Response to ADEC Concerns Related to Vapor Intrusion Investigations at the Former Communications Site

PREPARED FOR: U.S. Army Corps of Engineers

PREPARED BY: CH2MHILL

COPIES: Jacobs
Army

DATE: June 23, 2010

The purpose of this technical memorandum is to document a response to Alaska Department of Environmental Conservation (ADEC) concerns related to previous subslab soil gas sampling associated with the remedial investigation at the Former Communications Site on Fort Wainwright in Alaska. ADEC's concerns were stated in an e-mail from Ms. Debra J. Caillouet to Mr. Joseph Malen on June 11, 2010.

A project team conference call took place on June 17, 2010, to discuss and address the concerns. The following sections of this technical memorandum outline the concerns presented and associated discussion that took place during the June 17 conference call. The concerns are identified and discussed in the order of their listing in Ms. Caillouet's June 11 e-mail.

Subslab Soil Gas Samples for Radon using Tedlar® Bags (Reference CH2M HILL Standard Operating Procedure [SOP]): Analysis and Collection of Subslab Soil Gas Samples for Radon Using Tedlar® Bags)

From e-mail:

Log	Sample ID	Concern
A Tedlar® Bag	2L	3-minute purge, 4-minute sample, zero vacuum at end of sample
A Tedlar® Bag	42L	3-minute purge, 5-minute sample, zero vacuum at end of sample
A Tedlar® Bag	34L	3-minute purge, 4-minute sample, zero vacuum at end of sample

Response:

Purge Duration

SOP 2.2.4: Purging is carried out by pulling soil gas through the system at a rate of 200 milliliters per minute (ml/min) for a time period sufficient to achieve a purge volume that equals at least 3 to 5 dead volumes (internal volume of the in-ground annular space, sample line, and sampling manifold system).

The purge duration did not deviate from the SOP. Consistent with the SOP and the requirements for helium leak testing, the purge time achieved a purge volume of at least 3 to 5 dead volumes and provided sufficient volume to complete the helium leak test.

Sample Duration

SOP 3.6: When the bag appears to be full (around 5 minutes), close the manifold valve and turn the pump off. Record the final time and average flow rate of the sampling.

The sample duration did not deviate from the SOP. The sampling was stopped when the Tedlar® bag appeared to be nearly full. Sampling times were 4 and 5 minutes.

Zero Vacuum at End of Sample

SOP 3.7: Disconnect the "To Vacuum" fitting to allow the pressure to return to ambient in the air sampler box.

This did not deviate from the SOP. The purge vacuum and sampling vacuum on the Soil Gas Field Sampling Log are the pressures showing on the sampling manifold during purging and sampling. These vacuums would be greater than zero if there were obstructions (concrete dust or water) in the subsurface or sampling train, preventing soil gas from flowing freely. Therefore, purging and sampling vacuums of zero are ideal, since this shows that soil gas flow from the subsurface to the Tedlar® bag is not impeded. Also, collecting a soil gas sample in a Tedlar® bag is different from collecting a soil gas sample in a SUMMA™ canister. The Tedlar® bag is placed in a sampler box, and soil gas is pulled into the Tedlar® bag by creating a negative pressure inside the sampler box (but outside the bag). When the sample collection is complete (the Tedlar® bag is nearly full of soil gas), the pressure inside the sample box should return to zero, as discussed in the SOP. The line item on the sampling form labeled "Sampling Pressure" should not be misconstrued as a pressure reading for the sample itself.

Subslab Soil Gas Samples for VOCs Using SUMMA™ Canisters (Reference CH2M HILL SOP): Collection of Subslab Vapor Samples Using SUMMA™ Canisters)

From e-mail:

Log	Sample ID	Concern
B-Summa	49L	3 minute purge at 0 vacuum, 57 minute sample with 30 " Hg pressure, sampling rate in cc/min shown as 1/2 hour, sampling vacuum of 0, and a final pressure of 3. Probe resealed twice.
B-Summa	47L	3 minute purge at 0 vacuum, 58 minute sample with 30" Hg pressure, sampling rate in cc/min shown as 1/2 hour, sampling vacuum of 0, and a final pressure of 4.
B-Summa	43R	3 minute purge at 0 vacuum, 50 minute sample with 30 " Hg pressure, sampling rate in cc/min shown as 1/2 hour, sampling vacuum of 0, and a final pressure of 2. Indoor Air Temp=68 and subslab=70.4
B-Summa	42R	3 minute purge at 0 vacuum, 55 minute sample with 30" Hg pressure, sampling rate in cc/min shown as 1/2 hour, sampling vacuum of 0, and a final pressure of 2. HRV not operating.

