

**SITE INVESTIGATION WORK PLAN**

**CALMAR FACILITY  
333 Turnbull Canyon Road  
City of Industry, CA**

Submitted to:

**First Industrial Realty Trust**  
Chicago, Illinois

And

**Los Angeles Regional Water Quality Control Board**  
Los Angeles, California

Prepared by:

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Chicago, Illinois

March 19, 2004



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## 1.0 INTRODUCTION

This *Site Investigation Work Plan* (Work Plan) summarizes the site investigation proposed by First Industrial Realty Trust (First Industrial) for the Calmar site (Subject Property) located at 333 Turnbull Canyon Road in City of Industry, California (Figure 1). The site investigation at the Subject Property will be conducted following consultation and approval of this Work Plan by the Los Angeles Regional Water Quality Control Board (RWQCB).

## 2.0 OBJECTIVES

This Work Plan includes our proposed scope of work, following the RWQCB Interim Guidance for Active Soil Investigation, dated February 25, 1997, and DTSC and RWQCB Advisory – Active Soil Investigations, dated January 28, 2003 (i.e., Interim Guidance Document – refer to Appendix A). The purpose of this site investigation is to: (1) acquire soil gas and soil matrix data to update existing laboratory analytical data; (2) to further delineate the nature and extent of known constituents of concern (COCs); and, (3) to address emergent chemicals. The most recent soil-gas data that is available to BB&J, First Industrial and the RWQCB was collected in September 2000. Based on conversations with First Industrial and the RWQCB, BB&J would like to collect more data for use in developing a Remedial Action Plan (RAP) that will address the RWQCB's concerns regarding chlorinated compounds detected in soils at the Subject Property.

## 3.0 BACKGROUND

Numerous soil investigations have been performed at the Subject Property by Levine Fricke Recon (LFR) and other environmental firms. During these activities, chlorinated compounds were detected in soil samples collected on site, primarily near the southwest corner of the Subject Property. As a result, a RAP was prepared and submitted to the RWQCB by Calmar to address the previously identified chlorinated compounds in soil. However, the RAP, which intended to use a soil vapor extraction (SVE) system process technology, was not implemented. Rather, correspondence with Calmar and the subsequent receipt of pertinent documentation indicated that Calmar did not believe an SVE system would address the COCs. Consequently, Calmar is currently in negotiations with the RWQCB to modify the RAP, including consideration of an alternative to allow natural attenuation.

## 4.0 SITE DESCRIPTION

The Calmar Facility, located at 333 Turnbull Canyon Road in City of Industry, California, has been in operation as a plastics injection-mold production plant since 1963, when the facility was constructed. The 6.6-acre property contains one, single-story, slab-on-grade building, which is approximately 112,000-square feet. Activities at the Subject Property include manufacturing, storage and distribution. The southwestern portion of the site has been used as a hazardous waste storage area.

## 5.0 SCOPE OF WORK

To address this project's objectives, BB&J is proposing the following fieldwork (i.e., Tasks) to be conducted at the Subject Property (refer to Appendix B for a copy of BB&J's Health and Safety Plan):

- Task 1 Soil Gas Survey; and,
- Task 2 Soil Matrix – Confirmation Sampling.

### 5.1 Task 1 – Soil Gas Survey

Upon acceptance of this Work Plan by the RWQCB, 10 soil gas probe locations will be utilized to assess the soil located beneath the southwestern portion of the Subject Property. Each probe location (i.e., soil boring) will be advanced to maximum depths of 5, 10 and 20 feet below ground surface (bgs) using truck-mounted Geoprobe™ drilling equipment. BB&J may advance 5 additional soil borings based on field observations. These soil boring locations will be positioned in a grid pattern near the southwest corner of the on-site building (refer to Figure 3 for the proposed soil sampling locations). To ensure the collection of a representative sample, discrete volumes of soil gas will be purged to eliminate atmospheric air. The sample vacuum will be monitored during purging to avoid high vacuum pressures (in order to maintain equilibrium in the soil).

Soil gas will be withdrawn from the soil boring after purging using a Hamilton 10-cc glass syringe. Duplicate samples will be collected, as required, in compliance with the Interim Guidance Document. Soil gas samples will be sub-sampled and analyzed within 30 minutes of collection by HP Labs, an on-site, State-certified mobile laboratory. Our field personnel and subcontractors, under the supervision of a California Registered Geologist, will deliver the soil gas samples directly to the mobile laboratory. Chain-of-custody documentation will accompany the samples at all times.

HP Labs will analyze the soil gas samples for the Primary Target Compounds listed in Section 3.1 of the Interim Guidance Document. A minimum of thirty samples will be collected, analyzed and compared to the laboratory results from the data during the previous soil gas surveys.

### 5.2 Task 2 – Soil Matrix Sampling

At the deepest point of each sampling location, i.e. at 20 feet bgs, BB&J will collect a discrete soil sample. The soil borings will be advanced using limited access, hollow-stem auger drilling equipment. Soil samples will be collected from each soil boring at selected intervals by driving a sampler ahead of the push rods into undisturbed soil. Soil will be classified in accordance with the Unified Soil Classification System (USCS) by our field personnel, under the supervision of a California Registered Geologist. The soil samples will be preserved using United States Environmental Protection Agency (U.S. EPA) Preparation Method 5035. The soil samples will then be labeled and placed in a chilled ice chest for delivery to a State-certified laboratory for chemical testing. Chain-of-custody documentation will accompany the soil samples at all times.

During soil boring advancement, BB&J will monitor duplicate soil samples and soil cuttings for field indications of contamination such as discoloration (based on visual observations) or the presence of volatile organic compounds (VOCs) using a portable Foxboro 128GC organic vapor analyzer (OVA). The OVA will be calibrated using 50-ppm hexane.

Selected soil samples will be analyzed by a State-certified laboratory for VOCs and California Administrative Metals (CAM metals) using U.S. EPA Method Analytical Method 8260B. One soil sample per soil boring will be submitted for laboratory analysis (a total of 10 samples). If BB&J elects to investigate the aforementioned additional soil boring locations, one soil sample from each additional soil boring will be submitted for laboratory analysis (a total up to 5 additional soil samples).

To address U.S. EPA Emergent Chemicals, BB&J will also submit a soil sample from the sampling location exhibiting the highest field-detected concentrations of chlorinated solvents for additional laboratory analysis of all emergent chemicals.

### 5.3 Task 3 – Reporting

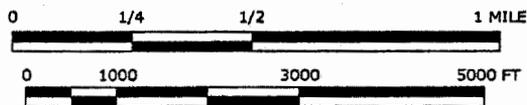
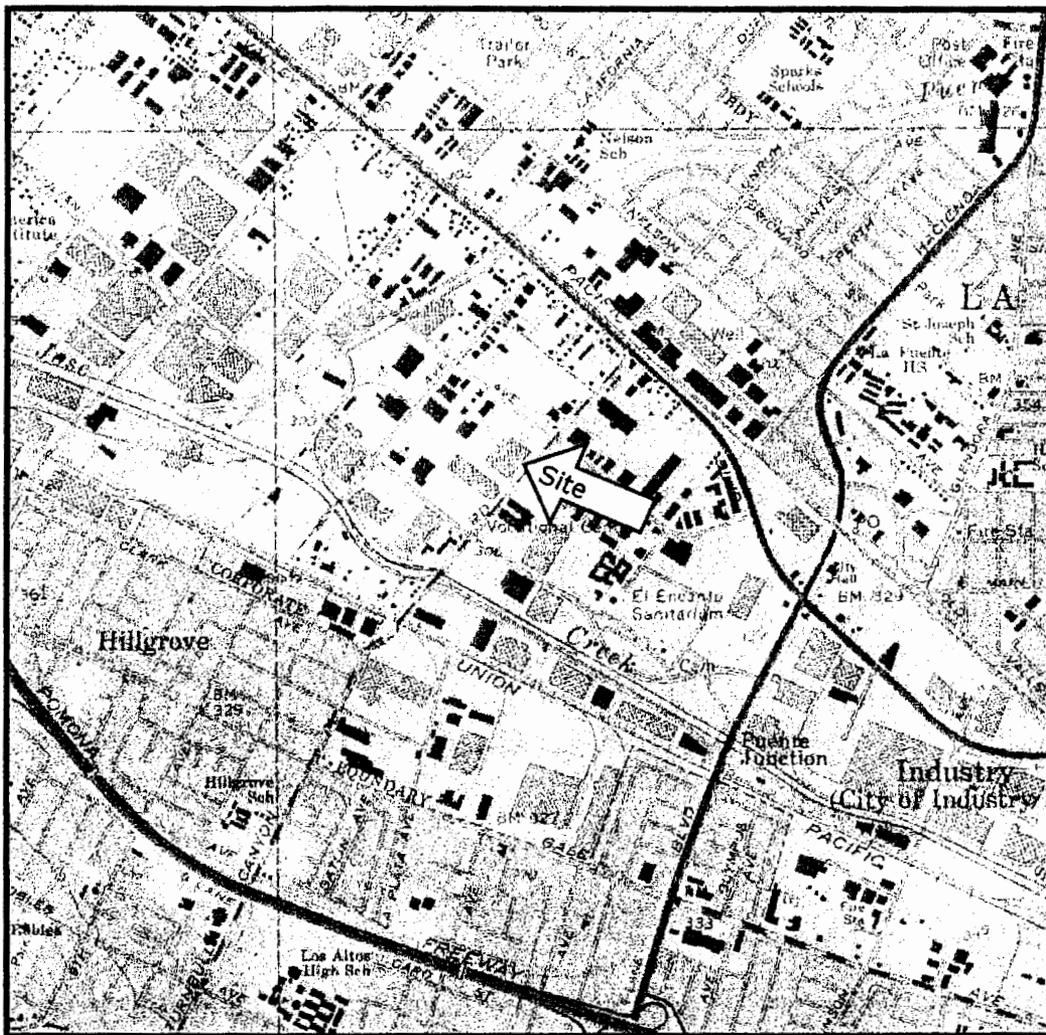
On completion of the fieldwork, BB&J will prepare a report documenting field activities at the Subject Property. The report will include the following:

- Manifests;
- Certifications;
- Chain-of-Custody Documentation;
- Soil Test Results;
- Laboratory Documents; and,
- Other Relevant Documentation.

The report will be prepared in accordance with the appropriate regulatory guidance documents and will be prepared as a pre-site closure assessment report.

**FIGURES**

Source: U.S. Geological Survey Baldwin Park Quadrangle, CA  
7.5 Minute Series (Topographic), Dated 1966, Photorevised 1981.

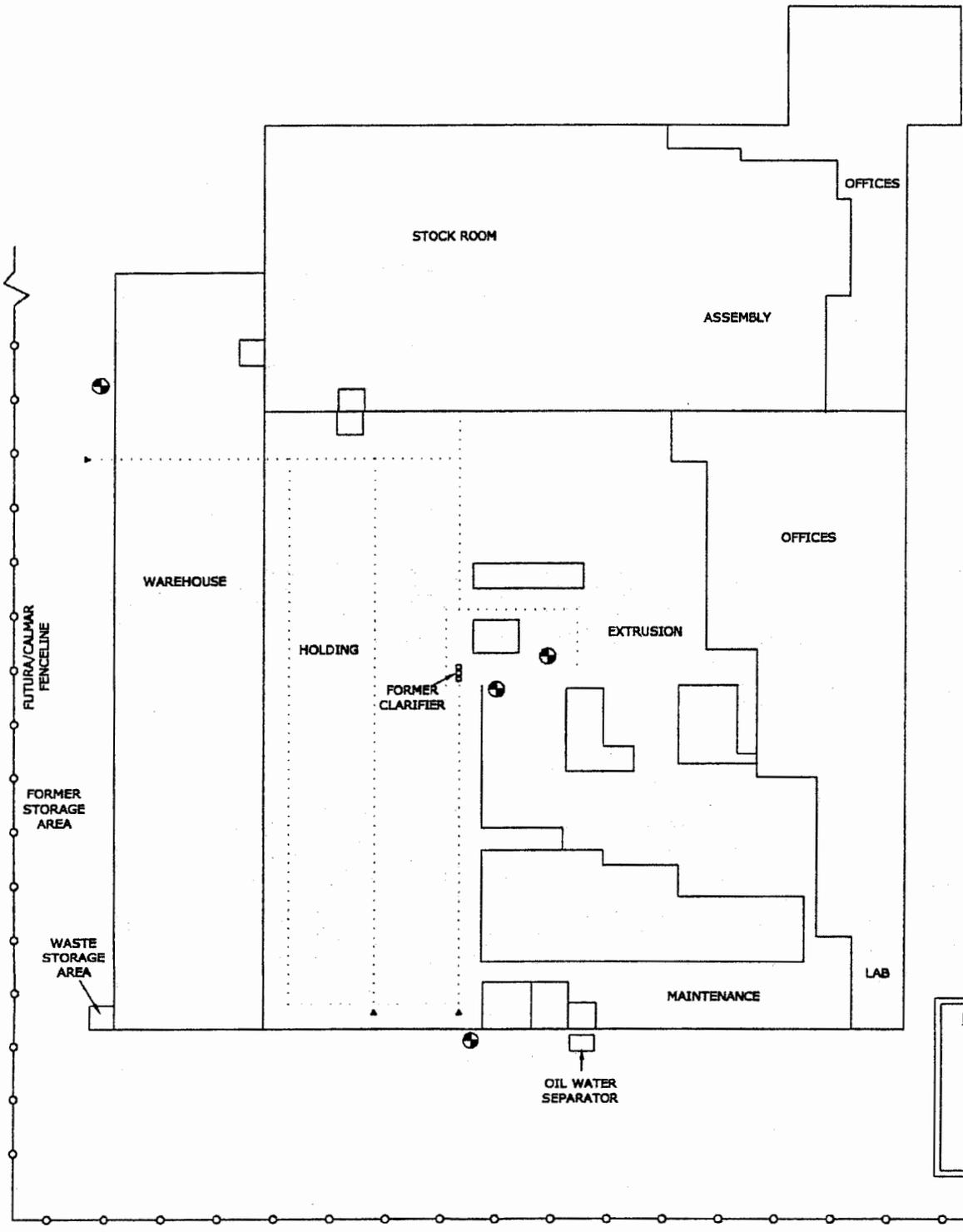


Quadrangle Location

Prepared by/Date: AFW / 3.19.04  
Checked by/Date: DW / 3.19.04

<p>Calmar Facility 333 Turnbull Canyon Road City of Industry, California</p>	 <p>Chicago Atlanta Boston Mexico City www.bbjgroup.com</p>	<p>Site Location Map</p> <p>Project 0098704      Figure 1</p>
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Source: Site reconnaissance by Richard Garlitz of BB&J on August 2, 2003.



