

REVIEW COMMENT SET
REVIEW OF: DRAFT PHASE I RFI/RI WORK PLAN
ROCKY FLATS PLANT
OTHER OUTSIDE CLOSURES
OPERABLE UNIT NO. 10
OCTOBER 1991

[PRELIMINARY NOTE 1: We worked from the Inter-Agency Agreement (IAG), January 22, 1991, without modifications or amendments

We do not have (and therefore cannot verify compliance with) the following documents:

Resource Conservation and Recovery Act of 1976 (RCRA) Part B Permit Application, Revision No. 1, December 15, 1987 and April 13, 1998 partial revision.

Transuranic Mixed Wastes, RCRA Part B Permit Application, July 1, 1988.

Comprehensive Environmental Assessment and Response Program, Phase I, DOE 1991

The Quality Assurance (QA) Addendum for OU10 was not available, precluding review of certain QA protocols.

PRELIMINARY NOTE 2: Because certain sections (i.e., Section 2.1, 2.2 and 7.3) included numerous subsections (i.e., the individual site descriptions, conceptual models and field sampling plans (FSPs)), we have chosen to address these sections generically.

CRITICAL COMMENT

1. The data quality objectives (DQOs) developed in this work plan do not appear to meet the objectives of a quantitative assessment program. The FSP should be tied much more closely to specific data needed to address concerns critical to quantitative decision-making.

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GENERAL COMMENTS

1. The Work Plan appears to be on schedule for submission according to the IAG Milestone Schedule (IAG Statement of Work [SOW] p. 17).
2. The Work Plan demonstrates an understanding of the process for selecting applicable or relevant and appropriate requirements (ARARs). Comments have been made where text needs revision, however, potential ARARs have not been evaluated individually.
3. Since project scoping has not been performed in detail, the work plan has a weak conceptual framework and quantitative basis. Current Environmental Protection Agency (EPA) efforts at streamlining emphasizes the importance of adequate project scoping to a successful, parsimonious effort. Many activities (such as preliminary development of alternatives, conceptual model development, and DQO development) should be conducted in detail during scoping.
4. The document seems to miss the overall role of a conceptual model in the scoping of an RCRA Facility Investigation/Remedial Investigation (RFI/RI) - Corrective Measures Study/Feasibility Study (CMS/FS) effort. Instead of forming the framework around which the RFI/RI effort is based, the conceptual modeling effort appears to be viewed as an appendage to the overall RFI/RI process. The conceptual models presented in the Work Plan should be specific, address the important issue of future land use, and have the capacity to consider the importance of other sources of contamination on the OU10 individual hazardous substance sites (IHSSs).
5. To be adequate from a quantitative point of view, the DQO process discussed in Section 4.0 should provide the framework for development of statistically-based tools and data of adequate quality to permit the making of decisions critical to environmental restoration within known bounds of uncertainty. The key RFI/RI decisions should be identified. The Work Plan should provide the basis for the quantitative decision-making that drives the RFI/RI - CMS/FS program.
6. The Phase I RFI/RI effort will not produce the data needed for a Baseline Risk Assessment.
7. Section 8.0, Baseline Risk Assessment, is a generic description of the human health risk assessment process. The contents of this section are not related to the actual Phase I RFI/RI effort. Relating the requirements of the baseline risk assessment presented in Section 8.0 to the FSP would greatly benefit the Work Plan.

In Section 8.2, (Baseline Risk Assessment, Data Collection and Evaluation) on pg. 8-6, several action items are identified in the bullets under Data Collection. These include such quantitative considerations as addressing modeling parameter needs, defining background sampling needs to distinguish site-related contamination from naturally occurring or other nonsite-related levels of chemicals, conducting preliminary exposure assessments, and

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developing an overall strategy for sample collection to make sure data are appropriate for use in quantitative risk assessment. None of these action items have been addressed in the Phase I RFI/RI work plan for OU10

We suggest that the investigators go through Section 8.0 and integrate many of the actions identified therein into the development of the FSP. Section 8.0 should be used to ensure that the Phase I field effort is collecting the data needed for risk assessment. The DQO process should be rigorously applied to these data needs

8. The FSP is weak in several ways. The sampling designs (particularly the grid spacing) are not justified on quantitative (i.e., statistical) grounds. There needs to be an attempt to justify the numbers of samples to be collected. There should be assurance that the data will meet the needs of quantitative decision-making.
9. To be consistent with current EPA guidance, serious consideration of remedial alternatives development and their consideration in scoping the Phase I sampling program need to be addressed before all Phase I data have been collected.
10. While there is occasional mention of background concentrations and comparisons of monitoring results with background concentrations, it is clear that these issues have not been seriously considered. This is reflected in the FSP and the Quality Assurance Project Plan (QAPP), which give inadequate consideration to the use of duplicate samples to establish total variability. This variability is critical to designing an effective sampling program to determine if background or fixed (often risk-based) standards have been exceeded.

The methodology by which site-specific statistical background values will be established should be presented. Critical decisions regarding attainment of cleanup standards will ultimately be based on this work.
11. The exposure assessment, and particularly the use of modeling to estimate concentrations of contaminants at offsite points of exposure, is weak. Models need to be identified, and the statistical characterization of exposure assessment parameters should be addressed.
12. The Environmental Evaluation Work Plan (EEWP) does not appear to completely fulfill the recommended EPA guidance for preparation of an RI/FS Work Plan and a Sampling and Analysis Plan (SAP). The most significant shortcomings in the EEWP as compared to the EPA guidance are deficiencies in (1) the initial evaluation of existing data and information, which should include the conceptual model, and (2) the work plan rationale, which should include the definition of the environmental risk assessment methodology and associated data needs
13. The EEWP identifies the need for coordination and integration of data collection activities with the EEWPs being conducted for OU1, OU2, and OU5. However, the integration and coordination of the data collection activities (and subsequent interpretations of impacts and risks to receptors) in the OU10 and OU2 EEWPs may be difficult due to differences in

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technical approach. We recommend that consistency in the EEs across Rocky Flats Plant (RFP) is established and maintained.

