See Also: 8-20-96 RBCA

Weiss Associates Environmental and Geologic Services

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April 21, 1997

Mr. Scott O. Seery, CHMM
Alameda County Department of Environmental Health
1131 Harbor Bay Pkwy, #250
Alameda, CA 94502-6577

RE: **Workplan for Risk-Based Corrective Action Evaluation**
Former Shell Service Station
15275 Washington Avenue
San Leandro, California
WIC # 204-6852-1008
WA Job #81-1227-4

Dear Mr. Seery:

On behalf of Shell Oil Products Company (Shell), Weiss Associates (WA) has revised this workplan per our meeting with you on April 10, 1997. The previous workplan, dated August 20, 1996, detailed a plan to assess and, if necessary, mitigate risk to potential receptors. This assessment will follow the procedures outlined in the American Society for Testing and Materials (ASTM) Standard E-1739, *Risk-Based Corrective Action Applied at Petroleum Release Sites (RBCA).*

WA's proposed plan included four phases: 1) conduct a Tier 1 RBCA evaluation; 2) collect additional site data, if necessary, as determined by the Tier 1 evaluation and in anticipation of the Tier 2 evaluation; 3) conduct a Tier 2 RBCA evaluation; and 4) submit a corrective action plan that will address the site-specific action levels developed in the Tier 2 evaluation. **The revised workplan described below is essentially identical in scope to the proposed workplan dated August 20, 1996. Changes have been made in order to address the commont brought up during our meeting on April 10, 1997, and provide further detail for phase 2, the collection of additional field data.**

RBCA Tier 1 Evaluation

WA performed a RBCA Tier 1 evaluation using previously collected site data and submitted a draft of the evaluation on December 9, 1996. The objective of the Tier 1 evaluation was to identify potentially complete exposure scenarios and to determine if constituents of concern (COCs) present in site soil and ground water pose an unacceptable risk to potential receptors based upon conservative, non-site specific exposure scenarios,. Site data was compared to residential Tier 1

risk-based screening levels (RBSLs) for all potentially complete exposure pathways. The ASTM values were adjusted, as necessary, to reflect the California-approved toxicological factor(s).

The draft Tier 1 RBCA evaluation indicated that the concentrations of some COCs in ground water and subsurface soil exceed the Tier 1 RBSLs, assuming the most conservative, non-site specific exposure scenarios. The draft evaluation indicated that Tier 1 RBSLs for benzene are exceeded for the following pathways:

- Volatilization to outdoor air from subsurface soils,
- Volatilization and vapor intrusion to buildings from ground water and from subsurface soils,
- Soil leachate to ground water for ingestion, and
- Ingestion of ground water from a hypothetical well.

Tier 1 RBSLs were also exceeded for toluene vapor intrusion to buildings from subsurface soils. Based on our review, WA recommends further site investigation to incorporate realistic site-specific data and assumptions before developing a corrective action plan (CAP) under the Tier 2 RBCA evaluation.

Additional Field Investigation

The exposure pathways that appear to be of primary concern are volatilization from subsurface soils and ground water to indoor and outdoor air. Therefore, WA recommends collecting soil vapor survey (SVS) data to complete a Tier 2 evaluation for this site. The objective of this SVS is to collect and analyze soil vapor samples, and assess the potential migration of vapor-phase hydrocarbons from the water table, surface soil, and subsurface soil to ground surface. These soil vapor data will facilitate an evaluation of the potential volatilization of dissolved hydrocarbons and migration of these hydrocarbons into indoor and outdoor air, and whether these pathways pose an unacceptable human health risk. WA believes that soil vapor data can eliminate uncertainties involved in the RBCA vapor transport model and, therefore, offer a more direct and reliable estimate of the attenuation of contaminants with time and distance. The recommended calculation methods for a Tier 2 evaluation require estimating a concentration in soil vapor and then modeling migration to the receptor location based upon a linear concentration gradient assumption. Use of actual SVS data will eliminate the need for estimating soil vapor concentrations, and will provide an indication of the actual soil vapor concentration gradient with depth.

SVS data may also be used to calibrate and verify the results of alternative vapor transport models which include attenuation due to low permeability barriers and degradation. In addition to analyzing the vapor samples for benzene, toluene, ethylbenzene and xylenes (BTEX), the laboratory will analyze the samples for atmospheric gases, including oxygen, carbon dioxide and methane, to assess hydrocarbon degradation rates in the vadose zone.

