RESPONSES TO COLORADO DEPARTMENT OF HEALTH AND U. S. ENVIRONMENTAL PROTECTION AGENCY COMMENTS

FINAL PHASE I RFI/RI WORK PLAN FOR OPERABLE UNIT NO. 4 (SOLAR EVAPORATION PONDS) ROCKY FLATS PLANT

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS PLANT
GOLDEN, COLORADO

ENVIRONMENTAL RESTORATION PROGRAM

REVISION 1
MAY 1992

ADMIN RECORD

A-OU04-000171

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REVIEWED FOR CLASSIFICATION/UCNI
By
Date 8/19/92

ADMIN RECORD

COLORADO DEPARTMENT OF HEALTH COMMENT RESPONSES
DRAFT FINAL, PHASE I RFI/RI WORK PLAN
SOLAR EVAPORATION PONDS
OPERABLE UNIT NO. 4

GENERAL COMMENTS

CDH-G1 The Conceptual Model Flow Chart, Figure 2-30, is incomplete. Wind deposition of contaminated aerosols and soils to surface water is excluded. Pumping of Ground Water (and Vadose Water) both on and off-site is excluded. The Baseline Risk Assessment and the Environmental Evaluation sections reference use of the conceptual model.

Response: The conceptual model has been revised in response to this comment.

CDH-G2 Clarification on the number of boreholes to be "advanced deeper," or the process to determine the appropriate number, for the purpose of delineation of paleochannels and fracture sets must be incorporated. Specific methods for the delineation of fracture sets are unclear and may be insufficient.

Response: The Arapahoe sandstone has been tentatively located directly below ponds 207-C and the northwest corner of 207-A. Its higher hydraulic conductivity relative to the Arapahoe claystone makes it a potential path of contaminant migration. A subset of six of the proposed borings in the Solar Pond area will be advanced into bedrock. These borings are identified in green on Figure 7-4. The proposed locations of these borings are based upon the geologic cross sections in Section 2.0 of the work plan. Prior to drilling, the locations will be reevaluated and changed as necessary to incorporate any new data or geologic interpretations. Specific objectives are to further characterize site geology by delineating the Arapahoe sandstone, visually determine the presence or absence of fractures in bedrock, and identify a potential path of contaminant migration.

CDH-G3 The Data Quality Objectives as presented in Table 4.1 generally contain vague objectives, fail to provide quantities (number of holes, grid sizes, etc.) and fail to discuss data quality (parameter types, i.e., TCL Metals). A summary table of these activities must be included in Section 7.

Response: A summary table of activities for Phase I RFI/RI OU4 has been incorporated into section 7.0 as Table 7-5.

CDH-G4 The plan for locating holes at liner cracks and within competent liner areas fails to acknowledge repairs and replacement of liners or the potential for lateral migration of contaminants beneath the liners.

Response: The Work Plan has been modified to acknowledge that lateral migration of contaminants beneath the current liner may have occurred as a result of cracks in the old liner.

CDH-G5 The proposed "geographic approach" of Phase I activities, concurrent with sludge removal, is not demonstrated in respect to conclusion of field investigations by August 19, 1992. The Division questions whether the schedule of activities is realistic.

Response: The term "geographic approach" has been deleted for section 7.0 of the work plan.

CDH-G6 The work plan first advocates vadose zone monitoring but later suggests that it will be included if "deemed appropriate." The Division expects vadose zone monitoring to be a component of the work plan.

Response: Vadose zone monitoring is potentially useful in the OU 4 Phase I RFI/RI for delineating the extent of contamination in soil, determine infiltration potential and monitor pond closure. The work plan will clearly define the objectives of vadose zone monitoring at OU 4, present an outline or "skeleton of the plan, and state that the plan will be presented in a technical memorandum. Discussions of vadose zone monitoring in Section 4.0, 5.0 and 7.0 of the work plan will be made consistent with one another.

CDH-G7 The Division questions the sensitivity of downhole geophysical tools as an effective means of measuring radionuclide contamination. Alternatives should be considered and, if appropriate, included in the plan.

Response: Because potential OU4 radionuclides are not strong gamma emitters, borehole logging with gamma detection instruments is not expected to provide useful information on radionuclide concentrations. No borehole logging will be performed for this purpose.

CDH-G8 DOE has not demonstrated what data are available, or how data will be acquired, to model aquifer drawdown for the purpose of determining piezometer spacings.

