Comment Response Summary

for the

Remedial Investigation Report
for the Burial Grounds Operable Unit
at the Paducah Gaseous Diffusion Plant,
Paducah, Kentucky
DOE/LX/07-0030&D1

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

COMMENT RESPONSE SUMMARY
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EPA Comments—November 17, 2008			
1.	General	Based upon the review of the Baseline Risk Assessment and supporting sections of the RI Report, the BRA as written is insufficient for the determination of future actions at the listed sites. A data quality assessment has not been presented in the BRA, which limits the conclusions that can be made regarding the adequacy and sufficiency of the data used in the risk assessment. There are also significant issues regarding the assessment of groundwater in the BRA that must be clarified.	The data was reviewed prior to use in any section of the RI to ensure that it met the DQOs established in the approved work plan. After collection, the data was reviewed to determine that it filled the data gaps identified in the work plan as well. Additional text has been added to the document (Section 4 and Section 7) to clarify that the data quality is sufficient to meet the data needs identified during the DQO process. For surface and subsurface soil exposures, the revised RI (Appendix F, Appendix G, and Section 6) presents the results of previous competed risk assessments (these previous assessments contained the DQA for that data). For SWMUs for which new surface soil data has been collected (SWMUs 3 and 7), the impact of that new data on the results of the previous risk assessment are discussed in the uncertainty section of Appendix F. The issues regarding the assessment of groundwater in the BRA are addressed in the applicable comments below.
2.	General	Nomenclature – Throughout the document the text refers to SWMU numbers and/or Facility numbers with equal ease, which may work for those who are very familiar with the sites but not for those who have to refer back and forth to find out which facility is associated with which SWMU. Please present both when referring to one or the other.	Both SWMU and facility names are presented where appropriate (in earlier sections where SWMUs are being described); otherwise, in later sections of the document, the SWMU designation alone is used.

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3.	General	Please see the NCP at 40 *CFR* 300.430(d)(3). PGDP needs to provide location-specific ARARs in the RI and, to the extent they are available, provide chemical-specific ARARs. Action specific ARARS will be evaluated and discussed during scoping of the feasibility study.	Preliminary available location-specific ARARs are included in the RI (Appendix H). Preliminary ARARs also were identified in the BGOU RI/FS Work Plan. The process of ARAR identification is an iterative one that is continuously changing throughout the RI/FS process until the ROD is issued. Site-specific ARARs will be identified during the remedial action selection. It should be noted that the outline for an RI report in Appendix A of the FFA does not include an ARARs list.
4.	Executive Summary, Pg ES-3, Table ES-1	Frequency of detection (FD) can be a misleading indicator if 50% is the FD criterion. For example, SWMU 4 is a major source of TCE groundwater contamination, but no organic compounds show up as frequently detected. There might only be two or three hits of TCE, but the concentrations indicate presence of principal threat waste (PTW). The presence of TCE as PTW is acknowledged three paragraphs below. EPA would prefer to see the issues of greatest concern discussed first, rather than starting with a FD chart that shows iron and manganese as the “predominant contaminants in the UCRS. Does PGDP expect to focus a remedy on iron and manganese? If not, then “demote” them in prominence.	As suggested, the page was revised to move the discussion of those SWMUs with principal threat wastes ahead of the discussion of frequency of detection and Table ES-1.

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5.	Section 1.3.5.2, SWMU 6	Were any surface soils analyzed for radiological contamination? Also, what is the nature of the 4 geophysical anomalies located just north of SWMU 6 (see Figure 2.4)	In accordance with the BGOU Work Plan, surface soils were not planned to be sampled at SWMU 6 as part of this investigation. The geophysical anomalies just north of the SWMU boundary represent parked vehicles/equipment. At the time of the geophysical survey, several surface obstructions and influences affected the survey data. They are identified on Figure 6 of Appendix A of the WAG 3 RI Report as a forklift, mower, and metal debris. A discussion of these anomalies has been added to Section 2.1 of the RI report.
6.	Pg 3-11, Figure 3.5	Revise this figure using current groundwater elevation data. It is inappropriate to use data that are 13 years old to represent a current picture of groundwater flow. Also, highlight the locations of all burial grounds so they can be viewed in the context of groundwater flow.	The figure has been revised to show the locations of the BGOU SWMUs. The figure is meant to show the conceptual water table elevation (which occurs in the UCRS) and not groundwater flow directions since UCRS groundwater flow is predominantly downward. The November/December 1995 data is representative and adequate for illustrating the typical water table elevation in the UCRS. The following text has been added to the report: "While Figure 3.5 shows data from November and December 1995, hydrographs of UCRS monitoring wells on-site indicate fluctuations of only a few ft over the past 10 years; therefore, this figure still provides an adequate representation of the UCRS water table."
7.	Pg 3-20, 4th ¶	Flow through meters for dissolved oxygen are not particularly accurate for DO below 1 mg/L. This should be presented as an uncertainty in this section.	We recognize that measurements below 1 mg/L are not as accurate as those where dissolved oxygen is greater than 1 mg/L. Text has been added in Section 3.9.3, Groundwater Geochemistry, to address this uncertainty.

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8.	Figure 3-5	Does not appear to support the flow directions indicated on Figure 3-18. Please show current flow contours on both figures.	Figure 3.18 shows groundwater flow directions in the RGA, while Figure 3.5 shows the water table elevation (which exists in the UCRS).
9.	Pg 3-35, 1st ¶	Please specify whether "groundwater flow.." refers to the velocity, transmissivity, or some other component of groundwater flow.	This has been revised to state this is the "average flow velocity."
10.	Figure 3-20	Should be for SWMU 5, but is labeled as SWMU 4.	The figure label was revised.
11.	Pg 3-39	For clarity, the discussion on the first half of this page needs a figure.	Figure 3.21 was developed to help with clarification.
12.	Pg 3-51, last ¶	Presence of a source zone in the UCRS is postulated based on observed concentration changes in the RGA. What does PGDP propose doing to verify the presence or absence of this source, and when will the work be done to allow for completion of problem identification?	The presence of the DNAPL source in the UCRS is the conceptual model assumption that will be used for developing and evaluating remedial options in the feasibility study (the volumetric extent of soil contaminated with TCE DNAPL has been estimated in the RI report (Section 4) and will be refined as necessary for the FS). Further investigation may be implemented, if needed, to reduce uncertainty (in volumetric extent of the DNAPL) in support of the remedial design after completion of the feasibility study.
13.	Pg 4-8, Table 4.4	Explain why the MCLs for the radionuclides are not listed, and only the NALs.	The MCLs that are available for the radionuclides have been added to Table 4.4.
14.	Pg 4-8, Section 4.2, Table 4.5, 6,7	Cs-137 is not listed, but for 1 'hit' [0.456 pCi/g] in the Tables for SWMU 2, yet Table 6.3 shows it as the predominant risk, 67% & 70% for future risk scenarios [as well as in Exec Summary, P.ES-9, 2nd bullet]. App. F, shows 51 pC/g Cs-137, presumably from historical data? Revise to correct or explain the apparent discrepancy.	There are no detections of Cs-137 at SWMU 2. There was one detection at SWMU 3 in boring 003-005 at a depth of 5 ft (0.456 pCi/g). SWMU 2 risk no longer lists Cs-137 as a predominant risk.

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15.	Figures 4-17 through 4-37	Many of the trend graphs for uranium and some of the metals in the UCRS groundwater show detection limits significantly elevated over concentrations. Explain how these graphs can reasonably depict accurate contamination trends in the UCRS.	Some additional discussion regarding the specific trends in these charts (particularly UCRS trends) is included in the text (Section 4.4.2). Also, the following text was added: "These graphs show both the result and the laboratory detection limit. In some cases, particularly with radiological constituents, the report result is less than the detection limit (this would be qualified as a "nondetect" in the database)."
16.	Section 4.4.3	Please provide a reference to figures in this document that at least show the sampling locations on which the data tables are based. Referring the reviewer to two 8-year old reports would be unacceptable. Also, the last paragraph on Page 4-89 postulates that a TCE DNAPL source is present in the RGA based on dissolved phase groundwater samples, yet no effort was made to identify the extent of this source to allow the FS to fairly evaluate alternatives. This is a data gap that needs to be filled, likely by additional RI field work.	Figure 4.3 shows the sampling locations. Section 4.4.3 (now Section 4.5.2) was revised to include a reference back to Figure 4.3. In addition, additional text has been added to better explain the existence of the DNAPL at SWMU 4 and the uncertainty surrounding its volumetric extent. The development of alternatives for the FS will make assumptions on the volumetric extent of the DNAPL source based on preliminary estimates in the RI. Also, some of the visualization figures from Appendix D have been pulled forward into Section 4 (such as a figure showing TCE concentrations in soil) to better show the extent of contamination at each unit.
17.	Pg 4-99, SWMU 5, 3rd ¶	Explain why organics were not analyzed in this RI. What information resulted in this decision, especially when the major groundwater contamination is organic, and the historical and process knowledge for disposal at the burial grounds are incomplete.	In the approved work plan, Section 9.3.4, the SWMU 5 sampling plan, did not specify the sampling and analysis of organics. During scoping for the BGOU work plan, it was determined, based on analysis of previous data and historical practices, that SWMU 5 is not an expected source of organic contamination.

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18.	Pg 4-105, 2nd ¶	This paragraph appears to conclude that SWMU 6 is not a source of TCE contamination to the RGA. Yet, the TCE concentrations in 006-025 (downgradient) are always higher than those in 006-024 (upgradient). This indicates a contribution from SWMU 6 to the northwest plume. Please clarify one way or the other.	TCE concentrations in 006-025 are always higher since it is located closer to the centroid of the Northwest Plume. A figure showing the relationship of SWMU 6 and the underlying Northwest Plume in the RGA has been added to the report (Figure 4.53).
19.	Pg 4-113, end of 1st ¶	The data in Table 4-41 pretty clearly show that the sample from down-gradient location 007-010 shows higher concentrations of TCE, *cis*-1,2 DCE, and vinyl chloride than does up-gradient location 007-007, generally by a factor of 2 or more. Revise text to account for this or modify the conclusion in the paragraph.	Both locations 007-007 and 007-010 are UCRS samples where groundwater flow is predominantly downward. To support the conclusion provided in the text, a figure showing the relationship of SWMUs 7 and 30 with the underlying TCE plume in the RGA is presented. (Figure 4.5.9.)
20.	Pg 4-124, 2nd ¶	Provide a figure reference show the location of the referenced wells, and associated cross-sections.	Figure 4.15 shows the monitoring well locations for SWMU 30. The text on page 4-124 (now page 4-150) was revised to include a reference back to Figure 4.15. Figure 3.21 has been revised to include a reference map to show the location of the cross-section for SWMUs 7 and 30.

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21.	Pg 4-129, Table 4.46	Table 4.46 shows historical data for Sr90 in SWMU 145. Sr90 is a fission product, hat has not shown to be a constituent of uranium tailings from Hanford used in enrichment at Oak Ridge, Paducah, and Portsmouth. It indicates low-level radioactive waste might have been brought from other sites. Provide a discussion indicating it probable origin? Also, there's no discussion of this radionuclide on P.5-5 with other fission product discussions. Cs137 is highly suspect also as having come from Hanford.	There is documentation of strontium and cesium at PGDP; *Study of Plutonium and Fission Products* (KYL-20, (July 1995) identified Cs-137 and Sr-89; *Historical Impact of Reactor Tails on the Paducah Cascade* (KY/L-1239, March 1984) identified Cs-137 and Sr-90 in feed plant ash. While the quantity of Sr-90 that came to Paducah from sites (Hanford and Savannah River, as well as others) is a trace quantity, it has been seen in samples collected from C-410 ash. It is logical to assume that where ever Cs-137 was found, Sr-90 would be found as well. Cesium-137 and strontium-90 have half-lives of 30.2 years and 28.8 years, respectively, and still are being found at the site, while other fission products with shorter half-lives have since decayed. Section 4.10.2 has been revised to include this information.
22.	Section 5.6.7	While there may have been no work done in this investigation to further characterize a DNAPL source in the RGA under SWMU 4, PGDP is still obligated to provide the results in this report from the SI report for the Southwest Plumes. This RI report is supposed to accomplish problem identification so that the FS can evaluate remedies. It cannot be left to the FS to assess the effect of this additional source term in the RGA, as is stated. The resolution of the Southwest Plume dispute transferred this SWMU to the BGOU RI. Therefore the BGOU RI needs to do a complete job of describing nature and extent of contamination related to SWMU 4. This is a data gap that needs to be filled, likely through additional sampling.	The revised BGOU RI (Section 4) includes additional discussion of the nature and extent of contamination related to SWMU 4, including the DNAPL RGA source. While there is still uncertainty related to the DNAPL in the RGA, assumptions can be made in the FS to bound the extent. Then, remaining uncertainty can be addressed, if needed, prior to implementation of a remedy.

