21433

RESPONSE TO EG&G COMMENTS

ON

OBSERVATIONS ON THE OCCURRENCE OF PLUTONIUM AND AMERICIUM IN GROUND AND SURFACE WATER

ROCKY FLATS PLANT

903 PAD, MOUND, AND EAST TRENCHES AREAS

OPERABLE UNIT NO. 2

U.S. Department of Energy
Rocky Flats Plant
Golden, Colorado

JANUARY 1993

List of commentors:

1. L. Woods
2. R. S. Roberts
3. E. J. Morritz
4. M. Z. Litaor
5. U. S. Geological Survey
6. G. Wetherbee
7. R. D. Lindberg
8. R. G. Smith Jr.
9. Unidentified Commentor

Responses to Comments by:

L. Woods

EG&G ROCKY FLATS
ENVIRONMENTAL MANAGEMENT DEPARTMENT

DOCUMENT REVIEW SHEET

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TITLE Observations on the Occurrence of Plutonium and Americium in Ground and Surface Water (Draft) date August 1992

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SECTION OR PARAGRAPH	COMMENT	DISPOSITION	Concur (initial)
General	This need an Executive Summary or at least some sort of introductory summary of the findings.	An executive summary will be provided in the final version.	
Page 1-1	The three purposes might be clearer if they were presented as bullets instead of strung together in a sentence.	The purposes of this study will be presented as bullets.	
Page 2-1	How likely is groundwater to contain Pu and Am? They are both not very soluble and are very well retained by soil particles.	The document concludes, among other things, that Pu and Am are present in ground water.	
Page 3-5	What is HSU? The same as IHSS?	HSU refers to Hydrostratigraphic Unit.	
Page 3-5	Is the reported concentration the mean? Other statistics (e.g. the median) could also be used and the one presented should be clearly identified.	The reported concentration is the mean.	

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SECTION OR PARAGRAPH	COMMENT	DISPOSITION	Concur (initial)
Page 3-5, Paragraph 4	Do you identify specifically which of the data presented are in the reagent blank-subtracted category and which are related to MDA's? or were all post-1990 data in the second?	All pre-1990 data were blank-subtracted, and all 1990 and post-1990 data were not blank-subtracted.	
Page 4-1, Paragraph 2	Mean concentrations are presented with no discussion about the variability inherent in the data. The conclusions presented need a discussion of the differences relative to the uncertainty.	The means discussed in the text are presented to give the reader the magnitude of the plutonium concentrations observed, with and without considering outliers. The table (Table 4-1) lists minimum and maximum values to show the range of the data.	
Page 4-1, Paragraph 3	How frequently have the wells with "frequent occurrences" had occurrences? This discussion is too vague. It sounds like "smoke".	Figures 3-1, 3-2 and 3-4 presents the ratio of detections to total number of samples allowing the reader to evaluate the frequency of detection.	
Section 4.2.2, Page 4-3	The argument for excluding some data points is a good point to make. The discussion presented here is much too vague to do a good job of making the point, however. Is more detail available that can be incorporated? For example, is there a lack of validation? Are there high concentrations for which there is no logical explanation? Is it possible that the sample was contaminated?	Detailed examination of each data point is beyond the scope of this document. A subjective determination on the validity of each data point would involve a complicated and lengthy discussion in the text. Therefore, all data points were used in generating mean, maximum and minimum activity values. However, the commenters concerns regarding the influence of unvalidated data on the conclusions is acknowledged.	
Page 4-3	Again, despite the extensive discussion just presented about statistics, only means and not confidence intervals, standard deviations or other estimates of variability are presented.	Table 4-2 has been revised to include the total number of samples, the total number of detects, the number of samples used to compute the mean, the number of nondetects considered in computation of the mean, and the mean value. To avoid bias, nondetects with high detection limits were not considered in computation of the mean. Calculation of the mean using one-half the MDA for nondetects is explained in the footnote. Because the data do not come from a single population, i.e., they are plutonium concentrations within and exterior to areas of contamination, the population statistic - standard deviation, was not calculated. The minimum and maximum values are provided, however.	
Page 4-4, Paragraph 2	It may be worth pointing out for technical accuracy for Pu and Am may be either in particles larger than 0.45μm or in flocculated groups of smaller particles that are larger than 0.45μm.	This issue will be clarified in the revised draft.	

