

# Comment Response Summary

for the

*Site Evaluation Report for Rubble Areas at the Paducah Gaseous Diffusion Plant,  
Paducah, Kentucky*

**(DOE/LX/07-0227&D1, Primary Document)**

**U.S. Environmental Protection Agency Region 4 and  
Commonwealth of Kentucky – October 2009**



Prepared for  
U.S. Department of Energy  
Office of Environmental Management

**COMMENT RESPONSE SUMMARY**  
**for the**  
*Site Evaluation Report for Rubble Areas at the*  
*Paducah Gaseous Diffusion Plant, Paducah, Kentucky*  
*(DOE/LX/07-0227&D0, Primary Document)*

| Comment Number                      | §/Page/¶. | Reviewer and Comment   | Response   |
|-------------------------------------|-----------|--|--|
| <b>KY Comments, October 6, 2009</b> |           |  |  |
| General Comments                    |           |  |  |
| 1.                                  |           | Please include a table that has the GPS coordinates associated with each rubble pile.  | See the added Table 4 in Section 4.2 for GPS survey results.   |
| 2.                                  |           | The method employed by the USEC lab for isotopic uranium analysis does not use HF for dissolution. Please update the isotopic uranium data for this project to reflect the appropriate qualifiers.   | Section 3.1.5 was modified to include the following statement: "In addition, in regard to fixed-base laboratory isotopic uranium analyses, it should be noted that nitric acid was used for dissolution. The data in the database will be qualified to note the use of nitric acid in lieu of hydrofluoric acid during dissolution." |
| 3.                                  |           | KY-19 consists of many of concrete pieces. More discussion is needed regarding the "contamination" identified. Specifically, indicate if the elevated reading were from the area or from an isolated piece(s) of material.   | The following statement was added to the Executive Summary and Section 3.1.2: "KY-19 includes an area of approximately 80 ft by 20 ft and includes one concrete slab and a 6 ft long, 1 inch metal pipe with fixed radiological contamination."  |
| 4.                                  |           | Reproduce the pictures of the rubble areas presented in the SAP in the SER so that the reader can draw his or her own conclusions regarding the current use of the rubble. Sometime your field person writes that the rubble "could be considered" as performing a function. While this is a valid observation by the field person, someone looking at the pictures may draw a different conclusion. | Suggest that the reference to the SAP photographs be maintained in lieu of duplicating the photographs in the SER. Both documents are included within the Soils OU Administrative Records and the SER references the SAP.  |

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| 5.                       |   | The count rate that was reported from the original 2006 survey of KY-19 was 200 counts per minute (CPM). It is noted that the background count rate is 50 CPM. These values are reasonable enough. However, it is stated that there is no dose rate. This is a conceptual error. The statement cannot be made that there is no dose rate just because the instrument does not output dose rate. Any time there is a detectable CPM, there also must be a detectable dose rate, as dose rate is derived from count rate and several other variables. Dose rate should be proportional to count rate, and will therefore be four times background dose rate. Please remove any reference to “no dose rate” at this site from this document. | The term “no measurable dose” was removed from the document in six locations.  |
| 6.                       |   | Please include the original survey results from 2006 for KY-19 in this document. Please state in the text that the survey in 2009 did not indicate any elevated readings.   | The original survey results are attached to the CRS. The following statement also was added to the document in Section 4.2: “The 2009 survey results confirmed the fixed contamination.” |
| <b>Specific Comments</b> |   |   |  |
| 1.                       | Executive Summary, Page xi, 2nd Paragraph, Lines 2-3 and Page xi, Executive Summary, Investigation Findings, Lines 3-4. | The statements “exceeding twice background” and “above twice background” are unclear without a statement of what background is. Please state in the text that the background is 7,000 CPM.  | The following was added to the Executive Summary: “(background is considered approximately 7,000 counts per minute)”   |