Log	Sample ID	Concern
B-Summa	47R, 45R, 45L	Notes for these are on this page, but no samples. Also 45L shown at 91 and 88 degrees. No explanation of where these were obtained. Also what kind of putty was replaced? Doesn't sound like the cement that should be around the probe.

Response:

3-minute Purge Times

SOP 4.1.1.5: Two liters of subslab gas need to be purged before sampling. The purge time is 10 minutes, at a flow rate of 200 ml/min.

This did deviate from the apparent wording of SOP; however, it does not deviate from the intention of the SOP. The intent of the SOP recommendation to purge 2 liters of subslab soil gas is specifically to ensure that at least 3 to 5 dead volumes are purged and that there is sufficient volume to perform the helium leak check. The 3-minute purge time accomplished both of these requirements. This SOP will be revised to clarify that at least 3 to 5 dead volumes should be purged prior to sampling and the additional purge volume required to perform the helium leak check will be kept to a minimum in accordance with the ADEC guidance.

Purge at 0 Vacuum

This did not deviate from the SOP. The purge vacuum and sampling vacuum on the Soil Gas Field Sampling Log are the pressures showing on the sampling manifold during purging and sampling. These vacuums would be greater than zero if there were obstructions (concrete dust or water) in the subsurface or sampling train preventing soil gas from flowing freely. Therefore, purging and sampling vacuums of zero are ideal, since this shows that soil gas flow from the subsurface to the canister is not impeded. The line item on the sampling form labeled “sampling pressure” should not be misconstrued as a pressure reading for the sample itself. The sample pressure of the sample sent to the lab is indicated by the label “Final Canister Pressure.”

Sample Collection Durations

The SOP notes that sample times and flow rates are subject to project requirements and does not specify a sample time or flow rate. The samples were collected in accordance with ADEC VI guidance (the flow controllers for this sampling event were set to collect 6-liter samples at less than 200 ml/min, over at least a 30-minute period). The flow controllers are calibrated by the laboratory and are often slightly faster or slower than the specified flow rate. It is acceptable for the sampling period to be longer than 30 minutes, provided that the required sampling volume is collected. The next work plan addendum will include a table identifying the type and volume of container and the range of acceptable sample collection durations for each type of sample collected.

Sample with 30-inch Mercury Pressure

SOP 5.2: The vacuum pressure in the canister should be between 28 and 30 inches of mercury. If not, then the canister has leaked and should not be used for sampling.

This did not deviate from the SOP. The initial pressure of the SUMMA™ canisters should be between -28 and -30 inches of mercury.

Sampling Rate in cc/min Shown as 1/2 Hour

The theoretical sampling rate for a 6-liter sample collected over 30 minutes is 200 cc/min (also equal to 200 ml/min). The exact sampling rates can be calculated from the canister volume and the exact sample collection periods for each sample. It is often not practical or helpful to calculate the actual flow rate in the field since nothing can be done to adjust the flow rate in the field.

Sampling Vacuum of 0

SOP 5.4: During the sampling period, record the lowest pressure from the manifold gauge on the field log.

This did not deviate from the SOP. The purge vacuum and sampling vacuum on the Soil Gas Field Sampling Log are the pressures showing on the sampling manifold during purging and sampling. These vacuums would be greater than zero if there were obstructions (concrete dust or water) in the subsurface or sampling train preventing soil gas from flowing freely. Therefore, purging and sampling vacuums of zero are ideal, since this shows that soil gas flow from the subsurface to the canister is not impeded. The line item on the sampling form labeled "Sampling Pressure" should not be misconstrued as a pressure reading for the sample itself. The sample pressure of the sample sent to the lab is indicated by the label "Final Canister Pressure."

Final Pressure of 4 Inches

A final pressure in the SUMMA™ canister between -0.5 and -5 inches of mercury is ideal. Provided that the final pressure is more than -10 inches of mercury (between -10 and 0 inches of mercury), the laboratory will have enough sample volume to perform the analysis. The SOP will be revised to indicate that final pressures should be between -0.5 and -10 inches of mercury.

Probe Resealed Twice

SOP 4.1.1.5: During the purge, observe the helium detector for indication of probe leakage (for example, infiltration of room air into the probe). If a reading of >5 percent is observed, then the probe leak check has failed, and corrective action is required.

This did not deviate from the SOP. If a leak in the subslab soil gas probe is detected during the helium leak test, corrective action should be taken which may include resealing the probe with Fix-It-All (a VOC-free patching compound) or Portland cement, or temporarily patching it with modeling clay. The probe was resealed twice with Fix-It-All and then passed the helium leak test; these actions were in accordance with the SOP.

Indoor Air Temperature = 68 and Subslab = 70.4

SOP 5.9: Fill out all appropriate documentation (sampling forms, sample labels, chain of custody, sample tags, etc.).

