MONITORING WELL INSTALLATION AND SAMPLING WORK PLAN

SOURCE AREA 12
DEL AMO SUPERFUND SITE
LOS ANGELES, CALIFORNIA

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1.0 INTRODUCTION AND BACKGROUND

Presented in this document is a work plan for the installation and sampling of a monitoring well at groundwater contamination source area 12 (SA12; Figure 1) within the Del Amo Superfund Site. This proposed investigation will be conducted under the existing Administrative Order on Consent between the Respondents and the U.S. Environmental Protection Agency (USEPA) and as a continuation of the Light Non-Aqueous Phase Liquid (LNAPL) Characterization Investigation currently in progress.

Past observations of groundwater samples collected from a temporary well point and recent Ultra-Violet Optical Screening Tool (UVOST) and hydrocarbon saturation testing findings from the ongoing LNAPL Characterization Investigation indicate the presence of LNAPL at SA12. The UVOST data have provided additional information regarding the approximate extent of the LNAPL and the area where the greatest LNAPL impact has occurred. USEPA is currently considering active remediation in this area to address the LNAPL; however, there are currently no permanent water table monitoring wells in the LNAPL area.

2.0 PURPOSE AND SCOPE

The purpose of the proposed well is to (1) enable collection and analysis of LNAPL samples, if available; and (2) provide for long-term monitoring of groundwater quality at the source area.

2.1 Data Quality Objectives

An overview of the proposed investigation is provided below through the USEPA’s seven-step Data Quality Objectives (DQO) process:

(1) State the Problem
There are currently no monitoring wells by which water table groundwater and LNAPL conditions can be evaluated at SA12. USEPA has indicated that active remediation is likely to be required to address LNAPL in the subsurface at SA12.

(2) Identify the Decision
The following decisions will be made based on results from the investigation:
• Is LNAPL present at SA12 at saturations sufficient to enter a monitoring well?
• What is the nature and magnitude of dissolved volatile organic compound (VOC) concentrations in the water table at SA12?

(3) Identify the Inputs to the Decision
Inputs to the above decisions will include the following:

• Field results for interface probe observations regarding the presence or absence of LNAPL in the monitoring well;
• Laboratory analytical results for LNAPL and/or groundwater samples collected from the well; and
• Federal and state regulatory criteria for drinking water.

(4) Define the Boundaries of the Study
The boundaries of the investigation are defined with respect to the geographic area of concern, potentially impacted media, and time constraints. The area of concern is limited to SA12, which is currently being evaluated as part of an ongoing NAPL Characterization investigation. SA12 lies primarily within parcel 7351-033-017, near the south eastern corner of the Del Amo site (Figure 1). For the purposes of this investigation, potentially impacted media of concern are limited to groundwater within the water table zone.

The field investigation will begin following USEPA approval of this work plan and after the necessary access notifications, agreements and permits are obtained from the various property owners and regulatory agencies. It is anticipated that the field investigation will be completed within six weeks of receiving USEPA approval. Laboratory analytical data will be available after approximately two additional weeks and the results and the findings will be communicated to USEPA within two weeks after that.

(5) Develop a Decision Rule
The following decision rule will be applied upon evaluation of the analytical results:

LNAPL will be concluded to be present at saturations sufficient to enter a monitoring well if future field testing using an interface probe indicates the presence of LNAPL in the well. Groundwater will be concluded to contain dissolved-phase constituents at levels of concern if laboratory analytical results indicate one or more constituents are present in samples collected from the well at concentrations in excess of State or Federal Maximum Contaminant Levels (MCLs) for drinking water.
(6) Specify Tolerable Limits on Decision Errors
The proposed investigation is concerned with a relatively limited area 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 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 contaminant concentrations that are only slightly below regulatory criteria, quality assurance/quality control data that casts doubt on the validity of the primary sample analytical results, or field evidence of significant contamination, such as LNAPL presence, that is inconsistent with laboratory analytical data.

(7) Optimize the Design for Obtaining Data
Step 7 involves providing a description and rationale for the investigative approach. This information is provided within Sections 2.2 – 2.8 below.

2.2 Field Investigation
The following tasks will be completed for the investigation:

- Review of the existing site-specific health and safety plan for the site;
- Completion and development of a single four inch diameter, water table zone monitoring well;
- Two rounds of LNAPL and/or groundwater sampling;
- Laboratory analysis of the LNAPL/groundwater samples for VOCs; and
- Review and evaluation of the data with respect to the stated objectives and completion of a Technical Memorandum presenting the results.

