1.0 INTRODUCTION AND BACKGROUND

This document presents a work plan for subsurface sampling at parcel 7351-034-041 on the Del Amo Superfund Site. The subject property is located at 19771 Magellan Drive in Torrance, California (Figure 1). The purpose of the proposed investigation is to address property owner concerns regarding the potential presence of hydrocarbons associated with former rubber plant facilities under the existing building on the subject property. If present, the potential for unacceptable exposure to building occupants via the indoor air pathway will additionally be evaluated.

Styrene processing facilities associated with a larger synthetic rubber plant were located at the subject property prior to development of the current site building. Locations of former rubber plant facilities and analytical results for subsurface soil gas and indoor air samples collected at the property as part of the Remedial Investigation for the Del Amo Superfund Site are summarized in Appendix A. As indicated there, a series of volatile organic compound (VOC) storage tanks, including benzene, ethylbenzene, toluene, and styrene, were previously located near the eastern boundary of the subject property. Soil gas data for sampling locations in the vicinity of the former tanks indicate detections of benzene, ethylbenzene and toluene at concentrations of up to 32 parts per million by volume (ppmv). These data were limited to sampling locations outside of the current building. The majority of the former VOC storage tank area lies within the current building footprint. The VOC storage tank area was identified as a groundwater contamination source area in the RI report (URS, 2007).

Other former rubber plant facilities, including a skimmer basin and slop oil tanks were located near the center and western portions of the existing building. No soil or soil gas samples were collected at these locations because they were within the footprint of the existing building.

Indoor air data from the building collected as part of the RI in 1994 indicate several VOCs were detected at concentrations in excess of ambient air preliminary remediation goals. These VOC included:
<table>
<thead>
<tr>
<th>VOC</th>
<th>Maximum Concentration (μg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzene</td>
<td>35</td>
</tr>
<tr>
<td>Tetrachloroethene</td>
<td>30</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>5.9</td>
</tr>
<tr>
<td>Methylene Chloride</td>
<td>8.3</td>
</tr>
</tbody>
</table>

At the time of the RI field investigation, the subject property was occupied by a theatrical lighting services company. The building was used for office and warehouse space, but included some product assembly, repair and stage demonstration areas. A milling machine and theatrical fog machine were present. The fog machine was used to produce stage effects, and worked by atomizing mineral oil. Toluene, xylenes, MEK, 1,1,1-TCA, petroleum distillates and mineral oil were in use/stored within the building at the time of sampling (URS, 2001).

The existing building has been owned and occupied by Classic Design, a furniture manufacturing and upholstery business, since 2003. Mr. Julien Benassaya, a representative of Classic Design, has reported the following site conditions since their occupancy:

- The appearance of an oily substance on top of the concrete slab foundation during past heavy rainfall events;
- The presence of stained and odorous soil beneath a portion of the concrete floor slab underlying a bathroom near the eastern boundary of the building that was exposed during improvement activities;
- Odors within the building that are most noticeable immediately after the building has been closed for several days or more.

As part of an initial response to the above concerns, a URS representative visited the subject property in July 2008. Rectangular staining patterns were observed on the concrete floor slab, suggesting past releases of oil on the floor surface around former machinery locations or floor covering materials. Based on this observation, the oily slab noted by the current building occupant during past rainfall events may have resulted from mobilization of hydrocarbons that were previously released onto the top of the slab rather than originating from soil underneath the slab. Similarly, odors within the building may be due to volatilization of materials from within the building rather than migration of subslab vapor, although the latter cannot be ruled out.

Based on the above information, the proposed investigation is focused on the potential presence of hydrocarbon-impacted soil and soil vapor associated with the former rubber
plant under the floor slab of the existing building. Indoor air sampling is not proposed for the building at this time. In the event that elevated levels of contaminants associated with the former rubber plant are found to be present beneath the slab, additional investigations will be proposed to evaluate whether this contamination is impacting indoor air and poses a health risk to building occupants.

2.0 WORK PLAN FOR SOIL AND SOIL VAPOR SAMPLING

2.1 Data Quality Objectives
An overview of the soil and soil vapor sampling work plan is provided below through the EPA's seven-step Data Quality Objectives (DQO) process:

(1) State the Problem

The occupant at the subject property has observed what appeared to be hydrocarbon-impacted soil under the existing building and also reports occasional instances of odors inside the building and an oily residue on the concrete floor slab. These conditions could potentially be associated with residual contamination from former rubber plant facilities, or alternatively, with hydrocarbon releases from within the building that are unrelated to the rubber plant.

(2) Identify the Decision

The following decisions will be made based on results from the investigation:

- Is hydrocarbon-impacted soil or soil vapor associated with the former rubber plant present under the concrete floor slab with VOC concentrations that pose an unacceptable health risk?
- If hydrocarbons are present, is there physical evidence indicating they have migrated upward through the concrete floor slab in liquid form?

(3) Identify the Inputs to the Decision

Inputs to the above decisions will include the following:

- Laboratory analytical VOC data from subslab soil vapor samples;
- Laboratory analytical data from soil and concrete core samples for Total Petroleum Hydrocarbons (TPH), VOCs, and Polycyclic Aromatic Hydrocarbons (PAHs);
Federal and state regulatory criteria for air, including California Human Health Screening Levels (CHHSLs) and USEPA Screening Levels for Residential and Industrial Air;

Guidance documents, including the "Interim Final, Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air" (DTSC/CalEPA, 2004).

Field observations indicating the likely presence and distribution of contaminants in the concrete core and soil, such as staining, odors, and elevated total organic vapor readings.

Field observations along with professional judgment and experience may play important roles in decision making, especially with respect to whether any hydrocarbons present are associated with the former rubber plant and whether they have migrated through the concrete slab in liquid form. For example, visual evaluation and/or laboratory analysis of concrete cores may indicate hydrocarbon is more prevalent at either the upper or lower end of the core. Heavy staining at the top with little or none at the bottom would suggest that the hydrocarbon release originated from within the site building rather than migrating upward from the subslab soil, while the opposite would be true for staining that is concentrated near the bottom of the core. Additionally, if the composition of any hydrocarbons found in soil are not consistent with those found in overlying concrete core samples, it can be concluded that they are not likely to be related.

(4) Define the Boundaries of the Study

The boundaries of the investigation are defined here with respect to the geographic area of concern, potentially impacted media, and temporal constraints. The investigation is bounded geographically by the footprint of the current building on the subject property, as shown on Figure 2. Potentially impacted media of concern include subslab soil and soil vapor, the concrete floor slab of the building, and indoor air at the building. While the floor slab, soil and soil vapor will be directly sampled and evaluated, indoor air will be indirectly evaluated based on analytical data for subslab vapor samples. Depending upon results from the evaluation of the subslab vapor and soil, additional investigation of indoor air may be considered in the future.

There are no known time constraints by which the investigation must be completed. It is anticipated that data collection will occur within two weeks of approval of this work plan by the U.S. Environmental Protection Agency (USEPA) and the property owner.
(5) Develop a Decision Rule

The following decision rules will be applied upon evaluation of the analytical results:

- If one or more soil vapor VOC concentrations exceed either 100 times the CHHSIL or USEPA screening criteria for commercial air, then a potential for unacceptable risk to building occupants through the vapor intrusion/indoor air pathway will be concluded to exist and further evaluation and/or remedial measures will be recommended. The 100-times attenuation factor is applied based on the estimated relationship between subslab vapor concentrations and indoor air, as presented in the “Interim Final, Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air” (DTSC/CalEPA, 2004).

- If one or more soil constituents are detected at concentrations in excess of USEPA screening criteria for industrial soil, then a potential for unacceptable exposure will be concluded to exist for future construction workers involving projects where the impacted subsurface soil may be exposed. However, no such projects are planned at this time and thus further evaluation or remediation beyond the scope of this work plan is not planned or necessary at this time. The soil data will be retained within the existing database for the subject property and taken into consideration prior to any further improvements/redevelopment of the subject property under the existing institutional control pilot program for the Del Amo site.