**LEGEND**

- Sewer Drain
- Utility Trench
- Utility Trench Outlet
- Fence

NOT TO SCALE

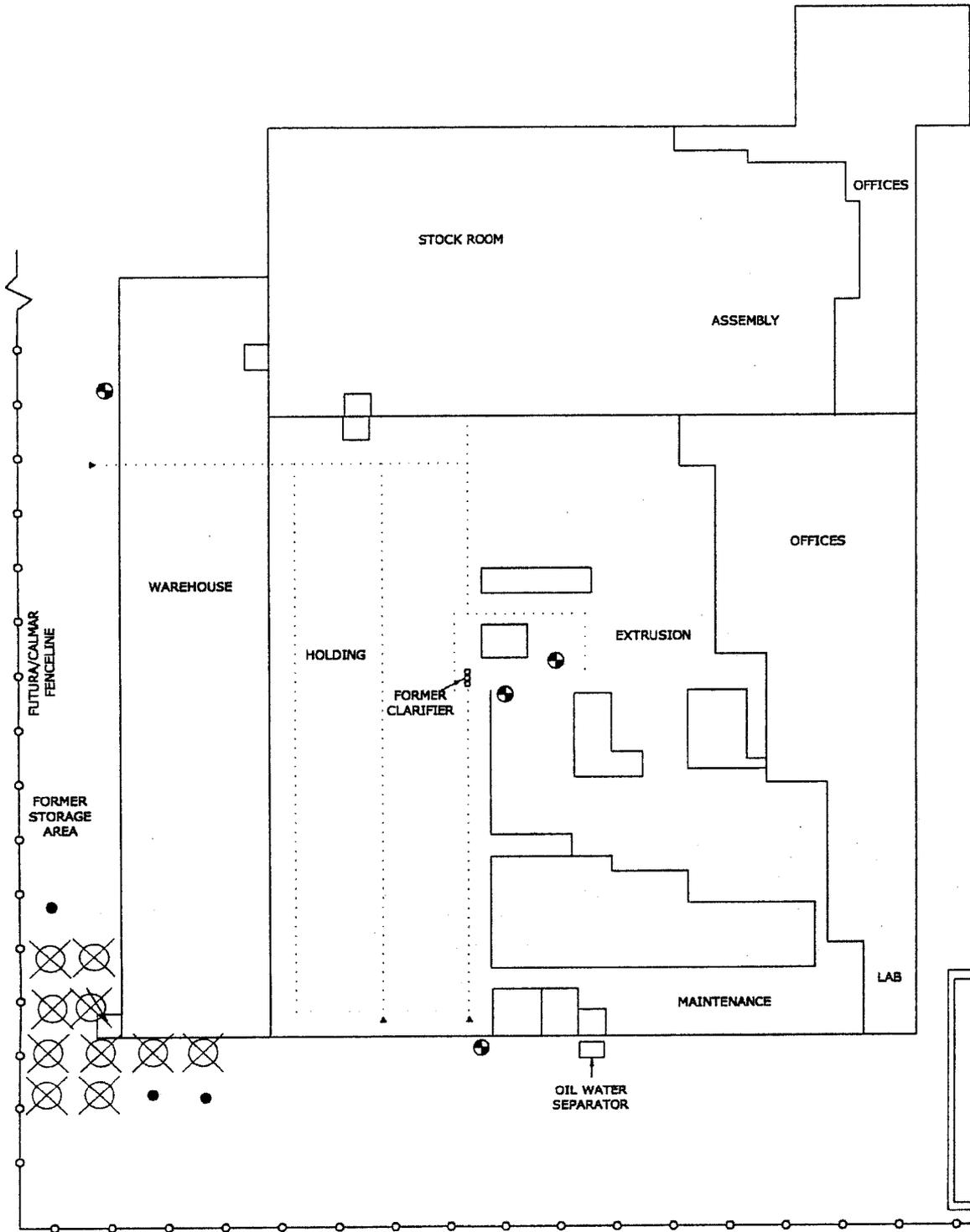
Prepared by/Date: NP 1/21/04  
Checked by/Date: WJ 1/27/04

Calmar Facility  
333 S. Turnbull Canyon Road  
City of Industry, California

Bradburne, Briller & Johnson, LLC  
Chicago Atlanta  
Boston Mexico City  
www.bbjgroup.com

Site Plan  
Project 0098704  
Figure 2

Source: Site reconnaissance by Richard Garlitz of BB&J on August 2, 2003.



**LEGEND**

- Sewer Drain
- Utility Trench
- Utility Trench Outlet
- Fence
- Proposed Boring Location
- Alternate Boring Location

NOT TO SCALE

Prepared by/Date: *ALP* 1/31/04  
Checked by/Date: *2002* 1/31/04

Calmar Facility  
333 S. Turnbull Canyon Road  
City of Industry, California

Bradburne, Briller & Johnson, LLC  
Chicago Atlanta  
Boston Mexico City  
www.bbjgroup.com

Site Plan with  
Proposed Boring Locations  
Project 0098704  
Figure 3

**APPENDIX A**

**DTSC AND LARWQCB ADVISORY -ACTIVE SOIL GAS INVESTIGATIONS,  
DATED JANUARY 28, 2003**



Gray Davis, Governor  
Winston H. Hickox, Agency Secretary  
California Environmental Protection Agency



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January 28, 2003

To: Interested Parties

**ADVISORY – ACTIVE SOIL GAS INVESTIGATIONS**

In a coordinated effort, the Department of Toxic Substances Control (DTSC) and the California Regional Water Quality Control Board – Los Angeles Region (LARWQCB) have jointly developed the "Advisory – Active Soil Gas Investigations" (see the attached). This document is to ensure that consistent methodologies are applied during active soil gas investigations to produce high quality data for regulatory decision-making. The document has been reviewed by other government organizations and by the soil gas consulting community. Their comments have been considered and, where appropriate, incorporated in the document. This is an on-going effort to streamline the characterization of gas phase contaminant sites. As additional knowledge and experience are obtained, this Advisory may be modified as appropriate.

This document is issued by DTSC and LARWQCB as an Advisory subject to review and revision as necessary. The information in this Advisory should not be considered as regulations. Mention of trade names or commercial products does not constitute the Agency's endorsement or recommendation.

If you have any questions regarding this document, please contact the joint-agency project coordinator Mr. Joe Hwang, of DTSC, at (714) 484-5406.

Sincerely,

Edwin F. Lowry  
Director  
Department of Toxic Substances Control

Dennis A. Dickerson  
Executive Officer  
California Regional Water Quality Control Board  
Los Angeles Region

Enclosure

*The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at [www.dtsc.ca.gov](http://www.dtsc.ca.gov).*

bcc: Dr. Yue Rong – LARWQCB  
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Ms. Dorothy Rice – DTSC/HQ  
Mr. Hamid Saebfar – DTSC/Glendale  
Ms. Sharon Fair – DTSC/Glendale  
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## ADVISORY – ACTIVE SOIL GAS INVESTIGATIONS

As a coordinated effort, this document is issued by the California Regional Water Quality Control Board – Los Angeles Region (LARWQCB) and Department of Toxic Substances Control (DTSC) as an Advisory subject to review and revision as necessary. Mention of trade names or commercial products does not constitute the Agency's endorsement or recommendation. The information in this Advisory should not be considered as regulations. In this Advisory, "Agency" should mean LARWQCB and/or DTSC.

### 1.0 INTRODUCTION

Active soil gas investigations are useful to obtain vapor phase data at sites potentially affected by volatile organic compounds (VOCs), including chlorinated and aromatic hydrocarbons. Active soil gas investigations may also be used to investigate sites potentially affected by methane and hydrogen sulfide, and to measure fixed and biogenic gasses (e.g., oxygen, carbon dioxide, or carbon monoxide). Among other things, the data can be used to identify the source and determine the spatial distribution of VOC contamination at a site, or to estimate indoor air concentrations for risk assessment purposes.

For site characterization, the Agency encourages both soil gas and soil matrix sampling. Typically, soil gas data are more representative of actual site conditions in coarse-grained soil formations while soil matrix data are more representative of actual site conditions in fine-grained soil formations. For evaluating the risk associated with vapor intrusion to indoor air, soil gas data are the preferred contaminant data set, where practicable. Flux chamber and passive sampling methods are not discussed in this Advisory. Any sites where such sampling methods are necessary will be addressed separately.

On February 25, 1997, LARWQCB re-issued the "Interim Guidance for Active Soil Gas Investigation" (ASGI) as guidance for investigating sites with potential VOC contamination. Unless otherwise noted in this Advisory, the active soil gas investigation should be performed in accordance with the most current ASGI.

### 2.0 SUPPLEMENTAL RECOMMENDATIONS

The following sections supplement the ASGI in an effort to ensure that consistent methodologies are applied during soil gas investigations to produce reliable and defensible data of high quality. All sampling probe installation, sampling, and analytical procedures, whether or not discussed below, are subject to Agency review and approval.

- 2.1 Project Management
- 2.2 Soil Gas Sampling Probe Installation
- 2.3 Purge Volume Test
- 2.4 Leak Test
- 2.5 Purge/Sample Flow Rate
- 2.6 Soil Gas Sampling
- 2.7 Analysis of Soil Gas Samples

## 2.1 Project Management

2.1.1 Workplan: An appropriate workplan should be prepared and submitted to the Agency for review and approval at least 30 days prior to its implementation. Any variations or deviations from this Advisory should be specified in the workplan. The soil gas workplan can either be incorporated as part of a comprehensive site investigation workplan or as a stand-alone document, depending on site-specific circumstances.

### 2.1.2 Field Activities

- A. The Agency should be notified 10 working days prior to implementation of field activities. All necessary permits and utility clearance(s) should be obtained prior to conducting any investigations described in this Advisory.
- B. All engineering or geologic work (e.g., logging continuous soil cores, soil description) should be performed or supervised by a California Registered Professional in accordance with the Business and Professions Code, Chapters 7 and 12.5, and the California Code of Regulations, Title 16, Chapters 5 and 29.

In addition, for proposed school sites, all work performed should be under the direction and supervision of a project coordinator experienced in soil gas investigations [e.g., an Environmental Assessor as defined in Education Code Section 17210(b)].

- C. Evaluation of raw data by Agency staff may occur either in the field or in the office.
  - 1. Hard copies of the complete raw laboratory data, including handwritten data and field notes, should be provided to the Agency staff upon request.
  - 2. Adjustments or modifications to the sampling program may be required by Agency staff to accommodate changes mandated by evaluation of the data set or unforeseen site conditions.
- D. Investigation derived wastes (IDWs) should be managed as hazardous waste until proven otherwise or until specifically approved by the Agency as being non-hazardous waste. IDWs should be handled and disposed in accordance with federal, state and local requirements.

E. Field Variations

1. To expedite the completion of field activities and avoid potential project delays, contingencies should be proposed and included in the project workplan (e.g., soil matrix samples will also be collected if clayey soils [as defined in the Unified Soil Classification System (USCS)] are encountered during the proposed soil gas investigation).
2. The Agency field staff should be informed of any problems, unforeseen site conditions, or deviations from the approved workplan. When it becomes necessary to implement modifications to the approved workplan, the Agency should be notified and a verbal approval should be obtained before implementing changes.

F. Soil Matrix Sampling Requirements: Companion soil matrix sampling may be conducted concurrently with a soil gas investigation (in accordance with the ASGI, Section 5.0), except where extremely coarse-grained soils (as defined in USCS) are encountered or when specifically excluded by the Agency.