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23.	Section 6	In general, Section 6, Baseline Risk Assessment, is an inadequate summary of the material presented in Appendix F, which contains the actual Baseline Risk Assessment (BRA). The summary of the BRA should follow the major sections of the risk assessment, as described in the Risk Assessment Guidance for Superfund (i.e., Data Collection/Assessment, Exposure Assessment, Toxicity Assessment, and Risk Characterization). The summary presented in Section 6 should also include the Remedial Goal Options calculated for the identified COCs. Revise the section to follow the steps of a baseline risk assessment so that Appendix F is appropriately represented.	Section 6 of the BHHRA was reorganized to better reflect the results of Appendix F and provide the requested additional summary information. Summaries of Appendix F information on data collection, exposure assessment, toxicity assessment, and risk characterization have been added to Section 6. The summary and conclusions section of Appendix F, including the appropriate RGO tables were brought into Section 6.
24.	Pg F-22, Figure F.1	The Figure details the steps for conducting the data evaluation for the BRA. The text in this section of the document does not include the Data Quality Assessment Step. It is not clear whether the objectives of the project sampling design have been met for the burial ground sites. The document should be amended to include a Data Quality Assessment.	For surface and subsurface soil exposures, the revised RI (Appendix F, Appendix G, and Section 6) present the results of previous competed risk assessments (these previous assessments contained the DQA for that data). For SWMUs for which new surface soil data has been collected (SWMUs 3 and 7), the impact of that new data on the results of the previous risk assessment are discussed in the uncertainty section of Appendix F. The modeling of groundwater contaminants from subsurface soil data included all data (historical and RI); the adequacy of this data is discussed in Section 4, (nature and extent), which also includes comparisons of historical and RI maximum detected values.
25.	Pg F-237, Table F.262	The table only shows risk to 1000 yrs, though Page 5-3 of the summary text, Sec.5.2.1 # (3,) indicates 10,000 yrs in modeling groundwater. EPA recommends showing risks out to 10,000 yrs to show if any further peaks between 1000 & 10,000 yrs.	The SESOIL AT123D model used currently can model only out to 1,000 years. The “10,000 years” reference in Section 5.2.1 will be corrected to 1,000 years.

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26.	Section 6	In general, Section 6, Baseline Risk Assessment, is an inadequate summary of the material presented in Appendix F, which contains the actual Baseline Risk Assessment (BRA). Revise the summary of the BRA to follow the major sections of the risk assessment, as described in the Risk Assessment Guidance for Superfund (i.e., Data Collection/Assessment, Exposure Assessment, Toxicity Assessment, and Risk Characterization). Also, present the Remedial Goal Options (RGOs) in Section 6 that the BRA calculated for the identified COCs.	Section 6 of the BHHRA was reorganized following the suggested RAGS format to better reflect the results of Appendix F and provide the requested additional summary information. Summaries of Appendix F information on data collection, exposure assessment, toxicity assessment, and risk characterization have been added to Section 6. The summary and conclusions section of Appendix F, including the appropriate RGO tables were brought into Section 6.
27.	Section 6.31	It unclear from the text whether the risk characterization presented in the first paragraphs and bullet lists refer to the current or future industrial scenarios. The text should be clarified.	Section 6.2.2.2 now discusses the exposure differences between current and future industrial workers. The results for both types of industrial worker are present in the risk characterization summary tables for SWMUs for which both types of workers were evaluated. Text in risk characterization and conclusions has been rewritten to distinguish clearly which worker (current or future) is being discussed.
28.	Figure F-1 on Pg F-22	The Figure details the steps for conducting the data evaluation for the BRA. The text in this section of the document does not include the Data Quality Assessment Step. It is not clear whether the objectives of the project sampling design have been met for the burial ground sites. The document should be amended to include a Data Quality Assessment.	For surface and subsurface soil exposures, the revised RI (Appendix F, Appendix G, and Section 6) present the results of previous competed risk assessments (these previous assessments contained the DQA for that data). For SWMUs for which new surface soil data has been collected (SWMUs 3 and 7), the impact of that new data on the results of the previous risk assessment are discussed in the uncertainty section of Appendix F. The modeling of groundwater contaminants from subsurface soil data included all data (historical and RI); the adequacy of this data is discussed in section 4, (nature and extent), which also includes comparisons of historical and RI maximum detected values.

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29.	Section F.2.3.2	The criteria for screening soil are described in this section. One of the bullet points notes that if a contaminant was detected in fewer than 5% of the sampling locations, it was eliminated as a COPC. Region 4 does not consider frequency of detection an appropriate criterion for COPC selection. In this case, the uncertainty section of the document (Section F.6.1.1) weighs the potential impact of eliminating the infrequently detected compounds from the risk assessment and determines that deletion of the constituents did not have an impact on the risk assessment findings. Region 4 requests that future documents should refrain from eliminating contaminants as COPCs based upon the frequency of detection.	The frequency of detection will not be used to eliminate COPCs in future baseline risk assessments.
30.	Section F.2.3.3	Based upon the information presented, the basis for evaluating groundwater is unclear. In this section, soil concentrations are compared to site-specific soil screening levels for the protection of groundwater. The screening is presented in Tables F.19-F.26. Analytes retained as COPCs are presented for each SWMU in Tables F.19 through F.26. It is not clear from these tables whether the "maximum detected" concentration for each analyte represents the maximum in surface soil, subsurface soil, or both. Further, these COPCs are intended to identify soil concentrations that may negatively impact groundwater and are not groundwater COPCs as the tables title would suggest. The next paragraph states: *Selected analytes then were modeled as described in Section 5 of the main text and Appendix E. After the modeling was completed, the calculated analyte concentration in the RGA groundwater was compared to the resident child NAL from the 2001 Risk Methods Document and the provisional groundwater backgrounds shown in the 2001 Risk Method Document in Table A.13. Analyte concentrations in groundwater that exceeded both the NAL and background values then were carried through the risk assessment and risk and hazards were*	This risk assessment will continue to use the modeled groundwater concentrations to understand the impacts from the sources to groundwater at various points of exposure. The process for evaluating soil for groundwater contaminants is now is Section 5, and the screening tables for soil contaminants for groundwater modeling are now in Appendix E (attachment E3). The text has been rewritten and new footnotes added to the tables to better explain the process used for the groundwater risk assessment. The subsurface soil down to the RGA was screened against SSL protective of groundwater and resident child direct exposure NALs to determine which contaminants should be modeled for groundwater. The groundwater risk assessment was based on modeling source terms for contaminants exceeding those criteria in soil to groundwater. The results from modeled concentrations are presented in the risk and hazard tables as well as the risk characterization tables. Results for screening measured concentrations in groundwater (a comparison done in the work plan) are now presented only in the historical

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30. (cont.)		*calculated for the Rural Resident Groundwater User at the following locations: at the SWMU boundary, at the plant boundary, at the property boundary, at the Little Bayou Seeps (when particle modeling showed a contribution to the seep), and at a well located near the Ohio River.* It is not clear from this description how "selected analytes" were chosen for modeling. The results of the screening of the modeled concentrations versus the resident child NAL is not presented in this section, so it is unclear what the results of the screening are. The basis for the selection of groundwater COPCs is not presented in the BRA. The text then states: *This risk assessment uses the modeled groundwater concentrations at all points of exposure (POEs). A screening of measured concentrations in the groundwater against NALs and action levels is presented in Appendix E of the BGOU work plan. A list of COCs from that screening of measured groundwater reproduced in Section F. 7.4.3.* The discussion in this section does not adequately describe why modeled groundwater data was determined to be preferable to measured groundwater data for use in the BRA nor does it adequately indicate why it was deemed appropriate to screen measured groundwater data in the work plan. The list of COCs presented in Section F.7.4.3 includes the list of COCs identified in the BGOU work plan. The list is more extensive that that based upon the modeled groundwater data carried through the risk assessment. Section F.7.4.3 also does not indicate why groundwater concentrations were modeled for use in the risk assessment.	section in a separate section (Section F.1.5) with an explanation for why they may differ from the modeled results.

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30. (cont.)		Significant revision of this section of the BRA is necessary to clarify how groundwater has been evaluated in this BRA and the rationale for doing so.	
31.	Section F.3.4.1	This section describes the calculation of the exposure point concentrations that were used in the risk assessment calculations. The groundwater EPCs are based upon modeled groundwater concentrations at four Points of Exposure: plant boundary, property boundary, Ohio River, and seeps at Little Bayou Creek. Table F.47 indicates that the "future on-site residential" exposure scenario is quantitatively evaluated for groundwater exposure. It is not clear if "on-site" is intended to convey someone who may live within the boundaries of PGDP or on the footprint of the SWMU in question. Either way, modeled groundwater concentrations at boundaries of the plant or PGDP boundaries may be significantly different than in the areas of the plumes' origination. Greater detail is warranted in this section to describe how the modeled groundwater EPCs are applicable to potential exposures for the future on-site resident.	The modeled groundwater concentrations for the "future on-site residential" are for a resident using groundwater drawn from under the edge of the SWMU footprint. The text has been rewritten to clarify the location of the on-site resident for groundwater exposure.
32.	Table F.152	The Table includes the target organs that may be affected by each contaminant. However, subsequent reporting of the various calculated Hazard Indices (Section F.5) does not use this information to segregate the potential hazards by target organ where the HI exceeds 1. As part of the risk characterization, hazard indices that exceed 1 should be segregated by target organ to provide additional information to risk managers.	Table F.152 includes the target organ endpoints used to establish the RfD. Potentially, effects to organs other than the target organ also could occur when the RfD is exceeded; therefore, the HI is presented only as the total HI for the purposes of making decisions about these sites. This approach is in accordance with the current Risk Methods Document for PGDP.

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33.	Section 6.5.3	This section describes the Contaminants of Concern for contaminants in groundwater based upon modeling from soil concentrations. However, the discussion is confused by presenting a list of "priority COCs" that were "found in groundwater at individual SWMUs." The description of groundwater evaluation and findings presented throughout the document must be clarified.	Measured groundwater results are now mentioned only in Section F1.5 in Appendix F. Priority COCs, as defined in the text, are COCs with risk exceeding 1E-04 or a hazard index of 1 for any scenario for soil or water. These text lists of priority COCs are based only on the modeled groundwater and the previous assessments for soil and are provided to highlight the biggest contributors to risk and hazard. All COCs are provided in the risk characterization tables in Section 6 and in Appendix F.
34.	Section 7.2, Pg 7-2, last line of section	Insert "less than" after "HI".	Text was revised.
35.	Tables 7.2 through 7.4	Please see comment above related to frequency of detection as an acceptable indicator of the problem, and revise to more fully summarize results to the RI.	As suggested in the earlier comment (Comment # 4), the text in this section was revised to move the discussion of those SWMUs with principal threat wastes ahead of the discussion of frequency of detection and Table 7.2.
36.	Section 7.5	Add here that the SWMU boundary was also evaluated as a POE in addition to those in the 2001 Risk Methods Document.	Text was revised.
37.	Table 7.5	If modeling predicts MCLs will be exceed in the Ohio River, explain why they would not also be exceeded at the Little Bayou seeps which feed into the river.	The modeled flowpaths in question do not contribute to the seeps in Little Bayou Creek. If a modeled flowpath did contribute to both the seeps and the river and exceeded MCLs at the river, it also would exceed MCLs at the seeps since the seeps are slightly upgradient of the river.
38.	Section 7.6, 2nd sentence	Insert "within the current plant boundary" after "Land use". DOE property outside the fence has other anticipated uses.	Text was revised.