Details regarding the above tasks are described 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 sampling activities using a calibrated MiniRAE 2000 photo-ionization detector (PID). Calibration procedures for the PID are provided in Appendix A. 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 action levels and appropriate personal protective equipment (PPE) are presented in the Health and Safety Plan and are available upon request.

2.4 Well Drilling and Completion

The location of the proposed well is indicated on Figure 2. This location is adjacent to UVOST location CPL0088, where the most extensive hydrocarbon signature was observed. The well will be installed using the soil boring at this location that was recently proposed for sampling as part of the ongoing LNAPL Characterization work at SA12.

Screening for subsurface utilities or other obstructions in the vicinity of the proposed well location was previously completed as part of the LNAPL Characterization work. Additional screening consisting of air knifing to a depth of approximately 7 feet below ground surface will be completed prior to proceeding with drilling of the coincident soil boring and monitoring well.

Installation of the new well will be accomplished by first sealing the completed soil boring between its total depth, currently proposed to be 80 feet below ground surface (bgs), and the total planned depth of the new well at 43 feet bgs. The seal will consist of cement-bentonite grout, and will be emplaced from the bottom up using a tremie pipe or equivalent. Following emplacement of the seal, the borehole will be reamed from its original diameter of approximately four inches to a final diameter of approximately 10 inches. Reaming will be conducted using mud rotary drilling methods. Logging and soil sampling of the borehole will have been previously completed as part of the LNAPL Characterization investigation and no further soil sampling or logging is proposed as part of the well installation.

Upon reaming to the target depth, the drilling mud will be thinned and the blank well casing and screen will be inserted into the borehole. A schematic well construction diagram is presented in Figure 3. The well will be constructed of 20 feet of 4-inch diameter stainless steel V-wire wrapped well screen with 0.01-inch slots and approximately 23 feet of polyvinyl chloride (PVC) flush-threaded Schedule 80 PVC blank casing. The well screen will be placed to span the water table and allow for a rising
water table. The water table is estimated to be present at a depth of approximately 33 feet bgs at this location based on pore-pressure dissipation testing completed at the time of UVOST/cone penetrometer testing (CPT) location CPL0088. No glues or adhesives will be used to connect the well casing sections or screen.

A filter pack consisting of washed, graded #1C silica sand will be tremied into the annular space between the casing and borehole from total depth to approximately five feet above the top of the screen. The level of the filter pack will be verified by tag line measurement during emplacement. The volume of sand used will be compared with the calculated annular volume to verify proper placement of the filter pack.

A bentonite pellet seal at least three feet thick will be placed immediately above the filter pack. The level of the top of the bentonite seal will be verified by tag line measurement. The pellets will be hydrated and adequate time for hydration will be allowed before proceeding further. The annular space above the bentonite pellet seal will be filled with a Volclay\textsuperscript{TM} bentonite grout mixture, consisting of a 24 gallons per 60-pound sack, water to bentonite ratio. The grout will be emplaced from the bottom up using a tremie pipe to within three feet of the surface. The top three feet will then be cemented and a locking steel flush-mount cover will be installed. A 3-foot-square, 4-inch-thick concrete pad will be poured around the well and will be recessed into the ground and sloped outward to prevent drainage into the well. A measuring point will be marked on the top of the inner well casing and the inner and outer well casing will be permanently labeled with the well identification. A well construction diagram, detailing as-built conditions with associated measurements from ground surface will be completed following well construction. The well seal will be allowed to cure for at least 48 hours prior to well development.

2.5 Well Development
Well development will be performed with a truck-mounted development rig using bailing, surging and jetting techniques to remove remnant drilling mud and stimulate groundwater flow into the well. Well development will be initiated by measuring the depth to the bottom of the well and comparing that value to the well completion diagram value to determine the amount of solids that have settled out of suspension since well installation. The well will then be bailed until most of the settled material has been removed. A recirculating jetting tool will be used to wash the screen and filter pack throughout the screened interval. The volume of recirculation will be slowly decreased, removing the fines from circulation until the fluids become relatively clear of sediment.

Development will proceed using vented surge blocks to concentrate surge energy over 5-foot intervals of the screen length from the bottom upward. After surging the entire length of screen within the saturated zone, approximately one casing volume of water will be bailed out. During bailing, the amount of sand in the produced water will be
evaluated. The sequence of surging and bailing will be repeated until the produced water is relatively free of sand.