14. The EEWP needs to address in more detail the impact and risk assessment methodologies. In general, the EEWP needs to demonstrate how risks and impacts will be assessed (based mainly on tissue burdens), and (with the exception of aquatic toxicity testing) how exposure to suites of contaminants will be addressed. The methodology used to define ecological criteria in the pathways analyses should be explained in detail. The discussion should not preclude an adequate evaluation of the criteria development methodology, the uncertainties associated with the methodology, and how these criteria can be used in impact assessment.
15. The EEWP indicates that the ecological inventory stations will be located at, or in the immediate vicinity of, stations at which abiotic media will be characterized for contaminant burdens. We are concerned that sufficient data on the nature and extent of contamination may not be available to aid in the selection of the final locations for the ecological inventory sampling. The EEWP indicates that development of criteria for selection of contaminants of concern will occur during Task 1. However, it is not clear how these criteria will influence the selection of contaminants for Phase I sampling of abiotic media.
16. The precise use to which reference areas will be put should be defined (i.e., in a quantitative context). The EEWP should describe in detail the approach to impact or risk assessment to be employed using these reference areas. If assessment methodologies employing reference areas are to be used, we suggest that different approaches are considered, such as comparing impacted areas in OU10 with a number of similar reference areas throughout the general Boulder-RFP region so that a standard "range" of background or reference conditions can be established for the entire RFP and used consistently across OUs. It would then be possible to test whether or not OU10 area(s) fall within the range of unimpacted conditions.
17. According to Figure 9.4-1, Task 1 scoping activities will take five months to complete (months 1-5), while Task 2 activities will require up to nine months to complete (months 1-9). The Task 3 field sampling activities are scheduled to begin in month 1. Given the need to complete the scoping activities before field sampling can be initiated, beginning ecological inventory sampling and toxicity testing in month 1 does not seem realistic.

SPECIFIC COMMENTS

1. Section 1.0, page 1-1, para. 1: Since the fifth sentence almost implies that Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requirements don't apply, the sentence should be changed to "Although the IAG makes RCRA activities and terminology primary at OU10, it nonetheless requires compliance with both RCRA and CERCLA."
2. Section 1.0, page 1-1, para. 3: This Work Plan correctly addresses characterization of source materials and soils. The IAG, however, states further that this is to "... provide the

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information necessary to determine the risk associated with the source of contamination at each...unit..." (IAG SOW, p. 13) Characterization of source materials and soils may not provide enough information for adequate risk assessment.

3. Section 1.0, pg. 1-1, para. 2: The relationship of IHSS definitions to the several source documents should be clarified, particularly with respect to the information in Section 1.3.2 on pg. 1-7.
4. Section 1.0, pg. 1-3, para. 1: A sentence should be added to explain how National Environmental Policy Act (NEPA) activities and documentation requirements have been handled.

Since the EPA Superfund Public Health Evaluation Manual is no longer applicable, we suggest deleting the last bullet item. Several other guidance documents that should be included in the list are as follows:

Environmental Protection Agency (EPA) 1987a. Data Quality Objectives for Remedial Response Activities: Development Process. Office of Emergency and Remedial Response. EPA/540/G-87/003.

Environmental Protection Agency (EPA) 1987b. Data Quality Objectives for Remedial Response Activities, Example Scenario: RI/FS Activities at a Site with Contaminated Soil and Ground Water. Office of Emergency and Remedial Response. EPA/540/G-87/004.

Environmental Protection Agency (EPA) 1989a. Report on Minimum Criteria to Assure Data Quality. EPA/530-SW-90-021.

Environmental Protection Agency (EPA) 1990a. Guidance for Data Useability in Risk Assessment. Interim Final. Office of Emergency and Remedial Response, EPA/540/G-90/008.

Environmental Protection Agency (EPA) 1990b. A Rationale for the Assessment of Errors in the Sampling of Soils. Office of Research and Development, Environmental Monitoring Systems Laboratory, Las Vegas, NV, EPA/600/4-90/013.

5. Section 1.2, pg. 1-4, para. 2: Some mention should be made of the QAPJP and the Quality Assurance Addendum (QAA), as they are critical to a successful RFI/RI effort.
6. Section 1.2, pg. 1-4, para. 3: If the FSP will provide data to "evaluate remedial alternatives" it assumes that potential remedial alternatives have been identified. These alternatives should be identified.
7. Section 1.2, pg. 1-5, para. 1: The last sentence in this paragraph appears to be redundant within itself. We suggest rewording the sentence to read "The baseline risk assessments will provide the justification for performing Corrective/Remedial Actions."

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8. Section 1.2, pg 1-5, para 2. The phrase " . . . to adequately characterize . . . " should be defined in terms of what will be evaluated quantitatively, what will be evaluated qualitatively, and what are the restrictions and uncertainties in the assessment.

The bullet items do not appear to be sufficient for a comprehensive environmental evaluation. Any additional efforts to be conducted under Phase II should be described briefly to set the proper context for evaluation of Phase I field efforts

- 9 Section 1.3.1, pg. 1-6, para. 1: If materials referred to in the " . . . off-site disposal of solid radioactive materials . . . " contains Pondcrete and Saltcrete it is mixed waste.

The DOE facility to which the waste will be transferred for disposal should be identified.

The relationship of the last sentence (beginning with "Preliminary assessments") to the OU10 IHSSs should be described

10. Section 1.3.2, pg. 1-7, para. 1: The relevance of these different IHSSs categories to the way in which the RFI/RI effort is conducted should be explained.

11. Section 1.3.3.1, pg 1-8, para. 1 and 2. These paragraphs should be moved so that the second paragraph is first.

The "security area" and "buffer zone" identified in paragraph 2 should be included in Figure 1.3-1

- 13 Section 1.3.3.2, pg. 1-8, para. 3. The "operation area of RFP" should be defined.

14. Section 1.3.3.3, pg 1-8, para. 4. This summary discussion should be more detailed (e.g., "cool winters, with some snow" should be replaced with average temperatures and inches of precipitation).

15. Section 1.3 3.3, pg 1-10, para 1: Please relate this information to RFP, especially this last sentence.

- 16 Section 1.3 3 4, pg 1-10, para 3: The series of ponds on Walnut and Woman Creeks should be discussed

The drainage situation on the southern RFP security area should be presented so there is clear recognition that the flow was to Woman Creek, and the SID diverted this flow path from Woman Creek.

The reference to " . . . between RFP and Woman Creek . . . " needs to be clarified. It appears the reference is to the RFP security area.

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17. Section 1.3.3 5, pp. 1-10 & 1-12, para. 4. If the "Property Protection Area (PPA)" is the buffer zone it should be identified as such. The information about the size of these areas is redundant and could be deleted.

The reference to the Montane uplands is confusing. The location of the uplands should be included. The term "... expressed in the foothills as savannah..." should be clarified.

The reference to "Ravines" should be clarified (i.e. is this the foothills ravine community discussed in the next paragraph).

18. Section 1.3.3.5, pg 1-12, para. 1: The references to "... the lands acquired in 1974 ..", "... the lands originally acquired for the site in 1951 ..." and "... the original boundary ..." are confusing. Consistency in the use of these terms is necessary.

A map showing the distribution of vegetation types over the RFP would be helpful.

A map showing the distribution of the IHSSs over these vegetation units would also be useful.

There is no mention of endangered or threatened species on the RFP. Several species of concern have recently been found and should be reported.

