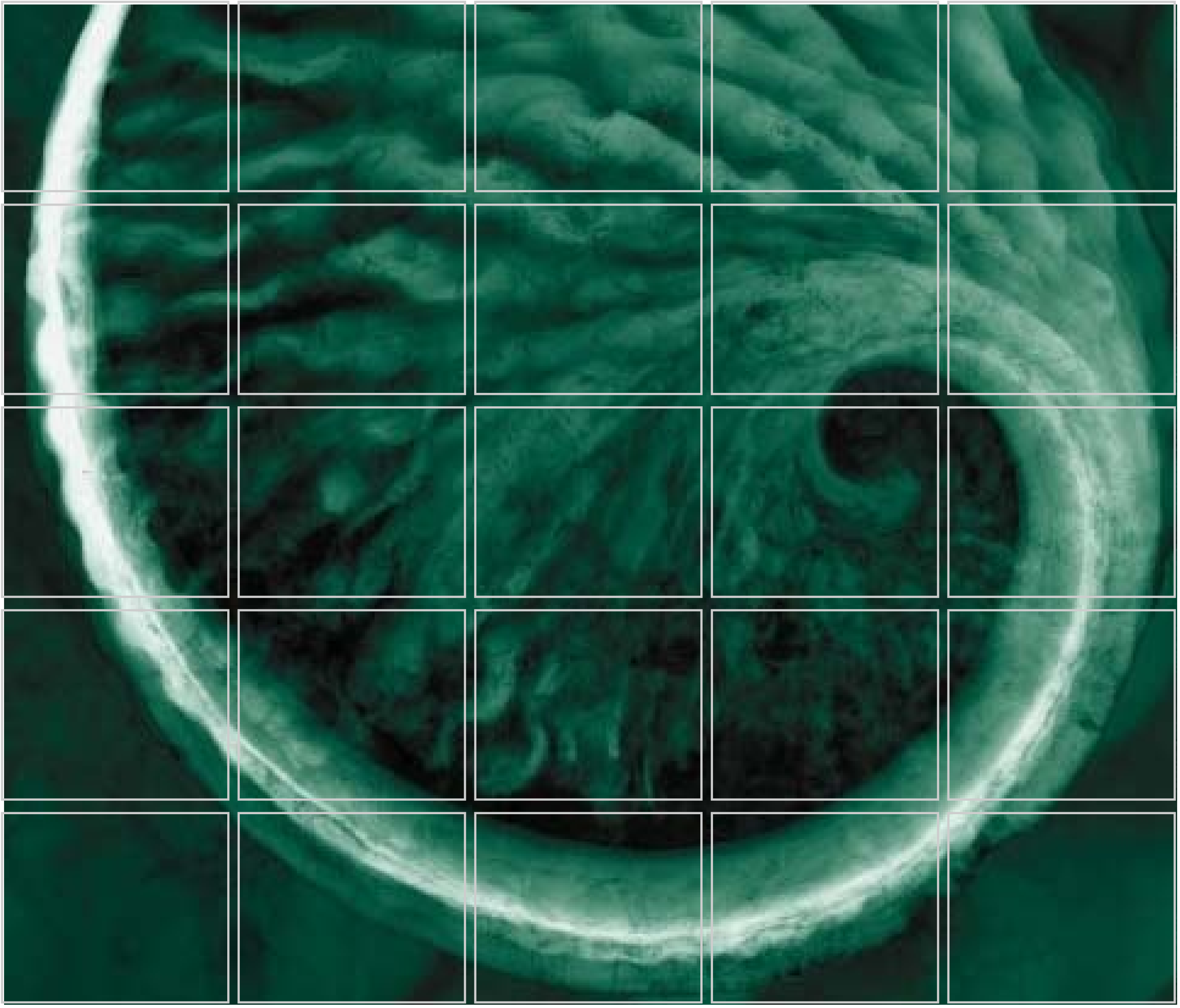
APPENDIX E-4: REMEDIAL ACTION PLAN



Remedial Action Plan

Westside Medical Park - Bundy Parcel

April 2005

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Westside Medical Park, LLC

Remedial Action Plan:
Westside Medical Park Bundy Parcel

April 2005

Los Angeles County, California

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1.0 INTRODUCTION

On behalf of Westside Medical Park, LLC, (Westside), ERM-West, Inc. (ERM) has prepared this Remedial Action Plan (RAP) for proposed remediation activities at the Bundy Parcel of the Westside Medical Park site (Site). The Site is located at 1901, 1925, and 1933 South Bundy Drive in Los Angeles County, California (Figure 1).

The subject property (Figure 2) consists of an approximately 5-acre parcel of land with three buildings that are currently vacant. These buildings were historically used for manufacturing and office administration activities, as documented in the *Phase I Environmental Site Assessment* Report (ERM; 2004a). Based on results of previous investigations, and the results of the more recent Phase II investigation, presented in the *Phase II Site Investigation Report* (ERM; 2004b), soil and soil vapor beneath three areas of the Site are impacted with volatile organic compounds (VOCs) and potentially semivolatile organic compounds (SVOCs) at concentrations warranting remedial action (Figure 2).

The overall objective of this RAP is to clean up identified impacted areas so that property redevelopment can proceed. Specifically, this document describes the remedial actions and provides detailed procedures for implementation of these actions.

The RAP is organized as follows:

- Section 2.0 summarizes Site background information, including previous investigation results;
- Section 3.0 discusses the remedial objectives of the RAP;
- Section 4.0 describes the proposed remediation activities including additional soil sampling, soil vapor extraction (SVE), and groundwater monitoring;
- Section 5.0 discusses health and safety requirements for the proposed field activities;
- Section 6.0 proposes a project schedule; and
- Section 7.0 provides references.

2.0 SITE BACKGROUND

2.1 GENERAL SITE DESCRIPTION AND HISTORY

The Site is located on the south side of South Bundy Drive, at the southwest intersection of South Bundy Drive and West Olympic Boulevard, in the City of Los Angeles, Los Angeles County, California. The Santa Monica Freeway (Interstate 10) is located within 1/2-mile to the south of the Site. The Site is accessible from South Bundy Drive and Nebraska Avenue (Figure 2).

The Bundy Parcel consists of three buildings and paved parking areas. The three buildings are located within a mixed commercial, office, and light industrial land use area. The three buildings have a total useable space measuring approximately 84,000 square feet. It was reported that at one time, all three buildings were connected. There are no basements located in any of the subject property buildings. Observations of building interiors show evidence of historic building modifications such as former walls and bay doors being filled in or 're-bricked' (ERM; 2004a).

The 1901 South Bundy Drive building was the first of the three buildings constructed in 1950. Having a total useable space of 30,000 square feet, this building is a single-story brick structure, with a concrete floor, and exposed wood-frame ceiling. The 1925 South Bundy Drive building was constructed later in 1953, and measures 20,000 square feet in size. The largest of the three buildings is the 1933 South Bundy Drive structure. This building measures over 34,000 square feet. The 1925 and 1933 buildings are similar in construction, having a concrete floor, and exposed wood-frame ceiling. Although at one time used for manufacturing and/or warehousing, all of the buildings appear to have been used more recently as office space (ERM; 2004a).

2.2 GEOLOGY AND HYDROGEOLOGY

Alluvial sediments underlying the Site consist primarily of silty to clayey sands and sands with gravel. The upper alluvial sediments are underlain by marine and non-marine terrace deposits of the Lakewood Formation, which consists mainly of gravel, sand, sandy silt, and clay. Groundwater was encountered at approximately 33 to 35 feet below ground surface (bgs) at the Site. Groundwater flow is generally to the south within this uppermost water bearing zone (ERM; 2004a).

Numerous industrial and municipal groundwater wells exist in the vicinity of the Site (ERM; 2004a). Most of those wells are part of the City of Santa Monica Well Field, which has been reportedly impacted with chlorinated VOCs. The closest groundwater wells are located approximately 1/2 mile from the Site. Previous reports indicated these wells are screened at depths of 200 to 540 feet bgs, and that a thick clay layer separates shallow groundwater from these screened intervals used for municipal and industrial water supply.

2.3 *SUMMARY OF PREVIOUS ENVIRONMENTAL ACTIVITIES*

Prior to Westside's acquisition of the property, several environmental investigations were conducted on behalf of the former owners. A *Preliminary Site Assessment Report* (Glenfos; 1995a) and *Phase II Investigation Report* (Glenfos; 1995b) were prepared by the previous consultant, Glenfos, Inc. for AGI Properties, Inc. In 1996, an additional soil assessment was completed, followed by the installation and operation of a vapor extraction system on the Olympic Parcel (Glenfos; 1996a and 1996b). In 2000, further soil and soil vapor investigations were completed on the Olympic Parcel to collect additional data for subsurface delineation (Glenfos; 2000). Lastly, quarterly groundwater monitoring has been conducted since July 2001 through the present. Glenfos submitted the most recent quarterly groundwater monitoring report to the Regional Water Quality Control Board (RWQCB) in March 2004.

Subsequent to acquisition by Westside, a Phase I Environmental Site Assessment and a Phase II Site Investigation were conducted at the Site by ERM (ERM; 2004a, 2004b).

The results of these activities indicate the following:

- The presence and extent of chemicals in soil beneath the Bundy Parcel are well characterized. Although several VOCs were detected, all noted concentrations were well below applicable regulatory standards, with the exception of tetrachloroethylene (PCE) and trichloroethene (TCE). PCE and TCE concentrations in excess of the Office of Environmental Health Hazard Assessment's (OEHHA) soil screening levels (SSL) for soil vapor intrusion were detected in ten soil samples. Nine of the ten PCE and TCE detections were limited to one area, within the northwestern half of building 1933 (grid B8);

- PCE and TCE are present in soil vapor beneath the Bundy Parcel. PCE and TCE were detected at concentrations exceeding the OEHHA's SSL for soil vapor intrusion. The vertical and lateral extent of these VOCs is generally well characterized. The highest concentrations were observed in and around grid B8 under the 1933 building. Concentrations above the OEHHA's SSL were also reported southwest of the 1901 building (grid D5);
- VOCs, including PCE, TCE, 1,1-dichloroethylene (1,1-DCE), chloroform, and several other compounds, are present in groundwater at the Site. PCE, TCE, and 1,1-DCE are likely attributable to upgradient sources and previous operations at the Olympic Parcel. The presence of chloroform is likely a result of an off-site source. Chloroform concentrations in groundwater are highest at upgradient locations, and decrease across the Site. A potential source (the Department of Water and Power facility) of chloroform contamination is present to the northwest of the Site. Based on this data, the Bundy Parcel does not appear to be the source of contamination to groundwater; and
- Perfluoroalkanes are present in soil vapor beneath the boundary that separates the Bundy and Olympic Parcels, adjacent to the northeast corner of the 12333 Olympic building (grid F7). Based on research efforts initiated in 1999 by the United States Environmental Protection Agency (USEPA), perfluoralkanes were generally found to have relatively low toxicity values. However, when ingested, these compounds have the potential to break down into other compounds within the blood stream of organisms. Some of the breakdown products including perfluorooctonoic acid (PFOA) are suspected to have higher toxicity values. PFOA was not observed in soil vapor, soil or groundwater samples collected and analyzed utilizing USEPA Method 8260, and extraction method 5030 (ERM; 2004c).

2.4 PROPOSED LAND USE

Westside is in the process of redeveloping the Bundy Parcel of the Site as either a residential or mixed residential/commercial use development. Although not a focus of this RAP, the Olympic Parcel of the Site will be developed for commercial uses.

3.0 REMEDIAL OBJECTIVES

The overall objectives of the remediation program are to eliminate potential exposures to VOCs and perfluoroalkanes, and to reduce contaminant mass. Two VOCs, PCE and TCE, will likely drive the remedial actions, based on the potential risks associated with soil vapor intrusion into future residential or commercial buildings, and future potential threats to groundwater.

Based on the Site conditions and ERM's experience, an in situ approach incorporating SVE, vapor abatement, and optimized system operation will likely result in the most cost effective and timely cleanup of the impacted material. In one area, the fine-grained soils may have been impacted with perfluoroalkanes. The removal of these compounds may require that the SVE system in the area is enhanced through the application of heat-based technologies. However, the initial effort will be restricted to SVE alone as this may prove to a sufficient means of removing the fluorinated alkanes.

The criteria used to determine when the remedial objectives have been met (i.e., clean up is complete) will be a combination of concentration and performance-based criteria, including:

- Mass removed and removal rate;
- Point of diminishing returns (i.e., remediation effort and costs far exceed the benefits of treatment);
- Lack of rebound in VOC and perfluoroalkane concentrations; and
- Risk reduction/elimination.

4.0 PROPOSED REMEDIAL ACTIONS

Based on the Site investigations completed to date, VOC-impacted soil exists from approximately 5 feet bgs to over 25 feet bgs, with the soil matrix consisting predominantly of fine-grained sand, silt, and, to a lesser extent, clay. The two main areas where elevated concentrations of PCE and TCE exist are Areas 1 and 2. Area 1, which is centered on the northwestern half of the 1933 building, contains much higher PCE and TCE concentrations in soil vapor than Area 2. Area 2 is centered immediately southwest of the 1901 building (Figure 2). Lastly, a third area (Area 3), adjacent to the northeast corner of the 12333 Olympic building, may contain elevated concentrations of perfluoroalkanes in the vapor phase. The three areas are shown on Figure 2.

To address these impacts, ERM proposes a remediation program consisting of the following components:

1. **Additional Soil Sampling** - During the 2004 Phase II Site Investigation, organochlorine pesticides (OCPs) were detected in four of the ten soil samples collected. Polychlorinated biphenyls (PCBs) were only detected in one of the ten samples. Although all detections were reported as less than regulatory standards, additional soil sampling is proposed to ensure that more elevated levels of OCPs and PCBs distribution in the vicinity of these detections are not present.
2. **Soil Vapor Extraction and Treatment** – SVE is an effective and proven remedial technology that relies on applied vacuum to the subsurface to remove VOC- and perfluoroalkanes-laden soil vapor. The soil vapors are typically removed through a network of vapor extraction wells covering the impacted area and passed through treatment prior to discharge to the atmosphere. The fine-grained materials present at the property will likely require a dense network of vapor extraction wells and strategic system operation (i.e., pulsed operation of the well field or alternating between venting and extracting in each well to ensure more efficient vapor flow and contaminant mass removal).

   ERM may enhance the SVE system with the application of heated air or electric resistance heating (ERH) technologies. These approaches have been found to enhance the volitization of SVOCs and may be applicable to Area 3 if SVE alone does not completely address conditions in this area.

   At some point during extraction, the VOC and perfluoroalkane concentrations in the extracted vapors and the corresponding mass removal rate will reach asymptotic levels. When asymptotic conditions or diminished returns have been confirmed, rebound testing and confirmation soil sampling will be performed.

