



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 4  
ATLANTA FEDERAL CENTER  
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ATLANTA, GEORGIA 30303-8960

November 17, 2016

Ms. Tracey Duncan  
Federal Facility Agreement Manager  
United States Department of Energy  
Portsmouth/Paducah Project Site Office  
5501 Hobbs Road  
Kevil, KY 42053

RE: EPA Conditional Concurrence: C-400 Vapor Intrusion Study Work Plan to Support the Additional Actions for the (2013) Comprehensive Environmental Response, Compensation, and Liability Act Five Year Review at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky (DOE/LX/07-2403&D2), submitted October 20, 2016 (PPPO-02-3695333-17).

References

1. Correspondence from R. Chaffins (EPA) to J. Woodard (DOE). September 30, 2014. Subject: EPA Deferred Protectiveness Determination – PGPD 2013 Five Year Review.
2. OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air, OSWER 9200.2-154, Office of Solid Waste and Emergency Response, Environmental Protection Agency, June 2015.

Dear Ms. Duncan,

The U. S. Environmental Protection Agency (EPA) Region 4 has reviewed the Department of Energy's (DOE) *C-400 Vapor Intrusion Study Work Plan to Support the Additional Actions for the (2013) Comprehensive Environmental Response, Compensation, and Liability Act Five Year Review at the Paducah Gaseous Diffusion Plant (DOE/LX/07-2403&D2)* and DOE responses to regulatory agency comments. The draft final (D2) C-400 Building Vapor Intrusion (VI) Work Plan is fundamentally flawed: despite several tri-party conference calls and Agency formal comments on the draft VI Work Plan, DOE continues to decline to include collection of concurrent sub-slab vapor, indoor air, and ambient air samples as part of the vapor intrusion study. Conditions that must be satisfied by DOE prior to EPA approval of the C-400 Building VI Study Work Plan for the PGDP are provided as an enclosure to this letter.

On September 30, 2014, EPA advised DOE of our determination to defer the protectiveness statement for the C-400 Building response action pending completion of additional work and provision of additional information for Agency evaluation (*Reference 1*). Given the magnitude of high concentration volatile organic compound (VOC) contamination, including TCE DNAPL present in the surrounding subsurface soils and

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possibly below the building itself, the potential for vapor intrusion is likely. Therefore, EPA advised DOE in 2014 that the vapor intrusion study should be conducted in near-term, and not delayed until a future action, with the study results reported to EPA not later than March of 2016. Because DOE's efforts to execute and report on the C-400 Building VI Study are significantly behind schedule, and the number of workers in the building who have the potential to be exposed to VOCs through vapor migration pathway has reportedly increased since EPA's September 2014 letter, the urgency for DOE to conduct a vapor intrusion study for the C-400 Building, consistent with EPA protocols and based on current toxicity values and risk assessment methodology (*Reference 2*), is greater than ever.

Satisfactory resolution of EPA's enclosed Conditions for approval of the C-400 Building VI Study Work Plan for additional action for the 2013 CERCLA Five Year Review is necessary to for DOE to move forward expeditiously with the required VI Study at C-400 and to support EPA re-evaluation of DOE's C-400 remedy protectiveness statement (protective in the short-term) and a revised protectiveness determination by EPA Region 4. If you have any questions about this correspondence, please do not hesitate to contact me at (404) 562-8547 or via electronic mail at [corkran.julie@epa.gov](mailto:corkran.julie@epa.gov).

Sincerely,



Julie L. Corkran, Ph.D.  
Federal Facility Agreement Manager  
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Enclosure

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**United States Environmental Protection Agency (U.S. EPA) Region 4  
Conditions for Approval:**

C-400 Vapor Intrusion Study Work Plan to Support the Additional Actions for the (2013)  
Comprehensive Environmental Response, Compensation, and Liability Act Five Year Review at  
the Paducah Gaseous Diffusion Plan, Paducah, Kentucky (DOE/LX/07-2403&D2),  
dated October 20, 2016

**McCracken County, KY  
U.S. EPA ID KY8890008982**

EPA Conditions for Approval: Sampling Locations and Approach

**Condition 1.** Revise the Vapor Intrusion (VI) Study Work Plan for the C-400 Building to propose collection of *concurrent* air samples from: (i) the sub-slab of C-400 Building, (ii) the indoor air of the C-400 Building, and (iii) the ambient air outside of the C-400 Building, consistent with **Conditions 2, 3 and 4**, below.

**Condition 2.** Revise the VI Study Work Plan for the C-400 Building to reflect the following sample locations that EPA has determined will evaluate specific aspects of the conceptual site model.