- Evaluation of whether hydrocarbons are associated with the former rubber plant and whether they migrated through the floor slab in liquid form will be based largely on professional judgment, and depending upon the findings, may not be able to be established with certainty. For example, data indicating extensive benzene or ethylbenzene in soil or subslab vapor under the building would likely be concluded to be associated with the former rubber plant given their history of use at the plant site and the lack of any known significant usage at the building. However, the presence of oily soil in a relatively limited area under the slab of the existing building could potentially be associated with either the former rubber plant or subsequent facilities/operations unrelated to the rubber plant. Observation and testing of the concrete core may provide additional evidence of the origin of observed hydrocarbons, as described in DQO Step 3 above, but depending upon the investigation findings, it is also possible that no definitive conclusion regarding the origin of the contamination will be possible. Decisions regarding the need for further evaluation and/or remedial action when the origin
of the contamination is uncertain will be made based on the specific findings using professional judgment, and in consultation with USEPA.

(6) Specify Tolerable Limits on Decision Errors

The proposed investigation is concerned with a relatively limited area (the building at the subject property) and has a limited scope; therefore, statistical analysis regarding tolerable limits on decision errors has not been undertaken. In the event that investigative findings indicate that reasonable doubt remains regarding either of the decisions in DQO Step 2 above, then either (a) The Respondents will work in conjunction with USEPA to agree upon an expanded sampling/analytical program to provide additional information by which to make the decisions, or (b) the decisions will be made using a conservative approach that errs on the side of caution. Findings that would trigger these responses may include analytical data that indicate contaminant concentrations that are only slightly below the various regulatory criteria thresholds, or field evidence of significant contamination, such as strong odors or staining, that is inconsistent with laboratory analytical data.

(7) Optimize the Design for Obtaining Data

Step 7 involves providing a description and rationale for the method by which the investigative data will be collected. This information is provided within Sections 2.2 – 2.8 below.

2.2 Scope of Work

The following tasks will be completed as part of the proposed investigation:

- Review of the existing health and safety plan for the Del Amo site;
- Sampling of the top and bottom of the concrete floor slab within the subject property building at three locations (six concrete samples total);
- Collection of three subslab vapor samples and one duplicate vapor sample from within the building;
- Hand auger drilling of three shallow soil borings within the building and collection of one or more soil samples from each boring;
- Laboratory analysis of the concrete core samples for total petroleum hydrocarbons (TPH) - hydrocarbon chain and PAHs;
- Laboratory analysis of the soil vapor samples for VOCs;
- Laboratory analysis of the soil samples for TPH, VOCs, and PAHs; and
• Evaluation of the findings and preparation of a written report.

Further details regarding these tasks are presented below.

2.3 Health and Safety Plan
The existing, site-specific health and safety plan includes procedures appropriate for the proposed field activities. Field personnel are required to be familiar with the plan prior to initiation of field work.

Health and safety procedures that will be implemented during the investigation include workspace air monitoring. Air monitoring for total organic vapors will be conducted during subsurface drilling and sampling activities using a calibrated MiniRAE 2000 photo-ionization detector (PID). Calibration procedures for the PID are provided in Appendix B. Operator breathing zone action levels above which the respiratory personal protective equipment (PPE) level must be increased are set at 1 part per million (ppm) for >1 minute (half-face respirator), 5 ppm for >1 minute (full-face respirator), and 10 ppm for >1 minute (supplied air). Further details regarding appropriate PPE and the action levels are presented in the Health and Safety Plan.

2.4 Concrete Core Sampling
Concrete core sampling will be completed to allow evaluation of whether liquid hydrocarbons have migrated through the floor slab of the building on the subject property and whether the hydrocarbons, if present, are associated with the former rubber plant. Samples will be collected at a minimum of three locations, as indicated on Figure 2. These locations coincide with (1) the area of the former VOC storage tanks and the area of hydrocarbon-impacted soil reported by the building owner (see location 1 on Figure 2); (2) the former skimmer basin (location 2) and (3) the former slop oil tanks area (location 3). Locations 2 and 3 may be adjusted slightly during the field investigation to correspond to areas of local surface staining on the concrete floor slab. If surface staining is not present in the general vicinity of locations 2 and 3, additional concrete sampling locations may be added in areas of the floor slab where surface staining is present.

All sampling locations will be marked and cleared with a representative of the building owner with respect to subsurface obstructions and utilities. Clearance of the sampling locations will be based on as-built building plans and other relevant information available.

Approximately 1-inch diameter concrete cores will be cut from the slab at each sampling location using a concrete coring saw. Upon retrieval, the core will be visually evaluated
for evidence of hydrocarbon staining and the observations will be recorded in a field logbook. As applicable, the observations will note any progressive increase or decrease in staining from the top to the bottom of the core. Two samples of the concrete will be collected from each core, one from near the top of the core and the other from the bottom of the core. The core samples will be broken off from the complete core using a hammer or other available means.

Following collection, the concrete samples will be placed in individual plastic bags and sealed. The bags will be labeled to indicate the sample number, location, position (top or bottom of core), sampling date and time, and the identity of the individual collecting the sample. The samples will be placed in a cooled ice chest for temporary storage, and will be transported to the analytical laboratory within 24 hours of collection along with chain-of-custody documentation.

2.5 Subslab Vapor Sampling
Subslab vapor sampling will be conducted to evaluate the potential presence of VOC vapors. Subslab vapor sampling will be completed coincident with the three previously described concrete core samples.

Vapor sampling will be completed in general accordance with procedures outlined in the California Department of Toxic Substances Control (DTSC) / California Regional Water Quality Control Board (RWQCB) “Advisory – Active Soil Gas Investigations (DTSC / RWQCB, 2003). Vapor sampling will be accomplished through the previously completed floor slab core holes. The vapor probe, consisting of approximately ¼-inch diameter metal tubing and the probe tip/sampling port, will then be installed so that the probe tip is at or slightly below the base of the slab, as indicated schematically on Figure 3. The annular space around the probe tip will be filled with a filter sand up to the bottom of the cement slab and a Teflon™ disk will placed on the probe above the filter sand. The remaining annular space between the probe and the slab will then be sealed with quick-setting cement grout. The Teflon separator will prevent the grout from flowing downward and into or past the probe tip. Sample collection equipment consisting of various tubing, summa canisters, a vacuum pump, and valves will then be connected to the top of the vapor probe to enable sampling.

Prior to sample collection, leak testing will be conducted to confirm the integrity of the cement seal around the vapor probe and the above-grade sample collection equipment. Leak testing of the sample collection equipment will be accomplished by closing the appropriate valves to isolate the system from the probe and then establishing a vacuum in the system using the vacuum pump. A vacuum gauge will be monitored for several
minutes to observe whether the vacuum is maintained while the pump is off. If a loss or
decrease in vacuum is observed, the system will be repaired until the vacuum can be
maintained.

Leak testing of the vapor probe seal will be accomplished by placing a small enclosure
over the top of the sampling probe and introducing helium into the enclosed airspace.
The pump will then be operated to apply a vacuum to the probe, and the produced vapor
will be monitored by capturing samples of the produced vapor in Tedlar bags and
measuring the helium concentrations in the samples with a Mark Products model 9822,
factory calibrated, portable helium detector. Helium concentrations detected in the
samples must be less than 10% of the concentrations measured within the enclosed
airspace to be acceptable. If the concentration exceeds 10%, the vapor probe seal will be
considered inadequate and will either be repaired or a new sampling location will be
selected and prepared.

