



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
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: Addendum to the Soils Operable Unit Remedial Investigation 2 Report for Solid Waste Management Unit 229 at the Paducah Gaseous Diffusion Plant (DOE/LX/07-2306&D2/A1/R1), Primary Document, transmittal dated August 12, 2016 (PPPO-02-3613659-16A)

References

1. EPA Comments (June 15, 2016): Subject: Addendum to the Soils Operable Unit Remedial Investigation 2 Report for SWMU 229.
2. EPA Electronic Correspondence (September 15, 2016). Subject: SWMU 229 Comment Resolution Meeting - D2 Redline changes addressing VI not consistent throughout document
3. Tri-Party Comment Resolution calls: July 18 and October 4, 2016.
4. 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) *Addendum to the Soils Operable Unit Remedial Investigation 2 Report for Solid Waste Management Unit 229 at the Paducah Gaseous Diffusion Plant* (DOE/LX/07-2306&D2/A1/R1) and DOE's responses to EPA's comment regarding evaluation of the vapor intrusion pathway for this Solid Waste Management Unit (SWMU). EPA conditions for document approval were generated during this review and are provided as an enclosure to this letter in support of DOE document revision and resubmission. The draft (D1) Feasibility Study for SWMU 229 is currently scheduled in the Site Management Plan for submission to EPA and the Kentucky Department for Environmental Protection (KDEP) in the third quarter (April – June) of 2025.

EPA issued a single comment on the draft version of the Remedial Investigation (RI) report requesting clarification of DOE's approach to evaluation of the vapor migration pathway for SWMU 229 (*Reference 1*), stating:

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D.3.4 Identification of Exposure Pathways (Pages D-30 through D-34). Inhalation of vapors emitted by surface soil was considered for multiple receptors in the Solid Waste Management Unit (SWMU) 229 Baseline Human Health Risk Assessment (BHHRA). However, it appears that the potential for vapor migration from contaminated groundwater, including groundwater in the Upper Continental Recharge System (UCRS), was not evaluated for any of the potential receptor populations. (See Sections D.3.4: D.3.5; and D.7.2). Section D.3.4.2 of the report - *Delineation of Exposure Point/Exposure Routes - Vapor Intrusion* - states:

Transport of vapors in subsurface soils and shallow groundwater into buildings is considered a potential future exposure pathway. The POE—location where this is complete—is focused at the source areas where volatile compounds were release. These are the primary locations where VOCs may be in the soils or upper groundwater layer where a building may be constructed in the future. Although future residential use is not considered likely, this exposure route was considered in this BHHRA for rural residential scenario. No additional contribution via inhalation of vapors that may be transported into basements is expected.

However, the lines of evidence used by the Department of Energy to evaluate (or decide not evaluate) inhalation of vapors related to a potential “upper groundwater layer” release to indoor air vapor intrusion exposure pathway are not clearly presented in the report. Additional detail is needed in the report (Section D.3.4 – Identification of Exposure Pathways; elsewhere as appropriate following tri-party discussion of this comment) to clarify this issue for the reader.

EPA reviewed the revised report (DOE/LX/07-2306&D2/A1/R1) and provided informal written feedback for tri-party discussion (*Reference 2*). EPA’s feedback illustrated that DOE’s revisions to the document did not address apparent internal inconsistencies in whether and how exposures to vapors from contaminated groundwater were assessed (whether for “inhalation of vapors related to a potential upper groundwater layer where a building may be constructed in the future”, or inhalation of vapors during showering, for example), and did not adequately clarify DOE’s approach to evaluating the vapor intrusion pathway (*Reference 2; enclosed*).

Based on tri-party discussions on October 4, 2016, it is EPA’s understanding that:

- At no point in the past has DOE conducted soil sampling to manage the uncertainty regarding whether TCE or other volatile organic compound (VOC) releases to soils from past SWMU operations occurred (DOE elected not to sample soils for VOCs based on a report of an inventory of materials stored at SWMU 229 at the time the unit was returned by USEC to DOE at some point in the past).
- SWMU 229 lies in the heart of the Northwest Plume (SWMU 201; TCE and Tc-99 primary contaminants), yet existing TCE contamination in the Upper Continental Recharge System (UCRS) and/or Regional Groundwater Aquifer (RGA) was not considered by DOE in this RI Report Addendum when evaluating the potential risks from vapors through any exposure pathway.