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| 2.                    | Executive Summary, Investigation Findings, Page xi, Last Sentence and Page 17, Section 4.2, Lines 9-10, Page 19, Section 5(i). | The statements "...results indicate constituents at or near background levels", "...indicate levels below or near background" and "...laboratory results were below or near background" should not be made until the isotopic uranium results are updated with the appropriate qualifiers discussed in general comment #1.   | Please see the response to General Comment No. 2.   |
| 3.                    | Section 1.3.1 pgs 3 and 4.   | Inform the reader that some of WAG 17 was referred to WAG 25 and that those elements are now SWMUs and part of the Surface Water Operable Unit.  | The following was added to Section 1.3.1 "...with some areas of concern (AOCs) from WAG 17 referred to WAG 25, which is now part of the SWOU."  |
| 4.                    | Section 3.1.4, pg 11.  | SW846 6020 ICP-MS is cited as the method for measuring uranium in soil while in Table 3 alpha, gamma, and liquid scintillation are cited. Please reconcile the citation with Table 3.  | The text was corrected to now read: "The method used for measuring total uranium in soil was SW846-6020, which is Inductively Coupled Plasma-Mass Spectrometry (ICP-MS). The method for measuring isotopic uranium in soil was Alpha Spectrometry." Table 3 also was corrected for total uranium to include SW846-6020. |
| 5.                    | Page 11, Section 3.1.4, 3rd Paragraph.   | This paragraph states "...all constituents are below or near background levels" and "The method used for measuring uranium in soil was SW846-6020,..." The data provided in Appendix B reports uranium results for sample RPKY18RU-01D of 7.57 mg/kg. The PGDP Background Study (1997) lists the background for uranium as 4.85 mg/kg. Please clarify the background level for uranium analyzed by SW846-6020. | Text has been revised to "...all constituents are near or within twice background levels (DOE 2001). The uranium result in soil below pile BX (removed as a maintenance action) indicated 7.57 mg/kg uranium that is within twice the background level of 4.9 mg/kg."   |

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| 6.                    | Page 12, Table 3, Analytical Method, Radionuclides. | The general nature of the analytical method column in this table for radionuclides has resulted in errors. For example, "gammaemitting radionuclides" are not routinely analyzed by alpha spec and alpha emitting radionuclides such as "uranium-234" are not routinely analyzed by gamma spec or liquid scintillation. Please correct this table.  | Table 3 has been corrected. Also, please see response to Specific Comment No. 4.   |
| 7.                    | Section 3.2, pg 13.                                 | Please confirm that the field quality control samples were duplicates as indicated by the text. Recall that the parties have had multiple conversations concerning the differences between split samples and duplicates.  | The section has been revised to read as follows: "Field quality control samples included the following: field splits and field blanks. Both field splits and field blanks were collected and analyzed at a minimum frequency of one for every 20 samples collected or 5%. As only five samples were collected, only one field split and one field blank were collected." |
| 8.                    | Rubble Pile SAP Field Checklist for KY-24, pg A-17. | The bottom line of this report was cut off by the copier and needs to be resubmitted.   | The noted checklists have been replaced with better quality copies.  |
| 9.                    | Rubble Pile SAP Field Checklist for KY-24, pg A-17. | The checklist for KY-24 appears to describe uncharacterized waste and not rubble. This waste needs to be properly characterized and dispositioned. This area fits the definition of a SWMU; therefore, a SWMU Assessment Report needs to be immediately submitted to the Division along with a timetable for characterization of the wastes present in KY-24. Section 5 needs to be revised to include a discussion of the cited materials. | As KY-24 is not on DOE property and the material is not of DOE origin, it is recommended that Kentucky contact the owner in regard to this waste.  |
| 10.                   | Section 4.2, pg 17.                                 | Please include a discussion of those rubble piles which could not be fully scanned because they were beside a creek or ditch and the water was too deep to afford access. Please include each specific rubble pile that was not completely scanned with an estimate of the amount scanned.  | Please see the revised Section 3.2.1 that discusses deviations of the SAP and now includes this text: "Those rubble areas that could not be 100% accessed due to water included KY-17, 18, 19, 20, 21, 34, 41, and 44. A minimum of 50% of the rubble typically was surveyed, with the exception of one (40%), as noted in the completed checklists."                    |