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39.	Section 7.6, 1st ¶	Delete or modify the discussion of existing Institutional Controls with respect to the future excavation scenario at the BGOUs. As a risk assessment scenario one cannot assume that any such controls are in place, and this property is ultimately slated to go out of DOE control.	The sentence discussing institutional controls has been deleted from the Executive Summary, Section 6, and Section 7.
40.	Pg 7-11, 4th ¶	The discussion of results of the SERA indicates that ecological risk exists at the BGOU. Typically when this is the case, further steps are conducted in the ecological risk assessment process. Explain clearly why this may not be necessary at the BGOU.	Remedial actions are planned under the FS for the soils and groundwater at the BGOU sites. The screening results for the burial grounds will be reviewed during the FS to ensure that the actions taken to mitigate risks to human health also will address the ecological COPCs.
41.	Section 7.7.1, 1st ¶	Paragraph 1 presents DOE's planning assumptions. It does not seem appropriate at this stage of the RI to be presenting assumptions on what the remedies are before completing the FS. Please delete the paragraph and insert actual recommendations for future work.	The first paragraph was deleted and the second paragraph was revised as follows (now Section 7.8.1): "Based on results in this RI Report, an FS will be conducted for each of the SWMUs in the BGOU. A listing of potential alternatives is detailed in Tables 7.9 and 7.10 and is consistent with data collection objectives in the work plan."

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42.	General	According to the discussion entitled "Conclusions" in the Executive Summary, trichloroethene (TCE) trends at SWMUs 7 and 30 indicate that the TCE dense nonaqueous-phase liquid (DNAPL) source is likely constrained to the Upper Continental Recharge System (UCRS) soils. It is unclear how TCE trends at SWMUs 7 and 30 indicated that the TCE DNAPL source was likely constrained to the UCRS soils. TCE was detected within UCRS, Regional Gravel Aquifer (RGA) and McNairy soils at SWMU 7 and within UCRS and RGA soils at SWMU 30. In addition, it is unclear how the occurrence of TCE in the RGA was differentiated between a TCE DNAPL source and the Northwest Plume. Section 4.4.6, SWMU 7, states that "The occurrence of VOCs and 99Tc in the RGA is largely due to the Northwest Plume, which passes beneath SWMU 7." Revise the text to provide a detailed discussion clarifying why the TCE DNAPL source is likely constrained to the UCRS soils. Ensure that this discussion addresses weathering of the detected TCE and the need for fingerprint analyses to assess the viability of these assumptions.	Section 4.8.2, SWMU 7 Goundwater, in the revised report now includes additional discussion on the occurrence of TCE in the UCRS at SWMU 7. A figure has also been added to show the relationship of SWMUs 7 and 30 to the underlying plume in the RGA. The underlying plume is responsible for the TCE in the lower RGA and McNairy Formation. Additional discussion related to the correlation between groundwater fluctuations and TCE spikes in MW66 and the rationale that TCE is a UCRS source at SWMU 7 has been added. Because data indicates the high probability of the UCRS source and upgradient monitoring documents the location of the Northwest Plume centroid flowing beneath SWMUs 7 and 30, it has been determined that fingerprint analyses are not necessary.
43.	General	Goal 1, Characterize Nature of Source Zone, listed in Table 1.1, Goals Identified for the BGOU RI, does not appear to have been met. For example, several inorganics and radionuclides (e.g., arsenic, uranium, cesium-137, uranium-234, and uranium 238) were detected in Boring 003-005 through 003-009 without vertical or horizontal delineation. Similarly, several inorganics, organics – volatiles, and radionuclides (e.g., arsenic, beryllium, iron, manganese, 1,1-DCE, thorium-230, uranium-234) were detected in Angled Boring 007-002 without vertical or horizontal delineation. As such, the nature and extent of contamination at several waste cells does not appear adequately delineated. In addition, without proper delineation, it is unclear if migration to groundwater is occurring. Revise the BGOU RI to determine the nature and extent of contamination at each SWMU in order to document achievement of Goal 1.	While uncertainties remain, soil borings and samples proposed in the BGOU work plan were completed. The remaining uncertainties will be managed in the FS. Additional sampling may be needed in the future to address uncertainties related to remedial design. Additional text and figures have been added to Section 4 to better explain the nature and extent of many contaminants. Section 5 (and Appendix E) provides estimated volumes for key COCs as well as model results showing migration of contaminants downward to the RGA and laterally to various points of compliance.

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44.	General	Several groundwater samples were collected from temporary borings. Groundwater samples collected from borings either through augers, from open boreholes, or via temporary PVC casings are only sufficient to assess the presence or absence of contaminants of concern (COCs). This data should not be used to make defensible risk management decisions, as these samples were not collected from reproducible data points. Data from a formally installed and developed wells will need to be collected to make risk management decisions regarding whether COCs are present or not at the sampled temporary well locations. Revise the BGOU RI and future submittals to include data from reproducible data points for risk management decision purposes. Furthermore, identification of sample locations from reproducible data points should be included on Figure 4.9, Page 4-17 through Figure 4.16, Page 4-24.	The collection of groundwater samples from temporary borings rather than installed monitoring wells was the method proposed in the BGOU work plan. The groundwater data from the temporary borings was screened against RGA background values and NALs in Section 4, to provide an indicator on nature and extent of contamination, but this was independent of the risk assessment presented in Section 6 and Appendix F. This data was not used in the risk assessment. In addition, data derived from these samples is not being used for risk management decisions. On Figure 4.9 through Figure 4.16, the reproducible data points have either the "MW" for monitoring well or "PZ" for piezometer designation. All other locations represent temporary locations. Results from the temporary locations are used semi-qualitatively to evaluate the presence or absence of COCs and are supported by sampling from reproducible data points when making risk management decisions.

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45.	General	Section 3.9.4, BGOU Hydrogeologic Conceptual Model (Page 3-51), states "For SWMU 4, the evidence of DNAPL presence is markedly higher dissolved TCE levels (commonly 1,000 to 4,000 µg/L) in the RGA on the west (downgradient) side of the SWMU. The area of higher TCE levels spans the entire west side of SWMU 4, suggestive of a diffuse source of DNAPL contamination in the UCRS soils underlying the burial grounds. A discrete area of 10,000 µg/L in the lower RGA implies the presence of a small pool of DNAPL (zone of higher DNAPL saturation) at the base of the RGA." According to Section 1.2.1, Scope, the potential DNAPL source zone beneath SWMU 4 remains within the scope of the BGOU "for assessment and remedial action, if required." It is unclear how the potential DNAPL source zone beneath SWMU 4 can be assessed when no groundwater samples were collected in the RGA, as discussed in Section 3.9.3.2, SWMU 4 Hydrogeologic Interpretation. Based on Figure 3.19, WAG3, SWMU 4 Lithologic Cross-Section A-A', and Figure 2.10, SWMU 4 Angled Borings, no groundwater samples have been collected in the RGA. Revise the BGOU RI to clarify how the potential DNAPL source zone beneath SWMU 4 can be assessed when no groundwater samples were collected in the RGA.	The BGOU work plan (Section 9.3.3) states sufficient data exists at SWMU 4 to meet the RI/FS goals. The current conceptual model of having a DNAPL source in the UCRS and RGA will be used in developing and evaluating remedial options. Additional text and figures has been added to Section 4 to clarify the existence of TCE DNAPL at the unit.
46.	General	The first paragraph in Section 4, Nature and Extent of Contamination, indicates "Some lateral movement of contaminants would occur in the UCRS, but these pathways appear limited." However, sampling and analytical data to support this argument have not been provided. Revise the BGOU RI to include a detailed discussion the assertion that some lateral movement of contaminants would occur in the UCRS but these pathways appear limited, and to include figures clearly documenting this phenomenon. Section 4 presents no visual data presentation, only tabular presentations of data. Further, Section 4 does not discuss whether a decreasing concentration trend is observed with depth to address vertical extent of contamination issues. Revise Section 4 to address vertical extent of contamination.	Additional discussion has been added to Sections 3 and 4 to more clearly explain the flow of groundwater in the UCRS. The UCRS exhibits vertically downward hydraulic gradients on the order of 0.5 to 1 ft/ft. Lateral hydraulic gradients are much less (1 to 2 orders of magnitude less than vertical gradients) and hydraulic conductivity values in the UCRS only vary over a couple orders of magnitude. The downward driving force and lack of connectivity of the slightly higher conductivity lenses in the UCRS leads to predominantly downward flow.

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47.	General	Based on Table 4.19, SWMU 30 Locations of Subsurface Soil Contaminants, and Figure 4.7, Soil Sample Locations at SWMU 30, it appears that inorganic and radionuclides (e.g., beryllium, iron, manganese, vanadium, uranium, uranium-234, uranium-238) were detected upgradient of the SWMU 30 waste cells at Angled Borings 030-003 and 030-004. As such, it is unclear if additional waste cells or outside sources exist at SWMU 30. Revise the BGOU RI to clearly indicate if additional waste cells or outside sources exist at SWMU 30 and are contributing to soil contaminant detections.	Borings 030-003 and 030-004 were situated to characterize a geophysical anomaly discussed in Section 1.3.7.2 and shown in Figure 2.5. The anomaly is related to metal reinforcement within the footer and retaining walls of the former incinerator. The constituents detected in borings 030-003 and 030-004 are related to the material remaining from the former incinerator.
48.	General	It is unclear if the goals established in Table 1.1, Goals Identified for the BGOU RI, have been met. For example, the potential interaction of sources has not been assessed in the BGOU RI. According to Section 5.6.3, Potential Interaction of Sources, "The interaction of these contaminant plumes will be assessed during the FS to ensure that the total risk from a combination of plumes is considered in the selection of remedial options." In addition, it is unclear why a TCE RGA source, discussed in Section 5.6.7, SWMU 4 RGA TCE Source, has not been evaluated in the RI. To meet the goals delineated in Table 1.1, include these assessments as an addendum to this BGOU RI.	The goal of this RI was to evaluate the impacts to groundwater on a SWMU-by-SWMU basis. According to the flow paths presented in Figure E.3.18, the contaminant plumes from a few of the BGOU SWMUs may interact. The contaminant flow paths from SWMU 6 and SWMU 30 may interact; however, SWMU 6 did not have any groundwater COCs. The contaminant plumes from SWMU 3 and SWMU 5 may interact, and SWMU 2 may interact with a portion of the SWMU 5 contaminant plume. The modeling uncertainty analysis sections of the report have been expanded to discuss the potential impact of combined plumes. The TCE DNAPL source in the RGA is postulated based on dissolved-phase contamination exceeding 10 mg/L immediately downgradient of the SWMU (Section 4.5.2). The DNAPL source term for TCE in the RGA at SWMU 4 was not evaluated in the modeling analyses since the RGA concentrations in the lower RGA currently exceed the MCL, as discussed in Section E.3.3.7. The DNAPL volume also has been estimated and added to the discussion.

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49.	General	According to the second paragraph in Section 5.6.6, Burial Cell Waste, "The purpose of the modeling in this RI report was to identify SWMUs requiring additional analyses in the FS." However, Section 1.1, Purpose of Report, states "The objectives of the RI included characterization of nature, extent, and magnitude of source zones and secondary sources (such as contaminated soil) at the locations listed above. Additionally, the purpose of the RI is to determine surface and subsurface transport mechanisms and to support an evaluation of remedial technologies." It is unclear why additional analyses have not been completed or proposed as part of the RI to meet the objectives of the RI. Revise the BGOU RI to include an assessment of the additional analyses necessary to meet the objectives of the RI as delineated in Section 1.1.	The sentence in Section 5.6.6 (now 5.5.6) stating, "The purpose of the modeling in this RI report was to identify SWMUs requiring additional analyses in the FS" was removed from the section. The phrase was originally used to indicate that the modeling results would be incorporated into the alternatives analysis in the FS.
50.	General	It is unclear how Goal 2, Define Extent of Source Zone and Contamination in Soil and Other Secondary Sources At All Units, has been met when Section 5.6.8, SWMU 3 UCRS Groundwater Contamination, states "The groundwater analyses conducted for this RI are based on soil samples obtained from soils surrounding the SWMUs and their subsequent release to the RGA and transport through the RGA. In some instances, water samples from wells in the UCRS indicated additional contaminant concentrations that were not accounted for in the analyses. For example, UCRS wells MW85, MW88, MW91, and MW94 at SWMU 3 indicated elevated levels of TCE." While the water data were added to the SWMU 3 TCE soil concentrations and a Statistical Analysis and Decision Assistance (SADA) nearest neighbor interpolation was accessed, the nature and extent of TCE contamination in the UCRS has not been supported by sampling data. Revise the BGOU RI to ensure Goal 2 is met.	The source term development discussion (Attachment 2 to Appendix E) has been expanded to clearly present the methodology, results, and uncertainty in the analyses.