The final development task will be to pump the well at a constant rate until a minimum of five well casing volumes of water have been removed and field measurements of pH, temperature, conductivity, and turbidity stabilize. After well development has been completed, the depth to the bottom of the well shall be verified by tag line measurement and documented.

2.6 Surveying
The completed well will be surveyed by Olson and DeTilla, a registered land surveyor. The survey will include well location, elevation of the land surface, and elevation of the top of the PVC casing at the defined measuring point. The location of the wells will be referenced to the California State Plane Coordinates, and elevations will be referenced to the nearest U.S. Geodetic Datum. Elevations will be measured to the nearest 0.01 feet.

2.7 Groundwater/NAPL Measurement, Purging and Sampling
Two rounds of groundwater sampling for the new well will be completed. The first round will be completed no less than one week after well development. The second round of sampling will be conducted within a two-week period after receipt of laboratory results from the first sampling round.

The groundwater level/NAPL thickness in the well will be measured prior to each sampling event. Groundwater/NAPL measurements will be accomplished using an electronic interface probe. Measurements will be made to the nearest hundredth of an inch and be documented in a field notebook or form. If LNAPL is present, it will be sampled using a disposable bailer without any prior purging of the well. Each sample will consist of three filled 40 milliliter VOA vials supplied by the laboratory with appropriate preservatives. Upon collection, each container will be immediately labeled to indicate the owner, date and time of collection, sample collector, and sample identification. Sample containers will then be placed in a chilled cooler for temporary storage. The cooler will be transported to the laboratory at the end of each sampling day by same-day courier or overnight delivery service along with chain-of-custody documentation.

Upon completion of LNAPL sampling, or if LNAPL is not present, the well will be purged and groundwater will be sampled using a dedicated submersible pump or equivalent. Purging will continue until field measurements of water quality, including temperature, pH and turbidity are relatively stable and at least three casing volumes of groundwater have been removed. Following purging, groundwater samples will be collected using the same sample containers and handling procedures outlined above for LNAPL.
2.8 QA/QC Samples
Quality Assurance/Quality Control (QA/QC) samples will consist of one trip blank sample for each sampling round. The trip blank sample will be prepared by the laboratory and accompany the primary samples at all times. QA/QC samples will otherwise be handled and documented as described above for the primary samples.

2.9 Laboratory Analyses
All LNAPL, groundwater and QA/QC samples will be tested for VOCs by USEPA Method 8260B. Testing of the groundwater samples will additionally include the following parameters to assist in remedial design and evaluation of biodegradation.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metals (As, Cr, Fe, Mn)</td>
<td>EPA 6010</td>
</tr>
<tr>
<td>Ferrous Iron(Fe++)</td>
<td>SM 3500</td>
</tr>
<tr>
<td>Total Organic Carbon (TOC)</td>
<td>SM5310D</td>
</tr>
<tr>
<td>Total Inorganic Carbon (TIC)</td>
<td>SM5310D</td>
</tr>
<tr>
<td>Chemical Oxygen Demand (COD)</td>
<td>SM5220D</td>
</tr>
<tr>
<td>Total Dissolved Solids (TDS)</td>
<td>SM2540C</td>
</tr>
<tr>
<td>Alkalinity</td>
<td>SM2320B</td>
</tr>
</tbody>
</table>

In addition to the above suite of laboratory tests, groundwater samples will also be tested for pH, Oxidation Reduction Potential (ORP), and dissolved oxygen (DO) in the field at the time of groundwater sampling.

Laboratory analyses will be completed by Calscience Environmental Laboratories, Inc. (Calscience) of Garden Grove, California. Calscience is a state-certified laboratory for the planned analyses. The laboratory will be instructed to present results from the analyses in both hard copy and electronic deliverable format.

2.10 Investigation Derived Waste
Investigation derived waste (IDW) is anticipated to include potentially contaminated drill cuttings, drilling mud, decontamination fluids, well purge and development water, and PPE. Drill cuttings will be separated from the drilling mud using a portable mud shaker and transferred to a closed-top roll-off bin using a self-dumping hopper and forklift. The roll-off bin will be transferred to a holding area at the Waste Pit Area at the site for temporary storage pending waste characterization and evaluation of disposal options. Drilling mud will be removed from the mud tank using a vacuum truck and placed into a portable, closed-top tank at the Waste Pit Area. Liquids from equipment decontamination and well development, purging and sampling will be temporarily contained in portable water trailers or truck-mounted tanks and transferred as necessary to holding tanks at the Waste Pit Area. Used PPE will be double-bagged in plastic bags and placed in trash bins.
IDW containers will be properly sealed and labeled. The containers will be periodically inspected for leaks, including prior to any waste transport. IDW will remain at the Waste Pit Area until proper disposal can be evaluated and arranged. Wastes will be profiled and subsequently disposed by a licensed waste hauler as soon as they are accepted at an approved disposal facility. If wastes are determined to be hazardous, disposal will occur within 90 days of generation.