19. Section 1.3.3 5, pg. 1-13, para. 1: Prairie dogs should be included in this section
20. Section 1.3.3 6, pg. 1-15, para. 1: The assertion that "RFP is located in a rural area" has not been adequately justified, particularly with regard to the population information in the next paragraph. More recent land use data should be used in place of the 1973 data.
21. Section 1.3.3.6, pg. 1-15, para. 2: The fifth sentence, beginning with "Recent population estimates registered ..." should read "Recent estimates of population growth registered .."
22. Section 1.3.3 6, pg. 1-16, para 1: The term "TOSCO" should be defined.
23. Section 1.3.3.7, pp 1-16 to 1-19, entire section: The discussion of regional geology and hydrology is not geared to quantitative assessment. There is needs to be consideration of the heterogeneity of the geological media.

A "West to East Cross-Section" of the geology would be very helpful.

The uppermost hydrologic unit, which is of regulatory significance, should be identified in this section.

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24. Section 1.3.3.7, pg 1-19, para. 1: The depth to the water table should be provided.

Some indication of the variability of the depth of alluvium and the characteristics thereof should be included.

Also, the rates of groundwater flow should be provided.

25. Section 1.3.3 7, pg. 1-20, para. 1: The bedrock aquifer of concern and its linkages with the alluvium should be defined. Whether the aquifer is included in the "uppermost hydrologic unit" and how much of the Arapahoe Formation is potentially affected by RFP activities should also be discussed.

Other RFI/RI Workplans describe a "weathered zone" in the Arapahoe Formation that is potentially affected by RFP activities. How this "weathered zone" relates to the information this paragraph should be discussed.

The rates of groundwater flow should be included.

26. Section 2.0, pg. 2-1, para. 3: This paragraph is difficult to understand. The statement that "The background level data used to analyze the 1988 soil data . . ." should be clarified. With regard to the last sentence, the specific table number from the Background Geochemical Characterization Report should be cited.

27. Section 2.1, pp. 2-1 to 2-146, entire section: This section presents background and physical setting information for the OU10 IHSSs (Sections 2.1 1. through 2.1.16). The following types of concerns were found in these discussions:

There should be closer correspondence of the text discussions and the figures displayed in these sections. In some cases, entities are mentioned in the text, but not shown on the corresponding figure. For example, Section 2.1.1.3 (pg. 2-7) indicates that the french drain system and interceptor trenches are shown in Figure 2.1-1, while they are not. In Section 2.1.4 1, the description of the location of the Dumpster Storage Area of IHSS 174 is difficult to reconcile with Figure 2.1-8. Locations of stained ground and their relationship to specific soil sample locations should be made clear for all IHSSs. In certain cases, wells identified as being closest to IHSSs could be shown on the associated figures (e.g., Figure 2 1-13).

The individual IHSS discussions contain numerous instances of repetitive material. For example, the second paragraph in Section 2.1.4.2 (pg 2-27) and the second paragraph in Section 2.1.4.4 essentially say the same thing. A similar situation exists for Sections 2.1.5.1 and 2.1.5.2. Such redundancy should be removed in editing.

With regard to the "Physical Characteristics" discussions, there is occasional inconsistency in the depth of surficial material and the depth to groundwater. For example, in Section 2.1.1.3, the depth of surficial material is given as 10 ft, while the groundwater is given as approximately 10 to 15 ft below the ground surface

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The 1988 soil sampling efforts should be discussed at the beginning of the section. Proper background to this effort should be presented, since it is the primary data source for the IHSS-specific sections on the Nature and Extent of Contamination. The discussions about only certain percentages of soil samples being collected while awaiting final approval of the Closure Plan needs to be clarified on a generic basis at the beginning of Section 2.

The soils sampling data from the 1988 survey is presented in a very "non-quantitative" manner, and there appears to be no attempt to utilize these data to design an efficient Phase I sampling program. These data might well be useful in establishing variance components for optimizing the design of the Phase I field effort.

There are numerous references to comparison of the results of the 1988 soil sampling to background. Apparently this indicates a simple comparison of individual values from the IHSS soils with background means(?). Such comparisons have no statistical meaning, and a concentration above a background mean does not necessarily mean that the contaminant is present above background. These discussions need to indicate exactly what was done in these comparisons, and why they were done.

The tables of soils sampling summary data (e.g., Table 2-1) could be improved, at least with regard to the "Concentration Range" column. We suggest adding a column giving the detection limits. The importance of the "B" delimiters is also not entirely clear. How a concentration range for radionuclides can be determined when only one sample is collected needs to be clarified.

There are several references to a "random systematic grid sampling program" (for example, see Section 2.1.4.2). This has not been adequately defined, and does not appear to represent what it says. A random systematic grid is one in which the first location is selected at random, and all other locations are defined on the basis of this first location.

The discussions should pay more attention to the important consideration of contamination from other sources, which is particularly important for groundwater assessment. Upgradient wells at several IHSSs (e.g., IHSS 176) are contaminated, yet the plan mentions nothing about the source of the contamination (in the case of IHSS 176, it is the Solar Ponds). The importance of this contamination should be given greater consideration.

The influence of the slope of the weathered bedrock surface on groundwater flow in the alluvium (particularly where the alluvial layer is shallow) indicates that this phenomenon must be considered in groundwater flow modeling. Since groundwater modeling is not discussed, this is not given adequate attention. It should be an integral component of the conceptual model at the site, and is a source of heterogeneity in the system.

28. Section 2.1.1.3, pg 2-7, para. 2: The reference to "shallow soils around IHSSs 124.1 . . ." should be clarified. Also, how the unsaturated conditions of the shallow soils shows that the existing french drain system is effectively collecting the shallow groundwater from the area of these tanks should be clarified.

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29. Section 2.1.1 4, pg 2-7, para 4: The "possible" contaminants listed herein were not discussed in Section 2.1.1.1, as indicated.
30. Section 2.1.3.2, pp. 2-21 & 2-22, para. 4. Whether or not the six tanks referred to herein are the same 6 tanks cited 3 paragraphs earlier in Section 2.1.3.1 (pg. 2-21) should be indicated. The presentation of the results of the tank sampling is not clear. The entire paragraph should be written more clearly to allow the reader easier understanding.
31. Section 2.1 4.1, pg. 2-24, para. 3 What happened when the dumpster became full should be described.
32. Section 2.1.5.4, pg 2-46, para. 5 How radiological contaminants were identified above background when there were no positive Fiddler readings needs to be explained
33. Section 2.2, pp 2-146 to 2-172, entire section: This section presents the site conceptual models each OU10 IHSS (Sections 2.2 1. through 2.2.16). The following types of concerns were found in these discussions:

These conceptual models are very general. Much more site-specific detail should be provided. The investigators take the position that adequate data are not available for development of more detailed conceptual models at this stage. We disagree, particularly with respect to location of receptor points and receptor populations. These models are not adequate to serve as the basis of a Phase I RFI/RI sampling effort, and their generality and lack of detail draw into question their adequacy for development of a baseline risk assessment. The investigators should review Section 8.3, where much of the information that should be included in a conceptual model is discussed.