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SECTION OR PARAGRAPH	COMMENT	DISPOSITION	Concur (initial)
Section 5	It is almost impossible to figure out what you are trying to say in this section. It suffers from poor grammar, fuzzy thinking and unjustified speculation. It needs to be completely rewritten.	This section will be rewritten.	
General	This is an exceedingly poor report. It really ought to be redone and revised again before it is transmitted to anyone.	Comment is acknowledged.	
Page 5-1, Paragraph 3	Runoff is probably not a very important transport mechanism where grassland vegetation is maintained. Almost all precipitation will infiltrate and move downslope through the soil. For dramatic (one year in a hundred) storms, there may well be some surface flow, but litter and vegetation are much better at turning precipitation into infiltration than is commonly believed.	Surface soils are eroded and transported to surface water stations via runoff during precipitation events. The precise mechanism (sheet flow or channelized flow) or time frame is not specified in the report and is beyond the scope of this study. The uncertainty regarding the precise mechanism and time frame will be emphasized in the next draft.	
Page 6-1, Conclusion No. 3	It is possible that the larger than 0.45μm particles are actually aggregates of much smaller clay particles unless efforts were made to disperse such aggregates during sample preparation.	This issue will be clarified in the next draft.	
Page 6-1, Conclusion No. 5	You have no measurements of runoff or overland flow to substantiate the second statement. The last point is a good one and should be related to the above explanation as a limitation on interpreting these data.	See above response.	

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Responses to Comments by:

R. S. Roberts

EG&G ROCKY FLATS
ENVIRONMENTAL MANAGEMENT DEPARTMENT

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SECTION OR PARAGRAPH	COMMENT	DISPOSITION	Concur (initial)
Section 1.2, Paragraph 2, Page 1-2	What is the "dispersed form" of Pu referred to in Sentence 4.	According to Olsen (1980), the dispersed form of Pu included particles ranging from 0.01μm to atomic sized (dissolved).	
Section 2, Paragraph 5, Page 2-1	Look at the spatial relationships between detects and surface water also. Is there a non-detect between these points? Is the groundwater detect spurious?	Detailed examination of each data point is beyond the scope of this document. A subjective determination on the validity of each data point would involve a complicated and lengthy discussion in the text. Therefore, all data points were used in generating mean, maximum and minimum activity values.	
	Evaluate the groundwater data to see if any detects are valid. This would include looking at the spatial relationships between detects. These spatial relationships would tell us if the detects actually have a source or are randomly spaced. Using frequency of detection along with spatial relationships could disqualify a detect. Temporal variations also need to be addressed.		

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SECTION OR PARAGRAPH	COMMENT	DISPOSITION	Concur (initial)
Section 2, Paragraph 5, Page 2-1 (Continued)	Why are we looking at bedrock wells below the UHSU and #1 sandstone? Since we are doing this, a step needs to be included in the UHSU and LHSU interactions. Also, the interactions between the LHSU and surface water are a separate issue.	The water chemistry in bedrock wells below the UHSU was examined for completeness. One objective of this study is to determine if ground water discharging to surface water could account for all of the Pu and Am activity in surface water. Based on Pu and Am activity in ground water from both the LHSU and UHSU, ground water is not the sole source for Pu and Am activity in surface water. Further discussion on the interaction between individual HSUs and between a specific HSU and surface water would not change the conclusions regarding the source for Pu and Am activity in surface water. The authors acknowledge, however, that an understanding of the interaction between individual HSUs and between HSUs and surface water is an important component of the site wide Remedial Investigation.	
Section 2, Page 2-2	In addition to surface soils, should we also evaluate sediments as a possible source of contamination?	The author does not consider stream sediments as a distinct source separate from surface soils. Stream sediments were derived, originally, from surface soils in a continuing process whereby surface soils are eroded and transported to streams via surface runoff during precipitation events. See response to L. Woods Comment No. 14 for additional discussion.	
Section 2, Last paragraph, Page 2-2	I see two separate exercises here. One will be to look at the sediment/surface water interaction in Woman and Walnut Creeks. The other will be to look at correlations between TSS and Pu and Am in surface water seeps.	A comparison cannot be made between Pu and Am activity in sediments and surface water as sediment and surface water samples were not collected concurrently.	
Section 3, Paragraph 2, Page 3-1	Is the bedrock shown in Figure 3-2 a particular sandstone unit.	Pu and Am activity shown on Figure 3-2 represent water quality in monitoring wells installed in all bedrock formations.	
Section 3.1, Paragraph 2, Sentence 7, Page 3-1	The sentence is incorrect. It is possible to hydraulically distinguish unconfined sandstone recharge from infiltration by precipitation and alluvial groundwater flow.	To clarify this issue, the revised draft will state that alluvial groundwater and unconfined groundwater present in sandstone bedrock are hydraulically connected.	