- a. A sub-slab and indoor air sample located in the southeast corner of the C-400 building. As illustrated in Figure 2 of the Draft VI Work Plan (April 2016), the highest known VOC concentrations in the subsurface are located near the southeast corner. Sampling at this location will act as an evaluation of the worst case VI risk due to releases that are known to have occurred beyond (upgradient of) the immediate footprint of the 400-Building.
- b. Paired (i) ‘in the crack’ and (ii) indoor air samples collected from the known floor crack located on Figure 9 of the VI WP. This sample will assess the VOC concentrations of air that is moving through the main fracture identified by DOE in the C-400 Building slab.
- c. Paired (i) sub-slab and (ii) indoor air samples located in the basement area near former degreaser tanks. This pair of samples will assess the current VOC concentrations in the air and in the sub-slab at the location of one of the Building’s largest interior historical use locations of solvents.
- d. Paired (i) sub-slab and (ii) indoor air samples located adjacent to the location of one of the smaller stand-alone degreasers. Samples from this location would assess whether indoor releases from these smaller sources penetrated the floor and act as a source for VI, different from the external releases that occurred southeast (upgradient) of the Building.
- e. An indoor air sample adjacent to the air intake of the usually operating large exhaust fan located in the basement as seen on Figure 9 of the VI Work Plan.

- f. Paired sub-slab and indoor air samples located in the office space of currently the C-400 southeast corner office space. These smaller volume rooms often have higher modeled VI risk and may be currently occupied or occupied in the future.
- g. Paired sub-slab and indoor air samples located in the northeast portion of the building to act as a location with a limited likelihood of identifying VI risk. As a ‘best case’ sample location, if VI risk is identified that would inform the need to investigate other areas of the building that seem less obvious locations for VI risk based upon our current understanding of the building conceptual site model.
- h. Manometers should be installed adjacent to the sub-slab locations mentioned in the Conditions above, and near the operating exhaust fan. Pressure readings of the sub-slab conditions, along with paired pressure readings inside the Building, should be collected at each sampling location under the three operating conditions described in **Condition 3**, below, to assess the vapor intrusion inducing effect of the exhaust fan operation.
- i. The ambient air samples should be collected from all four sides of the building. Wind direction and speed data should be collected in the vicinity of the Building, but far enough removed from the Building and other buildings as to minimize wind shadow or turbulence effects. The variability of wind during an 8-hour period, and the variability of wind immediately near the building, are variables that cannot be controlled but that can be recorded.

**Condition 3.** Revise the VI Work Plan to reflect the following approach to collection of the samples described in **Condition 2**, above:

- a. The sampling should be for 8 hour periods.
- b. An initial round of sampling should take place under three conditions;
  - (i) exhaust fan on and doors open,
  - (ii) exhaust fan on but doors closed and
  - (iii) the exhaust fan off and the doors closed.

These scenarios will evaluate the building under normal operation conditions, conditions where the exhaust fan would be exerting an enhanced vapor intrusion effect, and conditions under natural forces, respectively.

- c. The VI Work Plan should specify that each scenario in (b) will be established for 24 hours prior to sampling to permit air/vapor conditions to equilibrate.

**Condition 4.** The sampling locations and approach described in **Conditions 1, 2, and 3**, above, will provide the basis of an initial vapor intrusion investigation. Revise the VI Work Plan to state that a second round of data collection is contingent upon the evaluation by DOE, EPA, and the Kentucky Department for Environmental Protection of the initial round of data collection.

EPA Conditions for Approval: Project-Specific Quality Assurance Project Plan

**Condition 5: Response to EPA General Comment 1**

The response is insufficient. While the C-400 VI Work Plan section titles [i.e., Section 7 (Sampling Locations and Rationale) and Section 8 (Sampling Analysis Methods)] were added to Quality Assurance Project Plan (QAPP) Worksheets #11 (Project Quality Objectives/Systematic Planning Process Statements), #14 (Summary of Project Tasks), #17 (Sampling Design and Rationale), #18 (Sampling Locations and Methods/Standard Operating Procedure Requirement Table), and #30 (Analytical Services Table), sections titles and specific subsection references were not added to QAPP Worksheet #10 (Problem Definition) for references to Sections 6 (Site-Specific Vapor Intrusion Conceptual Site Model) and 10 (Investigation Decision Rules).

Revise QAPP Worksheet #10 to include section title and specific subsection references to Sections 6 (Site-Specific Vapor Intrusion Conceptual Site Model) and 10 (Investigation Decision Rules) of the Draft Final C-400 VI WP.

**Condition 6: Response to EPA General Comment 2**

The response is insufficient. While Appendix B (Quality Assurance Project Plan) was revised to include Appendix B (Scoping Presentation), the seven step data quality objectives (DQOs) process does not describe the concurrent collection of indoor air, ambient air, and sub-slab vapor samples. As such, Appendix B cannot be evaluated as presented in the Draft Final C-400 VI WP.