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51.	General	It does not appear that the site-specific sampling plans established in Section 9.3, Site-Specific Sampling Plans, have been adequately completed. For example, Section 9.3.1, SWMU 2, states that samples will be collected from existing RGA upgradient and downgradient wells, or new upgradient and downgradient wells will be installed and sampled. These wells will be upgradient and downgradient to SWMUs 2 and 3. However, based on Sections 4.4, Groundwater, no groundwater samples were collected from SWMU 2 during the current RI, and no RGA samples were collected from SWMU 3. As such, it is unclear if the BGOU RI has adequately completed the approved SAP. Revise the BGOU RI to clarify how these deviations from the approved SAP impact the objectives of the sampling strategy.	Sampling and analytical data are available for SWMUs 2 and 3 monitoring wells as part of the site's environmental surveillance program. Groundwater samples were collected from the monitoring wells at SWMUs 2 and 3 in the winter of 2007, during the RI field work. Contaminant trends for SWMU 3 wells are summarized in Figures 4.25 through 4.45 in the revised report. Figures with SWMU 2 well trends, as well as analytical data from the winter of 2007, have been added to the RI report. Text and tables from three RGA monitoring wells (MW67, MW76, and MW420) at SWMU 3 also have been added to discussions regarding SWMU 3 groundwater. UCRS groundwater samples were not obtained at SWMU 2 due to low yield.
52.	General	Based on the discussions included in Appendix E, Fate and Transport Modeling, and other portions of the BGOU RI, insufficient groundwater data exists to proceed to the FS. The BGOU RI needs to be revised to clearly indicate where data gaps exist, and allow for the collection of additional data as need to have an accurate understanding of site conditions before proceeding to the FS. Further, Section 5.6.1, Source Term Development, indicates in the first paragraph that, "Due to the lack of sample data points, the nearest neighbor interpolation tends to estimate large areas of contamination for which there are no data; therefore, SADA provides a conservative estimate of the total contamination using the nearest neighbor interpolation method." The purpose of modeling is to use field and analytical data to do interpolations and predictions. To be fully effective, the model should not use interpolated data as model input. Revise this discussion to indicate if additional sample location data would reduce this uncertainty, and to include information on where sample data points are lacking.	Sufficient groundwater data does exist to proceed to the FS; however, to understand better the limitations of the source term modeling, additional information has been provided in Attachment 2 of Appendix E explaining the basis of source term development. This discussion includes why results of environmental sampling need to be interpolated in order to use samples collected at points to represent contaminant concentrations in a volume of soil. The discussion recognizes that additional sampling locations always reduce the uncertainty present in source term mass estimates that result from environmental heterogeneities.

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53.	General	According to the second paragraph of Section E.3.3.1, Source Term Development, of Appendix E, Contaminant Fate and Transport Modeling Results for the BGOU RI, "The nearest neighbor technique was selected for source zone refinement because it yielded results that were most compatible with the conceptual site model of contaminant release." However, a comparison of the techniques (nearest neighbor, natural neighbor, inverse distance, ordinary kriging, and indicator kriging) to the conceptual site model (CSM) of contaminant release was not provided. Additionally, Section E.3.3.1 states "While the sampling results are appropriate for source identification, a denser sampling pattern would have allowed for more refined estimates of both the COC source zone volumes and concentrations." As such, it is unclear if the nearest neighbor technique was the most compatible with the CSM and if it adequately met Goal 2, Define Extent of Source Zone and Contamination in Soil and Other Secondary Sources at All Units, of Table 1.1, Goals Identified for the BGOU RI. Revise the BGOU RI to demonstrate that the nearest neighbor technique was the most compatible with the CSM and that it adequately met Goal 2 of Table 1.1, or alternatively propose additional efforts to be conducted in achieving Goal 2.	Additional information has been provided in Attachment 2 to Appendix E to justify the source term development methodology. The nearest neighbor method was determined to provide the highest mass concentrations in the source model, providing a conservative source term estimate. This addresses, in part, the known low bias in the data caused by the inability to sample the waste The verification report for SADA (EPA 2000) states that "although geostatistical-based kriging interpolation approaches are more mathematically rigorous than the simple interpolation approaches using nearest neighbor, they are not necessarily better representations of the data. Statistical and geostatistical approaches attempt to minimize the mathematical constraint, similar to a least squares minimization used in curve-fitting of data. While the solution provided is the "best" answer within the mathematical constraints applied to the problem, it is not necessarily the best fit of the data. There are two reasons for this.: "First, in most environmental problems, the data are insufficient to determine the optimum model to use to assess the data. Typically, there are several different models that can provide a defensible assessment of spatial correlation in the data. Each of these models has its own strengths and limitations, and the model choice is subjective" (EPA 2000). "This conundrum leads to the second reason for the difficulty, if not impossibility, of finding the most appropriate model to use for interpolation–which is, that

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			unless the analyst is extremely fortunate, the measured data will not conform to the mathematical model used to represent the data. At best, the interpolation can be reviewed to determine if it is consistent with the data" (EPA 2000).
54.	General	According to the fourth paragraph of Section E.3.3.1, Source Term Development, of Appendix E, Contaminant Fate and Transport Modeling Results for the BGOU RI, the lack of vertical control throughout the layers tended to result in contamination being estimated throughout the depth of the vertical layers. Sample detections in a layer with no corresponding sample locations in the adjacent vertical layers resulted in predictions of contamination in these adjacent layers. As such, it is unclear how accurately the transport model (AT123D) represents actual site conditions. For example, SWMU 2, a 32,000 square foot area, has only been evaluated by 18 sample locations (7 surface, 11 subsurface). As such, it appears that a significant portion of SWMU 2 is represented by the transport model rather than actual site data. Revise the BGOU RI to clarify how the transport model adequately represents actual site conditions and how the FS will adequately address such data gaps. Furthermore, clarify how the BGOU RI has met Goal 1, Characterize Nature of Source Zone, in Table 1.1, Goals Identified for the BGOU RI.	Additional information has been provided in Attachment 2 to Appendix E to justify the source term development methodology.
55.	General	A data gap assessment was not provided as part of the BGOU RI. This information is necessary prior to remedy assessment. A number of data gaps exist related to source areas, fluctuations in data, modeling inputs and modeling calibrations. Revise the BGOU RI to address these data gaps and include a data gap assessment as part of the conclusions to this BGOU RI. Once this has been completed, it is recommended that the modeling be updated and recalibrated to reflect the additional information.	The BGOU scoping process went through a SWMU-by-SWMU data evaluation to determine where data gaps existed. The Work Plan included a summary of the data gap analysis and provided data needs for the RI. Remaining uncertainties can be managed through the feasibility study with additional investigations conducted, if needed, for remedial design.

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56.	Executive Summary, Fate and Transport (Goal 3), Pg ES-7	The text in the first paragraph on Page ES-7 states "Vapor transport modeling assessed contaminant concentrations in a hypothetical residential basement at the SWMU and in hypothetical residential basements at the plant boundary and property boundary POEs (Table ES.5)." It is unclear why vapor transport modeling did not assess contaminant concentrations for the industrial worker onsite. For example, it is unclear why the vapor transport model did not assess vapor intrusion through building slabs and/or drainage/sewer piping. Revise the BGOU RI to include a vapor transport model that assesses vapor intrusion through building slabs and/or drainage/sewer piping.	Currently there are no buildings located over the contaminated material at the BGOU SWMUs. The existing buildings at PGDP are slated to be decontaminated and demolished after the DOE mission is complete. Based on the current surrounding land use, it is reasonable to assume that the most likely future land use will be rural residential housing; therefore, the on-site industrial worker scenario was not evaluated. The residential scenario would be bounding for the industrial worker exposure.
57.	Section 1.2.2, Rationale for Field Sampling, Pg 1-6	The second paragraph in Section 1.2.1, Scope, states "The Groundwater Operable Unit (OU) Strategic Initiative will address dissolved-phase groundwater contamination in the RGA beneath the BGOU SWMUs; however, secondary sources of groundwater contamination that are derived from the BGOU burial grounds, such as the potential dense nonaqueous-phase liquid (DNAPL) source zone beneath SWMU 4, remain within the scope of the BGOU for assessment and remedial action, if required." While Section 1.2.2 states that "...the RGA was not part of this investigation and will be evaluated through the Groundwater OU (with the exception of borings advanced to the RGA to evaluate upgradient and downgradient contaminant levels at SWMUs 3 and 7)." As such, it is unclear whether secondary sources of groundwater contamination that are derived from the BGOU burial grounds were evaluated or if borings were only advanced to the RGA to evaluate upgradient and downgradient contaminant levels at SWMUs 3 and 7. Revise the BGOU RI to clarify how secondary sources of groundwater contamination that are derived from the BGOU burial grounds were evaluated within the scope of the BGOU if borings were only advanced to the RGA to evaluate upgradient and downgradient contaminant levels at SWMUs 3 and 7.	The BGOU work plan did not propose borings in the RGA to evaluate secondary sources. Text was added to Section 1.2.2 to explain that the assessment of secondary sources in this RI is based primarily on historical data. The text also has been clarified to say that deep borings evaluated groundwater in the RGA at SWMU 7 only. Additional sampling may be necessary in the future to address uncertainties related to remedial design.

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58.	Section 1.3.1.2, Site History, Pg 1-10	The last paragraph of Section 1.3.1.2 states "...four 30-gal drums (one of these drums contained a uranium and TCE sludge and the others were of such poor integrity that the contents could not be ascertained) and 35 55-gal drums (30 of these drums contained uranium sludges, not TCE, one drum contained TCE, and the rest were of such poor integrity their contents could not be ascertained) were recovered. The drums containing TCE were placed in overpacks for proper disposal. Additionally, the liquid portion of the uranium solutions found in the other drums was transferred to new drums for proper disposal (Ashburn 1984). The remaining material was left within the SWMU and re-covered." It is unclear what remaining material was left within the SWMU and re-covered. Revise Section 1.3.1.2 to clarify what material was left within the SWMU and recovered in an effort to meet Goal 1, Characterize Nature of Source Zone, in Table 1.1, Goals Identified for the BGOU RI.	None of the 30-gal drums containing TCE were found intact. Only the drum containing TCE (placed in an overpack) and the liquid portion of the uranium solutions were removed. The remaining materials (everything except the 55-gal drum containing TCE that was overpacked and the liquid portion of the uranium solutions that was transferred to new drums) were returned to the pit and covered. The grid and inventory did not match what was found in the 1984 excavation. Section 1.3.1.2 has been revised to clarify this.
59.	Section 1.3.6.1, Site Description, Pg 1-20	Based on the Phase II Site Investigation (SI) geophysical survey conducted within SMWU 7, and as presented on Figure 2-5, SWMU 7 and 30 Geophysics, Pit B and Pit C may be one continuous pit. It is unclear why the BGOU RI does not assess whether Pits B and C are one continuous pit or two separate pits. As such, it is unclear if the BGOU RI has met Goal 1, Characterize Nature of Source Zone, in Table 1.1, Goals Identified for the BGOU RI. Revise the BGOU RI to provide a discussion regarding whether Pits B and C are one continuous pit or two separate pits. In addition, clarify how Goal 1, Characterize Nature of Source Zone, has been adequately met for all SWMUs.	Section 1.3.6.1 mentions that the older geophysical survey suggested Pits B and C may be one continuous pit; however, the "current interpreted geophysical anomaly" depicted in Figure 2.5 indicates Pits B and C are two separate pits. The current geophysical survey data collected for this RI addresses this uncertainty and no further discussion is necessary.

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60.	Figure 2.9, SWMU 3 Angled Borings, Pg 2-12	According to Section 2.5.2, SWMU 3, "Movement of planned boring locations to their final placement varied only slightly to allow for set-back to avoid penetrating the C-404 cap or the bottom of the burial cell." The C-404 cap and the bottom of the burial cell have not been depicted on Figure 2.9. As such, it is unclear how the movement of planned boring locations to their final placement avoided penetrating the C-404 cap and/or the bottom of the burial cell. Revise Figure 2.9 to show the C-404 cap and the bottom of the burial cell, even if the locations are estimated.	Figure 2.9 has been revised to show estimates of edge of cap. Since this was originally an aboveground impoundment, the bottom of the burial cell is not specified.
61.	Figure 2.13, SWMUs 7 and 30 Angled Borings, Pg 2-19	Section 2.5.5, SWMUs 7 and 30, state that a ditch filled with water exists north of the planned boring location for Boring 030-001. However, the location of the ditch has not been provided on Figure 2.13. Revise the SWMU figures to include surface features that impacted proposed boring locations and/or impact groundwater/surface water flow. Further, this section states that Boring 007-012 was moved from the originally planned location because the previous geophysical survey did not delineate the apparent large burial area connecting the F Pit area and Pit G, indicated on Figure 2.13. However, the relocated location of Boring 007-012 has not been provided on Figure 2.13. Revise Figure 2.13 to include Boring 007-012, or add a footnote that indicates which figure it is presented on.	Ditches and the surface water flow direction in the ditches have been provided in appropriate figures (Figure 1.9 for SWMUs 7 and 30). There is no boring 007-012. Boring 007-011 in Figure 2.13 (boring 007-003-VSB in the work plan) was moved northwest. This typo was corrected.