3. **Groundwater Monitoring Well Installation and Quarterly Sampling** – The installation of two up-gradient monitoring wells will lead to a better understanding of potential off-site sources. Additionally, it is recommended that the quarterly groundwater monitoring program be continued. The frequency of the sampling event will likely decrease in subsequent years.

Detailed procedures for implementation of these activities and the rationale for selecting SVE for soil remediation are presented in subsequent sections.

4.1 ADDITIONAL SOIL SAMPLING

Twelve shallow soil borings will be installed to evaluate the shallow soil near the soil locations previously reported with detections of OCPs and PCBs, as shown on Figure 3. One sample will be collected at each new boring, at approximately 6 inches bgs ("near-surface"). The soil borings will be installed using a hand auger, and soil samples will be collected using a slide hammer equipped with a brass sleeve. Concrete and/or asphalt coring will be required prior to collection of the soil samples.

Upon collection of the soil sample at each depth, the brass sleeve containing the sample will be carefully removed and packaged for laboratory analysis. The samples will be analyzed for chlorinated pesticides and PCBs using USEPA Methods 8081 and 8082, respectively.

4.2 RATIONALE FOR SELECTION OF SVE FOR SOIL REMEDIATION

The following subsections discuss the remedial technologies/alternatives that were considered and evaluated for the most effective approach for this site.

4.2.1 Identification of Remedial Technology Types for Soil

As discussed in previous sections, soil and soil vapor containing VOCs at concentrations warranting active remediation were identified at the Bundy Parcel. At sites where VOCs are present in soil and treatment is warranted, the USEPA recommends the use of either of the three presumptive remedies (1) SVE, (2) thermal desorption, or (3) incineration.

Presumptive remedies are the preferred technologies for common categories of sites, based on historical patterns of remedy selection and the USEPA's evaluation of performance data on technology implementation to date. The use of presumptive remedies saves time and costs by streamlining the number of remedial alternatives evaluated.

The presumptive remedies process provides a series of steps for considering and selecting a remedy. These steps include:

- Identifying the VOCs present;
- Identifying the presence of non-VOCs; and
- Reviewing advantages and disadvantages of presumptive remedies based on site-specific characteristics.

For this Site, in addition to USEPA suggested presumptive remedies, excavation and in situ chemical oxidation were also considered due to demonstrated successes at similar sites. Both of these approaches can prove to be advantageous due to their ability to potentially achieve cleanup objectives rapidly. As such, ERM considered four remedial alternatives as presented below.

4.2.2 *Description of Remedial Alternatives for Impacted Soil*

4.2.2.1 Remedial Alternative 1 – No Action

Alternative 1 assumes that no active treatment measures, Site modifications, or other actions would be undertaken to reduce or eliminate human health and environmental risks associated with VOCs in soil or soil vapor. Evaluation of this response action is required by the National Contingency Plan (NCP). The No Action alternative represents the baseline Site risk that would exist if no remedial actions were implemented.

4.2.2.2 Remedial Alternative 2 – Excavation and Off-Site Disposal

Alternative 2 assumes that all VOC-impacted soil would be excavated and transported to an approved, off-Site landfill for disposal. ERM estimates that approximately 17,000 cubic yards of soil would require excavation to remove impacted soil. Considering the large volume of impacted soil, multiple excavators and backhoes would be required to complete the activities in a timely manner. Excavated soil would be temporarily stored on Site in stockpiles, pending characterization.

Prior to backfilling, confirmation soil samples will be collected from the bottom and sidewalls of the excavations. The results of the soil sampling will be compared to the remedial objectives to determine if additional excavation is warranted. Soil excavation would cease when confirmation soil sampling results indicate that remedial objectives are achieved.

Samples would be collected from stockpiles to characterize excavated soil. This data will be used to decide the appropriate disposal method and location of the soil.

Upon completion of the sidewall and floor sampling, the excavation would be backfilled with clean backfill material. The backfill material would be placed in 12-inch lifts and compacted to 95 percent relative compaction. A minimum of one compaction test will be performed per lift. If a compaction test fails, the lift will either be recompacted or replaced until proper compaction is attained.

4.2.2.3 *Remedial Alternative 3 – In situ Chemical Oxidation*

Alternative 3 employs in situ chemical oxidation to treat the VOC-impacted soils beneath the Bundy Parcel. In situ chemical oxidation is a maturing technology that involves the placement of an oxidant into the subsurface to react with the contaminants of concern.

One of the most common oxidants available for in situ remediation of VOCs is potassium permanganate ($KMnO_4$). $KMnO_4$ reacts rapidly with the double bonds in chlorinated ethenes. Permanganate oxidizes the chlorinated ethenes to carbon dioxide and chloride ion. The end products of the reaction of $KMnO_4$ with chlorinated VOCs are carbon dioxide, water, hydroxide ion, potassium ion, manganese dioxide, and chloride ion. For example the reaction of $KMnO_4$ with PCE is represented in the following balanced stoichiometric equation:

$$4KMnO_4 + 3C_2Cl_4 + 4H_20 \rightarrow 6CO_2 + 4MnO_2 + 4KCl + 8HCl$$

Implementation of a $4KMnO_4$ oxidation program would generally involve the following:

- Collection of two to three representative soil samples from the various types of lithology present beneath the Bundy Parcel, for use in a bench-scale test.
- Implementation of a bench-scale test to determine the effectiveness of $4KMnO_4$ for remediation of VOC-impacted soil at the Site. This test would also determine the proper dosage of $4KMnO_4$ based on VOC

concentrations and the competing oxidant demand of naturally occurring organic materials within the soil.

- Injection of 1 to 5 percent by weight $4KMnO_4$ solution into the subsurface of the three impacted areas of the Bundy Parcel. A direct-push GeoProbe rig would be utilized for targeted delivery of the $4KMnO_4$ solution. Based on the volume and lateral extent of the impacted soil, it is estimated that approximately 60 borings would be required for the purpose of oxidant injection.
- Upon completion of the injection program, soil borings would be installed for the purpose of collecting confirmation soil samples for comparison to the baseline concentrations of VOCs.
- If necessary, additional injection events would be implemented until the remedial objectives are met.

4.2.2.4 Remedial Alternative 4 – Soil Vapor Extraction and Treatment

Alternative 4 includes implementation of SVE within the source areas to address soil and soil vapor containing VOCs. SVE removes VOCs from the unsaturated zone soil by using forced drawn air currents applied to extraction wells. A blower creates a vacuum, thereby inducing air flow through the subsurface around each extraction well and mobilizing soil vapor to a certain area. The soil vapor, which includes VOC-laden vapors, is then transported to the vacuum well and through a pipe network to a treatment system. Soil vapor is treated above ground and discharged to the atmosphere.

Vapor-phase granular activated carbon (GAC) or oxidation are the two methods that were considered as viable options for treatment of extracted vapors. The GAC method involves passing extracted soil vapor through a series of vessels filled with GAC. Organic compounds, with an affinity for carbon (such as VOCs present within the soil vapor), are transferred from the vapor phase to the solid phase by sorption to the carbon. When the absorptive capacity of the carbon is exhausted, the spent carbon, containing the chemical constituents, is sent off Site for regeneration. The required frequency for regeneration depends on the concentrations of chemicals in the influent stream, loading rate, and the system flow rate.

The oxidation method involves the destruction of VOCs in extracted vapor using oxidation equipment (typically thermal or catalytic) at high temperatures. Catalytic oxidation units utilize a catalyst to lower the temperature range required for the oxidation to occur. For destruction of halogenated VOCs, a flue gas scrubber is utilized to reduce acid gas emissions. The contaminated air is heated within the oxidation chamber utilizing natural gas, propane, or electricity. The energy costs for this technology can be costly for soil vapors at low VOC concentrations. Due to the potentially high energy costs, this technology type was not retained for further analysis in this evaluation.

4.2.3 Remedial Alternatives Evaluation Criteria

This subsection describes the three screening criteria that were used in the evaluation of the remedial alternatives.

4.2.3.1 Effectiveness

Each remedial technology/process option was screened with respect to effectiveness in satisfying the remedial objectives. The effectiveness of the technology/process option is assessed by considering:

- The ability of a remedial technology/process option to achieve the desired remedial goal for each contaminant of concern;
- The degree of protectiveness to human health and the environment provided by the remedial technology/process option during construction and implementation; and
- How proven and reliable the process is with respect to Site conditions.

4.2.3.2 Implementability

The implementability criterion evaluates the technical and administrative feasibility of a remedial technology/process option by considering the following factors:

- The institutional aspects of implementation of a remedial technology/process option, including the ability to obtain necessary permits and public acceptance; and
- The availability of support services and equipment associated with the remedial technology/process option and the degree to which the technology has been demonstrated at other sites.

4.2.3.3 Cost

This criterion is used to compare the relative capital and operation and maintenance (O&M) costs of the remedial technologies/process options. During this initial screening of remedial technologies/process option, cost is considered a minor screening criterion.

4.2.4 *Remedial Alternatives Evaluation*

Table 1 summarizes the four remedial alternatives, and provides a brief discussion of the screening criteria discussed in Section 4.2.3.

4.2.4.1 Alternative 1 – No Action

Alternative 1 assumes that no active treatment measures, site modifications, or other actions would be undertaken to reduce or eliminate human health and environmental risks associated with VOCs in soil or soil vapor. This alternative does not meet the remedial objectives, and therefore is not considered to be an effective approach.

4.2.4.2 Alternative 2 – Excavation and Off-site Disposal

Alternative 2 includes the excavation, transportation, and disposal of VOC-impacted soil. This approach would be highly effective, due to the complete removal of risks associated with residual contamination in the soil and soil vapor phase. However, this remedial alternative would be extremely costly, with an estimated total cost in the range of $1.5 million to $2.5 million, which is approximately three to five times more costly than Alternatives 3 and 4.

4.2.4.3 Alternative 3 – In Situ Chemical Oxidation

Alternative 3 includes in situ chemical oxidation to treat the VOC-impacted soils beneath the Bundy Parcel. In situ oxidation is a technology that has been proven to effectively reduce the mass and concentrations of organic compounds. Considering the lateral extent of the impacted area, a large volume of solution would be required to meet the stoichiometric demand of the organic contamination in the soil as well at the native soil demand. Due to the heterogeneous nature of the subsurface soils at the Site, a certain degree of uncertainty exists related to the effectiveness of this approach. It is likely that two or three injection events would be required to sufficiently oxidize the VOCs. The estimated cost to implement this alternative is $250,000 to $500,000.

4.2.4.4 Alternative 4 – Soil Vapor Extraction

Alternative 4 includes implementation of SVE within three areas to address soil and soil vapor containing VOCs. This proposed treatment technology is readily available and implementable. SVE is a proven, reliable technology and is the USEPA-suggested presumptive remedy for treatment of VOCs in soil. This alternative has the least amount of uncertainty related to the total cost and effectiveness. The only significant uncertainty with this alternative is the project duration. The cost estimate for this alternative is $350,000 to $450,000.

4.2.5 Remedial Alternative Selection

Based on the evaluation presented in Section 4.2.4 and summarized in Table 1, Alternative 4 was selected to address the VOC-impacted soil present at the Site. This alternative was selected as a result of the following:

- Alternative 1 does not meet two of the three criteria and was eliminated from further consideration.
- Alternative 4 is nearly as effective as Alternative 2 and equally as effective as Alternative 3, with less uncertainty than either Alternatives 2 or 3.
- Alternative 4 is at least as easily implementable as Alternatives 2 and 3.
- Alternative 4 is also the lowest cost alternative.

The section below describes the details for implementing Alternative 4.

4.3 SOIL VAPOR EXTRACTION AND TREATMENT

SVE removes VOCs and SVOCs from the unsaturated zone soil by using forced or drawn air currents applied to extraction wells. A blower creates a vacuum, thereby inducing airflow through the subsurface around each extraction well. The increased airflow in the vadose zone mobilizes soil vapor over a certain area. The soil vapor, which includes VOC- and perfluoroalkane-laden vapors, is transported to the extraction well and through a pipe network to a treatment system. Soil vapor is treated above ground to remove VOCs and perfluoroalkanes prior to discharge to the atmosphere.

The heated air and/or ERH enhancements being considered will involve raising the subsurface for Area 3 to temperatures to near the boiling point of water (100^{o} C). At this temperature, the vapor pressure of the contaminants is raised 1 to 2 orders of magnitude. Once the vapor pressure has increased, the contaminants can be readily extracted and treated as described previously.

The following subsections describe the system design, permitting requirements, installation procedures, startup, operation and maintenance, and eventual shutdown and decommissioning procedures.

4.3.1 Permitting

Permits are required for the installation and operation of the enhanced SVE system. Well construction permits are required from the Los Angeles County Department of Health Services (DHS) for the SVE wells. A discharge permit is also required from the South Coast Air Quality Management District (SCAQMD) to construct and to operate the SVE system. ERM will obtain these permits prior to construction of the SVE system.

4.3.2 System Description

The process flow diagram for the SVE system is presented on Figure 4. This diagram depicts the SVE wells, the vapor extraction equipment, and the vapor abatement equipment. The design aspects of each of these components are discussed in detail below.

The SVE system will include nine extraction wells in Area 1, five in Area 2 and five in Area 3. A vacuum of approximately 80 inches of water will be applied at the wellheads to induce soil vapor flow in the affected subsurface. Because ERM encountered predominantly fine-grained soil during the 2004 Site investigation, ERM proposes a dense network of vapor extraction wells to ensure adequate vapor capture.

The proposed well spacing assumes a radius of influence (ROI) of approximately 20 feet. As shown on Figures 4 and 5, the SVE wells, spaced approximately at 35 feet apart, are located to provide overlapping ROIs to prevent the formation of subsurface regions in the source area that are unaffected by the applied vacuum.

4.3.3 Soil Vapor Extraction Well Installation

The number of SVE wells and their locations were determined based on data from the previously submitted investigation reports. A radius of influence of approximately 20 feet was assumed for each SVE well. A dense well network is planned with wells spacing set at approximately 35 feet to allow for sufficient overlap between wells due to the fine-grained materials present at the Site.

Prior to commencing drilling activities, ERM will obtain the necessary well permits from the DHS. ERM will contact Underground Services Alert (USA) and contract a private utility locating service to clear the proposed well locations of proximity to underground utilities. In addition, approximately the first 5 feet of each boring will be cleared with a hand auger. Concrete and/or asphalt coring will be required prior to hand augering.

