



ENERGY AND ENVIRONMENT CABINET

Steven L. Beshear
Governor

Department for Environmental Protection
Division of Waste Management
200 Fair Oaks, 2nd Floor
Frankfort, Kentucky 40601-1190
www.kentucky.gov

Leonard K. Peters
Secretary

November 27, 2013

Ms. Rachel Blumenfeld
US Department of Energy
Portsmouth/Paducah Project Site Office
PO Box 1410
Paducah, Kentucky 42002

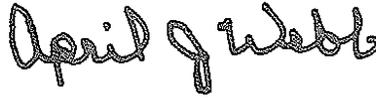
RE: Submittal of Comments to the Treatability Study Work Plan for Steam Injection, Groundwater Operable Unit (DOE/LX/07-1294&D1)
Paducah Gaseous Diffusion Plant
Paducah, McCracken County, Kentucky
KY8-890-008-982

Ms. Blumenfeld:

The Kentucky Division of Waste Management (Division) received the *Treatability Study Work Plan for Steam Injection, Groundwater Operable Unit*, dated October 18, 2013 on October 21, 2013. The Division has completed its review of the subject document and is hereby submitting comments as an attachment. Please address these comments in a D2 version of the document.

If you have any questions or require additional information, please contact Brian Begley at (502) 564-6716, or e-mail at brian.begley@ky.gov.

Sincerely,



April J. Webb, P.E., Manager
Hazardous Waste Branch

AJW:tm:bb:lww

ec: Jennifer Tufts, US EPA - Region 4, Tufts.Jennifer@epa.gov
Jon Richards, US EPA – Region 4; Richards.jon@epa.gov
William E. Murphie, DOE – Paducah, William.murphie@lex.doe.gov
David Dollins, DOE – Paducah, dave.dollins@lex.doe.gov
Rich Bonczek, DOE – Lexington, rich.bonczek@lex.doe.gov
William Creech, DOE - Lexington; William.creech@lex.doe.gov
Jennifer Woodard, DOE – Paducah, Jennifer.Woodard@lex.doe.gov
Kim Crenshaw, DOE – Paducah, kim.crenshaw@lex.doe.gov
Mark J. Duff, LATAKY – Kevil; mark.duff@lataky.com
Myrna Redfield, LATAKY – Kevil, Myrna.Redfield@lataky.com
John Wesley Morgan, LATAKY – Kevil; John.Morgan@lataky.com
Jana White, LATAKY – Kevil; jana.white@lataky.com
Craig Jones, LATAKY – Kevil, craig.jones@lataky.com
Michael Clark, LATAKY – Kevil, michael.clark@lataky.com
Jeff Carman, LATAKY – Kevil, Jeff.carman@lataky.com
Darla Bowen, LATAKY – Kevil; darla.bowen@lataky.com
Jessica Lemus, LATAKY – Kevil; Jessica.lemus@lataky.com
Tracey Duncan, P2S – Paducah; tracey.duncan@lex.doe.gov
Rebecca Wren, P2S – Paducah, Rebecca.Wren@lex.doe.gov
Christa Dailey, P2S – Paducah, christa.dailey@lex.doe.gov
Bethany Jones, P2S – Paducah; Bethany.jones@lex.doe.gov
Jim Ethridge, CAB – Paducah; jim@pgdpcab.org
Matt McKinley, CHFS – Frankfort, matthewW.mckinley@ky.gov
Stephanie Brock, CHFS – Frankfort, StephanieC.Brock@ky.gov
Nathan Garner, CHFS – Frankfort; Nathan.garner@ky.gov
Sandra Cooke, KDAQ – Frankfort, sandra.cooke@ky.gov
Dustin Davis, KDAQ – Paducah, dustin.davis@ky.gov
Charles Stangle, KDAQ – Paducah, Charles.stangle@ky.gov
Todd Mullins, KDWM – Frankfort, Todd.Mullins@ky.gov
Brian Begley, KDWM – Frankfort; brian.begley@ky.gov
Gaye Brewer, KDWM – Paducah, gaye.brewer@ky.gov
Jeff Gibson, KDWM – Frankfort, Jeffrey.Gibson@ky.gov

DWM File: #750-V, Graybar AIM20130006 (Steam Injection Treatability Study WP)

**Kentucky Division of Waste Management comments pertaining to the
Treatability Study Work Plan for Steam Injection, Groundwater Operable Unit
Paducah Gaseous Diffusion Plant, Paducah, Kentucky**

DOE/LX/07-1294&D1

November 27, 2013

General Comments

1. On maps depicting analyte concentrations, please consider indicating where in the subsurface the sample was collected (e.g., whether the screened interval is located in the UCRS, RGA (upper, middle, lower)). Other groundwater plume maps reviewed by the Division in the past have included a color-coded pie chart to symbolize the depth location. Another suggestion would be to designate a location in the aquifer with a corresponding letter after the MW#uR = upper RGA; MW#mR = middle RGA, etc.

