

RESPONSE TO COMMENTS

**RFI/RI WORK PLAN
FOR OU 3**

ROCKY FLATS PLANT

U S DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden Colorado

ENVIRONMENTAL RESTORATION PROGRAM

DECEMBER 6 1991

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Comment Responses on the Final Draft OU 3 RFI/RI Work Plan

Introduction

DOE and EG&G appreciates the opportunity to respond to the comments received on the Final Draft OU 3 RFI/RI Work Plan dated July 1991. Comment responses have been prepared for comments received from EPA, PRC, the Technical Review Group, CDH, Jeb Love, and the US Fish and Wildlife Services. The comments are presented followed by DOE's response. The Final Work Plan has been revised to incorporate many of the comments received. The Final Work Plan has also been revised to clarify how each pathway presented in the conceptual models for the IHSSs are addressed. The approach and rationale for the selection of contaminants of concern has also been expanded and clarified.

EPA Comments and Comment Responses

General Comments

General Comment I Comments on the Field Sampling Plan as related to the site conceptual model.

Comment A—IHSS 199 Conceptual Model

Comment 1A—Discussion Reference to numbered exposure pathways correspond to pathways in Table 2-5 (attached). DOE acknowledges in Section 2.1.4, Nature of Contamination, that there is a gap in available information about the nature of the contamination in IHSS 199. Past studies have focused on characterization of plutonium contamination in the off site soils as a result of airborne plant releases. The workplan further cites numerous studies which have conclusively demonstrated that the major source of the existing off site plutonium contamination was the leaking drums from the 903 Pad area. With this premise, the workplan is then designed to validate existing plutonium in the soils data in order to make some firm quantitative conclusions about the potential health risks associated with the off site plutonium and its decay product americium. The approach taken to meet this narrow objective appears technically justified. However, EPA believes the workplan concept is flawed because it is too narrow and not designed to address contaminants other than a few select radionuclides in the soils and in the air.

Response 1A. The contaminants that are being addressed in OU 3 are those for which a complete migration pathway and source have been identified. The program designed for the OU 3 soils is based on historical sampling results and known sources for dis-

persing contaminants via the air pathway to OU 3. The sources identified in the approved Past Remedy Report include the 903 Pad, the beryllium fire, and the Solar Evaporation Ponds. The 903 Pad has been identified as the major source for offsite plutonium contamination at OU 3. Plutonium, americium, and uranium will be analyzed in soils for OU 3. Three studies have investigated the potential for beryllium to have been released to offsite soils. CDH has analyzed for beryllium in two sampling episodes and the RFP performed a study in 1982. All three studies indicate beryllium was not detected in offsite soils. If beryllium is not detected then it is unlikely other metals would have been dispersed via the air pathway to OU 3 since no other major sources of contaminants have been identified. The Solar Evaporation Ponds are being investigated in OU 4. If these investigations identify metals in soils that could potentially migrate offsite due to wind dispersion, soils will be investigated further in OU 3. Metals and other contaminants are more likely to migrate from the RFP via the surface water and sediment loadings in the drainages. In these pathways, metals and other potential contaminants are being analyzed.

Comment 2A. Specific Comments The second paragraph on page 2-18 recognizes the following additional potential sources of off site contamination

- (1) " the on site burning of wastes, including waste oils contaminated with trace amounts of uranium "
- (2) "A fire which breached the exhaust filters of a beryllium-machining building, possibly releasing airborne beryllium to the environment. "
- (3) " wind stripping of waste water from the solar evaporation ponds "

EPA's comments on how these possible contaminants are or are not addressed in the workplan are as follows

- (1) Uranium The text recognizes that airborne transport of uranium to off site soils could occur. However, there is no specific discussion (i.e. characterization data, historical release data, etc.) anywhere in the work plan about a possible source of uranium and no discussion about the fate and transport properties of uranium. Apparently, DOE intends to investigate surficial soil uranium contamination as evidenced by the details in the field sampling plan and discussion with DOE representatives over the last several weeks. However, it is our understanding that the investigations of vertical migration will not include uranium. EPA can not approve the OU 3 RFI/RI workplan until uranium is included in the studies of vertical migration and until discussions in the text on fate and transport properties (Section 2.5.1.3, Release Mechanisms and Transport Media) include uranium. These items are crucial to the investigation of the nature and extent of OU 3 contamination and are necessary to address exposure pathways 1, 2, 8, and 9.

(2) Beryllium Beryllium is dismissed as a possible IHSS 199 contaminant based on 2 studies by the Colorado Department of Health conducted in 1971 and 1989. However, there is no reference listed in Section 12.0 of the workplan for these studies. With no data useability evaluation of these studies, it is incumbent on DOE to further investigate beryllium contamination in IHSS 199 if for no other reason than to validate the previous results. Since beryllium is apparently a potential contamination source, its fate and transport properties must also be included in the discussions in Section 2.5.1.3 and it must be included in the analytical program for soils in OU 3. This information is necessary in order to address all exposure pathways identified in the site conceptual model for IHSS 199 except exposure pathway 8.

(3) Contaminants Originating in Solar Ponds DOE recognizes the possibility of nonradioactive metal contamination and inorganic ion contamination resulting from wind stripping of the solar ponds in Section 2.1.4.1, RFP Contamination Sources. However, the conceptual model ignores these contaminants with the general statement on page 2-47, "Few potential airborne pathway sources appear to exist on the RFP for metals other than beryllium." In addition, EPA believes DOE must also recognize non-radioactive metals. EPA can not approve the OU 3 RI workplan until fate and transport properties of metals are fully considered and the TAL metals analysis is included in the analytical program for soil samples. This analysis is necessary to address all exposure pathways identified in the site conceptual model for IHSS 199 except exposure pathway 8. This information is also necessary in order to address exposure pathway 29 (resuspension of unsaturated sediments near reservoir shorelines and subsequent deposition onto soils) which was identified in the site conceptual model for IHSSs 200-202. The sediments are being investigated for metal contamination. Unless the soils are also analyzed, this pathway cannot be completely evaluated.

Response 2A(1)—Uranium A discussion of fate and transport of uranium has been incorporated into the Final Work Plan in Subsection 2.5.1.2. Uranium analyses have been incorporated into the vertical profile sampling for soils and sediment. Uranium analysis will also be performed on the air samples.

Response 2A(2)—Beryllium Three studies evaluating beryllium concentrations in soils have been performed. CDH performed studies in 1971 and 1989. The results from the 1989 study indicate beryllium was below method detection limits in all samples. During the historical release evaluation, an additional study performed by the RFP in 1982 was also found. During this study 243 samples were collected on and around the RFP. The conclusion from the study was that beryllium was not detected in the buffer zone or offsite. These three studies indicate beryllium is not detected in OU 3 soils. These data will be used for site characterization and, therefore, do not need to meet the data useability criteria required for performing a quantitative risk assessment. The existing

beryllium data are useable for site characterization and, as indicated, beryllium is not a contaminant of concern for OU 3

The CDH 1989 soil sampling reference has been incorporated in Section 12.0, References. General fate and transport discussions of inorganics have been included in the Final Work Plan in Subsection 2.5.1.1

Response 2A(3)—Contaminants Originating in Solar Ponds. The solar ponds are being evaluated in OU 4. The likelihood of contaminants from the solar evaporation pond being dispersed by wind stripping to OU 3 is small. If the beryllium source, released from a fire, which is a larger source and was released into the air, did not reach OU 3, it is unlikely the potential contaminants from the solar ponds would reach OU 3. If contaminants are identified in OU 4 that could affect OU 3, the field program for OU 3 will be modified based on discussions with EPA, CDH, DOE and EG&G.

Metals are being evaluated in the media where transport from the RFP is most likely to occur, i.e. the drainages.

Comment 2B. The soils conceptual model summary on page 2-55 of the workplan recognizes that water erosion is a potentially significant release mechanism yet the field sampling plan and the associated analytical program are not sufficient to address exposure pathways 6 and 7, surface runoff into surface water and subsequent deposition for all the creeks and ditches within OU 3. The surface water sampling program is designed to only characterize the drainages from RFP and the reservoirs. This results in not only an inadequate characterization of the above mentioned pathways, but also exposure pathway 5, fugitive dust deposition onto surface water. DOE must either include all of the surface water and sediment concentrations in all the components within OU 3, i.e., what exposure assessment modelling efforts will be implemented.

Response 2B. Field reconnaissance of the drainages in OU 3 has shown that flows are low and intermittent in the natural drainages. Therefore, a large scale surface water drainage investigation is not warranted. Surface water samples will be collected in Church Ditch as it begins flowing through OU 3 (southeast of buffer zone) and also before it discharges into Great Western Reservoir. This will help characterize surface runoff from OU 3 to ditches. In addition, surface water samples will be collected along Smart Ditch, Broomfield Diversion Ditch, Woman and Walnut Creeks, Big Dry Creek, and Clear Creek Irrigation Ditch. The sediment sampling of drainages has been expanded in the Final Work Plan (see subsection 6.3.3). Sediment drainage locations have been expanded to include Smart Ditch, Church Ditch and two unnamed topographic drainages between Walnut and Woman Creeks.

Comment 2C. The field sampling plan and the associated analytical program are not sufficient to address exposure pathway #2, resuspension of contaminated soils into air. The existence of contaminants other than plutonium and americium in air needs to be investigated. DOE must either expand the analytical program to include TAL metals, and add appropriate monitoring stations to address the 199 contamination (not just the

sediment contamination) or alternatively, DOE must specify the modelling effort to including model calibration and validation which is intended to be used to address this pathway

Response 2C The air program has been expanded in the Final Work Plan to include a sample location in a vegetated area on OU 3. This will allow evaluation of the potential resuspension of soils to the air pathway. A wind tunnel will be used to control wind speeds. This will provide information on what wind speeds are needed for resuspension of soils. Wind tunnels will also be used for the air sampling at Great Western Reservoir and Standley Lake where exposed sediments are located.

As discussed in Comment Response IA, since the presence of metals are not anticipated in the OU 3 soils, metals will not be addressed in the air. The metal analyses in the sediments can be modelled from the information obtained from the wind tunnel to predict dispersion of metals to air. The exposed unvegetated sediments have the highest resuspension potential and therefore, are most likely to be dispersed by air.

Uranium analyses have also been incorporated into the air program.

Comment 2D In discussions on the fate and transport of plutonium in the environment, it is noted that plutonium speciation is heavily influenced by pH and oxidation-reduction capacity (Eh). For this reason, Eh needs to be included in the parameters measured for the soil samples. This information is needed to adequately address exposure pathways 1 through 10 as the contaminant source for these pathways is the IHSS 199 soils.

Response 2D Reducing conditions are more likely to occur in the sediments of the reservoirs than in the soils or sediments of the drainages. Dissolved oxygen measurements will be made in the reservoirs to provide an indication of whether the interface between the water column and sediments is a reducing condition. As stated in Section 2 of the work plan, the mobility of plutonium in reducing conditions increases but not significantly.

Comment 2E. Summary discussion concerning the conceptual model for IHSS 199 indicates that inhalation and plant ingestion are the most plausible exposure routes. This discussion is premature and appears to bias the proposed field sampling program. DOE must recognize that direct soil ingestion is also a plausible exposure route and may be a significant one. The discussion on exposure routes may be true for plutonium and americium, however, DOE must characterize other contaminants which may have different fate and transport properties and which may cause a different conclusion to be drawn.

Response 2E. As indicated on Figure 2-14 of the Final Work Plan, soil ingestion is recognized as a primary pathway for the IHSS 199. The discussion of plausible exposure routes was performed in the Past Remedy Report and the Historical Information Summary and Preliminary Health Risk Assessment Report. In addition, as described in

Section 2.0 and on Table 5 1 and Table 6 1, all pathways identified on the conceptual models are addressed by the sampling program for OU 3. DOE is characterizing other contaminants for OU 3 if there is a known source, complete exposure pathway, and detection in the media along Indiana Street. For example, metals are being analyzed in the sediments and surface water because there are potential sources located along the drainages of Woman and Walnut Creeks and they have been detected along Indiana Street. Volatiles and semivolatiles will not be analyzed in OU 3 because only spurious hits of common laboratory contaminants in the media sampled along Indiana Street have been noted.