The extraction wells will be installed using hollow-stem auger (HSA) drilling techniques with a drill rig equipped with 8-inch outside diameter augers. Samples will be collected during drilling using an 18-inch-long, split-barrel soil sampler lined with three 6-inch brass sleeves. Soil samples will be collected by driving the sampler into native soil below the auger head using a 140-pound hammer with a 30-inch drop. Soil samples will be taken at 5-foot intervals during drilling for lithologic description and field screening with a photoionization detector (PID).

The SVE wells will be constructed of 4-inch- diameter, Schedule 40 polyvinyl chloride (PVC) blank casing, slotted (0.020-inch factory cut) well screen and No. 3 sand filter pack. The sand pack will be placed around the well casing from the bottom of the borehole to 2 feet above the screened interval in each well. A 2-foot bentonite seal will be emplaced in the borehole annulus above the sand pack, and the remaining annulus will be sealed with cement/bentonite grout.

The wells will be screened from 5 to 30 feet bgs to maximize the amount of screen across the vadose zone while maintaining several feet to groundwater (approximately 35 to 40 feet bgs). It is assumed that all wells will be completed aboveground connected via a manifold to allow for multi-well control from one central location (See Figure 6). Each SVE wellhead will include a dilution valve, a soil vapor sampling port, and a vacuum gauge.

4.3.4 *Soil Vapor Extraction System Equipment*

The SVE system includes both above- and under-ground conveyance piping, blower, air/water separator, and vessels. Other standard equipment utilized in the SVE system includes control valves, sample ports, and pressure indicators.

Above-ground process piping for the SVE system will be constructed using 4-inch Schedule 40 PVC piping in Areas 1 and 2. In Area 3, the conveyance piping will be constructed of 4-inch diameter, Schedule 80 PVC piping. The piping layout is also shown on Figure 5. The SVE system will include a skid-mounted positive displacement blower capable of providing a flow rate of 300 standard cubic feet per minute (scfm) and a vacuum up to 80 inches of water to compensate for pressure loss in the process lines.

ERM will work with Westside and Teledyne Controls (the current tenant of the Olympic Parcel) to identify a source of electricity in the vicinity of the SVE system. The source of electricity will be routed to a control panel in the vicinity of the blower, which will, in turn, be wired to provide power to all electrical components of the SVE system.

VOCs will be removed from the extracted vapor stream by two connected 2,000-pound GAC vessels prior to discharge to the atmosphere. GAC was selected as the vapor abatement technology based on the VOC concentrations observed in the vapor stream during previous investigations. ERM anticipate that caustic-washed GAC or polymer absorption technologies will be used to address the potential presence of the Perfluoralkanes in Area 3. The specific removal technology will be defined following the collection of baseline data in Area 3 as described in Section 4.2.5.

4.3.5 Baseline Analytical Testing

Prior to SVE system start-up in Area 3, vapor samples will be collected from the extraction wells and analyzed by gas chromatograph/mass spectrometer (GC/MS) to categorize the mass spectral pattern (fingerprint) of each of the specific perfluoroalkanes present in the subsurface. These fingerprints will be used to further define the treatment technologies. For instance, if polymer-based removal systems are found to be more efficient than caustic-washed carbon absorption, the specific polymer used will be defined by the type and concentration of perfluoroalkane present. In addition, the fingerprint results will be compared to effluent samples to ensure removal efficiencies for vapor treatment, and to subsequent well-specific data to measure removal efficiencies.

4.3.6 System Start-up and Operation

During the first week of operation, the SVE system will be monitored daily. An ERM technician will take measurements of the system as directed by the project engineer and will collect the following readings:

- Extraction well and system flow rates using a hot wire anemometer;
- Wellhead and system influent and effluent temperatures and vacuums or pressures;
- Wellhead and system influent and effluent VOC concentrations using a PID; and
- Water levels in the air and water separator.

Any accumulated water in the air and water separator will be drummed and stored on Site pending disposal using previously established waste profiles.

In addition to the readings listed above, the technician will also collect influent and effluent vapor samples on the first and final days of the first week of operation. Six-liter summa canisters will be used to collect the samples, which will be analyzed for VOCs using USEPA Method TO-14, and for perfluoroalkanes by GC/MS fingerprinting. The initial sample will be analyzed with a 2-day turnaround time to ensure permit compliance and notification to SCAQMD. The information collected during this startup will serve as the baseline sampling data.

During the first week of operation, the project engineer will make a daily evaluation of the system operation and recommend necessary adjustments. System evaluation will include, but is not limited to:

- Air discharge permit compliance;
- Calculation of actual treatment system loading and expected change-out durations;
- Calculation of total VOC and perfluoroalkane mass removal rates and historical trending;
- Calculation of fuel and electrical usage rates;
- Calculation of knockout water accumulation rates;
- Radius of SVE and thermal influence; and
- Optimal system operation scheme.

After the first week of operation, an ERM technician will make weekly Site visits. Along with the activities listed in the system startup monitoring section, the technician will perform the following:

- Complete maintenance activities for the air and water separator, and extraction blower, as required by the manufacturer's specifications;
- Drum the knock-out water from the air and water separator and arrange for disposal;
- Replenish fuel in the generator as needed;
- Oversee absorption system change-outs as needed; and
- Make or arrange for any repairs needed to the system.

The technician will also collect influent and effluent vapor samples at the end of each month. Six-liter summa canisters will be used to collect the samples, which will be analyzed for VOCs using USEPA Method TO-14, and for perfluoroalkanes by GC/MS fingerprinting. Samples will be analyzed on a standard turnaround time. If effluent VOC concentrations exceed air discharge permit limits, the system will be immediately shut down and the SCAQMD will be notified.

4.3.7 Extraction Strategy

Given the presence of significant fine-grained material at the Site, ERM anticipates that the system will be operated strategically to ensure optimized mass removal. The exact operation scenario will be determined during system startup and testing. For planning purposes, ERM has assumed that the maximum system flow rate at any time is 300 scfm. Due to the estimated vapor flow rates, there are no current plans to operate all of the extraction wells in each area at the same time. Instead, strategic system operation (i.e., pulsed operation of the well field or alternating between venting and extracting in each well) is planned to ensure more efficient vapor flow and contaminant mass removal. This will mean a combination of some wells will be operated for each area separately. The extracted vapor stream will be treated to remove VOCs and perfluoroalkanes prior to discharge to the atmosphere. The vapor treatment components are shown on the process flow diagram presented on Figure 4.

4.3.8 Confirmation Sampling

When a state of diminished returns has been confirmed, the technician will again collect influent and effluent vapor samples. Six-liter summa canisters will be used to collect the samples, which will be analyzed for VOCs using USEPA Method TO-14 and perfluoroalkanes by GC/MS fingerprinting. If it is determined that remedial objectives have been met, an application for shut down will then be made based on the sampling results and the following performance based criteria:

- VOC and perfluoroalkane mass reduction;
- Asymptotic recovery rates;
- Lack of rebound; and
- Risk reduction/elimination.

It is possible that remedial objectives will be observed in one or more areas before the other area(s) and thus will be terminated in advance. Shutting down an unproductive (diminished returns) area will allow for an increased focus of extraction and thus remediation within areas exhibiting relatively higher rates of production.

4.3.9 *System Shut-down and Decommissioning*

It is anticipated that the SVE program will be operating for approximately 12 months. The analytical data will be transmitted to the RWQCB on a quarterly basis. Upon completion of the SVE program, all equipment will be removed from the Site and the vapor extraction wells will be decommissioned.

4.4 *GROUNDWATER MONITORING*

The following subsections describe the well installation, groundwater sampling, and reporting activities for the groundwater monitoring program. Up-gradient monitoring wells will be installed in the northern boundary of the Site (Figure 7).

4.4.1 *Well Installation*

Prior to initiating drilling activities, ERM will contact USA to clear proposed well locations of buried utilities. In addition, ERM will also obtain the appropriate drilling and well permits from the DHS.

The boreholes for well installation will be drilled using a HSA drill rig equipped with 8-inch outside-diameter augers. Samples collected during drilling will be collected using an 18-inch-long, split-barrel soil sampler lined with three 6-inch brass sleeves. Soil samples will be collected by driving the sampler into native soil below the auger head using a 140-pound hammer with a 30-inch drop. Soil samples will be taken at

5-foot intervals during drilling for lithologic description and field screening with a PID.

All downhole well materials will be decontaminated before use. Soil cuttings from the installation of the monitoring wells will be placed in 55-gallon drums, pending analysis for waste disposal.

The two new wells will be constructed of 4-inch diameter, Schedule 40 PVC casing with 0.020-inch machine-slotted screen and No. 3 sand filter pack. The well will be completed at grade, fitted with a locking cap and enclosed within a traffic-rated well vault with a bolted cover. Following installation, the wells will be surveyed by a State-licensed land surveyor. Survey data will include horizontal coordinates in the California State Plane system and elevations in feet above mean sea level, to the nearest 0.01 feet.

A minimum of 72 hours after installation, the new wells will be developed by a combination of bailing, surging, and pumping to remove accumulated sediments. Water quality parameters including pH, temperature, conductivity, and turbidity, will be monitored at regular intervals during development. Development will be considered complete following removal of a minimum of ten casing volumes of water and stabilization of measured water parameters (values within 0.1 pH unit, 10 percent specific conductivity, and 1°C between consecutive measurements).

4.4.2 *Groundwater Sampling*

Approximately one week following installation and development, the two new wells will be sampled along with the existing wells (MW-1 through and MW-6) at the Site. Conventional purging methods will be used to purge and sample the wells, using a submersible pump or a clean, disposable bailer. Prior to sampling each well, depth to water and apparent total depth will be measured to determine the volume of water to be purged. During purging, water parameters will be monitored as mentioned above for well development.

Sampling will commence following removal of a minimum of three well volumes and stabilization of parameters. Samples will be transferred directly into clean, laboratory-supplied containers. Groundwater samples will be analyzed for VOCs (including fuel oxygenates, 1-4 dioxane, and 1,2,3 trichloropropane) in accordance with USEPA Method 8260B. Collected samples will be placed in an ice chest cooled to 4 C, and maintained under chain-of-custody control until delivery to a California-certified laboratory.

ERM will then conduct quarterly groundwater monitoring events using the sampling procedures described above. Static water levels shall be measured and recorded immediately before beginning purging and/or sampling activities. The procedure shall be accomplished with a decontaminated electronic measuring probe. Water levels will be measured from the elevation reference point marked on the PVC inner casing. The measuring process will be repeated until consecutive water level measurements agree to within 0.01 foot.

Water produced from wells during sampling will be stored on Site in 55-gallon drums, pending disposal.

4.4.3 Reporting

ERM will prepare a quarterly SVE Operation and Maintenance and Groundwater Monitoring Report to the SCAQMD. ERM expects that the SVE sections will include the following:

- A brief discussion of the system history;
- A discussion of soil venting system operational performance;
- VOC and perfluoroalkane mass balance calculations;
- Current mass removal rates and historical trends;
- VOC and fluorinated alkane mass discharge rates; and
- A description of planned activities.

Additionally, the first quarterly report will summarize the results of groundwater well installation and sampling activities. Subsequent quarterly reports will summarize the groundwater sampling activities and present recommendations for additional actions, if necessary, or rationale for Site closure.

5.0 *HEALTH AND SAFETY*

Activities described in this RAP will be performed in accordance with a revised Site-specific Health and Safety Plan (HASP). The procedures described in the HASP will be implemented and enforced by a health and safety representative during all fieldwork. Compliance with the HASP will be required of all persons who enter restricted areas for the project. The revised Site-specific HASP is included as Appendix A.

The purpose of the HASP is to:

- Assign Site personnel health and safety responsibilities;
- Establish process safety requirements for all equipment, including hazards associated with the excavation equipment, drill rig, and other hazards;
- Prescribe mandatory operating procedures;
- Establish personal protective equipment requirements for work activities;
- Establish emergency response procedures; and
- Provide information on the health and physical hazards of on-site activities.

The HASP will comply with all federal Occupational Safety and Health Administration (OSHA) regulations, as applicable and appropriate.

Only ERM staff and approved subcontractors will be allowed in the work area. Regarding Site access and control, no additional measures will be implemented to further restrict Site access since the existing property fence and gates are adequate. In addition, any excavations left open overnight will be covered, and the work zone will be surrounded by caution tape.

6.0 SCHEDULE

Mobilization for all field activities is dependent on approval of this RAP. Assuming an approximate 30-day review by the RWQCB, it is anticipated that field activities can begin in early to mid May 2005. The additional soil sampling and drilling activities are expected to take approximately 4 to 6 weeks. Obtaining a permit-to-construct and permit-to-operate may require 4 to 6 weeks. SVE system construction can begin as soon as the SCAQMD issues the permits and is expected to take approximately 2 weeks.