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- The Conceptual Site Model for SWMU 299 defines the (surface and subsurface) soils unit as extending from zero (0) to 4 feet below ground surface.
- Operating on the assumption that SWMU 229 soils between 0-4 feet below ground surface are not contaminated with TCE or other chlorinated solvents, for the purpose of risk assessment and (per DOE's response during the October 4 conference call) consistent with DOE- PGDP's Human Health Risk Methods Document, DOE advised that they "modeled" the TCE that would leach from soils to groundwater (zero/non-detect). The modeled concentration was assumed to be the concentration for direct contact and inhalation for future well water use and was also used to model vapors to the subsurface soil for vapor intrusion considerations.
- Using the "modeled" concentration of TCE in groundwater (zero/non-detect), DOE states in various locations throughout the 229 report that the following exposure pathways are evaluated in the Baseline Human Health Risk Assessment (BHHRA), including:
 - ingestion of groundwater as a drinking source;
 - inhalation of volatile organic compounds emitted by groundwater during household use;
 - dermal contact while showering; and
 - inhalation of vapors that migrate through soils and intrude into a home.
- Discussions with DOE did not clarify why an exposure pathway for future industrial worker inhalation of vapors that migrate through soils from groundwater was not considered in the report.
- The database used by DOE for the SWMU 229 risk assessment does not include known TCE data values for UCRS or shallow RGA groundwater in the vicinity of SWMU 229. For the purpose of illustration, actual reported concentrations of TCE in groundwater in wells near SWMU 229 in 2015 include (June 2016 data pull from PEGASIS), for example:

MW-66 (shallow RGA)	549 ug/L (2015)
MW-186 (UCRS)	19.9 ug/L (2015)
MW-187 (UCRS)	4020 ug/L (2015)

- As shown in the table, below, these actual concentrations of TCE in nearby wells exceed the Maximum Contaminant Level (MCL) of 5 ug/L and the EPA Vapor Intrusion Screening Level (VISL) of 1.2 ug/L (10E-6 residential, assuming groundwater temperature of 25 C).

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SWMU 229		> EPA VISL TCE (1.2 ug/L)?	>MCL TCE (5 ug/L)?	Potential exposure pathway concerns for inhalation or direct contact based on screen?
DOE "modeled" TCE				
UCRS	ND/zero	No	No	No
RGA	ND/zero	No	No	No
Actual TCE conditions (2015)				
UCRS	19.9 (MW186)	Yes	Yes	Yes
UCRS	4020 (MW187)	Yes	Yes	Yes
RGA	746 (MW 66)	Yes	Yes	Yes

The table above illustrates that different conclusions are drawn based on VISL and MCL screens of DOE "modeled" TCE concentrations in groundwater and actual TCE concentrations in groundwater in the groundwater underlying SWMU 229. It is reasonable to conclude that a BHHRA using data representing actual TCE contaminant conditions in the groundwater for SWMU 299 would yield different risk assessment results. The Region is concerned that the EPA Vapor Intrusion Technical Guide (June 2015) is being interpreted, through the DOE PGDP Human Health RMD, to suggest that a quantitative consideration of a vapor migration pathway evaluation is only triggered in PGDP risk assessments when the SWMU is considered to be an on-going source of VOCs through leaching from the soil interval of interest to groundwater, as demonstrated by DOE modeling activities, regardless of the actual groundwater contamination conditions. These aspects of DOE-PGDP's approach to assessing risks from future potential exposure to TCE contamination in groundwater through inhalation and direct contact are not transparent to the reader in the SWMU 229 report.

Also, the SWMU 229 report is not clear regarding the DOE-PGDP interim and final programmatic strategy and timetable for assessing inhalation of volatile organic compounds emitted by groundwater during household use; dermal contact while showering; and inhalation of vapor that migrate through soils for future residents and industrial works at SWMU 229. Further, EPA notes that new building construction is forecast at PGDP in the next ten years, but vapor migration into buildings has not in the past, nor is it currently being assessed, at the SWMU level in the DOE cleanup program (as illustrated for SWMU 229), nor has DOE proposed a programmatic strategy for evaluating the vapor intrusion pathway for worker protection in existing buildings or for proposed new building construction at the Superfund Site.

As discussed with DOE and KDEP during our call on October 4, 2016, EPA is interested in ensuring that (i) sufficient limited text revisions are included in appropriate sections of the SWMU 229 report to ensure that the RI and risk assessment process that was conducted by DOE, and the conclusions drawn, are transparent to the reader and in the Administrative Record, and (ii) that

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apparent internal inconsistencies in the text (which appear to be primarily a function of DOE's use of the DOE-PGDP Human Health RMD and template language that has not been adequately customized for SWMU 229) are eliminated or clarified, as appropriate, in support of EPA document approval.

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.

Sincerely,



Julie L. Corkran, Ph.D.
Federal Facility Agreement Manager
Superfund Division

Enclosures

- 1) EPA Conditions for SWMU 229 RI Report Addendum Approval
- 2) EPA Electronic Correspondence (September 15, 2016) to April Ladd (DOE). Subject: SWMU 229 Comment Resolution Meeting.

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

*Addendum to the Soils Operable Unit Remedial Investigation 2 Report for Solid Waste Management Unit
229 at the Paducah Gaseous Diffusion Plant (DOE/LX/07-2306&D2/A1/R1)
Dated August 2016*

**McCracken County, Kentucky
EPA ID KY8890008982**

Background

SWMU 229 lies in the heart of the Northwest (NW) Groundwater Plume (SWMU 201) at the PGDP. Technetium-99 and TCE are reported as the primary contaminants of concern in the NW Plume. Actual reported concentrations of TCE in groundwater in selected wells near SWMU 229 in 2015 are noted below (June 2016 data pull from PEGASIS).