The conceptual models ignore future use scenarios, which should be considered in the baseline risk assessment.

The conceptual models demonstrate no awareness of the importance of other sources of contamination on the IHSSs in OU10. The relationship of the IHSSs to each other and to other OUs as far as fluxes of contaminants is concerned must be addressed in the conceptual models or serious errors in designing the Phase I RFI/RI field efforts will occur.

We suggest that Section 2.2 begin with a schematic representation of a comprehensive risk model for OU10 that includes all known possible exposure pathways (i.e., over all IHSSs). This will foster consistency in application of the assessment over IHSSs.

34. Section 2.2.2.5, pg 2-149, para. 4: The reference to exposure of human receptors if the site is excavated indicates that worker exposure is being considered here. How worker exposure is important to the baseline risk assessment should be explained.

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35. Section 2.2.4.4, pp. 2-153 & 2-154, para. 5: Statements to the effect that "Migration of contaminants off site is not expected to produce a major impact" should be eliminated. Such statements are not supported by information presented thus far in the work plan.
36. Section 2.2.5.2, pg 2-154, para. 3: The last sentence indicating that "Nitrate/nitrite was detected above background in two samples" should be clarified as far as what medium is being discussed.
37. Section 3.0, page 3-1, para. 1: Potential location-specific ARARs would be better determined at this early stage (for precisely those reasons given in Section 3.2.3.). The main subjects of concern for location-specific ARARs are things like faults, wetlands, salt-domes, historic or archeological sites, wilderness, endangered species, etc. If any of these are present, there may be major implications for the cleanup process.

IAG Sections 107 and 108 call for a facility-wide ARARs study to set cleanup standards at Rocky Flats. The study is to be done by DOE, with approval by EPA. If this study has been done, it should supply virtually all indicated potential ARARs for OU10.

38. Section 3.2, page 3-1, para. 3: The third sentence, "The screening process will consider..." is incorrect. An accurate description of the screening is given on the next page, 3-2, in the middle of the first full paragraph.

The last sentence in paragraph 3 should say, "When more than one ARAR is identified, dealing with a single subject, the more stringent..."

39. Section 3.2, page 3-1, para. 4: The first sentence is inaccurate, the first step in identifying potential ARARs has already occurred. Charts are included in this Chapter.
40. Section 3.2, page 3-2, para. 1: This paragraph contains an excellent summary of the process for selecting standards. It is seldom explained so well.
41. Section 3.2.3, page 3-5, para. 1: SOPs are not likely specific enough to cover the variety of situations that can arise. It is best that site managers be familiar with the ARARs concerning investigation-derived wastes in order to be sure those requirements are met.
42. Section 3.2.4, page 3-5, para. 2: This paragraph is largely redundant. It could be deleted. If not deleted, the second sentence should be corrected to show that compliance with the most stringent ARARs is likely to ensure attainment of similar, but less stringent ARARs dealing with the same subject.
43. Tables 3-1, 3-2, and 3-3: All titles should indicate the domain (installation, individual site, etc.) for which these are potentially applicable.
44. Table 3-1: "Site-specific" is too ambiguous a term for a subtitle in this instance. "Site" can mean the installation or individual Ous or IHSSs. The term "Site" should be clarified.

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45. Table 3-1 and Table 3-3. These tables need to be enlarged since some of the material is not readable.
46. Section 4.0, pp. 4-1 to 4-11, entire section: This section on Data Needs and Data Quality Objectives never gets to the quantitative core of the matter of DQO development. It needs greater detail to serve as the basis of the Phase I field effort.
47. Section 4.0, pg. 4-1, para. 2: The areas addressed by Phase I of the RFI/RI do not appear to be consistent with those presented earlier or with the actual field activities. There does not really appear to be a difference in "definition of contaminant sources" (Phase I) and "determination of the nature and extent of contamination" (Phase II). This needs to be clarified.
48. Section 4.0, pg. 4-1, para. 3: Contrary to what this paragraph says, DQOs were not established for the OU10 Phase I RFI/RI in accordance with Appendix A of the Rocky Flats Plant Site-Wide Quality Assurance Project Plan.
49. Section 4.1.3, pg. 4-3, para. 1: This would be a good place to present a generic conceptual model for the OU10 IHSSs. This model should include all possible OU10 exposure pathways.

This paragraph attempts to justify the very generic nature of the conceptual models presented in Section 2.2. However, the conceptualizations could be much more site-specific than they are.

50. Section 4.1.4, pg. 4-3, para. 2: The criteria for evaluating the usability of existing data should be provided. The EPA guidance document should be cited.
51. Section 4.1.4, pp. 4-3 & 4-4, para. 4: The reference to "an analytic level . . . required that yields data of sufficient quality" indicates that the investigators have not given adequate consideration to the importance of field (spatial) variability in developing DQOs. Table 4-1 gives the same indication. Analytic levels are one aspect of DQO development. PARCC parameters are another, and should be addressed in this work plan.
52. Section 4.1.4, pg. 4-5, para. 1: Table 4-1 does not summarize the data quality objectives and data needs. Table 4-1 addresses only some aspects of DQO development and data needs. The fact that "Support Baseline Risk Assessment," "Support Environmental Evaluation," and "Evaluation of Remedial Alternatives" reference the data needs of the other two objectives in Table 4-1 would indicate that conceptually, there is something wrong with the way these data needs or their data quality objectives are defined. This should be clarified.
53. Section 4.2.2, pg. 4-8, para. 1: The statement to the effect that data collected in Phase I will be used to determine the availability and toxicity of the contaminants of concern needs to be clarified.

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54. Section 4.2.3, pg. 4-10, para. 1 This paragraph indicates that the FSP evaluates data quantity needs, and that site-specific sampling rationale are presented for the collection of data to fulfill the data needs. It also says that the FSP evaluates the sampling and analysis options. This does not appear to be correct and should be clarified.
55. Section 4.2.3, pg. 4-10, para. 2: The reference to the effect that PARCC goals should not be set (considered) at the outset of the RFI/RI is correct only if the Phase I RFI/RI field program is designed to provide the type of data needed to set PARCC parameters for subsequent phases of the program. Such is not the case for the OU10 Phase I field efforts, where virtually no attention is given to characterizing the components of variation needed to design an efficient Phase II field program.
56. Section 4.2.3, pg. 4-10, para. 3: This paragraph indicates that the specific objectives associated with each of the PARCC parameters are included in the QAA. We are unable to check this information since a copy of the QAA for OU10 was not included in the document for review.
57. Section 5.1, pg. 5-1, para. 2 It is unclear why the QAA is not part of the SAP. This relationship should be clarified. The last sentence contradicts Section 1.2, which says the Health and Safety Plan will be issued.
58. Section 5.5.2, pg. 5-4, para. 2: This paragraph contains several serious oversights.