2.1.3 Soil Gas Investigation Reports: A soil gas investigation report including a discussion of field operations, deviations from the approved workplan, data inconsistencies, and other significant operational details should be prepared. The report may either be a stand-alone document in a format recommended by the Agency or be included within a site-specific assessment report. At a minimum, the report should contain the following:

- A. Site plan map and probe location map at an appropriate scale as specified in the workplan (e.g., scale: one inch = 40 feet);
- B. Final soil gas iso-concentration maps for contaminants of concern at the same scale as the site plan map;
- C. Summary tables for analytical data, in micrograms per liter ( $\mu\text{g/L}$ ), in accordance with the ASGI;
- D. Legible copies of field and laboratory notes or logs;
- E. All analytical results and Quality Assurance/Quality Control (QA/QC) information including tables and explanations of procedures, results, corrective actions and effect on the data, in the format specified by the Agency; and
- F. Upon request, all raw data including chromatograms and calibration data should be submitted to the Agency.

## 2.2 Soil Gas Sampling Probe Installation

- 2.2.1 **Lithology:** Site soil or lithologic information should be used to select appropriate locations and depths for soil gas probes. If on-site lithologic information is not available prior to conducting the soil gas investigation, at least one (1) continuously cored boring to the proposed greatest depth of the soil gas investigation should be installed at the first sampling location, unless specifically waived or deferred by Agency. Depending on site conditions, additional continuously cored borings may be necessary.
- A. Lithologic logs should be prepared for all borings (e.g., continuously cored borings, soil matrix sampling, geotechnical sampling, etc.). Note: This does not apply to direct-push soil gas probe installations.
  - B. Information gathered from the continuously cored borings may include soil physical parameters, geotechnical data and contaminant data.
  - C. If low-flow or no-flow conditions (e.g., fine-grained soil, clay, soil with vacuum readings that exceed approximately 10 inches of mercury or 136 inches of water) are encountered, soil matrix sampling using EPA Method 5035A should be conducted in these specific areas. Also see Section 4 of LARWQCB's "General Laboratory Testing Requirements for Petroleum Hydrocarbon Impacted Sites" on use of EPA Method 5035A.
  - D. If the bottom five (5) feet of a continuously cored boring is composed of clay or soil with a vacuum exceeding approximately 10 inches of mercury or 136 inches of water, the continuously cored boring should be extended an additional five (5) feet to identify permeable zones. If the extended boring is also composed entirely of clay, the boring may be terminated. Special consideration should always be given to advancing borings and ensuring that a contaminant pathway is not being created through a low permeability zone.
- 2.2.2 **Sample Spacing:** A scaled site plan depicting potential or known areas of concern (e.g., existing or former sumps, trenches, drains, sewer lines, clarifiers, septic systems, piping, underground storage tanks [USTs], chemical or waste management units) should be provided in the project workplan. Sample spacing should be in accordance with the most current ASGI and may be modified based on site-specific conditions with Agency approval. To optimize detecting and delineating VOCs, the grid spacing should be modified to include biased sampling locations.

2.2.3 Sample Depth: Sample depths should be chosen to minimize the effects of changes in barometric pressure, temperature, or breakthrough of ambient air from the surface; and to ensure that representative samples are collected. Consideration should be given to the types of chemicals of concern and the lithology encountered.

- A. At each sample location, soil gas probes should be installed at a minimum of one sample depth, generally at five (5) feet below ground surface (bgs), in accordance with the most current ASGI.
- B. Samples should be collected near lithologic interfaces or based on field instrument readings (e.g., Flame Ionization Detector [FID], Photo Ionization Detector [PID]) from soil cuttings and/or cores to determine the location of maximum analyte concentrations at the top or bottom of the interface depending upon the analyte.
- C. Multi-depth sampling is appropriate for any of the following locations:
  - 1. Sites identified with subsurface structures (e.g., USTs, sumps, clarifiers, waste or chemical management units), subsurface sources (e.g., oil fields, artificial fill, buried animal waste), changes in lithology, and/or contaminated groundwater. Soil gas probes should be emplaced below the base of any subsurface structures, sources or backfilled materials in the vadose zone. Collection of deeper samples should be done in consultation with Agency staff;
  - 2. Areas with significantly elevated VOC concentrations detected during shallow or previous vapor sampling;
  - 3. Areas where elevated field instrument readings are encountered from soil matrix cuttings, cores or samples; or
  - 4. In the annular space of groundwater monitoring wells during construction, where an assessment of the vertical extent of soil gas contamination is necessary.
- D. If no lithologic change or contamination is observed, default sampling depths may be selected for multi-depth sampling. For example, soil gas samples may be collected at 5, 15, 25, 40 feet bgs, etc., until either the groundwater is encountered or VOCs are not detected, whichever comes first.
  - 1. Additional samples may be necessary based on site conditions.
  - 2. For Preliminary Endangerment Assessments: When 40 feet bgs is reached, collection of deeper samples may be waived.

However, assessment and/or characterization of the deeper vadose zone may be required in the future to protect groundwater resources.

2.2.4 Sampling Tubes: Sampling tubes should be of a small diameter (1/8 to 1/4 inch) and made of material (e.g., nylon, polyethylene, copper or stainless steel) which will not react or interact with site contaminants. For example, metal tubes should not be used for collection of hydrogen sulfide samples.

- A. Clean, dry tubing should be utilized at all times. If moisture, water, or an unknown material is present in the probe prior to insertion, the tubing should be decontaminated or replaced.
- B. After use at each location:
  - 1. Non-reusable (e.g., nylon or polyethylene) sampling tubes should be discarded; or
  - 2. Reusable sampling tubes should be properly decontaminated as specified in Section 2.2.7.
- C. A drawing of the proposed probe tip design and construction should be included in the project workplan.

2.2.5 Soil Gas Probe Emplacement Methods

- A. Permanent or Semi-permanent Soil Gas Probe Methods:  
Permanent or semi-permanent soil gas probes may be installed, using a variety of drilling methods. Please note that the mud rotary drilling method is not acceptable for soil gas probe emplacement. Other drilling methods such as air rotary and roto sonic can adversely affect soil gas data during and after drilling and will require extensive equilibration times. Therefore, they are not recommended. Other soil gas probe designs and construction (e.g., soil gas wells or nested wells) may be appropriate and should be discussed with Agency staff prior to emplacement. When additional sampling is not anticipated per consultation with the Agency, such probes may be properly removed or decommissioned after completion of the soil gas investigation.
  - 1. The probe tip should be emplaced midway within a minimum of one (1) foot of sand pack. The sand pack should be appropriately sized (e.g., no smaller than the adjacent formation) and installed to minimize disruption of airflow to the sampling tip. See Figure 1 for more information.
  - 2. At least one (1) foot of dry granular bentonite should be emplaced on top of each sand pack to preclude the infiltration

of hydrated bentonite grout. The borehole should be grouted to the surface with hydrated bentonite. With respect to deep probe construction with multiple probe depths, the borehole should be grouted between probes. One (1) foot of dry granular bentonite should be emplaced between the filter pack and the grout at each probe location. See Figure 2 for more information.

3. The use of a downhole probe support may be required for deep probe construction (e.g., 40 feet bgs for direct push probes).
  - a. Such probe support may be constructed from a one-inch diameter bentonite/cement grouted PVC pipe or other solid rod, or equivalent, allowing probes to be positioned at measured intervals.
  - b. The support should be properly sealed or solid (internally or externally) to avoid possible cross-contamination or ambient air intrusion.
  - c. The probes should be properly attached to the exterior of the support prior to placement downhole.
  - d. Alternative probe support designs should be described in the project workplan. If probe support will not be used for deep probes, justification should be included in the project workplan.
4. Tubing should be properly marked at the surface to identify the probe location and depth.
5. As-built diagrams for probes or wells should be submitted with the soil gas investigation report detailing the well identification and corresponding probe depths. A typical probe construction diagram may be submitted for probes with common design and installation.
6. Unless soil gas probes are removed or decommissioned, probes should be properly secured, capped and completed to prevent infiltration of water or ambient air into the subsurface and to prevent accidental damage or vandalism. For surface completions, the following components may be installed:
  - a. Gas-tight valve or fitting for capping the sampling tube;
  - b. Utility vault or meter box with ventilation holes and lock;
  - c. Surface seal; and
  - d. Guard posts.

B. Temporary Soil Gas Probe Emplacement Method: In general, the drive rod is driven to a predetermined depth and then pulled back to expose the inlets of the soil gas probe. After sample collection, both the drive rod and tubing are removed.

1. During installation of the probe, hydrated bentonite should be used to seal around the drive rod at ground surface to prevent ambient air intrusion from occurring.
2. The inner soil gas pathway from probe tip to the surface should be continuously sealed (e.g., a sampling tube attached to a screw adapter fitted with an o-ring and connected to the probe tip) to prevent infiltration.

2.2.6 Equilibration Time: During probe emplacement, subsurface conditions are disturbed. To allow for subsurface conditions to equilibrate, the following equilibration times are recommended:

- A. For probes installed with the direct push method where the drive rod remains in the ground, purge volume test, leak test, and soil gas sampling should not be conducted for at least 20 minutes following probe installation.
- B. For probes installed with the direct push method where the drive rod does not remain in the ground, purge volume test, leak test, and soil gas sampling should not be conducted for at least 30 minutes following probe installation.
- C. For probes installed with hollow stem drilling methods, purge volume test, leak test, and soil gas sampling should not be conducted for at least 48 hours (depending on site lithologic or drilling conditions) after the soil gas probe installation.
- D. Probe installation time should be recorded in the field log book.

2.2.7 Decontamination: After each use, drive rods and other reusable components should be properly decontaminated to prevent cross contamination. These methods include:

- A. 3-stage wash and rinse (e.g., wash equipment with a non-phosphate detergent, rinse with tap water, and finally rinse with distilled water); and/or
- B. Steam cleaning process.

### 2.3 **Purge Volume Test**

To ensure stagnant or ambient air is removed from the sampling system and to assure samples collected are representative of subsurface conditions, a

purge volume versus contaminant concentration test should be conducted as the first soil gas sampling activity at the selected purge test point. The purge volume test is conducted by collecting and analyzing a sample for target compounds after the removal of appropriate purge volumes.

2.3.1 Purge Test Locations: The purge test location should be selected as near as possible to the anticipated or confirmed contaminant source, and in an area where soil gas concentrations are expected to be greatest based on lithology (e.g., coarse-grained sediments). The first purge test location should be selected through the workplan approval process or as a field decision in conjunction with Agency staff.

2.3.2 Purge Volume: The purge volume or "dead space volume" can be estimated based on a summation of the volume of the sample container (e.g., glass bulbs), internal volume of tubing used, and annular space around the probe tip. Summa™ canisters, syringe, and Tedlar™ bags are not included in the dead space volume calculation. The Agency recommends step purge tests of one (1), three (3), and seven (7) purge volumes be conducted as a means to determine the purge volume to be applied at all sampling points.

- A. The appropriate purge volume should be selected based on the highest concentration for the compound(s) of concern detected during the step purge tests. The purge volume should be optimized for the compound(s) of greatest concern in accordance with Section 2.2 of the ASGI.
- B. If VOCs are not detected in any of the step purge tests, a default of three (3) purge volumes should be extracted prior to sampling.
- C. The step purge tests and purging should be conducted at the same rate soil gas is to be sampled (see Section 2.5).
- D. The purge test data (e.g., calculated purge volume, rate and duration of each purge step) should be included in the report to support the purge volume selection.

2.3.3 Additional Purge Volume Test

- A. Additional purge volume tests should be performed to ensure appropriate purge volumes are extracted if:
  - 1. Widely variable or different site soils are encountered; or
  - 2. The default purge volume is used and a VOC is newly detected.

B. If a new purge volume is selected after additional step purge tests are conducted, the soil gas investigation should be continued as follows:

1. In areas of the same or similar lithologic conditions:
  - a. Re-sample 20 percent of the previously completed probes. This re-sampling requirement may be reduced or waived in consultation with Agency staff, depending on site conditions. If re-sampling indicates higher detections (e.g., more than 50 percent difference in samples detected at greater than or equal to 10 µg/L), all other previous probes should be re-sampled using the new purge volume.
  - b. Continue the soil gas investigation with the newly selected purge volume in the remaining areas.
2. In areas of different lithologic conditions: Continue the soil gas investigation with the newly selected purge volume in the remaining areas.

## 2.4 Leak Test

Leakage during soil gas sampling may dilute samples with ambient air and produce results that underestimate actual site concentrations or contaminate the sample with external contaminants. Leak tests should be conducted to determine whether leakage is present (e.g., the leak check compound is detected and confirmed in the test sample after its application).

2.4.1 Leak tests should be conducted at every soil gas probe.

2.4.2 Leak Check Compounds: Tracer compounds, such as pentane, isopropanol, isobutene, propane, and butane, may be used as leak check compounds, if a detection limit (DL) of 10 µg/L or less can be achieved. These compounds may be contained in common products such as shaving cream.

2.4.3 A leak check compound should be placed at any location where ambient air could enter the sampling system or where cross contamination may occur, immediately before sampling. Locations of potential ambient air intrusion include:

- A. Sample system connections;
- B. Surface bentonite seals (e.g., around rods and tubing); or
- C. Top of the Temporary Soil Gas Probe (see Section 2.2.5.B).