7.0 REFERENCES

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Figures

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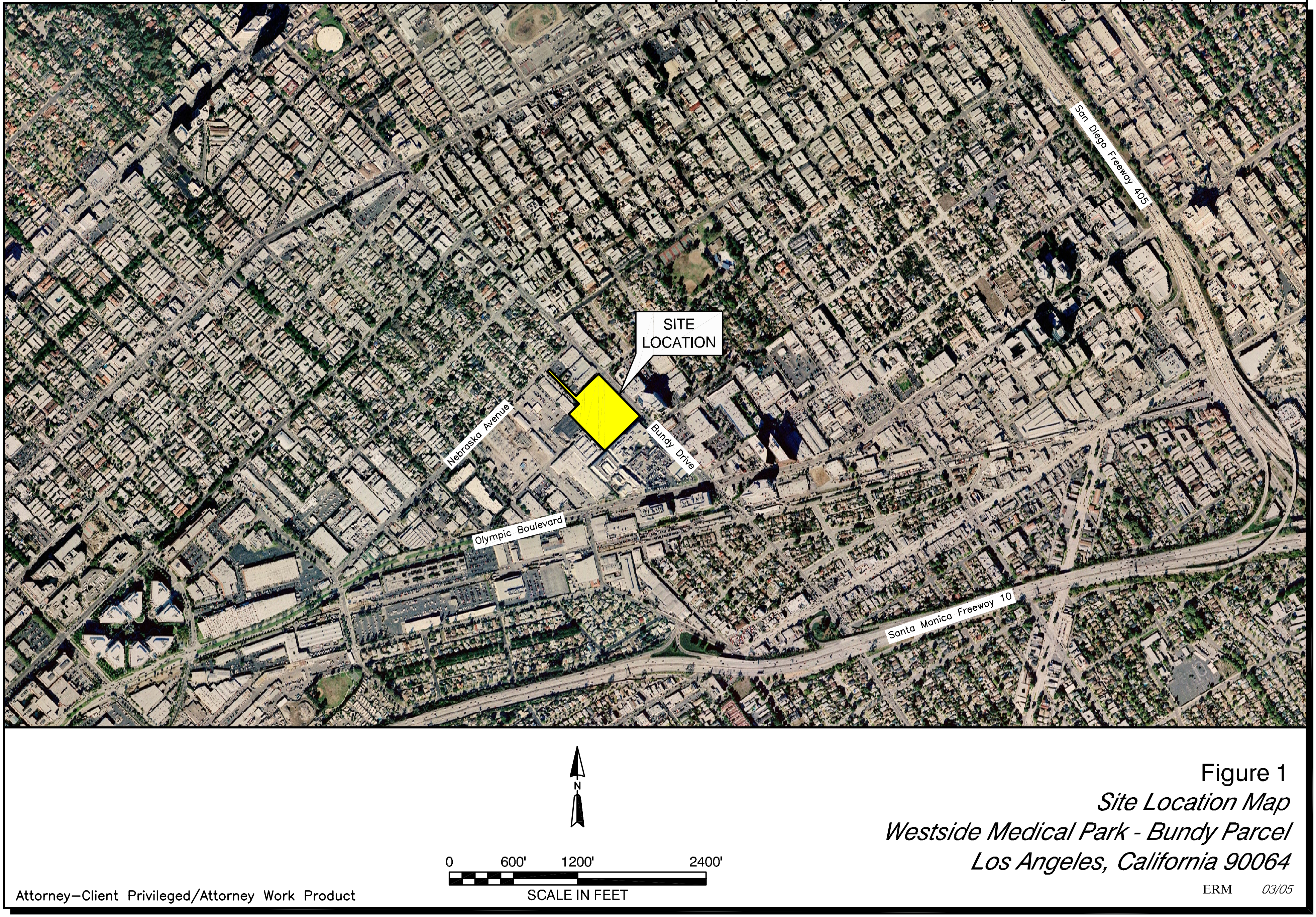

Figure 1
Site Location Map
Westside Medical Park - Bundy Parcel
Los Angeles, California 90064

Attorney–Client Privileged/Attorney Work Product

ERM 03/05

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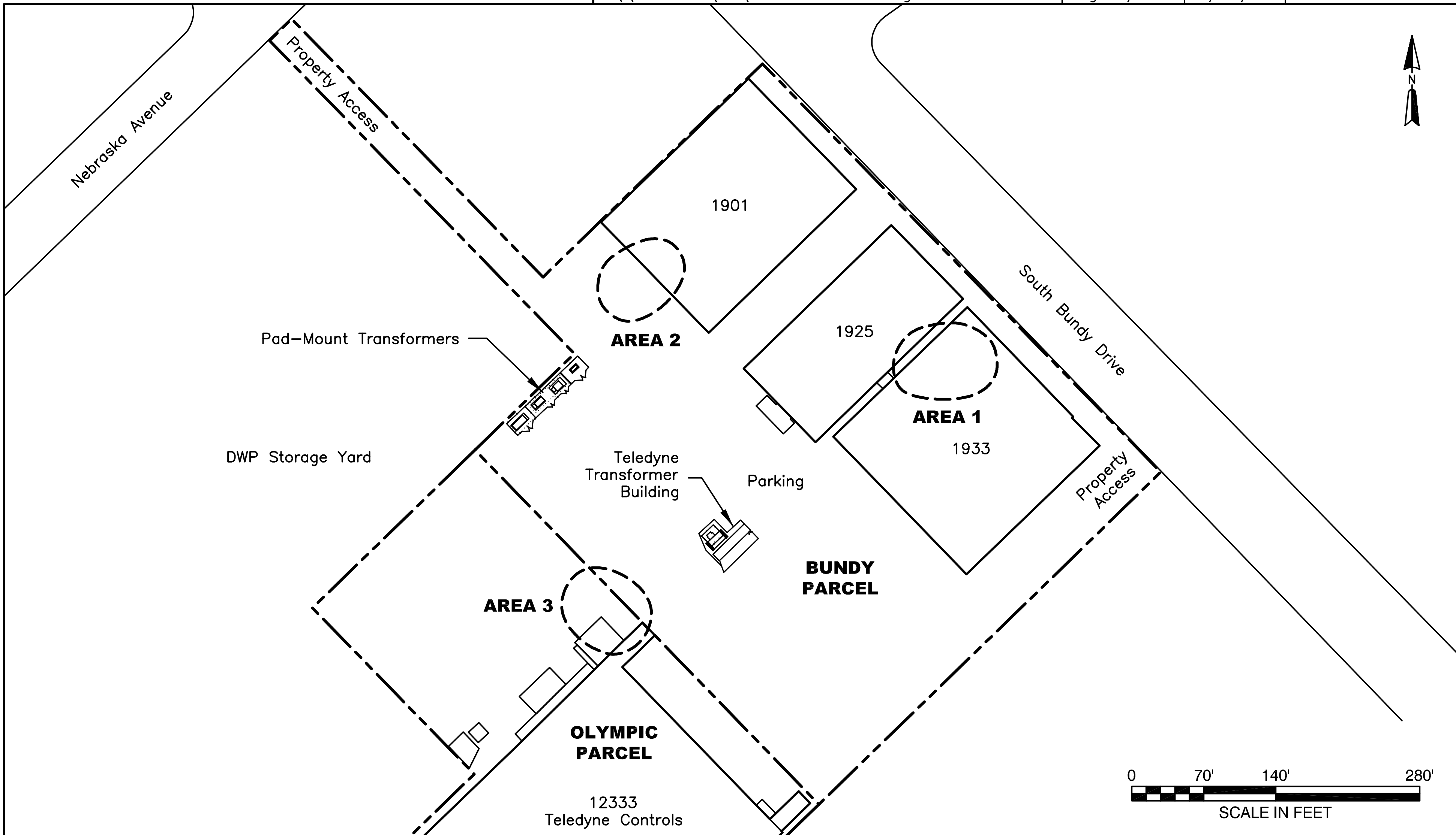

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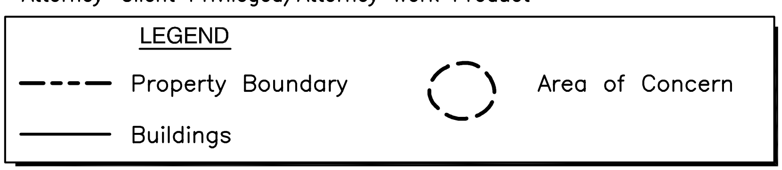

Figure 2

Site Layout Map

Westside Medical Park - Bundy Parcel

Los Angeles, California 90064

ERM *03/05*

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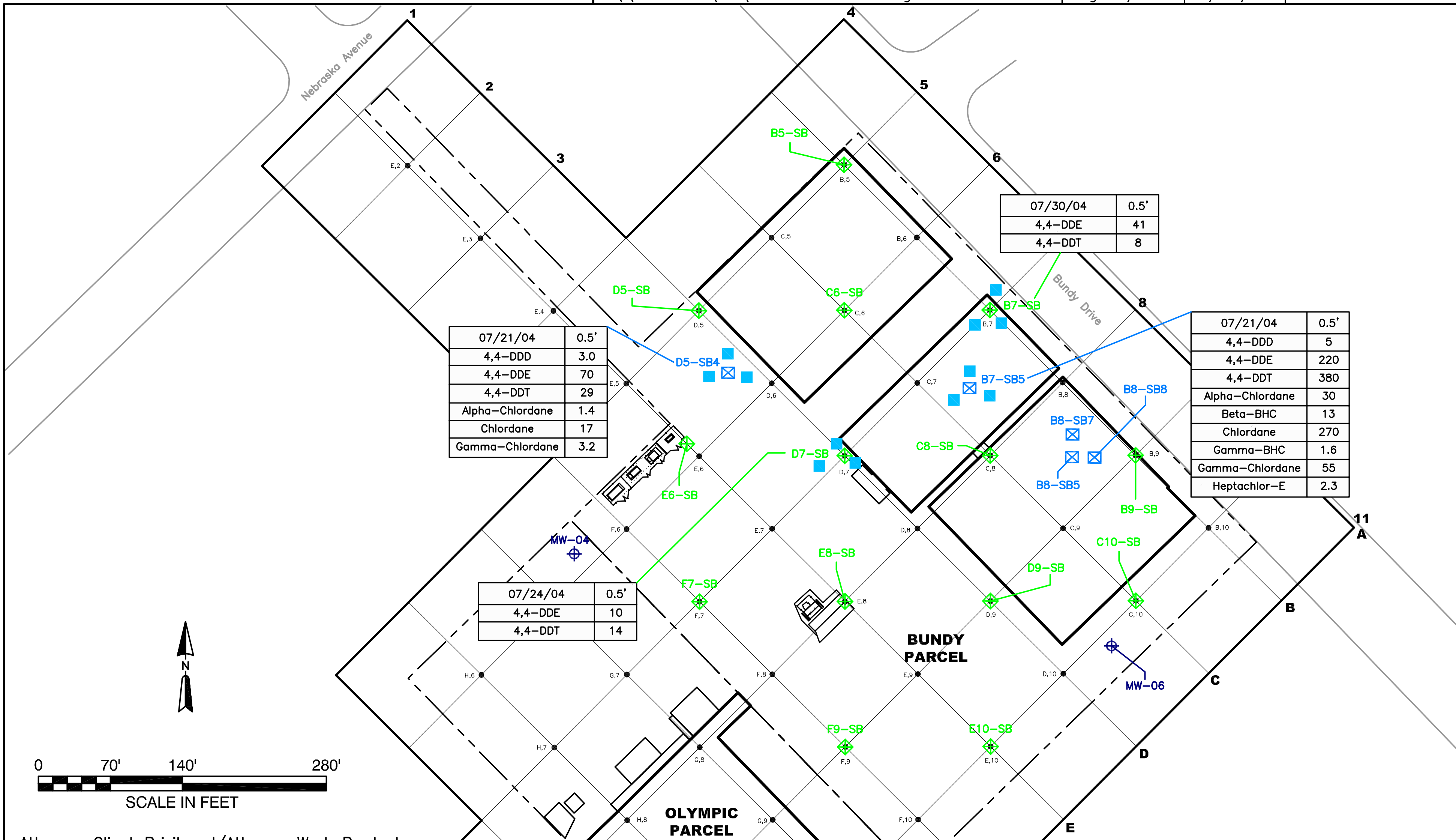

07/30/04	0.5'
4,4-DDE	41
4,4-DDT	8

07/21/04	0.5'
4,4-DDD	3.0
4,4-DDE	70
4,4-DDT	29
Alpha-Chlordane	1.4
Chlordane	17
Gamma-Chlordane	3.2

07/21/04	0.5'
4,4-DDD	5
4,4-DDE	220
4,4-DDT	380
Alpha-Chlordane	30
Beta-BHC	13
Chlordane	270
Gamma-BHC	1.6
Gamma-Chlordane	55
Heptachlor-E	2.3

07/24/04	0.5'
4,4-DDE	10
4,4-DDT	14

Attorney-Client Privileged/Attorney Work Product

LEGEND

- Proposed Directed Sampling Location
- Systematic Sampling Location
- Directed Sampling Location
- Monitoring Well

D7-SB — Sample ID

07/24/04	0.5'
4,4-DDD	10

Sample Date and Depth
Concentrations in Micrograms per Kilogram

Property Boundary
Buildings

Figure 3

Proposed Directed Sampling Locations
Westside Medical Park - Bundy Parcel
Los Angeles, California 90064

ERM *03/05*

Project No. 0020626.01
Date: 03/08/05
Drawn By: H. Magaña
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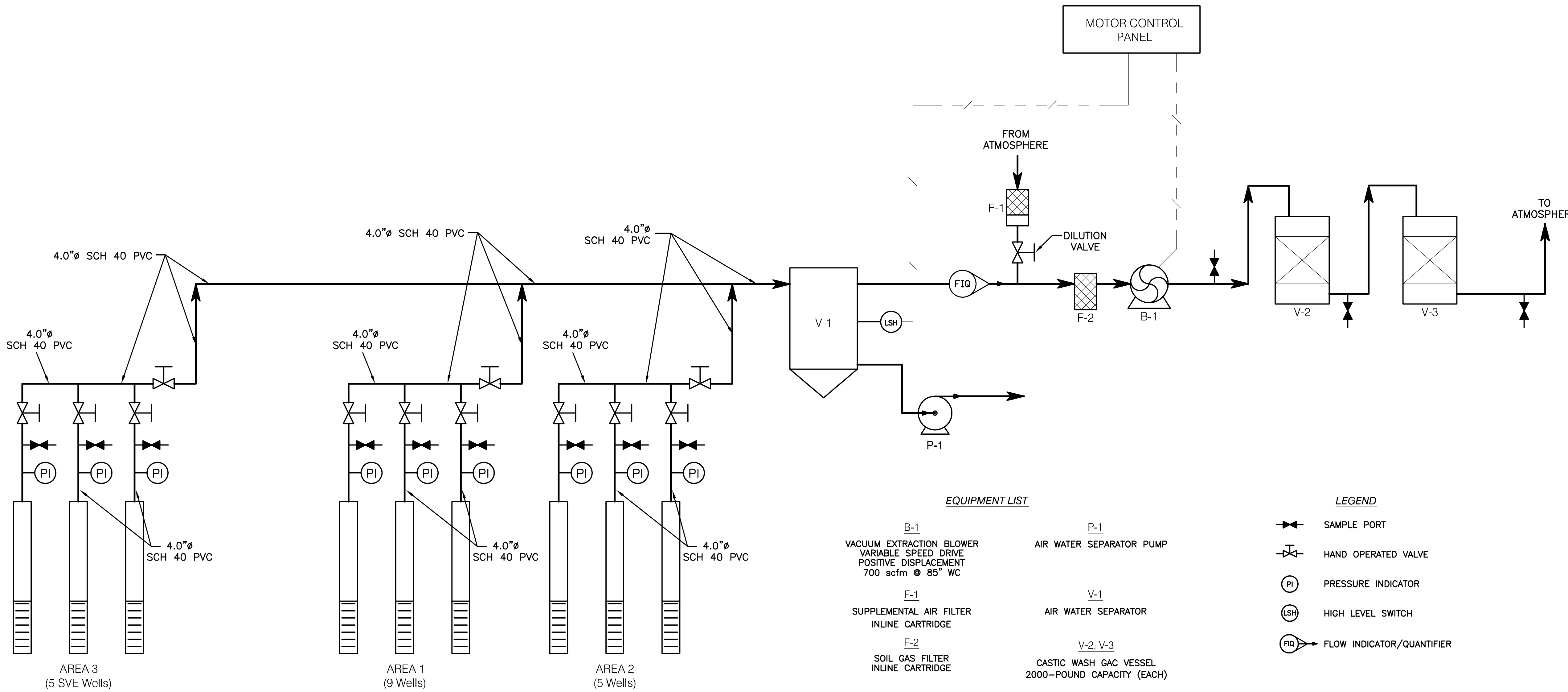