MW-66 (shallow RGA)	549 ug/L (2015)
MW-186 (UCRS)	19.9 ug/L (2015)
MW-187 (UCRS)	4020 ug/L (2015)

This Addendum RI and Risk Assessment is unusual because it focuses exclusively on a defined volume of soil (0-4 feet below ground surface). Evaluation of other environmental media (such as groundwater) and related exposure pathways are limited to contaminants that may have originated from within that defined soil volume. Specifically, despite actual TCE contaminant concentrations in the UCRS and shallow RGA near SWMU 299 exceeding the constituent-specific Maximum Contaminant Level (MCL; 5 ug/L) for residential drinking water, and exceeding the Vapor Intrusion Screening Level (residential; 1.2 ug/L), the SWMU 229 Addendum RI and Risk Assessment report does not utilize these data to establish contaminants of potential concern and evaluate exposure pathways: a Baseline Human Health Risk Assessment for SWMU 229 using data representing actual TCE contaminant conditions in the groundwater would yield different risk assessment results than those presented in the current report. Thus, there is a logical disconnect for the reader between the reality of the potential risks posed by actual groundwater contaminant conditions underlying SWMU 229 and the risk evaluation that DOE presents in the SWMU 229 report.

The following EPA Conditions for document approval are provided to ensure that the scope of the document is clear to both current and future readers. This is particularly important as the next step in the CERCLA cleanup process for SWMU 299 is not scheduled until 2025.

EPA Conditions for Approval

(Note to user: all page numbers refer to the redline revision, DOE/LX/07-2306&D2/A1/R1, dated August 2016)

Condition 1: Executive Summary - Uncertainties/Assumptions (Pages ES-7 through ES-8, Pages 19-20 of 362). Revise the Executive Summary to include a subheading titled "Vapor Intrusion" with the following text (revised by DOE as noted below):

The inhalation of vapors exposure route is not assessed because the VOC emission by subsurface soils is an incomplete pathway (i.e., no source of VOC s is known to be present in the 0-4 ft below

ground surface soil interval). Inhalation of vapors migrating from the TCE-contaminated groundwater that currently underlies the SWMU could pose as a medium of concern under certain exposure scenarios (for example, the future industrial worker and future rural resident exposure scenarios); however, these risks were not quantified and are deferred to evaluation *___DOE to insert statement regarding DOE-PGDP programmatic path forward for assessing current and future vapor intrusion risks from contaminated groundwater at the PGDP___*.

Condition 2: Section 2.1. Soil Investigations (2-1, Page 31 of 362). A brief rationale (beyond “as directed by the work plan”) for limiting subsurface investigation to 4 feet below ground surface should be provided in this section for clarity.

Condition 3: Section 4. Evaluation Approach (4-1, Page 53 of 362). This section states: “As discussed in the SMP, prior to GDP shutdown, the Soils OU will focus on accessible plant surface soils (ground surface to 10 ft bgs and 16 ft bgs in the vicinity of pipelines) not associated with PGDP operations (DOE 2015b).” For clarity, a description of how this addendum, limited to 0-4’ bgs, helps to achieve this goal should be provided (i.e., reference other data described in Section 4.1, etc.).

Condition 4: Section 4.5.1 Human Health – Pathways Not Quantitatively Evaluated – Vapor Intrusion (4-14, Page 66 of 362). This section should be expanded to include exposure pathways not evaluated related to actual groundwater contamination arising from other sources. Revise the following text as follows (*revisions in italics*):

The inhalation of vapors exposure route is not assessed because the VOC emission by subsurface soils is an incomplete pathway (i.e., no source of VOC s is known to be present *in the 0-4 ft below ground surface soil interval*). *Inhalation of vapors migrating from the TCE-contaminated groundwater that underlies the SWMU could pose as a medium of concern under certain exposure scenarios (for example, future industrial worker and future rural resident exposure scenarios). However, these exposure pathways were outside the scope of this investigation and were not quantified in this risk assessment.*

Condition 5: Section 4.5.1 Human Health - Pathways Not Quantitatively Evaluated – Groundwater (4-14, Page 66 of 362). Section 4.5.1 should be expanded to include exposure pathways not evaluated related to actual groundwater contamination arising from other sources. Add a bullet with the following text:

Although from sources other than SWMU 299, the existing contamination in groundwater underlying SWMU 299 could pose a medium of concern under certain exposure scenarios (such as ingestion of groundwater); however, these risks were not quantified in this risk assessment.

Condition 6: Section 6.1. Goal 1 (6-2, Page 88 of 362). The text states, “The nature and extent of contamination at SWMU 229 is considered defined adequately.” This statement should be expanded to clarify that this includes only soil contaminants in or originating from soil at SWMU 229.