Purge testing will additionally be completed to verify that vapor samples for VOC testing
are collected after an appropriate volume of vapor is purged from the vapor probe. Purge
testing will be completed simultaneously with the vapor probe leak testing using the same
general procedure, except that total organic vapor concentrations rather than helium
concentrations will be monitored. Total organic vapor concentrations within the Tedlar
bag samples will be measured using a calibrated PID (see calibration procedure in
Appendix B), and detected concentrations associated with the corresponding volume of
vapor removed will be recorded in the field documentation. It is anticipated that a total
volume of no more than 2 liters of vapor will be removed during the combined
purge/probe seal leak testing.

Vapor sampling will commence following successful completion of the leak and purge
testing. The samples will be collected by opening the appropriate valves, allowing the
vacuum within the summa canisters to induce the flow of vapor from beneath the slab
into the vapor probe, through the tubing, and into the summa canisters. Vapor flow rate
during sampling will be automatically limited to no more than 200 ml/min by flow
controllers that are attached to the summa canisters. Summa canister valves will be
closed and sample collection terminated when the vacuum has diminished to
approximately 5 inches of water, indicating the summa canisters are nearly full. A
duplicate vapor sample will be collected at one of the three sampling locations for quality
assurance/quality control (QA/QC) purposes.

Summa canisters will be labeled and handled as previously described for the concrete
samples. Following completion of sampling, the vapor probes will be removed and the
sampling locations will be abandoned by filling the concrete core hole with a cement and bentonite mixture.

2.6 Soil Sampling

Soil borings and sampling will be completed to enable evaluation of the potential presence of hydrocarbons in subsurface soil. Soil borings will be completed either coincident or immediately adjacent to each of the three previously described sampling locations. An approximately 4" diameter hole will be cut in the concrete floor slab to allow completion of each boring. The boring will be advanced using hand auger methods, and subsurface conditions will be recorded on a boring log in accordance with the Unified Soil Classification System. Total organic vapor concentrations associated with cuttings from the soil boring will be monitored and recorded in the boring log. If evidence of soil contamination is observed, such as elevated total organic vapor concentrations or staining, at least one “worst case” soil sample will be collected from the zone of apparent contamination using a slide hammer equipped with stainless steel sample rings. Upon retrieval from the boring, plastic end caps will be fitted to the rings, and the sample will be appropriately labeled to identify the boring, depth, and date and time of collection. Soil samples for subsequent VOC analysis will be collected from the soil core using EPA Method 5035 sampling equipment and techniques, as described in Appendix C.

In the event that multiple zones of contamination are apparent in one or more borings or the nature of the contamination changes significantly between the top and bottom of a boring, multiple soil samples from the same soil boring may be collected for analysis, at the discretion of the field personnel. Alternatively, if there is no evidence of contamination in one or more borings, a single soil sample will be collected at the maximum depth of the borings, at approximately 6 feet below grade. All soil samples will be labeled and handled as described above for the concrete samples.

The soil borings will be abandoned following completion of sampling activities by backfilling with bentonite chips or pellets. Following emplacement in the soil borings, the bentonite will be hydrated with water to ensure an adequate seal is formed. The overlying concrete slab hole will be patched with quick-setting cement to make a flush surface. In the event that floor tiles are damaged during sampling activities, arrangements will be made for their repair or replacement.
2.7 Laboratory Analyses
The primary and duplicate soil vapor samples will be analyzed for VOCs using EPA Method TO-15. Concrete core and soil sample testing will include the following analyses and associated methods:

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPH (carbon chain; C₆-C₄₄)</td>
<td>8015</td>
</tr>
<tr>
<td>VOCs</td>
<td>8260B</td>
</tr>
<tr>
<td>PAHs</td>
<td>8310</td>
</tr>
</tbody>
</table>

All laboratory testing will be completed by Calscience Environmental Laboratories Inc. (CEL), of Garden Grove, California. CEL is a certified laboratory for the requested analyses.

2.8 Report
A written report will be prepared presenting the investigative findings regarding the laboratory analytical results. The report will discuss the results with respect to the potential for exposure hazards based on comparison of detected concentrations with regulatory criteria and guidelines. These standards will include CHHSLs and USEPA screening levels for air and USEPA screening criteria for soil. In the event that significant concentrations of hydrocarbons are found to be present in concrete core, subslab vapor or soil samples (i.e., in excess of regulatory criteria or guideline values), the report will also present conclusions regarding whether the contamination is likely to be associated with the former rubber plant. As discussed in section 2.1 above, any conclusion reached regarding this issue will be based on the nature and distribution of the detected contaminants as well as professional judgment. Depending upon the findings, it may not be possible to draw conclusions regarding the origin of the contamination with any certainty. As appropriate, recommendations for further evaluation and/or mitigation measures will additionally be presented in the report.
APPENDIX A

SUMMARY OF EXISTING DATA
APN 7351-033-017
APPENDIX B

PHOTOIONIZATION DETECTOR CALIBRATION PROCEDURES
Portable Handheld VOC Monitor

The rugged MiniRAE 2000 is the smallest pumped handheld volatile organic compound (VOC) monitor on the market. Its Photoionization Detector's (PID) extended range of 0-10,000 ppm makes it an ideal instrument for applications from environmental site surveying to HazMat/Homeland Security.

Key Features

Proven PID technology The patented 3D sensor provides a 3-second response up to 10,000 ppm and sets a new standard for resistance to moisture and dirt.

Self-cleaning lamp and sensor Our patented self-cleaning lamp and sensor minimize the need for maintenance and calibration.

The MiniRAE 2000 lamp and sensor can be taken apart in seconds for easy maintenance without tools!

Measure more chemicals than with any other PID With over 100 Correction Factors built into the MiniRAE 2000 memory and the largest printed list of Correction Factors in the world (300+), RAE Systems offers the ability to accurately measure more ionizable chemicals than any other PID. When a gas is selected from the MiniRAE 2000's library, the alarm points are automatically loaded into the meter.

User friendly screens make it easy to use for simple applications and flexible enough for sophisticated operations.

Drop-In battery When work schedules require putting in more than the 10 hours supplied by the standard NiMH battery, the drop-in alkaline pack supplied with every MiniRAE 2000 lets you finish the job.

Rugged Rubber Boot The standard rubber boot helps assure that the MiniRAE 2000 survives the bumps and knocks of tough field use.

Strong, built-in sample pump draws up to 100 feet (30m) horizontally or vertically.

Tough flexible inlet probe

Large keys operable with 3 layers of gloves.

Easy-to-read display with backlight.

Stores up to 267 hours of data at one minute intervals for downloading to PC (with the datalogging option).

3-year 10.6 eV lamp warranty

Applications

HazMat/Homeland Security

- Initial PPE (personal protective equipment) assessment
- Leak detection
- Perimeter establishment and maintenance
- Spill delineation
- Decontamination
- Remediation

Industrial Hygiene/Safety

- Confined Space Entry (CSE)
- Indoor Air Quality (IAQ)
- Worker exposure studies

Environmental

- Soil and water headspace analysis
- Leaking underground storage tanks
- Perimeter fenceline monitoring
- Fugitive emissions (EPA Method 21)
- Vapor recovery breakthrough
- Landfill monitoring
### Specifications

**Default Sensor Settings**

<table>
<thead>
<tr>
<th>Gas Monitor (ppm)</th>
<th>Range (ppm)</th>
<th>Resolution Time (T90)</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOCs</td>
<td>0 - 999 ppm</td>
<td>0.1 ppm</td>
<td>&lt; 3 sec</td>
</tr>
<tr>
<td></td>
<td>100 - 10,000 ppm</td>
<td>1 ppm</td>
<td>&lt; 3 sec</td>
</tr>
</tbody>
</table>

**Detector Specifications**

- **Size:** 8.27” x 3.0”W x 2.0”H (21.0 x 7.62 x 5.0 cm)
- **Weight:** 20 oz with battery pack (553g) w/o rubber boot
- **Sensor:** Photoionization sensor with standard 10.6 eV or optional 9.6 eV or 11.7 eV UV lamp
- **Battery:** Rechargeable, external, field replaceable
  - Nickel-Metal-Hydride (NiMH) battery pack
  - Alkaline battery holder (for 4 AA batteries)