2.4.4 The leak test should include an analysis of the leak check compound. If a leak check compound is detected in the sample, the following actions should be followed:

- A. The cause of the leak should be evaluated, determined and corrected through confirmation sampling;
- B. If the leak check compound is suspected or detected as a site-specific contaminant, a new leak check compound should be used;
- C. If leakage is confirmed and the problem can not be corrected, the soil gas probe should be properly decommissioned;
- D. A replacement probe should be installed at least five (5) feet from the original probe decommissioned due to confirmed leakage, or consult with Agency staff; and
- E. The leak check compound concentration detected in the soil gas sample should be included and discussed in the report.

## **2.5 Purge/Sample Flow Rate**

Sampling and purging flow rates should not enhance compound partitioning during soil gas sampling. Samples should not be collected if field conditions as specified in Section 2.6.4 exist.

- 2.5.1 The purging or sampling flow rate should be attainable in the lithology adjacent to the soil gas probe.
  - A. To evaluate lithologic conditions adjacent to the soil gas probe (e.g., where no-flow or low-flow conditions), a vacuum gauge or similar device should be used between the soil gas sample tubing and the soil gas extraction devices (e.g., vacuum pump, Summa™ canister).
  - B. Gas tight syringes may also be used to qualitatively determine if a high vacuum soil condition (e.g., suction is felt while the plunger is being withdrawn) is present.
- 2.5.2 The Agency recommends purging or sampling at rates between 100 to 200 milliliters per minute (ml/min) to limit stripping, prevent ambient air from diluting the soil gas samples, and to reduce the variability of purging rates. The low flow purge rate increases the likelihood that representative samples may be collected. The purge/sample rate may be modified based on conditions encountered in individual soil gas probes. These modified rates should be documented in the soil gas report.

## 2.6 Soil Gas Sampling

After the soil gas probe is adequately purged, samples should be collected by appropriate methodologies.

2.6.1 Sample Container: Samples should be collected in gas-tight, opaque/dark containers (e.g., syringes, glass bulbs wrapped in aluminum foil, Summa™ canisters), so that light-sensitive or halogenated VOCs (e.g., vinyl chloride) will not degrade.

- A. If a syringe is used, it should be leak-checked before each use by closing the exit valve and attempting to force ambient air through the needle.
- B. If syringe samples are analyzed within five (5) minutes of collection, aluminum foil wrapping may not be necessary.
- C. EPA Method TO-14A, TO-15, or an equivalent air analysis method, requires samples be collected in Summa™ canisters.
- D. If a Summa™ canister is used, a flow regulator should be placed between the probe and the Summa™ canister to ensure the Summa™ canister is filled at the flow rate as specified in Section 2.5.2.
- E. Tedlar™ bags should not be used to collect VOC samples.
- F. Specific requirements for methane and hydrogen sulfide sample containers are specified in Section 2.7.9.

### 2.6.2 Sample Collection

- A. Vacuum Pump: When a vacuum pump is used, samples should be collected on the intake side of the vacuum pump to prevent potential contamination from the pump. Vacuum readings or qualitative evidence of a vacuum should be recorded on field data sheets for each sample.
- B. Shallow Samples: Care needs to be observed when collecting shallow soil gas samples to avoid sample breakthrough from the surface. Extensive purging or use of large volume sample containers (e.g., Summa™ canisters) should be avoided for collection of near-surface samples [e.g., shallower than five (5) feet bgs].

### 2.6.3 Sample Container Cleanliness and Decontamination

- A. Prior to its first use at a site, each sample container should be assured clean by the analytical laboratory as follows:
  - 1. New containers should be determined to be free of contaminants (e.g., lubricants) by either the supplier or the analytical laboratory; and
  - 2. Reused/recycled containers: Method blank(s), as specified in Section 2.7.1.A, should be used to verify sample container cleanliness.
- B. After each use, reusable sample containers should be properly decontaminated.
  - 1. Glass syringes or bulbs should be disassembled and baked at 240° C for a minimum of 15 minutes or at 120° C for a minimum of 30 minutes, or be decontaminated by an equivalent method.
  - 2. Summa™ canisters should be properly decontaminated as specified by appropriate EPA analytical methods.
  - 3. During sampling activities using reused/recycled sampling containers (e.g., glass syringes, glass bulbs), at a minimum one (1) decontaminated sample container per 20 samples or per every 12 hours, whichever is more often, should be used as a method blank (as specified in Section 2.7.1.A) to verify and evaluate the effectiveness of decontamination procedures.
- C. Plastic syringes should be used only once and then properly discarded.

### 2.6.4 Field Conditions: Field conditions, such as rainfall, irrigation, fine-grained sediments, or drilling conditions may affect the ability to collect soil gas samples.

- A. Wet Conditions: If no-flow or low-flow conditions are caused by wet soils, the soil gas sampling should cease. In addition, the Agency recommends that the soil gas sampling should not be conducted during or immediately after a significant rain event (e.g., 1/2 inch or greater) or onsite watering.
- B. If low flow conditions are determined to be from a specific lithology, a new probe should be installed at a greater depth or a new lateral location should be selected after evaluation of the site lithologic logs (See Section 2.2.1) or in consultation with Agency staff.

- C. If moisture or unknown material is observed in the glass bulb or syringe, soil gas sampling should cease until the cause of the problem is determined and corrected.
- D. If refusal occurs during drilling, soil gas samples should be collected as follows or in consultation with Agency staff.
  - 1. For sample depths less than five feet, collect a soil gas sample following the precautions outlined in Section 2.6.2.B.
  - 2. For sample depths greater than five feet, collect a soil gas sample at the depth of refusal.
  - 3. A replacement probe should be installed within five (5) feet laterally from the original probe decommissioned due to refusal. If refusal still occurs after three tries, the sampling location may be abandoned.

2.6.5 Chain of Custody Records: A chain of custody form should be completed to maintain the custodial integrity of a sample. Probe installation times and sample collection times should be included in the soil gas report.

## 2.7 Analysis of Soil Gas Samples

2.7.1 Quality Assurance/Quality Control (QA/QC): The soil gas analytical laboratory should comply with the project Quality Assurance Project Plan (QAPP) and follow the QA/QC requirements of the most current ASGI and the employed EPA Method. If there is any inconsistency, the most restrictive and specific requirements should prevail. The analytical data should be consistent with the Data Quality Objectives (DQOs) established for the project. The Agency staff may inspect the field and/or laboratory QA/QC procedures. Copies of the QA/QC plan and laboratory calibration data should be presented to the Agency field staff upon request.

Field QC samples should be collected, stored, transported and analyzed in a manner consistent with site samples. The following QC samples should be collected to support the sampling activity:

### A. Sample Blanks

- 1. Method Blanks: Method blanks should be used to verify the effectiveness of decontamination procedures as specified in Section 2.6.3.B.3 and to detect any possible interference from ambient air.
- 2. Trip Blanks for Off-site Shipments: Whenever VOC samples are shipped offsite for analysis, a minimum of one (1) trip blank

per day should be collected and analyzed for the target compounds. Trip blanks, consisting of laboratory grade ultra pure air, are prepared to evaluate if the shipping and handling procedures are introducing contaminants into the samples, and if cross contamination in the form of VOC migration has occurred between the collected VOC samples. Trip blank containers and media should be the same as site samples.

B. Duplicate Samples: At least one (1) duplicate sample per laboratory per day should be field duplicate(s). Duplicate samples should be collected from areas of concern.

1. Duplicate samples should be collected in separate sample containers, at the same location and depth.
2. Duplicate samples should be collected immediately after the original sample.

C. Laboratory Control Samples and Dilution Procedure Duplicates: Laboratory Control Samples (LCS) and Dilution Procedure Duplicates (DPD) should be done in accordance with the most recent ASGI (Sections 3.5.0 and 3.12.4, respectively).

D. Split Samples: The Agency staff may request that split samples be collected and analyzed by a separate laboratory.

2.7.2 Laboratory Certification: Although the California Department of Health Services, Environmental Laboratory Accreditation Program (ELAP) does not currently require certification for soil gas analytical laboratories, the Agency recommends laboratories utilizing EPA Methods 8260B, 8021B, and 8015B for analyses of soil gas samples obtain ELAP certifications for such EPA analytical methods accordingly. The Agency or DTSC's Hazardous Materials Laboratory (HML) staff may inspect the laboratory.

2.7.3 Detection Limits for Target Compounds: Analytical equipment calibration should be in accordance with the most current ASGI. Consideration and determination of appropriate DLs should be based on the DQOs of the investigation.

- A. The DL for leak check compounds should be 10 µg/L or less (see Section 2.4.2). The DL for oxygen (O<sub>2</sub>) and carbon dioxide (CO<sub>2</sub>) should be one (1) percent or less. The DLs for methane and hydrogen sulfide are specified in Section 2.7.9.
- B. If the investigation is being conducted to delineate the extent of contamination, a DL of 1 µg/L is appropriate for all targeted VOCs.

- C. If the soil gas data are to be used to support risk assessment activities, a DL of 1 µg/L may be appropriate for the initial screening when evaluating all targeted VOCs. If the data are non-detect for all targeted VOCs, additional sampling with lower DLs is not required. If VOCs are detected, additional sampling, using a DL of 0.1 µg/L, may be required to confirm the non-detection of carcinogenic VOCs [see the Toxicity Criteria Database of the California Environmental Protection Agency, Office of Environmental Health Hazard (OEHHA), or the Integrated Risk Information System (IRIS) Database of the United States Environmental Protection Agency]. A DL of 0.1 µg/L may be proposed and used for all carcinogenic target VOCs from the beginning of the investigation.
- D. Based on site-specific DQO needs, lower DLs may be required. Examples of sites requiring site-specific DQO needs include, but are not limited to, chlorinated solvents sites, former industrial facilities and landfills. Several less common VOCs, not included on the ASGI-targeted compound list, may require lower detection limits [e.g., bis(chloromethyl)ether, DBCP (1,2-dibromo-3-chloropropane), or ethylene dibromide] when they are known or suspected to be present.
- E. If the required DLs cannot be achieved by the proposed analytical method, additional sample analysis by a method achieving these DLs [e.g., EPA Method 8260B with selective ion method (SIM), TO-14A, TO-15] may be required. Use of these methods should comply with the QA/QC requirements as specified in Section 2.7.1.
- F. For results with a high DL reported (e.g., due to matrix interference or dilution), the laboratory should provide a written explanation. Re-sampling and analyses may be required at the appropriate DL for a specific compound.

2.7.4 Sample Handling: Exposure to light, changes in temperature and pressure will accelerate sample degradation. To protect sample integrity:

- A. Soil gas samples should not be chilled;
- B. Soil gas samples should not be subjected to changes in ambient pressure. Shipping of sample containers by air should be avoided; and
- C. If condensation is observed in the sample container, the sample should be discarded and a new sample should be collected.

- 2.7.5 Holding Time: All soil gas samples (e.g., samples of VOCs, methane, fixed gases, or biogenic gases), with the exception of hydrogen sulfide samples, should be analyzed within 30 minutes by an on-site mobile laboratory. Hydrogen sulfide samples should be analyzed as specified in Section 2.7.9.B.2. Under the following conditions, holding times may be extended and analyses performed off-site:
- A. Soil gas samples collected in glass bulbs with surrogates added within 15 minutes of collection may be analyzed within 4 hours after collection;
  - B. Soil gas samples collected in Summa™ canisters may be analyzed within 72 hours after collection; and
  - C. Methane samples may be analyzed as specified in Section 2.7.9.A.2.

2.7.6 Analytical Methods

- A. VOC Samples: All VOC samples should be analyzed using only a Gas Chromatograph/Mass Spectrometer (GC/MS) method (e.g., EPA Method 8260B, used for analysis of soil gas samples, EPA Method TO-14A or TO-15, or equivalent), except at well-characterized sites (e.g., VOCs are known to be present and confirmed based on previous GC/MS analyses). A non-GC/MS method (e.g., EPA Method 8021B, used for analysis of soil gas samples) may be used only for routine monitoring of VOC contamination at well-characterized sites.

If during routine monitoring, new VOC(s) were detected by a non-GC/MS method, then at least 10 percent of the samples with each newly identified VOC should be confirmed by a GC/MS method. Thereafter, routine monitoring can resume with the non-GC/MS method, including the new analyte(s).

- B. Methane and Hydrogen Sulfide Samples: These gas samples should be analyzed using methods specified in Section 2.7.9.

2.7.7 Auto samplers may be used if:

- A. One (1) sample is introduced at a time;
- B. The sample vials are gas-tight and never opened after the sample is added;
- C. Proper holding times are maintained (see Section 2.7.5); and
- D. All samples are secured and under proper custody.

## 2.7.8 Target Compounds

### A. VOCs

1. ASGI-Targeted Compounds: The ASGI (dated February 25, 1997) includes 23 primary and four (4) other target VOCs. All quantifiable results should be reported.
2. Others: The estimated results of all Tentatively Identified Compounds (TICs) or non-ASGI-targeted compounds detected should be included in the report. If TICs or non-ASGI-targeted compounds are identified, contact the Agency to determine whether additional action is required (e.g., running additional standards to quantify TICs or non-ASGI compounds) and whether the use of these estimated data for risk evaluation is appropriate.