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62.	Section 2.5, Deviation from Originally Planned Sample Locations, Pg 2-27	Section 2.5 discusses modifications to the original investigation scope by relocating borings and the associated reasons. However, there is no indication that the results of the implemented modifications successfully addressed the reasons for relocating the borings. For example, Section 2.5.1, SWMU 2, states angled boring location 002-002 was moved in order to place it north of burial areas (see Figure 2.8, SWMU 2 Angled Boring Locations) which reportedly contained uranium sawdust and shavings. However, no information was provided as to whether or not these materials were encountered at the new location. Revise Section 2.5 to indicate whether or not the modifications to the original investigation scope proved successful.	Text has been revised to indicate relocations were successful (after borings were relocated, no unexpected materials were drilled through).
63.	Table 2.3, Summary of BGOU RI QC Sampling, Pg 2-29	According to Section 2.6.1, Field QC, "The target frequency of collection for QC samples was 1 in 20 for equipment rinseates, field blanks, and field duplicates. Overall this target was met for the project." However, based on Table 2.3, the target frequency of collection for QC samples was not met at SWMU 3 (Field Duplicates 2 of 46), SWMU 7 (Equipment Rinseates 2 of 82, Field Blanks 4 of 82), or SWMU 30 (Equipment Rinseates 1 of 21, Field Blanks 1 of 21, and Field Duplicates, 1 of 21). Revise the BGOU RI to discuss these inconsistencies.	The target frequency of collection for QC samples was 1 in 20 for equipment rinseates, field blanks, and field duplicates. These targets were applied to the overall field project, not individual SWMUs. Overall, the QC frequency targets were met for the project.
64.	Section 2.6.2, laboratory QC, Pg 2-29	Based on the information provided, it is unclear whether the United States Enrichment Corporation (USEC) Paducah laboratory constitutes a third party laboratory or not. Based on Section 2.6.2, the USEC Paducah laboratory performed all the laboratory analyses of soil and groundwater samples for the BGOU RI. Revise the BGOU RI to provide additional details clarifying how utilization of the USEC Paducah laboratory is appropriate.	The USEC Paducah laboratory is owned and operated by the United States Enrichment Corporation. The USEC laboratory is a DOE approved laboratory that is audited annually for compliance with requirements. The RI Report was revised to include this information.

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65.	Section 2.6.2, Laboratory QC, Pg 2-32	It is unclear why an insufficient volume of soils was available for all analyses planned at three intended locations. According to Section 2.6.2, under the discussion of Completeness, metals were not analyzed from locations 145-104 at 15 feet (ft) below ground surface (bgs) and radionuclides were not analyzed from locations 007-001 and 007-006 at 60 ft bgs and 45 ft bgs, respectively. Revise the BGOU RI to clarify why an insufficient volume of soils was available for these analyses. In addition, discuss the impact these missing samples had on the BGOU RI meeting Goal 1, Characterize Nature of Source Zone, in Table 1.1, Goals Identified for the BGOU RI.	Sometimes the full sample is not recovered from the sampling tube. For boring 007-001, the entire sampling interval was not recovered (the sampling interval from 57 to 60 ft stated minimal sample recovered). For boring 145-104, the sample included wood fragments, which limited the amount of soil in the sample. The text was revised to remove 007-006 since radiological data was available for the 45 ft sample (presented in Table 4.34). Both sample locations were reviewed to determine if the missing data was critical and it was determined to not have an impact. Since these instances of not having sufficient soil were the exception rather than the norm, there are no impacts on meeting the RI/FS goals. The report was revised to clarify why an insufficient volume of soil was available at these locations.
66.	Section 2.6.4, Data Management, Pg 2-36	Although 94 percent (%) of the vanadium analyses are equal or less than the Paducah background values, it is unclear if the 6% that exceed background values are concentrated in one area. According to Section 2.6.4, comparison of vanadium data with Paducah background values demonstrates that vanadium is naturally occurring, but all of the rejected samples were collected from SWMU 145. Revise Section 2.6.4 to clarify that the 6% of samples exceeding background values are not concentrated in one area, reflecting a potential vanadium source. For clarity, include a table and figure identifying the sample locations for the 6% samples which exceeded background values.	Figure 2.15 was included and shows the locations of samples with vanadium exceeding background values. A table will not be added here since SWMU-by-SWMU results of vanadium above screening values are provided in Section 4, plus, all the vanadium rejections were at SWMU 145.

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67.	Section 2.6.4, Data Management, Pg 2-36	The text states that because water samples are used primarily to supplement the characterization of the BGOU SWMUs, the importance of rejected metals analyses is minimal. Although the analysis of subsurface soil samples is the primary measure that supports the assessment of nature and extent and risk, it is unclear what impact the rejected groundwater data has on assessing the leachability of site soil metals. Revise the BGOU RI to evaluate how the rejected metals analyses impact the assessment of leachability for metals in BGOU soils.	It's difficult to collect UCRS groundwater samples at the site. Because the modeling results (soil) and not UCRS groundwater results were used to assess impact, the rejected metals analyses have no impact on the assessment of leachability for metals in BGOU soils.
68.	Section 3.5, Soils, Pg 3-7	Section 3.5 states that Paducah Gaseous Diffusion Plant (PGDP) soils have a low buffering capacity (pH of 4.5 to 5.5). The impact of acidic leachate on metal solubility and mobility has not been discussed. The last paragraph of Section 3.5 states that "Under background conditions, the cation exchange capacity is sufficient to bind metals in the soils; however, acidic leachate will significantly increase metal solubility and mobility." Revise the BGOU RI to further discuss acidic leachate potential on a SWMU-by-SWMU basis.	The text in Section 3.5 has been revised to state the acidic leachate potential at each SWMU is uncertain, but some discussion of acidic leachate potential (where possible) has been added to Section 3.5. Text in the Executive Summary (page ES-13) also states this uncertainty will be evaluated further and managed in the FS.
69.	Section 3.6, Hydrologeo-logy, Pg 3-8	Section 3.6 states "The infiltration rate for the PGDP area is approximately 6.6 inches/yr based on site-specific groundwater modeling. This 6.6 inches/yr applied over the area of the industrial area of the plant yields approximately 0.4 mgd of recharge to the shallow groundwater system. Leakage from plant water utilities is suspected to be another important source of infiltration at PGDP. Water use for PGDP for calendar year 2006 averaged 13 mgd. Municipal water systems lose as much as 24% of their daily conveyance (Jowitt and Xu 1990). A similar loss of the PGDP system would equal 3.1 mgd." It is unclear how the infiltration from the industrial area of the plant and leakage from plant water utilities impacts infiltration of water in the UCRS. Revise Section 3.6 to clarify how the infiltration from the industrial area of the plant and leakage from plant water utilities impacts infiltration of water in the UCRS.	Additional text has been added to Section 3.6 to clarify how anthropogenic recharge from features in the industrial area (waterlines, lagoons, cooling tower basins) creates more infiltration through areas of the UCRS and mounding in the RGA; however, the BGOU SWMUs, which do not have similar industrial features, are minimally impacted, if at all, by losses from the industrial area of the plant.

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70.	Section 3.9.2, Underground Utilities and Plant Operations, Pg 3-18	According to Section 3.9.2, "Underground utilities are sparse in the area of the BGOU SWMUs and appear to have had no impact on contaminant migration from or into the SWMU areas." It is unclear how underground utilities have had no impact on contaminant migration from or into the SWMU areas. For example, it is unclear how the abandoned electrical conduit that runs across SWMU 2 has not had an impact on contaminant migration from or into the SWMU areas. No data have been presented within the BGOU RI to substantiate these claims. Revise Section 3.9.2 to include analytical data supporting the assertion that underground utilities have had no impact on contaminant migration from or into the SWMU areas.	The statement is based primarily on the lack of underground utilities in the areas of the BGOU SWMUs that would leak and influence recharge, as postulated in more industrial areas of the plant (refer also to Section 3.6). There is no analytical data to support or refute the assertion that underground utilities have had no impact on contaminant migration.
71.	Section 3.9.3, BGOU Hydrogeology, Pg 3-20	The text states that the dissolved oxygen and oxidation/reduction potential measurements at each SWMU are generally well distributed through the cumulative range. It is unclear how oxygen and oxidation/reduction potential measurements at each SWMU are generally well distributed through the cumulative range when a single value or no data are available for several SWMUs as indicated in Table 3.3, Summary of Dissolved Oxygen and Oxidation/Reduction Potential Data of the UCRS (Samples from 64 ft depth or less) for the BGOU RI. Revise the BGOU RI to clarify how oxygen and oxidation/reduction potential measurements at each SWMU are generally well distributed through the cumulative range.	The statement was based on the SWMU-by-SWMU data shown in Figures 3.8 through 3.15. Where many measurements exist, such as from the C-404 wells and the C-746-S/T wells, the measurements over time occur across the entire range of dissolved oxygen and oxidation/reduction. The text has been revised to clarify the uncertainty due to few-to-no measurements at some of the SWMUs.

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72.	Section 3.9.3.1, SWMUs 2 and 3 Hydrogeologic Interpretation, Pg 3-30	The discussion entitled UCRS Groundwater Flow and Hydraulic Potential in Section 3.9.3.1 states that "Because SWMU 3 is an above-ground facility with a RCRA multi-layered cap, all but the base of the landfill wastes are likely unsaturated." However, the footnote to this statement indicates that "The continuing recovery of leachate from the facility indicates that some infiltration occurs and the base of the disposal cell must be saturated." As such, it is unclear if the landfill wastes are saturated or unsaturated. Revise the discussion of UCRS Groundwater Flow and Hydraulic Potential in Section 3.9.3.1 to indicate that the level of saturation of landfill wastes at SWMU 3 is unknown and clearly indicate that this is a data gap requiring additional investigation. Alternatively, provide information specifying the degree of saturation associated with the landfill wastes.	The overall saturation level throughout the waste in SWMU 3 is unknown and will be managed as an uncertainty in the FS; however, the conceptual model for SWMU 3 is, as stated in the text on page 3-31, "...with the shallow water table and generation of leachate, it is assumed that all but the base of the landfill wastes are likely unsaturated."
73.	Figure 3.18, Prevailing Groundwater Flow Directions in the RGA, Pg 3-34	Groundwater data supporting the prevailing groundwater flow directions in the RGA depicted in Figure 3.18 have not been provided or referenced. Revise Figure 3.18 to include a reference to the groundwater data used to support the prevailing groundwater flow directions in the RGA presented in Figure 3.18.	Reference was added.
74.	Section 3.9.3.2, SWMU 4, Hydrogeologic Interpretation, Pg 3-35	Section 3.9.3.2 states "There are no direct measurements of the depth of the water table beneath SWMU 4." This is a data gap. Revise the BGOU RI to address this data gap.	The conceptual model for SWMU 4 is that the UCRS water level is similar to that observed in SWMUs 2 and 3, and the water level extends up into the waste burial pits. Text was revised to reflect this.
75.	Section 3.9.3.4, SWMU 7 and 30, Hydrogeologic Interpretation, Pg 3-43	The BGOU RI does not a present plausible explanation or cause for the TCE "pulses" which are documented in the groundwater data for these SWMUs. This is a data gap. Revise the BGOU RI to address this data gap.	Additional text has been added to Section 4.8.2, SWMU 7 Groundwater, to clarify how peaks in hydraulic head correspond to spikes in TCE in an upper RGA well (MW66). Other sources of data (soil data and UCRS monitoring well data) are consistent with the interpretation of a TCE DNAPL source in the UCRS at SWMUs 7 and 30.