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| 11.            | Section 4.2, Lines 6-7 and Page 20, Section 5.1, Line 4, Page 17. | The location of the "...unfiltered 200 counts per minute..." is unclear. Please explain whether the "...unfiltered 200 counts per minute..." was for a specific location in the rubble or if it was averaged for the entire rubble area.         | The units of counts per minute are provided as a result of a fixed point reading on one piece of rubble. The rubble area was surveyed; however, once a slightly elevated reading was noticed, a fixed point reading was taken from where the highest reading on the one piece of rubble was detected. The phrase "at a fixed point" was added to the statement to clarify.  |
| 12.            | Section 5 (ii), pg 19.  | Drinking water supplies can include surface water, especially for livestock and wildlife. Please include surface water in this discussion.   | Surface water was added to (ii) on page 19 as requested.  |
| 13.            | Section 5 (iii), pg 19.   | Please discuss the waste stored in drums at KY-24. If oil is present, it may pose a threat of release.   | Please see response to Specific Comment No. 9.  |
| 14.            | Section 5.1, pg 20.   | Please delete the first two words of the paragraph; they set the wrong tone for the discussion. Revise the discussion to include the drums found in the bunker at KY-24. With drums present, the final sentence in the paragraph is not correct. | <p>The term "As expected" was deleted. In regard to the drums found in the bunker at KY-24, please refer to the response to Specific Comment No. 9. The following was added to Sections 5.1: "Additionally, no indication was found of treatment, storage, or disposal of solid or hazardous waste, with the exception of drums located off DOE property at KY-24 that appeared to contain "Formula 480 Liquid Clay Concrete" and "Quaker State Motor Oil."</p> <p>In addition, the following was added to Sections 3.2.1 and the Executive Summary: "On another note, drums were identified off DOE property at KY-24 that appeared to contain 'Formula 480 Liquid Clay Concrete' and 'Quaker State Motor Oil'."</p> |

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| 15.                            | Rubble Pile SAP Field Checklist, Page A-27, KY-39 BWMA. | This checklist indicates that originally 12,000 cpm was observed at this site, and that background was 7,000 cpm. A reading of 71% over background with such a relatively high count rate should be easily reproducible and is outside the range of what could be considered instrument error. Following best practices, a worker who was surveying this site and noted a high reading would certainly confirm the reading multiple times prior to recording an elevated value. It is, therefore, unreasonable for these values to simply be lined through and ignored. Additionally, a reading of 71% over background using a beta/gamma or gamma detector could indicate the presence of uranium at levels many times higher than background, due to the decay method of these isotopes and instrument sensitivity in the energy range of the small percentage of emitted particles that are actually able to be detected. Please provide further justification for the survey error and provide the "Rad Supervisor e-mail 2/24/09" referred to on this checklist. | Once brought to the attention of the Rad Supervisor, he immediately requested his HPs to proceed to KY-39 and resurvey. Based upon the resurvey, they found no elevated radiological readings. The following is the Rad Supervisor's responses to the initial readings as documented in the e-mail:<br><br>"I'll investigate. The readings should be in CPM (counts per minute) not DPM (disintegrations per minute). I'll talk to the RCT and figure it out."<br><br>Once the HPs returned, the following was documented:<br><br>"All readings were in counts per minute. The RCT went back to the area with a pancake probe and no elevated contamination was detected." |
| EPA Comments, October 13, 2009 |   |   |  |
| General Comments               |   |   |  |
| 1.                             |   | Appendix A, Completed Rubble Pile SAP Field Checklists, states that several of the rubble areas were not completely surveyed. For example, approximately 40 percent (%) of KY-17 was surveyed. Additionally, only 2 global positioning system (GPS) points out of 4 were obtained at KY-20. Without survey results for GPS locations over significant portions of all sites, it is unclear how the objective of defining the nature and extent of contamination has been met. Clarify how it will be determined that the nature and extent of contamination has been delineated at the rubble sites. Also, clarify if any rubble piles subjected to a partial survey will be re-surveyed.   | During previous scoping meetings for the rubble piles SAP, it was recognized that all rubble areas may not be accessible including the underside or not accessible for other reasons such as high water. It was recognized that if no radiological contamination or oil staining was present on the accessible areas, this was sufficient to document nature and extent. This methodology was agreed to during scoping as was implemented for WAG 17 rubble areas in the 1990s (the Rubble Area SAP references the WAG 17 rubble investigation). Also, please refer to the response to KY Specific Comment No. 10.   |