Condition 7: Section 6.3.3. Last bullet (6-4, Page 90 of 362). The text states, “Most of the assumptions about exposure and toxicity used in the BHHRA are representative of the maximums for each parameter.” This statement is not accurate. Risk assessment parameters include a mix of central tendency and upper-bound estimates (not maximums). Please amend this statement accordingly.

Condition 8: Appendix D: Baseline Human Health Risk Assessment (D-13, Page 199 of 362). The text states: “This risk assessment also includes modeled concentrations of contaminants in the Regional Gravel Aquifer (RGA) to support the refinement of an assessment of potential risks to human health and the environment through groundwater for contaminant concentrations exceeding the respective soil screening levels (SSLs) for the RGA (see Appendix C).” For clarity the text should be revised to (i) indicate that the groundwater investigation was limited to contaminants that might arise from the soil at SWMU 229, and (ii) that the risk assessment does not consider *actual* TCE and Tc-99 contaminant conditions in the groundwater underlying the SWMU.

Condition 9: D.3.4 Identification of Exposure Pathways – D.3.4.1 Potential Receptor Populations, Future Industrial Workers (D-31, Page 217 of 362). For clarity, revise the text under the *Future Industrial Worker* subtitle as follows:

Because no volatile organic compound (VOC) source in soils is known to be present (the 0-4 ft bgs soil interval was not sampled for VOCs), VOC emission from subsurface soils was assumed to be an incomplete exposure pathway, and inhalation of vapors was not assessed. Inhalation of vapors migrating from the contaminated groundwater that underlies SWMU 229 could, however, pose as a medium of concern under the future industrial worker scenario (new building construction): these risks for the Future Industrial Worker receptor population were not considered in this risk assessment.

Condition 10: D.3.4 Identification of Exposure Pathways – D.3.4.1 Potential Receptor Populations, Hypothetical Rural Resident (D-34, Page 220 of 362).

- (a) Revise the following text under the *Future Hypothetical Rural Resident* subheading as follows for accuracy and transparency (*revisions in italics*):

Future residents are assumed to be exposed to the RGA groundwater for SWMU 229 where potential impacts to groundwater are identified from the *0-4 feet below ground surface soils: for SWMU 229, TCE was assumed to be non-detect in the 0-4 ft bgs soil interval.*

- (b) Revise the following text under the *Future Hypothetical Rural Resident* subheading as follows for accuracy and transparency (*revisions in italics*):

Because no volatile organic compound (VOC) source in soils is known to be present (*the 0-4 ft bgs soil interval was not sampled for VOCs*), VOC emission from subsurface soils is an incomplete exposure pathway, and inhalation of vapors was not assessed. *Inhalation of vapors migrating from the TCE-contaminated groundwater that underlies SWMU 229 could, however, pose as a medium of concern under the future rural resident scenario: this exposure pathway for the hypothetical rural resident was not evaluated in this risk assessment.*

Condition 11: D.3.4 Identification of Exposure Pathways – D.3.4.2 Delineation of Exposure Point/Exposure Routes, Groundwater (D-35, Page 221 of 362).

For clarity, the text should be revised to indicate that (i) evaluation of exposure to groundwater was limited to contaminants in soil (0-4 bgs) at SWMU 229 that might contribute to groundwater contamination and (ii) actual groundwater sampling data from contaminant plume underlying the SWMU was not considered in this evaluation.

Condition 12: Appendix D: D.3.4.2 Delineation of Exposure Point/Exposure Routes- Vapor Intrusion (D-35, Page 221 of 362). This section of the risk assessment includes language that has been carried forward from the D1 but was deleted elsewhere in the D2 (in response to EPA’s June 15, 2016, comment letter). For example, these sentences are not accurately represented to the reader:

- “Although future residential use is not considered likely, this exposure route was considered in this BHHRA for rural residential scenario.”
- “No additional contribution via inhalation of vapors that may be transported into basements is expected.”
- “Transport of vapors in subsurface soils and shallow groundwater into buildings is considered a potential future exposure pathway (EPA 2015a).” Revise the text to clarify that potential vapors from actual contaminants in groundwater from sources other than SWMU 229, such as TCE contamination underlying the SWMU, were not evaluated in this BHHRA.

Revise the text to clarify that (i) Vapor intrusion was not considered in this BHHRA for future residential use, (ii) inhalation of vapors transported into basements is expected based on comparison of actual groundwater contaminant concentrations in the vicinity of SWMU 27 to EPA Vapor Intrusion Screening Levels and (iii) the evaluation of vapor intrusion at this SWMU is limited to contaminants that might arise from SWMU 229 soil contamination.

Condition 13: D.3.6.1 Development of Conceptual Site Models (D-44, Page 230 of 362). Revise the text as follows:

The inhalation of vapors exposure route is not assessed because the VOC emission by subsurface soils is an incomplete pathway (i.e., no source of VOC s is known to be present *in the 0-4 ft below ground surface soil interval*). ~~There are no VOC data for SWMU 229 subsurface soils were not sampled for VOCs in subsurface soils~~ because they were determined not to be contaminants of interest (DOE 2010).