Specific Comments

1. **Section 1.2, Figure 1, Page 3:** The data being depicted in this figure is somewhat confusing and requires some additional discussion or explanation. Data being presented varies in date from May 2011 to December 2012 and it is not clear how data was chosen for inclusion. If multiple samples were collected in 2012, was the highest sample value or the most recent sample analyzed used? For the samples from 2011, it is assumed that no samples were collected in 2012; were any of these monitoring wells sampled for TCE in 2012 or 2013? Some discussion of the data associated with concentrations depicted in the southeast corner of C-400 is warranted. From data records obtained from PEGASIS it appears that MW-175, MW-156, MW-406pt5, MW-407pt4 were sampled quarterly in 2012. The concentrations in all four wells were significantly elevated in the first three quarters of 2012 and then drop off dramatically in the fourth quarter. This phenomenon is not mentioned or described in the text. Such a discussion is warranted given the close proximity to the proposed treatability location to this area. Please add a section to the document that addresses the data within the southeast area of C-400 and provides an interpretation of why concentrations decreased in the fourth quarter of 2012.

Figure 1 appears to be cropped and certain labels and callouts are not contained within the field of view being depicted. Please correct the labels so they are all legible and appropriate.

The most recent sample result for MW-206 found in PEGASIS was 3.6ug/L from a 9-2-2009 sample. Please make sure the sample collected from 5-10-2012 was not inadvertently omitted from PEGASIS.

2. **Section 1.3, Figure 2, Page 6:** Due to lessons learned from other PGDP related projects, please identify that the proposed locations for the injection well and temperature monitoring wells have all been verified as viable locations?
3. **Section 1.3, Figure 2, Page 6:** How stable is the direction of groundwater flow in the area being proposed for the treatability study? Given that the proposed orientation and placement of the temperature monitoring wells is along the axis of the depicted groundwater flow direction, how likely is the groundwater flow direction to shift from that axis? Will a shift in the groundwater flow direction skew the modeling results of the treatability study? Will the direction of groundwater flow be monitored or checked prior to well placement? Please provide the most recent groundwater flow map with the control wells used to make the determination. Has any shifting occurred since the USEC operations ceased? What dataset was used to determine the direction of groundwater flow in Figure 2? The data depicted in Figure 6 appears to contradict the groundwater flow interpretation presented in Figure 2, please explain.
4. **Section 1.5, Page 12, 1st paragraph, 3rd sentence:** “The hydraulic potential (water level) of the shallow McNairy Formation is slightly less than that of the RGA and dips northward, similar to the RGA.” Please check the accuracy of this statement. A November 2013 presentation from KRCEE showed the hydraulic potential of the shallow McNairy to be slightly greater than that of the RGA. KRCEE used co-located McNairy and RGA wells with a dataset from October 2011 to support their conclusion. If the statement presented in the document is no longer valid or the hydraulic potential is now considered to be variable, please rephrase this statement.
5. **Section 1.5, Page 12, 5th paragraph, 2nd sentence:** “Principal controls on RGA hydraulic gradient are the amount and rate of leakage from PGDP utilities and the stage of the Ohio River, the primary discharge zone of the regional groundwater flow systems (RGA and McNairy).” If the amount of leakage from PGDP utilities is one of the principal controls on RGA hydraulic gradient, then what affect has the USEC shut-down had on the hydraulic gradient in the vicinity of this treatability study.
6. **Section 1.5, Table 1, Page 12:** The table provides a range of hydraulic conductivity tests. Please add the year that each of these tests was performed. Where possible, please provide the document in which these pumping tests were originally presented. It is also noteworthy to reference the MW# associated with each of these pumping tests. Also indicate which one of these pumping tests is considered to be representative of the treatability study area.