Another pathway of concern is the ingestion of surface soil in unpaved locations of the site. To evaluate potential risk from exposure to surface soil, WA recommends collecting surface soil samples in four of the SVS sampling locations (see Figure 1) at a depth of 2 ft below ground surface.

To conduct the SVS, WA proposes to:

- Obtain a right-of-entry (ROE) agreement with the owner of the property;
- Locate all underground utility lines and prepare a site-specific health and safety plan;
- **Install soil vapor probes at five (5) locations and collect soil vapor samples at a depth of 4 ft (Figure 1). Samples will be collected using a 10 cubic centimeter (cc) syringe for onsite lab analysis for CO_2, O_2, and methane, and with 1 liter SUMMA canisters for offsite lab analysis for BTEX.**
- **Install soil vapor probes at four (4) locations and collect soil vapor samples at depths of 2 ft, 4 ft, and 6 ft (Figure 1). Samples will be collected using a 10 cubic centimeter (cc) syringe for onsite lab analysis for CO_2, O_2, and methane, and with 1 liter SUMMA canisters for offsite lab analysis for BTEX.**
- **Collect continuous core samples at four (4) locations to a depth of 8 feet.** These samples will be collected at approximately the same location as the vertical profile samples. Soil samples will be analyzed for total petroleum hydrocarbons as gasoline (TPH-G), BTEX and geotechnical data.
- **Collect an ambient, above ground air sample over 8 hours with periodic recording of wind direction for comparison to the SVS data.** The ambient air sample will be collected using a 6 liter SUMMA canister and flow controller set to collect an 8 hour integrated air sample. The SUMMA canister will be analyzed at an offsite lab for BTEX.

Soil vapor sampling depths proposed above may be revised in the field, based upon the depth to the water table, to ensure samples are collected above the capillary fringe and to ensure the collection of a representative vertical profile.

WA will collect the samples in one-liter SUMMA canisters, because of their ease of use and transport, and the low detection limits achievable from whole-air samples. Also, the passivation process used in canister preparation eliminates some of the (minor) concerns associated with the sample integrity of Tedlar bags. A SVS sampling protocol is attached in Attachment A and WA's sampling QA/QC plan is presented as Attachment B.

The SVS samples will be sent to a California-certified analytical laboratory. All samples will be analyzed using EPA Method TO-3 for BTEX. The TO-3 methodology is an EPA-approved method with good repeatability for whole-air samples and typical detection limits are quite low (1 part per billion by volume for each BTEX constituent).

The SVS sample locations presented in Figure 1 were selected based on our meeting with you on April 10, 1997, to achieve the following objectives:

1. Soil vapor samples collected at a depth of 4 ft will be used to characterize the extent of soil and ground water contamination effecting the soil vapor pathway in the vicinity of potential source areas and receptors.

2. Vertical soil vapor profile samples will be collected at two expected source area locations, at a receptor location within the trailer park, and below the service bay of the former service station building. Vertical soil vapor profile data will aid in characterizing the concentration gradient which provides the driving force for volatilization to outdoor air and to vapor intrusion into buildings.

3. Continuous core samples will aid in characterizing the subsurface statigraphy and provide vapor phase migration parameters for use in subsequent Tier 2 modeling.

WA will notify you prior to beginning this work and will submit a report presenting the results of the investigation soon after completing the field work. WA expects to conduct the SVS work in the first or second week of May, after 5 to 7 days of dry weather and after obtaining the ROE agreement from the current property owner. Because potential seasonal variations may affect soil vapor transport parameters, WA intends to return to the site within six months to verify the current SVS workplan results under drier / potentially more conservative conditions. The scope of additional sampling activities will be decided based upon the results of the current SVS workplan results.

WA will calculate emissions to ambient air and vapor intrusion into enclosed spaces using SVS data collected closest to the potential receptors and utilizing the methodologies described in ASTM Standard E-1739. These results will be compared to Tier 1 RBSLs, and a Tier 2 evaluation will be conducted for exposure pathways that exceed Tier 1 RBSLs.

RBCA Tier 2 Evaluation

WA will perform a RBCA Tier 2 evaluation using both previously collected site data and the SVS data. The objective of the Tier 2 evaluation is to determine Site-Specific Target Levels (SSTLs) protective of human health for COCs at the site. These SSTLs will be used as action levels in the CAP prepared as step 4 of this evaluation.