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76.	Figure 3-22, Plan View and Cross-section View of SWMUs 7 and 30 Illustrating the Relationship of the Water Table to the Waste Pits, Pg 3-44	The groundwater flow direction has not been depicted on Figure 3-22. As such, upgradient and downgradient sample locations cannot be determined. Revise the BGOU RI to ensure all SWMU figures include groundwater flow direction.	Figure 3.22 shows shallow water level elevation in the UCRS. Because groundwater flow is predominantly downward in the UCRS, groundwater flow direction arrows would be inappropriate for determining upgradient and downgradient locations.
77.	Section 3.9.4, BGOU Hydrogeologic Conceptual Model, Pg 3-46	The text in the first paragraph of Section 3.9.4 states that "Groundwater flow through the UCRS (HU1, HU2, and HU3) is primarily downward to the top of the RGA (HU4 and HU5). Limited lateral dispersion results as groundwater and contaminants migrate vertically through the UCRS." However, Figure 3.27, Conceptual Model of the Groundwater Flow System, does not clearly reflect this depiction of groundwater flow through the UCRS and RGA. Revise the BGOU RI to clearly depict groundwater flow through the UCRS and RGA or include a note of explanation on Figure 3.27.	The UCRS and RGA were labeled on Figure 3.28 (previously Figure 3.27).
78.	Section 4.4.1, SWMU 2, Pg 4-54	It is unclear why groundwater samples were not collected from two angled borings installed at SWMU 2. According to Section 4.4.1, "Groundwater samples were attempted at the two angled borings installed at SWMU 2 as part of this RI; however, none were collected." Revise the BGOU RI to explain why deviations from the sampling and analysis work plan occurred. In addition, incorporate these deviations in Table A.3, BGOU RI Sample Locations.	Section 9.1.2.2 of the BGOU work plan states that "water sampling in the UCRS will be dictated by the presence of water-bearing zones." Even where the UCRS is saturated, the low permeability/hydraulic conductivity makes it difficult to collect groundwater samples. Since the samples in the UCRS were attempted, but the unit didn't yield sufficient water, this is considered an anticipated outcome rather than a deviation. The text in Section 4.3.2 (formerly Section 4.4.1) has been clarified to explain why the samples were not collected.

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79.	Section 4.4.1, SWMU 2, Pg 4-61	It is unclear how Goal 2, Define Extent of Source Zone and Contamination in Soil and Other Secondary Sources At All Units, and Goal 3, Determine Surface and Subsurface Transport Mechanisms and Pathways, have been met when no recent groundwater samples were collected at SWMU 2 during the RI. The UCRS, RGA and McNairy were characterized by samples collected before 1998. As such, it is unclear if transport mechanisms and pathways have changed since that time. Revise the BGOU RI to clarify how Goals 2 and 3 have been met and how current groundwater conditions have been assessed.	Figures with SWMU 2 monitoring well trends, collected as part of the site environmental monitoring program, as well as analytical data from the winter of 2007, have been added to the RI report (Figures 4.21, 4.22, and 4.23). There is no reason to believe transport mechanisms or pathways have changed over the last 10 years.
80.	Figures 4.26, 4.27, 4.28, TCE Trends in SWMU 3 UCRS, Upper RGA, and Lower RGA Wells, Pgs 4-76 to 4-78	It is unclear why TCE trends increased over the UCRS, Upper RGA, and Lower RGA between 2006 and 2007, and over the entire sampling history in most cases. As such, it is unclear if a new TCE source or an outside source of TCE exists at SWMU 3, or if some remedial mechanism was stopped. Revise the BGOU RI to include a discussion regarding changes in TCE concentrations and discuss factors that may have led to the observed trends.	Text was added (page 4.51) about the overall increasing trend in UCRS well MW91. While UCRS well MW94 increased over the past couple of years, it still has an overall downward trend, and the recent increase may be similar to the increases observed in 2005 and 2006. The TCE trends in the RGA appears to be controlled by an upgradient source.
81.	Figures 4.29, 4-30, 4-31, ^{99}Tc Trends in SWMU 3 UCRS, Upper RGA, and Lower RGA Wells, Pgs 4-79 to 4-81	It is unclear why the ^{99}Tc trends graphs present such an erratic concentration trend over the UCRS, Upper RGA, and Lower RGA over the sampling history. As such, it is unclear if an ongoing/pulsating new ^{99}Tc source or an outside source exists at SWMU 3. Revise the BGOU RI to include a discussion regarding changes in ^{99}Tc concentrations and factors that may have led to the observed trends.	The decreasing trends of ^{99}Tc in UCRS wells, MW85, MW88, and MW94 and increasing trend in UCRS well MW91 has been added to the text on page 4-52. The "erratic" fluctuations are common and only the dominant trends are noted. Most of the RGA monitoring wells have negligible ^{99}Tc. Upper RGA well MW84 has a suspect spike in 2005 and lower RGA well 226, an upgradient well, has a relatively consistent trend over the time period shown in the chart.

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82.	Figures 4.32, 4.33, 4.34, ^{234}U Trends in SWMU 3 UCRS, Upper RA, and Lower RGA Wells, Pgs 4-82 to 4-84	It is unclear why U-234 trends increased then decreased between 2006 and 2007. For example, the U-234 trend at well MW90A/MW91/MW92 increased from approximately 0 to 1.5 to 1 pCi/L between 2006 and 2007. Revise the BGOU RI to include a discussion regarding changes in concentration trends and factors that may have led to the changes.	The overall ^{234}U levels shown in these charts is low although a few are greater than the background value for the RGA (0.7 pCi/L). All the upper RGA data is nondetect. The lower RGA spike in MW95A is suspect since it doesn't reflect "plume behavior" (gradual increase and decrease expected with a pulse of contamination moving in groundwater rather than a one-time spike). The UCRS shows a few detections that are above the RGA background value. Of particular note with the ^{234}U data is the increased detection limits in 2006 and 2007, which apparently are related to shorter counting times. Because no long-term trends are identified, the RI report text was not revised.
83.	Figures 4.35, 4.36, 4.37, ^{238}U Trends Trends in SWMU 3 UCRS, Upper RA, and Lower RGA Wells, Pgs 4-85 to 4-87	It is unclear why U-238 trends increased then decreased between 2006 and 2007. For example, the U-238 trend at well MW90A/MW91/MW92 well increased from approximately 0.2 to 1.1 to 0.5 pCi/L between 2006 and 2007. Revise the BGOU RI to include a discussion regarding changes in concentration trends and factors that may have led to the changes.	All the upper RGA data is nondetect. The lower RGA spike in MW95A is suspect since it doesn't reflect "plume behavior," otherwise most lower RGA data is also nondetect and/or below the RGA background value of 0.7 pCi/L. The UCRS has two wells (MW85 and MW94), which are consistently above the RGA background value. Because no long-term trends are identified, the RI report text was not revised.

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84.	Figure 4.38, TCE Source Area at SWMU 145, Pg 4-130	There are no wells located in the potential TCE source area. As such, it is unclear what data were utilized to define the source area. Revise the BGOU RI to clarify what data were used to define the source area depicted on Figure 4.38.	The assumed location of the source was based on TCE concentrations in the upper, middle, and lower RGA from established monitoring wells and temporary borings in conjunction with. RGA groundwater flow directions (flow directions were used to approximate the general location of a UCRS source that would result in the distribution observed in the borings/wells). The source area was postulated in the C-746-S&T Landfill Site Investigation Report. Because of the low TCE concentrations, this is not considered a DNAPL source. Discussion regarding this has been added to the revised text for SWMU 145 groundwater (page 4-167).
85.	Appendix D, Three Dimension Visualization Pictures	Several of the three-dimensional visual presentations in Appendix D depict interpretations for which there appear to be no data points to substantiate the interpretation. Address the following concerns in the figures identified below: • SWMU 2 *cis*-1,2-DCE: 0 – 20 ft bgs; SWMU 2 Vinyl chloride: 0 – 20 ft bgs; and SWMU 2 PCB-1248: 0 – 20 ft bgs do not include a well looking south. Thus, it is unclear how the contamination levels were established and the depicted view created. Possibly, a sampling location was inadvertently left off these views. Resolve this apparent discrepancy in the data presentation. • SWMU4 appears to have a data gap to the west of the visualized area. Address this perceived data gap. • SWMU 5 appears to have a data gap to the southwest of the visualized area. Address this perceived data gap. • SWMU 30 appears to have a data gap to the north of WB-4. Address this perceived data gap.	For SWMU 2, the data in the visualizations show only historical data where multiple samples were collected (for *cis*-1,2-DCE, vinyl chloride, and PCB-1248, this represents the five borings shown in the referenced figures). There was no vinyl chloride or PCB-1248 in the two borings drilled for this RI (Table 4.7). The text in the RI report has been revised to address the visualization of TCE (and the fact that the RI borings were not included) and how the TCE and *cis*-1,2-DCE distributions are similar. No data gap was identified for SWMU 4 during the scoping process. The soil borings on the western side of SWMU 4 are depicted in the figure, they just are not included as part of the fence diagram. Data gaps at SWMU 5 identified during scoping were addressed by the sampling plan. All subsurface samples are included in the figures. The text regarding SWMU 5 subsurface soil has been revised to discuss the highest

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85. (cont.)		• SWMU 145 appears to have data gaps to the southeast and west of DG-029, and along the east of the visualized area. Address this perceived data gap.	detection of beryllium, for instance, where the next sample depth showed less than background, thus showing the limited extent of the beryllium in the southwest of the SWMU. The limit of contamination found in the shallow soils at location WB-4 is bounded on the north by the ditch located north of the SWMU shown in Figure 1.9 (the ditch is approximately 10 ft deeper than the surface at location WB-4). Data gaps identified during scoping were addressed during implementation of the work plan. Concentrations in constituents on the east side appear low such that no further data is needed eastward. Most contamination at SWMU 145 is located along the former course of the NSDD, which subsequently was backfilled to allow a cap to be placed on the C-746-S Landfill.
86.	Appendix E, Section E.3.3.1, Source Term Development, Pg E-77	Section E.3.3.1 states "In several cases, the SADA estimated uranium mass in relation to other metals (i.e., vanadium and manganese) appears to be underestimated. The mass of metals, such as vanadium and manganese also appear to be overestimated using SADA." The text states that the issue of the uranium mass potentially present in the waste zone in relation to the estimated SADA mass will be evaluated further in the FS. If the mass of contamination is not understood, and it is a critical input into remedy evaluation, then the RI has not fully met its objective of identifying the problem warranting action, interfering with scoping and development of the FS. Revise the BGOU RI to describe how it will be ensured that the underestimation of uranium mass potentially present in the waste zone in relation to the estimated SADA mass will be evaluated further in the FS.	As noted in the Executive Summary, "…one key uncertainty associated with the sampling approach (and common to burial ground investigations) is that the samples do not characterize the waste directly…Upcoming remedial decisions must consider the available documentation of the buried waste in addition to the soil and groundwater characterization data to limit this uncertainty." Additional discussion has been provided in Section 5.5.1 pertaining to the potential uranium mass being under predicted.

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87.	Section 1.1, Purpose of Report, Pg 1-4	The text in Section 1.1 states "The objectives of the RI included characterization of nature, extent, and magnitude of source zones and secondary sources (such as contaminated soil) at the locations listed above." However, no locations are listed. Revise the BGOU RI to resolve this issue.	The "above" is referring back to the list of BGOU SWMUs on page 1-1. For clarification, "above" was deleted and replaced with "on page 1-1."
88.	Section 1.3.1.1, Site Descriptions, Pg 1-10	The text states Figure 1.4, SWMU 2 Historical Layout, presents the historical grid layout as documented. However, the documentation to support the presented disposal plot configuration grid has not been provided or referenced. As such, it is unclear if the historical grid configuration layout presented in Figure 1.4 is correct. Revise Section 1.3.1.1 to include a reference which supports the historical grid layout depicted in Figure 1.4.	The reference has been provided on page 1-11.
89.	Figure 3-20, WAG 3, SWMU 4 Lithologic Cross-Section C-C', Pg 3-38	According to Section 3.9.3.3, SWMUs 5 and 6 Hydrogeologic Interpretation, Figure 3.20 represents SWMUs 5 and 6 not SWMU 4, as labeled. Revise Figure 3.20 to resolve this discrepancy.	Figure 3.20 has been revised to show it's for SWMU 5.
90.	Figure 3.21, SWMUs 7 and 30 Lithologic Cross-Section A-A', Pg 3-41	The A-A' cross-section reference line for the cross-section presented could not be located on any figure in the BGOU RI. As such, it is unclear how the A-A' reference line was established. Revise Figure 3.21 to resolve this issue.	Reference map has been included in the figure.
91.	Table 4.5, Summary of Historical Modeling Results, Pg 4-8	The Chemicals of Potential Concern Determined by Historical Groundwater Modeling for SWMU 2 are identified as TCE and other VOCs. Revise Table 4.5 to specify the other VOCs.	The table was revised to include the other COPCs, *cis*-1,2-DCE and vinyl chloride.