Comment B—IHSS's 200-202, Conceptual Models

Comment 1B—Discussion. References to numbered exposure pathways correspond to Table 3 1 DOE's discussion in Section 2.5.2.2.2, Sediment And Water Characteristics, neglects sediment transport. This leads to a discussion of contaminant fate and transport which ignores the potential for past contamination resulting from Rocky Flats Plant activity to affect sediment media within OU 3. The result is a lack of understanding about potential for certain classes of contaminants to be found in the sediments of 200-202 and consequently, a lack of understanding about what is considered to be the current contamination source. EPA considers this to be a flaw in the conceptual model and in the resulting field sampling plan. EPA recommends that a discussion be included in the workplan about the fate and transport properties of every class of contaminant in every environmental medium identified by the conceptual model. Where information is lacking to support eliminating a certain class from the analyte list for a certain medium, the field sampling plan must be designed to collect the necessary information. A technically complete workplan will address every potential exposure pathway identified in the conceptual model.

Response 1B. In Section 2 of the Final Work Plan, a discussion of each pathway in the conceptual model has been included. Each pathway is numbered. As seen on Tables 5 1 and 6.1, each pathway in the conceptual models is addressed in the field sampling program. DOE has not neglected sediment transport as a mechanism for release. The drainages and reservoirs are being investigated to characterize these pathways.

A discussion about the amount of sediment transport has been incorporated into Sub-section 2.5 2.2.2.

As discussed in Section 6.2, analytes have been eliminated from OU 3 when no source has been identified and where analytes have not been detected in samples collected along Indiana Street.

Comment 2—Specific Comments

Comment 2a DOE recognizes in Section 2.5.2.2.1, Contaminant Characterization, the radionuclides, metals, VOCs, semi-volatile organics, inorganic ions, and herbicides could all have feasibly been transported to off site drainages and reservoirs. The work plan discusses all these contaminant classes except the semivolatiles and the field sampling plan is not designed to look for semivolatiles in the reservoirs. No explanation is given. Due to the varying mobility of the particular compounds of this class, semivolatiles must be included in the analytical program for surface water, and saturated and unsaturated sediment. This will address exposure pathways 11 through 33.

Response 2a In Section 6.2 of the Draft Final Work Plan there was a discussion of the fate and transport of semivolatiles. Also in Section 6.2 of the work plan the rationale for eliminating semivolatiles in surface water and sediments was provided. Semivolatiles were not detected in the surface water and sediment samples collected along Indiana Street. Also, results from OU 1 and 2, indicate semivolatiles were not detected frequently in any of the media sampled. In the Final Work Plan the fate and transport discussion has been moved to Subsection 2.5.1.1. The rationale for eliminating semivolatiles in each media is presented in Subsection 6.2.

Comment 2b DOE characterizes the sediment and water in the drainages of OU 3 as being erosional. However, there is no quantification of sediment transport to support this assumption. This is important because it affects the field sampling plan for the drainages which is designed to define the source term. DOE must first recognize sediment transport as a release mechanism and then design the field sampling plan to address all possible sediment contamination.

Response 2b A discussion regarding sediment transport has been incorporated into Section 2.5.2.2.2 of the Final Work Plan. Studies indicate sediment erosion is small, approximately 3 ton/year/acre. DOE has recognized that sediment transport is a release mechanism as shown on the conceptual models presented in Section 2.0.

Comment 2c. As is the case for IHSS 199, the field sampling plan and the associated analytical program are not sufficient to address resuspension of contaminants from the identified source (contaminated sediment in the case of IHSSs 200-202) into air. The existence of contaminants other than plutonium and americium in air needs to be investigated, particularly since DOE recognizes the transport of these contaminants via sediment. This addresses exposure pathways 27-30 in the conceptual model. DOE must either expand the air analytical program to include uranium, TAL metals, and TCL semivolatiles or alternatively, DOE must specify the modelling effort including calibration and validation which are intended to be used to address this pathway. Appropriate models which may be considered are discussed in the Superfund Exposure Assessment Manual (EPA/540/1-88/001, April 1988).

Response 2c. Uranium has been incorporated into the air sampling program. The semivolatiles have been eliminated from the air sampling program because there is no identified source of semivolatiles and results from samples collected from media along Indiana Street indicate semivolatiles are not present. Metals will not be sampled directly in the air program, however, metal results from the sediments and information obtained from the wind tunnel can be modelled to predict risk from inhalation of metals

Comment 2d. As discussed for IHSS 199, the oxidation-reduction potential is important to the understanding of plutonium fate and transport. This parameter must be included in the field analytical plan for sediments

Response 2d. As stated in Comment Response 2D, dissolved oxygen measurements will be collected during surface water sampling to identify if reducing conditions exist at the water/sediment interface in the bottom of the reservoir. This is the only area where reducing conditions are likely to exist. In-situ Eh measurements would be difficult to obtain from the bottom of the reservoirs. In addition, as indicated in Section 2, the mobility of plutonium in reducing conditions is not great.

Comment 2e. The recent detections of tritium in Standley Lake surface water samples indicate that tritium must be characterized in the surface water and sediments of Standley Lake, Great Western Reservoir, and Mower Reservoir

Response 2e. The detection of tritium in Standley Lake is believed to be a spurious detection that was not confirmed in subsequent sampling. Tritium will be analyzed in the sediments along Walnut Creek and surface water samples collected along Indiana Street

General Comment II—Comments on the Statistical Basis for the Field Sampling Plan

EPA believes that the field sampling plan for OU 3 must be statistically designed to meet specific performance measures. This is true for all media within the OU. EPA's Guidance for Data Useability in Risk Assessment (EPA/540/G-90/006) discusses this concept in Chapter 4, Steps for Planning for the Acquisition of Environmental Data in Baseline Risk Assessments. DOE has attempted to use statistics in the choice of the number of sampling locations for sediment within the drainages of each reservoir and also in the sampling grid for the soil samples. We believe this effort falls short of what is necessary. EPA guidance specifies that the minimum recommended performance standards for risk assessment purposes are 80 % confidence and 90 % power. For all media other than sediments, the confidence and power of the proposed OU 3 program are not indicated and in no cases are the statistical details included to support the number of samples proposed by DOE.

EPA believes that a statistical justification of the OU 3 program is essential. This is particularly true because of DOE's indicated intent to use the data collected in the RFI/RI program to verify existing data. Recognizing the effort involved, we propose that representatives of DOE, EG&G, and CDH cooperate in this effort. EPA has some particular expertise that can be utilized in this effort. We suggest that the regulatory agencies and DOE/EG&G meet soon to outline specific tasks that will be required and to agree on the responsibilities and schedule for accomplishing those tasks. We envision those tasks to generally include the establishment of a database of existing environmental data which was relied on for the OU 3 RFI/RI workplan, statistical analysis of the existing data by media to determine the statistical basis for design of a new sampling program, agreement on how the existing data will be verified, and continued maintenance of the database as new information becomes available.

If DOE chooses not to approach the statistical design of the sampling plan cooperatively, the RFI/RI workplan must still be based on at least an 80 % confidence and a 90 % power to be considered acceptable and the details of the statistical justification must be included in the workplan.

Response II The statistical justification for the sediment sampling in the drainages and reservoirs and the justification for the soils program has been incorporated into the Final Work Plan (Subsection 6.3.1). The historical data were evaluated and power curves generated to estimate the number of samples necessary to achieve an 80 % confidence and 90 % power. As indicated in discussions with EPA and CDH on October 31, 1991, in some media obtaining the confidence and power criteria is not practical. This is because the levels of radioactivity that are being detected on OU 3 are close to the minimum detectable activity level. The analytical results therefore measure the variability of the analytical method and sample technique rather than the contaminant levels. The statistical justification is provided for the media where primary and secondary exposure pathways have been identified based on the approved Past Remedy Report and the Historical Information Summary and Preliminary Health Risk Assessment Report. All pathways are addressed in the OU 3 sampling plan, but the minor pathways may not all have a statistical basis.

DOE appreciates meeting with EPA and CDH personnel in the development of the OU 3 statistical approach.

Specific Comments

Executive Summary, Page ES-2 The objectives stated here are biased. Characterization of contamination within OU 3 cannot be limited to plutonium and americium. Revise the text here to indicate that the objective of the investigation of OU 3 is to characterize the nature and extent of all contamination, either resulting from Rocky Flats Plant releases or co-mingled with Rocky Flats Plant releases. Unless modified, the objective as stated here and in other sections of the workplan (Sections 5.1.4) are

inconsistent with the conclusions and recommendations contained in the approved final Past Remedy Report

Response. The objectives of the OU 3 RFI/RI Work Plan are consistent with the Past Remedy Report Historical Information Summary and Preliminary Health Risk Assessment Report. The conclusions in the Past Remedy Report "Multiple plutonium exposure pathways from the IHSS 199 were analyzed. The pathway analysis suggests that airborne dust inhalation is the most significant in terms of human health risk under current site conditions. Under a future residential use scenario, the soil ingestion pathway may also be significant. Although other exposure pathways are not considered significant under this analysis, all pathways will be addressed under scheduled RFI/RI activities at IHSS 199." As shown on Tables 5-1 and 6-1 in the revised work plan, all pathways from the conceptual model are being addressed in the OU 3 Work Plan. Conclusions from the Past Remedy Report, also state "...it is recommended that additional site data, including meteorological parameters, surface and ground-water characterization, biological uptake, and concentrations of plutonium and other radionuclides in all media be obtained. Further soil sampling should be performed to confirm or negate conclusions concerning plutonium and americium concentrations in soil at IHSS 199." DOE maintains that the objectives of the OU 3 Work Plan are consistent with the approved final Past Remedy Report.

Figure 1-3, Downstream Surface Water Features. The RFI/RI Workplan for OU 3 must anticipate the proposed Option B project and demonstrate that the respective activities will be coordinated. This indicates not only the diversion of Woman Creek around Standley Lake Reservoir, but all components of Option B which may affect OU 3

Response. The discussion regarding coordination with Option B has been incorporated in the Final Work Plan (See Subsection 1.3.9)

Page 1-12, second paragraph. Elaborate on the discussion of groundwater recharge. For example, provide the details about the extent of recharge to the upper and lower hydrostratigraphic units and if the recharge is local or regional. This becomes important to the understanding of the potential for RFP to affect groundwater quality and will provide support to the proposed groundwater sampling program for OU 3. Since the lower hydrostratigraphic unit has the potential to transport contamination on what is currently known about groundwater transport and what information is still unknown needs to be provided in the workplan

Response. The discussions in Section 1.0 and 2.0 of the work plan came from the approved Past Remedy Report and Historical Information Summary and Preliminary Human Health Risk Assessment Report. The rationale for the groundwater program for OU 3 was provided in section 6.2 of the Draft Work Plan. Regarding transport to the South Platte, the groundwater rate presented in the work plan is 1 foot per day. In one hundred years, the groundwater would have migrated 3,650 feet. It is unlikely groundwater would contaminate the South Platte River

Page 2-28, Section 2.2.3 Elaborate on the chemical composition of the "decontaminated process and laundry effluent" that was discharged into South Walnut Creek drainage

Response The text has been clarified to state "These effluents were discharged in accordance with internal guidelines (in particular, USAEC guidelines in the early history of the RFP) and increasingly during the past two decades, with State and Federal pollution discharge regulations. The effluents contained metals, radionuclides, and inorganic ions (especially nitrate) within concentration limits considered acceptable at the time."

Page 2-47, Nonradioactive Contaminants The last sentence in this paragraph is not supported. Table 6-2 which lists fate and transport properties of various contaminants does not include inorganic compounds. Revise the text to include fate and transport information on inorganic compounds in Table 6-2.