**Operating Period:** 10 hours continuous operation

**Display:** Large LCD, backlight activated manually, with alarms or darkness

**Keypad:** 1 operation and 2 programming keys

**Direct Readout:**
- VOCs as ppm by volume
- High and low values
- STEL and TWA (in hygiene mode)
- Battery and shut down voltage

**Alarms:**
- 90 dB buzzer and flashing red LED to indicate exceeded preset limits
- High: 3 beeps and flashes per second
- Low: 2 beeps and flashes per second
- STEL and TWA: 1 beep and flash per second
- Alarms automatic reset or latching with manual override
- Optional plug-in pen size vibration alarm
- User adjustable alarm limits

**Calibration:**
- Two point field calibration of zero and standard reference gas. Calibration memory of 8 calibration gases, alarm limits, span values and calibration date

**DataLogging:**
- Optional 267 hours (at one minute intervals) with date/time. Header information includes monitor serial number, user ID, site ID, date and time

**Sampling Pump:**
- Internal, integrated flow rate 400 cc/min
- Sample from 100” (30m) horizontally or vertically

**Low Flow Alarm:**
- Auto shut-off pump at low flow condition

**Communication:**
- Download data and upload instrument set-up from PC through RS-232 link to serial port

**Temperature:**
- 14° to 104° F (-10° to 40°C)

**Humidity:**
- 0% to 95% relative humidity (non-condensing)

**EMI/RFI:**
- Highly resistant to EMI/RFI
- Compliant with EMC Directive 89/336/EEC

**IF rating:**
- IP-65: protected against dust, protected against low pressure jets of water from all directions

**Hazardous Area Approval:**
- US and Canada: UL and cUL
- Europe: ATEX II 1G Ex ia IIC T4

**Attachment:**
- Durable bright yellow rubber boot w/ belt clip & wrist strap

**Warranty:**
- Lifetime on non-consumable components
- (per RAE Systems Standard Warranty), 3 years for 10.6 eV PID lamp, 1 year for pump and battery

**MinI RAE 2000 and Accessories**

**Monitor only includes:**
- 10.6eV, 9.6eV or 11.7eV as specified
- RAE Systems UV lamp: 10.6eV, 9.6eV or 11.7eV as specified
- 5-inch Flex-I-Probe
- External filter
- Rubber boot with belt clip
- Alkaline battery adapter
- Tool kit
- Lamp cleaning kit
- Nickel-Metal-Hydride battery
- 120/230 V AC/DC wall adapter (if specified)
- Operation and maintenance manual

**Monitor with accessories kit adds:**
- Hard transport case with pre-cut foam
- 5 porous metal filters and O-rings
- Organic vapor zeroing adapter
- Gas outlet port and tubing

**Optional calibration kit adds:**
- 10 ppm isobutylene calibration gas, 34L
- Calibration regulator and flow controller

**Datalogging monitor adds:**
- ProRAE Suite software package for Windows 98, NT, 2000 and XP
- Computer interface cable

**Optional Guaranteed Cost of Ownership Program:**
- 4-year repair and replacement guarantee
- Annual maintenance service

**Distributed By:**

**Equipco**
- 2100 Meridian Park Boulevard
- Concord, CA 94520
- Tel: 1-888-234-5678

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* On going projects to enhance our products means that these specifications are subject to change

** Performance based on isobutylene calibration
4.4 Calibrate and Select Gas

CAUTION WARNINGS:
The calibration of all newly purchased RAE Systems instruments should be tested by exposing the sensor(s) to known concentration calibration gas before the instrument is put into service for the first time.

For maximum safety, the accuracy of the MiniRAE 2000 should be checked by exposing it to known concentration calibration gas before each day's use.

In the first menu of the programming mode, the user can perform functions such as calibration of the MiniRAE 2000 Monitor, select default cal memories, and modify cal memories (see Table 4.4).

<table>
<thead>
<tr>
<th>Table 4.4</th>
<th>Calibrate/Select Gas Sub-Menu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Air Cal?</td>
<td></td>
</tr>
<tr>
<td>Span Cal?</td>
<td></td>
</tr>
<tr>
<td>Select Cal Memory?</td>
<td></td>
</tr>
<tr>
<td>Change Span Value?</td>
<td></td>
</tr>
<tr>
<td>Modify Cal Memory?</td>
<td></td>
</tr>
<tr>
<td>Change Correction Factor?</td>
<td></td>
</tr>
</tbody>
</table>

Calibrating the MiniRAE 2000 monitor is a two-point process using "fresh air" and the standard reference gas (also known as span gas). First a "Fresh air" calibration, which contains no detectable VOC (0.0 ppm), is used to set the zero point for the sensor. Then a standard reference
gas that contains a known concentration of a given gas is used to set the second point of reference.

*Note:* The span value must be set prior to calibrating for fresh air or span.

The user can store calibrations for up to 8 different measurement gases. The default gas selections are as follows:

Cal Memory #0.....Isobutylene
Cal Memory #1.....Hexane
Cal Memory #2.....Xylene
Cal Memory #3.....Benzene
Cal Memory #4.....Styrene
Cal Memory #5.....Toluene
Cal Memory #6.....Vinyl Chloride
Cal Memory #7.....Custom?

Memory #0 functions differently than the other 7 memories. For Memory #0, isobutylene is always the calibration gas. When the gas is changed in Memory #0 to one of 100 other preprogrammed chemicals or to a user-defined custom gas, a correction factor is applied to all the readings. During calibration, the unit requests isobutylene gas and displays the isobutylene concentration immediately following calibration, but when the unit is returned to the normal reading mode, it displays the selected gas and applies the correction factor.

The other 7 cal memories require the same calibration gas as the measurement gas. These memories may also be modified to a preprogrammed chemical or to a user-defined custom gas. In the gas library, only the gases that
can be detected by the installed UV lamp will actually be displayed. Note that although the correction factor for the new gas will be displayed and can be modified, this factor is not applied when Memories #1-7 are used. Therefore the factor will not affect the readings in these memories.

Once each of the memories has been calibrated, the user can switch between the calibrated gases by changing the cal memory without the need to recalibrate. Or the user can switch the measurement gas in Memory #0 and the appropriate correction factor will automatically be applied without the need to recalibrate. If the gas is changed in Memories #1-7, it is necessary to recalibrate.

To change a default gas from the list above to a library or custom gas, first go to Select Cal Memory (Section 4.4.3) and then proceed to Modify Cal Memory (Section 4.4.5) to enter the desired gas. If the desired compound does not appear in the preprogrammed library, the user can use the Custom_VOC entry in the library, or the name and correction factor of any of the existing compounds can be changed as described in Section 4.4.5. A list of some 300 correction factors is given in Technical Note 106, available at the website www.raesystems.com.
4.4.1 Fresh Air Calibration

This procedure determines the zero point of the sensor calibration curve. To perform a fresh air calibration, use the calibration adapter to connect the MiniRAE 2000 to a "fresh" air source such as from a cylinder or Tedlar bag (option accessory). The "fresh" air is clean dry air without any organic impurities. If such an air cylinder is not available, any clean ambient air without detectable contaminant or a charcoal filter can be used.

1. The first sub-menu shows: "Fresh air Cal?"

2. Make sure that the MiniRAE 2000 is connected to one of the "fresh" air sources described above.

3. Press the [Y/+] key, the display shows "zero in progress" followed by "wait.." and a countdown timer.

4. After about 15 seconds pause, the display will show the message "zeroed... reading = X.X ppm..." Press any key or wait about 20 seconds, the monitor will return back to "Fresh air Calibration?" submenu.