First, the methodology for comparison of "all analytical data collected" against background values " . . . to determine their significance . . ." has not been adequately developed, and the data to be collected are not particularly amenable to such comparison. There has been no consideration given to the level of replication, Type I and II error levels, etc., nor the statement of hypotheses for such comparisons.

Second, the statement to the effect that groundwater quality data " . . . from upgradient monitoring wells will be used to determine site-specific background values for groundwater analytes" indicates that the investigators pay no heed to the problem in contamination of upgradient wells at many sites, and the need for appropriate approaches to groundwater monitoring.

59. Section 5.6, pg. 5-4, para. 3: The Phase I field effort will not produce the data needed for a baseline risk assessment.
60. Section 5.6, pg. 5-6, para. 1: The data to address these objectives under Phase I need to be identified.
- How the level of uncertainty is to be identified and characterized should be explained.
61. Section 5.6, pg. 5-6, para. 2: Environmental impacts are not addressed under the baseline risk assessment.

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62. Section 5.6, pg 5-6, para. 3: The reference to "scoping the BRAP" is curious in that no such meaningful scoping appears to have been yet accomplished.

The statement regarding the "... references to be used during the baseline risk assessment ... " should be clarified.

63. Section 5.7.1, pg 5-7, para. 2. With regard to the substance of the RFI/RI effort at OU10, it is not clear what the relationship of RCRA and CERCLA jurisdiction. What difference this jurisdiction make to the conduct of the RFI/RI needs to be explained. This paragraph is in error in asserting that CERCLA will be used as guidance.
64. Section 5.7.1, pg 5-11, para. 2. We disagree with the first sentence indicating that the existing data do not adequately characterize the source, release mechanisms, and migration pathways for contamination at OU10, as well as the second statement that existing data are not sufficient for implementing the screening of alternatives. Much more could have been accomplished with current knowledge on both accounts.
65. Section 6.0, pg 6-2, Figure 6.0-1: Why the Baseline Risk Assessment continues into 1996 with no apparent field activities being conducted after the Phase I effort should be explained.
66. Section 7.1, pg. 7-1, para. 2. The media that are the subject of Phase I RFI/RI field investigation for OU10 should be identified.
67. These specific objectives are not consistent with objectives for Phase I discussed elsewhere.
68. Section 7.3, pg 7-5, para 2. The fact that a single soil sample may be used to characterize the physical parameters for input to baseline risk assessment is an indication that the investigators may not have a proper appreciation of the need to characterize variability in all parameters and data sources used for risk assessment. Detailed DQO development process associated with this work plan would show the need for estimates of variability in parameters and input data.
69. Section 7.3.1, pp 7-5 to 7-36, entire section. This section presents the sampling plans for each of the 16 OU10 IHSSs. Rather than repeat the same comments, we address substantive issues in a generic manner, as follows:

The FSP never gets to the quantitative basis for risk assessment. There should be quantitative criteria developed to assure the quality of the data generated in this Phase I program. Hypotheses should be stated in terms that can be tested.

There appears to be no consideration of PARCC parameters. According the QAPjP, the specific objectives associated with each of these parameters are dependent on the intended use(s) of the data, and should be described in the WP/QAA prior to initiating any sampling or analysis activities

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The sampling design does not provide the basis for generating an unbiased estimate of the mean and variance of contaminant concentrations at the site. Therefore, it does not provide the data needed to determine if the site mean concentration statistically exceeds background.

The FSP does not properly address the role of field duplicates in a sampling program. Field duplicates provide data on total variability, the most important estimate of sample variability one can make. It defines the precision of the measurement process, and is essential to proper design of sampling efforts for hypothesis testing (e.g., the estimation of the number of samples required to meet DQOs).

The IHSS-specific sampling plans pay no attention to the problem of contamination from adjacent contaminated areas. Such contamination has profound implications to the design of a monitoring program.

According to the QAPjP, options chosen for sampling and analysis must be specifically described somewhere in the WP, preferably in the FSP. A DQO summary form (Figure A1.6 of the QAPjP) should be included.

According to the QAPjP, the methods and protocols used to select samples that are representative of a particular sampling site will be described in the specific WP/QAA. This should be addressed.

For a number of IHSSs, the discussions of the field sampling need to be more detailed and specific. For example, Section 7.3.1 discusses the characteristics of the soil borings without ever relating it to the specific borings displayed in Figure 7.3-1.

In Section 7.3, the depths at which the soil gas samples will be collected should be indicated.

The direction of groundwater flow should be provided on the associated figures (e.g., Figure 7.3-1).

In several cases, it was stated that FIDLER and soil gas surveys would be used to locate areas of potential contamination. Any such discussions should clearly indicate what types of contaminants will and will not be detected with these instruments.

At a number of sites, the spacing between samples on a systematic grid sampling array is given. Spacing in a systematic grid is determined by the inherent variability in the data, as primarily controlled by spatial variability in contaminant concentrations. The FSP makes no mention of the fact that variance estimates were used to determine this spacing. The investigators should justify the spacing selected on quantitative grounds.

70 Section 7.5, pg. 7-43, para. 1. The justification for the development of analytical suites for each OU10 IHSS appear to be weak. Additional information should be provided that will assure the reader that contaminants of concern have been adequately addressed.

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71. Section 7.5, pp. 7-44 to 7-50, Table 7-2: The heading of the first column on pages 2 of 7 and 3 of 7 is incorrect (these are not metals)

Explain what is done in situations where the laboratory PQLs exceed ARARs. How this situation is handled as far as characterizing a site as contaminated should be explained. The QAPjP recognizes that some WPs may require lower detection limits for more stringent measurements.

72. Section 7.7, pg 7-56, Table 7-6: The identified minimum standards for the field and laboratory quality control samples identified herein should not be used if data are available to provide site-specific estimates. The historical data collected in 1988 might provide such information.

73. Section 7.7, page 7-55 to 7-57. The RFP Quality Assurance Project Plan (QAPjP) requires the Work Plan or Quality Assurance Addendum (QAA) for each OU to address the acceptable variances of the Quality Control (QC) sample data (i.e. field duplicates, trip blanks, and equipment rinse blanks). These variances should be stated and discussed in this section of the Work Plan.

The QAA for other OUs available to us indicates an acceptable variance for QC samples of "30 percent relative percent difference for aqueous samples and 40 percent for homogenous, non-aqueous samples". Although this variance may be acceptable, the determination of sample variance using the procedure for duplicate sampling specified in the RFP QAPjP is not adequate. Sample variance calculated using data from split samples rather than duplicates does not quantify total variance.