Response: Existing data regarding water table configuration, alluvial hydraulic conductivity, trench geometry, and withdrawal rate will be used to simulate water table drawdown and area of influence. Historical water level measurements will be reviewed to evaluate seasonal and long-term water table fluctuations. Alluvial hydraulic conductivity will be estimated from sedimentologic descriptions of the alluvial aquifer, and from existing aquifer test results. Records of trench

installation will be used to estimate depth of the drains, and flow measurements of seepage collected along portions of the ITS will be used to estimate withdrawal rate.

SPECIFIC COMMENTS

CDH-S1 Section 1.2: Why does the plan (page 1-3, second paragraph) state that "only a small fraction" of the data for this area has been validated? According to previous reports submitted on this operable unit (1989 and 1990 Annual Ground-Water Monitoring Reports for Regulated Units at Rocky Flats Plant), a large portion of this data has been previously validated. Is there a need to redo this process? If so, please clarify why.

Response: The data referred to in this section is soil sampling results not ground water sampling results, therefore, this is a separate data validation process. The plan has been modified to specify data type.

CDH-S2 Section 2.1: The text of paragraph 2, page 2-2, should be amended to clarify that the IM/IRA being implemented to enable Solar Ponds water and sludge removal is separate and in addition to the IM/IRA requirements of the IAG. The IM/IRA specified in the IAG is specifically intended to provide a closure process for the solar pond cells.

Response: The text has been amended to clarify that the current IM/IRA being implemented is part of the IM/IRA process being taken to close the solar pond cells.

CDH-S3 Section 2.2.3: The Division notes that Ponds 207-B Center and South were relined (the old liners were removed) while the North liner was repaired. See comment to Section 5.3.5.

Response: No Work Plan revision required; see response to comment CDH-S16.

CDH-S4 Section 2.2.4: This section indicates that a leak detection system was installed for Pond 207-C. Has the system ever detected a leak? If so, was the pond emptied in an attempt to locate a specific failure in the liner? Were any failures found? Were any cleanup actions taken? Does information exist to relocate the spot of any liner failure?

Response: All information obtained on the leak detection system at Pond 207-C has been incorporated into the text.

CDH-S5 Section 2.2.4.1: Under the heading Lower Hydrostratigraphic (Confined) Unit, page 2-19, please indicate the units, i.e. cm/s.

Response: The text has been corrected.

CDH-S6 Section 2.5: In reference to the last paragraph, page 2-20, the 1990 Annual Ground Water Monitoring Report for Regulated Units at Rocky Flats Plant reported that extremely high levels of volatile organic constituents (CCl_4 and trichloroethene) were found in wells at the southwest corner of Pond 207-C. There is the distinct possibility that solvents similar to these were disposed of in the ponds and that residual VOC amounts in the ponds are low because of volatilization. Are these VOCs assumed to come from a source different than the ponds?

Radionuclides identified here as "immobile" may be more mobile than suggested. Since it is known that radioactive materials were disposed of in the Original Ponds, the construction of the current system and the movement of colloidal clays may have contaminated more soils than are currently assumed. In the investigation of the Original Pond and 207-C this issue should be given full consideration and be reflected in the eventual RFI/RI report.

Response: At this time, the source of the high levels of VOCs in well P210189 is unknown. Ground water data from P210189 has been reviewed and the field sampling plan revised to include VOC sampling in the vicinity of the Original Pond.

The text states that the radionuclides are immobile relative to some other contaminants, particularly nitrate. This behavior is evident from existing soil and ground water data from the Solar Evaporation Ponds area, and is consistent with the physical-chemical properties of these contaminants. Likely, radionuclide transport mechanisms include physical transport of liner clays and surficial soils by reworking during construction activities, movement by foot and motorized traffic, and dispersal by wind. Surficial radiation screening and soil sampling are proposed as methods for characterization of these potential pathways. In addition, routine analysis of deeper soils for radionuclides is also proposed to ensure characterization of all potential contaminant sources.

CDH-S7 Section 2.5.3: What ground water monitoring programs are included in the "RCRA Ground Water Monitoring Program" at the plant? Not all units monitored

for ground water quality at the plant are regulated under RCRA. This section needs to be clarified to DOE's benefit. The specific program under which this monitoring is done should be included here.

Response: The plan has been modified to include reference to the Ground Water Assessment Plan.

CDH-S8 Section 2.6.5: The first sentence, second paragraph, of the section states: "The surface water system represents a potential route of exposure from ingestion/absorption/inhalation and direct contact exposure routes. Please explain the difference, if any, between (dermal absorption and direct contact? The conceptual model, Figure 2-30, shows only three exposure routes. The Division believes dermal absorption and dermal contact are equivalent; however, if "direct" contact is intended to reflect an additional exposure route, please amend the conceptual model. If not, correct the text.