Condition 14: D.7.1 Chemicals of Potential Concern (D-74, Page 261 of 362). The text states “Through a series of screening steps, which follow the Risk Methods Document (DOE 2015a) and other regulatory agency approved procedures, the data sets were reduced to lists of COPCs for SWMU 229.” The DOE-PGDP Risk Methods Document is not an EPA-approved document and is not a Primary Document subject to EPA (or KDEP) approval under the CERCLA Federal Facility Agreement. Remove the phrase “and other regulatory agency approved procedures” or amend the text to read “and regulatory agency approved procedures for ____ (citation), ____ (citation)” etc.

Condition 15: D.7.2 Exposure Assessment (D-74-75, Page 261 of 362). The text in this section lists the following exposure scenarios for the Future Rural Resident:

Future Rural Resident

Incidental ingestion of surface soil

Dermal contact with surface soil

Inhalation of vapors emitted by surface soil

External exposure to ionizing radiation in surface soil

Ingestion of groundwater

Dermal contact with groundwater while showering

Inhalation of vapors emitted by groundwater during household use/showering and

Inhalation of vapors indoors from transport from subsurface VOCs

Revise this section to clarify that (i) *Ingestion of groundwater, Dermal contact with groundwater while showering, Inhalation of vapors emitted by groundwater during household use/showering, and Inhalation of vapor indoors from transport from subsurface VOCs* in this risk assessment did not consider the actual VOC contamination that underlies SWMU 229 and (ii) TCE was assumed to be non-detect in the 0-4 ft bgs soil interval and groundwater underlying the unit. A footnote to this effect will suffice.

Condition 16. D.7.5 Observations (D-77, Page 263 of 362).

- (a) The text states that “Consistent with regulatory guidance and agreements contained in the Risk Methods Document (DOE 2015a), this BHHRA presents ELCRs and HIs for land use scenarios representing current use, as well as for several hypothetical future uses.” Revise the sentence to remove the phrase “and agreements contained in”.
- (b) The bulleted text states that “Future hypothetical on-site rural resident – direct contact with surface soil (soil 0 to 1 ft bgs) and use of groundwater drawn from the RGA at source areas” was evaluated in the BHHRA. The phrase “drawn from the RGA at source areas” is vague in this context. It is EPA’s understanding that this phrase is an oblique reference to concentrations of RGA groundwater contaminants that were modeled by DOE for contaminants of potential concern in the subsurface (0-4 feet bgs) soil (the “source area”), not actual existing groundwater contaminant conditions underlying the SWMU. Revise this section to clarify that *actual* contaminant concentrations in groundwater underlying the SWMU were not considered in the BHHRA.
- (c) Footnote Table D-48 to state: “actual existing groundwater contaminant conditions underlying SWMU 229, including TCE and Tc-99, were not considered in these calculations.”

ENCLOSURE #2 to EPA Letter dated November 17, 2016 - Conditions for Approval, SWMU 229 D2 A1 R1

From: Corkran, Julie

Sent: Thursday, September 15, 2016 8:54 AM

To: 'Ladd, April' <April.Ladd@lex.doe.gov>; Brewer, Gaye (EEC) <Gaye.Brewer@ky.gov>; Begley, Brian (EEC) <Brian.Begley@ky.gov>

Cc: Bonczek, Richard <Rich.Bonczek@lex.doe.gov>; Greene, Dennis (PPPO/CONTR) <Dennis.Greene@lex.doe.gov>; Nourse, Bobette (PPPO/CONTR) <Bobette.Nourse@lex.doe.gov>; Layne, Kelly <Kelly.Layne@FFSPaducah.Com>; 'White, Jana' <Jana.White@FFSPaducah.Com>

Subject: RE: SWMU 229 Comment Resolution Meeting - D2 Redline changes addressing VI not consistent throughout document

Good morning to all:

It does not appear that the editing of the document for consistency with DOE intent was completed or I am misunderstanding the presentation of information.

With reference to the EPA comment on VI (D2/A1) and DOE's response to comment, I offer the notes below and request clarification on why edits were not made for consistency with the premise that:

Inhalation of vapors from SWMU 229 soils by all receptors is incomplete because the characterization of the surface soils (0-1 ft bgs) and subsurface soils (1-4 ft bgs) did not identify VOCs to be a contaminant of potential concern; therefore, inhalation of vapors was not assessed quantitatively or qualitatively for SWMU 229.

Is the italicized language above the message that DOE is trying to convey? If not, please provide corrections to the sentence above so that we all have the same baseline understanding of DOE's intent in support of completing this discussion.

I am also concerned that the EPA VI guidance is being interpreted, through the DOE PGDP RMD, to suggest that consideration of a vapor migration pathway evaluation is not indicated when VOCs are present in groundwater - only if there is on-going sourcing of VOCs to groundwater from the soil interval of interest (as indicated in this report for SWMU 229). I want to work through this with you, Ben Bentkowski and Tim Frederick. If the DOE reason for not evaluating this pathway is that the pathway was not scoped whenever the workplan was scoped, that does not mean that the pathway does not ever get evaluated for this SWMU (or other SWMUs) if the groundwater characterization data suggest we should take a look.