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SECTION OR PARAGRAPH	COMMENT	DISPOSITION	Concur (initial)
Section 3.1, Page 3-7	The effect of unvalidated data needs to be assessed. Do these points bias the mean high or low?	Budgetary and time constraints preclude further evaluation of this issue.	
Section 3.1, Page 3-7	Why isn't a background performance check performed? This is important. The method that is used for this needs to be examined closely. Did the background sample analysis address dissolved or total radionuclides?	The magnitude of the blank (or background) value is an important QA/QC consideration. Unfortunately, the QC protocols employed prior to 1990 were not well documented.	
Section 4.2.1, Paragraph 1, Page 4-1	Why are we looking at Pu and Am concentration levels in bedrock wells?	The water chemistry in bedrock wells below the UHSU was examined for completeness. One objective of this study is to determine if ground water discharging to surface water could account for all of the Pu and Am activity in surface water. Based on Pu and Am activity in ground water from both the LHSU and UHSU, ground water is not the sole source for Pu and Am activity in surface water. Further discussion on the interaction between individual HSUs and between a specific HSU and surface water would not change the conclusions regarding the source for Pu and Am activity in surface water. The authors acknowledge, however, that an understanding of the interaction between individual HSUs and between HSUs and surface water is an important component of the site wide Remedial Investigation.	
Section 5, Paragraph 1, Page 5-1	Is there a known connection between surface water and bedrock?	The water chemistry in bedrock wells below the UHSU was examined for completeness. One objective of this study is to determine if ground water discharging to surface water could account for all of the Pu and Am activity in surface water. Based on Pu and Am activity in ground water from both the LHSU and UHSU, ground water is not the sole source for Pu and Am activity in surface water. Further discussion on the interaction between individual HSUs and between a specific HSU and surface water would not change the conclusions regarding the source for Pu and Am activity in surface water.	

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SECTION OR PARAGRAPH	COMMENT	DISPOSITION	Concur (initial)
Section 6, Paragraph 1, Page 6-1	How is it possible to state that Pu and Am concentrations exceed background levels? There is no basis for comparison.	It appears the Commenter is concerned with the acceptability and/or comparability of background Pu and Am activities in surface and ground water. Table 1-1 presents the currently accepted background values for Pu and Am activity (total and dissolved) for ground and surface water at RFP.	
Section 6, Paragraph 3, Page 6-1	Presence of particles greater than 0.45 μ in ground water does not make sense.	Ground water samples typically exhibit varying degrees of turbidity as a result of aquifer fines mobilized during well construction, development and subsequent purging prior to sampling. In addition, authogenic clay particles may also be transported through the aquifer by groundwater.	

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Responses to Comments by:

E. J. Morritz

EG&G ROCKY FLATS
ENVIRONMENTAL MANAGEMENT DEPARTMENT

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Section 1.2, Paragraph 2, Page 1-2	Note that in the standard methods, solids which are retained on a 0.45 μm filter are considered TSS while solids that pass through a 0.45 μm filter are considered TDS.	The author does not disagree with the commenters statement. However, the terms used in this document are defined in Section 1.	
Table 1-1	Are there WQCC surface water and groundwater standards for Am?	Yes. They are shown in Table 1-1.	
Section 2, Paragraph 6, Page 2-2	Is 0.45 μm the cutoff point for dissolved radionuclide concentrations? Follow the guidelines specified in standard methods.	There are no specific guidelines for determining dissolved vs. particulate radionuclides. As you point out in comment 1, 0.45u is an arbitrary pore size diameter for differentiating between dissolved and suspended solids. Water passing a 0.45u filter can contain high concentrations of colloidal material.	
Section 3.2, Paragraph 2, Page 3-5	Is minimum detectable activity (MDA) calculated as per EPA "or" RFP annual report method (page 205, 1990)? Are they the same?	MDAs are calculated in accordance with the EG&G General Radiochemistry and Routine Analytical Services Protocol (GRRASP). EPA radiochemical analytical procedures are referenced in this document.	

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Section 4.2.4, Paragraph 1, Page 4-4	You are making the assumption that the Pu is in a plume emanating from the 903 Pad and activity decreases with distance from source. This is not necessarily the case. Perhaps Pu has been "flushed" from the system and you are observing the tail of the plume.	The Aerial Radiological Survey of RFP (Figure 5-1) conducted in 1990, shows the presence of radionuclides in surface soils around and east of the 903 Pad suggesting that the suspected source material for the ground water plume has not been depleted. The author acknowledges, however, that the precise mechanism for the introduction of radionuclides into groundwater is uncertain.	
Section 5, Paragraph 5, Page 5-4	1. Are the correlations between radionuclide concentration and TSS mathematically calculated? 2. If yes, what was the confidence level? 3. What are the resulting correlation equations?	Correlation equations and correlation coefficients for the TSS/radionuclide concentrations relationships are provided in the revised document. The coefficients are not used to draw any conclusions, however. Conclusions are drawn based on the overall trends in the data.	

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Responses to Comments by:

M. Z. Litaor

EG&G ROCKY FLATS
ENVIRONMENTAL MANAGEMENT DEPARTMENT

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Section 1.2, Paragraph 1, Page 1-1	Figure 1-1 does not provide the location of seeps.	Figure 1-1 illustrates the locations of IHHSs. Figure 3-4 provides the location of seeps.	
Section 1.2, Paragraph 1, Page 1-1	Concentrations of Pu and Am are undefined. Summarize Pu and Am data.	This document in its entirety is intended to provided, among other things, a summary of Pu and Am activity in surface and ground water. Therefore, it is inappropriate to present this information in a Section entitled Background Information. The requested data is presented in subsequent Sections.	
Section 1.2, Paragraph 1, Page 1-1	The paragraph has to be rewritten with much better use of historical data (i.e., references). There are unsubstantiated statements that should be modified.	Many statements made in Section 1.2 are supported by the references cited. Additional references will be provided for statements made in the first paragraph of this Section.	
Section 1.2, Paragraph 1, Page 1-2	Provide references to support the statement that "Pu and Am in surface soils are obvious sources of these radionuclides occurring in surface water, and a possible source of Pu and Am occurring in ground water."	The revised text will discuss soil erosion as one of several mechanisms by which radionuclides are introduced into surface water.	

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SECTION OR PARAGRAPH	COMMENT	DISPOSITION	Concur (initial)
Section 1.2, Paragraph 2, Page 1-2	The work by Penrose et. al. (1990) showed that the size of colloidal Pu is between 20-450 nanometer.	Comment is acknowledged.	
Section 1.2, Paragraph 2, Page 1-2	Mention in paragraph 2 that Pu can also adsorb onto colloidal material.	The text will be modified to indicate that Pu can adsorb to colloidal material.	
Section 1.2, Paragraph 2, Page 1-2	How do you know that the dispersed form of Pu resulted from the dissolution of Pu by hydrochloric acid that formed in the drums of cutting oil?	It is beyond the scope of this study to confirm the work performed by Olsen, et al., 1980.	
Section 1.2, Paragraph 2, Page 1-2	What is the rationale for the statement that the dispersed form of Pu is adsorbed to clay? We are currently performing research in this area using a sequential extraction procedure. It is most likely that PuO_2 is adsorbed to organic matter and/or sesquioxides, and not to clay.	It is beyond the scope of this study to confirm the work performed by Olsen, et al., 1980.	
Section 1.2, Paragraph 2, Page 1-2	Why don't we use a "colloidal" definition, instead of a "dissolved" definition?	The text will be revised as follows: "Total" data are the Pu and Am activities of unfiltered water. "Filtered" data are the Pu and Am activities of water samples that have been passed through a 0.45 μ filter.	
Table 1-1	Are the background concentrations of Pu and Am listed in Table 1-1 the mean concentrations? If yes, what is the standard deviation?	The background values are the upper limits of the 95% tolerance intervals as presented in the Background Geochemical Characterization Report, 1992. This is now noted in the footnote to the table.	
Section 3, Paragraph 2, Sentence 7, Page 3-1	Provide additional information on recharge mechanisms to unconfined sandstone. How did the investigator determine the recharge cycle?	To clarify this issue, the revised draft will state that alluvial groundwater and unconfined groundwater present in sandstone bedrock are hydraulically connected.	
Figure 3-1	Figure needs to be augmented with additional information from previous OU2 investigations.	Please provide specific examples of missing information. The authors are not aware of missing information from "previous OU2 investigations".	