Note: The charcoal filter has a check box so that user can mark off a box each time the filter has been used. The charcoal filter should be replaced after 20 calibrations.
**4.4.2 Span Calibration**

This procedure determines the second point of the sensor calibration curve for the sensor. A cylinder of standard reference gas (span gas) fitted with a 500 cc/min. flow-limiting regulator or a flow-matching regulator is the simplest way to perform this procedure. Choose the 500 cc/min. regulator only if the flow rate matches or slightly exceeds the flow rate of the instrument pump. Alternatively, the span gas can first be filled into a Tedlar Bag, or delivered through a demand-flow regulator. Connect the calibration adapter to the inlet port of the MiniRAE 2000 Monitor, and connect the tubing to the regulator or Tedlar bag.

Another alternative is to use a regulator with >500 cc/min flow but allow the excess flow to escape through a T or an open tube. In the latter method, the span gas flows out through an open tube slightly wider than the probe, and the probe is inserted into the calibration tube.

Before executing a span calibration, make sure the span value has been set correctly (see next sub-menu).

1. Make sure the monitor is connected to one of the span gas sources described above.

2. Press the [Y/+] key at the “Span Cal?” to start the calibration. The display shows the gas name and the span value of the corresponding gas.

3. The display shows “Apply gas now!” Turn on the valve of the span gas supply.
4. Display shows “wait.... 30” with a count down timer showing the number of remaining seconds while the monitor performs the calibration.

5. To abort the calibration, press any key during the count down. The display shows “Aborted!” and return to “Span Cal?” sub-menu.

6. When the count down timer reaches 0, the display shows the calibrated value.

**Note:** The reading should be very close to the span gas value.

7. During calibration, the monitor waits for an increased signal before starting the countdown timer. If a minimal response is not obtained after 35 seconds, the monitor displays “No Gas!” Check the span gas valve is on and for lamp or sensor failure before trying again.

8. The calibration can be started manually by pressing any key while the “Apply gas now!” is displayed.

9. After a span calibration is completed, the display will show the message “Span Cal Done! Turn Off Gas.”

10. Turn off the flow of gas. Disconnect the calibration adapter or Tedlar bag from the MiniRAE 2000 Monitor.

11. Press any key and it returns back to “Span Gas Cal?”
4.4.3 Select Cal Memory

This function allows the user to select one of eight different memories for gas calibration and measurement. For Memories #1-7, the calibration and measurement gas is the same and no correction factor is applied. For Memory #0, the calibration gas is always isobutylene and the measurement gas may be different, in which case the correction factor for that gas is automatically applied. The default gas selections are listed in Section 4.4.

1. “Select Cal Memory?” is the third sub-menu item in the Calibration sub-menu. Pressing the [Y/+] key, the display will show “Gas =” gas name followed by “Mem # x?”

2. Press [N/-] to scroll through all the memory numbers and the gas selections respectively. Press [Y/+] to accept the displayed Cal Memory number.

3. After the [Y/+] key is pressed, the display shows “Save?” Press [Y/+] key to save and proceed. Press [N/-] to discard the entry and advance to the next sub-menu.

4. If the gas in a newly selected Cal Memory number is not calibrated, the display shows “CF= x.xx”. A correction factor with the value “x.xx” will be applied.

5. If the gas of a newly selected cal memory number has been calibrated previously, the display shows “Last calibrated xx/xx/xx”.

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4.4.4 Change Span Value

This function allows the user to change the span values of the calibration gases.

1. "Change Span Value?" is the fourth sub-menu item in the Calibration sub-menu

2. Press [Y/+], display shows the gas name and the span value. A cursor will blink at the first digit of the Span value. To modify the span gas value, go to Step 3. Otherwise, press and hold the [MODE] key for 1 second to accept the previously stored span gas value and move to the next sub-menu.

3. Starting from the left-most digit of the span gas value, use the [Y/+] or [N/-] key to change the digit value and press [MODE] key momentarily to advance to next digit. Repeat this process until all digits are entered. Press and hold the [MODE] for 1 second to exit.

4. The display shows "Save?" To accept the new value, press the [Y/+] key. Press the [N/-] key or the [MODE] key to discard the change and move to the next sub-menu.
4.4.5 Modify Cal Memory

If the current cal memory number selected is not memory 0, users will be prompted whether to modify the settings of the selected cal memory. Press \([Y/+]\) to modify the cal memory and \([N/-]\) to go to the next sub-menu.

Once \([Y/+]\) is pressed the LCD display will show the current memory number, current Gas selected and prompt user for acceptance of current gas selected.

1. Press \([N/-]\) to modify the gas selection if desired. Or press \([Y/+]\) key to skip the change of gas selection, and proceed to the next sub-menu.

2. After pressing \([N/-]\), display shows “Copy gas from library?” Press \([Y/+]\) to accept or \([N/-]\) for the next sub-menu, “Enter Custom gas?”

3. In the “Copy gas from library” submenu, use \([Y/+]\) and \([N/-]\) keys to scroll through the selections in the library. Press \([\text{MODE}]\) key momentarily to select the gas. The display shows ”Save?” Press \([Y/+]\) to save or \([N/-]\) to discard the changes and proceed to next sub-menu.

4. In the Custom gas sub-menu, the user can enter the gas name. Press the \([Y/+]\) or \([N/-]\) key to cycle through all 26 letters and 10 numerals. Press the \([\text{MODE}]\) key momentarily to advance to the next digit. The flashing digit will move to the next digit to the right. Repeat this process until all digits (up to 8 digits) of the custom gas name is entered.
Press and hold the [MODE] key for 1 second to exit the name entry mode. The display will show "Save?" Press [Y/+] to save the entry, or [N/-] to discard the changes.
4.4.6 Change Correction Factor

This function allows the user to change the Correction Factor of the standard calibration gas (only for Cal Memory #0).

1. “Change Correction Factor?” is the sixth sub-menu in the Calibration sub-menu.

2. Press [Y/+] key. Display shows the gas name, then the correction factor. A cursor blinks at the left-most digit of the correction factor. If user wants to modify the correction factor, go to Step 3. Otherwise, press and hold the [MODE] key for 1 second to accept the previously stored correction factor value and return to the first sub-menu of the calibrate/select gas menu.

3. Starting from the left-most digit of the correction factor, use [Y/+] or [N/-] key to change the digit value and press [MODE] key momentarily to advance to the next digit, the cursor will move to the next digit to the right. Repeat this process until all digits are entered. Press and hold the [MODE] for 1 second to exit.

4. The display shows “Save?” To confirm the new value, press [Y/+] to accept the change. Press [N/-] or [MODE] to discard the change and return to the first sub-menu, Calibrate and Select Gas.
APPENDIX C

ENCORE SAMPLING PROCEDURES
2.0 SUMMARY OF METHOD

2.1 Low concentration soil method - generally applicable to and soils and other solid samples with VOC concentrations in the range of 0.5 to 200 µg/kg.

Volatile organic compounds (VOCs) are determined by collecting an approximately 5-g sample, weighed in the field at the time of collection, and placing it in a pre-weighed vial with a septum-sealed screw-cap (see Sec. 4) that already contains a stirring bar and a sodium bisulfate preservative solution. The vial is sealed and shipped to a laboratory or appropriate analysis site. The entire vial is then placed, unopened, into the instrument carousel. Immediately before analysis, organic-free reagent water, surrogates, and internal standards (if applicable) are automatically added without opening the sample vial. The vial containing the sample is heated to 40°C and the volatiles purged into an appropriate trap using an inert gas combined with agitation of the sample. Purged components travel via a transfer line to a trap. When purging is complete, the trap is heated and backflushed with helium to desorb the trapped sample components into a gas chromatograph for analysis by an appropriate determinative method.

2.2 High concentration soil method - generally applicable to soils and other solid samples with VOC concentrations greater than 200 µg/kg.

The sample introduction technique in Sec. 2.1 is not applicable to all samples, particularly those containing high concentrations (generally greater than 200 µg/kg) of VOCs which may overload either the volatile trapping material or exceed the working range of the determinative instrument system (e.g., GC/MS, GC/FID, GC/EC, etc.). In such instances, this method describes two sample collection options and the corresponding sample purging procedures.