Revise Appendix B to include the seven step DQO process for the concurrent collection of indoor air, ambient air, and sub-slab vapor samples.

**Condition 7: Response to EPA Appendix B Comments 4, 10, 12, 16 through 22, 24 and 25**

In all of the referenced RTCs above, DOE states that “the level of provided detail was consistent with that provided in the approved Water Policy QAPP and the programmatic QAPP.” The standard for sufficient detail in a project specific QAPP is the level required to meet EPA-505-B-04-900A, dated March 2005 (UFP-QAPP Manual), not the level found in a previously issued DOE QAPP nor the DOE-PGPD Programmatic QAPP (a DOE Contractor template) that is not an EPA-approved QAPP for cleanup work under the Paducah GDP Federal Facility Agreement.

- (i) Revise the QAPP to ensure that the requested information, consistent with the UFP-QAPP Manual, is incorporated into the next revision of the VI Work Plan.
- (ii) Revise the QAPP to remove text that advises the reader (whether verbatim or generally) that “the level of provided detail was consistent with that provided in the approved Water Policy QAPP and the programmatic QAPP.”

**Condition 8: Response to EPA Specific Comment 1**

The response is sufficient; however, placeholders should be included in QAPP Worksheet #3 (Distribution List) for the project roles (field team leader, laboratory, validator, subcontractors, etc.) to document that additional entities will be included on the distribution list.

Revise QAPP Worksheet #3 to include placeholders for project roles that will be included on the distribution list.

**Condition 9: Response to EPA Specific Comment 2**

The response is sufficient; however, placeholders should be included in QAPP Worksheet #4 (Project Personnel Sign-Off Sheet: Sample Collection, Data Analysis, Data Validation) for the sign-off of key project personnel (project manager, personnel responsible for quality assurance and quality control, field team leader, and analytical laboratory, etc.).

Revise QAPP Worksheet #4 to include placeholders for the sign-off of key project personnel.

**Condition 10: Response to EPA Specific Comment 3**

The response is sufficient; however, placeholders should be included in QAPP Worksheet #5 (Project Level Organizational Chart) for the project roles (Program Manager, Environmental Monitoring Project Manager, etc.).

Revise QAPP Worksheet #5 to include placeholders for project roles on the organizational chart.

**Condition 11: Response to EPA Specific Comment 5**

The response is sufficient; however, placeholders should be included in QAPP Worksheet #7 (Personnel Responsibilities and Qualifications Table) for the project roles (field team leader, personnel responsible for quality assurance and quality control, etc.).

Revise QAPP Worksheet #7 to include placeholders for project roles on the personnel responsibility and qualifications chart.

**Condition 12: Response to EPA Specific Comment 7**

The response is insufficient. While Section 7 (Sampling Locations and Rationale) was updated to indicate that differential pressure measurements will be collected on days when sampling occurs, Section 7 and QAPP Worksheet #11 (Project Quality Objectives/Systematic Planning Process Statements) do not discuss the use of meteorological data from the nearest airport to supplement the on-site determination of wind direction, as described in the response.

Revise Section 7 and QAPP Worksheet #11 to discuss the use of meteorological data from the nearest airport to supplement the on-site determination of wind direction.

**Condition 13: Response to EPA Specific Comment 8**

The response is insufficient. The response indicates that no specific measurement performance criteria (MPC) will be established in advance to evaluate the sampling and analysis precision, accuracy and bias; however, specific MPC are critical to ensure that the sample and the field replicate meet the DQOs.

Revise QAPP Worksheet #12 (Measurement Performance Criteria) to include specific MPC to evaluate the sampling and analysis precision, accuracy and bias.

**Condition 14: Response to EPA Specific Comment 9**

The response is insufficient. QAPP Worksheet #15 (Project Action Limits and Laboratory-Specific Detection/Quantitation Limits) does not discuss how analytes without project action limits (PALs) will be evaluated.

While the response indicates that results will be reported and discussed, revise QAPP Worksheet #15 to clarify how analytes without PALs will be evaluated.

**Condition 15: Response to EPA Specific Comment 11**

While QAPP Worksheet #17 (Sampling Design and Rationale) and Section 7 (Sampling Design and Rationale) were revised, the VI WP does not include the concurrent collection of indoor air, ambient air, and sub-slab vapor samples.

Revise Worksheet #17 to reflect the concurrent collection of indoor air, ambient air, and sub-slab vapor samples and the rationale used to determine the number and location for all proposed samples as described in **Conditions 1 through 4** of this Conditional Concurrence letter.

**Condition 16: Response to EPA Specific Comment 12**

While QAPP Worksheet #18 (Sampling Locations and Methods/SOP [Standard Operating Procedure] Requirements) was revised to reference Sections 7 (Sampling and Rationale) and 8 (Sampling and Analysis Methods), the revised VI WP does not include the concurrent collection of indoor air, ambient air, and sub-slab vapor samples. As such, Sections 7 and 8 cannot be evaluated as presented in the Draft Final C-400 VI WP.

