



Department of Energy

Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, Tennessee 37831—

December 20, 2004

Mr. Kerry Trammel, Chair
Oak Ridge Site Specific Advisory Board
P.O. Box 2001, EM-91
Oak Ridge, Tennessee 37831

Dear Mr. Trammel:

**OAK RIDGE SITE SPECIFIC ADVISORY BOARD (ORSSAB) COMMENTS ON
SOIL VAPOR RESULTS FOR WINTER SAMPLING FOR BUILDINGS K-1007,
K-1225, K-1330, K-1400, AND K-1580 AT THE EAST TENNESSEE
TECHNOLOGY PARK, OAK RIDGE TENNESSEE**

Thank you for the comments on the vapor intrusion evaluation conducted by DOE as part of the property transfer process for the subject five office buildings at the East Tennessee Technology Park. Our responses to the comments are attached. These responses were prepared several months ago, but had not been sent to you pending Environmental Protection Agency (EPA) Region 4, and Tennessee Department of Environment and Conservation (TDEC) concurrence through their review of the *Covenant Deferral Request (CDR) for Buildings K-1007, K-1225, K-1330 and K-1580 at the East Tennessee Technology Park*. The CDR was approved by EPA on October 7, 2004, and concurred by the Governor of the State of Tennessee on October 29, 2004. The responses to the ORSSAB comments, along with those for regulatory and all other public comments received, will be included in the approved CDR which will be made available to the public through the DOE Information Center in the near future.

Sincerely,

A handwritten signature in black ink, appearing to read "D. Adler", written over the word "Sincerely,".

David G. Adler, Team Leader
IWDP & EI Team

Attachment

cc: w/attachment
Susan Cange, ORO, NS-53
Pat Halsey, ORO, EM-91
Debbie Vaughn-Wright, EPA-Region 4
John Owsley, TDEC
Tom Gebhart, TDEC

**RESPONSE TO
OAK RIDGE SITE SPECIFIC ADVISORY BOARD (ORSSAB) COMMENTS
ON SOIL VAPOR RESULTS FOR WINTER SAMPLING
FOR BUILDINGS K-1007, K-1225, K-1330, K-1400, AND K-1580
AT THE EAST TENNESSEE TECHNOLOGY PARK**

1. Soil vapor results for the winter sampling for Buildings K-1007, K-1225, K-1330, and K-1580 at ETTP have been made available to the public. In general, the presentation of the results and the associated sampling and analysis plan could be improved to facilitate greater public education and contribution to the overall knowledge base of this issue. ORSSAB feels that other technically sound approaches allowed by the guidance in evaluating the vapor intrusion pathway may have better achieved these objectives. We are not convinced that the protocol is adequate to reassure the public of the safety of the buildings. Please clarify the objectives of conducting this vapor intrusion analysis.

RESPONSE: A detailed description of the approach followed by ORO to evaluate the vapor intrusion pathway is presented in Section 4.4 of each EBS (the “path forward”) so the public can understand the purpose and the salient information. The results presented on the web sites were intended to be summary level information. The objective of conducting vapor intrusion analysis is to determine if a source of volatile organic compounds exists underneath a facility or area proposed for transfer to the private sector. If it is determined that a source exists, the next objective would be to learn if vapors are present at harmful levels that would require protective measures should the facilities be transferred.

The approach followed was thoroughly discussed and negotiated with the technical experts and Project Managers at EPA Region 4 and ORO. Several approaches were considered since the issue of vapor intrusion was raised by EPA in March 2003. Among the approaches considered was the modeling of the sub-surface transport of chlorinated volatiles, but this approach was not suitable due to the geologic conditions (i.e., occurrence of Karst) at ETTP. Another approach considered and rejected due to the presence of karst was the screening of the available groundwater data against the generic Tier II criteria presented in EPA guidance “*Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils.*” The collection of ambient air samples was also considered and dismissed due to the difficulty involved in isolating the actual source of any detected VOCs (e.g. new carpet fumes, paint, health and beauty consumer products, soil vapor, etc.). Lastly, evaluation of the vapor intrusion pathway based on evaluation of a “worst case scenario,” was considered and proposed to EPA. This strategy consisted of monitoring ambient air and sampling water in the sumps inside the basement of Building K-1401.

These conditions were considered to represent a worst case scenario for ETTP since a chlorinated VOC plume exists directly beneath K-1401, the groundwater infiltrates into the basement sumps, and the concentrations of chlorinated VOCs in that plume are among the highest observed at ETTP. Although this approach involved monitoring indoor air VOC concentrations where a direct vapor intrusion pathway existed, EPA-Region 4 was concerned that the approach was not representative of the different conditions in each of the buildings proposed for transfer and might not represent a "worst case."