Corrective Action Plan

WA will prepare a CAP in accordance with California Administrative Code 23 CAC Section 2725. The CAP will include an impact assessment of the site, an evaluation of corrective action alternatives, a determination of contaminant target levels, and a verification monitoring plan along with the proposed corrective action.

WA trusts this workplan satisfies your request. Please call if you have any questions or comments.

Sincerely,
Weiss Associates

Pleas J. McNeel, M.S., P.E.
Senior Staff Engineer I

Steve Long, P.E.
Project Engineer

Enclosures: Attachment A: SVS Sampling Protocol
Attachment B: QA/QC Plan

cc: Alex Perez, Shell Oil Products Company
Brad Broschetto, Shell Oil Products Company
Erik Hansen, Shell Development Company
Kevin Graves, Regional Water Quality Control Board, San Francisco Bay Region

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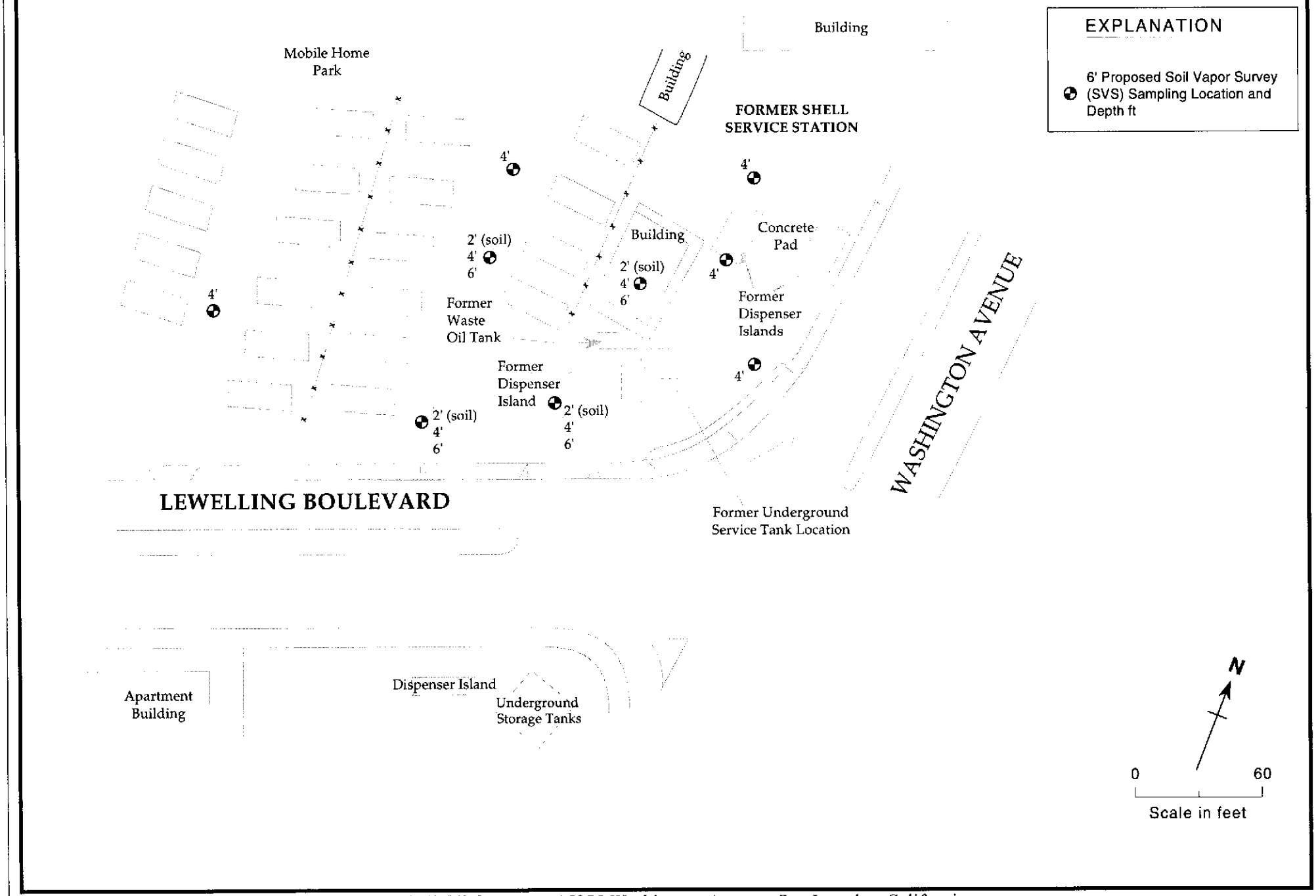

Figure 1. Proposed SVS Sampling Locations - Shell Oil Company, 15275 Washington Avenue, San Leandro, California

ATTACHMENT A

SVS SAMPLING PROTOCOL

I. Probe Placement

A) A clean soil gas probe is removed from the "clean" storage tube.