I am going to request an extension so that we can try to work through these observations rather than put them into a formal letter at this time.

Excerpts from the revised document: redlines have been retained in red, below. Apparently inconsistent language is highlighted in yellow. Questions are posed in the right-hand column

Excerpt	Notes/Questions
<p>4-14: The inhalation of vapors exposure route is not assessed because VOC emission by subsurface soils is an incomplete pathway (i.e., no source of VOCs is known to be present).</p>	<p>The inhalation of vapors exposure route is not assessed because VOC emission by subsurface soils is an incomplete pathway (i.e., no source of VOCs is known to be present in surface (0-1 ft bgs) and subsurface (1-4 ft bgs) soils).</p>
<p>D-34: and a child potentially exposed to site surface soils for SWMU 229, which is within the limited area. Although this land use is unlikely, this evaluation provides information on potential for adverse impacts if no land use restrictions were in place. Future residents are assumed to be exposed to RGA groundwater for SWMU 229 where potential impacts to groundwater are identified from the soils. Appendix C describes the groundwater modeling. Because no volatile organic compound (VOC) source in soil is known to be present, VOC emission is an incomplete exposure pathway, and inhalation of vapors was not assessed.</p>	<p>I do not understand the sentence highlighted in yellow. Is DOE stating that the EPA guidance only drives assessment of exposure to VOCs in groundwater (UCRS or RGA) if on-going sourcing of VOCs from soils is demonstrated? "...where potential impacts to groundwater are identified from the soils." But not when screening values for VOCs in groundwater are exceeded?</p> <p>I am unclear. Cross-walking with D.7.2, Future Rural Resident exposure assessment, where (section, pages numbers) in this document, did DOE quantitatively evaluate and present conclusions for:</p> <ul style="list-style-type: none"> Inhalation of vapors emitted by surface soil External exposure to ionizing radiation in surface soil Ingestion of groundwater Dermal contact with groundwater while showering Inhalation of vapors emitted by groundwater during household use/showering and Inhalation of vapors indoors from transport from subsurface VOCs <p>This may be in the BHHRA portion of the document, but I am not able to find it.</p> <p>Also, please evaluate this revision for accuracy: Because no volatile organic compound (VOC) source in the 0-4 ft bgs soil interval is known to be present, VOC emission is an incomplete exposure pathway, and inhalation of vapors was not assessed.</p>
<p>D-35: Vapor Intrusion. Transport of vapors in subsurface soils and shallow groundwater into buildings is considered a potential future exposure pathway (EPA 2015a). The POE—location where this is complete—is focused at the source areas where volatile compounds were release. These are the primary locations where VOCs may be in the soils or upper groundwater layer where a building may be constructed in the future. Although future residential use is not considered likely, this exposure route was considered in this BHHRA for rural residential scenario. No additional contribution via inhalation of vapors that may be transported into basements is expected.</p>	<p>So, VOCs in groundwater at SWMU 27 (data pull by Gaye and discussed in July) and this language in D.35 suggests that the report should have evaluated vapor intrusion for SWMU 229.</p> <p>"this exposure route was considered in the BHHRA for rural residential scenario.." Is this the case? See my question above for D-34.</p>

<p>Where are the lines of evidence presented for “no additional contribution via inhalation of vapors that may be transported into basements is expected” (which is, presumably, a re-statement of “inhalation of vapors indoors from transport from subsurface VOCs in D-34).</p> <p>What are the companion conclusions with supporting lines of evidence for the stated assessment of “inhalation of vapor emitted by surface soil” and “inhalation of vapors emitted by groundwater during household use/showering” (see D-34).</p> <p>The highlighted sentence is not a logical statement – evaluate for logical dependency.</p>	
<p>D-44: SWMU 229 with the stepout gridding includes 0.849 acres and 2 EUs. The conditions at SWMU 229 generally are consistent with the generalized CSM. The inhalation of vapors exposure route is not assessed because VOC emission by subsurface soils is an incomplete pathway (i.e., no source of VOCs is known to be present). There are no VOC data for SWMU 229 in subsurface soils because they were determined not to be contaminants of interest (DOE 2010).</p>	<p>Included here as the set-up for D.7.2</p> <p>Also, the Risk Methods Document (DOE 2015) is not an “other” regulatory agency approved procedure document. Revise the sentence for accuracy: remove the phrase “other regulatory agency approved procedures” or amend to read “and regulator approved procedures for ____ (citation), ____ (citation), etc.”</p> <p>Preceding notes address future rural resident.</p> <p>If the set-up in D.7.1 (pg 4-14 and D-44) is that the COPC eval determined the COPCs list, and VOCs were not on the list, why are “inhalation of vapors emitted by surface soil” and “subsurface soil” listed in D.7.2 as components of the exposure assessment for SWMU 229 for the various receptor populations?</p>
<p>D.7.1 CHEMICALS OF POTENTIAL CONCERN COPCs were selected from soil data collected in the Soils OU RI and Soils OU RI 2 from the OREIS database. This data set was screened to produce final COPCs lists aggregated by location. Through a series of screening steps, which follow the Risk Methods Document (DOE 2015a) and other regulatory agency approved procedures, the data sets were reduced to lists of COPCs for SWMU 229.</p>	<p>D.7.2 EXPOSURE ASSESSMENT Historical information and newly collected data were used to develop a CSM. After consideration of the available data and scope of the SI, the potential receptor population under current conditions at the source units is industrial workers, and the potential receptor populations under future conditions are industrial workers, excavation workers, and residents.</p> <p>Industrial Worker Incidental ingestion of surface soil Dermal contact with surface soil Inhalation of vapors emitted by surface soil External exposure to ionizing radiation in surface soil</p> <p>Outdoor Worker Exposed to Surface Soil Incidental ingestion of surface soil Dermal contact with surface soil Inhalation of vapors emitted by surface soil External exposure to ionizing radiation in surface soil</p> <p>Outdoor Worker and Excavation Worker Exposed to Surface and Subsurface Soil Incidental ingestion of surface and subsurface soil Dermal contact with surface and subsurface soil</p>