EQUIPMENT LIST

B-1
VACUUM EXTRACTION BLOWER
VARIABLE SPEED DRIVE
POSITIVE DISPLACEMENT
700 scfm @ 85" WC

P-1
AIR WATER SEPARATOR PUMP

F-1
SUPPLEMENTAL AIR FILTER
INLINE CARTRIDGE

V-1
AIR WATER SEPARATOR

F-2
SOIL GAS FILTER
INLINE CARTRIDGE

V-2, V-3
CASTIC WASH GAC VESSEL
2000–POUND CAPACITY (EACH)

LEGEND

- SAMPLE PORT
- HAND OPERATED VALVE
- PI PRESSURE INDICATOR
- LSH HIGH LEVEL SWITCH
- FIQ FLOW INDICATOR/QUANTIFIER

Figure 4
Piping and Instrumentation Diagram
Westside Medical Park - Bundy Parcel
Los Angeles, California 90064

Attorney–Client Privileged/Attorney Work Product

ERM 03/05

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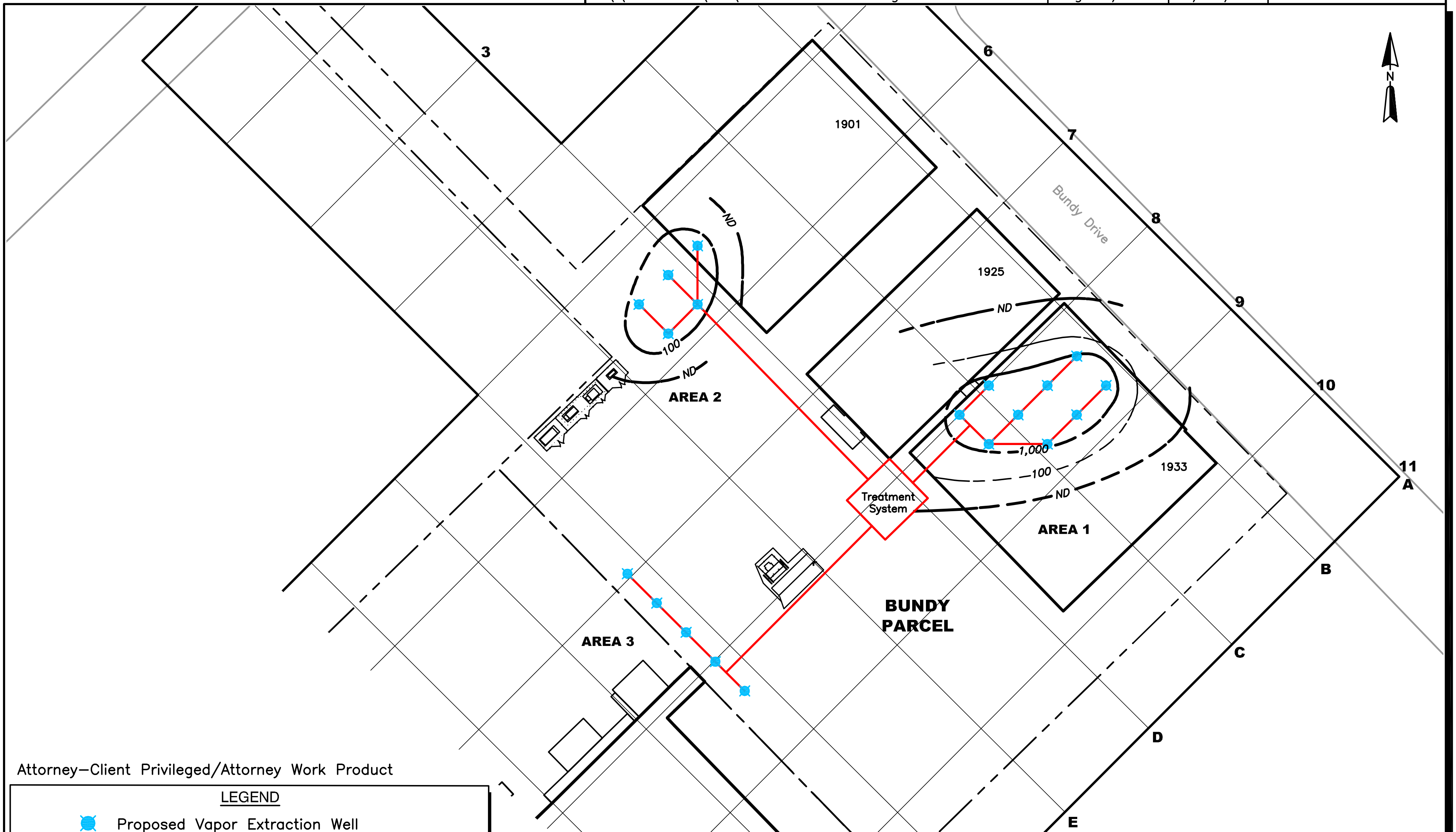


Attorney–Client Privileged/Attorney Work Product

LEGEND

- Proposed Vapor Extraction Well
- Property Boundary
- Buildings
- 100 — Total VOC Concentration Contour in Soil Vapor at 15' bgs (ppbv); Dashed Where Inferred
- ND — Not Detected

0 60' 120' 240'

SCALE IN FEET

Figure 5

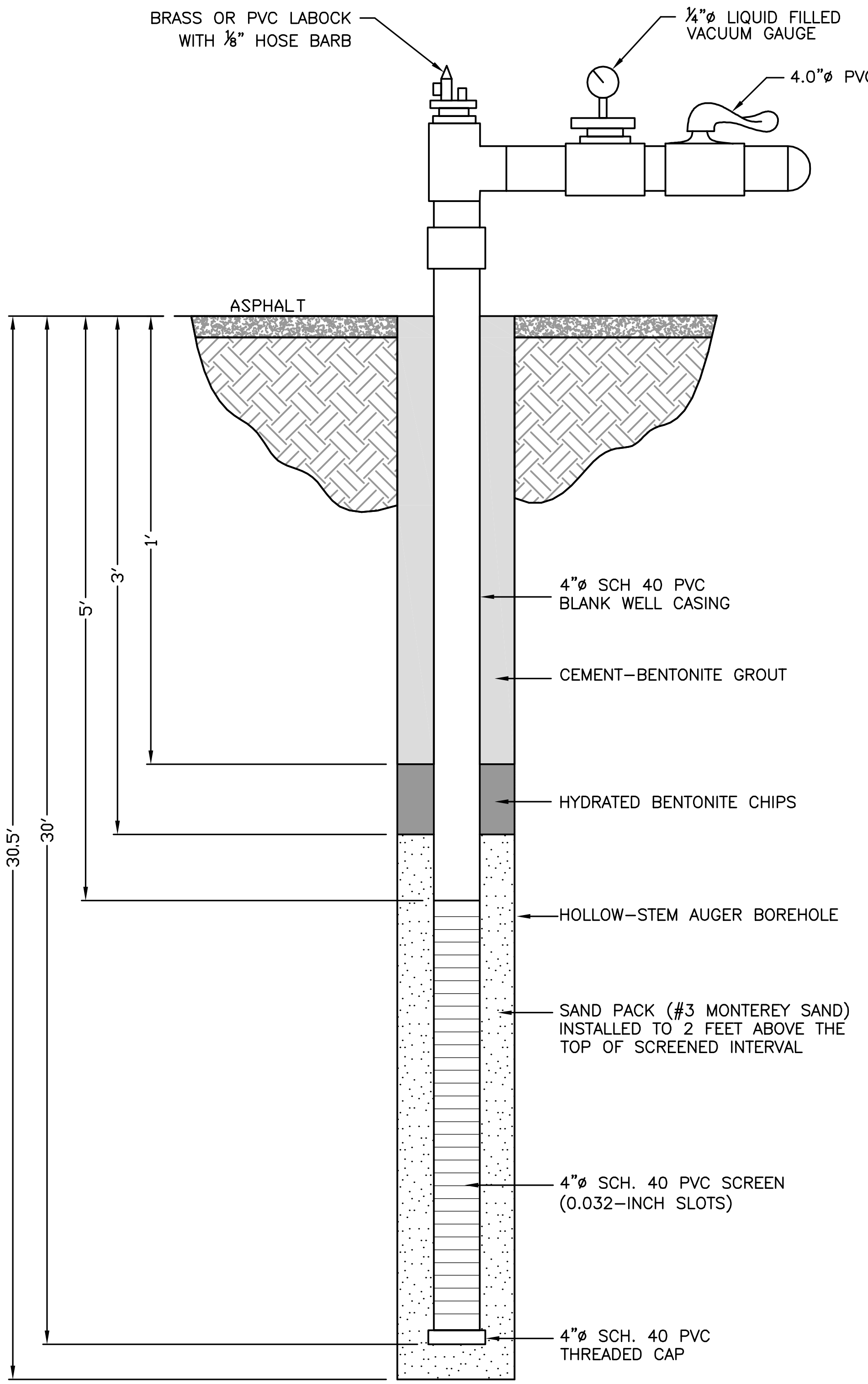
Proposed Soil Vapor Extraction-System Layout

Westside Medical Park - Bundy Parcel

Los Angeles, California 90064

ERM *03/05*

Project No. 0020626.01
Date: 03/08/05
Drawn By: H. Magaña
CAD File: F:\\0020626\01\002062601-36.dwg



ABOVE GRADE
SOIL VAPOR EXTRACTION WELL
(TYPICAL FOR AREAS 1 AND 2)

Figure 6
Well Construction Detail
Soil Vapor Extraction System
Westside Medical Park - Bundy Parcel
Los Angeles, California 90064

ERM 03/05

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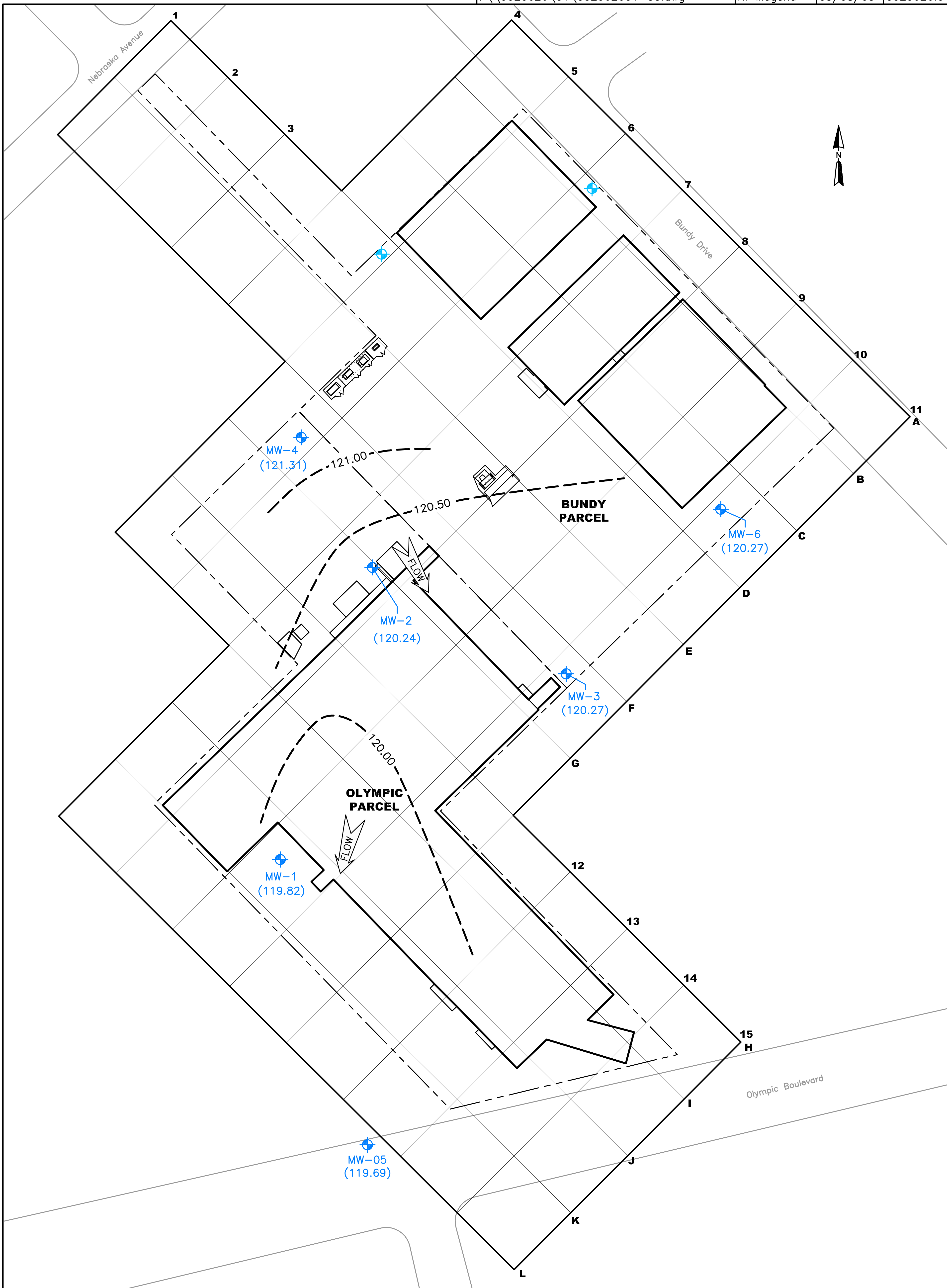

LEGEND

- Proposed Monitoring Well Locations
- Monitoring Well Locations
- (119.69) Elevation Above Mean Sea Level
- FLOW Approximate Direction of Groundwater Flow
- Property Boundary
- Buildings

0 60' 120' 240'

SCALE IN FEET

Attorney-Client Privileged/Attorney Work Product

Figure 7

Proposed Monitoring Well Locations
Westside Medical Park - Bundy Parcel
Los Angeles, California 90064

ERM *03/05*

Table

Table 1
Remedial Technologies and Process Options
Westside Medical Park

Remedial Alternative	Remedial Technology Type	Description	Effectiveness	Implementability	Cost	Comments
1	No Action	No institutional controls or treatment.	Does not meet remedial objectives.	As no action is taken, this approach is readily implementable.	No Cost	Impacted soil will continue to pose a threat to the groundwater quality and future site residents.
2	Excavation and Off-Site Disposal	Excavation, transportation, and disposal of approximately 17,000 cy of impacted soils.	Very effective approach for complete removal of impacted soils.	Easily implemented.	$1.5M - $2.5M	Effective and rapid approach. High cost.
3	In Situ Chemical Oxidation	Injection of potassium permanganate using a direct-push rig and mixing truck.	Proven technology type to reduce contamination mass and concentration.	The size of the impacted area will require a large volume of solution and at least two separate injection events.	$250K - $500K	The heterogeneous nature of the soils at the Site may limit the effectiveness of this approach.
4	SVE	Vapor extraction and treatment using a granular activated carbon system.	Proven technology type to reduce contamination mass and concentration.	Technology is readily available and implementable.	$350K - $450K	SVE is the most viable approach for achieving the remedial objectives.

