0.900	2.900	1.800	1.800
Chromium	500	66.200	45.600	108.000	61.200	12.500	40.600	22.600	35.200	43.500	45.000	42.500	46.100	54.600
Cobalt	8000	9.000	8.700	6.500	9.100	ND	7.300	5.800	7.800	8.000	7.100	8.900	ND	6.600
Copper	2500	108.000	75.500	66.800	159.000	33.100	90.900	14.000	20.100	43.200	85.300	34.300	24.100	24.200
Lead	1000	1.000	ND	ND	67.700	1.200	40.100	3.100	3.800	4.800	4.900	5.000	2.900	5.100
Mercury	20	0.053	0.047	0.063	0.240	0.033	0.058	0.026	0.029	0.074	0.072	0.050	0.026	0.020
Molybdenum	3500	4.400	6.300	4.700	7.500	2.200	2.400	ND	1.200	9.600	7.300	9.700	6.600	ND
Nickel	2000	27.200	21.100	29.100	32.900	5.000	17.100	10.500	31.500	30.700	24.800	20.400	19.200	31.200
Selenium	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	500	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thallium	700	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	2400	66.000	45.600	109.000	61.600	12.200	39.400	22.000	34.200	43.000	44.200	41.200	44.300	55.900
Zinc	5000	59.100	57.300	119.000	117.000	16.400	57.800	26.800	35.200	81.600	70.800	59.500	33.900	47.200

ND Non-detect
Above Total Threshold Limit Concentration
Reported in mg/kg

EPA CAM 17
Metals

Analyte	TTLC	Probe locations								
		P10-05	P10-10	P10-15	P10-20	P10-25	P10-30	P10-37	P10-42	P10-50
Antimony	500	3.500	2.100	1.600	1.300	ND	1.700	1.400	1.500	1.300
Arsenic	500	2.500	2.100	1.800	1.900	ND	1.400	3.600	3.200	1.800
Barium	10000	223.000	287.000	241.000	251.000	109.000	174.000	325.000	288.000	454.000
Beryllium	75	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	100	0.900	2.900	2.100	2.400	2.000	1.300	1.100	1.400	1.500
Chromium	500	36.100	43.600	50.000	67.400	49.000	43.900	44.600	60.600	50.000
Cobalt	8000	6.800	7.000	7.500	6.300	6.600	6.300	6.300	8.000	6.700
Copper	2500	20.300	65.100	15.800	18.900	19.400	77.500	81.700	63.000	60.500
Lead	1000	3.700	4.600	ND	ND	ND	30.800	11.000	7.300	22.700
Mercury	20	0.027	0.023	0.077	0.065	0.075	0.100	0.073	0.068	0.090
Molybdenum	3500	1.100	1.100	3.300	6.000	1.900	5.700	5.000	7.600	6.500
Nickel	2000	15.400	18.000	19.300	14.700	13.900	18.700	29.500	22.300	25.700
Selenium	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	500	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thallium	700	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	2400	32.400	41.900	47.800	65.100	47.500	42.500	43.200	58.800	49.000
Zinc	5000	69.600	117.000	104.000	72.000	102.000	167.000	197.000	86.200	142.000

ND Non-detect
Above Total Threshold Limit Concentration
Reported in mg/kg

EPA CAM 17
Metals

Analyte	TTLC	Probe locations								
		P11-05	P11-10	P11-15	P11-22	P11-25	P11-30	P11-40	P11-45	P11-50
Antimony	500	ND	ND	3.900	ND	1.100	1.500	ND	ND	ND
Arsenic	500	1.100	ND	5.700	1.700	1.200	2.800	1.100	ND	1.100
Barium	10000	333.000	288.000	1220.000	149.000	211.000	151.000	49.500	46.500	32.600
Beryllium	75	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	100	0.700	0.600	5.700	1.300	2.000	2.600	ND	ND	ND
Chromium	500	34.100	27.700	109.000	19.200	56.900	64.400	9.000	10.900	8.600
Cobalt	8000	5.400	ND	ND	ND	7.100	10.200	ND	ND	ND
Copper	2500	19.800	14.000	45.900	17.400	12.500	45.300	8.200	6.200	7.300
Lead	1000	4.500	2.200	4.800	1.800	ND	1.800	ND	ND	ND
Mercury	20	0.026	0.024	0.023	0.010	0.057	0.082	0.021	0.011	0.011
Molybdenum	3500	ND	ND	4.200	ND	1.600	7.500	ND	ND	ND
Nickel	2000	13.000	10.200	34.100	10.400	15.500	52.000	4.000	5.100	3.400
Selenium	100	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	500	ND	ND	3.100	ND	ND	ND	ND	ND	ND
Thallium	700	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	2400	32.500	26.800	108.000	18.100	53.900	62.000	8.500	10.400	8.400
Zinc	5000	82.800	53.900	63.600	20.700	87.400	118.000	13.600	11.100	9.800