After significant discussion between ORO and EPA Region 4, it was agreed that sub-slab monitoring would be performed in the buildings. Collecting soil vapor directly beneath the building is a direct method for determining whether or not a source of VOCs exists beneath the building, and there are no karst consideration issues. The results would be definitive. Although more resource intensive than other approaches considered, this approach is advantageous in that it provides data at the source of the issue rather than relying on screening techniques or other information to determine if a source or potential source exists. This approach is also found within EPA's draft guidance.

2. A number of specific issues were identified in review of the sampling and analysis plans and presentation of the soil vapor results:
 - a) Although the sampling indicates that the inlet tubing to the soil vapor sampling system shall be as short as possible, no additional information is provided on steps that were taken to avoid biasing results.

RESPONSE: The TO-15 method was followed explicitly in order to minimize bias as much as possible. The sampling team was consistent at each sampling location by using new, certified clean tubing, new, cleaned fittings (as per the manufacturer's specifications: Swagelok Specification SC-10 Rev. A, Standard Cleaning and Packaging, and following TO-15 and EPA-Region 4 protocols for stainless and teflon). The same size tubing was used (dedicated to each separate sample location), which was the shortest possible to avoid diluting ("scrubbing") of the sample. In addition, the SUMMA canisters were pressurized at the laboratory and checked prior to use to ensure they were properly pressurized.

- b) No duplicate samples are specified for the soil vapor samples that would provide indication of repeatability of the sampling results at a given location.

RESPONSE: As indicated, field duplicates were not collected as part of this sampling effort. Based on the nature of field duplicates, method TO-15 does not lend itself to this type of collection primarily because time is required for the sub-slab conditions to return to equilibration after initial sampling using the SUMMA (vacuum) canisters. Collection of a duplicate would require taking a sub-slab sample at a location and returning 3-4

days later to collect another sample at this location which in essence is not a true duplicate sample. Field duplicates are taken to evaluate the variability or reproducibility of the field sampling technique. (Note: The apparatus shown in EPA presentations for collection of duplicate vapor intrusion samples consists of two SUMMA canisters connected to a single sub-slab sampling port. The SUMMA canisters are individually valved at the canister. As such, this device does not collect a duplicate but instead collects a split sample.)

- c) Analytical data quality objectives are incomplete except for specification of reporting and detection limits well within the capability of the method. Default application of Method TO-15 requirements must otherwise be assumed. According to Compendium Method TO-15, there are three performance criteria to be met for a system to qualify under that method. These criteria are: the method detection limit of ≤ 0.5 ppbv, replicate precision within 25%, and audit accuracy within 30% for concentrations normally expected in contaminated ambient air (0.5 to 25 ppbv). Additionally, whether the analytical laboratory used the SIM or SCAN mode of analytical operation is not specified. The choice is a consideration in determining other tentatively identified compounds along with those on the target list but can also affect reported results.

RESPONSE: The analytical laboratory contracted for the TO-15 analysis was directed to perform all requirements of the method. The low standard used for the GC/MS calibration curve for sample analysis was 0.2 ppbv, which demonstrates that the method detection limit of $< \text{or} = 0.5$ ppbv was met. The laboratory chemist performing the analysis demonstrated the initial capability for method TO-15 in September 2002. Copies of the initial demonstration from the analyst's training file show that the replicate precision was within 25% for the four QC test concentrations, and that the accuracy was within 30% for the Laboratory Control Sample (LCS) at a concentration of 10 ppbv. The documentation of the analyst's initial demonstration of capability for method TO-15 is available upon request.

The project specified that up to 20 tentatively identified compounds were to be reported from the TO-15 analysis of soil vapor samples, which were reported by the laboratory from the SCAN mode analysis. In order to achieve the project-required reporting limits (RRL) and method detection limits (MDL), the laboratory also analyzed and reported four of the target compounds in SIM mode for all samples, as the detection limits in SIM mode are lower than those achievable in SCAN mode. (These four target compounds could not be suitably detected in SCAN mode, and thus SIM was run). Compounds reported from the SIM mode analysis included: 1,2-dichloroethane, carbon tetrachloride, 1,2-dichloropropane, and 1,1,2,2-tetrachloroethane. Project RRLs were set at the 10^{-5} risk level, and method detection limits at the 10^{-6} risk level.

- d) The presentation of the results simply announces the results and does not provide sufficient information for determination of whether the results are valid based upon the criteria discussed above.