2.2.1 The first option is to collect a bulk sample in a vial or other suitable container without the use of the preservative solution described in Sec. 2.1. A portion of that sample is removed from the container in the laboratory and is dispersed in a water-miscible solvent to dissolve the volatile organic constituents. An aliquot of the solution is added to 5 mL of reagent water in a purge tube. Surrogates and internal standards (if applicable) are added to the solution, then purged using Method 5030, and analyzed by an appropriate determinative method. Because the procedure involves opening the vial and removing a portion of the soil, some volatile constituents may be lost during handling.

2.2.2 The second option is to collect an approximately 5-g sample in a pre-weighed vial with a septum-sealed screw-cap (see Sec 4) that contains 5 mL of a water-miscible organic solvent (e.g., methanol). At the time of analysis, surrogates are added to the vial, then an aliquot of the solvent is removed from the vial, purged using Method 5030 and analyzed by an appropriate determinative method.

2.3 High concentration oily waste method - generally applicable to oily samples with VOC concentrations greater than 200 µg/kg that can be diluted in a water-miscible solvent.
Samples that are comprised of oils or samples that contain significant amounts of oil present additional analytical challenges. This procedure is generally appropriate for such samples when they are soluble in a water-miscible solvent.

2.3.1 After demonstrating that a test aliquot of the sample is soluble in methanol or polyethylene glycol (PEG), a separate aliquot of the sample is spiked with surrogates and diluted in the appropriate solvent. An aliquot of the solution is added to 5 mL of reagent water in a purge tube, taking care to ensure that a floating layer of oil is not present in the purge tube. Internal standards (if applicable) are added to the solution which is then purged using Method 5030 and analyzed by an appropriate determinative method.

2.3.2 Samples that contain oily materials that are not soluble in water-miscible solvents must be prepared according to Method 3585.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

Refer to the introductory material in this chapter, Organic Analytes, Sec. 4.1, for general sample collection information. The low concentration portion of this method employs sample vials that are filled and weighed in the field and never opened during the analytical process. As a result, sampling personnel should be equipped with a portable balance capable of weighing to 0.01 g.

6.1 Preparation of sample vials

The specific preparation procedures for sample vials depend on the expected concentration range of the sample, with separate preparation procedures for low concentration soil samples and high concentration soil and solid waste samples. Sample vials should be prepared in a fixed laboratory or other controlled environment, sealed, and shipped to the field location. Gloves should be worn during the preparation steps.

6.1.1 Low concentration soil samples

The following steps apply to the preparation of vials used in the collection of low concentration soil samples to be analyzed by the closed-system purge-and-trap equipment described in Method 5035.

6.1.1.1 Add a clean magnetic stirring bar to each clean vial. If the purge-and-trap device (Sec. 4.2) employs a means of stirring the sample other than a magnetic stirrer (e.g., sonication or other mechanical means), then the stir bar is omitted.

6.1.1.2 Add preservative to each vial. The preservative is added to each vial prior to shipping the vial to the field. Add approximately 1 g of sodium bisulfate to each vial. If samples markedly smaller or larger than 5 g are to be collected, adjust the amount of preservative added to correspond to approximately 0.2 g of preservative for each 1 g of sample. Enough sodium bisulfate should be present to ensure a sample pH of ≤2.

6.1.1.3 Add 5 mL of organic-free reagent water to each vial. The water and the preservative will form an acid solution that will reduce or eliminate the majority of the biological activity in the sample, thereby preventing biodegradation of the volatile target analytes.
6.1.1.4 Seal the vial with the screw-cap and septum seal. If the double-ended, fritted, vials are used, seal both ends as recommended by the manufacturer.

6.1.1.5 Affix a label to each vial. This eliminates the need to label the vials in the field and assures that the tare weight of the vial includes the label. (The weight of any markings added to the label in the field is negligible).

6.1.1.6 Weigh the prepared vial to the nearest 0.01 g, record the tare weight, and write it on the label.

6.1.1.7 Because volatile organics will partition into the headspace of the vial from the aqueous solution and will be lost when the vial is opened, surrogates, matrix spikes, and internal standards (if applicable) should only be added to the vials after the sample has been added to the vial. These standards should be introduced back in the December 1996 laboratory, either manually by puncturing the septum with a small-gauge needle or automatically by the sample introduction system, just prior to analysis.

6.1.2 High concentration soil samples collected without a preservative

When high concentration samples are collected without a preservative, a variety of sample containers may be employed, including 60-mL glass vials with septum seals (see Sec. 4.4).

6.1.3 High concentration soil samples collected and preserved in the field

The following steps apply to the preparation of vials used in the collection of high concentration soil samples to be preserved in the field with methanol and analyzed by the aqueous purge-and-trap equipment described in Method 5030.

6.1.3.1 Add 10 mL of methanol to each vial.

6.1.3.2 Seal the vial with the screw-cap and septum seal.

6.1.3.3 Affix a label to each vial. This eliminates the need to label the vials in the field and assures that the tare weight of the vial includes the label. (The weight of any markings added to the label in the field is negligible).

6.1.3.4 Weigh the prepared vial to the nearest 0.01 g, record the tare weight, and write it on the label.

NOTE: Vials containing methanol should be weighed a second time on the day that they are to be used. Vials found to have lost methanol (reduction in weight of >0.01 g) should not be used for sample collection.

6.1.3.5 Surrogates, internal standards and matrix spikes (if applicable) should be added to the sample after it is returned to the laboratory and prior to analysis.

6.1.4 Oily waste samples

When oily waste samples are known to be soluble in methanol or PEG, sample vials may be prepared as described in Sec. 6.1.3, using the appropriate solvent. However, when the solubility of the waste is unknown, the sample should be collected without the use of a preservative, in a vial such as that described in Sec. 6.1.2.

6.2 Sample collection
Collect the sample according to the procedures outlined in the sampling plan. As with any sampling procedure for volatiles, care must be taken to minimize the disturbance of the sample in order to minimize the loss of the volatile components. Several techniques may be used to transfer a sample to the relatively narrow opening of the low concentration soil vial. These include devices such as the EnCoreTM sampler, the Purge-and-Trap Soil Sampler TM, and a cut plastic syringe. Always wear gloves whenever handling the tared sample vials.

6.2.1 Low concentration soil samples

6.2.1.1 Using an appropriate sample collection device, collect approximately 5 g of sample as soon as possible after the surface of the soil or other solid material has been exposed to the atmosphere: generally within a few minutes at most. Carefully wipe the exterior of the sample collection device with a clean cloth or towel.

6.2.1.2 Using the sample collection device, add about 5 g (2 - 3 cm) of soil to the sample vial containing the preservative solution. Quickly brush any soil off the vial threads and immediately seal the vial with the septum and screw-cap. Store samples on ice at 4°C.

NOTE: Soil samples that contain carbonate minerals (either from natural sources or applied as an amendment) may effervesce upon contact with the acidic preservative solution in the low concentration sample vial. If the amount of gas generated is very small (i.e., several mL), any loss of volatiles as a result of such effervescence may be minimal if the vial is sealed quickly. However, if larger amounts of gas are generated, not only may the sample lose a significant amount of analyte, but the gas pressure may shatter the vial if the sample vial is sealed. Therefore, when samples are known or suspected to contain high levels of carbonates, a test sample should be collected, added to a vial, and checked for effervescence. If a rapid or vigorous reaction occurs, discard the sample and collect low concentration samples in vials that do not contain the preservative solution.

6.2.1.3 When practical, use a portable balance to weigh the sealed vial containing the sample to ensure that 5.0 ± 0.5 g of sample were added. The balance should be calibrated in the field using an appropriate weight for the sample containers employed (Sec. 4.5.5). Record the weight of the sealed vial containing the sample to the nearest 0.01 g.