Total sample variance that impacts the quantitative analysis of site characteristics and calculations for achievement of DQO's contains two components. These are:

- a. the variance associated with the sampling procedures, sample handling, and sample analysis, and
- b. the natural variance that exists within a sampling site.

The total variance is determined with data collected from true duplicate samples collected separately in a specified time frame and at relative locations within the sampling site. The QAPjP should be modified to require collection of duplicate samples as separate samples rather than split samples to provide an analysis of total variance.

The frequency of QC sample collection should be based on the total variance calculated from previously collected data at each OU. The Work Plan should state that the duplicate sample collection frequency shown in Table 7-6 shall be evaluated during the assessment effort to determine if it is sufficient to maintain a total variance within the acceptable range. Any changes to the sample frequency should be provided to the EMAD along with supporting calculations.

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74. Section 7.7, page 7-55 to 7-57. Site specific DQO's are required in the QAPJP (Section 3.0, page 11 of 25) to be documented in the Work Plan or QAA. This information is not provided in the Work Plan and should be included in one of these documents.

Variance calculations specific to the data collected at each OU is one of several factors that should be addressed to evaluate the DQO's for a particular OU. The evaluation of DQO's during the assessment should be required in the Work Plan for each OU.

75. Section 7.7, page 7-55 to 7-57. The Work Plan should require calculations of variance for the different types of blanks required during the sampling effort. An evaluation of the variance calculation results and an analysis of the impact of these results should be required for each blank sample type.
77. Section 8.1, pg 8-1, para. 2. If the baseline risk assessment is to be based on Phase I RFI/RI results, it cannot meet the objectives bulletized in this paragraph.
78. Section 8.1, pp 8-1 & 8-2, para. 3. The need to consider future land use scenarios in the baseline risk assessment should be addressed.
79. Section 8.2, pg 8-2, para. 4. Statements to the effect that "... reduction in the number of chemical and radiological contaminants identified to a list of contaminants of concern (COCs) will be evaluated in accordance with EPA Guidance (EPA, 1989b)" should be rewritten to be stronger.
80. Section 8.1, pg 8-4, Table 8-1. The "Superfund Public Health Evaluation Manual (SPHEM)" is out of date and should be deleted.
81. Section 8.2, pg 8-7, para. 1: Section 2.0 does not list the IHSS-specific COCs. The Work Plan states that the historical data have not been validated, therefore, they cannot be used to identify IHSS-specific COCs.
82. Section 8.3, pg 8-7, entire section: Exposure assessment is a complicated process which usually involves application of transport models to estimate offsite exposure concentrations. This section needs to discuss transport modeling in more detail.
83. Section 8.3, pp 8-7 & 8-9, para. 4: The first bullet recognizes the need to consider "future uses" in the baseline risk assessment. This does not seem to have been carried forward throughout the assessment.

With regard to the second bullet, why this characterization of human receptors was not part of the Phase I field investigation should be explained.

The fifth bullet should be deleted.

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84. Section 8.3.3, pg. 8-11, para. 1: While the exact exposure scenarios related to future land use may well have to wait definition until policy decisions are rendered, none of this is relevant to current land use conditions. Potential receptors should have already been identified as part of the scoping process.
85. Section 8.3.4, pg. 8-11, para. 2: How points of human exposure will be identified during the site characterization should be explained, particularly those located offsite.
86. Section 8.3.5, pg. 8-11, para. 3. This reference to modeling is inadequate. The investigators should have a firm handle on modeling needs already, at least on a generic basis. This paragraph points to inadequate scoping.
87. Section 8.3.5, pg. 8-11, para. 4. This discussion of uncertainty is very important. Specifically how this will be accomplished should be expanded and described.
88. Section 8.3.5, pg. 8-12, para. 1: What data are being described here should be explained.
89. Section 8.3.6, pg. 8-12, para. 2: The source of these region-specific exposure parameters should be cited.
90. Section 8.3.6, pg. 8-13, para. 2. What "contaminant rates" means in the first sentence should be explained.
91. Section 8.3.6, pg. 8-13, para. 3. The use of "reasonable estimates of exposure parameters" does not appear to be consistent with "using available, region-specific exposure parameters" in the first paragraph of this section (i.e., Section 8.3.6).
92. Section 8.3.6, pg. 8-13, para. 4. This paragraph indicates that descriptions of present, future, potential, and reasonable use exposure scenarios along with a description of the assumptions made and the use of the data, as well as a description of the fate and transport models that will be used, including a summary of the data that will be used with these models will be submitted sometime before the baseline risk assessment is conducted. The fact that these important issues have not yet been addressed draws into question the sufficiency of the Phase I field effort.
93. Section 8.4, pg. 8-14, para. 2: With regard to the fourth sentence, beginning with "Moreover, receptors may be exposed . . ." some mention should be made of potential exposure to more than one contaminant.

It would appear at least some of the bullet items may be ARARs. Perhaps this should be checked.

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94. Section 8.4, pg. 8-16, para 2. With regard to the first sentence, it does not seem appropriate to summarize toxicological studies for those contaminants for which health based standards or criteria already exist. Anyway, summarization of any toxicological studies performed for COCs seems like a tall order. This should be modified.
95. Section 8.5, pg. 8-17, entire section The investigators have attempted to improve this section compared to the one in past documents (e.g, OU7 Phase I RFI/RI Work Plan). The investigators should ensure that the text is consistent with and representative of the information included in Figure 8.5-1.
96. Section 8.5, pg. 8-17, para 1: The reference says "EPA, 1989b" but Figure 8.5-1 says "EPA, 1989a." This difference should be reconciled.
97. Section 8.5, pg 8-17, para 2: Explain what "selected contaminants" means in the second sentence

This paragraph does not appear to differentiate carcinogenic and non-carcinogenic risk estimation. This distinction needs to be made explicitly clear.

This discussion should address combining risks across contaminants, as is shown in Figure 8.5-1.

The fourth sentence, beginning with "Intakes (exposure level) of exposed . . ." has a problem with regard to " . . . all appropriate exposure pathways to contaminants."

The last sentence in this paragraph (beginning with "Risks will be quantified . . ." should be deleted.

98. Section 8.6, pg 8-17, para. 4. While this paragraph recognizes the need to consider uncertainty during the entire RFI/RI effort (and not just at the end of the assessment), it fails to recognize the mandate to work diligently to keep this uncertainty to a minimum. This can only be done if the DQO process is conducted in a meaningful manner.
99. Section 8.6, pg 8-19, para 1. The discussion of uncertainty analysis is much too general to be meaningful. The investigators should specify, in detail, what uncertainty analyses will be conducted.
100. Section 9.1, p 9-1, para 1: The objectives of the baseline EE should include the evaluation of potential ecological effects under future conditions
101. Section 9.1.1, p 9-3, para. 1. The coordination of the OU10 EE with the RFI/RI activities at OU1, OU2, and OU5 and the ongoing site-wide baseline study should be discussed with more detail in the EEWP.