Abbreviations

cy = Cubic yards
K = Thousand

Appendix A

Health and Safety Plan

Health and Safety Plan
Field Activities

Westside Medical Park

March 2005

www.erm.com

Westside Medical Park

Health and Safety Plan
Field Activities

March 2005

0020626.01

Westside Medical Park
1901, 1925, and 1933 South Bundy Drive and
12333 West Olympic Boulevard
Los Angeles, California

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Internal Health and Safety Coordinator

Alfonso Nuñez
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1.0 *INTRODUCTION*

This Health and Safety Plan (HASP) has been developed by ERM-West, Inc. (ERM) to establish the health and safety procedures required to minimize potential hazards to personnel who will be involved in the remedial activities planned for the Westside Medical Park Site (Site), located at 12333 West Olympic Boulevard (Olympic Parcel) and 1901, 1925, and 1933 South Bundy Drive (Bundy Parcel), Los Angeles, California. A map of the Site location and site plan is provided herein as Figure 1.

The provisions of this HASP directly apply to ERM personnel and contractors who will be potentially exposed to safety and/or health hazards related to the project. This HASP does not directly apply to client personnel, although ERM will inform the client on the safety and health aspects of the work based upon the guidelines specified in this HASP.

The procedures in this HASP have been developed based upon current knowledge regarding the specific chemical and physical hazards that are known or anticipated to be potentially associated with the operations to be conducted at the site as indicated by analytical laboratory data generated during previous site investigations.

It is ERM's policy that activities covered by this HASP must be conducted in complete compliance with this HASP and with all applicable federal, state, and local health and safety regulations, including the California Code of Regulations (CCR), Title 8, Section 5192, and the Title 8, Subchapter 4, Construction Safety Orders, as applicable. These regulations are enforced and administered by the California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA).

On-site personnel who cannot, or will not, comply with the policies and requirements incorporated in the HASP will be excluded from project activities. Prior to the commencement of field activities, all ERM and subcontractor personnel covered by this HASP must review this document and sign and return the signature page to the Project Manager. A copy of this form is provided in the appendix section of the HASP.

1.1 *SITE DESCRIPTION*

This section discusses the location and general characteristics of the Site.

The Site is located in Los Angeles, California, as shown on Figure 1. The Site is bounded on the north and east by Bundy Drive, on the south by Olympic Boulevard, on the northwest by Nebraska Avenue and on the west by commercial properties. The Site consists of four primary industrial structures. Teledyne Controls, Inc. occupies one structure (Teledyne) and the other three structures are vacant. The Site is located in an industrial area.

1.2 *OBJECTIVE*

Specific objectives of the tasks described in this HASP include:

- Evaluation of subsurface soil to further delineate the distribution of Polychlorinated biphenyls (PCBs) and organochlorine pesticides;
- Installation, operation and maintenance of a soil vapor extraction (SVE) system to extract and treat volatile organic compound (VOC) laden soil vapor;
- Installation of two groundwater monitoring wells for additional definition of potential off site contamination sources; and
- Sampling of groundwater on a quarterly basis for additional data collection and continued groundwater monitoring.

1.3 *PRIOR INVESTIGATIONS*

Prior to Westside Medical Park's acquisition of the property, several environmental investigations were conducted on behalf of the former owners. Subsequent to acquisition by the Westside Medical Park, a Phase I Environmental Site Assessment and a Phase II Site Investigation were conducted at the Site by ERM. All investigations were documented in reports previously submitted to the appropriate regulatory agencies.

The results of the latest investigations indicate the following:

- The presence and extent of chemicals in soil beneath the Bundy Parcel are well characterized. Although several VOCs were detected, all reported concentrations were well below applicable regulatory standards, with the exception of tetrachloroethylene (PCE) and trichloroethene (TCE). PCE and TCE concentrations in excess of the Office of Environmental Health Hazard Assessment's (OEHHA) soil screening levels (SSL) for soil vapor intrusion were detected in ten soil samples. Nine of the ten PCE and TCE detections were limited to one area, within the northwestern half of building 1933.

- PCE and TCE are present in soil vapor beneath the Bundy Parcel. PCE and TCE were detected at concentrations exceeding the OEHHA's SSL for soil vapor intrusion. The vertical and lateral extent of these VOCs is generally well characterized. The highest concentrations were observed in the same general area under the 1933 building. Concentrations above the OEHHA's SSL were also reported southwest of the 1901 building.
- VOCs, including PCE, TCE, 1,1-dichloroethylene (1,1-DCE), chloroform, and several other compounds, are present in groundwater at the Site. PCE, TCE, and 1,1-DCE are likely attributable to upgradient sources and previous operations at the Olympic Parcel. The presence of chloroform is likely a result of an off-site source. Chloroform concentrations in groundwater are highest at upgradient locations, and decrease across the Site. A potential source (the Department of Water and Power facility) of chloroform contamination is present to the northwest of the Site. Based on this data, the Bundy Parcel does not appear to be the source of contamination to groundwater.

1.4 PROPOSED WORK

The following tasks may be conducted as part of the planned field activities:

- Installation of up to 26 vapor extraction wells to an approximate depth of 30 feet using a hollow stem auger drilling rig;
- Installation of two groundwater monitoring wells to an approximate depth of 45 feet using a hollow stem auger drilling rig;
- Installation of aboveground SVE system equipment including one blower, one air/water separator, manifold piping, and two granular activated carbon vessels;
- Operation and maintenance of SVE system and ancillary equipment;
- Soil sampling during well installations; and
- Development and sampling of groundwater monitoring wells.

2.0 KEY PERSONNEL

The organization and responsibilities for implementing safe project activities, and more specifically, the requirements contained in this HASP, are discussed in this section. The key personnel for this project are listed in Table 1.

Table 1 ***Key Personnel***

Title	ERM Personnel
Principal-in-Charge (PIC)	**Brett Bowyer**
Project Manager (PM)	**Alfonso Nuñez**
Task Manager/Site Health and Safety Officer (TM/HSO)	**Alfonso Nuñez**
Soil Scientist	**To be determined**
Internal Health and Safety Coordinator (IHSC)	**Robin Woolson**

Contractors will be used for this project for tasks such as drilling and waste handling. All contractors will be trained according to regulations enforced by Cal/OSHA, 8 CCR 5192 and certified to work on hazardous waste sites. All contractors will be responsible for implementing and maintaining safety provisions specified in this HASP and applicable to their industry standards and state regulations under Title 8.

2.1 PROJECT MANAGER

ERM's PM is responsible for ensuring the overall health and safety of this project and for ensuring that the requirements described herein are understood and followed by key project personnel. The PM often serves in the role of TM/HSO and in such cases the PM is responsible for the tasks and responsibilities described in Section 2.2.

2.2 TASK MANAGER/SITE HEALTH AND SAFETY OFFICER

The ERM TM/HSO has primary responsibility for ensuring the overall health and safety of this project, including the primary responsibility for enforcing HASP requirements once work begins.

The TM/HSO has the authority to immediately correct all situations where HASP noncompliance is noted and to immediately stop work in cases where an immediate danger is perceived.

The TM/HSO's specific responsibilities include:

- Ensuring that all project personnel have received a copy of and have read this HASP, and have completed the Health and Safety Signature Sheet (Appendix A);
- Ensuring that all contractors who use this HASP read and sign the "Disclaimers and Limitations on Use" (Appendix A);
- Requiring the attendance of all Site personnel to a Job Safety Briefing (also referred to as tailgate safety briefing) apprising them of the contents of this HASP and the specific hazards identified to be present at the facility, prior to performing work and if work locations or task(s) change during a day, and documenting this briefing on the Job Safety Briefing Form (included in Appendix A);
- Ensuring that sufficient personal protective equipment (PPE), as required by this HASP, is available during the project, and procuring and distributing the PPE and air monitoring instrumentation needed for the project;
- Verifying that all PPE and health and safety equipment is in good working order;
- Obtaining all subcontractor documentation of employee participation in a medical monitoring and training program;
- Maintaining a high level of health and safety consciousness among employees at the facility;
- Maintaining communications with the IHSC, as referenced in the following section, in the event of any health and safety conflicts;
- Controlling Site entry for unauthorized personnel;
- Assuring completion of personal and ambient air monitoring;
- Supervising and monitoring the safety performance of all personnel to ensure that required health and safety procedures are followed and correcting any deficiencies;
- Conducting accident/incident investigations and preparing investigation reports (an Accident/Incident Investigation Form is included in Appendix A), if necessary; and
- Initiating emergency response procedures, if necessary.

2.3 *INTERNAL HEALTH AND SAFETY COORDINATOR*

ERM's IHSC is responsible for the preparation, interpretation, and modification of this HASP. Modifications to this HASP that may result in less stringent precautions cannot be undertaken by the TM/HSO without the approval of the IHSC.

Specific responsibilities of the IHSC include:

- Advising the TM/HSO on matters relating to health and safety on this project;
- Maintaining contact with the PIC in the case of injury, exposure, or other related issues;
- Recommending appropriate PPE and air monitoring instrumentation to protect personnel from potential hazards present on site;
- Performing field audits, when necessary, to monitor compliance with the HASP and its effectiveness;
- Conducting or directing personal exposure monitoring, where required and where deemed necessary, to determine the adequacy of protective measures and PPE specified by this HASP;
- Maintaining contact with the TM/HSO to regularly evaluate project conditions and new information that might require modification to this HASP;
- Working with the TM/HSO to ensure that sufficient PPE is available at the Site; and
- Conducting briefing meetings, when necessary, to apprise personnel of the contents of this HASP and the project hazards.

2.4 *PRINCIPAL-IN-CHARGE*

ERM's PIC is responsible for assisting the IHSC in case of injury, exposure, or with any other issues in which the IHSC may need guidance or technical support. The PIC may also serve in the role of IHSC, and in such cases, the PIC is responsible for ensuring the tasks as described in Section 2.3 are accomplished as necessary.

2.5 *FIELD PERSONNEL*

All field and subcontractor personnel are responsible for following HASP procedures and for performing their work in a safe and responsible manner. Specific requirements include:

- Obtaining a copy of this HASP and reading it, in its entirety, prior to the start of field activities;
- Signing the Health and Safety Signature Sheet (Appendix A) acknowledging receipt and understanding of this HASP;
- Bringing forth any questions or concerns regarding the content of the HASP to the TM/HSO or IHSC prior to the start of work;
- Reporting accidents/incidents and the presence of potentially hazardous working situations to the TM/HSO; and
- Complying with the requests of the TM/HSO.

3.0 *PARTICIPANT QUALIFICATIONS*

To participate in this project, employees must be trained, as well as involved with medical surveillance and record keeping programs. The details associated with these requirements are briefly described below.

3.1 *TRAINING REQUIREMENTS*

All ERM and subcontractor personnel working on the Site will have completed an extensive training course and have previously worked at least 3 days at a hazardous waste site. The training course must be designed to meet the requirements of 8 CCR 5192. The training course must consist of a combination of 40 hours of classroom and field exercises, plus an annual 8-hour refresher.

All Site participants will be required to show proof of current training (less than 1 year since initial or refresher training) prior to participating in field activities. Intended participants without current training documentation will be excluded from Site activities.

Additionally, all personnel who are required to use respirators and other PPE must be trained in their proper selection, use, and limitations (see Section 6.1 - Personal Protection).

3.2 *MEDICAL REQUIREMENTS*

All on-site personnel, subcontractors, and visitors will be required to have a written statement from a licensed physician stating they have had a medical examination that meets the requirements of 8 CCR 5192. This examination must include pulmonary function testing, as well as certification by the physician of the employee's ability to wear a negative-pressure respirator and perform strenuous work. If a person sustains an injury or contracts an illness related to work on site that results in lost work time, he/she must obtain written approval from a physician to regain access to the Site.

3.3 *RECORDKEEPING*

Air monitoring (Section 5.0) via industrial hygiene monitoring or direct reading instrumentation will become part of the written record. Both medical and air monitoring data will be retained for 30 years. Training records shall be maintained in project files and are available for inspection at any time. Subcontractor training and medical surveillance certification will also be maintained in project files.

4.0 HAZARD EVALUATION

4.1 CHEMICAL HAZARDS

Based on previous data collected from soil, soil vapor, and ground water beneath the Site and adjacent areas, the primary constituents of concern at the Site are the chlorinated volatile organic compounds (VOCs) tetrachloroethylene (PCE) and trichloroethylene (TCE). PCE and TCE concentrations in excess of the Office of Environmental Health Hazard Assessment's (OEHHA) soil screening levels (SSL) for soil vapor intrusion were detected in the subsurface soil during ERM's Phase II Site Investigation conducted in 2004. The potential hazards associated with PCE and TCE are discussed in Sections 4.1.1.1 and 4.1.1.2, respectively.

Additional VOCs, metals, total petroleum hydrocarbons (TPHs), Polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides, Polychlorinated biphenyls (PCBs), polyflourinated compounds, fuel oxygenates, 1,4-Dioxane, and 1, 2, 3-Trichloropropane were also detected in subsurface soil, soil vapor and/or ground water, but below applicable regulatory levels. The potential hazards associated with these additional constituents were discussed in ERM's July 2004 Site Specific HASP (ERM; 2004).

4.1.1 Volatile Organic Compounds

4.1.1.1 Tetrachloroethylene (PCE)

Tetrachloroethylene appears as a colorless liquid with a mild, chloroform-like odor. This compound is an irritant to the eyes, nose, and throat causing nausea, flush face and neck, vertigo, dizziness, incoherence, and causes liver damage with possible carcinogenic effects. The Cal/OSHA permissible exposure limit (PEL) is listed as 25 ppm or 100 ppm for the short-term exposure limit (STEL). The PEL is defined as the maximum permitted time-weighted average concentration that a worker may be exposed to over an eight-hour period whereas the STEL refers to a 15-minute exposure concentration.

4.1.1.2 Trichloroethylene (TCE)

Trichloroethylene appears as a colorless liquid, commonly dyed blue, with a chloroform like odor. This compound is irritant to the eyes, skin.

Absorption of this compound causes vertigo and fatigue. Ingestion of this compound causes tremors, nausea, and vomiting. Skin or eye contact causes cardiac arrhythmia and liver damage with possible carcinogenic effects. The Cal/OSHA PEL is listed as 25 ppm or the STEL is 100 ppm.