RESPONSE: The results that were made available to the public were intended to be a summary for ease of review. Additional details, including validation information, will be included in the EBS reports that will be available to the public once the CDR has been approved by the regulators. For these analyses, a 100% validation was performed. No data were rejected (i.e., "R" qualified) for these four buildings.

- e) The presentation of the results does not discuss any issues that arose during field implementation of the sampling plan or any deviations from the sampling plan or during analysis and how such issues were addressed.

RESPONSE: The final EBSs note any deviations from the SAP, if applicable. The only field changes that occurred during our winter sampling were in the sample collection for Building K-1580. For this building, sample collection took place on two separate occasions because during the first sampling event, the drilling met refusal (the sampling crew could not take a sample due to encountering a material that could not be penetrated by the sampling equipment) at two locations (locations 3 and 5). During the second sampling event, the sample at location 3 was collected successfully. Because the sample at location 5 was planned to provide coverage (it was not a biased sample), DOE and EPA agreed to obtain data for this area from an alternate location. The location and another alternate, should similar refusal occur, has been selected for the sampling event planned for the summer of 2004.

Method TO-15 applies to ambient concentrations of VOCs above 0.5 ppbv. The laboratory case narratives included with the analytical data packages discuss that the laboratory extended this method to 0.1 ppbv for most of the compounds of interest to achieve the project required reporting and detection limits. The laboratory also reported surrogate recoveries as an internal quality control indicator although the method does not specify the addition of surrogate compounds. There were no other deviations from the TO-15 method.

- f) The sampling plan indicated that a groundwater sample would also be collected in the first phase of sampling to define current conditions and monitor for any future change in conditions. Presentation of the groundwater sampling results accompanying the soil vapor samples is not obvious along with any criteria that would be used to establish future changes in conditions.

RESPONSE: As indicated, the groundwater data results were not presented as part of the information on the website. Additional discussions

with EPA on how to assess changes in site conditions occurred after the information had been placed on the web site. Based on further evaluation and discussions with EPA, groundwater data will not be used to indicate changes in site conditions. It was concluded that the physical conditions and uncertainties associated with groundwater at ETTP preclude the use of groundwater data as a definitive indicator of changing site conditions. These include the absence of the water table in the unconsolidated zone near many of these buildings, temporal fluctuations in the depth to water, inability to establish correlations between groundwater concentrations and soil vapor concentrations, and uncertainty of water transport pathways in a karst environment. Instead, EPA and DOE agreed that re-sampling will be conducted to monitor whether protectiveness is maintained at the frequency determined by rearranging the risk and hazard equations of the CERCLA risk assessment guidance. This approach will determine the number of years a worker would need to be exposed to the maximum detected concentrations of VOCs in a particular facility in order to have a cumulative risk of 1.0×10^{-6} or a Hazard Index of 1.0.

- g) The rationale and justification for selection and application of the attenuation coefficients to calculate indoor air concentrations are not obvious. The same attenuation coefficient appears to be used for each compound at each building. The potential presence of undocumented preferential pathways for vapor intrusion would seem to be a logical consideration that would require modification of this assumption to be considered.

RESPONSE: Factors that were considered in developing the rationale and justification for the coefficients used included conservative room air volumes (low air exchange and small volume), porous material for the vapor to pass through to building foundations, and large foundation/wall cracks. These are conservative assumptions. Additionally, after discussion and consideration, the technical lead toxicologist from EPA approved the attenuation factors and the resulting trigger levels that were used.

3. Generally, the presentation of these results appears to be an exercise that involved considerable resources and application of evolving technical protocol to situations where the issue being investigated was not expected to be a problem, although the Federal Facility Agreement parties agreed to investigate it. Other technically sound approaches could have been implemented and presented that would better characterize the presence of the issue on the Oak Ridge Reservation and facilitate greater public education and contribution to the overall knowledge base at the national level. Presentation of these and future vapor intrusion results based on addressing the issues raised above is recommended.

RESPONSE: DOE agreed with EPA's recommendation to investigate the vapor intrusion pathway. This was in response to EPA's concern regarding the

occurrence of volatile organic compounds in shallow groundwater in some areas at the ETTP coupled with uncertainties regarding plume migration at the site. Several technical approaches were proposed and considered, as explained above. The approach implemented was selected from the approaches presented based on its advantages and acceptability to EPA. The issues raised by the LOC and the SSAB will be addressed, as appropriate, when presenting vapor intrusion results in the future. We will continue to work with EPA on the assessment of this issue and to keep the public informed of the Reindustrialization Program studies.