B. Leak Check Compounds: All quantifiable results should be reported as specified in Section 2.4.4.E.

C. Specific Compounds: Based on the site history and conditions, analyses for specific compounds may be required by the Agency staff. Examples include:

1. In areas where USTs or fuel pipelines are identified, soil gas samples should be analyzed for oxygenated compounds [e.g., methyl tertiary butyl ether (MTBE), ethyl tertiary butyl ether (ETBE), di-isopropyl ether (DIPE), tertiary amyl methyl ether (TAME), tertiary butyl alcohol (TBA), and ethanol];
2. At oilfield sites where semi-VOCs or Total Petroleum Hydrocarbons (TPHs) are detected in the soil gas samples, fixed and biogenic gas (O<sub>2</sub>, CO<sub>2</sub>, and CH<sub>4</sub>) data should be obtained using a Thermal-Conductivity Detector (TCD) or a hand-held instrument;
3. At petroleum contaminated sites (including oilfields), dairies, wetlands, landfills or other sites where the presence of methane and/or hydrogen sulfide is suspected, soil gas samples should be analyzed for methane and/or hydrogen sulfide;
4. At sites where use of chlorinated solvents with 1,4-dioxane is suspected or known to exist, soil gas samples may be analyzed for 1,4-dioxane with a detection limit of 1 µg/L; or
5. See Section 2.7.9.A.4 below.

2.7.9 Methane and Hydrogen Sulfide Sampling Programs: If the presence of methane and/or hydrogen sulfide is suspected, they should also be included in the analytical plan. After evaluating the initial soil gas data, the Agency may recommend that testing for methane or hydrogen sulfide cease.

- A. Methane Sampling Program: Methane samples may be analyzed by a GC using modified EPA Method 8015B, EPA Method TO-3, or ASTM 3416M (EPA 3C), or by an appropriate hand-held instrument (e.g., Land Tech Gas Analyzer GA-90, Gas Emissions Monitor GEM-500, GEM-2000).
1. Detection Limit: The DL for methane analysis should not exceed 500 parts per million by volume (ppmv).
  2. Methane Sample Containers: In addition to the gas-tight sample containers previously specified in Section 2.6.1, Tedlar™ bags may be used for collection of methane samples with a holding time of no more than 24 hours.
  3. Methane Screening Level: When methane is detected at 1,000 ppmv or more, additional sampling and/or further investigation is recommended to identify the source(s).
  4. At sites where methane is investigated and detected at a level of 5,000 ppmv or more, fixed and biogenic gas (O<sub>2</sub>, CO<sub>2</sub>, and CH<sub>4</sub>) data should be obtained using a Thermal-Conductivity Detector (TCD) or a hand-held instrument.
  5. To determine that the area is pressurized by migration of gases, pressure readings of each sampling tube system should be recorded in the field logs and reported along with the methane concentration.
  6. Special GC Requirements: The GC method requires calibration curves for analytes such as methane since it is not a normal target analyte for such an analytical method.
  7. Special Hand-Held Instruments Requirements: Hand-held instruments should be calibrated in accordance with the manufacture's instructions. When a hand-held instrument is used to analyze methane samples, the Agency recommends that at least 10 percent of all positive methane samples (e.g., more than 5,000 ppmv), rounded to the nearest whole number, be confirmed by another hand-held instrument (different unit or brand) or by a GC method.
- B. Hydrogen Sulfide Sampling Program: Hydrogen sulfide may be analyzed by a GC using the South Coast Air Quality Management District (SCAQMD) Method 307-91 or EPA Method 16, or by an

appropriate hand-held instrument (e.g., LTX-310 calibrated for hydrogen sulfide or Jerome 631-X).

1. Detection Limit: The DL should be equal to or less than 0.5 ppmv or be sensitive enough to allow for a modeled ambient air concentration (at least one microgram per cubic meter) at the soil surface.
2. Holding Time: Hydrogen sulfide samples should be extracted directly into a hand-held analyzer within 30 minutes of collection to minimize the risk of losing the hydrogen sulfide due to reaction with active surfaces. If a hand-held instrument is not used, hydrogen sulfide samples should be analyzed as below:
  - a. Within 30 minutes of collection, using the GC procedures; or
  - b. Within 24 hours of collection, if a surrogate is added to the samples, or 100 percent duplicate samples are collected.
3. Sample Containers: The following sample containers are recommended:
  - a. Minimum one (1) liter black Tedlar™ bag fitted with polypropylene valves or the equivalent;
  - b. 100-ml gas-tight syringe fitted with an inert valve and wrapped in aluminum foil;
  - c. Gas-tight glass bulb wrapped in aluminum foil; or
  - d. Glass-lined or silicon coated Summa™ canister.
4. Precautions
  - a. Since hydrogen sulfide is extremely unstable in the presence of oxygen and moisture, contact of hydrogen sulfide samples with them should be avoided.
  - b. Due to the high reactivity of hydrogen sulfide gas, contact of hydrogen sulfide samples with metallic or other non-passive surfaces should be avoided during sample collection, storage and analysis.
  - c. Care must be taken so that GC components do not react with the sample. Typically glass-lined injection ports and Teflon™ tube packed columns are used to avoid loss of hydrogen sulfide due to reaction with active surfaces.

### 3.0 SOIL PARAMETERS

If the soil gas data will be used in a health risk assessment, an estimation of the indoor air concentration should be performed using soil gas data with an Agency approved or modified predictable indoor air model. Default values of input parameters may be used in accordance with the approved indoor air modeling guidance and in consultation with Agency staff. If default values are not used, site-specific soil parameters should be obtained as discussed below.

To assess health risk, indoor air quality, the threat of groundwater contamination from VOCs, or to evaluate the effectiveness of a proposed remedial technology, the following soil matrix parameters should be obtained from a minimum of three (3) sample locations (at depths\* corresponding to or associated with the detected VOCs) for each soil type in association with the soil gas investigation:

- 3.1 Soil description performed and presented in accordance with the Unified Soil Classification System (USCS);
- 3.2 Density;
- 3.3 Organic carbon content of the soil\*\* (by the Walkee Black Method);
- 3.4 Soil moisture;
- 3.5 Effective permeability\*\*\*;
- 3.6 Porosity; and
- 3.7 Grain size distribution analysis (curve) and evaluation of fine-grained soil content (by wet sieve analysis and any supplementary methods as necessary) to determine the percent clay, silt and sand. (The grain size distribution analysis will be used to classify the soil in accordance with the U. S. Soil Conservation Service [SCS] soil type, which is the same as the U. S. Department of Agriculture soil type.)

\* Samples may be collected from proposed depths at the continuously cored boring.

\*\* This input parameter is required for soil matrix VOC samples only. This parameter sample should not be collected from an impacted area.

\*\*\* As an alternative, the measurements of saturated hydraulic conductivity may be used to estimate vapor permeability.

### 4.0 REFERENCES

Additional information may be found in the following documents:

American Society for Testing and Materials (ASTM), "Standard Guide for Soil Gas Monitoring in the Vadose Zone, ASTM Standard D 5314-92," January 1993; Reapproved 2001; website <http://www.astm.org>

California Regional Water Quality Control Board, Los Angeles Region, "Interim Guidance for Active Soil Gas Investigation," February 25, 1997

California Regional Water Quality Control Board, Los Angeles Region, "General Laboratory Testing Requirements for Petroleum Hydrocarbon Impacted Sites," June 22, 2000

U.S. Environmental Protection Agency, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, EPA Publication SW-846, Third Edition," November 1986, as amended by Updates I (Jul. 1992), II (Sep. 1994), IIA (August 1993), IIB (Jan. 1995), III (Dec. 1996), IIIA (Apr. 1998), IVA (Jan. 1998) and IVB (Nov. 2000); website <http://www.epa.gov/SW-846/main.html>

U.S. Environmental Protection Agency, "U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, EPA 540/R-94/012," February 1994; website <http://www.epa.gov/region09/qa/superfundclp.html>

U.S. Environmental Protection Agency, "Soil Gas Sampling, SOP#: 2042, Revision #: 0.0," June 1, 1996; website [http://www.ert.org/respons\\_resrcs/sops.asp](http://www.ert.org/respons_resrcs/sops.asp)

U.S. Environmental Protection Agency, "Summa Canister Cleaning Procedures, SOP #1703, Rev. #: 0.0," 09/01/94; website [http://www.ert.org/respons\\_resrcs/sops.asp](http://www.ert.org/respons_resrcs/sops.asp)

California Environmental Protection Agency (Cal/EPA), Office of Environmental Health Hazard (OEHHA), Toxicity Criteria Database; website <http://www.oehha.ca.gov/risk/ChemicalDB/index.asp>

United States Environmental Protection Agency, Integrated Risk Information System (IRIS) Database; website <http://www.epa.gov/iris/>

## **ACKNOWLEDGEMENTS**

This Advisory was prepared under the direction of Sharon Fair, Branch Chief of DTSC's School Property Evaluation and Cleanup Division. Many Agency project supervisors, engineers, geologists, toxicologists, industrial hygienists, legal advisors, and Hazardous Material Laboratory staff provided support and consultation. In addition, the contents of this Advisory were greatly improved through discussions and comments received from consultants, school districts and numerous soil gas companies.

## **FOR MORE INFORMATION**

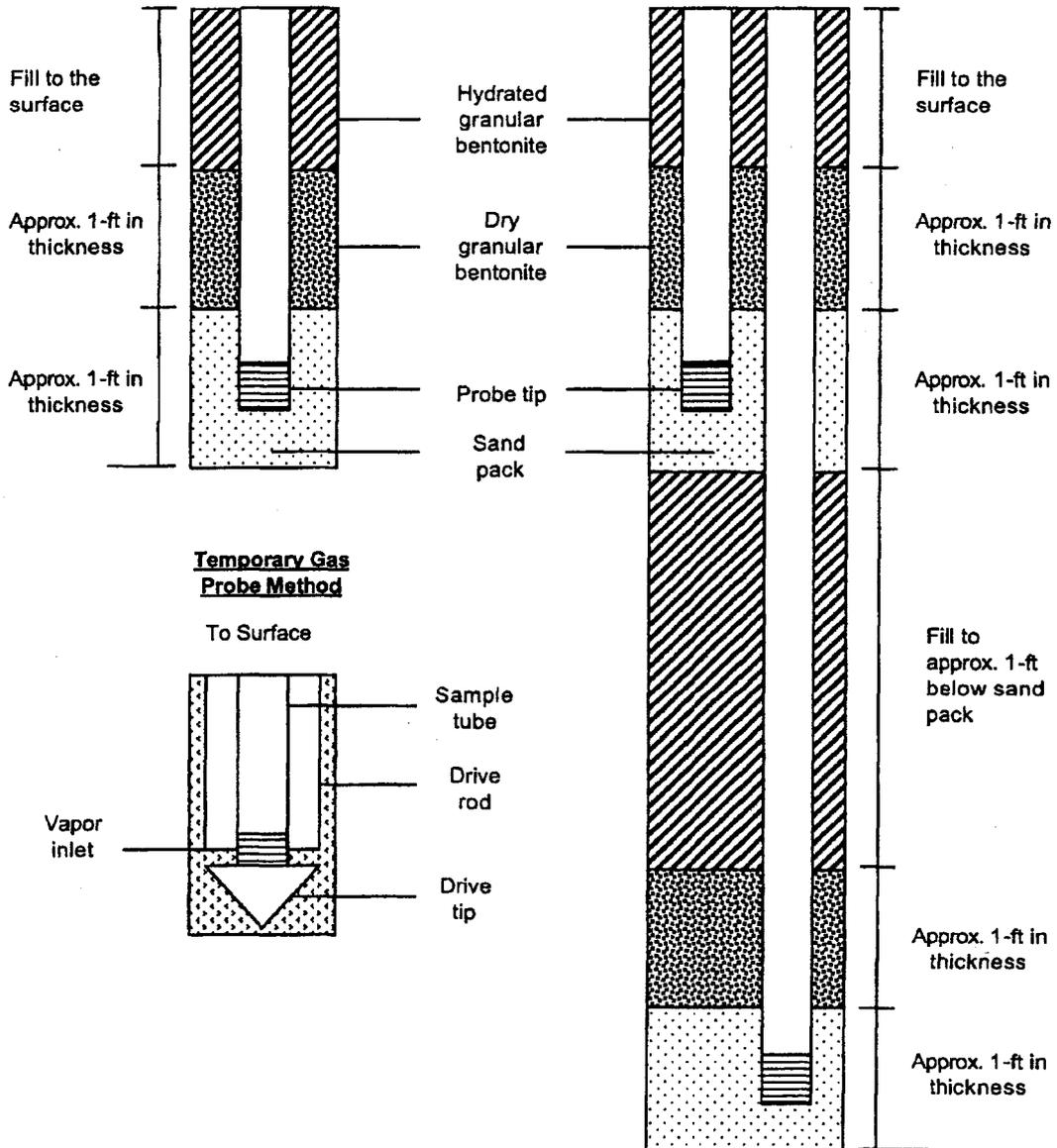
Please contact the following person if you need additional information or if you have comments:

Mr. Joe Hwong, RG, CHG  
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**Figures – Soil Gas Probe Emplacement Methods**

**Figure 1 – Permanent/Semi-permanent Gas Probe Construction Diagram**

**Figure 2 – Multi-depth Gas Probe Construction Diagram**



**APPENDIX B  
HEALTH AND SAFETY PLAN**

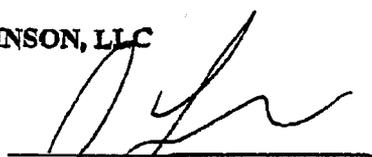
# HEALTH AND SAFETY PLAN

For:

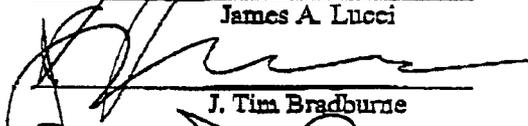
**CALMAR FACILITY**  
**333 TURNBULL CANYON ROAD**  
**CITY OF INDUSTRY, CA**  
**BB&J Project No. 10115.0098704**

Prepared by:  
**BRADBURNE, BRILLER & JOHNSON, LLC**

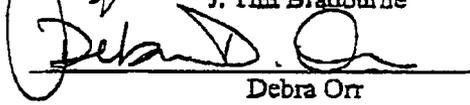
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3.18.04  
James A. Lucci

**PRINCIPAL:**

  
J. Tim Bradburne

**PROJECT MANAGER:**

  
Debra Orr

**FIELD SAFETY COORDINATOR:**

  
Richard Garlitz

**Expected Duration of Scope of Work**

March through July 2004

## **EMERGENCY CONTACTS AND PHONE NUMBERS**

*To be determined and verified by Field Safety Coordinator prior to initiating work*

**HOSPITAL:** Good Samaritan Hospital, 1225 Wilshire Blvd, Los Angeles, CA (see *attached MAP*)

General No. 213.977.2121

Emergency No. 213.977.2420

**FIRE:** 911

**POLICE:** 911

**24-HOUR EMERGENCY SPILL RESPONSE:** 1-800-424-9300 CHEMTREX

**Health and Safety Officer:** James A. Lucci Work: 978-834-0798

Home: 978-463-3090

Cell: 978-853-3526

**Principal:** J. Tim Bradburne Work: 312-726-8556

Cell: 312-961-5617

Home: 312-961-5617

# HEALTH AND SAFETY PLAN

For:

**CALMAR FACILITY**  
**333 TURNBULL CANYON ROAD**  
**CITY OF INDUSTRY, CA**  
BB&J Project No. 10115.0098704

Prepared by:

**BRADBURNE, BRILLER & JOHNSON, LLC**

**HEALTH AND SAFETY OFFICER:**

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**PRINCIPAL:**

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**PROJECT MANAGER:**

Debra Orr

**FIELD SAFETY COORDINATOR:**

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**Principal:** J. Tim Bradburne Work: 312-726-8556

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### TABLE

Table 1: Potential Chemical(s) of Concern

### ATTACHMENTS

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- Attachment B: Health and Safety Summary Report
- Attachment C: Personnel Acknowledgement Form
- Attachment D: Map to Nearest Hospital

## **1.0 INTRODUCTION**

On April 28, 1971, The United States Congress passed into law the Occupational Safety and Health Act (The Act). The purpose of The Act is to encourage safe and healthful working conditions for all employees. Bradburne, Briller & Johnson, LLC (BB&J) has prepared this Health and Safety Plan (HSP) in general accordance with the requirements outlined in the Occupational Safety and Health Administration (OSHA) Standard 29 Code of Federal Regulations (CFR) 1920.120.

## **2.0 PERSONNEL REQUIREMENTS**

The following sections provide general requirements and guidelines for BB&J's Health and Safety Officer (HSO), the project-specific Field Safety Coordinator (FSC) and the on-site field personnel.

### **2.1 Health and Safety Officer**

The primary responsibilities for the HSO include the following:

- Develop and implement health and safety policy for BB&J;
- Conduct health and safety audits, including field audits;
- Provide continued health and safety support as needed;
- Project contact for health and safety issues;
- Review and enforce the site-specific HSP; and,
- Review results of Job Hazard Analysis Report (Attachment A) and site-specific Health and Safety Summary Report (Attachment B).

### **2.2 Field Safety Coordinator**

The primary responsibilities for the FSC include the following:

- Develop and enforce site-specific HSP;
- On-site supervisor and contact for health and safety during field activities;
- Prior to initiating field work, ensure route to hospital is correct and accessible (verify route is free from construction activities and or roads are not shut down);
- Prior to initiating field work, conduct brief site reconnaissance and become familiar with site conditions, boundaries, and physical hazards;
- Prior to initiating field work, complete Job Hazard Analysis Report (See Attachment A);
- Prior to initiating field work, determine and designate applicable Work Zones (see Section 3.7);
- Prior to initiating field work, conduct Site Safety Meeting, which will included:

- A verification to ensure workers have appropriate medical and hazardous waste training;
  - A brief introduction to on-site personnel and on the contents of this HSP;
  - A determination of a meeting spot, located upwind, in case of an emergency evacuation;
  - A review of the Job Hazard Analysis Report;
  - A discussion period for personnel to review the HSP, and ask questions about the planned work or potential hazards; and,
  - An explanation of the required personal protection equipment (PPE), and procedures to alter the level of PPE (i.e., only the FSC is authorized to allow changes in the PPE which is outlined in this HSP).
- Oversee field health and safety procedures and operations for BB&J personnel;
  - Ensure that proper first aid and safety equipment are available;
  - Perform (or oversee) health and safety monitoring (i.e., site and personnel monitoring);
  - Determine if conditions are hazardous to on-site personnel or the public and to terminate work if necessary;
  - Oversee personnel and equipment decontamination procedures to ensure proper procedures are being adhered to; and,
  - Upon completion of the fieldwork, complete the Health and Safety Summary Report (Attachment B) and inform HSO of any health and safety related activities/incidents at the site.

### 2.3 On-Site Personnel

Primary responsibilities of the on-site personnel shall be the following:

- Perform a brief site reconnaissance to familiarize themselves with site conditions, boundaries and physical hazards;
- Attend Site Safety Meeting;
- Review the HSP and ask questions about the planned work and/or hazards (*NOTE: By BB&J voluntarily sharing information contained in this HSP, subcontractors are not relieved of the responsibility to provide their personnel with adequate and proper supervision, safety information, instruction and equipment*);
- Adhere to the instruction of the FSC and procedures in the HSP;
- Don the appropriate PPE as specified in the HSP and as directed by the FSC;

- Report any potential or existing hazards on the work site to the FSC immediately upon discovery; and,
- Sign this HSP acknowledging that this HSP was made available for review. A Personnel Acknowledgement Form is included as Attachment C.

#### 2.4 Hazardous Waste Worker Training

BB&J field-personnel, at a minimum, have completed the following training as applicable and required by OSHA 29 CFR 1910.120(e):

- OSHA-approved 40-hour health and safety course "*Health and Safety for Hazardous Waste Operations*";
- OSHA-approved "*8-Hour Annual Health and Safety Refresher Training for Hazardous Waste Operations*"; and,
- One day of actual field experience under the direct supervision of a trained experienced supervisor.

BB&J site-supervisors have also completed an additional 8-hours of training designed for managers (i.e., OSHA-approved "*8-Hour Site Supervisor*" course).

Training and OSHA certificates are kept on file with BB&J's HSO.

#### 2.5 Medical Surveillance

BB&J field personnel participate in the company's medical monitoring program.

#### 2.6 Audits

Audits of the project file and field audits will be performed randomly at the judgement of the HSO to determine compliance of the HSP. Discrepancies, deviations and/or violations will be documented and issued to the project file, along with copies to the project personnel (i.e., principal, project manager and FSC).

### 3.0 SITE INFORMATION

The following information is based on BB&J's knowledge of the site history and current conditions.

#### 3.1 Background

First Industrial requested that BB&J prepare a proposal to perform a Phase II Environmental Site Assessment (ESA) at a property located at 333 Turnbull Canyon Road in City of Industry, California (Subject Property). The purpose of this site investigation is to: (1) acquire soil gas and soil matrix data to update existing laboratory analytical data; (2) to further delineate the nature and extent of known constituents of concern (COCs); and, (3) to address emergent chemicals. The most recent soil-gas data that is available to BB&J, First Industrial and the RWQCB was collected in September 2000. Based on conversations with First Industrial and the RWQCB, BB&J would like to collect more data for use in developing a Remedial Action Plan (RAP) that will address the RWQCB's concerns regarding chlorinated compounds detected in soils at the Subject Property.

Levine Fricke Recon (LFR) and other environmental firms have performed numerous soil investigations at the Subject Property. During these activities, chlorinated compounds were detected in soil samples collected on site, primarily near the southwest corner of the Subject Property. As a result, a RAP was prepared and submitted to the RWQCB by Calmar to address the previously identified chlorinated compounds in soil. However, the RAP, which intended to use a soil vapor extraction (SVE) system process technology, was not implemented. Rather, correspondence with Calmar and the subsequent receipt of pertinent documentation indicated that Calmar did not believe an SVE system would address the COCs. Consequently, Calmar is currently in negotiations with the RWQCB to modify the RAP, including consideration of an alternative to allow natural attenuation.

#### 3.2 Operational Hazards

Prior to commencement of field activities, the Field Safety Coordinator will conduct a site reconnaissance to identify any potential visible hazards or operational hazards existing on-site or created from work activities. For example, physical hazards inherent to construction activities include trip hazards, lifting/handling of heavy objects, movable heavy equipment, etc.). The following is a list of some of the on-site hazards that exist at the Subject Property:

- Presence of on-site machinery, i.e., drill rig; and,
- On-site and nearby automobile traffic.

#### 3.3 Sources of Hazardous/Toxic Materials and Chemical Hazards

Based on BB&J's understanding of the Subject Property's historical and current conditions, the following list identifies potential and/or actual sources of hazardous/toxic materials and chemical hazards (e.g., potential recognized environmental condition):

- Numerous soil investigations have been performed at the Subject Property. During these activities, chlorinated compounds have been detected in soil samples collected on-site, primarily near the southwest corner of the Subject Property.

### 3.4 Constituents of Concern [COCs (i.e., Chemical Hazards)]

A list of known or suspected COCs associated with the aforementioned potential and/or actual sources of hazardous/toxic materials and chemical hazards is presented on Table 1. In addition, the tables include the National Institute for Occupational Safety and Health (NIOSH) recommended exposure limits (RELs), and OSHA permissible exposure limits (PELs). The RELs and PELs are based on a time-weighted-average (TWA) concentrations for up to a 10-hour and 8-hour workday during a 40-hour workweek, respectively.

Additional chemical-specific health and safety information can be found on specific Material Safety Data Sheet(s) (MSDS), which can be requested from BB&J corporate headquarters in Chicago.

### 3.5 Media of Concern

The following media is known or suspected to be impacted with COCs (check all that apply):

Surface Soil:       Surface Water:       Other  List \_\_\_\_\_  
Subsurface Soil:       Ground Water:

### 3.6 Tools and Equipment

Tools and equipment used shall be inspected daily and prior to use by the operator and maintained to be safe and adequate for their designated use.

### 3.7 Work Zones

Prior to field activities, the FSC shall determine the applicable Work Zones depending on the extent of work activities to be conducted. Personnel shall be briefed on the use and requirements of each area.

Up to three zones will be established within each work area. The zones are:

- Exclusion Zone;
- Decontamination Zone, and,
- Support Zone.

The inner boundary of the Support Zone will delineate the safe perimeter. The specific zone areas will change according to the specific task being performed and the location of that task.

#### Exclusion Zones

The Exclusion Zone is defined as the area where a potential for harm to personnel exists due to the known or likely presence of potential hazards (e.g., chemical hazards, physical hazards, etc.). Activity such as subsurface drilling, sampling, and/or installations will occur in the Exclusion Zone.

#### Decontamination Zone

The Decontamination Zone is the area where personnel conduct personal and equipment decontamination. It is essentially a buffer zone between the exclusion zone and the support zone. If necessary, there will be one or more central decontamination zones for operational equipment. Personal protective equipment (PPE) will be decontaminated at the local decontamination zone for each work site. If necessary, decontaminated

clothing will be temporarily contained in a 55-gallon drum and decontamination fluids will be temporarily containerized in separate 55-gallon drums pending disposal (*Consult the site-specific Proposal or Work Plan for specific decontamination procedures*).

If necessary, a safe perimeter will be established for work areas to protect against physical and chemical hazards. The safe perimeter delineates where the chemical and physical hazards associated with onsite activities are reduced. For active subsurface assessment sites, the safe perimeter will be marked (if possible pending site obstructions and operations) by traffic cones and/or caution tape. No persons will be allowed inside the perimeter without proper protective equipment. Equipment within a work area (e.g., auger sections, steel casings, barrels, etc.) will be stored in an orderly fashion so as to minimize physical hazards.

#### Support Zone

The Support Zone is located outside the safe perimeter, where the chance to encounter hazardous materials or conditions is minimal. Personal protective equipment is therefore not required. PPE will be stored there, as will first aid equipment.