7. **Section 1.6, Figure 6, Page 13:** What is the significance of the July 12, 2012 dataset that is being used to generate the potentiometric surface map? Figure 2 presented data from December 28, 2012, yet Figure 6 used data collected from July 12, 2012. Is there a reason why older data is being used to represent the potentiometric surface? Is the potentiometric surface in the area of C-400 stable over time? If the potentiometric surface in this area varies over time, please add a discussion about the variation and whether or not a variable potentiometric surface in the area of the treatability study could impact how the treatability study is carried out and/or how the modeling results are interpreted. Please use the most recent water-level measurements to construct a potentiometric surface map and indicate how it compares to previous interpretations. Also specify whether the USEC plant shut-down is expected to have a noticeable impact on water levels within this general area.
8. **Section 1.6, Page 16, 4th Bullet:** This bullet refers to the HU 4 hydrogeologic unit being absent in areas near the southeast corner of C-400. Is this intent here to refer to HU 3 rather than HU 4? Modify the text if required.
9. **Section 1.6, Page 16, 4th Paragraph:** The text indicates that free-phase DNAPL has not been encountered in samples collected to date near C-400. This is incorrect. A water sample obtained from a multi-port well located immediately east of C-400 contained DNAPL. Please revise the text accordingly.
10. **Section 3.1, Page 17, Last Paragraph:** Given the importance of determining groundwater velocity and direction, more should be said here as to how temperature measurements will be used to obtain this information. Following implementation of C-400 Phase I, the Independent Technical Review Panel criticized DOE and its contractor for improperly using temperature measurements (decay) to gage groundwater velocity near C-400. Estimates obtained in this way were used in the McMillin McGee proprietary model and may have contributed to the model's inability to properly predict how ERH would perform in the deeper portions of the RGA. How will DOE and its treatability study contractor insure that these same mistakes are not repeated? Please provide a detailed explanation of how temperature will be used to determine velocity and flow direction of the RGA near C-400. Also, please speak to the assumed accuracy of such measurements.
11. **Section 1.6, Figure 8, Page 18:** It appears that some of the data may be missing from sample depths 60' and 65' below ground surface. Were these sample depths omitted from borings or were those intervals not sampled in several wells? What map depicts where these soil borings are located in relation to C-400? If no map exists, please add these locations to one of the existing maps and make reference to that map on this figure.

- 12. Section 3.1, Table 2, Page 19:** The ‘Alternative Actions’ column was left blank. Were there any alternative actions identified during the DQO process? If not, please indicate ‘none identified’ instead of leaving the field blank.
- 13. Section 3.1, Table 2, Page 19:** Bullets 4 and 5 under “Identify Inputs to the Decision” appear to be somewhat redundant. The “heat required to successfully remediate the RGA” cannot be estimated without taking into account the groundwater velocity impacts. Consider deleting the 4th bullet.
- 14. Section 3.1, Table 2, Page 19:** Under “Develop a Decision Rule” DOE fails to specify which model(s) will be used, in combination with to-be-identified metrics, to ultimately assess the viability of implementing a Steam Enhanced Extraction remedy at C-400. When will DOE identify the 2D and 3D models that will be required?
- 15. Section 5.3.2.1, Page 37:** When will the final decision to install an extraction well be made and what will the decision be based upon?
- 16. Section 5.3.3, Page 37:** Will sampling procedures for higher temperature media be required for this study? If so, these should be included in the QAPP and discussed in the appropriate portion of the document.
- 17. Section A.9, Pages A-14 through A-16:** With the plant shutdown and exodus of USEC, will the plant emergency response structure described in the HASP still be in place in late 2014 and early 2015?
- 18. QAPP Worksheet #16, Last Sentence, Page B-35:** Please clarify if the fixed-laboratory analyses that is expected within 28 days refers to only the lab transmittal of the results. Does this time-frame allow for the sharing of data with the project team? If the 28 days only pertains to the transmittal of data results, when are the results expected to be in a format that will be made available to the project team?
- 19. QAPP Worksheet #17, 3rd Bullet, Page B-36:** The bullet states, “groundwater and temperature sample requirements will be determined by the steam remediation vendor.” The Division does not object to DOE conferring with its subcontractor prior to providing this information. However, the number of samples must be evaluated in the context of the treatability study work plan. Consequently, this information should be provided in the D2 work plan. Ideally the information would be shared with the Division and U.S. EPA prior to submittal of the work plan.

20. QAPP Worksheet #22, Page B-41: Nothing is said here regarding calibration of the downhole temperature sensors that are so critical to the success of this study. Will these sensors also be calibrated prior to being placed in the ground?

-End of KY Comments-