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92.	General	The Baseline Human Health Risk Assessment (BHHRA) for the Remedial Investigation Report for the Burial Grounds Operable Unit dated July 2008 (BGOU RI) is provided in Appendix F, Baseline Human Health Risk Assessment. The BHHRA was reviewed to ensure that the approach was in accordance with Volume 2, Human Health, Methods for Conducting Risk Assessment and Risk Evaluations at the Paducah Gaseous Diffusion Plant (Human Health Methods Document) which integrates human health risk assessment guidance from the United States Environmental Protection Agency (EPA) and the Kentucky Department for Environmental Protection (KDEP). While most exposure parameters used in the exposure assessment are in accordance with the Human Health Methods Document, there are a few exceptions. In most cases, the March 2008 version of Methods for Conducting Risk Assessment and Risk Evaluations at the Paducah Gaseous Diffusion Plant (2008 Risk Methods Document) is referenced as the source of these updated values. Currently, the 2008 Risk Methods Document is not recognized as the primary source of information for Paducah Gaseous Diffusion Plant (PDGP) human health risk analyses. Thus, use of updated parameter values taken from the document should be adequately supported in the text. Other discrepancies between the exposure values used in the BHHRA and those in the Human Health Methods Document were noted during the review as well. However, references for and information supporting the use of these values were not provided. Specific examples are addressed in the attached Specific Comments.	The soil risk assessments are summaries of previous risk assessments, so the calculation tables and references for those factors are found in the original risk assessments. For groundwater, the tables of equations/factors reference either the 2001 or 2008 Risk Methods Document.

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93.	General	The BHHRA-related tables in Section 6, Baseline Risk Assessment, have been taken directly from Appendix F where the actual BHHRA is provided. However, adequate supporting discussion has not been included. Further, the organization of Section 6 hinders a cohesive presentation of information related to the BHHRA. For example, Table 6.2, Scenarios for which Human Health Risk Exceeds *de minimus* Levels, should transition directly to the risk characterization tables, Tables 6.3 through 6.10, as the tables directly relate to each other (Table 6.2 is based on information taken from Tables 6.3 through 6.10). However, the beginning of Section 6.2, SERA, is inserted between the end of Section 6.1, BHHRA, and Tables 6.3 through 6.10. It is recommended that Section 6.1 be revised, at a minimum, to include references to the discussions of the exposure assessment, toxicity assessment, risk characterization, and uncertainty in Appendix F. Further, it is recommended that Tables 6.3 through 6.10 be moved to the end of Section 6.1, providing a more cohesive presentation of both the BHHRA and the screening-level ecological risk assessment (SERA). These changes will ensure that the information provided, including tables, is straightforward for all stakeholders.	Section 6 has been rewritten to include summaries of each section of the risk assessment presented in Appendix F. The section has been reorganized so that the summary of the SERA appears after the discussion of the human health risk assessment.

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94.	General	Section F.3.3.3, Delineation of Exposure Point/Exposure Routes, of the BHHRA describes the exposure routes evaluated and those that were quantitatively assessed in this BHHRA. Several exposure routes were not quantitatively evaluated, particularly those dealing with surface water. Typically, this approach is supported in the text by the assertion that earlier assessments demonstrated risks from this exposure route (i.e., surface water) were minimal. However, this assertion is not supported by the information related to earlier risk analyses presented in Section F.1, Results of Previous Studies, or Attachment F2, Historical Risk Assessment Tables. Exposure routes and pathways should not be eliminated from quantitative assessment without supporting justification. Revise Section F.1 to include information supporting the assertion that earlier BHHRAs demonstrated that risks and hazards resulting from exposure to surface water were minimal. Briefly describe the earlier assessment(s) and indicate whether they were quantitative or qualitative in nature. References to the appropriate earlier BHHRA reports should also be provided in Section F.3.3.3. Additionally, various exposure routes were not assessed quantitatively because only modeled groundwater data were available for this BHHRA in areas where the subject future activity might occur (e.g., dermal contact with water while swimming or wading in privately owned fish ponds filled with groundwater). In these cases, ensure that a qualitative evaluation/discussion of these exposure routes is included in Section F.6, Uncertainty in the Risk Assessment, and referenced appropriately within Section F.3.3.3.	Section F.3.3.3 now describes which pathways were included in the current BHHRA for groundwater use and which pathways were not evaluated quantitatively in the new assessment. The revised BHHRA therefore includes previously calculated risks for the vegetable ingestion pathway. Other pathways, such as exposure to surface water in fish ponds, were not included in any of the BHHRAs. It is anticipated that the evaluations and actions under the surface water operable unit (SWOU) will address these exposures either qualitatively or quantitatively.

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95.	Section 5.2.1, COPC Selection, Pg 5-3	Section 5.2.1 lists the seven screening steps used to determine which chemicals of potential concern (COPCs) would be retained for groundwater fate and transport modeling. The sixth step indicates that analytes were screened from modeling if the only detections among the analyses were near the detection limit and flagged "B" to indicate the presence of blank contamination. Step 7 indicates that analytes were screened from modeling if the number of detections was less than 5 percent (%0. Revise Section 5, Fate and Transport, to list those analytes not carried forward in the groundwater fate and transport modeling of the BGOU solid waste management units (SWMUs). It is recommended that the lists be provided in the SWMU-specific subsections of Section 5.0 and the impact of not including these analytes in the fate and transport modeling discussed in Section 5.6, Fate and Transport Uncertainty.	The screening methodology has been added to Appendix E3. This appendix shows the analytes that were screened from the groundwater modeling analyses. The criteria described in Section 5.2.1 were used to determine which soil analytes were selected to be modeled to groundwater. These analytes were modeled in groundwater and the resulting values beneath the SWMU were used in an additional screening step where the groundwater concentrations were compared to residential child groundwater NALs as described in Section 5 to produce the final list of groundwater analytes and their modeled concentrations that were used in the risk assessment in Appendix F. The screening analysis for groundwater ensures that analytes removed from the analysis would provide a risk or hazard less than 1E-06 or 0.1, respectively. In several instances, analytes retained for further analysis were found not to reach the groundwater in the 1,000 year period modeled. In addition, several of the analytes were fund to provide concentrations less than the existing background groundwater concentrations. The results of the groundwater screening based on the child NALs also have been inserted in Section 5 for each SWMU in Tables 5.5 through 5.12.

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96.	Section 6.1, BHHRA, Pg 6-2	Section 6.1 references Table 6.1, Land Use Scenarios and Media Assessed for Each Source Area Included in the RI for the BGOU, for information on the land use scenarios and environmental media assessed for each SWMU in the BGOU. Neither the text nor Table 6.1 explains why surface soil was not evaluated at SWMU 145 for various site receptors. While it appears that SWMU 145 may contain negligible soil, justification for excluding the media from quantitative evaluation should be included in the text discussion that supports Table 6.1. Revise Section 6.1 accordingly and ensure Table 6.1 contains a footnote explaining why surface soil at SWMU 145 is not considered a complete pathway for various site receptors.	Surface soil for SWMU 145 is primarily a constructed cap for two closed Subtitle D Landfills. The only soil data available was from a very limited area that was determined that all surface samples from that SWMU represented the ditch areas outside SWMU 145 and were not representative of surface soil concentrations within SWMU 145. Information from the closure documents will be appropriately referenced that clarifies that the constructed cap met the closure requirements of Subtitle D closure and does not warrant an additional risk assessment.
97.	Table 6.10, Summary of Risk Characterization for SWMU 145, Pgs 6-23 to 6-24	The notes at the bottom of Table 6.10 indicate "NE" was used to denote exposure pathways with excess lifetime cancer risk (ELCR) less than 1.00E-06 or hazard index (HI) less than 0.1 as well as exposure pathways not considered in the BHHRA. Thus, the table does not distinguish between cases where risks and hazards were quantified but below target levels and cases where pathways were not considered in the BHHRA. To distinguish between these two cases, it is recommended that Table 6.10 be revised to use a separate symbol for identifying exposure pathways that were not considered in the BHHRA. Further, a footnote or endnote should be added to refer stakeholders to a discussion explaining why the pathways were not considered in the BHHRA.	The tables for SWMU 145 will be revised to distinguish between pathways that were not evaluated for this SWMU (surface soil exposure pathways) and pathways for which there are no COCs. NE now is used only for an applicable scenario that was not evaluated (such as soil at SWMU 145). "---" now appears for scenarios evaluated, but below target levels, and "NA" refers to a pathway that is not applicable (such as separate cancer risk for the child or teen recreational user). The rationale for excluding certain scenarios from evaluation for SWMU 145 is discussed in the text.

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98.	Section 6.3.3, Observations – Future Recreational Users, Pg 6-28	Regarding SWMU 7, the last paragraph in Section 6.3.3 states "default factors used to model contaminant transfer in game are extremely conservative. Iron and uranium both show very large contributions to HI from quail ingestion compared to ingestion of other game (deer and rabbits) and other pathways." Further, the discussion states "the quail ingestion risk and hazard calculations, therefore, are not the most appropriate pathway for consideration for decision-making in the FS." The decision to consider quail ingestion risk and hazard calculations versus those for other ingested game should consider multiple lines of evidence including, but not limited to, estimates of risk and hazard, the occurrence and prevalence of game species at the site, and observed behavior of the receptor population. Further, judgments based on risk and hazard characterizations are likely beyond the intended scope of a BHHRA. It is recommended that the statement regarding the use of quail ingestion risk and hazard calculations in the feasibility study (FS) be moved from Section 6.3.3 to a discussion of recommendations based on all analyses performed as part of the BGOU RI. Note this issue also applies to Appendix F, Baseline Human Health Risk Assessment, Section F.7.5.3, Observations – Future Recreational Users, which contains an identical discussion of risk and hazard results for quail ingestion at SWMU 7.	Because the risk assessments for soil exposure now consist of summaries of previous risk assessments, all interpretation pertaining to individual results or calculations has been removed. The observation and conclusions sections in Appendix F and Section 6 include some discussion of COCs and whether the risk and hazard may be overestimated, but there is no discussion of uptake factors.

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99.	Section 6.3.4, Observations – Future On-Site Rural Residents, Pg 6-28	Section 6.3.4 indicates that total uranium accounted for essentially all of the hazard at SWMU 6, but the exposure point concentration (EPC) was based on a single detection out of 15 samples at the site, and is therefore, not of particular concern for decision making in the FS. Based on the information in Section 6.3.4, this detection should not be discounted completely in the FS as it is unclear whether the single detection of uranium was fully delineated. It is recommended that this statement be removed from Section 6.3.4. Note this issue also applies to Appendix F, Baseline Human Health Risk Assessment, Section F.7.5.4, Observations – Future On-Site Rural Residents, which contains an identical discussion of total uranium hazard at SWMU 6 based on a single detection out of 15 samples.	Because the risk assessment for soil now consists of a summary of past risk assessments, this interpretive material has been removed, as the original documents now summarized here evaluated the dataset and developed the EPC.
100.	Appendix F, Baseline Human Health Risk Assessment, Section F2.3.3, Evaluation of Modeled Concentrations for Groundwater, Pg F-41	The first paragraph in Section F.2.3.3 indicates analytes retained as COPCs in groundwater are listed in Tables F.19 through F.26. Further, the text states "Selected analytes then were modeled…" implying that all analytes were not addressed in the groundwater modeling effort. Revise Appendix F to include a list of identified COPCs that were not addressed in the groundwater modeling.	Groundwater COPCs not modeled are found in the screening tables: all analytes screened as COPCs appear in Tables F.3 to F.10 with "yes" in the rightmost columns. The risk and hazard tables (Tables F.44 to F.67) include the subset that exceeded the resident child NAL at the unit boundary and which also were modeled to the other POEs.