Response The fate and transport of inorganics has been incorporated in to Subsection 2.5.1.1 in the Final Work Plan.

Page 2-50, Nonradioactive Contaminants The CDH reference which seems to be the basis for conclusions about beryllium is missing from section 12.0 of the work plan.

Response The reference has been added to the Final Work Plan.

Page 2-55, Section 2.5.2.1 It is also reasonable to assume that on site contamination can migrate off site via sediment transport. This needs to be indicated in the text and the remedial investigation should be designed to investigate this pathway.

Response A discussion of predicted sediment loads from surface runoff has been included in the Final Work Plan. The Final Draft Work Plan recognized the potential of offsite migration via sediment transport. That is the focus of the sediment drainage and reservoir sampling program.

Page 3-2, last bullet. The Colorado Water Quality Control Commission's statewide and classified groundwater area standards have been finalized. Modify this section of the work plan to reflect this.

Response The potential ARARs presented in Section 3.0 are the most recent requirements for the OU 3 contaminants of concern. As ARARs for RFP are determined, this section will be updated as necessary.

Page 3-3, first paragraph The sentence in the tenth line of this paragraph indicates that ARARs which are below PQLs will not be considered as ARARs by DOE. This is incorrect. ARARs below PQLs are still ARARs. However, in such situations, it may be appropriate for EPA to waive the ARAR on the basis of technical impracticability in accordance with Section 300.430(f)(1)(ii)(c)(3) of the National Contingency Plan.

Response. The sentence has been changed to read, "where ARARs and TBCs are not available or are less than laboratory practical quantitation limits (PQLs), PQLs will be used to measure compliance with ARARs and TBCs "

Page 4-6, Section 4.7. Delete the sentence "Based on the data collected and evaluated to date, it is unlikely treatability studies will be necessary " The statement is biased and predecisional.

Response. Based on the approved preliminary risk assessment in the Past Remedy Report and The Historical Information Summary and Preliminary Health Risk Assessment Report, the statement is not biased

Page 4-10 and 4-11 Delete Section 4.9 and Section 4.10 from the workplan. These tasks are strictly feasibility study tasks which will not be performed during the remedial investigation phase of OU 3 This workplan is intended to describe the remedial investigation tasks

Response. The FS typically runs concurrently with the RI (Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, EPA, October 1988) and, therefore, should be discussed in the work plan. However, as stated, Tasks 9 and 10 will be performed only if the Baseline Risk Assessment determines that the risks posed by "contamination at OU 3 must be remediated " Based on the preliminary risk assessment (Past Remedy Report and Historical Information Summary and Preliminary Health Risk Assessment Report), it is not anticipated that the Baseline Risk Assessment will determine the OU 3 risks, if any, require remediation.

Page 5-1, first paragraph. Change this paragraph to read, "Information from the human health risk assessment and the environmental evaluation is one factor that is considered when determining the need for remediation of the site If a decision is made that remediation is necessary, the risk assessment information and the RFI/RI site characterization data is used to evaluate remedial alternatives during the feasibility study "

Response. The Final Work Plan has been modified to state "Human health and environmental assessments help identify the need for remediation and are used along with the RFI/RI site characterization data to evaluate remedial alternatives, if necessary "

Page 5-1, last paragraph. Modify the second sentence of this paragraph to read "Previous data collection activities focused on site characterization and not on source characterization and contaminant fate and transport which are both necessary to perform a quantitative human health risk assessment and an environmental evaluation "

Response. The sentence was not modified because evaluations at the 903 Pad have focused on source characterization

Page 5-3, Section 5 1.3, Develop Conceptual Model Modify the second sentence in this paragraph to read "The potential pathways identified are those associated with soil, surface water, groundwater, aquatic and terrestrial biota, and air/wind " The sentence is incorrect as written because it refers to environmental media as exposure pathways

Response The text has been modified in the Final Work Plan

Page 5-11, first paragraph In order to increase the credibility of the work plan, DOE must describe how data collected from other OUs will be considered and how decisions will be made to expand the OU 3 program Such information is most easily presented in a decision tree diagram

Response As data are evaluated in other OUs, and evaluations warrant further investigation in OU 3, EPA, CDH, and DOE/EG&G will meet to define the appropriate activities for OU 3 EPA and CDH will approve any additional activities identified A discussion regarding this approach has been included in the work plan (Subsection 6 1 2)

Page 6-28, Section 6.2.2 1 1 Modify the last sentence in this paragraph to read "If VOAs are identified as a problem in the surface water or sediments, VOAs for groundwater will be incorporated into the sampling program " Also indicate exactly what criteria will be used by DOE to determine when a concentration of a particular contaminant is a "problem" EPA emphasizes that additivity of effects due to exposure to multiple contaminants must be considered in any screen of contaminants

Response The sentence was rewritten in the Final Work Plan to state "If metals are determined to be a problem in surface water or sediments at OU 3, metals will be added to the analyte list "

Page 6-28, Section 6.2.2 1.2 The statement that semivolatiles have been dropped from the groundwater program for OU 1 and OU 2 is incorrect These compounds are still included in the OU 1 and OU 2 groundwater programs There are numerous erroneous statements throughout the workplan about analytical programs for groundwater surface water and sediment in the on-site operable units DOE must go through the OU 3 workplan and verify all statements made about other operable units and correct the OU 3 workplan as required

Response The program to eliminate semivolatiles from OU 1 and 2 was approved However, due to the timing of the approval and the ongoing field events, the samples were analyzed for semivolatiles even though the plan has subsequently been approved to eliminate them The references to the analytes currently being analyzed at other OUs has been eliminated in the Final Work Plan

Page 6-30, Section 6.2.2 1 5 Modify the eighth sentence in this paragraph to read, "If metals are determined to be a problem in surface water or sediments at OU 3, metals

will be added to the analyte list " As indicated above, explain what is considered to be a "problem"

Response. The Final Work Plan has been revised as suggested

Page 6-35 Here and in other sections of the workplan, DOE refers to SOPs which are currently under development The workplan will not be considered complete until those SOPs have been prepared, submitted, and approved

Response. The referenced SOP has been incorporated into an SOP addenda and is provided in Section 11.0 The only SOP that has not been included in the work plan is the SOP for the air sampling using a wind tunnel As discussed with EPA and CDH on November 5, 1991, it was agreed that the air program sampling procedures would be prepared as an addenda to the Final Work Plan

Page 6-37, last paragraph. EPA has serious concerns about how DOE plans to use the randomly collected soil samples from various land uses as described in the workplan. We believe it is incorrect to combine data which was collected randomly as described in the workplan with the data collected based on the soil sampling grid described in earlier sections of the workplan At a minimum, DOE must include all details of how this randomly collected land use data will be interpreted and subsequently used

Response. The purpose of soil sampling referred to in the comment is to characterize the plutonium, americium, and uranium levels at more distal locations from the RFP Ten locations have been selected based on aerial photographs and are presented in the Final Work Plan Locations were selected by identifying ten-acre plots where open space of fields, golf courses, or parks were identified at more distal areas from the RFP The samples will be collected in the same fashion as the soil grid samples The samples may be combined with the grid samples if statistical evaluations indicate this is appropriate Combining the samples may improve the power and confidence of the soil sampling program

Page 6-47, Section 6.3.4 Is the lower hydrostratigraphic unit being monitored? If so, where? This is important information to include in the section of the workplan to give the reader an understanding of the groundwater system in the vicinity of Rocky Flats.

Response As the work plan indicates, two well pairs will be drilled at Great Western Reservoir and Standley Lake One well at each location will monitor the shallow alluvial system and the other well will monitor the deeper Arapahoe system (the lower hydrostatic unit) Along Indiana Street, one well (Well 0386) currently is monitoring the lower hydrostatic unit

Page 7-5, first paragraph. The generic risk assessment in the Final Past Remedy Report considered two hypothetical land use scenarios, recreational use and residential use In the residential use scenario, the range of plutonium concentrations considered resulted in range of risks of 2.2×10^{-5} to 2.2×10^{-7} In the recreational use scenario, the

range of plutonium concentrations considered resulted in a range of risks of 7 0E-06 to 7 0E-08 Correct the OU 3 workplan to reflect all the information in the Past Remedy Report

Response. The risks have been corrected and presented for the recreational and residential scenarios

Page 7-15, Section 7.3, Exposure Assessment. Nowhere in the discussion on exposure assessment does DOE recognize that a reasonable maximum exposure will be considered in the baseline risk assessment for OU 3 The preamble to the National Contingency Plan indicates that in the Superfund program, the exposure assessment involves developing reasonable maximum estimates for both current land use conditions and future land use conditions In general, the baseline risk assessment will look at a future land use that is both reasonable from land use development patterns, and may be associated with the highest (most significant) risk, in order to be protective These considerations will lead to the assumption of residential use as the future land use in many cases An assumption of future residential land use may not be justifiable if the probability that the site will support residential use in the future is small DOE has not presented any information to support a low probability of residential use at OU 3, yet has not indicated in the work plan that a residential use will be considered On the contrary, DOE has indicated that a "light industrial setting" and a "research Biologist setting" will be considered with no justification for these choices This is inconsistent with the National Contingency Plan and with the requirements of the Interagency Agreement Section VII D 1 b of the Statement of Work requires DOE to submit for review and approval a technical memorandum describing the present, future, potential and reasonable use exposure scenarios with a description of the assumptions made and the use of data Given these factors, DOE must delete reference to exposure scenarios which will be considered in the baseline risk assessment for OU 3 and instead, describe the process required by the Interagency Agreement and DOE's plans for accomplishing the requirements, including descriptions of the deliverables and schedules

Response This section has been revised to reflect the NCP requirements for the exposure assessment

Page 8-1, Section 8 0, Environmental Evaluation The approach described in this section of the workplan for conducting an environmental evaluation is inconsistent with the approach which has been developed through discussions of the Risk Assessment Technical Working Group for the Rocky Flats EPA believes that the differences in approach are extensive enough that the studies from different operable units will not be comparable The OU 3 Environmental Evaluation workplan must be revised to be consistent with the approach taken for OU 1, OU 2, and OU 5 During the revision, the following specific comments must be addressed

- a The workplan emphasizes small mammals to the exclusion of birds, reptiles, and insects No explanation is given If DOE follows the iterative process

described in OU 5, surveys for birds, reptiles, and insects will be required for terrestrial ecosystem characterization

b The workplan seems to make an issue of gaining access for terrestrial work but not for aquatic work. No explanation is given. The revised workplan must detail any anticipated access problems and provide a means of handling those problems

Response. The environmental evaluation has been revised and reformatted to be consistent with the work plans for OU 1, OU 2, and OU 5. The revised work plan describes two subtasks that will be conducted early in the EE process (Subtasks 1.4 and 2.3) to select target species and target taxa for field investigations. Based on the information available at this time, the expected levels of contaminants in this offsite area, and the difficulty involved in sampling different wildlife populations, we expect small mammal communities will be an appropriate sampling target. However, the final decisions on target taxa will be made early in the EE implementation based on the criteria presented in the Final Work Plan, and birds or insects could be selected.

The work plan has been revised to delete language regarding potential property access issues. Property access was addressed prior to the Initial Site Visit in October 1991 and EG&G and DOE will continue to work with the property owners to provide access for the RFI/RI field investigations.

Appendix A. DOE has constructed a semivariogram to support the proposed soil sampling plan for OU 3. However, not all soil sampling results which are available were used in this construction. Also, Indiana Street was chosen as the cutoff boundary for this analysis, i.e. no consideration is given to sampling results from samples taken south and north of the Rocky Flats. Obviously, some screening criteria was applied to the available studies, however, the details are not provided. This analysis must be revised to include areas north and south of the Rocky Flats and all available studies must be utilized unless some justification can be provided for dismissing certain available information.

Response. The intent of the kriging was not to evaluate data. The sole purpose of the evaluation was to use comparable historical data to estimate the optimal grid spacing for sampling activities in OU 3. The grid spacing was reduced from 1700 meter spacing to the more conservative 1000 meter spacing. It should also be noted that the sampling grid for OU 3 has been expanded to sample areas north and south of the buffer zone.