6.2.1.4 Alternatively, collect several trial samples with plastic syringes. Weigh each trial sample and note the length of the soil column in the syringe. Use these data to determine the length of soil in the syringe that corresponds to 5.0 ± 0.5 g. Discard each trial sample.

6.2.1.5 As with the collection of aqueous samples for volatiles, collect at least two replicate samples. This will allow the laboratory an additional sample for reanalysis. The second sample should be taken from the same soil stratum or the same section of the solid waste being sampled, and within close proximity to the location from which the original sample was collected.

6.2.1.6 In addition, since the soil vial cannot be opened without compromising the integrity of the sample, at least one additional aliquot of sample must be collected for screening, dry weight determination, and high concentration analysis (if necessary). This third aliquot may be collected in a 60-mL glass vial or a third 40-mL soil sample vial. However, this third vial must not contain the sample preservative solution, as an aliquot will be used to determine dry weight. If high concentration samples are collected in vials containing methanol, then two additional aliquots should be collected, one for high concentration analysis collected in a vial containing methanol,
and another for the dry weight determination in a vial without either methanol or the low concentration aqueous preservative solution.

6.2.1.7 If samples are known or expected to contain target analytes over a wide range of concentrations, thereby requiring the analyses of multiple sample aliquots, it may be advisable and practical to take an additional sample aliquot in a low concentration soil vial containing the preservative, but collecting only 1-2 g instead of the 5 g collected in Sec. 6.2.1.1. This aliquot may be used for those analytes that exceed the instrument calibration range in the 5-g analysis.

6.2.1.8 The EnCore™ sampler has not been thoroughly evaluated by EPA as a sample storage device. While preliminary results indicate that storage in the EnCore™ device may be appropriate for up to 48 hours, samples collected in this device should be transferred to the soil sample vials as soon as possible, or analyzed within 48 hours.

6.2.1.9 The collection of low concentration soil samples in vials that contain methanol is not appropriate for samples analyzed with the closed-system purge-and-trap equipment described in this method (see Sec. 6.2.2).

6.2.2 High concentration soil samples preserved in the field

The collection of soil samples in vials that contain methanol has been suggested by some as a combined preservation and extraction procedure. However, this procedure is not appropriate for use with the low concentration soil procedure described in this method.

NOTE: The use of methanol preservation has not been formally evaluated by EPA and analysts must be aware of two potential problems. First, the use of methanol as a preservative and extraction solvent introduces a significant dilution factor that will raise the method quantitation limit beyond the operating range of the low concentration direct purge-and-trap procedure (0.5-200 μg/kg). The exact dilution factor will depend on the masses of solvent and sample, but generally exceeds 1000, and may make it difficult to demonstrate compliance with regulatory limits or action levels for some analytes. Because the analytes of interest are volatile, the methanol extract cannot be concentrated to overcome the dilution problem. Thus, for samples of unknown composition, it may still be necessary to collect an aliquot for analysis by this closed-system procedure and another aliquot preserved in methanol and analyzed by other procedures. The second problem is that the addition of methanol to the sample is likely to cause the sample to fail the ignitability characteristic, thereby making the unused sample volume a hazardous waste.

6.2.2.1 When samples are known to contain volatiles at concentrations high enough that the dilution factor will not preclude obtaining results within the calibration range of the appropriate determinative method, a sample may be collected and immediately placed in a sample vial containing purge-and-trap grade methanol.

6.2.2.2 Using an appropriate sample collection device, collect approximately 5 g of sample as soon as possible after the surface of the soil or other solid material has been exposed to the atmosphere: generally within a few minutes at most. Carefully wipe the exterior of the sample collection device with a clean cloth or towel.

6.2.2.3 Using the sample collection device, add about 5 g (2 - 3 cm) of soil to the vial containing 10 mL of methanol. Quickly brush any soil off the vial threads and immediately seal the vial with the septum and screw-cap. Store samples on ice at 4°C.
6.2.2.4 When practical, use a portable balance to weigh the sealed vial containing the sample to ensure that 5.0 ± 0.5 g of sample were added. The balance should be calibrated in the field using an appropriate weight for the sample containers employed (Sec. 4.5.5). Record the weight of the sealed vial containing the sample to the nearest 0.01 g.

6.2.2.5 Alternatively, collect several trial samples with plastic syringes. Weigh each trial sample and note the length of the soil column in the syringe. Use these data to determine the length of soil in the syringe that corresponds to 5.0 ± 0.5 g. Discard each trial sample.

6.2.2.6 Other sample weights and volumes of methanol may be employed, provided that the analyst can demonstrate that the sensitivity of the overall analytical procedure is appropriate for the intended application.

6.2.2.7 The collection of at least one additional sample aliquot is required for the determination of the dry weight, as described in Sec. 6.2.1.6. Samples collected in methanol should be shipped as described in Sec. 6.3, and must be clearly labeled as containing methanol, so that the samples are not analyzed using the closed-system purge-and-trap equipment described in this procedure.

6.2.3 High concentration soil sample not preserved in the field

The collection of high concentration soil samples that are not preserved in the field generally follows similar procedures as for the other types of samples described in Secs. 6.2.1 and 6.2.2, with the obvious exception that the sample vials contain neither the aqueous preservative solution nor methanol. However, when field preservation is not employed, it is better to collect a larger volume sample, filling the sample container as full as practical in order to minimize the headspace. Such collection procedures generally do not require the collection of a separate aliquot for dry weight determination, but it may be advisable to collect a second sample aliquot for screening purposes, in order to minimize the loss of volatiles in either aliquot.

6.2.4 Oily waste samples

The collection procedures for oily samples depend on knowledge of the waste and its solubility in methanol or other solvents.

6.2.4.1 When an oily waste is known to be soluble in methanol or PEG, the sample may be collected in a vial containing such a solvent (see Sec. 6.1.4), using procedures similar to those described in Sec. 6.2.2.

6.2.4.2 When the solubility of the oily waste is not known, the sample should either be collected in a vial without a preservative, as described in Sec. 6.2.3, or the solubility of a trial sample should be tested in the field, using a vial containing solvent. If the trial sample is soluble in the solvent, then collect the oily waste sample as described in Sec. 6.2.2. Otherwise, collect an unpreserved sample as described in Sec. 6.2.3.

6.3 Sample handling and shipment

All samples for volatiles analysis should be cooled to approximately 4°C, packed in appropriate containers, and shipped to the laboratory on ice, as described in the sampling plan.

6.4 Sample storage

6.4.1 Once in the laboratory, store samples at 4°C until analysis. The sample storage area should be free of organic solvent vapors.
6.4.2 All samples should be analyzed as soon as practical, and within the designated holding time from collection. Samples not analyzed within the designated holding time must be noted and the data are considered minimum values.

6.4.3 When the low concentration samples are strongly alkaline or highly calcareous in nature, the sodium bisulfate preservative solution may not be strong enough to reduce the pH of the soil/water solution to below 2. Therefore, when low concentration soils to be sampled are known or suspected to be strongly alkaline or highly calcareous, additional steps may be required to preserve the samples. Such steps include: addition of larger amounts of the sodium bisulfate preservative to non-calcareous samples, storage of low concentration samples at -10°C (taking care not to fill the vials so full that the expansion of the water in the vial breaks the vial), or significantly reducing the maximum holding time for low concentration soil samples. Whichever steps are employed, they should be clearly described in the sampling and QA project plans and distributed to both the field and laboratory personnel. See Sec. 6.2.1.2 for additional information.
Disposable En Core® Sampler

Sampling Procedures

Using The En Core® T-Handle

NOTE:
1. En Core® Sampler is a SINGLE USE device. It cannot be cleaned and/or reused.
2. En Core® Sampler is designed to store soil. Do not use En Core Sampler to store solvent or free product!
3. En Core® Sampler must be used with En Core® T-Handle and/or En Core® Extrusion Tool exclusively. (These items are sold separately.)

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<td>Groove</td>
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BECOME TAKING SAMPLE:
1. Hold coring body and push plunger rod down until small o-ring rests against tabs. This will assure that plunger moves freely.