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Section 5, Paragraph 2, Page 5-1	Surface soils in OU2 are not the secondary, but the primary source of contamination.	The author agrees that soils are the primary source for Pu and Am in surface water. The phrase "secondary source" was not intended to imply a relative ranking. The text will be clarified.	
Section 5, Paragraph 3, Sentence 1, Page 5-1	The statement needs to be supported with data. Most of the surface flow at RFP runs along roads not through soils. The high percentage of vegetative cover reduces surface flow considerably. In addition, the texture of the soils (loamy to sandy loam) is conductive to infiltration. Most likely soil erosion is a minor component in the fate and transport of Pu from soils to surface water. However, flow within the soils to seeps is probably the principal cause, and is currently under study.	The revised text will discuss soil erosion as one of several mechanisms by which radionuclides are introduced into surface water.	
Section 5, Paragraph 3, Page 5-1	The concern relating to higher radionuclide concentrations in surface water due to disturbance of soils near a sampling station should be addressed promptly.	Acknowledged.	
Section 5, Paragraph 4, Page 5-4	Prove that the majority of radionuclides in surface water are associated with eroded soils.	The revised text will discuss soil erosion as one of several mechanisms by which radionuclides are introduced into surface water.	
Section 5, Paragraph 4, Page 5-4	The majority of radiochemical contamination is in a particular phase due to vadose zone flow and not through overland transport.	The commenter appears to imply that Pu and Am adsorbed to particulates in the surface soil matrix are transported to surface water sampling stations by aqueous flow through the vadose zone. If this is the commenters position, the author is in disagreement with the commenter. Aqueous flow through soils as a wetting front (during or after a precipitation event or snow melt) would be primarily in a vertical direction until the wetting front was depleted or it encountered the water table (perched or otherwise). Lateral flow (to a seep) would occur as ground water in a saturated interval. One conclusion of this study was that ground water is not the primary source for Pu and Am detected in surface water.	

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Section 6, Paragraph 5, Page 5-4	1. It is not clear why surface soils constitute a secondary source for radionuclides in surface water. It is doubtful that surface runoff by precipitation is the mechanism whereby soil contamination is introduced into surface water. Flow and transport within the vadose zone is more important and is currently under study.	See above response.	

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Responses to Comments by:

U. S. Geological Survey

EG&G ROCKY FLATS
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Table 4-2	It would be helpful to include in this table the number of values in the "accepted data set" and the number of values for which 1/2 the GRRASP MDA of 0.005 was used. Also a standard deviation would be helpful. For example: ^{231}Pu — ^{241}Am mean +/- S.D. (1,2) — etc. 0.127 +/1 ? (7,?) 1.) All values reported..... 2.) One half the GRRASP (EG&G....) In this way it is possible to see how the 0.005 data affects the mean values.	Table 4-2 has been revised to include the total number of samples, the total number of detects, the number of samples used to compute the mean, the number of nondetects considered in computation of the mean, and the mean value. To avoid bias, nondetects with high detection limits were not considered in computation of the mean. Calculation of the mean using one-half the MDA for nondetects is explained in the footnote. Because the data do not come from a single population, i.e., they are plutonium concentrations within and exterior to areas of contamination, the population statistic - standard deviation, was not calculated. The minimum and maximum values are provided, however.	