PRC Comments and Comment Responses

General Comment 1

Comment. Data presented during the negotiations and development of the OU5 (Woman Creek priority drainage) work plan indicated the presence and persistence of a variety of contaminants (including volatile organics, radionuclides, base neutrals, and acids) at two sediment stations at the southern boundary of OU5. These sediment stations, designated SED-18 and SED-19, are located at seeps at the headwaters of southern tributary of Woman Creek. Sediment sampling station, SED-19, has exhibited contaminant concentrations exceeding background over the last few years and may indicate ground water contamination in this area. The final Phase I RFI/RI work plan for OU5 indicates the operable unit boundary for OU5 does not extend south of these stations, therefore DOE's contractor does not intend to sample sediments and seepage south of these points. Therefore, to determine the extent of contamination in this area, seepage and sediment samples must be collected in drainages south of the OU5 boundary during the OU3 investigation. This must include, but is not limited to, any seeps and sediments occurring in reentrant valleys south of these sites to the boundary of the buffer zone, with the head of Smart Ditch drainage especially targeted. The analyte list must be the same as the finalized OU5 sediment and surface water analyte list to facilitate data comparison.

Response Additional sediment samples have been incorporated into the Final Work Plan. Two samples are planned for Smart Ditch from the east of Indiana Street. It is not within the scope of OU3 to investigate areas within the buffer zone.

General Comment 2

Comment. The proposed sampling plan does not address all the exposure pathways listed in the conceptual models. Specifically, the ground water analysis does not include all the analytes to be sampled for in the sediments even though leaching, infiltration, and percolation of contaminants from sediments to ground water may occur. Another pathway identified in the conceptual models but not addressed in the field work plan is the movement of contaminants (such as metals) through resuspended soil. These problems could be addressed by adding additional analytes to the sampling list or preparing models illustrating methods of transport.

Response All the pathways identified on the conceptual models are addressed in the field sampling plan. Tables 5-1 and 6-1 identify which pathway each data collection activity is addressing. See EPA General Comment Response I for additional discussion on rationale of analyte program for OU3.

General Comment 3

Comment. The few radionuclides proposed as analytes for the OU3 investigation appear to be inadequate based on the historical data (Section 6.2, DOE 1991) and the methods proposed in the work plan for choosing analytes (Section 6.3, DOE, 1991). Strontium, radium, and tritium were all detected in ground water, surface water, and sediments at the Indiana Street Rocky Flats Plant (RFP) boundary (Section 6.2, DOE, 1991) and yet none of these radionuclides are proposed analytes in the offsite areas downgradient (with the exception of tritium in surface water only). The only radionuclides proposed as analytes are "plutonium, americium, and uranium...identified as site wide chemicals of concern" (p 6-34, DOE, 1991). Selection of chemicals of concern prior to the investigation is premature. The public concern regarding these off-site areas in OU3 is high, especially with respect to radionuclide contamination.

Response. Strontium and radium are naturally occurring radionuclides and have not been identified as sources from the RFP, therefore they will not be analyzed in the samples. Tritium, identified as a potential source along Walnut Creek, will be analyzed in sediments collected along Walnut Creek.

Specific Comment 1

Comment. Page 2-48, Section 2.5.1, paragraph 2. The off-site surface soils conceptual model discussion does not include any information on the fate and mobility of uranium in the environment. This information should be added to the report.

Response. A discussion of uranium in the environment has been incorporated into the Final Work Plan. See EPA's Comment Response I for more discussion.

Specific Comment 2

Comment. Page 2-48, Section 2.5.1.2.1, paragraph 3. This paragraph states that plutonium primarily exists as plutonium 239 and 240, and then references Table 2-5. However, Table 2-5 is a conceptual model for IHSS-199 and does not include any information on the forms of plutonium at OU3. Table 2-5 should be modified to provide the supporting information referenced in this paragraph.

Response. The table was inadvertently omitted in the draft. The correct table and reference has been incorporated into the Final Work Plan.

Specific Comment 3

Comment. Page 2-60, Section 2.5.2.3. No discussion of the nonradioactive contaminants fate and mobility in air, ground water, or biota is included in this section. This information should be added to the work plan.

Response A general discussion of the fate and transport of organic and inorganic discussions is included in Section 2.0. Section 2.0 is a summary of the information presented in the approved Past Remedy Report and Historical Information Summary and Preliminary Health Risk Assessment Report. Detailed discussions of the fate and transport of all nonradioactive contaminants is beyond the scope of a work plan.

Specific Comment 4

Comment. Page 3-1, Section 3.0. This discussion provides information on chemical-specific applicable and/or relevant and appropriate requirements (ARARs) for soil, surface water, and groundwater. No chemical-specific ARARs for air are given. This information should be added.

Response ARARs for air will be addressed in the CMS/FS Report. This is consistent with the work plans for OUs 4, 5, and 6. The Federal and State Standards for air exist only as source and activity specific requirements and therefore will be addressed in the FS.

Specific Comment 5

Comment. Page 3-14, Section 3.2.3, paragraph 2. This text states that the introductory paragraph of Section 3.2.3 explained that detailed, location-specific ARARs will be proposed in RFI/RI report and action-specific ARARs will be addressed in the corrective measures study/feasibility study (CMS/FS) report. However, the introduction does not clearly state this information. The language from this paragraph should be directly incorporated into the introduction, so that the reader immediately knows why all three of the ARAR types are not being discussed in the report.

Response The introductory second paragraph of Section 3.0 addresses when action- and location-specific ARARs will be addressed.

Specific Comment 6

Comment. Page 6-7, Table 6-1. The table does not state that sediments collected along Walnut Creek will also be analyzed for tritium. The analysis should be added to the table.

Response Tritium has been added to the list of analytes for Walnut Creek sediments in Table 6.1.

Specific Comment 7

Comment. Page 6-25, Section 6.2, paragraph 1. This paragraph states that data collected from 1987 to 1990 were utilized to determine the analytes of interest in various OU3 media. However, during a September 9, 1991 meeting, EG&G stated that only

data from 1988 to the present were used. The correct time frame of data collection should be listed in this paragraph. Additionally, this paragraph does not explain how many samples were collected from the alluvial wells, Walnut and Woman Creeks or why these data are of sufficient quality to determine the chemical analyses for water sampling locations within OU3. Further explanation of the data quality should be added to this section.

Response. The number of analyses performed for each data set has been incorporated into the tables in Section 6.0. In addition, the undetected analyses are also included so the reader can see all of the analyses that were performed for each sample. The data set includes samples from 1987 and therefore the text is correct. Recent data collected by EG&G meets data useability requirements. The data are being used primarily for site characterization and not for the risk assessment.

Specific Comment 8

Comment. Pages 6-28 and 6-30, Table 6-1. Pages 6-28 and 6-30 state that if volatile organic compounds (VOCs) or metals are detected in surface water or sediment samples, these analytes will be added to the ground water sampling program. This information should be listed on Table 6-1 (page 6-9).

Response. The purpose of Table 6-1 is to summarize the proposed field sampling plan. The intent is not to summarize all contingency plans. The text has been revised to state "If contaminants are detected, an expanded groundwater field investigation will be developed."

Specific Comment 9

Comment. Page 6-28, Sections 6.2.2.1 1-6 2.2.1.5. These sections describe how data collected from four alluvial wells were used to determine which analytes would be sampled for in the OU3 monitoring wells. However, the OU3 ground water monitoring program will also sample the bedrock aquifer system. Because the alluvial and bedrock ground water systems are two separate systems, it is not appropriate to utilize data from existing alluvial wells to eliminate analytes in bedrock ground water samples. Either data from existing bedrock wells should be referenced, or an explanation of why alluvial well data are applicable to bedrock wells at OU3 should be included in this section.

Response. The referenced sections have been modified to summarize the three alluvial wells and one bedrock well separately. There was an error in the Draft Work Plan when it was stated the data summarized four alluvial wells.

Specific Comment 10

Comment. Page 6-41, Table 6-1 and Table 6-10 Page 6-41 states 20 percent of the sediment samples will be analyzed for TOC, bulk density, and grain size Table 6-1 (page 6-14) states that only 10 percent of the sediment samples will be analyzed for these parameters, whereas Table 6-10 (page 6-76) again states that 20 percent of the sediment samples will be analyzed for these parameters These consistencies should be corrected and the correct percentage listed consistently

Response Ten percent of the soils and sediment samples will be analyzed for TOC, bulk density, and grain size The text has been modified to consistently state this

Specific Comment 11

Comment. Page 6-41, Section 6 3 2 1, paragraph 1 Further explanation of the statistical method utilized is needed to determine that collecting seven sediment samples provides a 99-percent confidence level and collection of three samples provides an 85-percent confidence level Specifically, it should be explained why the referenced method (Conover, 1980) is considered the appropriate method for OU3

Response The statistical justification has been modified in the Final Work Plan (see subsection 6 3 1)

Specific Comment 12

Comment. Page 6-41, Section 6 3 2 1, paragraph 2 To assess fate and transport, 10 percent of the sediment samples will be analyzed for total organic carbon, bulk density, and grain size To fully understand the mineralogy of the sediment samples, it is suggested that x-ray diffraction also be performed on 10 percent of the sediment samples

Response The x-ray diffraction information is not necessary for the RFI/RI to assess fate and transport

Specific Comment 13

Comment. Page 6-55, Section 6 3 3 2, paragraph 1 This paragraph states that alkalinity (pH) measurements will be taken according to standard operating procedure (SOP) 4 8 However, SOP 4 8 is not on the list provided in Section 11, Standard Operating Procedures and Procedure Change Notices, of this work plan

Response The SOP has been added to Section 11 0 in the Final Work Plan

Specific Comment 14

Comment. Page 6-47, second paragraph There appears to be a typographical error in this paragraph Great Mower Reservoir should be changed to Great Western Reservoir

Response. The correction has been made in the Final Work Plan

Specific Comment 15

Comment. Page 6-49, section 6 3 5, paragraph 3 This paragraph states that both the data collected from the existing air monitoring program and the proposed OU3 air monitoring program will be used for the human health risk assessment. However, it is not clear whether the data collected from these two programs consistently reports the same information, or if the data were collected in the same manner Air samples collected during the OU3 air program will be analyzed for isotopic plutonium and isotopic uranium Some of the air samplers currently on-site report gross alpha and beta only In addition, the data for the OU3 air sampling will be collected during three discrete 8-hour sampling events Although an 8-hour sampling period is commonly used for risk assessment data collection, an 8-hour air sample collection period in this case will not provide an adequate concentration of samples to meet the laboratory analytical requirements The collected data will therefore indicate no detections, thereby providing a very biased result. This sampling method is also inconsistent with air samplers currently in use which collect samples for a longer period of time Further explanation is needed regarding which existing air monitoring locations will be used, what is analyzed for at these locations, and the manner in which the sample is collected

Response. The air sampling program has been modified in the Final Work Plan The specifics to the sampling program will be addressed in an addenda to the Final Work Plan. The addenda will be submitted to EPA for approval Two ultra-high volume air samplers are proposed to be installed near Standley Lake These samples will run continuously during a specified period (several months, at a minimum) In addition three locations have been proposed to sample using a wind tunnel. The locations proposed are at Standley Lake, Great Western Reservoir, and a vegetated soil location

Specific Comment 16

Comment. Page 6-49, Section 6 3 5, paragraph 5 Air samplers in the OU3 air sampling program will collect radionuclide particulate matter whose diameter is 10 microns (um) or less (PM10) This size range will not detect plutonium particles whose diameter is larger than 10 um Specifically, attached plutonium particles in the 30-um to 100-um diameter range will not be collected.

Response The air sampling program has been modified in the Final Work Plan. The details of the air sampling program will be provided in an addenda to the Final Work Plan. It is anticipated that all particles will be sampled in the new program.