ND Non-detect
Above Total Threshold Limit Concentration
Reported in mg/kg

EPA CAM 17
Metals

Analyte	TTLC	Probe locations									
		P12-05	P12-10	P12-15	P12-20	P12-25	P12-30	P13-05	P13-10	P13-15	BACKGROUND
Antimony	500	1.200	ND	ND	ND	ND	ND	4.200	2.500	2.300	ND
Arsenic	500	ND	ND	ND	ND	ND	ND	5.200	2.900	2.200	ND
Barium	10000	627.000	793.000	648.000	1720.000	1290.000	1160.000	149.000	286.000	437.000	282.000
Beryllium	75	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	100	1.200	1.200	ND	1.900	1.800	1.100	2.000	2.900	1.700	1.000
Chromium	500	82.500	68.800	48.800	59.200	89.000	49.200	50.000	64.300	55.800	54.900
Cobalt	8000	12.100	ND	6.800	ND	ND	ND	7.800	7.500	8.900	5.700
Copper	2500	38.400	25.700	25.300	37.400	37.400	26.200	53.500	36.400	46.200	78.900
Lead	1000	ND	ND	ND	ND	ND	ND	4.000	3.100	4.600	8.600
Mercury	20	0.063	0.043	0.052	0.023	0.036	0.026	0.083	0.059	0.062	0.056
Molybdenum	3500	5.600	2.400	3.300	1.800	3.600	ND	8.600	5.500	6.900	6.600
Nickel	2000	39.700	18.600	18.500	14.800	28.600	16.300	37.600	30.300	33.500	30.900
Selenium	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silver	500	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thallium	700	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	2400	80.700	70.300	48.800	60.400	92.100	50.600	48.500	59.600	53.200	57.300
Zinc	5000	86.700	117.000	46.100	81.100	72.400	52.600	79.600	76.500	86.900	95.100

ND Non-detect
Above Total Threshold Limit Concentration
Reported in mg/kg

Back Ground Information Taken for the Palos Verdes Landfill Remedial Investigation Report Used for Comparison to Samples Taken for Disposal Gardens Investigation

TABLE 3.5-1
BACKGROUND AND DOWN-CANYON SUBSURFACE SOIL SAMPLE RESULTS
PALOS VERDES LANDFILL - REMEDIAL INVESTIGATION REPORT