Inhalation of vapors emitted by surface and subsurface soil
External exposure to ionizing radiation in surface and subsurface soil

Future Rural Resident

Incidental ingestion of surface soil
Dermal contact with surface soil
Inhalation of vapors emitted by surface soil
External exposure to ionizing radiation in surface soil
Ingestion of groundwater
Dermal contact with groundwater while showering
Inhalation of vapors emitted by groundwater during household use/showering and
Inhalation of vapors indoors from transport from subsurface VOCs

Recreational User

Incidental ingestion of surface soil
Dermal contact with surface soil
Inhalation of vapors emitted by surface soil
External exposure to ionizing radiation in surface soil

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From: Ladd, April [<mailto:April.Ladd@lex.doe.gov>]

Sent: Thursday, July 14, 2016 5:18 PM

To: Corkran, Julie <Corkran.Julie@epa.gov>; Brewer, Gaye (EEC) <Gaye.Brewer@ky.gov>; Begley, Brian (EEC) <Brian.Begley@ky.gov>

Cc: Bonczek, Richard <Rich.Bonczek@lex.doe.gov>; Greene, Dennis (PPPO/CONTR) <Dennis.Greene@lex.doe.gov>; Nourse, Bobette (PPPO/CONTR) <Bobette.Nourse@lex.doe.gov>; Layne, Kelly <Kelly.Layne@FFSPaducah.Com>

Subject: RE: SWMU 229 Comment Resolution Meeting

I have researched the text that we used in the RI2 report in this same section (section D) for similar areas (DMSAs) and propose to edit the text in the SWMU 229 report as stated below. Please let me know if this addresses the comment.

“The conditions at SWMU 229 generally are consistent with the generalized CSM. Inhalation of vapors from subsurface soils into buildings is not complete. There are no VOC data for SWMU 229 in subsurface soils because they were determined not to be contaminants of interest (DOE 2010).”

Thanks,

April Ladd

US Department of Energy
PPPO Paducah Site Office

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I am not authorized to change the scope, price, time required for contract performance, terms or conditions of the contract. If you believe that a change has been directed as a result of this letter (or email), then in accordance with contract clause DEAR 952.242-70 "Technical Direction," you are directed to contact the Contracting Officer, in writing, within five (5) working days after receipt of this letter (or email) and prior to taking any action as a result of this letter.

From: Corkran, Julie [<mailto:Corkran.Julie@epa.gov>]

Sent: Wednesday, July 13, 2016 3:43 PM

To: Ladd, April <April.Ladd@lex.doe.gov>; Brewer, Gaye (EEC) <Gaye.Brewer@ky.gov>; Begley, Brian (EEC) <Brian.Begley@ky.gov>

Cc: Bonczek, Richard <Rich.Bonczek@lex.doe.gov>; Greene, Dennis (PPPO/CONTR) <Dennis.Greene@lex.doe.gov>; Nourse, Bobette (PPPO/CONTR) <Bobette.Nourse@lex.doe.gov>; Layne, Kelly <Kelly.Layne@FFSPaducah.Com>

Subject: RE: SWMU 229 Comment Resolution Meeting

Thank you, April.

I have looked at the DOE response to the EPA comment and the proposed revision in the Redline version of the document. I do not consider the response or the redline revision to be responsive to my comment regarding evaluation of vapor intrusion for SWMU 229.

- The new language appears contradictory to the original language.
- The new language is (like the old language) an assertion/conclusion without presentation of the supporting lines of evidence.

Perhaps there is enough time before the call on Monday for the DOE team to take another look at the comment and proposed response.