Specific Comment 17

Comment. Page 6-72 through 6-75, Table 6-9. The herbicides atrazine and simazine are not listed on Table 6-9, Soil Sediment, and Water Sampling Parameters. These herbicides should be added to the table.

Response Atrazine and simazine have been added to Table 6-9.

Specific Comment 18

Comment. Page 6-79, Table 6-11. Table 6-11, Sample Containers, Sample Preservation, and Sample Holding Times for Water Samples OU2, includes sulfide and total dissolved solids (TDS). However, neither of these parameters are listed in the text of the work plan; therefore, sulfide and TDS should be removed from the table.

Response These parameters have been removed from the table in the Final Work Plan.

Specific Comment 19

Comment. Page 6-81, Table 6-12. Table 6-12, Sample Containers, Sample Preservation, and Sample Holding Times for Soil Samples OU3, includes sulfide. However, this parameter is not listed in the text of the work plan, and therefore should be removed from the table.

Response Sulfide has been removed from the table in the Final Work Plan.

Specific Comment 20

Comment. Page 7-14, section 7.3.4. A reasonable minimum exposure (RMinE) is proposed to be calculated along with the reasonable maximum exposure (RMaxE). This is good, but no method for deriving a RMinE is given. The method used should be provided in this section.

Response The reasonable minimum exposure (RMinE) is intended to approximate the lower 5th percentile estimate of exposure dose. It is analogous to the reasonable maximum exposure (RME) which should approximate the upper 95th percentile estimate of exposure dose. Both values will be computed using techniques similar to those presented to EPA and CDH in the August 8, 1991 Risk Assessment Technical Working Group meeting. Techniques such as sampling from statistical distributions using Monte-Carlo simulations were presented at that meeting.

Specific Comment 21

Comment. Page 7-15 to 7-16, Section 7.3.5 Only two future exposure scenarios are proposed a light industrial setting and a research biologist setting. No residential setting is proposed for analysis of risks. No justification for this omission is provided. A residential scenario should be included.

Response. This section has been revised to reflect the NCP requirements for the exposure assessment.

Specific Comment 22

Comment. Page 9-2, Figure 9-1 The conceptual schedule for the phase I RFI/RI activities groups all the field activities together. Because ground water wells will be sampled for some analytes only if they are detected in sediment and surface water samples, the text should explain whether ground water wells will be sampled last, or if the well will be resampled if these contaminants are discovered in the other media.

Response. The ground water wells installed downgradient of Great Western Reservoir and Standley Lake are to characterize the interaction between the reservoirs and the groundwater system in the vicinity of the reservoirs. If VOC or metal contamination is detected in the surface water, groundwater, or sediments along Indiana Street, the entire OU3 groundwater sampling program will be revised. Groundwater wells will be sampled quarterly. If metal contamination is identified as a concern in the reservoirs, metals can be incorporated in the groundwater program at that time.

Rocky Flats Cleanup Commission Comments and Comment Responses

General Comment 1

Comment. Why is the CDH special construction standard for plutonium in soil (0.9 pCi/g) used as a basis in this work plan? Understandably it was the level set by the court for the 1985 lawsuit, but why not set the standard to reflect background values? What are the differences in health/environmental risks? Perhaps more discussion of the January 1976, CDH study, "A Risk Evaluation for the Colorado Plutonium-in-Soil Standard," should be added to both this work plan and the Past Remedy Report.

Response. The CDH standard of 0.9 pCi/g is not the basis for the work plan. It is only the basis for the settlement agreement lands which are not directly related to the CERCLA requirements. A discussion of ARARs is more useful in the RFI/RI Report.

General Comment 2

Comment. The Cleanup Commission has reservations about the efficacy of the tilling program on the remediated lands, as well as continued recreational activities on Standley Lake which could disturb the sediments. Perhaps as interim measures, the soil tilling activities and shoreline recreational activities should be curtailed.

Response. The OU3 work plan does not address the tilling program. Sediments along the shoreline of Standley Lake will be evaluated to determine if there is a risk from recreating in the area. The preliminary risk assessment performed in the Historical Information Summary and Preliminary Health Risk Assessment indicated there is not a risk at Standley Lake.

General Comment 3

Comment. What effect will possible new radionuclide standards that will be determined by the Colorado Water Quality Control Commission in February have on this plan?

Response. The potential ARARs presented in Section 3.0 are the most recent requirements for the OU 3 contaminants of concern. As ARARs for RFP are determined, this section will be updated as necessary.

General Comment 4

Comment. Limnological studies are not mentioned as being integral to this evaluation. Page 8-9, mentions that the USGS study is ongoing. The Cleanup Commission strongly urges that these studies be completed and incorporated as soon as possible. Is there current understanding of all morphological features of the lakes? Is there an under-

standing of the frequency of turnover events that would help in determining the periods of stratification in the lakes? In addition, has rechanneling been considered as a possible mechanism for sediment dispersion as tributaries, especially during high flow periods, enter the lakes?

Response The project staff and EG&G will maintain contact with the USGS, and the project staff have reviewed the preliminary draft of their limnological report on Standley Lake. We concur with the recommendation of the Cleanup Commission to incorporate this USGS information into the OU 3 RFI/RI program. Basic limnological information will also be obtained on Great Western Reservoir to determine frequency of turnover in the reservoir, and additional sediment samples will be taken in both reservoirs to obtain more information on contaminant distribution.

General Comment 5

Comment. This plan does not adequately address synergistic effects in its determination of risk. Chapter 8 discusses synergistic/antagonistic effects in relation to the environmental evaluation, but no mention is made for the human health risk assessment.

Response. The human health risk assessment will qualitatively address synergistic and antagonistic effects. Defensible quantitative methods to evaluate synergistic, antagonistic or neutralizing effects do not currently exist. Guidelines proposed by EPA deal with additivity of dose and response, not synergism. However, additivity also has inherent problems and the potential for synergisms, antagonisms, and neutralizing effects only confounds the situation.

General Comment 6

Comment. The Cleanup Commission adamantly requests that any discussion or determinations of incremental risk be related to the cumulative risk of all exposures from the plant. The off-site soils are not the only contribution to cumulative risk to the public. A new risk accounting system must be developed that can provide a "total" risk to the public from all sources related to the RFP operations. This risk must then be added to, not just merely compared with, the already elevated risk of living in Colorado.

Response. The risk calculations will be presented and discussed in the RFI/RI Report.

General Comment 7

Comment. There are no discussion in this plan of how exact boundaries of OU3 will be determined. Is the soil sampling protocol extensive enough to be used in defining the boundaries? We request that all areas surrounding the plant at least be investigated for possible contamination before they are ruled out for inclusion in OU3.

remediation We are particularly concerned that areas directly south of the buffer zone are being excluded for consideration

Response The soil sampling grid has been extended to the south and north of the buffer zone in the Final Work Plan Ten additional soil samples will also be collected at more distal locations from the RFP to help define the OU3 boundaries (See Figure 6-4)

Specific Comments

Specific Comment 1

Comment. Page 1-16 Why are only 117 IHSS's mention when there are 178?

Response The work plan has been revised to state 178 IHSSs

Specific Comment 2

Comment. Page 1-17 The figures representing populations and households near the plant are confusing There is no indication of direction Assuming that "A" is north, the numbers for what one would assume to be the area around Leyden are too low

Response The figures were compiled from the 1989 Population, Economic and Land Use Data Base for Rocky Flats Plant Population data used in the RFI/RI Report will be updated at the time the report is prepared

Specific Comment 3

Comment. Page 2-41 Would it be beneficial to have the cities of Westminster, Northglenn and Thornton test their filter backwash sludge?

Response As indicated in the Technical Review Group meetings, the tests that have been performed have not detected radionuclides

Specific Comment 4

Comment. Page 4-6 The statement at the bottom of the page that, "based on data collected and evaluated to date, it is unlikely treatability studies will be necessary," should be stricken Members of the general public "might" react strongly to such a parameter declaration

Response Based on the approved preliminary risk assessment (Past Remedy Report), the statement is appropriate

Chapter 6—Comment 1

Comment. One vertical sediment sampling along the shoreline of the lake is not adequate

Response. The vertical profile sample is for characterization. Additional vertical profile samples are proposed for each of the reservoirs and for soils samples. Near shore sediment samples will be collected to evaluate the potential for resuspension of sediments

Chapter 6—Comment 2

Comment. Are the protocols for testing analytes other than radionuclides adequate?

Response. The protocols for all analyses are consistent with other sampling programs onsite. The methods proposed are consistent with the QAPP

Chapter 6—Comment 3

Comment. How much redundancy is there between the routine monitoring program and any special tests required for this study. We would encourage that all studies be combined as much as possible. What are the management plans to do so?

Response. In designing the field sampling plan for OU 3, existing sampling programs were considered to avoid duplication. For example, the surface water drainage program will utilize ongoing monitoring activities at Indiana Street as will the sediment and groundwater programs

Chapter 6—Comment 4

Comment. Why are residential wells going to be excluded from analysis? Would they not serve a valuable purpose in this study?

Response. The residential wells will not be sampled because the information regarding drilling and completion information is not complete. In addition, based on the schematic of the groundwater and surface water interaction presented in Figure 6-2 of the Final Work Plan, the flow pathway for potential contaminants in the shallow groundwater system is to the stream drainages

Colorado Department of Health Comment and Comment Responses

Specific Comments

Executive Summary On page two of this section an additional bullet needs to be added to the list of bullets presented. This bullet could say "Describe the fate and transport of contaminants found in OU 3." This RFI/RI Workplan should make an effort to go beyond only determining the nature and extent of contaminants. It needs to begin to determine how these contaminants move through environmental media (see IAG Statement of Work, Section VII)

Response The goals identified in the executive summary adequately address the goals of the RFI/RI

Executive Summary Within the "SOIL" subsection, the Executive Summary needs to clarify that soil sampling will be done in a 1000-meter grid covering an area that extends approximately three miles east from Indiana Street and over four miles north-south along the entire eastern boundary of the plant

Response The language has been clarified in the Final Work Plan

Section 1.3 An effort needs to be made to construct the subsections of Section 1.3 so they address the specifics of OU 3. OU 3 is not a part of RFP and the physical setting, physiography, geologic setting, bedrock, surficial deposits, hydrology, surface water, groundwater, and ecology need more site-specific treatment in these subsections of the text

Response Sections 1.0 and 2.0 were taken from the approved Past Remedy Report and Historical Information Summary and Preliminary Health Risk Assessment. Section 2.0 focuses specifically on the OU 3 setting while Section 1.0 is more of an overview of the surrounding settings

Section 1.3.3.1 The fifth sentence in the first paragraph of the section needs to be deleted. The depositional environment of the Arapahoe sands is still being developed

Response The referenced sentence has been deleted in the Final Work Plan

Figure 1-2 The color code on this figure needs to be changed. Because the color shades are similar and many of the ponds are very small on the map, the colors are hard to distinguish

Response The figure has been modified to more easily distinguish between colors

Figure 1-3 The location of Church Ditch needs to be added to this figure

Response. Church Ditch has been added to the figure as suggested.

Section 1.3.6.1 Please change "Single (unincorporated) residents are located " to "Single family dwellings are located in the unincorporated areas. "

Response. The sentence has been revised as suggested

Section 2.1.1. The word "contiguous" needs to be deleted from the first sentence of the second paragraph of this section

Response. The sentence has been revised as suggested

Section 2.1.2. This section should be re-named "Significant Historical Events in IHSS 199" This needs to be done so that the explanation of the litigation that follows in Section 2.1.2.1 will not be construed as comprehensively covering all portions of IHSS 199

Response. The section has been re-named as suggested.

Section 2.1.3.2. This section should be more comprehensive in it's discussion of the OU 3 surface water environment. Discussion should be added to include average and maximum flow rates in Walnut and Woman Creeks, Smart, Church, and Mower Diversion Ditched. There should also be a discussion of the normal flow periods for each of the ditches. In addition, an explanation of the surface water-ground water interchange should be included.