## 4.0 WORK PROCEDURES

The following sections outline the work procedures to be implemented:

### 4.1 Overview of Scope of Work

The following is a bullet-item list of the field activities proposed for the Subject Property:

- Notify local underground utility locating company California Underground Service Alert to locate and mark underground utilities and structures at least 72 hours prior to field work;
- Advance 10 soil gas probes using direct-push methods to approximately twenty feet below ground surface; and,
- Collect soil samples using hollow stem auger, for field screening and for potential submittal to an analytical laboratory for chemical analyses.

### 4.2 Site Monitoring Procedures

The FSC shall perform a visual inspection of the work area and surrounding areas to verify that they are free from work hazards and/or that the proper safety precautions have been taken. If the work area is located in an area where the general public are nearby (i.e., public area, sidewalk, etc.), the site shall be marked off and barricaded with yellow caution tape and/or other means to prohibit entry by unauthorized personnel. The FSC shall perform visual inspections periodically throughout the project.

### 4.3 Personnel Monitoring Procedures

Depending on the known and/or suspected COCs present at the Subject Property (refer to Table 1 and 2), personnel monitoring procedures will vary. For this project a portable Foxboro 128GC organic vapor analyzer (OVA), calibrated using 50-ppm hexane, will be used to monitor organic vapor levels in the breathing zone. If levels exceed 10 ppm above in the breathing zone for longer than one minute, work will be temporarily halted, and the area will be allowed to ventilate until readings are below 10 ppm in the ambient air. If levels do not dissipate to below 10 ppm in the breathing zone, work will cease and the work area evacuated until appropriate PPE is donned or corrective measures are implemented to dissipate the organic vapors levels to below 10 ppm. If the work area is not deemed safe to re-enter, work will be terminated until appropriate Health and Safety measures are taken (e.g., the level of PPE is upgraded).

### 4.4 Clothing and Protective Equipment Required

OSHA requires that PPE be used to protect individuals from exposure to physical, chemical, and biological hazards within a work area. The Environmental Protection Agency (EPA) has developed different levels, A, B, C, and D, of protection to help determine site-specific requirements for protective clothing and equipment. The following outlines the different levels:

#### LEVEL A:

Level A is the highest level of protection that can be worn by a site worker. Level A is required when:

- The hazardous substance has been identified and requires the highest level of protection for the skin, eyes and respiratory system;

- There is a potential for splash, immersion, or exposure to unexpected vapors, particulates, or gases that are harmful to the skin or may be observed through the skin;
- Confined space entry may be involved, and the need for Level A cannot be ruled out (but explosion hazard has been ruled out); and,
- The skin absorption hazard may likely result in immediate death, serious illness or injury, or impair the ability to escape.

#### LEVEL B:

Level B is used when maximum respiratory protection is desired, but the skin/eye hazards do not require Level A. Level B is required when:

- The highest level of respiratory protection is needed, but a lower level of skin protection is acceptable;
- The type of substances have been identified;
- A self-contained breathing apparatus (SCBA) is required; and,
- Less skin protection is need (i.e., vapor and gases are not believed to contain high levels of chemicals harmful to skin or capable of being absorbed through intact skin).

#### LEVEL C:

Level C provides less skin and respiratory protection. Level C is required when:

- The concentration(s) and type(s) of airborne substance(s) are known and the criteria for using an air-purifying respirator are met;
- Direct contact with the hazardous substance will not harm the skin, or the substance will not be absorbed through exposed skin;
- Air contaminants have been identified, concentrations measured, and an air purifying respirator is available that can remove the contaminants; and,
- An adequate level of oxygen (>19.5%) is available, and all other criteria for the use of air-purifying respirators are met.

#### LEVEL D:

Level D offers no respiratory protection and low protection against skin contact. Level D is required when:

- Minimal protection from chemical exposure is needed. It is worn to prevent nuisance contamination only when the atmosphere contains no known hazards and work functions preclude splashes, immersion, or the potential for inhalation of or contact with hazardous levels of any chemicals;

The level of PPE required for the scope of work outlined herein is indicated below:

CHECK ONE

PPE	A	B	C	D
• Positive pressure, full-face piece SCBA, or supplied-air respirator with escape unit	X	X		
• Totally encapsulating chemical-protective suit	X			
• Full- or half-face air purifying respirator (APR)			X	
• Hooded chemical-resistant clothing		X	X	
• Chemical-resistant boots with steel toe and shank	X	X	X	X
• Inner and outer chemical-resistant gloves	X	X	X	
• Coveralls				X
• Chemical-resistant gloves	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
• Hearing protection (e.g., ear plugs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
• Eye protection (e.g., face shield, safety goggles/glasses)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
• Hard hat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
• Leather gloves	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**NOTES:**

- X Indicates the minimum items required for the PPE Level
- Indicates additional PPE that will be donned for the scope of work outlined herein.

If it is determined necessary/appropriate by the FSC, the level of PPE requirement may be upgraded or downgraded depending on site-specific circumstances (e.g. presence or absence of organic vapors in the breathing zone). **NOTE:** Subcontractors are responsible for their own employees' PPE (including confined space safety equipment if applicable).

**4.5 Confined Space Entry**

Not applicable for this project.

**4.6 Decontamination Procedures**

Decontamination of equipment is an important method of controlling the spread of hazardous substances and preventing deterioration of the equipment. Equipment shall be washed thoroughly by scrubbing with a bristle brush in a solution of distilled or deionized water and non-phosphate-containing detergent. The equipment then shall be rinsed thoroughly with distilled or deionized water.

Personnel that have come into contact with potential chemicals shall wash affected area thoroughly with soap and water, followed by a thorough rinse with water.

Contaminated wash and rinse solutions must be containerized by using step-in containers to hold spent solutions or by other method(s) of containment. Tools that were used in the Exclusion Zone must not be removed without proper decontamination.

All contaminated materials and equipment used for decontamination (e.g., clothing, tools, buckets, brushes, etc.) must be secured in an appropriate container (e.g., drum, sealable bucket) and properly labeled. The spent decontamination solutions must be transferred to drums, which are appropriately labeled and disposed

of in accordance with local, State, and federal regulations. (Refer to the project specific Proposal or Work Plan for a more detailed procedure).

#### 4.7 Work Precautions/Procedures

The following activities are prohibited throughout the duration of the project (unless authorized by the FSC):

- Eating, drinking or using tobacco products;
- Removing PPE while in the exclusion zone;
- Exiting the work area without going through the decontamination process;
- Removing exposed equipment from the work area without going through the decontamination process; and,
- Disposing of any material or equipment that comes in contact with COC-impacted materials (soil, water, etc.) in a manner that is not in accordance with the procedures outlined herein.

## 5.0 EMERGENCY PROCEDURES

Emergency contacts and phone numbers are presented on the first page of this HSP.

A first aid kit shall be readily available (i.e., located the Support Zone) in the case of an injury and all workers shall be informed of its location prior to beginning work. In addition, if potential fire hazards exist, a fire extinguisher shall be on-site. The FSC shall be responsible for ensuring that proper first aid and safety equipment are available.

In the event of an injury, the FSC shall evaluate the nature of the injury, and if determined not to be life threatening, the injured person shall be decontaminated to the extent possible. Appropriate first aid shall be administered and/or the individual shall be transported to a medical facility and/or an ambulance contacted to transport the injured person to the designated hospital, if necessary (see attached map).

In the event of overt personal exposure (i.e., skin contact, inhalation and/or ingestion), consult the MSDS (if available) and implement the response procedures as indicated in the following sections:

### 5.1 Skin Contact

Direct contact is one of the primary routes of exposure. Some chemicals may pass through the skin into the bloodstream where they are transported to organs. Absorption into the skin is enhanced by abrasions, cuts, heat, and moisture.

If skin contact does occur, remove any contaminated clothing and thoroughly wash the area with soap and water. Consult the specific chemical MSDS for additional first aid procedures and seek medical help if necessary.

### 5.2 Inhalation

Inhalation is one of the primary routes of exposure. Some chemicals, either in a vapor, gaseous or solid state (i.e., adhered to airborne particulates) may enter the body through breathing.

If inhalation of a COC(s) occurs, move person upwind from the source, and remove any respiratory protection equipment (if in use). Consult the specific chemical MSDS for additional first aid procedures and seek medical help if necessary.

### 5.3 Ingestion

Ingestion is one of the primary routes of exposure. Some chemicals may enter the body through the mouth. No equipment should ever be put in the mouth, and eating and drinking are prohibited in the work area.

Emergency procedures for the ingestion of specific chemicals vary from chemical to chemical. Consult the specific chemical MSDS for first aid procedures and seek medical help if necessary.

### 5.4 Eye Contact

If a substance comes in contact with the eyes, flush with water or eye wash solution for at least 15 minutes. Consult the specific chemical MSDS for additional first aid procedures and seek medical help if necessary.

## 5.5 Cold Stress

Field activities in cold climates create a potential for cold stress. The warning symptoms of cold stress include: reduced coordination; drowsiness; impaired judgment; fatigue; numbing of the toes, fingers, nose and ears. To prevent cold stress, personnel shall wear appropriate clothing and maintain scheduled work/rest periods, with rest periods taken in a sheltered and heated location.

The following steps shall be taken (by the FSC) to minimize the potential for cold stress:

- Adjust work and rest schedules for workers;
- Provide shelter or heated areas for workers, and heating devices if needed;
- Maintain a supply of fluids for workers; and,
- Brief workers on the symptoms and how to recognize symptoms and treat cold stress.

If a worker is experiencing cold stress, the FSC (or other first aid-trained personnel) should administer appropriate first aid, such as moving the person to a warmer environment, placing blankets on the person, and contacting an ambulance to transport the injured person to the designated hospital, if necessary (see attached map).

## 5.6 Heat Stress

Heat stress is one of the most common and potentially serious illnesses and warrants preventive measures. Heat stress is caused by a number of factors, including environmental conditions, clothing, workload, and the individual characteristics of the worker. Depending on the conditions, heat stress can occur very rapidly – within as little as 15 minutes. The warning symptoms of heat stress include: reduced accuracy; comprehension and retention; fatigue; loss of strength; cramps; drowsiness, and rashes.

The following steps shall be taken (by the FSC) to minimize the potential for heat stress:

- Adjust work and rest schedules for workers;
- Provide shelter or shaded areas for workers, and cooling devices to aid natural body heat exchange;
- Maintain a supply of fluids for workers; and,
- Brief workers on the symptoms and how to recognize and treat heat stress.

If a worker is experiencing heat stress, the FSC (or other first aid-trained personnel) should administer appropriate first aid, such as moving the person to a cooler area, administering fluids, placing cold towels on the person, and contacting an ambulance to transport the injured person to the designated hospital, if necessary (see attached map).

## 5.7 Potential or Actual Fire/Explosion

If necessary, on-site personnel shall use available fire fighting equipment to control or extinguish a fire, and remove or isolate materials, which may contribute to a fire. The local fire department shall be contacted, along with the project manager, HSO, and/or client company officials as appropriate.

## 5.8 Spill or Release of Hazardous and Non-Hazardous Material

Hazardous Material. If a spill or release of hazardous material occurs, and the situation is not life threatening and there are limited exposure risks, an effort should be made to clean up, isolate or contain the spill as appropriate. Contact emergency response personnel, project manager, and/or client company officials as appropriate. See the first page of this HSP for emergency phone numbers.

24 Hour Emergency Response Company Chemtrex 1-800-424-9300

Non-Hazardous Material: If a spill or release of a non-hazardous material occurs, and the situation is not life threatening, an effort should be made to clean up, isolate or contain the spill as appropriate. Contact emergency response personnel, project manager, and/or client company officials as appropriate. See Page 1 for emergency phone numbers.

## 5.9 Evacuation Procedures

In the event that an emergency requires evacuation of the site, verbal instruction will be given by the FSC to evacuate the area. Personnel will immediately exit the site to the previously designated upwind location. The FSC will account for all personnel and will advise personnel of further instructions if necessary. Personnel shall not re-enter the site until the emergency conditions have been corrected and the FSC has authorized re-entry.