CONSTITUENT	UNITS	ALL BACKGROUND SUBSURFACE SOIL SAMPLES					
		ALL VALUES			NON-DETECTED VALUES		
		NO. OF SAMPLES	RANGE	MEAN	NO. OF ND SAMPLES	RANGE	MEAN
GENERAL PARAMETERS							
PH	PH	51	6.9 - 9	8.06	0	NA - NA	NA
CONDUCTIVITY	UMHOS/CM	50	<0.01 - 3850	1035.1	1	0.01 - 0.01	NA
NITRATE NITROGEN	MG/KG N	50	<0.01 - 129	6.45	8	0.01 - 0.05	0.025
SULFATE	MG/KG SO4	50	3 - 2760	316.4	0	NA - NA	NA
CHLORIDE	MG/KG CL	50	5 - 1200	90.6	0	NA - NA	NA
OIL & GREASE	MG/KG	42	<150 - 3900	367.5	4	150 - 150	150
HYDROCARBONS-MODIFIED8015	MG/KG HC	53	<0.2 - 0.5	0.12	50	0.2 - 0.2	0.2
METALS							
CALCIUM	MG/KG CA	53	1130 - 171000	35523	0	NA - NA	NA
MAGNESIUM	MG/KG MG	53	682 - 99000	16856	0	NA - NA	NA
ARSENIC	MG/KG AS	53	0.17 - 58	4.995	0	NA - NA	NA
BARIUM	MG/KG BA	53	5.59 - 4400	408.55	0	NA - NA	NA
CADMIUM	MG/KG CD	53	<0.15 - 18.9	4.72	3	0.15 - 0.15	0.15
TOTAL CHROMIUM	MG/KG CR	53	16.2 - 193	86.73	0	NA - NA	NA
COBALT	MG/KG CO	53	<1.8 - 24.3	7.36	3	1.8 - 2	1.93
IRON	MG/KG FE	53	613 - 32900	11343	0	NA - NA	NA
LEAD	MG/KG PB	53	<2 - 5.31	1.60	40	2 - 2.5	2.23
MANGANESE	MG/KG MN	53	25.2 - 590	192.07	0	NA - NA	NA
MERCURY	MG/KG HG	50	<0.050 - 0.318	0.0961	11	0.05 - 0.05	0.05
NICKEL	MG/KG NI	53	13.4 - 294	69.88	0	NA - NA	NA
POTASSIUM	MG/KG K	53	262 - 7240	2514.2	0	NA - NA	NA
SELENIUM	MG/KG SE	53	<0.01 - 2.9	0.47	4	0.01 - 0.01	0.01
SILVER	MG/KG AG	53	<1 - 4.25	1.018	23	1 - 1	1.0
SODIUM	MG/KG NA	53	114 - 4560	979.4	0	NA - NA	NA
ZINC	MG/KG ZN	53	30.8 - 408	106.04	0	NA - NA	NA
ANTIMONY	MG/L SB	53	<0.5 - 5.5	1.17	18	0.5 - 0.5	0.50
BERYLLIUM	MG/KG BE	53	<0.5 - 2.94	0.90	18	0.5 - 0.5	0.50
MOLYBDENUM	MG/KG MO	53	<0.86 - 70.6	12.14	5	0.86 - 1	0.964
THALLIUM	MG/KG TL	53	<0.5 - <0.5	NA	53	0.5 - 0.5	0.50
VANADIUM	MG/KG V	53	37.5 - 645	184.3	0	NA - NA	NA

4. Conclusion

Based on the analytical results obtained from gas and soil samples collected during the field investigation, the following observations and results are noted:

No disposal debris (glass, wood, metals, etc), was encountered during boring activities conducted. Based on the boring logs from the field investigation, only engineered fill soils were encountered, which based on historical documents, could have been import or onsite fill materials used to grade the site in preparation for development. Although the Palos Verde's Landfill was not the focus of this investigation, no evidence methane gas migration was detected during this study. Monthly monitoring of the 13 Gas Wells will be conducted and an attachment with the findings will be submitted.

The site based on historical research, field data and observations, would marginally be considered a disposal site subject to 27 CCR minimum standards for disposal sites; however, if disposal site minimum standards are applied, no violations or areas of concern would exist with respect to cover, grading, drainage, erosion, security and gas standards for closed disposal sites, pursuant 27 CCR Section. Although surface drainage problems have been noted at the site, they are primarily related to surface improvements and not the cover. The CIWMB will continue landfill gas monitoring for a one-year period to monitor subsurface gas conditions in installed gas monitoring probes will provide a letter-report of findings after a 12 month period.

Assuming the site is a disposal site, it appears to meet Title 27 CCR State minimum Standards. During the installation of the gas monitoring wells, no solid waste was encountered and no levels of methane were detected above the regulatory thresholds. However, one time sampling events are not sufficient to prove that the site has no gas migration occurring. Monthly monitoring is recommended on newly constructed probes for a period of one year. After one year of monitoring results, a findings report will be developed and distributed.

Since landfill gas production typically follows a temporal cycle (normally associated with local hydrologic conditions), data collected from the new gas monitoring wells will be reported to the Los Angeles County Department of Health's Solid Waste Division Local Enforcement Agency (LEA) to be analyzed and to determine if future actions are necessary. This report will be forwarded to The Department of Toxic Substances Control (DTSC) , and The Regional Water Quality Control Board and The Los Angeles County Department of Health Solid Waste Division, Local Enforcement Agency LEA for further comment .

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Dames and Moore Jan 10, 1997

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