Contrary to the text in the first paragraph of Section 2.1.3.2, the Jefferson County acreage in section 18 does not surround Mower Reservoir

Response. Section 2.0 was taken from the approved Past Remedy Report and Historical Information Summary and Preliminary Health Risk Assessment Report. The requested information will be provided in the RFI/RI Report. The text has been modified to state that the Jefferson County acreage is immediately west of Mower Reservoir

Section 2.2.2.2 Please include the normal surface water elevation of Great Western Reservoir in this section along with the average seasonal fluctuations of the water level. Please also include an estimate of the land surface exposed at the minimum water level

Response. The historical storage for Great Western Reservoir has been included along with seasonal variation in the Final Work Plan. Estimating the amount of exposed surface will be performed during the RFI/RI and included in the RFI/RI Report.

Section 2.3.2.2 See comment to Section 2.2.2.2 above and apply it to Standley Lake

Response The historical storage capacity for Standley Lake has been included along with the seasonal variations in the Final Work Plan

Section 2.5.1 The division appreciates the OU 3 dilemma that existing data are almost exclusively for Plutonium. However, this should not preclude discussions in this section of the text from including non-Plutonium contaminants. The conceptual models presented here should include comprehensive coverage of radionuclides and non-radionuclides. The text makes a small effort to do this, but discussions of release mechanisms, transport media, contaminant fate and transport, and contaminant mobility only cover plutonium. Please expand these sections to include other possible contaminants.

Response Additional discussion of fate and transport of organics and inorganics has been included in the Final Work Plan. The focus remains on plutonium and americium since they are the documented contaminants of concern for the site. More detailed discussions of the fate and transport will be included in the RFI/RI Report.

Section 3.0 Pending the results of the regulatory agencies request for a meeting regarding the ARAR approach for Rocky Flats RFI/RI's, the Division is withholding comments on the issue of TBC's and State standards. We will also withhold comments on the completeness of the list of constituents included in this work plan. However, in the following comments we have pointed out a few discrepancies.

On the first page of Table 3-1, under the column entitled "Tables A and B - Statewide," there is a standard of 15 pCi/l listed for Plutonium 239+240. Tables A and B include carcinogenic and non-carcinogenic organic chemicals only, and do not cover radionuclides. The standard for plutonium is incorrectly placed.

On the second page of Table 3-3, under the column entitled "Table 2 Radionuclides - Woman Creek," the standard of 0.05 pCi/l should be added for Americium 241 and for Plutonium 239+240.

Response A footnote to the plutonium standard has been added that references the radionuclide standards (Section 3.11.5(c)(2) in (d)). The standard of 0.05 pCi/l was added for americium and plutonium.

Table 5-1 The Division has been repeatedly assured that sampling and analysis will be conducted to determine if contamination to OU 3 has resulted from chemicals other than plutonium and americium. This would include other radionuclides. However, with few exceptions, this table only refers to analysis of plutonium and americium and neglects the other radionuclides. The Division believes that the sampling and analysis covered in this table should be for all radionuclides and should not be specific to only plutonium and americium.

In characterizing the nature and extent of soil contamination, the Division believes that analyses should be included for metals and any other potentially windblown chemicals or constituents that are or have been in use at RFP. Again, soil contamination may not be confined to just plutonium and americium.

To completely characterize the hydrology, a full suite of analyses needs to be done on any recovered groundwater. This would include analysis for all TAL metals and TCL volatiles.

In addition to the analyses mentioned, air samples need to be analyzed for gross alpha and gross beta.

Response. In discussion with CDH at the October 24, 1991 meeting, CDH clarified that they were looking for samples to be analyzed for gross alpha and beta and not a full isotopic analysis for all radionuclides. In the Final Work Plan, uranium has been added to the vertical soil and sediment sampling and to the air sampling programs. As shown on Table 6-11, analysis will be performed for gross alpha and beta in sediment samples, surface water samples, and groundwater samples.

Regarding the analyses that will be performed for soil samples in OU 3, see EPA Comment Response I.

The rationale for selecting the analyses for groundwater samples for OU 3 was presented in Section 6.2 of the draft and final work plans. The wells along Indiana Street represent the wells most likely to be affected by RFP activities. Since metals and volatiles were not detected above background in these wells, they are not likely to be detected in the groundwater wells installed for OU 3.

The air sampling program is being rewritten with details to follow in an addenda to the Final Work Plan.

Table 6-1--Soil. As stated above, the Division does not believe that analyzing soil samples for only plutonium and americium is sufficient to completely characterize any soil contamination in OU 3. We think that the surface soils need to be analyzed for all radionuclides and that 25% or more of the samples should also be tested for TAL metals and any other potentially windblown chemicals or constituents that are or have been in use at RFP. Because the plant history is now 40 years long, releases could have occurred long ago that, at the time, were considered of no consequence. Operations over the life of the plant are not well documented or understood. Whether or not a "source" or release can be pointed to for potential off-site soil contamination, the Division believes that some of the soil samples should get a full-suite analysis.

Response. The contaminants that are being addressed in OU 3 are those for which a complete migration pathway and source have been identified. The program designed for the OU 3 soils is based on historical sampling results and known sources for dispersing contaminants via the air pathway to OU 3. The sources identified in the

approved Past Remedy Report include the 903 Pad, the beryllium fire, and the Solar Evaporation Ponds. The 903 Pad has been identified as the major source for offsite plutonium contamination at OU 3. Plutonium, americium, and uranium will be analyzed in soils for OU 3. Three studies have investigated the potential for beryllium to have been released to offsite soils. CDH has analyzed for beryllium in two sampling episodes and the RFP performed a study in 1982. All three studies indicate beryllium was not detected in offsite soils. If beryllium is not detected then it is unlikely other metals would have been dispersed via the air pathway to OU 3 since no other major sources of contaminants have been identified. The Solar Evaporation Ponds are being investigated in OU 4. If these investigations identify metals in soils that could potentially migrate offsite due to wind dispersion, soils will be investigated further in OU 3. Metals and other contaminants are more likely to migrate from the RFP via the surface water and sediment loadings in the drainages. In these pathways, metals and other potential contaminants are being analyzed.

Table 6-1--Sediment. Sample locations need to be added to the sediment sampling program in the ephemeral streams north of Great Western Reservoir and in all ephemeral streams between Great Western and Standley Lake Reservoirs. Samples also need to be collected in Church Ditch. In addition, sediment data from the municipalities should be incorporated into this workplan and the data used to more effectively and efficiently design sediment sample collection.

Response Additional sediment sampling locations have been added to Church Ditch, Smart Ditch, and the unnamed drainages between Great Western Reservoir and Mower Reservoir. See Figure 6-5 in the Final Work Plan. DOE is not clear to what data from the municipalities CDH is referring. Sediment data along Indiana Street has been reviewed and incorporated into this work plan. DOE has requested all data from the Cities and it is being tabulated for inclusion in the RFI/RI Report.

Table 6-1--Surface Water Sampling for SW-1 should include, when possible, water from any ditches that transect OU 3.

Response The surface water drainage sampling program for OU 3 has been modified based on field reconnaissance. Some of the drainages are topographic drainages which contain water intermittently. Because of the low volumes of water flowing through the drainages, the surface water drainage will focus on the sampling stations along Indiana Street at Walnut and Woman Creeks, and Mower Diversion Ditch. Several surface water samples will be collected for site characterization purposes at Smart Ditch, Church Ditch, Woman Creek, Walnut Creek, Big Dry Creek, Clear Creek Irrigation Ditch, and Broomfield Diversion Ditch.

Table 6-1--Groundwater As stated previously, the Division believes that full suite analysis should be done on groundwater from OU 3. This should include all radionuclides, TAL metals, and TCL volatiles. We also believe that any groundwater monitoring wells should be drilled and the geologic material from those wells sampled in the same

manner that on-site wells are drilled and sampled. This would include coring, core sampling, core description, and well construction and development.

Response. The rationale for selecting the analyses for groundwater samples for OU was presented in Section 6.2 of the draft and final work plans. The wells along Indiana Street represent the wells most likely to be affected by RFP activities. Since metals and volatiles were not detected above background in these wells, they are not likely to be detected in the groundwater wells installed for OU 3.

Table 6-1—Air As stated previously, the Division would like any air samples to be analyzed for gross alpha, gross beta, and uranium.

Response Uranium has been added to the analyses for the air sampling program for OU 3. Gross alpha and beta will not be analyzed because they are not analyzed in the onsite air monitoring program. The air program is being changed to incorporate the wind tunnel study. An addenda to the Final Work Plan will be submitted for approval with the details of the air sampling program.

Figure 6-4. Please refer to the attached copy of Figure 6-4 for the Division's recommendation for additional sampling locations.

Please note that the additional sampling locations are within Church Ditch (3 samples), and the two ephemeral streams northeast of Mower Reservoir (4 samples). The Division believes these samples are justified because 1), these sediment locations are directly down the major wind vector from the plant and within the main plutonium contamination plume and 2), no data is currently being collected in these streams to study the collection and concentration role that they may be playing in the migration of plutonium in the surface system.

Response. Additional sediment sample locations have been added to the Final Work Plan. Two samples will be collected along Church Ditch, two in Smart Ditch, and two in the unnamed topographic drainages between Mower and Great Western Reservoir (see Figure 6-5).

Figure 6-5 Please refer to the attached copy of Figure 6-5 for the Division's recommendation for additional sampling locations.

These sample locations have been added for reasons similar to those stated in response to sample locations for the additional sediment sampling locations. These additions are necessary to gain complete understanding of the surface system.

Response. Field reconnaissance of the drainages in OU 3 have shown that flows are low and intermittent through the natural drainages. Therefore, a large scale surface water drainage investigation is not feasible. Surface water samples will be collected in Church Ditch as it begins flowing through OU 3 (southeast of the buffer zone) and also before it discharges to Great Western Reservoir. This will help characterize surface

runoff from OU 3 to ditches. Surface water samples will also be collected at Smart Ditch, Woman Creek, Walnut Creek, Big Dry Creek, Clear Creek Irrigation Ditch, and Broomfield Diversion Ditch. The ongoing monitoring of surface water at Woman and Walnut Creeks and Mower Diversion Ditch along Indiana will also be incorporated into the surface water evaluations.

Section 6.2 1.2 In the third sentence of the first paragraph in this section, the word "potential" needs to be added as an adjective for the acronym "ARAR." Tables 6-3, 6-4, and 6-5 do not present finalized ARAR values, but only present the lowest existing standard. This value may or may not become the actual ARAR.

Response The text and tables have been modified to state "potential" ARARs as suggested.

Tables 6-3, 6-4, and 6-5 The titles of these tables need to be expanded to clarify that the values presented come from groundwater, surface water, and sediment collected along Indiana Street.

Response The titles of the tables have been revised as suggested in the Final Work Plan.

Table 6-6 As has been indicated in previous comments, the Division believes that this table needs to be changed. Specifically, TCL VOAs, and TAL metals should be added to the groundwater analyses, TCL acid extractables and base/neutrals should be added to the sediment analyses, TCL pesticides and PCBs and TAL metals should be added to a percentage of the soil analyses.

Response As stated in previous comment responses to both EPA and CDH comments, the analyses identified for OU 3 were based on complete pathways from the conceptual model, identified sources from the RFP, and a review of the historical data collected at Indiana Street. Volatile analyses have been dropped from the sampling program for OU 3 because historical data indicated they have not been detected in media along Indiana Street. The cities of Westminster, Northglenn, and Thornton have eliminated VOAs from their monitoring program because past data have indicated no detections. Semivolatiles have been eliminated because there have been only spurious detections in the media along Indiana Street. Metals will be analyzed in surface water and sediment samples where potential sources exist on the RFP. See Section 6.2 for OU 3 chemical rationale.

Section 6.2 2 1 1 Groundwater should be analyzed for volatiles.

Response See comment response to Comment on Table 6-6.

Section 6.2 2 1 5 Groundwater should be analyzed for inorganics and metals.