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| 2.                    |                  | Section 4, Discussion and Results, is insufficiently detailed. Only a brief discussion of the sample results has been included. Without a detailed discussion of the results it cannot be determined if the nature and extent of contamination has been delineated at the rubble areas. Revise the SER to include a more detailed discussion of the sampling and survey results. Specifically, Section 4 should include a table summarizing the soil sample results for the five rubble areas.  | Please note the statement in Section 4.2 that indicates the 5 soil samples were near background as follows: "Results from soil sampling beneath the five rubble areas removed as a maintenance action indicate levels below or near background." In addition, the following information was added, "The five soil samples collected below the five rubble areas removed as a maintenance action were sampled and analyzed for radiological, PCB, and metals parameters. All data for the five samples are included on a CD in Appendix B." To avoid duplication, a table was not included, as the data for the five samples is included on the CD. |
| 3.                    |                  | Section 4.1, Conceptual Site Model, indicates that the rubble areas proximal to surface water drainage areas could result in several potential secondary exposure routes for human health and the environment. Additionally, Appendix A, Completed Rubble Pile SAP Field Checklists, indicates that many of the piles are or were used for stream bank and erosion control as well as dam and structural support. Given the location of these rubble areas adjacent to or within water, the potential exists for contamination of sediment and surface waters. Explain why no surface water or sediment samples were analyzed as part of this site evaluation. If these exposure routes will be sampled as part of another OU, it should be stated in the text. | Radiological surveys and oil staining determinations in addition to soil samples collected for those rubble areas removed as a maintenance action were collected as agreed to and required in the approved Rubble Area SAP. Sediment and surface water samples were not required in the Rubble Area approved SAP; however, if surface water or sediment is required to be sampled in the future, it will be included in the SWOU Off-Site investigation. The following statement was added to Section 4.1: "Surface water or sediment samples (if required) will be collected as part of the future SWOU Off-Site investigation."                  |

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| 4.                    |                  | Several descriptions presented in the Sampling and Analysis Plan for Rubble Area at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky (DOE/LX/07-0060&D2) dated September 2008 (SAP) do not correspond with the rubble piles discussed in Appendix A, Completed Rubble Pile SAP Field Checklists. For example, KY-38 Ballard Wildlife Management Area (BWMA) was described in the SAP as a “14’x 5’x 1’ area of concrete rubble”. However, only two pieces of rubble were identified covering an area of approximately six square feet. Additionally, for KY-31 the team surveyed a rubble pile that closely matched the SAP description, but the rubble was scattered throughout the area. However, the SAP described KY-31 as a 7’x 3’ area consisting of rubble including two concrete fence bases. These discrepancies in the survey of the rubble piles were not discussed in Section 3.2.1, Deviations from the SAP. Revise the SER to identify all cases in which the surveyed soil rubble pile did not match the description presented in the SAP. In addition, clarify how these deviations from the SAP impact the overall evaluation of the site. | The following information was included to clarify any variations of descriptions of the rubble areas between the SAP and SER: “In addition, some rubble areas such as KY-31 and KY-38 may have varying descriptions from the SAP compared to what is presented in this SER. The areas were documented using GPS coordinates, and the varying descriptions, based upon multiple interpretations by inspectors, do not have an adverse impact on determining if contamination is present at the rubble areas. Inspections occurred during the summer (full foliage) for the SAP and then during the winter (after ice storm) for the implementation of the SAP which also attributed to varying descriptions.” |
| 5.                    |                  | The SER states that there are no containers or tanks associated with the rubble areas. According to Appendix A, Completed Rubble Pile SAP Field Checklists, Rubble Pile KY-24 had several drums located in the bunker including one set of 4 drums, shrink-wrapped and labeled “Formula 480 Liquid Clay Concrete” and one drum labeled “QuakerState Motor Oil.” Additionally, Rubble Pile AE included crushed drums. Revise the SER to indicate that several drums associated with Rubble Piles KY-24 and AE require further assessment to determine if the drums contain any hazardous substances, pollutants, or contaminants.  | A similar comment from KY was provided (see KY specific Comment No. 9). The following response is provided (the SER was not revised): As KY-24 is not on DOE property and the material is not of DOE origin, it is recommended that Kentucky contact the owner in regard to this waste.  |