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101.	Appendix F, Baseline Human Health Risk Assessment, Table F.28, Dermal Contact with Soil by an Industrial Worker, Page F-82 and Table F.32, Dermal Contact with Soil by an Excavation Worker, P F-83	A surface area (SA) of 0.47 square meters per day (m2/d) was used to calculate the chronic daily intake (CDI) for dermal contact with soil by industrial and excavation workers. However, the Human Health Methods Document references a SA of 0.43 m2/d for these receptors. The differences in these SA values will have no significant impact on the risk assessment, but for clarification, cite a reference for the SA used to calculate the CDI	This value is the suggested dermal surface area for the outdoor worker from Table 2 of the 2002 Kentucky Risk Assessment Guidance For Superfund. This value is included in the 2008 DRAFT PGDP Risk Methods Document. The revised document does not contain this table because soil risks now are summarized from previous assessments.

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102.	Appendix F, Baseline Human Health Risk Assessment, Table F.29, Inhalation of Vapors from Soil by an Industrial Worker, Page F-82 and Table F.33, Inhalation of Vapors from Soil by an Excavation Worker, Pg F-83	A particle emission factor (PEF) of 6.2E+08 cubic meters per kilogram (m3/kg) was used to calculate the CDI and the radionuclide intake, pCi, for inhalation of vapors from soil by industrial and excavation workers. However, the Human Health Methods Document references a PEF of 3.21E+10 m3/kg. Cite a reference for the PEF used to calculate the CDI and pCi. In addition, provide a discussion justifying the use of the new value and discuss what impact, if any, its use has on risk and hazard estimates.	This value is the suggested PEF for the industrial scenario from Table 1 of the 2002 Kentucky Risk Assessment Guidance For Superfund. This value is included in the 2008 DRAFT PGDP Risk Methods Document. The revised document does not contain this table or use this value because soil risks now are summarized from previous assessments.
103.	Appendix F, Baseline Human Health Risk Assessment, Various Tables	For the exposure scenarios that require evaluation of a child receptor, a body weight of 15 kilograms (kg) was used to calculate the CDI and pCi. However, justification for the use of this value is not provided in the appropriate table footnotes. For the exposure scenarios requiring evaluation on an adult resident, an exposure duration (ED) of 24 hours was used. While the 2008 Risk Methods Document is referenced, the rationale for use of this value is not provided. Revise the impacted tables to include footnotes that provide justification for use of these exposure parameter values in calculating CDI and pCi.	This value is the suggested body weight for the child from Table 1 of the 2002 Kentucky Risk Assessment Guidance For Superfund. This value is included in the 2008 DRAFT PGDP Risk Methods Document. The reference for exposure time for the resident and for all the other values will be revised to cite the source used in the 2008 Methods Document and not the draft document itself. The revised document does not contain this table or use this value because soil risks now are summarized from previous assessments.

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104.	Appendix F, Baseline Human Health Risk Assessment, Figure F.3, Conceptual Site Model for BGOU, Pg F-91	Figure F.3 indicates that the "Groundwater (including seeps)" pathway is incomplete for future recreational users. However, Page F-78 indicates that Bayou Creek, as well as other local ponds, may be attractive for recreation (e.g., swimming, wading). Because groundwater may seep into local surface water bodies, groundwater appears to be a complete pathway for recreational users. Revise Appendix F to resolve this discrepancy.	The groundwater exposure pathway is incomplete (with the exception of the pathways for the Ohio River and Little Bayou seeps, which are complete) because there is no hydrogeological connection from the RGA groundwater and seeps to the ponds, and the current risk assessment evaluates only modeled groundwater from the RGA. The text states that evaluation of groundwater for residential use is the one used for decision-making and would be protective of any potential recreational exposures.
105.	Appendix F, Baseline Human Health Risk Assessment, Table F.151, Toxicity Values for Chronic Exposure to Carcinogens Via the Ingestion and Inhalation Exposure Routes, Pg F-147 and F-148	An inhalation slope factor, SFi, of 3.08E+00 [mg/(kg·day)]-1 was used for total polynuclear aromatic hydrocarbons (PAHs) [as benzo(a)pyrene]. However, Section F.4.2.2, Total PAHs, indicates a SFi of 2.51E-01 [mg/(kg·day)]-1 would be used in the BHHRA. It appears that 3.08E+00 [mg/(kg·day)]-1 is calculated from the inhalation unit risk for benzo(a)pyrene as recommended in the 1995 Supplemental Bulletins from EPA Region 4. Revise Table F.151 to include a footnote describing how the SFi listed for total polyaromatic hydrocarbons was calculated. Further, eliminate the discrepancy that exists between Table F.151 and Section F.4.2.2.	Information in the toxicity tables now includes only for groundwater COPCs [which does not include b(a)P]as soil risk assessments were summarized from other sources.

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106.	Appendix F, Baseline Human Health Risk Assessment, Table F.152, Toxicity Values for Chronic Exposure to Noncarcinogens Via the Ingestion and Inhalation Exposure Routes, Pgs F-149 to F-150	A value of 6.00E-03 was used for the oral reference dose, RfDo, and the inhalation reference dose, RfDi, for trichloroethylene (TCE). However, Section F.4.2.9, TCE (CAS 000079-01-6) (RAIS), indicates that values of 3.00E-04 and 1.14E-02 mg/(kg·day) would be used in the BHHRA (it is believed that the dermal and inhalation values are actually reversed in the last paragraph of Section F.4.2.9). A footnote to Table F.152 indicates that the RfDo and RfDi of 6.00E-03 is a "provisional value provided to DOE's Oak Ridge Operations by EPA's Superfund Health Risk Technical Support Center." Revise Appendix F to eliminate the discrepancy between the information listed for TCE in Table F.152 and Section F.4.2.9. Clearly indicate the RfDo and RfDi values used in the BHHRA and cite the source of those values. If 6.00E-03 mg/(kg·day) is retained, revise Section F.4.2.9 to provide the rationale for using this value in the BHHRA.	The values and sources for the TCE RfDs will be corrected. Information in the toxicity tables is now included only for groundwater COPCs as soil risk assessments were summarized from other sources.
107.	Appendix F, Baseline Human Health Risk Assessment, Section F.6.1.1, Selection of COPCs, Pg F-263	The first paragraph of Section F.6.1.1 discusses the elimination of constituents from the initial COPC screening process based on a detection frequency less than 5%. The text states "During the initial COPC selection process, analytes detected at a frequency less than 5% that were unlikely to be related to processes were eliminated as COPCs. Most COPCs detected at less than 5% frequency also were below their NAL…" The constituents eliminated due to frequency of detection that exceeded their no action levels (NALs) were not identified. Revise Section F.6.1.1 to identify those COPCs eliminated based on frequency of detection that also exceeded their NALs.	The tables of screening to identify contaminants selected for modeling to groundwater have been moved to attachment E3 of Appendix E. The footnotes now identify the specific COPCs eliminated based on frequency of detection and their NALs.

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108.	General	The Screening-Level Ecological Risk Assessment (SERA) for the Remedial Investigation Report for the Burial Grounds Operable Unit at the Paducah Gaseous Diffusion Plant dated July 2008 (BGOU RI) contains many of the required elements of an United States Environmental Protection Agency (EPA)-guidance derived ecological risk evaluation. However, the BGOU RI does not clearly identify the assessment and measurement endpoints for the BGOU. As early as Page ES-7 [see the discussion entitled Risk Assessment (Goal 4)] the text states that the Paducah Gaseous Diffusion Plant (PGDP) is an industrial facility and land use is expected to remain industrial. It also appears that the site does not support substantial ecological resources, and should; therefore, identify "community" level endpoints (i.e., plants and soil invertebrates) as assessment endpoints (Figure G.10, Preliminary Conceptual Site Model for BGOU SWMUs, Page G-23, identifies terrestrial plants as ecological receptors but does not specify soil invertebrates directly). These community endpoints should match the future land use setting and likely use of each solid waste management unit (SWMU). Revise the BGOU RI to identify the environmental resources to be protected (assessment endpoints), and the measurement endpoints used to support the exposure and effects evaluation.	The SERA has been revised to summarize the results of previously conducted ecological risk assessments for surface soil at these SWMUs. A reference is included for each type of screening level used in the previous assessments, but the justification for the choice of screening level is found in the original risk assessment.
109.	General	The SERA indicates that aquatic and wetland habitats (i.e., Little Bayou Seeps and the Ohio River) are present down-gradient of groundwater associated with the SWMUs. It is recognized that the groundwater is included in the forthcoming Ground Water Operable Unit (Ground Water OU) evaluation. The appropriate assessment and measurement endpoints protective of these resources (and for the Ground Water OU) need to be clearly identified and related to the surface water resources. Revise the BGOU RI to incorporate endpoints to evaluate surface soil runoff to adjacent aquatic settings such as the Ohio River, or clearly state if this pathway is considered complete or incomplete.	The SERA has been revised to summarize the results of previously conducted ecological risk assessments for surface soil at these SWMUs. These previous assessments evaluated the SWMUs against only terrestrial receptors/endpoints because water in the ditches near the units was too ephemeral to support aquatic life. The previous assessments also included some calculation of the potential for soil runoff from the SWMU surfaces to actual aquatic habitats further from the sites and concluded such runoff was unlikely to have an impact.

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110.	General	The SERA uses "No Further Action" (NFA) soil screening levels to evaluate effects. A single statement in the last paragraph of Section 6.2, SERA, Page 6-4, indicates these levels "are based on assessment endpoints designed to be protective of all ecological receptors that are potentially present at the site." However, it is unclear whether these NFA values match "community" or "individual" ecological receptor endpoints [e.g., No Observed Adverse Effect Levels (NOAELs) for food chain receptors, threatened/endangered species, plants, invertebrates] as information supporting neither approach is provided. Revise the BGOU RI to describe how these NFA values are deemed appropriate for the SERA evaluations, and how these values support the assessment and measurement endpoints for each SWMU.	The SERA has been revised to summarize the results of previously conducted ecological risk assessments for surface soil at these SWMUs. Results from those previous risk assessments, including HQs for NOAEL-based benchmarks for a suite of mammalian and avian receptors are included. Results of food chain modeling for potential risk from PCBs also are included.
111.	General	Section 1.1, Purpose of Report, of the BGOU RI indicates that the investigations described therein were designed to meet data quality objectives (DQOs) intended to support remedial decisions related to development of a comprehensive remedial investigation (RI) and feasibility study (FS). It is unclear if these DQOs have a risk assessment foundation. Revise the BGOU RI to clarify how the RI efforts were designed to achieve the SERA DQOs. In addition, note that the application of risk-derived DQOs would address the uncertainties identified and discussed on Page 6-31, Section 6.3.7, Observations from the SERA.	The SERA has been revised to summarize the results of previously conducted ecological risk assessments for surface soil at these SWMUs. The documents containing the original assessments address DQOs for those assessments.

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112.	General	The SERA identifies bioaccumulative chemicals of potential concern (COPCs). However, the SERA lacks food chain modeling of these chemicals for potential wildlife receptors known to occur at the site (e.g., coyote, eastern cottontail, opossum, groundhog, whitetail deer, raccoon, grey squirrel and a variety of bat species). Revise the SERA to present a conservative food chain evaluation for representative receptors, if the appropriate endpoints support this approach. As previously noted, the endpoint selection process should be revisited followed by clear identification of suitable receptors to be protected. Then an evaluation of food chain exposed receptors can be incorporated into the SERA, if appropriate.	Food web modeling by receptor for risk from PCBs was assessed in the *Surface Water Operable Unit (On-Site) Site Investigation and Baseline Risk Assessment Report* (DOE/LX/07-0001&D1). The risks to ecological receptors at each SWMU with measured PCB concentrations was calculated for section G.5 of the SERA using this information and used to provide additional evaluation of the risks from PCBs.
113.	Appendix G, Screening-Level Ecological Risk Assessment, Tables G.5 to G.11, Pgs G-25 through G-33	Tables G.5 to G.11 identify the selected COPCs at each of the SWMUs. The data are incomplete and cannot be independently verified. Revise the tables to list all of the analytes included in the analyses, not just those retained as COPCs. In addition, revise these tables to include: (1) the number of soil samples collected from each SWMU and the number of samples included in the evaluation; (2) the number of detections for each analyte; (3) the percent detection; (4) the minimum and maximum analytical detection limits; and (5) the range of detected values. Finally, the column labeled "Rationale" should also indicate if a non-detected analyte was retained as a COPC because the maximum analytical detection limit exceeded the soil NFA value.	These tables were replaced with summary tables of the information in the previous risk assessments. For each COPC, the new tables contain the frequency of detection, the maximum detected concentration, the 95% UCL (if used as an EPC for some receptors), the source for the screening values, and the HQ for each receptor evaluated. The table numbers in the original document for the same information for analytes screened but not retained as COPCs also are provided in Appendix G.