4.2 *PHYSICAL HAZARDS*

Physical hazards associated with remediation and sampling activities include vehicular traffic, slips (on wet surfaces), trips (on or around debris), falls, contact- and crushing-type injuries (with drilling equipment or other heavy equipment), sharp objects or flying debris, flammability, and heat-stress concerns. The potential for such hazards necessitates the use of gloves, safety shoes, or boots that meet American National Standards Institute (ANSI) Z41.1, eye protection that meets ANSI Z87.1, and hard hats that meet ANSI Z89.1. Personnel engaged in strenuous physical labor are to wear sturdy work gloves.

The location of all underground pipes, electrical conductors, fuel lines, water and sewer lines must be determined prior to any subsurface work (especially drilling activities). Any lines must be de-energized, locked-out or blinded off where feasible. In addition, the presence of any overhead hazards, such as powerlines, must be considered in advance prior to conducting activities such as drilling underneath these areas.

See Table 2 for a list of potential physical hazards that may be present and the procedures that will be utilized to minimize these potential hazards.

Table 2 *Potential Physical Hazards*

Potential Hazard	Source of Hazard	Procedures to Be Used to Minimize Hazard
Struck by heavy equipment	Drill rigs, backhoes, and other heavy equipment.	Maintain eye contact with equipment operators. Use proper PPE (i.e. hard hats, steel-toed boots, reflective vests, etc.). Maintain in pedestrian areas. Secure when not in use.
Puncture of utility line	Electrical, gas, water, or sewer line underground.	Locate existing utilities prior to start of operations. Maintain marked lines.
Slip, trips, or falls due to refuse and debris	Construction refuse and materials, trash, or excavated materials.	Maintain clean work areas and dispose of refuse promptly.
Fire/electrical hazard	Spark or heat producing equipment in the vicinity of combustibles.	Operate equipment away from combustibles such as vegetation. Maintain portable fire extinguishers nearby. Eliminate ignition sources. Bond or ground equipment if working in wet and/or flammable areas. Ground all portable generators.
Heat stress	Personnel working in environments with high ambient temperatures may be subject to adverse temperature-related effects.	Employ the buddy system. Each worker will be responsible to monitor his/her buddy for signs of heat stress (loss of concentration, profuse sweating, dizziness, etc.). The TM/HSO will also monitor working conditions via use of an ambient monitor when conditions warrant. Work/rest regimens may be followed (Table 3).
Dust	Automobiles/trucks/walking	Vehicles should be driven slowly and water can be used to moisten soil if necessary.
Struck by vehicular traffic in public right-of-way	Automobiles/trucks	Utilize traffic control plan. Provide dedicated traffic areas.
Unknown materials or hazards	Unexpected discovery or dumping	Do not move materials; isolate only if safe to do so, and call emergency services applicable such as the fire department, utility, etc.
Site Access	Construction activities	Barrier fence will protect construction areas.

4.2.1 *Use of Equipment*

Any equipment, including earth moving equipment, drill rigs, cranes, or other heavy machinery, will be operated in strict compliance with the manufacturer's instructions, specifications, and limitations, as well as any applicable regulations and operated by appropriately trained personnel or contractor

Any equipment or machinery that cannot be operated safely will be tagged and will not be operated until the unsafe condition has been removed or repaired. All repaired equipment will remain out of service until a designated qualified person has tested and inspected the equipment.

The contractor of heavy equipment operator will clearly designate the zone(s) associated with each piece of heavy equipment where the potential for injuring workers exists. No site personnel will be permitted to enter or access this zone without prior approval from the operator.

All heavy equipment provided or leased on Site shall be equipped with audible backup warning devices. The operator is responsible for inspecting the equipment daily to ensure that it is functioning properly and safely. This inspection will include all pins, pulleys, and connections subject to faster than normal wear and all lubrication points. In addition, the contractor will verify that the kill switch is properly functioning on the drilling equipment prior to use.

When equipment with moving booms, arms, or masts is operated in the vicinity of overhead hazards, the operator, with assistance from the designated signaling person, will ensure that the moving parts of the equipment maintain safe clearances to the hazards. Equipment will be kept away from energized electrical lines by at least 25 feet. Drill rigs and other equipment not specifically designed to move with the boom, mast, or arm elevated will be returned to traveling position and conditioned before being moved.

All portable equipment and tools will be inspected prior to each day's use and as often as necessary to ensure safety. Defective equipment and tools will be removed from service immediately. Examples of defective tools include:

- Hooks and chains stretched beyond allowable deformations;
- Cables and ropes with more than the allowable number of broken strands;

- Missing grounding prongs on power tools;
- Defective on/off switches;
- Mushroomed heads of impact tools;
- Sprung wrench jaws;
- Missing or broken handles or guards; and
- Wooden handles that are cracked, splintered, or loose.

All equipment and tools will be used within their rated capacities and capabilities.

The location of all underground pipes, electrical conductors, fuel, water and sewer lines must be determined prior to any drilling work. All lines must be de-energized, locked-out, or blinded off where feasible.

4.1.1 *Flammability Hazards*

The nature of this project and the operations to be performed may increase volatilization and cause a flammability hazard. Certain solvents can be extremely flammable. Methane gas is extremely flammable and has a low vapor density. Oxidation products from burning can be extremely deadly.

All electrical equipment used during the project will be inspected to ensure that they are in good repair and have no frayed or loose connections before they may be used on site. Only approved, listed equipment and components will be used. All connections will be made in accordance with National Electric Code practices. All equipment and devices so designed will be properly grounded or bonded to an adequate grounding mechanism. Only equipment listed as explosion-proof will be used in areas where explosivity is expected. If readings are sustained at or above 10 percent of the lower explosion limit (LEL), evacuate the site. Also, a fire extinguisher specified in Section 7.6 should be at the Site.

4.2.2 *Thermal-Stress Concerns*

Thermal stress includes heat stress, as well as cold injury. It should be noted that both types of thermal stress could occur simultaneously. The ambient air temperature, wind velocity, humidity, and activity level of the worker, as well as the type of protective equipment employed, are all factors which play a role in producing temperature stresses. Workers will be trained on the signs and symptoms of these forms of temperature stresses and will be encouraged to monitor themselves and others.

The human body has a regulator mechanism that maintains the body's core temperature at 98.6 degrees Fahrenheit. The body's energy is devoted to keeping the temperature within a fairly narrow range. When the body overheats, heat loss occurs primarily through evaporation via sweating and by radiant heat loss by dilation of blood vessels in the skin. When body temperature drops, involuntary shivering produces heat while constriction of the blood vessels in the skin reduces radiant heat loss.

Protective clothing designed to protect against chemicals interferes with the evaporative cooling mechanism. As a result, heat stress can develop rapidly in non-acclimated individuals. Cold stress can occur when the heat produced by intense activity is reduced by the stoppage of work. Chemical protective clothing offers no insulation and little protection against the cold; it does not retain body heat well. The water-saturated atmosphere that can occur within protective clothing loses heat more rapidly than ambient air; thus, heat loss can occur rapidly. During episodes of heavy work, it is possible for a worker to suffer symptoms of heat stress, only to experience cold stress when activity levels decrease or the work stops.

4.2.2.1 *Heat-Stress Concerns*

There are varying symptoms of heat stress, depending on its severity. Many heat-related problems occur in workers who are unaccustomed to heavy workloads and heat, or who are in poor physical condition. Obesity, alcohol or drug use, age, and the presence of other complicating factors, such as disease, also affect an individual's response to hot environments. In heat conditions, the work/rest regimen shown on Table 3 should be as followed. Heat stress is a general term used to describe one or more of the following heat-related disabilities and illnesses:

<u>Heat Cramps</u> are a condition characterized by painful, intermittent spasms of the voluntary muscles following hard physical work in a hot environment. Cramps usually occur after heavy sweating and often begin at the end of a work shift.

<u>Heat Exhaustion</u> is a condition characterized by profuse sweating, weakness, rapid pulse, dizziness, nausea, and headache. The skin is cool

and sometimes pale and clammy with sweat. Body temperature is normal or subnormal. Nausea, vomiting, and unconsciousness may occur.

Heat Stroke is a condition in which sweating is diminished or absent. The skin is hot, dry, and flushed. Increased body temperature, if uncontrolled, may lead to delirium, convulsions, coma, and even death. **Medical attention is needed immediately.**

When selecting chemical protective clothing and equipment, each item's benefit should be carefully evaluated for its potential for increasing the risk of heat stress. For example, if a lighter, less insulating suit can be worn without a sacrifice of protection, then the lighter suit should be worn.

Workers will be trained on the signs and symptoms of the forms of heat stress and will be encouraged to monitor themselves and others. In addition, experience has shown that the following work/rest regimen (Table 3) is appropriate for acclimatized field workers performing light to moderate work while wearing Level D protection. When upgrading the level of personal protection is deemed necessary, heat-stress conditions should be taken into consideration.

Table 3 Work/Rest Regimen in Level D Protection

Wet Bulb, Globe Temperature °Fahrenheit (F)/°Celsius (C)	Water Intake (quarts per hour)	Work/Rest Cycle (Minutes)
82 - 84 (28 - 29)	At least 0.5	50/10
84 - 88 (29 - 31)	At least 1	45/15
86 - 90 (31 - 32)	At least 1.5	30/30
90 and above (above 32)	More than 2	20/40

The workload classes are defined in The American Conference of Governmental Industrial Hygienists' booklet, *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices for 2003.*

5.0 EXPOSURE MONITORING PLAN

To identify and prevent the exposure of workers, an exposure monitoring plan will be followed. The following subsections summarize the details of the general area monitoring program, as well as the action levels that will be used to determine mitigating actions necessary.

5.1 GENERAL AREA AND PERSONAL MONITORING

Air monitoring maybe conducted to determine the presence of on-site hazardous conditions and will help determine the level of personal protection required for personnel. Environmental monitoring equipment includes a photoionization detector (PID) or a flame ionization detector (FID). In addition, a Miniature real-time aerosol monitor (Mini-RAM) dust monitor will be used during drilling activities if conditions warrant its use. Characterization with these instruments will determine airborne contaminants present and the respective concentrations in the workplace, and will help assess worker safety.

The intent of general area monitoring is to utilize generic field instruments and action levels to assess the continuous exposure to field personnel during Site activities, and upgrade or downgrade PPE as appropriate. Perimeter air monitoring will not be performed since the generation of dust or airborne contaminants is expected to be minimal. The general monitoring shall consist of daily breathing zone monitoring every 30 minutes using the PID or FID (and Mini-RAM if necessary) during Site activities. Daily calibration and maintenance of the PID or FID will also be recorded and performed according to the manufacturer's recommendations (see Appendix A for calibration documentation sheet). The Mini-Ram will be used to verify dust suppression activities. The Mini-RAM will be zeroed out during each day of use. The O_2/LEL meter will run continuously during excavation activities to verify readings for the presence of methane. All breathing zone readings will be recorded on ERM's Air Monitoring Form (provided in Appendix A).

5.2 ACTION LEVELS

The TM/HSO will establish daily background total organic vapor (TOV) and dust levels prior to initiating Site activities. Under most circumstances, this level can be determined by taking multiple readings at representative locations along the perimeter of the Site, and averaging the results of sustained measurements.

Decisions to upgrade personal protection will be based on sustained breathing zone TOV and/or total dust that exceeds background levels. Breathing zone refers to the area from the top of the shoulders to the top of the head. Specific criteria for upgrading personal protection based on TOV are presented in Table 4 as follows.

Table 4 *Criteria for Upgrading Respiratory Protection*

Sustained Breathing Zone TOV and Dust	Level of Respiratory Protection
Background + 5 ppm or Background + 0.5 mg/M³	Level D (no respiratory protection)
5 to 20 ppm or 0.5 mg/M³ to 2.5 mg/M³	Level C (half-face, air-purifying respirators, equipped with organic vapor/high-efficiency particulate air [HEPA] cartridges)
20 to 50 ppm or 2.5 mg/m³ to 5 mg/M³	Level C (full-face, air-purifying respirators equipped with organic vapor/HEPA cartridges)
Above 50 ppm or 5 mg/M³; Less than or equal to (≤) 19% Oxygen; Greater than or equal to (≥) 10% LEL; and Greater than or equal to (≥) 23.5% Oxygen	Cease activities, evacuate the exclusion zone.

6.0 *GENERAL SAFE WORK PROCEDURES*

Personal protection, work zone and decontamination procedures, and general safety rules are described in the following subsections.

6.1 *PERSONAL PROTECTION*

Initial protection will include the Level D requirements for PPE, and will be upgraded based on sustained PID/FID readings, or Mini-Ram readings (if conditions warrant its use), compared to the action levels listed in Table 4. Level D protection is planned based on the site characterization data accumulated, and interpreted prior to beginning Site activities. Engineering controls and work practices will be increased and/or altered prior to upgrading PPE to eliminate the increased hazard. If additional PPE is still necessary, work shall proceed under Level C protection. Levels of PPE are described below.

6.1.1 *Level D Protection*

Level D protection consisting of the following items is required for sustained PID/FID readings of less than 5 ppm above background, or for Mini-Ram readings of less than 0.5 mg/M^3 above background.

- Long-sleeve shirt and long pants;
- Outer nitrile gloves for material handling (inner nitrile or similar surgical gloves are recommended when practical) and leather work gloves when shoveling soil without free product (to be disposed of properly according to local and state regulations if used in handling contaminated soils);
- Steel-toed safety boots;
- Safety glasses;
- Hard hat; and
- Orange reflective vest.

Other personal protection readily available for use, if necessary, includes the following:

- Chemical-resistant outer gloves; and
- Hearing protection.

6.1.2 *Level C Protection*

Level C protection is required for sustained PID/FID readings of 5 to 20 ppm above background, or Mini-Ram readings of 0.5 mg/M^3 to 2 mg/M^3 above background. Level C protection consists of Level D protection, <u>plus</u> the following:

- Half-face APR or full face APR equipped with combination organic vapor/HEPA filter cartridges;
- Chemical resistant clothing (i.e., Tyvek, polycoated Tyvek, or Saranex), consisting of one-piece suits with attached hoods, booties, and elastic wrist bands;
- Outer nitrile gloves and inner nitrile gloves; and
- Steel-toed safety boots with chemically resistant overboots.
- Duct tape with emergency tabs.

During work activities, sustained PID/FID readings of 20 to 50 ppm above background, or Mini-Ram readings of 2 mg/M^3 to 5 mg/M^3, require Level C protection, with the substitution of a full-face APR equipped with organic vapor/HEPA filter cartridges, in place of half-face APR and safety glasses.