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| <b>Specific Comments</b> |   |   |  |
| 1.                       | Section 3.1.2.1, Evaluation of rubble areas that DOE removed as a maintenance activity and on DOE property, Page 11 | The text in Section 3.1.2.1 states that rubble in five areas, KY-18, KY-23, AE, BH, and BX, was previously removed by the Department of Energy (DOE) as a non-CERCLA maintenance activity. However, the completed rubble pile SAP field checklists, presented in Appendix A, Completed Rubble Pile SAP Field Checklists, state no rubble has been removed by a previous DOE maintenance activity. Revise the SER to clarify this discrepancy. | This is no discrepancy, as the checklists were correct at that time and were completed based upon the inspections of the existing rubble areas performed in February and March of 2009. Subsequent to the inspections, the five rubble areas (KY-18, KY-23, AE, BH, and BX) were removed in April and May of 2009 followed by collection of samples in May 2009. The rubble areas were first inspected, followed by removal and soil sampling. No changes were made to the document. |
| 2.                       | Section 3.2, Field Quality Control Samples, Page 13   | Section 3.2 is insufficiently detailed. For example, the section does not include a discussion of whether any of the quality control samples exceeded the measurement performance criteria. According to Appendix B, Fixed and Field Laboratory Results, exceedances of serial dilution did occur. Revise the SER to include a discussion of all QC exceedances and describe how the exceedances impact the data results.                     | The following statement was added to Section 3.2: "All quality control sample results including field blank and field split results were noted as acceptable in the data assessment checklist. Although serial dilution exceedances did occur, they did not adversely affect the quality of the data."   |
| 3.                       | Section 4.2, Survey Results, Page 17  | Section 4.2 states that results from soils sampling beneath the five rubble areas removed as a maintenance action indicate levels below or near background. However, the background levels have not been provided. Revise the SER to provide a tabular comparison of background levels to concentrations found on-site after the noted maintenance action.  | The background levels referenced in the SER are the background levels found in the 2001 Risk Methods Document, similar to the background levels referenced in previous Site Evaluation Reports.  |
| 4.                       | Appendix B, (CD) Fixed and Field Laboratory Results   | The table presenting the fixed and field laboratory results does not include an explanation of the data qualifiers used to characterize the listed results. Without such an explanation, it is unclear if the data have been qualified appropriately. Revise the SER to include an explanation or an additional table that effectively conveys the meaning of the data qualifiers used to characterize fixed and field laboratory results.    | Data qualifiers have been added to the data set to clarify.  |

RADIOLOGICAL SURVEY FORM

RECORD COPY

WCH 10/23/09

Survey No: O6-BOP-0538-S

Page 1 of 3

Date: 04/18/2006 Time: 1200 RWP No.: N/A

Location of Survey-General (Site/Bldg.): BIG BAYOU CREEK Specific (Room/Area/Item): AREA AROUND BRIDGE

Purpose of Survey(Circle One): Routine Special Release Receipt Pre-Shipment Shipment Characterization

RWP Job Coverage: Start Intermittant Continuous

Material / Other Job Description: SURVEY OF RUBBLE IN AREA

N/A

COPY

Instrument Information

Contamination / Field Instruments

Table with 7 sections: A, B, C, D, E, F, G, H. Each section contains instrument details like Model #, Serial #, Cal Due, Bkgd, MDC Pt, CF Pt, and Probe Model.

Laboratory Results Attached? (If Yes, See Attached Results) Yes No

Reference Surveys (if Applicable): N/A

Released To: NO ALPHA READINGS TAKEN DUE TO INACCESSIBILITY. BETA EXTENDABLE PROBE USED.

Comments: N

RCT: S. LANG / [Signature] Badge: 708705 RCT: C. BURRUS / [Signature] Badge: 705917

RADCON Supervisor Review: [Signature] / 04.20.06 Date



RADIOLOGICAL SURVEY MAP FORM

~~RECORD COPY~~ <sup>not</sup> 10/23/09

|            |                                 |
|------------|---------------------------------|
| SURVEY MAP | SURVEY NO.: <u>DL-BOP-0538S</u> |
|------------|---------------------------------|

**Legend:**

|                              |  |     |
|------------------------------|--|-----|
| <b>A</b> Air Sample Location | <input type="checkbox"/> Beta or Gamma Dose Rate | LAW |
| Smear / Direct               | <input type="checkbox"/> Neutron Dose Rate       |     |