Response. See comment response to Comment on Table 6-6 and previous comments on groundwater analyses

Section 6.2.2.3.2 At least a percentage of sediment samples should be analyzed for semivolatiles

Response. See comment response to Comment on Table 6-6 and previous comments on sediment

Section 6.2.2.4 At least a percentage of the soil samples need to be analyzed for pesticides and PCB's as well as metals

Response. Following a review of OU 2 data, there is no reason to believe PCBs, pesticides, or metals are contaminants of concern in OU 3 See discussion in Section 6.2 of the Final Work Plan.

Section 6.3.1.1 The Division was unable to find the soil profile sampling on a map Please either add a map indicating where these samples will be collected or add this information to an existing map

Response. A map is provided with vertical profile sampling locations in the Final Work Plan (Figure 6-3)

Table 6-9 Attached, please find some comments to Table 6-9 from Jeb Love of the Rocky Flats Program Unit These comments concern inadequate detection limits for some of the listed analytes as well as some analytes that have been incorrectly omitted.

Response. The analytical methods proposed in the work plan are consistent with other programs for the RFP See the comment response to Jeb Love's specific comments

Table 6-10 Please see the attached copy of Table 6-10 for the Division's suggested additions and changes

The reasons for the additions are as follows

- 1) Gross alpha and gross beta need to be added to profile soil sampling, the soil grid survey, reservoir vertical profiles, and air sampling because a more complete understanding is necessary to characterize the radionuclide contamination and background and associated risk to OU 3
- 2) TAL metals need to be added to a percentage of the soil grid survey so that metals can be characterized and the risk analyzed in the off-site areas Unless metals are sampled and analyzed for, the risk from them remains a quantity that cannot be quantified. The text was unable to present any historically collected soil data for metals because soils have never been tested for anything but plutonium The groundwater also needs to be tested for TAL metals This is a good

opportunity to extend RFP's understanding of metal occurrence and migration in the subsurface

3) The groundwater also needs to be tested for TCL volatiles, both to extend RFP's data base eastward and to prove that absence or presence of volatiles (the principle onsite contaminant) in the off-site subsurface

In addition, Table 6-10 should be expanded to clarify which sample types will be analyzed for pesticides and PCBs and semivolatiles

Also, the table indicates that analysis will be performed to break down the relative amounts of each uranium isotope. Please verify that the planned analysis method will, in fact, be able to accomplish this goal

Response As stated in previous comment responses, the rationale for the OU 3 sampling program is provided in Subsection 6.2. The analytical method proposed for uranium will provide the isotopic break down

Section 8.0 Comments to Section 8 from Jeb Love of the Rocky Flats Program Unit are attached. Mr. Love has been participating in the Risk Assessment Technical Working Group that has been attempting to establish some site-wide protocols for the Environmental Evaluations. Please address his comments with this in mind

Response No response required

Jeb Love's Comments and Comment Responses

General Comment Response to Jeb Love's Letter

The Final EEWP has been revised to present an approach similar to the other OU's EEWPs. An attempt is being made to coordinate with other OUs and consideration is given to site-wide modelling approaches.

Specific Comments

Page 6-72, Table 6-9 Soil, Sediment, and Water Sampling Parameters and Their Detection Limits Operable Unit No 3

The metal detection limits for water for cadmium, chromium, copper, and silver are not sensitive enough for the intended use of the data. Substitute the following:

<u>Target Analyte</u>	<u>Detection Limit $\mu\text{g/l}$</u>	<u>EPA Method</u>
Cadmium	0.1	213.2
Chromium	1.0	218.2
Copper	1.0	220.2
Silver	0.2	272.2

Add the following analytes to the list

N-ammonia ¹	350.2
N-nitrite ²	354.1
Total phosphorus ³	365.4
Total suspended solids ⁴	
Turbidity ⁵	180.1
Chlorophyll-a ⁶	

- 1 Ammonia toxicity is a concern to aquatic life. The ammonia levels in the on-site ponds and downstream are a compliance concern with the stream standards for ammonia on Walnut Creek.
- 2 Nitrite toxicity is a concern to aquatic life.
- 3 Total phosphorus in the reservoirs and loading to the reservoirs are needed for any baseline assessment used to measure the health of the reservoirs. With the nitrogen species a nutrient balance can be initiated.

- 4 Total suspended solids is a parameter used in partitioning and other assessments of surface waters and should be a standards analyte
- 5 Turbidity or particle counting should be considered relative to the radionuclide concentrations, particularly correlations with plutonium and americium. Any correlations that can be extrapolated from the data to enable the creation of an indicator for americium and plutonium should be considered
- 6 Chlorophyll-a should be considered in any baseline analysis of the reservoirs. The sampling protocol should require sampling in the photic zone

Chlorophyll-a also may be useful in investigating a correlation between plutonium, americium and turbidity, allowing the elimination of the effects of algae on turbidity

The baseline assessment of the reservoirs needs a loading analysis of nutrients, including the storm event data and atmospheric deposition. Turbidity and Chlorophyll-a analysis are recommended, but may be considered as topics for further discussion

Response The analytical methods proposed for OU 3 are consistent with the other OUs and the QAPP

The suggestion from Jeb Love to add nutrient (nitrogen and phosphorus) and chlorophyll-a to the analyte list for OU 3 was apparently made assuming that extensive ecological studies and/or a baseline assessment would be conducted on the water supply reservoirs in OU 3. Since the two water supply reservoirs currently obtain almost all their water from sources outside the Woman Creek and Walnut Creek watersheds, ecological study of the primary producers in the reservoir, and zooplankton which are the principal consumers of phytoplankton, are not planned. These communities will respond to parameters such as temperature, nutrient loading, and turbidity rather than to the low levels of a few contaminants from the RFP. Therefore, an ecological study of these communities would be almost exclusively an analysis of parameters not related to the RFP

At this time, the RFI/RI at OU 3 will rely on the ongoing limnological studies on Standley Lake by the USGS for information on nutrient loading and cycling in the reservoirs, and target benthic macroinvertebrate and fish communities which are more likely to provide quantitative evidence of RFP-related contamination, if it occurs

Water quality analytes such as ammonia and nitrite nitrogen are currently being monitored by DOE and the Cities of Westminster and Broomfield in Woman Creek and Walnut Creek. These parameters are also included in the OUs 5 and 6 investigations (the onsite portions of Walnut and Woman Creek—closer to potential sources). These data sources will be used in early 1992 to determine if there is any need to incorporate

nitrite and ammonia nitrogen, phosphorus, chlorophyll-a, etc. into the OU 3 program. The ephemeral nature of Woman and Walnut Creek within OU 3, the surface water management controls on these watersheds by the RFP, and the minor input of creek water into the reservoirs (in contrast to the major input from supply ditches) provides the rationale for not including these analytes at this point in time in the OU 3 program.

**Responses to Comments
From
U.S. Fish and Wildlife Service
On
Draft OU 3 RFI/RI Work Plan**

General Comment 1

Comment (1) Selection of contaminants and biota in the RFI/RI Workplan seems to have been done without application of the criteria for selection of Contaminants of Concern (COCs) or the criteria for selection of Target Biota Taxa (TBT) Specific contaminants and biota are discussed throughout RFI/RI Workplan with no reference to the relevant selection criteria The Service recommends that the appropriate criteria be applied to select COCs and TBT and all field investigations be tailored to the selected COCs and TBT

Response Section 8 of the RFI/RI Work Plan has been revised to incorporate procedures for finalizing selection criteria and then selecting contaminants of concern (COCs) and Target Biota Taxa (TBT) Based on available information, potential COCs and TBTs are discussed and presented in tables within the appropriate subtasks (Subtasks 1 4 and 2 3 presented in Section 8 0 of the Final Work Plan)

General Comment 2

Comment. (2) The Workplan describes releases of metals and organic compounds which could impact the environments of OU3, yet the Workplan seems to focus on impacts from radionuclides While the investigation of radionuclides is important, the potential for impacts from metals and organic compounds is too great to overlook The Service recommends that the criteria for selection of COCs be applied and the resulting COCs guide the investigation

Response For terrestrial ecosystems, the process of selecting COCs was applied to the contaminants on OU3 using criteria developed by EG&G for EEs at the RFP in the final work plan An initial list of contaminants of concern has been prepared, and will be finalized for the implementation of the EE as Tasks 1 and 2 Neither metals nor organic compounds are expected to be COCs for terrestrial ecosystems using these criteria See Section 6 0 in the final RFI/RI Work Plan for additional discussion of COCs

General Comment 3

Comment. (3) The field sampling plan does not contain the level of detail that is required by SOP 5 13 and it does not appear that the work required to meet this level

of detail has been accomplished (Standard Operating Procedures, Ecology 5 0, EG&G Rocky Flats, May 1991) The Service cannot determine, from the information presented to date, whether or not the data to be collected will be sufficient to evaluate injury or no injury to natural resources present at OU 3 at the level of detail required by the Natural Resource Damage Assessment Regulations (Natural Resource Damage Assessment Rule, 43 CFR Part 11, Subpart E)

Response. The field sampling plan (Section 8.3) in the Final Work Plan has been revised to conform to the requirements and format presented in SOP 5 13. An initial site visit was conducted in early October to survey field conditions and habitat types Proposed sampling locations were checked for applicability and the sampling approaches for terrestrial and aquatic ecosystems were discussed with EG&G and DOE This information was incorporated into the revised field sampling plan and requirements for the Natural Resource Damage Assessment process were considered.

Specific Comment 1

Comment. Section 2.1.2.2.2. Prairie dog suppression is proposed to facilitate revegetation of remedial acreage (pg 2-13) Any chemical suppression of prairie dogs must be cleared with Service personnel at this office to protect black-footed ferrets which may be present in prairie dog colonies.

Response. All references to prairie dog suppression have been removed from the Final Work Plan.

Specific Comment 2

Comment. 6 0 Field Sampling Plans The basis for the number of samples to be collected for each media at each site is not clearly documented The Service recommends that DOE collect sufficient samples/media (biotic and abiotic)/site for statistical analysis and include, in the field sampling plan, an explanation of the methodology used to determine sample size and sampling frequency for both reference and impacted areas The Natural Resource Damage Assessment Regulations require that sample size and frequency be sufficient for statistical analysis so that a clear determination of injury or no injury can be made (Natural Resource Damage Assessment Rule, 43 CFR Part 11, Subpart E, section 11 64) In addition, SOP 5 13 (pg 4) requires a clear statement of statistical design for implementation of this SOP (Standard Operating Procedures, Ecology 5 0, EG&G Rocky Flats, May 1991)

Response. The sample size, frequency and location for biotic sampling are discussed in the EE Field Sampling Plan in Section 8 3 of the Final Work Plan. The sampling protocol and procedures follow recommendations in the Ecological SOP in Volume 5 for statistical analysis and adequacy

Specific Comment 2

Comment. 6 0 Field Sampling Plans It is not stated in the Work Plan whether or not a site has been identified as a reference area for comparison of reservoir ecology sampling The Service recommends that a similar Front Range lake or reservoir be chosen

Response The work plan has been revised to clearly state that a reference reservoir (area) will be selected to provide data on aquatic and wetland ecosystems comparative to Mower Reservoir Since Great Western Reservoir and Standley Lake receive over 90 percent of their water supply via diversions from Clear Creek, and very little from the Rocky Flats Plant, there are no comparative ecology studies planned for these two reservoirs

Specific Comment 3

Comment. 6 3 6 1 Aquatic Ecosystems and Biota The workplan does not include evaluation or sampling of aquatic plants, however, they are an important component of the aquatic ecosystem and should be evaluated Aquatic plants are important waterfowl food items and could be an important route of exposure to contaminants

Response Plants in wetlands on the edges of the reservoir and near shore plants will be sampled in the terrestrial portion of the sampling procedures, and analyzed as a possible hazard to waterfowl based on the concentration of contaminants measured

Specific Comment 4

Comment. 6 3 6 1 2 Quantitative Aquatic Sampling

- (a) The Service recommends that macroinvertebrate samples be analyzed for tissue concentrations Macroinvertebrates are an important food source for many wading birds as well as waterfowl

Response Section 6 3 6 1 2 and Table 6-7 of the Draft Work Plan clearly stated that benthic macroinvertebrate samples would be collected and analyzed for tissue concentrations That activity will remain in the field sampling plan as presented in the Final Work Plan in Section 8 0

Comment. 6 3 6 1 2 (continued)

- (b) Along with water toxicity tests, the Service recommends that sediment toxicity tests be done to determine the acute toxicity of reservoir and creek sediments Many contaminants have a high affinity for sediment and can be acutely toxic even when water toxicity tests are negative

Response. The revised Final Work Plan and field sampling plan include toxicity tests using both water and sediments from several stations

Comment. 6 3 6 1 2 (continued)

In order to determine if bioaccumulation in fish tissues poses a hazard to the fish themselves, predators, and/or humans as stated in the workplan (pg 6-61), samples of whole body, fillets, and a filtering organ (i.e. liver or kidney) should be collected. Whole body samples are indicative of the predator exposure, fillets indicative of human exposure, and organ samples are indicative of fish health. Because it is difficult if not impossible to extrapolate from one type of sample to another, the Service recommends all three types of samples be collected.