*Culmar Facility / City of Industry, CA  
BB&J Project No. 10115.0098704*

*Health & Safety Plan  
March 16, 2004  
Log No. 04-0014*

**TABLE**

TABLE 1: List of Constituents of Concern<sup>1</sup> and Exposure Limits

COCS	Exposure Limit <sup>2</sup> (ppm) <sup>3</sup>								IP <sup>2</sup> (eV)	Characteristics / Health & Safety Comments
	NIOSH				OSHA					
	REL	STEL	C	PEL	STEL	C				
VOLATILES										
Benzene	0.1	1	NP	1	5	NP			9.24	CA; Known Carcinogen; aromatic odor
Toluene	100	150	NP	200	500 <sup>4</sup>	300			8.82	Sweet pungent odor
Ethylbenzene	100	125	NP	100	NP	NP			8.76	Aromatic odor
Xylenes (o, m & p) <sup>5</sup>	100	150	NP	100	NP	NP			8.56/8.44 <sup>6</sup>	Aromatic odor
Acetone	250	NP	NP	1000	NP	NP			9.69	Fragrant mint like odor
Bromoform	0.5	NP	NP	NP	NP	NP			10.48	Chloroform-like odor
Carbon tetrachloride	NP	2 <sup>7</sup>	NP	10	NP	25			11.47	CA; Ether-like odor
Chlorobenzene	NP	NP	NP	75	NP	NP			9.07	Almond-like odor
Chloroform	NP	2 <sup>7</sup>	NP	NP	NP	50			11.42	CA; Pleasant odor
Dichlorobromomethane	NP	NP	NP	NP	NP	NP			NP	
1,1-Dichloroethane	100	NP	NP	100	NP	NP			11.06	Pleasant, chloroform-like odor
1,2-Dichloroethylene (cis+trans)	200	NP	NP	200	NP	NP			9.65	Slightly acrid, pleasant, chloroform-like odor
Dichloromethane (Methylene chloride)	NP	NP	NP	25	125	NP			11.32	CA; Pleasant, chloroform-like odor
1,2-Dichloropropane	NP	NP	NP	75	NP	NP			10.87	CA; Pleasant, chloroform-like odor
1,3-Dichloropropylene (cis+trans)	1	NP	NP	NP	NP	NP			NP	CA; Pleasant, chloroform-like odor
Tetrachloroethylene	NP	NP	NP	100	NP	200			9.32	CA: Mild, pleasant, chloroform-like odor
Styrene	50	100	NP	100	NP	200			8.40	Sweet, floral odor
1,1,1-Trichloroethane	NP	NP	NP	NP	NP	NP			11.00	

Notes and acronym definitions are listed on page 2 of 2.

TABLE I: List of Constituents of Concern<sup>1</sup> and Exposure Limits

COCs	Exposure Limit <sup>2</sup> (ppm) <sup>3</sup>							IP <sup>2</sup> (eV)	Characteristics / Health & Safety Comments
	NIOSH			OSHA					
	REL	STEL	C	PEL	STEL	C	C		
1,1,2-Trichloroethane	NP	NP	NP	10	NP	NP	NP	11.00	
Trichloroethylene	NP	NP	NP	100	NP	NP	200	9.45	CA; Pleasant, chloroform-like odor
Vinyl Chloride	NP	NP	NP	1	NP	NP	5	9.99	Pleasant odor at high concentrations

**NOTES:**

- 1: Known or suspected constituents of concern
- 2: Exposure limits and ionization potential were obtained from the NIOSH Pocket Guide to Chemical Hazards dated June 1997.
- 3: Exposure limits are listed in ppm, unless noted
- 4: Based on a 10-minute peak (time-weighted average)
- 5: Exposure limits are the same for all isomers - ortho, meta and para
- 6: Ionization potential for ortho/meta/para isomers
- 7: Based on a 60-minute peak (time-weighted average)
- 8: Based on a 15-minute peak (time-weighted average)

**ACRONYMS:**

- NIOSH: National Institute for Occupational Safety and Health  
 OSHA: Occupational Safety and Health Administration Permissible Exposure Limit (1997)  
 CA: Considered to be a potential occupational carcinogen by NIOSH  
 COC: Constituent of Concern  
 REL: NIOSH Recommended Exposure Limit. Based on time-weighted average (TWA) concentrations for up to a 10-hour workday during a 40-hour workweek.  
 STEL: Short Term Exposure Limit. Measured over a 15-minute TWA exposure that should not be exceeded at any time during a workday.  
 C: Ceiling. Should not be exceeded at any time.  
 PEL: OSHA Permissible Exposure Limit. Based on time-weighted average (TWA) concentrations for up to an 8-hour workshift during a 40-hour workweek.  
 IP: Ionization Potential  
 NP: None published  
 ppm: Parts per million (Referencing benzene, 1 ppm = 3.19 mg/m<sup>3</sup> - each COC has different result in mg/m<sup>3</sup>)  
 mg/m<sup>3</sup>: Milligrams per meter cubed  
 eV: Electron volts

Prepared By/Date: \_\_\_\_\_  
 Checked By/Date: \_\_\_\_\_

*Calmar Facility / City of Industry, CA  
BB&J Project No. 10115.0098704*

*Health & Safety Plan  
March 16, 2004  
Log No. 04-0014*

**ATTACHMENT A:  
JOB HAZARD ANALYSIS WORKSHEET**

### JOB HAZARD ANALYSIS WORKSHEET

*To be completed by FSC prior to initiating field work.*

Project Name: Calmar Facility Field Safety Coordinator: \_\_\_\_\_  
Project Number: 10115.0098704 Dates in Field: \_\_\_\_\_

The FSC shall consider activities and conditions that actual or potential hazards exist, and provide recommendations to protect workers.

1. **Are there any slip, trip or fall hazards?** YES \_\_\_\_ or NO \_\_\_\_  
*If YES, then list, describe location, and present appropriate response to minimize or alleviate hazard:*  
\_\_\_\_\_  
\_\_\_\_\_
  
2. **Are there any overhead hazards?** YES \_\_\_\_ or NO \_\_\_\_  
*If YES, then list, describe location, and present appropriate response to minimize or alleviate hazard:*  
\_\_\_\_\_  
\_\_\_\_\_
  
3. **Are there any electrical or explosive hazards?** YES \_\_\_\_ or NO \_\_\_\_  
*If YES, then list, describe location, and present appropriate response to minimize or alleviate hazard:*  
\_\_\_\_\_  
\_\_\_\_\_
  
4. **Are there any noise hazards?** YES \_\_\_\_ or NO \_\_\_\_  
*If YES, then list, describe location, and present appropriate response to minimize or alleviate hazard:*  
\_\_\_\_\_  
\_\_\_\_\_
  
5. **Are excavations hazards present and/or expected?** YES \_\_\_\_ or NO \_\_\_\_  
*If YES, then list, describe location, and present appropriate response to minimize or alleviate hazard:*  
\_\_\_\_\_  
\_\_\_\_\_
  
6. **Is heavy vehicle traffic expected (i.e., moving hazards)?** YES \_\_\_\_ or NO \_\_\_\_  
*If YES, then list, describe location, and present appropriate response to minimize or alleviate hazard:*  
\_\_\_\_\_  
\_\_\_\_\_

**JOB HAZARD ANALYSIS WORKSHEET (continued)**

7. **Is there heavy machine operations expected?** YES \_\_\_\_ or NO \_\_\_\_  
*If YES, then list, describe location, and present appropriate response to minimize or alleviate hazard:*

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8. **Are there fire extinguishers easily accessible?** YES \_\_\_\_ or NO \_\_\_\_  
*If Yes, List and describe location:*

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9. **Are routes to emergency exits easily accessible?** YES \_\_\_\_ or NO \_\_\_\_  
*If Yes, List and describe location:*

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10. **Are there any other potential work hazards?** YES \_\_\_\_ or NO \_\_\_\_  
*If Yes, List and describe location:*

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Signature \_\_\_\_\_ Date \_\_\_\_\_  
*Field Safety Coordinator*

**\*\* RETURN A COPY TO HEALTH AND SAFETY OFFICER UPON COMPLETION OF WORK**

*Calmar Facility / City of Industry, CA  
BB&J Project No. 10115.0098704*

*Health & Safety Plan  
March 16, 2004  
Log No. 04-0014*

**ATTACHMENT B:  
HEALTH AND SAFETY SUMMARY REPORT**

### HEALTH AND SAFETY SUMMARY REPORT

*To be completed by Field Safety Coordinator (after completion of field work)*

Project Name: Calmar Field Safety Coordinator: \_\_\_\_\_  
Project Number: 10115.0098704 Dates in Field: \_\_\_\_\_

1. Were there any violations of the HSP by BB&J Personnel? YES \_\_\_ or NO \_\_\_  
If Yes, Explain:  
\_\_\_\_\_  
\_\_\_\_\_
2. Were there any violations of the HSP by subcontractors? YES \_\_\_ or NO \_\_\_  
If Yes, Explain:  
\_\_\_\_\_  
\_\_\_\_\_
3. Was there any obvious, significant exposure to COCs? YES \_\_\_ or NO \_\_\_  
If Yes, Explain:  
\_\_\_\_\_  
\_\_\_\_\_
4. Was there any OSHA reportable accidents or injuries? YES \_\_\_ or NO \_\_\_  
If Yes, Explain:  
\_\_\_\_\_  
\_\_\_\_\_

If Yes was answered in any of the aforementioned questions, provide a detailed explanation of the situation, including circumstances, personnel involved, causes, type of contamination (if applicable), corrective action taken (i.e., first aid or medical assistance required).

Signature \_\_\_\_\_ Date \_\_\_\_\_  
*Field Safety Coordinator*

**\*\* RETURN A COPY TO HEALTH AND SAFETY OFFICER UPON COMPLETION OF WORK**

*To be completed by Health & Safety Officer*

Was an audit conducted? YES \_\_\_ or NO \_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_  
*Health & Safety Officer*

*Calmar Facility / City of Industry, CA  
BB&J Project No. 10115.0098704*

*Health & Safety Plan  
March 16, 2004  
Log No. 04-0014*

**ATTACHMENT C  
PERSONNEL ACKNOWLEDGMENT FORM**

**PERSONNEL ACKNOWLEDGEMENT FORM**

By initialing and dating this form, the listed individual acknowledges that he/she has read and understands and will comply with the requirements of this Health and Safety Plan.

COMPANY	NAME (print)	SIGNATURE / DATE
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

*Calmar Facility / City of Industry, CA  
BB&J Project No. 10115.0098704*

*Health & Safety Plan  
March 16, 2004  
Log No. 04-0014*

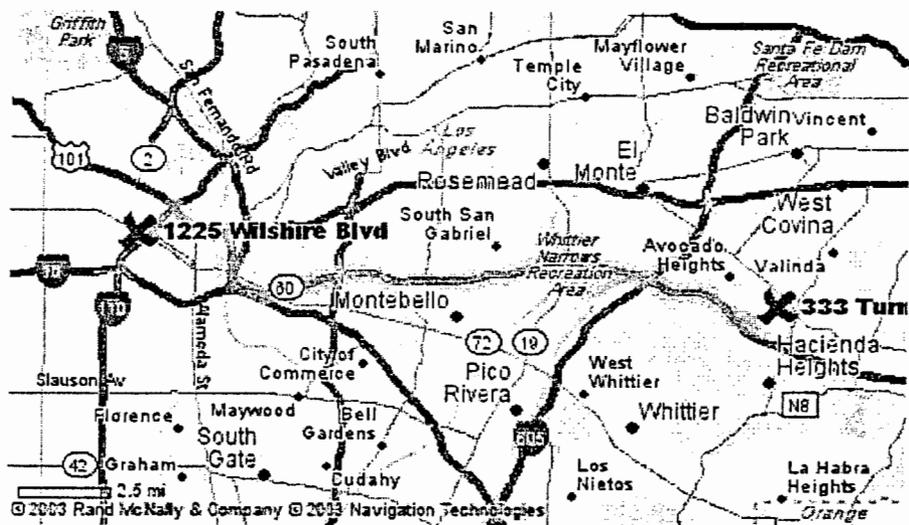
**ATTACHMENT D:  
MAP TO NEAREST HOSPITAL**

Log # 04-0014

Use the print feature in your browser to print this page.

Emergency #  
213-977-2420

**333 Turnbull Canyon Rd**  
**City Of Industry, CA 91745-1010**  
to  
**1225 Wilshire Blvd**  
**Los Angeles, CA 90017-1901**



Find it in the 2004 Road Atlas  
City Of Industry, CA & Los Angeles, CA  
• page 15, grid section SJ-11

**Estimated Total Driving Time:**  
23 minutes

**Estimated Total Driving Distance:**  
20 miles

**Total Number of Steps:**  
19

Step	Directions	Distance
1	You are at 333 Turnbull Canyon Rd, City Of Industry, CA.	
2	Go SW on Turnbull Canyon Rd for 0.79 miles	0.8 miles
3	Turn right onto Gale Av	0.8 miles
4	Bear right on ramp to CA-60 W (Pomona Frwy)	0.2 miles
5	Continue on CA-60 W (Pomona Frwy)	13.1 miles
6	Bear right onto off-ramp to Ramp	0.1 miles
7	Take US-101 N (Santa Ana Frwy) Ramp	0.1 miles
8	Take US-101 N (Santa Ana Frwy) Ramp	0.4 miles

- 9 Continue on US-101 N (Santa Ana Frwy) 2.7 miles
- 10 Bear right onto off-ramp to CA-110 S (Pasadena Frwy) 0.3 miles
- 11 Take CA-110 S (Pasadena Frwy) Ramp 0.3 miles
- 12 Continue on CA-110 S (Pasadena Frwy) 0.2 miles
- 13 Exit onto off-ramp to Ramp 0.1 miles
- 14 Take Ramp Ramp < 0.1 miles
- 15 Take Beaudry Av Ramp 0.3 miles
- 16 Take Beaudry Av Ramp 0.2 miles
- 17 Continue onto Beaudry Av 0.1 miles
- 18 Bear right onto Wilshire Blvd 0.3 miles
- 19 You are at 1225 Wilshire Blvd, Los Angeles, CA

**Destination:** 1225 Wilshire Blvd  
Los Angeles, CA 90017-1901