This does not deviate from the SOP. Indoor air and subslab temperatures were recorded on the Soil Gas Sampling Field Log.

HRV Not Operating

SOP 5.9: Fill out all appropriate documentation (sampling forms, sample labels, chain of custody, sample tags, etc.).

This does not deviate from the SOP. The current condition (operating or not operating) of the heat recovery ventilator (HRV) was recorded on the Soil Gas Sampling Field Log. Future data quality evaluation reports will identify those samples that are collected from units that are not representative of normal living conditions (such as indoor air temperatures <64 degrees Fahrenheit [°F] or >72°F, or inoperable HRV).

45L Shown at 91 and 88 Degrees

SOP 5.9: Fill out all appropriate documentation (sampling forms, sample labels, chain of custody, sample tags, etc.).

This does not deviate from the SOP. Indoor air and subslab temperatures were recorded on the Soil Gas Sampling Field Log. The temperature was elevated in this area of the building because the heating system and HRV were not operating correctly. Future data quality evaluation reports will identify those samples that are collected from units that are not representative of normal living conditions (such as indoor air temperatures <64°F or >72°F, or inoperable HRV).

What Kind of Putty Was Replaced

SOP 4.1.1.5: During the purge, observe the helium detector for indication of probe leakage (for example, infiltration of room air into the probe). If a reading of >5% is observed, then the probe leak check has failed, and corrective action is required.

Fix-It-All putty was used to patch the subslab soil gas probe. Fix-It-All is a volatile organic compound (VOC)-free patching compound that may be used in place of Portland cement for securing permanent subslab soil gas probes.

Log	Sample ID	Concern
C-Summa	29L	3 minute purge at 0 vacuum, 23 hour 4 minute (or 56 minute?) sample with 30 " Hg pressure, sampling rate in cc/min shown as 1/2 hour, sampling vacuum of 0, and a final pressure of 0. HRV not operating. Note says 29L FL says flowrate set for 8 hr sample.

Please see previous responses to comments regarding purge time, purge vacuum, sample vacuum, sampling rate, sampling vacuum, final sample pressure, and HRV condition.

The flow controller used to collect this sample was likely set incorrectly to collect the sample over an 8-hour period. The sample was started at 9:00 p.m. on December 10, 2009, and was collected at 8:04 a.m. on December 11, 2009. When the sample was collected, the final pressure was 0 inches of mercury, indicating that the SUMMA™ canister was full. It is acceptable for the sampling period to be longer than 30 minutes, provided that the required sampling volume was collected. A final pressure of -0.5 to -10 inches of mercury in the SUMMA™ canister is desirable because this residual vacuum can be confirmed by the laboratory upon receipt of the sample to confirm that the sample was not compromised during shipment. However, in addition to the gas-tight valve on the SUMMA™ canister, there is a gas-tight Swagelok cap on the canister inlet during shipment. This cap ensures that, even if the valve becomes loose, there will be no ambient air exchange. Although it is

not believed that the sample results were compromised, the data for this sample will be flagged in the evaluation report.

Log	Sample ID	Concern
D- Summa	13R	3 minute purge at 0 vacuum, 58 minute sample with 0 "Hg pressure

Please see previous responses to comments regarding purge time, purge vacuum, sampling duration and sample vacuum.

Log	Sample ID	Concern
E-Summa	14R	~20 hour sample, note that flow very slow, possibly 8 hr flow controller, temp 61

The flow controller used to collect this sample was likely set to collect the sample over an 8- or 24-hour period. The sample was started at 11:20 a.m. on August 27, 2009, and completed at 7:20 a.m. on August 28, 2009. When the sample was collected, the final pressure was 0 inches of mercury, indicating that the SUMMA™ canister was full. It is acceptable for the sampling period to be longer than 30 minutes, provided that the required sampling volume was collected. A final pressure of -0.5 to -10 inches of mercury in the SUMMA™ canister is desirable because this residual vacuum can be confirmed by the laboratory upon receipt of the sample to confirm that the sample was not compromised during shipment. However, in addition to the gas-tight valve on the SUMMA™ canister, there is a gas-tight Swagelok cap on the canister inlet during shipment. This cap ensures that even if the valve becomes loose, there will be no ambient air exchange. Although it is not believed that the sample results were compromised, the data for this sample will be flagged in the evaluation report.

Log	Sample ID	Concern
F-Summa	All	Temp 55-59 degrees

This does not deviate from the SOP. Indoor air and subslab temperatures were recorded on the Soil Gas Sampling Field Log. Heating systems were not operating during the event. Future data quality evaluation reports will identify those samples that are collected from units that are not representative of normal living conditions (such as indoor air temperatures <64F or >72F, or inoperable HRV).