2. Depress locking lever on En Core T-Handle. Place coring body, plunger end first, into open end of T-Handle, aligning the (2) slots on the coring body with the (2) locking pins in the T-Handle. Twist coring body clockwise to lock pins in slots. Check to ensure Sampler is locked in place. Sampler is ready for use.

TAKING SAMPLE:
3. Turn T-Handle with T-up and coring body down. This positions plunger bottom flush with bottom of coring body (ensure that plunger bottom is in position). Using T-Handle, push Sampler into soil until coring body is completely full. When full, small o-ring will be centered in T-Handle viewing hole. Remove Sampler from soil. Wipe excess soil from coring body exterior.

4. Cap coring body while it is still on T-handle. Push cap over flat area of ridge and twist to lock cap in place. CAP MUST BE SEATED TO SEAL SAMPLER (see diagram).

PREPARING SAMPLER FOR SHIPMENT:
5. Remove the capped Sampler by depressing locking lever on T-Handle while twisting and pulling Sampler from T-Handle.

6. Lock plunger by rotating extended plunger rod fully counterclockwise until wings rest firmly against tabs (see plunger diagram).

7. Attach completed tear-off label (from En Core Sampler bag) to cap on coring body.

8. Return full En Core Sampler to zipper bag. Seal bag and put on ice.
CAUTION! Always use the Extrusion Tool to extrude soil from the En Core Sampler. If the Extrusion Tool is not used, the Sampler may fragment, causing injury.

1. Use a pliers to break locking arms on cap of En Core Sampler. Do not remove cap at this time. (CAUTION: Broken edges will be sharp.)

2. To attach En Core Sampler to En Core Extrusion Tool: Depress locking lever on Extrusion Tool and place Sampler, plunger end first, into open end of Extrusion Tool, aligning slots on coring body with pins in Extrusion Tool. Turn coring body clockwise until it locks into place. Release locking lever.

3. Rotate and gently push Extrusion Tool plunger knob clockwise until plunger slides over wings of coring body. (When properly positioned plunger will not rotate further.)

4. Hold Extrusion Tool with capped Sampler pointed upward so soil does not fall out when cap is removed. To release soil core, remove cap from Sampler and push down on plunger knob of En Core Extrusion Tool. Remove and properly dispose of En Core Sampler.

Warranty and Disclaimers

IMPORTANT: FAILURE TO USE THE EN CORE® Sampler in compliance with the written instructions provided herein voids all express and implied warranties, including warranty of merchantability and fitness for a particular purpose.

PRINCIPLE OF USE. The En Core Sampler Cartridge System is a volumetric sampling system designed to collect, store and deliver a soil sample. The En Core Sampler comes in two sizes for sample volumes of approximately 25 or 5 grams. There are four components: the cartridge with a movable plunger; a cap with two locking arms; a T-handle (purchased separately); and an extrusion handle (purchased separately). NOTE: The En Core Sampler is designed to store soil. It is not designed to store solvent or free product.

QUALITY CONTROL. The cartridge is sealed in an airtight package to prevent contamination prior to use. Due to the stringent quality control requirements associated with the use of this system, the disposable cartridge is designed to be used only once.

WARRANTY. En Novative Technologies, Inc. ("En Novative Technologies") warrants that the En Core Sampler shall perform consistent with the research conducted under En Novative Technologies' approval, within thirty (30) days from the date of delivery, provided that the Customer gives En Novative Technologies prompt notice of any defect or failure to perform and satisfactorily prove thereof. This warranty does not apply to the following, as solely determined by En Novative Technologies: (a) Damage caused by accident, abuse, mishandling or dropping; (b) Samplers that have been opened, taken apart or mishandled; (c) Samplers not used in accordance with the directions; and (d) Damages exceeding the cost of the sampler. Seller warrants that all En Core Samplers shall be free from defects in title. The foregoing warranties are in lieu of all other warranties, whether oral, written, expressed, implied or statutory, including any information provided by sales representatives or in marketing literature. IMPLIED WARRANTIES OF FITNESS AND MERCHANTABILITY SHALL NOT APPLY. En Novative Technologies' warranty obligations and Customer's remedies, except as to title, are solely and exclusively as stated herein.

LIMITATION OF LIABILITY. IN NO EVENT SHALL EN NOVATIVE TECHNOLOGIES BE LIABLE FOR ANTICIPATED PROFITS, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF REVENUE, DOWN TIME, REMEDIATION ACTIVITIES, REMOVAL OR RESAMPLING, LOSS OF CAPITAL, SERVICE INTERRUPTION OR FAILURE OF SUPPLY, LIABILITY OF CUSTOMER TO A THIRD PARTY, OR FOR LABOR, OVERHEAD, TRANSPORTATION, SUBSTITUTE SUPPLY SOURCES OR ANY OTHER EXPENSE. DAMAGE OR LOSS, INCLUDING PERSONAL INJURY OR PROPERTY DAMAGE. En Novative Technologies' liability on any claim of any kind shall be replacement of the En Core Sampler or refund of the purchase price. En Novative Technologies shall not be liable for penalties of any description whatsoever. In the event the En Core Sampler will be utilized by Customer on behalf of a third party, such third party shall not occupy the position of a third-party beneficiary of the obligation or warranty provided by En Novative Technologies, and no such third party shall have the right to enforce same. All claims must be brought within one (1) year of shipment, regardless of their nature.

En Novative Technologies, Inc.
1241 Bellevue Street
Green Bay, WI 54302
Phone: 920-465-3900 • Fax: 920-465-3963
Toll Free: 888-411-0757
www.ennovativetech.com

The En Core® Sampler is covered by one or more of the following U.S. Patents: 5,343,771; 5,505,098; 5,517,868; 5,522,271. Other U.S. and Foreign Patents Pending.

* Viton® is a registered trademark of DuPont Dow Elastomers.
ERROR: undefined
OFFENDING COMMAND: ,J,Y;Derb4TD*?TS!

STACK:
Legend

- Parcel boundary
- Outlines of historical features with use/contents indicated
- Approximate location of former underground pipelines with a potential to have transported VOC-containing fluids
- Proposed concrete/soil vapor/soil sampling location

Note:
Two additional discretionary concrete sampling locations to be added, as needed

FIGURE 2

SAMPLING LOCATIONS
APN 7351-034-041
19771 Magellan Drive

URS
<table>
<thead>
<tr>
<th>Sample Media</th>
<th>Location (ft. bgs)</th>
<th>Date</th>
<th>Analysis Class</th>
<th>Analyte</th>
<th>Concentration</th>
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**PARCEL 7351-034-041**

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<td>Ambient Air PRG (0.67)</td>
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<td>Styrene</td>
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<td>Methyl Ethyl Ketone</td>
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### SUMMARY OF ANALYTICAL DATA
**PARCEL 7351-034-041**

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<th>Sample Media</th>
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<th>Analyte</th>
<th>Concentration</th>
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<td>Indoor Air</td>
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<td>VOCs</td>
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<td>Xylenes (Total)</td>
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To: Dante Rodriguez/R9/USEPA/US@EPA, ssayed@dtsc.ca.gov, tpeng@dtsc.ca.gov
cc: John_Dudley@URSCorp.com, george.landreth@shell.com, Barbara_Tennison@URSCorp.com
bcc

Subject: work plan, 19771 Magellan Dr., Del Amo site


Dante:

The attached files contain a work plan for a subsurface investigation at 19771 Magellan Drive on the Del Amo site for your review. We are currently awaiting approval of a proposed access agreement from the owner of this property. Upon receiving the signed access agreement and your approval of the work plan, we will schedule the field work and communicate that to you.

We look forward to any comments you may have and are of course available to answer any questions you may have.

best regards

Erich Weaver
URS Corporation
130 Robin Hill Rd
Santa Barbara CA 93117
805-964-6010
FAX 805-9640259

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