B) The soil gas probe is placed in the jaws of a hydraulic pusher/puller mechanism.

C) A sampling drive point is inserted into the bottom of the probe.

D) The hydraulic pushing mechanism is used to push the probe into the ground.

E) If the pusher mechanism will not push the probe into the ground to a sufficient depth for sampling, a hydraulic hammer is used to pound the probe into the ground.

II. Soil Gas Sample Extraction

A) An adapter is attached to the top of the soil gas probe.

B) A vacuum pump or large syringe is attached to the adapter via polyethylene tubing.

C) The vacuum pump or syringe is used to purge the sampling equipment with soil gas.

D) Approximately three probe volumes are purged before a sample is collected.

E) The probe purge flow rate is monitored using a rotometer at the vacuum pump or a syringe and timer. The flow rate is maintained below 5 liters per minute.

III. Soil Gas Sample Collection

A) After purging is complete, a stainless steel hypodermic syringe needle attached with Teflon tubing to a SUMMA canister is inserted through the silicone rubber, which acts as a seal, and down into the metal tubing of the sample probe. This technique eliminates the possibility of exposing the sample stream to any part of the adapter and associated tubing. Soil gas samples only contact clean decontaminated surfaces and never contact potentially sorbing materials (i.e., tubing, hose, pump diaphragm). Clean stainless steel hypodermic syringe needles and Teflon sample tubing are used for each sample.

B) The syringe needle and Teflon sample tubing is purged with soil gas. A 10 cubic centimeter (cc) soil gas sample is collected using a clean syringe and analyzed on-site for CO2, O2, and methane. Then, without removing the syringe needle from the adapter, a soil gas sample is collected slowly (1 to 3 liters per minute) using a SUMMA canister.

C) The syringe needle is removed from the adapter and the syringe needle and Teflon sample tubing is set aside for later decontamination.

D) If necessary, a second SUMMA canister sample is collected using the same procedure.

IV. Deactivation of Sampling Apparatus

A) The vacuum pump is turned off and unhooked from the adapter.

B) The adapter is removed and stored.

C) Using the hydraulic puller mechanism, the probe is removed from the ground.

D) The probe is stored in the "dirty" probe tube.

E) The probe hole is backfilled and capped, if required.

V. Logbook and U.S. EPA Field Sheet Notations for Sampling

A) Time (military notation)

B) Sample number

C) Location (approximate description - i.e., street names)

D) Sampling depth

E) Purge flow rate and time before sampling

F) Probe number

G) Observations (i.e., ground conditions, concrete, asphalt, soil appearance, surface water, odors, vegetation, etc.)

H) Backfill procedure and materials, if used

VI. Other Record Keeping

A) Chain of Custody data sheets are filled out for the SUMMA canisters.

B) Sample location is marked on the site map.

ATTACHMENT B

QA/QC PLAN

The following are QA/QC procedures for soil vapor survey:

I. Sampling Equipment

1. Each SUMMA canister is cleaned by Air Toxics LTD before use using a combination of dilution, heat and high vacuum. They are usually cleaned in batches, with one in ten samples certified by filling them with ultra high purity air, which is subsequently analyzed using GC/MS. If target analyte concentrations are below 0.2 ppbv, the "batch" of canisters is considered clean.

2. A clean syringe needle, Teflon sample tubing and SUMMA canister is used to collect each soil gas sample to prevent cross-contamination.

II. Laboratory Analysis

1. Duplicate samples are analyzed at a frequency of at least 10% by Air Toxics LTD.

2. Laboratory spikes are analyzed at a frequency of at least 10% by Air Toxics LTD.

3. Lab blanks are analyzed at a frequency of at least 10% by Air Toxics LTD.

4. For TO-14 analyses Air Toxics LTD will provide surrogates with every sample.