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102. Section 9.1.1.1, p. 9-5, para. 1: The Task 1 efforts should have already been accomplished as part of the RI scoping

Task 1 includes initiation of the DQO development process, but does not mention the preliminary identification of data needs. The preliminary identification of data needs should precede the development of DQOs.

103. Section 9.1.1.2, p. 9-5, para. 2: The majority of this work should have already been conducted as part of the RI scoping. Much of what is included under Task 2 is generally considered part of the conceptual model development. We suggest combining Tasks 1 with all or part of Task 2.
104. Section 9.1.1.2, p. 9-5, para. 2: This paragraph indicates that the final contaminants of concern are identified as a part of Task 2, before abiotic and biotic data gaps are filled and before a toxicity assessment is conducted. The contaminants of concern should not be finalized until data gaps are filled and toxicity tests conducted.
105. Section 9.1.1.2, p. 9-6, para. 3: It is unclear why "characterization of the risk or threat of OU10 contaminants to receptor populations and habitats" is being addressed at this stage of the assessment. It does not appear data are adequate at this stage to characterize risks.
106. Section 9.1.2, p. 9-8, para. 3: How the EE-specific contaminant data needs will be incorporated into the Phase I RI abiotic sampling program should be discussed.
107. Section 9.1.2.2, p. 9-30, para. 4: The implications of the lack of methods sensitive enough to distinguish adverse biological responses from background "noise" at low radiation dose levels should be discussed.
108. Section 9.1.4.3, p. 9-49, para. 1: Discuss the protocols for addressing the "candidate species for federal listing" This paragraph indicates that there is an underlying assumption that the existing data are acceptable to "write off" these taxa.
109. Section 9.2.1, p. 9-52, para. 1: DQOs cannot be developed until data needs are identified (in Task 2).

More detail on the process of "obtaining consensus" should be provided.

All of these activities should have been conducted as part of the work plan development.

110. Section 9.2.1.1, p. 9-52, para. 2. From what the list of chemicals to be evaluated can "be narrowed" needs to be defined.
111. Section 9.2.1.2, p. 9-54, para. 1: Discuss the ecological study effort and cite the task and document work plan section where the ecological study effort is discussed.

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The basis for the sample size requirements, and what is going to be done with the tissues that will require sample size considerations should be discussed.

Discuss where the "final selection of contaminants of concern and target biota taxa" will be conducted, and cite the specific task and work plan section.

112. Section 9.2.1.3, p. 9-55, para. 1: The second sentence in this paragraph states that one or more reference areas may be selected. Multiple reference areas should be employed, since a single reference area may not be representative of a particular habitat type.
113. Section 9.2.1.3, p. 9-55, para. 1. We question whether reference areas can be selected based on the data available for the Task 1 assessment.
114. Section 9.2.1.4, p. 9-55, para. 3. This section should be more specific.
115. Section 9.2.1.5, p. 9-57, para. 2. At this stage of work plan development, DOE should be able to give generic methods and protocols for the field sampling design. Without some indication of design protocols, we cannot adequately comment on the field program.
116. Section 9.2.2, p. 9-57, entire section: Most of these Task 2 efforts should have been conducted as part of the work plan scoping and development. Some of the Task 2 activities should be integrated with Task 1 activities, since both are part of work plan scoping and should contribute to the development of the conceptual model.
117. Section 9.2.2, p. 9-57, para. 3. The second bullet indicates that data on the nature and extent of contamination will be available for Task 2 activities. The relationships between Task 2 and past or ongoing RI activities related to abiotic sampling, and the relationship between Task 2 and Task 3 sampling activities should be described. Also, describe how the data on the nature and extent of contamination will be used to design the Task 3 activities.
118. Section 9.2.2, p. 9-27, para. 4. In general, the central importance of the availability of information on the nature and extent of contamination in conducting these integrated Task 2 & 3 activities should be discussed.

The relationship between data on the nature and extent of contamination and initial toxicity testing should be discussed.

The third bullet should include the identification and characterization of habitats.

With reference to the fourth bullet, discuss the attributes of these plant and animal species that will be characterized.

The fifth bullet should be combined with the fourth bullet. "Information" is too nebulous, be specific about what population characteristics will be studied.

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The protocols for gut content analysis should be discussed.

119. Section 9.2.2.1, p 9-58, entire section: This literature review should have been conducted as part of the RI work plan scoping and development activities.

The central role of a conceptual model in the organization and synthesis of historical data and identification of data gaps for Task 3 characterization should be recognized and discussed.

120. Section 9.2.3.2, p. 9-61, para. 3 The purpose of the Phase I RFI/RI of providing data " for confirming the presence or absence of contamination" should be more detailed.
121. Section 9.2.3.5, p 9-63, entire section: For each subsection, discuss what will be done with the data, why will each data type be collected, and how these data will be used in impact or risk assessment.
122. Section 9.2.3.5, p 9-63, para 3: Explain how the station locations for toxicity testing will be selected. Discuss how information on the nature and extent of contamination will be used in this selection process.
123. Section 9.2.3.5, p. 9-65, para 4. The parameters to be measured for the benthic community should be discussed.
124. Section 9.2.4, p. 9-66, entire section This discussion should start with a summary of the information that is available at the initiation of Tasks 4-7. The relationship of Tasks 4-7 to the data/information collection activities is not entirely clear.
125. Section 9.2.4, p. 9-67, para. 2 Please elaborate on the information in the second sentence of this paragraph regarding the integration of the program design with other ongoing RFI/RI studies.
126. Section 9.2.4.2, p 9-69, para 3 How data on the nature and extent of contamination will be used to identify exposure points and exposure concentrations should be explained.
127. Section 9.2.4.2, p. 9-70, para. 1: Explain why transport and fate modeling might be needed and specify the models to be used Unless the models are selected early in the process, site-specific data needed for modeling may be omitted from the field program.

It is not necessary under the National Contingency Plan (NCP) to conduct a "worst case" assessment

128. Section 9.2.4.2, p 9-70, paras 2 & 3: This approach represents a major departure from the standard "quotient method" of ecological risk assessment, and the methodologies should be presented in detail.

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129. Section 9.2.4.3, pp 9-70 & 9-71, para. 4: The first sentence in this paragraph needs some clarification, particularly with reference to the two mentions of "exposure." The use of the ecological data collected in Task 3 in this assessment should be discussed.
130. Section 9.2.4.3, p. 9-71, para. 1: This paragraph is critical in that it appears to discuss the impact assessment methodology. This methodology should be described in detail, including endpoints, hypotheses to be tested, and how these data will be provided. The implications of the "qualitative nature" of this characterization of adverse effects, including what can and cannot be done, should be discussed.
131. Section 9.2.4.4, p 9-71, entire section: This section is very general and incomplete. It should be expanded.
132. Section 9.2.5, p 9-72, para 1: Explain the circumstances under which additional ecotoxicological studies might be needed. The selection of stations for this sampling effort should be discussed.
133. Section 9.2.9, p. 9-72, para 2: The types of quantitative data which could be provided in these ecotoxicological studies should be described.