Sustained PID/FID readings over 50 ppm above background, or Mini-Ram readings above or 5 mg/M^3, require an immediate cessation of activities, and an evacuation of personnel from the exclusion zone. Questions regarding personal protection and related issues should be addressed to the TM/HSO. If the O_2/LEL meter records less than or equal to (≤) 19.5% oxygen or greater than or equal to (≥) 10% LEL, cease all activities immediately and evacuate the area.

6.2 *WORK ZONES AND DECONTAMINATION PROCEDURES*

Work zones and decontamination procedures will be established in accordance with guidance provided in Chapters 9 and 10 of the *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, published in 1985 by the National Institute for Occupational Safety and Health, United States Coast Guard FED-OSHA, and EPA. An exclusion zone will be established when the TM/HSO determines that one is necessary based on the type of work to be performed and the anticipated TOV and dust levels in the work area. Exclusion zones will be marked with yellow caution tape. The location of the zones may be modified to fit applicable field conditions, however, proposed modifications must be approved by the TM/HSO.

All sampling equipment will be washed between sampling intervals with a non-phosphate solution, followed by two potable water rinses, and a final rinse in de-ionized water, or a steam cleaner.

Water, soap, and paper towels will be available for cleaning of hands and face before breaks, eating, drinking, or smoking. On-site toilet facilities or an easily accessible toilet facility will also be available.

6.3 *GENERAL SAFETY RULES*

In addition to the specific requirements of this site-specific HSP, common sense should prevail at all times. The following general safety rules and practices will be in effect at the Site:

- The Site will be suitably marked or barricaded as necessary to prevent unauthorized visitors, but will not hinder emergency services, if needed. All visitors will be required to sign in on visitors log sheet provided in Appendix A.
- All open holes, excavations, trenches, and obstacles will be properly barricaded in accordance with local Site needs. These needs will be determined by proximity to traffic ways, both pedestrian and vehicular, and site of the hole, trench, or obstacle. If holes are required to be left open during non-working hours, they will be adequately decked over or barricaded and sufficiently lighted.
- Prior to conducting any digging or boring operations, underground utility locations will be identified. The Site representative and local utility authorities (or Underground Alert) will be contacted to provide locations of underground utility lines and product piping. All boring, excavation, and other Site work will be planned and performed with consideration for underground lines.
- Smoking and ignition sources in the vicinity of flammable or contaminated material are prohibited. Designated smoking areas will be delineated.
- Drilling, boring, movement and use of cranes and drilling rigs, erection of towers, movement of vehicles, and equipment as well as other activities will be planned and performed with consideration for the location, height, and relative position of aboveground utilities and fixtures, including signs, lights, canopies, buildings, other structures,

and construction as well as natural features such as trees, boulders, bodies of water, and terrain.

- When working in areas where flammable vapors may be present, particular care must be exercised with tools and equipment that may be sources of ignition. All tools and equipment so provided must be properly bonded and/or grounded.
- Identify areas of dry vegetation as a potential for combustible material.
- Beards that interfere with respirator fit are not allowed within the Site boundaries. This is necessary because all Site personnel may be called upon to use respirator protection in some situations, and beards do not allow for proper respirator fit.
- No smoking, eating, or drinking will be allowed in the contaminated areas.
- Tools and hands must be kept away from the face.
- Personnel must shower at the end of the shift or as soon as possible after leaving the Site.
- Each sample must be treated and handled as though it was extremely toxic.
- Do not touch obvious contaminated materials. Avoiding contact with these materials will facilitate decontamination.
- Persons with long hair and/or loose-fitting clothing that could become entangled in power equipment are not permitted in the work area.
- Employees shall be suitably dressed to perform their duties safely and in a manner that will not interfere with their vision, hearing, or free use of their hands or feet. Only waist-length shirts with sleeves and trousers that cover the entire leg are to be worn.
- Horseplay is prohibited in the work area. The TM/HSO has the authority to discharge Site personnel for horseplay.
- Work while under the influence of intoxicants, narcotics, or controlled substances is prohibited.

7.0 *EMERGENCY RESPONSE/ACCIDENT INVESTIGATION*

The telephone numbers of the police and fire departments, ambulance services, local hospital, and ERM representatives are provided in the reference sheet in Section 8.0 of this HASP. Directions to the nearest hospital are also provided on the sheet. (A map to the hospital is provided on Figure 2). The reference sheet will be maintained at the work site by the TM/HSO.

Any accident/incident resulting in an OSHA-recordable injury or illness, treatment at a hospital or physician's office, property damage, or a near-miss accident requires that an accident/incident report be completed and submitted to the ERM IHSC. A copy of this form is provided in Appendix A. The investigation will be initiated as soon as emergency conditions are under control. The purpose of this investigation is not to attribute blame, but to determine the pertinent facts so that repeat or similar occurrences can be avoided.

7.1 *PLANNING*

Prior to facility entrance, the TM/HSO shall plan emergency actions and discuss them with personnel conducting project work. Initial planning includes establishing the best means for evacuation from the area in case of a catastrophe.

7.2 *EMERGENCY SERVICES*

A tested system must exist for rapid and clear distress communications, preferably voice, from all personnel to the TM/HSO. The TM/HSO shall ensure that all personnel working at the facility know how to communicate with the appropriate local emergency response units as well as provide adequate and clear directions between work locations and the locations of support personnel, prior to commencing any facility investigation or operations. Emergency response contacts and telephone numbers are included in the emergency reference sheet provided in Section 8.0. A copy of this information must be posted in a visible location at the project site before operations commence.

7.3 *GENERAL EVACUATION PLAN*

In case of fire, explosion, or toxic vapor release and the TM/HSO orders a Site evacuation, the following steps shall be performed:

1. Announce the evacuation via radio/horn. Three blasts of a car, truck, air horn will be used to signal emergencies that require evacuating.
2. Evaluate the immediate situation and downwind direction. All personnel will evacuate in the upwind direction.
3. Assemble all personnel in an upwind area when the situation permits.
4. Account for all personnel.
5. Determine the extent of the problem.
6. Assist emergency teams with information and announce when it is safe to return to the site, based on clearance from the external Incident Commander in charge of the emergency

7.4 *EVACUATION/MEETING POINT*

In the case of an emergency, utilize the following locations as evacuation/meeting points, and provide this information to emergency personnel:

1. Site entrance on Bundy Drive.
2. The intersection of Bundy Drive and Olympic Boulevard.

The TM/HSO shall meet emergency personnel and guide them to the incident scene.

7.5 *FIRST AID*

Qualified personnel on site shall give first aid and stabilize any worker needing assistance. Life support techniques such as cardiopulmonary resuscitation and treatment of life-threatening problems such as bleeding, airway maintenance, and shock shall be given top priority. Professional medical assistance shall be obtained at the earliest possible opportunity. If assistance beyond first aid is required, **phone 911, and request emergency medical assistance**.

A first aid kit and emergency eyewash shall be maintained readily accessible to all workers. First aid kits must be maintained in all self-propelled equipment. The portable eyewash shall be supplemented by at least two, 5-gallon carboys full of potable water, which will substitute as the continuous-flowing eyewash facility, if neccassary. Emergency first aid for exposure, inhalation, or exposure to organic compounds is summarized in the following paragraphs.

7.5.1 *Eyes*

Flush eyes immediately with fresh water for at least 15 minutes while holding the eyelids open. If injury occurs or irritation persists, transport person to emergency room as soon as possible.

7.5.2 *Skin*

Wash skin thoroughly with soap and water. See a doctor if any unusual signs or symptoms or if any skin irritation occurs. Launder chemically impacted clothing.

7.5.3 *Inhalation*

Move exposed person to fresh air. If breathing has stopped, apply artificial respiration. **Call 911 immediately**.

7.5.4 *Ingestion*

If swallowed, DO NOT induce vomiting. **Call Poison Control Center immediately 1-800-876-4766.**

7.5.5 *Heat Stress*

Persons exhibiting any of the signs of heat stress should be immediately moved to a cooler environment, such as an air-conditioned trailer or vehicle. First aid for the specific types of heat stress include:

Heat Stroke. Call 911, begin cooling the individual by soaking their clothes in cool water and fanning.

Heat Exhaustion. Replenish fluids by having the individual drink water at regular intervals. If vomiting or loss of consciousness occurs, call 911.

Heat Cramps. Replenish salt balance by having the individual drink an electrolyte solution (i.e. Gatorade®). If cramps persist, person may need medical attention.

7.6 *FIRE PROTECTION AND RESPONSE*

To ensure that fire and explosion hazards are minimized, plans and procedures must be coordinated with the local Fire Department. A permit may be required before gasoline or other flammable liquids may be removed. Call 911 in the event of any fire at a work location. At least one fire extinguisher, with a minimum class rating of 20BC, shall be provided within 50 feet of the site activities.

8.0 *EMERGENCY REFERENCES*

8.1 *KEY EMERGENCY TELEPHONE NUMBERS*

AMBULANCE:	911
POLICE:	911
FIRE:	911
HOSPITAL:	911
NATIONAL RESPONSE CENTER:	1-800-424-8802
POISON CONTROL CENTER:	1-800-876-4766
CHEMTREC:	1-800-424-9300
ERM, SANTA ANA OFFICE:	1-714-430-1476

8.2 *NEAREST HOSPITAL*

UCLA Medical Center - Santa Monica (310) 319-4765
1250 16th Street
Los Angeles, CA 90025

A site to hospital map is provided as Figure 2.

8.2.1 *Directions to Hospital*

Start going Southwest on WEST OLYMPIC BOULEVARD toward CENTINELA AVENUE/SOUTH CENTINELA AVENUE. Turn RIGHT onto 20th STREET. Turn LEFT onto SANTA MONICA BOULEVARD/CA-2. Turn RIGHT onto 16th STREET. End at 1250 16th STREET, SANTA MONICA, CALIFORNIA. The total estimated time is 5 minutes and the total distance is 2.18 miles.

8.2.2 *Directions to Westside Medical Park*

From Interstate 10 traveling west exit onto Bundy Drive North, Exit 2C. Merge onto South Bundy Drive then turn Left onto West Olympic Boulevard. The Site is located at 12333 West Olympic Boulevard.

8.3 *ERM REPRESENTATIVES*

The following ERM representatives will serve in the role of TM*/HSO:

Mr. Brett Bowyer, Mr. Alfonso Nunez, Mr. Scott Terranova, and/or Mr. Bryan Bowe.

*Task Manager may be Site Health and Safety Officer and may be designated on a case-by-case basis.

ERM's DIHS is Ms. Robin Woolson.

Figures

Appendix A

Health and Safety Forms

Signature Page

The following signatures indicate that the Safety and Health Program has been read and accepted by ERM management and personnel, as well as all contractors and subcontractors and their personnel.

NAME	TITLE	COMPANY	SIGNATURE	DATE

JOB SAFETY BRIEFING FORM		
DATE:	TIME:	PROJECT #:
PROJECT NAME:		
SPECIFIC LOCATION:		
TYPE OF WORK:		
CHEMICALS PRESENT: Chlorinated VOCs, Metals, PAHs, TPHs, Pesticides, & PCBs		
SAFETY TOPICS DISCUSSED		
PROTECTIVE CLOTHING/EQUIPMENT:		
EMERGENCY PROCEDURES AND EVACUATION MEETING POINTS: Move Upwind, away from work area, Call 911		
HAZARDS OF CHEMICALS PRESENT: Inhalation and Dermal Skin Contact		
PHYSICAL HAZARDS:		
EMERGENCY PROCEDURES: Call 911, notify ERM PM		
HOSPITAL/CLINIC: UCLA Medical Center		
PHONE: 310-319-4765	PARAMEDICS: Call 911	
HOSPITAL ADDRESS: 1250 16th Street, Santa Monica, Los Angeles, CA		
SPECIAL HAZARDS:		
OTHER TOPICS:		

ATTENDEES	
Name (printed)	Signature

DISCLAIMERS AND LIMITATIONS ON USE

ERM-West, Inc. ("ERM") developed the following site-specific Health and Safety Plan (the "HASP") for use by ERM personnel and by ERM subcontractors (individually, an "ERM Contractor" and collectively, "ERM Contractors") in connection with the work (the "Project") being performed by ERM for Stonebridge Holdings, Inc. (the "Client") at the Stonebridge Development Site (the "Site"). ERM personnel must adhere to the practices and procedures specified in the HASP.

Each ERM Contractor must review the HASP and agree to accept and abide by the HASP, subject to any modifications to the HASP (to address the ERM Contractor's more stringent practices and procedures) agreed upon in writing by ERM and the ERM Contractor. The ERM Contractor shall indicate such acceptance by executing a copy of this notice of disclaimers and limitations on use as indicated below and returning it to ERM's project manager for the Project prior to its commencing work at the Site. However, if any ERM Contractor commences work at the Site, the ERM Contractor shall be deemed to have accepted the HASP and the terms hereof and the failure to execute and return to ERM a copy of this notice shall not be relevant to such interpretation.

If a contractor or a person other than the Client, ERM employees and ERM Contractors (individually, a "Third Party" and collectively, "Third Parties") receives a copy of the HASP, such Third Party should not assume that the HASP is appropriate for the activities being conducted by the Third Party. **NO THIRD PARTY HAS THE RIGHT TO RELY ON THE HASP. EACH THIRD PARTY SHOULD ABIDE BY ITS OWN SITE SPECIFIC HEALTH AND SAFETY PLAN IN ACCORDANCE WITH ITS OWN PROFESSIONAL JUDGMENT AND ESTABLISHED PRACTICES.**

ERM shall not be responsible for the implementation of any Third Party's safety program(s), except to the extent otherwise expressly agreed upon by ERM and a Third Party in writing. The services performed by ERM for the Client and any right of the Client and/or an ERM Contractor to rely on the HASP shall in no way inure to the benefit of any Third Party, including, but not limited to, employees, agents, or consultants and subcontractors of ERM Contractors, so as to give rise to any cause of action by such Third Party against ERM.

The HASP generated by ERM in connection with the Project is for use on a specific site and in connection with a specific project. ERM makes no representation or warranty as to the suitability of the HASP for reuse on another site or as to the suitability of the HASP for reuse on another project or for modifications made by the Client or a Third Party to the HASP.

ERM Contractors Only
Agreed and Accepted:

By: ______________________
Title: ____________________
Date: ____________________

HEALTH AND SAFETY READINGS PID/FID/Mini-RAM MEASUREMENTS				
Time	Date	LOCATION (Breathing Zone/Downwind Perimeter)	PID/FID/Mini-RAM	Concentration (ppm)

ERM EQUIPMENT CALIBRATION RECORD
(Per Manufacturer's Instructions)

INSTRUMENT MANUFACTURER/NAME:

MODEL:

SERIAL NUMBER:

CALIBRATION GAS OR STANDARD:

DATE	CALIBRATED BY	STANDARD (±)	READING	INITIALS