Thanks,

Julie

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From: Ladd, April [<mailto:April.Ladd@lex.doe.gov>]
Sent: Tuesday, July 12, 2016 2:37 PM
To: Corkran, Julie <Corkran.Julie@epa.gov>; Brewer, Gaye (EEC) <Gaye.Brewer@ky.gov>; Begley, Brian (EEC) <Brian.Begley@ky.gov>
Cc: Bonczek, Richard <Rich.Bonczek@lex.doe.gov>; Greene, Dennis (PPPO/CONTR) <Dennis.Greene@lex.doe.gov>; Nourse, Bobette (PPPO/CONTR) <Bobette.Nourse@lex.doe.gov>; Layne, Kelly <Kelly.Layne@FFSPaducah.Com>
Subject: RE: SWMU 229 Comment Resolution Meeting

The SWMU 229 comment resolution meeting has been scheduled for Monday July 18th from 2:00-3:00 CST. Check your inbox for a meeting notice from me. Please forward it on to other team members needed for discussion. Attached are the draft materials for the meeting. Let me know if you have any questions regarding the responses.

Thanks,

April Ladd

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From: Corkran, Julie [<mailto:Corkran.Julie@epa.gov>]
Sent: Tuesday, July 12, 2016 9:14 AM
To: Brewer, Gaye (EEC) <Gaye.Brewer@ky.gov>; Layne, Kelly <Kelly.Layne@FFSPaducah.Com>; Begley, Brian (EEC) <Brian.Begley@ky.gov>
Cc: Ladd, April <April.Ladd@lex.doe.gov>; Bonczek, Richard <Rich.Bonczek@lex.doe.gov>; Jones, Craig <Craig.Jones@FFSPaducah.com>; White, Jana <Jana.White@FFSPaducah.Com>; Campbell, Lee <Lee.Campbell@FFSPaducah.com>; Garner, LeAnne <LeAnne.Garner@FFSPaducah.com>; Redfield, Myrna <Myrna.Redfield@FFSPaducah.Com>
Subject: RE: SWMU 229 Comment Resolution Meeting

Assuming that DOE will provide draft responses to EPA and KY comments today (ca. one week in advance) in support of a discussion on Monday 7/18, I can arrange to move my CDO.

If the DOE draft responses were sent while I was out of the office last week, and I have missed them, please advise.

Thanks,

Julie

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From: Corkran, Julie

Sent: Monday, July 11, 2016 10:03 AM

To: 'Brewer, Gaye (EEC)' <Gaye.Brewer@ky.gov>; Layne, Kelly <Kelly.Layne@FFSPaducah.Com>; Begley, Brian (EEC) <Brian.Begley@ky.gov>

Cc: April Ladd <April.Ladd@lex.doe.gov>; Rich Bonczek <rich.bonczek@lex.doe.gov>; Jones, Craig <Craig.Jones@FFSPaducah.com>; White, Jana <Jana.White@FFSPaducah.Com>; Campbell, Lee <Lee.Campbell@FFSPaducah.com>; Garner, LeAnne <LeAnne.Garner@FFSPaducah.com>; Redfield, Myrna <Myrna.Redfield@FFSPaducah.Com>

Subject: RE: SWMU 229 Comment Resolution Meeting

The 18th is my CDO – I will check into whether I can change the date and let you know tomorrow (Tuesday, 7/12).

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From: Brewer, Gaye (EEC) [<mailto:Gaye.Brewer@ky.gov>]

Sent: Friday, July 08, 2016 10:01 AM

To: Layne, Kelly <Kelly.Layne@FFSPaducah.Com>; Corkran, Julie <Corkran.Julie@epa.gov>; Begley, Brian (EEC) <Brian.Begley@ky.gov>

Cc: April Ladd <April.Ladd@lex.doe.gov>; Rich Bonczek <rich.bonczek@lex.doe.gov>; Jones, Craig <Craig.Jones@FFSPaducah.com>; White, Jana <Jana.White@FFSPaducah.Com>; Campbell, Lee <Lee.Campbell@FFSPaducah.com>; Garner, LeAnne <LeAnne.Garner@FFSPaducah.com>; Redfield, Myrna <Myrna.Redfield@FFSPaducah.Com>

Subject: RE: SWMU 229 Comment Resolution Meeting

I'll put it on my calendar.

Gaye Brewer

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From: Layne, Kelly [<mailto:Kelly.Layne@FFSPaducah.Com>]

Sent: Wednesday, July 06, 2016 12:59 PM

To: Corkran, Julie; Begley, Brian (EEC); Brewer, Gaye (EEC)

Cc: April Ladd; Rich Bonczek; Jones, Craig; White, Jana; Campbell, Lee; Garner, LeAnne; Redfield, Myrna

Subject: SWMU 229 Comment Resolution Meeting

DOE would like to schedule a meeting to resolve EPA and KDWM's comments that were received on the SWMU 229 report. Will you please evaluate your schedules and let us know if you can accommodate a July 18th meeting date? Thank you!