Response. The Draft Work Plan field sampling plan called for fillet and whole body samples to measure potential bioaccumulation. The revised Final Work Plan will include procedures to also collect some liver samples from the more common species. The intent will be to obtain samples from sport fish and rough fish if catches are adequate.

Specific Comment 5

(a) **Comment.** 6 3 6 2 Terrestrial Ecosystems and Biota. It is not clearly stated how wetland areas present in OU 3 will be examined for evidence of contaminant accumulations (pg 6-65). Wetlands, regardless of size, are important to a large number of terrestrial and aquatic species. Because wetlands are capable of accumulating large quantities of contaminants, the Service recommends that DOE investigate both the terrestrial and aquatic communities in wetlands occurring in OU 3.

Response. The Final EE Work Plan specifies that the vegetation in wetlands will be investigated as the primary source of contaminant concentrations or uptake leading to higher trophic levels. If significant aquatic populations are located in wetlands, they will be also sampled, although it is not anticipated that sufficient aquatic populations exist outside the reservoirs, which are being sampled for aquatic components.

(b) **Comment.** There are no provisions in the Work Plan for the investigation of potential impacts to migratory birds at OU 3. There is available habitat for a variety of migratory birds associated with wetlands, grasslands, and uplands. These habitats are potential feeding, nesting, and roosting sites for waterbirds, passerines, and raptors. The Service recommends that DOE investigate migratory bird populations at OU 3 and their potential for exposure to contaminants.

Response Migratory birds are not a possible species for investigation of potential impacts for the following reasons

- 1 Migratory birds use the site for one or two seasons in a year
- 2 The impacts from the low concentrations of contaminants on the site cannot be separated from possible effects of feeding and resting at other sites along the Colorado Front Range, or in the area of their winter range
- 3 There is a large variability in the numbers and seasonal use of OU3 by migratory birds that would make populations effects difficult to determine

The literature on migratory birds and possible effects will be reviewed for this region to determine if impacts could occur, and methods to determine these impacts

Specific Comment 6

Comment. 63622 Reference Areas The use of reference areas is important for the determination of injury or no injury to populations and communities at Rocky Flats The Service recommends that the selected reference areas be documented in the Work Plan In addition, the sampling strategy for the reference areas and the methodology used to determine it should be included in the Work Plan If available, the Service also recommends the use of an off-site reference area

Response Reference areas are included in the Final EEWP The methodology for the reference areas will be similar to that used on OU3 for comparison

Specific Comment 7

Comment. 63623 Quantitative Terrestrial Studies The workplan makes the assumption that ecological effects will result only from measurable accumulations in a primary producer and a primary consumer (small mammal) (pg 6-66) Ecological effects can result without accumulations and these effects can possibly be measured by comparative ecology as stated in the Work Plan However, comparative ecology studies of small mammals is not possible without systematic population sampling The Service recommends that systematic sampling of small mammals for population densities and conditions be documented on OU 3

Response Small mammal populations are subject to fluctuations in density and other parameters that are related to intrinsic and external factors that are difficult to account for and separate from impacts from contaminants Without a baseline of several years population data in the area to be sampled, systematic sampling for population

parameters may not yield meaningful information related to contaminants effects. Small mammal populations will be sampled in reference and test areas and ecological endpoints such as abundance, variety of species, and physical condition will be compared

Specific Comment 8

Comment. 8.2.3.5 Food Webs The work plan states that information will be developed in the field on species diversity, biomass, sensitive habitats, and food webs (pg 8-20) How this will be done should be outlined in the Work Plan at the level of detail required by SOP 5.13, Ecology

Response. The field sampling plan for the environmental evaluation has been revised to conform to the requirements of Ecology SOP 5.13, and has been moved from Section 6, "Field Sampling Plan" to Section 8, "Environmental Evaluation Work Plan" Parameters, such as species diversity and biomass, will be measured to characterize selected aquatic and terrestrial communities and, where appropriate, will be used as ecological endpoints in comparative ecology studies Food webs will be assessed during development of exposure pathway models, and contaminant transport through food chains or webs for selected pathways may be evaluated quantitatively Sensitive habitats will be characterized and target taxa and ecological endpoints will be used to evaluate the potential effects of contaminants on those sensitive habitats.

Specific Comment 9

Comment. 8.2.7.1 Comparative Ecology Studies. If comparative ecology studies at OU 3 are directed at only two terrestrial communities, prairie vegetation and small mammals, as indicated in the Work Plan, then it is conceivable that data sufficient to determine injury or no injury to other species such as migratory birds will not be available The Natural Resource Damage Assessment Regulations require that "injury determination must be based upon the establishment of a statistically significant difference in the biological response between samples from populations in the assessment area and in the control area" (Natural Resource Damage Assessment Rule, 43 CFR Part II, Subpart E, section 11.64)

Response. The rationale for choosing prairie vegetation communities and small mammals is that these are the long term and primary producers and consumers on OU3 If no injury or effects can be demonstrated for these two terrestrial components that are completely dependant on conditions on the site, then effects on other species, such as raptors or migratory birds are not expected due to their short term or lower utilization of OU3 An appropriate control area cannot be chosen along the Front Range for migratory birds

Specific Comment 10

Comment. 8272 Bioaccumulation and Biomarker Studies The Work Plan states that biomarker studies will not be done because of the lack of accepted and standardized biomarkers However, the Natural Resource Damage Assessment Regulations do recognize specific biomarkers as being indicative of biological injury (Natural Resource Damage Assessment Rule, 43 CFR Part 11, Subpart E, section 11.62) The Service recommends the use of biomarker studies if they will be useful for the Contaminants of Concern and the Target Biota Taxa

Response The revised work plan presents a clear description of an initial Task 2, "Data Evaluation and Preliminary Risk Assessment" during which the potential use of biomarkers will be evaluated This task includes collection and evaluation of existing scientific information applicable to the environmental evaluation and a preliminary risk assessment based on available data The revised work plan includes language stating that the applicability of potential biomarkers will be evaluated during the subtasks, then incorporated into the following field investigations, if appropriate

**Responses to Comments
From
Colorado Division of Wildlife
On
Draft OU 3 RFI/RI Work Plan**

**Letter of August 28, 1991 to
David Simonson (DOE) from Dave Weber (CDOW)**

Comment. Page 2-36, Section 2 3 2 3 Biota—The last sentence regarding bald eagle use of Standley Lake could be beefed up a bit. Bald eagles have been regularly using the Standley Lake area for winter feeding and perching for at least several years.

Response. The discussion on threatened and endangered species has been revised to coincide with the above comment. Revisions were made to Section 2 3 2 3 and Section 8 1 4 3.

Comment. Page 8-15, Section 8 2 3 3—How about adding "potential for human consumption" as a criteria for species selection?

Response. Revisions were made to Subtask 1 4 and Subtask 2 3 in the Final Work Plan, which discuss selection criteria and the selection process. Sport fish and game animals will be considered during selection of target species.

TABLE 2 5
GENERAL CONCEPTUAL MODEL FOR IHSS 199

Contaminant Source	Release Mechanism	Transport Medium	Secondary Release Mechanism	Exposure Route	Receptor	PATHWAY #
Offsite Surface Soils	None	None	None	Ingestion Dermal Contact	Humans Biota	①
	Fugitive Dust (wind erosion)	Air	None	Inhalation	Humans Biota	②
	Fugitive Dust (wind erosion)	Air	Settled Dust-Plants	Ingestion Dermal Contact	Humans Biota	③
			Settled Dust-Soil			④
			Settled Dust-Water			⑤
	Surface Runoff (sediment load)	Surface Water	None	Ingestion Dermal Contact	Humans Biota	⑥
	Surface Runoff (sediment load)	Surface Water	Deposition/ Precipitation	Ingestion Dermal Contact	Humans Biota	⑦
	Infiltration/ Leaching	Groundwater	Pumpage	Ingestion Dermal Contact	Humans Biota	⑧
	Bioconcentration/ Bioaccumulation	Biota	None	Ingestion Dermal Contact	Humans Biota	⑨
	Tracking	Biota	None	Ingestion Dermal Contact	Humans biota	⑩

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TABLE 3.1
GENERAL CONCEPTUAL MODEL FOR SITES 200-202

Contaminant Source	Pathway #	Release Mechanism	Transport Medium	Secondary Release Mechanism	Exposure Route	Receptor
Sediments (saturated)	11	None	None	None	Ingestion Dermal Contact	Visitors
	12	Wind Stripping of Water	Air	None	Inhalation	Residents Visitors
	13	Wind Stripping of Water	Air	Seried Dust-Plants Seried Dust-Soil Seried Dust-Water	Ingestion Dermal Contact	Residents Visitors
	14	Reservoir Discharge	Surface Water	None	Ingestion Dermal Contact	Residents Visitors
	15	Reservoir Discharge	Surface Water	Deposition/ Precipitation	Ingestion Dermal Contact	Residents Visitors
	16	Infiltration/ Percolation	Ground Water	Seepage Pumpage	Ingestion Dermal Contact	Residents Visitors
	17	Bioconcentration/ Bioaccumulation	Biota	None	Ingestion Dermal Contact	Residents Visitors
Water	18	None	None	None	Ingestion Dermal Contact	Residents Visitors
	19	Wind Stripping of Water	Air	None	Inhalation	Residents Visitors
	20	Wind Stripping of Water	Air	Seried Dust-Plants Seried Dust-Soil Seried Dust-Water	Ingestion Dermal Contact	Residents Visitors
	21					
	22					
23	Reservoir Discharge	Surface Water	Deposition/ Precipitation	Ingestion Dermal Contact	Residents Visitors	

TABLE 3.1

GENERAL CONCEPTUAL MODEL FOR SITES 200-202
(Continued)

Contaminant Source	Release Mechanism	Transport Medium	Secondary Release Mechanism	Exposure Route	Receptor
Water (cont.)	24 Infiltration/Percolation	Ground Water	Seepage Pumpage	Ingestion Dermal Contact	Residents Visitors
	25 Bioconcentration/Bioaccumulation	Biota	None	Ingestion Dermal Contact	Residents Visitors
Sediments (dry)	26 None	None	None	Ingestion Dermal Contact	Residents Visitors
	27 Resuspension	Air	None	Inhalation	Residents Visitors
	28 Resuspension	Air	Settled Dust-Plants	Ingestion Dermal Contact	Residents Visitors
	29		Settled Dust-Soil		
	30		Settled Dust-Water		
	31 Leaching/Percolation	Ground Water	Seepage Pumpage	Ingestion Dermal Contact	Residents Visitors
	32 Bioconcentration/Bioaccumulation	Biota	None	Ingestion Dermal contact	Residents Visitors
33 Tracking	Biota	None	Ingestion Dermal Contact	Residents Visitors	