2.11 Reporting
Following completion of all field tasks and receipt of analytical laboratory results, a technical memorandum will be prepared describing the investigation and results. The report will present a well completion diagram and summarize results from the two rounds of LNAPL/groundwater sampling with respect to the presence and thickness of any LNAPL present and the VOC analytical results.
Legend

- Assumed area of Source Area 12, as presented in the Feasibility Study

Source: AirPhotoUSA dated February 2006

FIGURE 1
LOCATION MAP
Del Amo Superfund Site
FIGURE 2

PROPOSED MONITORING WELL LOCATION
20101 Hamilton Ave,
Los Angeles, CA

Legend

Proposed monitoring well location
Parcel Boundary

Approximate Scale in Feet
Well Cap

4" Diameter SCH 80 PVC
Blank Casing: 0-23'

8" Diameter Steel Locking Casing

Concrete Surface Seal: 0-2'

12" Diameter Traffic-Rated Vault

Volclay™: 2-15'

Bentonite Pellets: 15-18'

10" Diameter Borehole: 0-43'

4" Dia. Stainless Steel
Well Screen with 0.010" Slots:
23-43'

#1C Sand Filter Pack: 18-43'

End Cap
Total Depth: 43'

FIGURE 3
WELL CONSTRUCTION
DIAGRAM

Not to Scale
APPENDIX A

PHOTO-IONIZATION 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 any 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
- Split 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

ISO 9001

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Tel: 852.2869.0639
Specifications

Default Sensor Settings

<table>
<thead>
<tr>
<th>Gas Monitor (ppm)</th>
<th>Range (ppm)</th>
<th>Resolution Time (Sec)</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

- **Dimensions**: 8.2L x 3.0W x 2.0H (21.8 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 9.8 eV or 11.7 eV UV lamp
- **Battery**: Rechargeable, external, field replaceable Nickel-Metal-Hydride (NiMH) battery pack
- **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)
- **Response**: 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 latch 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 data

**Datalogging**

- Optional 24/7 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 setup 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

**Breathing**

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

**Hazardous Area Approval**

- US and Canada: UL and cUL, Classified for use in Class I, Division 1, Groups A, B, C and D hazardous locations
- Europe: ATEX II 2G EEx 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 10.6eV PID lamp, 1 year for pump and battery

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

** Performance based on isobutylene calibration

---

**MiniRAE 2000 and Accessories**

**Monitor only includes:**

- 10.6eV, 9.8eV or 11.7eV as specified
- RAE Systems UV lamp: 10.6eV, 9.8eV 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

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**DISTRIBUTED BY:**

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Tel: 852.2669.0828
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>Calibrate/Select Gas Sub-Menu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Air Cal?</td>
</tr>
<tr>
<td>Span Cal?</td>
</tr>
<tr>
<td>Select Cal Memory?</td>
</tr>
<tr>
<td>Change Span Value?</td>
</tr>
<tr>
<td>Modify Cal Memory?</td>
</tr>
<tr>
<td>Change Correction Factor?</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”.

4-11
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 [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 [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.
work plan, monitoring well installation at SA 12

Erich_Weaver

Dante Rodriguez, ssayed, tpeng,
randy.kellerman

george.landreth, mlbone, giecke, pgobb, John_Dudley,
Barbara_Tennison

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(See attached file: SA12 monitoring well work plan.pdf)(See attached file: Fig3
WellConstructionDiagram.pdf)(See attached file: Fig1 AerialLocMap.pdf)(See attached file:
Fig2 PropMonitoringWellLoc.pdf)(See attached file: Appendix A - PID calibration.pdf)

Gentlemen:

Please find in the attached files a work plan for installation and sampling of a water table monitoring well within
source area 12 at the Del Amo site. We plan on installing this well upon completion of the soil boring/sampling
program for this area that was described in a previous email submittal. With your approvals, we will begin drilling
for the soil boring/sampling program next week.

If you have any questions, please do not hesitate to call

best regards,

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