Revise Worksheet #18 to reflect the concurrent collection of indoor air, ambient air, and sub-slab vapor samples; the rationale used to determine the number and location for all proposed samples; and the sampling and analysis methods to be implemented, as described in **Conditions 1 through 4** of this Conditional Concurrence letter.

**Condition 17: Response to EPA Specific Comment 13**

The response is sufficient; however, it should be noted that EPA Method TO-15 has a suggested holding time of 30 days.

Revise the Worksheet to note that EPA Method TO-15 has a suggested holding time of 30 days.

**Condition 18: Response to EPA Specific Comment 16**

The response is insufficient. Specifically, QAPP Worksheet #23 (Analytical SOP Reference Table) lists the analytical method number (EPA Method TO-15) but not the laboratory specific standard operating procedure (SOP). While it is understood that a U.S. Department of Energy Consolidated Audit Program (DOECAP)-certified laboratory will be selected, Section 3.2.1 (Analytical SOPs) of the Uniform Federal Policy Quality Assurance Project Plan, EPA-505-B-04-900A, dated March 2005 (UFP-QAPP Manual) requires analytical SOPs be included to document how a particular laboratory will perform a specific analytical method.

Revise QAPP Worksheet #23 to include a placeholder for the analytical method number the to-be-determined DOECAP-certified laboratory will utilize. In addition, revise the Worksheet to state that that laboratory SOPs will be provided as an Addendum to this QAPP once available.

**Condition 19: Response to EPA Specific Comment 17**

The response is insufficient. While it is understood that a DOECAP-certified laboratory will be selected, Section 3.2.2 (Analytical Instrument Calibration Procedures) of the UFP-QAPP Manual requires laboratory analytical instrument calibration procedures be included to ensure that analytical methods and the selected instrumentation meet the project requirements for selective, sensitive, accurate, and precise detection and quantitation of the analytes of interest.

Revise QAPP Worksheet #24 (Analytical Instrument Calibration Table) to include a placeholder for the analytical instrument calibration procedures that the to-be-determined DOECAP-certified laboratory will utilize. In addition, revise the Worksheet to state that laboratory SOPs will be provided as an Addendum to this QAPP once available.

**Condition 20: Response to EPA Specific Comment 18**

The response is insufficient. While it is understood that a DOECAP-certified laboratory will be selected, Section 3.2.3 (Analytical Instrument and Equipment Maintenance, Testing, and Inspection Procedures) of the UFP-QAPP Manual requires the description of the procedures and documentation activities that will be performed to ensure that all analytical instrumentation and equipment are available and in working order when needed.

Revise QAPP Worksheet #25 (Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table) to include a placeholder for the analytical instruments and equipment

maintenance, testing, and inspection procedures that the to-be-determined DOECAP-certified laboratory will utilize. In addition, revise the Worksheet to state that laboratory SOPs will be provided as an Addendum to this QAPP once available.

**Condition 21: Response to EPA Specific Comment 21**

The response is insufficient. While SOPs CP2-ES-5105/R0 (Volatile and Semivolatile Analyses Data Verification and Validation) and CP2-ES-5107/R0 (Inorganic Analyses Data Verification and Validation) were provided, QAPP Worksheet #35 (Assessment, Verification, and Validation (Steps IIA and IIB) Process Table) was not revised to include a list of data flags and qualifiers that will be assigned.

Revise QAPP Worksheet #35 to include a list of data flags and qualifiers that will be assigned.

**Condition 22: Response to EPA Specific Comment 22**

The response is insufficient. QAPP Worksheet #36 [Validation (Steps IIA and IIB) Summary Table] was not revised to include references to SOPs CP2-ES-5105/R0 (Volatile and Semivolatile Analyses Data Verification and Validation) and CP2-ES-5107/R0 (Inorganic Analyses Data Verification and Validation).

Revise QAPP Worksheet #36 to reference the SOPs noted above along with the National Functional Guidelines and QAPP Worksheets #12 (Measurement Performance Criteria), #15 (Project Action Limits and Laboratory-Specific Detection/Quantitation Limits), and #28 (QC Samples Table).

**Condition 23: Response to EPA Specific Comment 24**

The response is insufficient. While SOPs were provided, QAPP Worksheet #37 (Usability Assessment) does not indicate what will be included in the data assessment packages. At a minimum, QAPP Worksheet #37 should indicate how DQOs were determined to be met, as well as how precision, accuracy, representativeness, comparability, completeness, sensitivity, trends, biases, and uncertainties will be evaluated, along with sufficient information to support the data usability conclusions.

Revise QAPP Worksheet #37 to include this level of detail.