The bullet items identifying data-related protocols to be employed in refining the field sampling plan are good. This field sampling plan should be a deliverable, and should be reviewed and approved prior to implementation of the Task 9 sampling program.

134. Section 9.2.5, p 9-73, para. 1: Discuss the rationale underlying the selection of sampling stations that will be employed in Task 9. The relationship of these station locations to the nature and extent of contamination should be discussed.

The technical objectives of the sampling effort, including the relationships to be determined, and how these efforts will provide data useful to risk assessment or impact characterization should be discussed.

135. Section 9.2.6, p 9-74, para. 3. The suitability criteria given in the last sentence seem to conflict with those presented earlier in the paragraph.
136. Section 9.2.6, p. 9-76, para 1: These environmental media samples should be discussed in greater detail, including the conditions under which these samples would be collected and the relationship to the Task 3 tissue collections. Also, the methodology for establishment of dose-response relationships from these field data should be discussed.

With regard to the last sentence, state plainly how the pathways model will be used to assess potential impacts.

137. Section 9.2.6, p 9-76, para. 4. The design of these statistical tests need to be discussed in some detail.

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138. Section 9.2.6, p 9-76 & 9-77, para. 5: The last sentence in the paragraph indicates that DOE will be very cautious in the selection of biological responses for implementation of the impact characterization methodology. This approach is to be applauded. Please discuss how the data to evaluate these quantitative considerations will be derived. We presume most of these data come from the Task 3 ecological inventory efforts, however, the quantitative aspects of the Task 3 efforts were not adequately described, and the situation should be clarified.
139. Section 9.2.7, p 9-78, para 1. The statement that relevant data will be "... integrated and evaluated in the characterization of potential environmental impacts" is not adequate. The key is how this characterization effort will be carried out. This methodology for risk assessment and impact characterization has not been adequately addressed in the work plan. Perhaps, as part of Task 9, there could be a subsection on "Impact Characterization."
140. Section 9.2.7, p. 9-78, para. 2 and p. 9-79, paras. 1 & 2. This discussion of remediation criteria, and the use of the "validated" pathway trophic model for establishing remediation criteria has not been properly introduced. The validation methodology and how this model will be used to assess impacts should be discussed.

The methodology for establishing ecological effects criteria (shown in Figure 9.2-4) and how the methodology takes into account exposure to multiple contaminants should be discussed in greater detail

Discuss the feasibility of this methodology in light of the existing toxicological data base and the prospects for collecting tissues in quantities sufficient for chemical analyses.

Discuss how determination of these criteria for OU10 will be coordinated with other RFI/RI studies and EEs, and how the acceptable criteria will be used in conjunction with ARARs to evaluate potential adverse effects.

141. Section 9.3, p 9-83, para. 1: Discuss the role of information on the nature and extent of contamination (and particularly the results of the Phase I sampling of abiotic media contamination) in the design of the field sampling plan. The general rationale underlying the selection of sampling stations should be provided.
142. Section 9.3.1, p 9-84, para. 3: The types of quantitative data to be collected during this sampling effort should be described
- Objective No 4 appears to be very important in that it involves an appraisal of the value of the collected data for quantitative assessment. The process of "determining objectives, measurement endpoints and methodologies for Task 9 field/laboratory contamination studies" should be discussed in detail.
143. Section 9.3.1, p 9-85, para 2: This discussion of statistical tests is too general. If sampling stations can be identified at this stage of the assessment, there must be a rationale underlying their selection.

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If there is a rationale, specific hypotheses to be tested must have been formulated. The approach to quantitative impact assessment should be explained in detail.

DOE should stress the use of these quantitative data to establish samples sizes for acceptable levels of uncertainty.

144. Section 9.3.2, p 9-85, entire section: The use of information on the nature and extent of contamination of abiotic media on the selection of sampling stations should be discussed. It appears from this discussion that very little of this type of information will be available for at least the first ecological inventory and toxicity testing efforts.

For all subsections which follow (i.e., Sections 9.3 2.1 to 9.3 2.5), the general rationale for the location of sampling stations should be discussed.

145. Section 9.3.2.1, p 9-87, para 2 Define the criteria for determining an adequate number of transects and how this will be implemented in the field. Discuss whether or not adequacy based on a species-area type relationship, or an acceptable level of variability for a population parameter (e.g., density) or community measure (species diversity).
146. Section 9.3.3, p. 9-90, para. 4: The first sentence indicates that reference areas will be established only for tissue analysis studies. The use of reference areas should be discussed with regard to other parameters, such as species diversity, population densities, productivity, etc.
147. Section 9.3 4 1, p. 9-92, para 2: How Type I and II errors are controlled through the use of this sample size formula should be described.
148. Section 9.3.4.2, p. 9-93, para. 1: Discuss how these (mainly) qualitative data on terrestrial wildlife and invertebrates will be of use in impact assessment.
149. Section 9.3 4.2, p. 9-94, para 1 This "quantitative information" appears to be mainly qualitative, at least as far as populations are concerned. Discuss how these (mainly) qualitative data will be used in impact assessment.
150. Section 9.3 4 4, p 9-95, para 1. The basis for the collection of three replicates should be discussed.
- Benthic macroinvertebrates should be identified to species to permit toxicity evaluations at the species-level.
151. Section 9 3 4.5 p. 9-95, paras. 3 & 4. Explain how these data will be used to characterize impacts.

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152. Section 9.3.6, p. 9-96, para. 3 Discuss the practical implications of these tissue sample requirements. The clear indication is that these analyses will be conducted on a species-specific basis. It has already been shown in Section 9.3.4.4 that species of benthos will not be identified. We find it unlikely that adequate sized tissue samples can be acquired for periphyton and benthos "species." Yet acquisition of species-specific tissue samples is required for implementation of the criteria development activities. Perhaps DOE should consider grouping taxa into trophic groups for tissue analysis. By pooling the biological material on the basis of trophic grouping, enough biomass may be obtained for tissue analysis.

The possible need for analysis of tissues for organic contaminants, and any practical limitations involved should be discussed.

153. Section 9.4, p. 9-99, para. 4 According to Figure 9.4-1, Task 100 scoping activities will take five months to complete, while Task 200 activities will require up to nine months to complete. Ecological field surveys will be initiated in month 1. Initiating ecological inventory sampling and toxicity testing in month 1 does not seem realistic, given the need to complete the scoping activities before field sampling can be initiated.

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