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Responses to Comments by:

G. Wetherbee

EG&G ROCKY FLATS
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General	It is incorrect to infer that radionuclide activity is synonymous with concentration. Concentration is in units of mass/volume, but activity is in units of "n" cubes/volume. You are reporting activity, not concentration.	The text will be revised to show the term activity in place of "concentration".	
Table 1-1, Page 1-4	1. The background concentrations of Pu and Am in surface water appear to be extremely high. 2. What is the "other" groundwater listed in Table 1-1?	The values are the upper 95% tolerance limits as reported in the Background Geochemical Characterization report. "Other" ground water referred to the lower ground water flow system at the RFP (deep bedrock sandstone). The table has been revised to be more clear and precise as to the origin and nature of the values shown.	
Section 2, Page 1-1	The phrase non-detect is not applicable for radionuclides because of the statistical nature of the analysis.	Values below the MDA can be considered nondetects. Development of a data set of "detects" is thoroughly discussed in Section 3.2.	

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Responses to Comments by:

R. D. Lindberg

EG&G ROCKY FLATS

ENVIRONMENTAL MANAGEMENT DEPARTMENT

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SECTION OR PARAGRAPH	COMMENT	DISPOSITION	Concur (initial)
General	Use the 9/30/92 background data if time permits.	This has been done.	
Section 1.2, Paragraph 1, Page 1-1	It is stated that "radionuclides are significantly elevated in surface soils in the vicinity of the 903 Pad." What yardstick are the radionuclide levels being compared against?	The word "significantly" will be deleted from the text.	
Section 1.2, Paragraph 1, Page 1-2	Provide a reference or some other evidence for the statement that Pu forms coprecipitates with hematite (Fe_2O_3).	This conclusion was made by Olsen, et al., 1980, and the revised text will cite this reference.	
Table 1-1	Do the background Pu and Am concentrations in surface water refer to the upper tolerance limits or the maximum values or the minimum values?	The background values are the upper limits of the 95% tolerance intervals as presented in the Background Geochemical Characterization Report, 1992. This is now noted in the footnote to the table.	
Figure 3-1	Are the dry wells shown in Figure 3-1 always dry?	Wells indicated as dry contained no ground water at the time that water sampling was attempted for radionuclide analyses.	

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SECTION OR PARAGRAPH	COMMENT	DISPOSITION	Concur (initial)
Figure 3-2	The table in Figure 3-2 showing Pu and Am concentrations in the various bedrock monitoring wells is incomplete.	The table presented on Figure 3-2 will be reviewed for completeness and modified as appropriate.	
Figure 3-3	The assumptions used for plotting the potentiometric surface of the unconfined ground-water flow system may not be true.	The hydrogeology of OU2 currently is under intensive study, primarily as part of the Phase II RI. In light of this, the authors acknowledge the commenters concern.	
Section 3.2, Paragraph 1, Page 3-5	The statement that, "the error term (b) when added to or subtracted from the radionuclide concentration provides a concentration range in which there is a 95% probability that the true concentration resides" is valid only for normal distribution and will not apply to Poisson distributions.	We agree. The statement has been removed from the text.	
Section 3.2, Page 3-7	Why is analytical result considered unacceptable if error term is larger than the reported concentration?	Review of the Pu activity data for ground water indicates that, for the data where the reported value is less than the MDA, 90% of the time the error term is equal to or greater than the reported value. This is discussed in the revised document.	
Section 4.2.1, Paragraph 2, Page 4-1	Was the distribution of Pu and Am concentrations tested? Was an outlier test applied?	This statistical treatment of the data was beyond the scope for this project. Please see response to USGS Comment 1.	
Section 4.2.1, Paragraph 2, Page 4-1	The data in Appendix does not support the statement that Pu and Am concentrations are as high as 0.5 and 0.04 pCi/ℓ in the Mound and East Trenches Area.	The data presented in the Appendices will be compared with the reported range of concentrations of Pu and Am in the Mound and East Trenches area. If an error is found, the text will be modified accordingly.	
Table 4-2, Page 4-5	Are the concentrations of Pu listed in Table 4-2 the "filtered" concentrations or the "total" concentrations?	Both filtered (dissolved) and unfiltered (total) concentrations are presented in Table 4-2.	
Table 5-1	List the mean concentrations of Pu and Am in Table 5-1.	This has been done.	
Section 5, Page 5-4	1. Provide the rationale for the statement that "if the majority of radionuclides in surface water are associated with eroded soils, then total radionuclide concentrations should exceed the dissolved fraction by at least a factor of 2. 2. What is the basis for selecting a factor of 2?	Total activity is the sum of the dissolved (filtered) activity and particulate activity. Therefore, if the majority of the activity is associated with particulates (i.e., eroded soils), the total activity must be greater than 2 times the dissolved (filtered) activity.	

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SECTION OR PARAGRAPH	COMMENT	DISPOSITION	Concur (initial)
Section 1.2, Paragraph 2, Page 1-2	Instead of the word "dissolved," it would be more appropriate to use the word "filtered."	The text will be revised as follows: "Total" data are the Pu and Am activities of unfiltered water. "Filtered" data are the Pu and Am activities of water samples that have been passed through a 0.45 μ filter.	
Section 5, Paragraph 5, Page 5-4	The approach towards deriving correlations between radionuclide concentrations and TSS should be more quantitative. Why not provide a linear correlation coefficient?	This has been done.	
Section 6, Page 6-1	1. Do the Pu and Am concentrations exceed UTL? 2. Support the claim that Pu and Am concentrations exceed background with specific figures.	The concentrations do exceed the upper tolerance limits. Concentration data and UTLs are presented in the document.	

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Responses to Comments by:

R. G. Smith Jr.

EG&G ROCKY FLATS

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SECTION OR PARAGRAPH	COMMENT	DISPOSITION	Concur (initial)
General	A major concern is the overly simplistic representation of the unconfined (upper HSU) ground water flow system. The hydrogeologic model appears to be based on 1988 data. Preliminary Phase II RI data indicates a more complex hydrogeological regime than assumed in the report.	The authors acknowledge that the hydrogeologic model for OU2 and RFP is being modified based on Phase II RI and other data. However, at this time the new information has not been released in draft form. Changes in our understanding of the interaction between the different hydrostratigraphic units and between ground water and surface would have little bearing on the primary conclusions made in this document. The conclusions are based on global observations on the Pu and Am activity in groundwater and surface water.	
General	Data from pre-1986 wells should not be emphasized (or discussed at all) considering how little we know about completion intervals, well seals etc.	It is recognized that there is considerable uncertainty regarding data from the pre-1986 wells due to lack of well construction information. Nevertheless, data from many of these wells indicate plutonium contamination which should not simply be summarily dismissed. In most instances, data from surrounding post-1986 wells corroborate the conclusion of groundwater plutonium contamination. This is discussed in the revised document (Section 3.4).	

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SECTION OR PARAGRAPH	COMMENT	DISPOSITION	Concur (initial)
Section 4.2.1, Page 4-1	Well 4286 is referenced as an East Trenches area well. The recent OU2 data indicate that this well is located in an alluvial (paleo) channel that leads from beneath the 903 Pad/Mound area. It is probable that ground water quality at this well is more representative of the 903 Pad/Mound area rather than East Trenches area contamination considering the local ground water flow regime.	The relevance of the main paleochannel on the bedrock surface will be reviewed with respect to statements made in sections 4.2.1 and 4.2.4. The text will be modified as appropriate.	
Section 4.2.3, Page 4-4	Total Pu and Am concentrations appear to be related to solid loading. It would appear that any discussion related to particle size of the contaminants (in the absence of TSS data or paired total and dissolved data) is highly speculative and possibly premature.	Comment is acknowledged. The text states that it is difficult to draw substantial conclusions regarding the chemical phase in which radionuclide exist in groundwater.	

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Figure 3-4	What is the location of SW059?	Surface water station SW059 is illustrated on Figure 3-4 and is located north of the Mound Area.	

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