Response: The text has been corrected from direct contact to dermal contact.

CDH-S9 Figure 2-14: Since holes SP04-87 and SP11-87 are used to depict lithologies on the Bedrock Geology Map, Figure 2-14, they should be included on Cross Section A-A' which passes through the affected area. The cross section may be constructed to pass directly through the holes or the holes may be projected to the cross section. (Please note that the "SP" holes are depicted in Appendix B, but the actual borehole logs are not included.

Also, a bedrock topography map of this surface would allow DOE to draw more realistic subcrop contacts. The contacts surrounding SP04-78 and SP11-87, and the sandstone area on the east side, could be better drawn as a result.

Response: Soil borings SP04-87 and SP11-87 have been added to cross section A-A and their logs will be included in Appendix B. A bedrock topography map will be incorporated into the final Phase I Project Plan. Due to a discrepancy between RfEDs and the geologic log for SP11-87, the bedrock geology map has been changed from Arapahoe Sandstone to silty claystone.

CDH-S10 Figure 2-30: A few comments are in order for this figure.

An arrow must be drawn from AIR to SURFACE WATER to account for both aerosols and soils being transported by wind through the air to surface water.

Another arrow must be drawn from GROUND WATER to PUMPAGE (a new Secondary Release Mechanism) to INGESTION and DERMAL CONTACT. The model must allow for the pumping of water from off-site wells and for potential future use of on-site water.

Comparable to the conceptual model for the OU-3 RFI/RI Work Plan, the Solar Ponds may be better portrayed as an Historical Source (not necessary to list) with the PIPELINE and POND LEAKAGE as Contaminant Sources. In this manner, INFILTRATION would be the Release Mechanism to GROUND WATER and SOILS. AEROSOLS may also be considered a source with WIND as a primary Release Mechanism.

Although it is possible to treat soils as a transport medium, the Division believes that the conceptual model would be better served with SOILS listed as a Contaminant Source.

With the foregoing changes as a starting point, additional, primary release mechanisms can be defined. For example, TRACKING of biota across contaminated soils would be a primary release mechanism while SEEPAGE from GROUND WATER to SURFACE WATER would be a Secondary Release Mechanism. Since both the Baseline Health Risk Assessment (re: Section 3.3.1) and the Environmental Evaluation (re: Section 9.2.1.3) will rely on the conceptual model, it should be both complete and accurate.

Response: Comments have been incorporated into a new conceptual model.

CDH-S11 Section 3.0: The Division will withhold comments to this section until such time as the site-wide chemical specific potential ARAR issues have been resolved. The Division reserves the right to comment on this section at that time.

Response: No comment.

CDH-S12 Section 4.1.4: After reviewing the Field Sampling Plan, the Division requires clarification on the process and procedures for delineation of paleochannels and fracture sets. For example, the number of borings to be "advanced deeper" (see comments to Section 7.3.5.3) are not defined. Consequently, the Division cannot determine whether the paleochannels are likely to be delineated. Also, delineation of fracture sets would appear to dictate the need for oriented core; however, coring versus drilling has not been specified except in Table 4.1.

Response: See response to CDH-G2.

CDH-S13 Table 4.1: The Division believes that the Data Quality Objectives listed in column one are generally vague. For example, Item 3, "Delineate sandstone paleochannels" should be expanded to explain the need to delineate the channels. It is appropriate to state that "characterization" of their location(s) beneath or in the vicinity of the Solar Ponds will aid in planning Phase II investigations on the nature and extent of contamination of ground water. Item 4, "Delineate fracture sets in bedrock" likewise should be expanded.

Item 5, "Install upgradient/background monitoring wells. . ." is not an objective. Installing wells is designed to meet an objective, in this instance, CDH Compliance Order 89-06-07-01 (please refer to the fifth paragraph of comments to Section 7.2).

The Sampling/Analysis Activity column is similarly vague. For Item 5, will the full suite analyses continue under the "other programs"? If not, why are they unnecessary? Also, the "other programs" must be specified for this portion of the plan to be effective.

For Item 7, the "selected parameters" should be described in general (i.e. TCL Metals), or a reference to the appropriate table(s) of Section 7 should be included.

Also under Sampling/Analysis Activity, it would be beneficial to indicate the number of holes, grid size, etc.; however, please see the comments to Section 7.

Response: Item 3 has been modified to incorporate comment. Also, see response to Section 4.1.4.

Item 4 has been deleted from Table 4.1 and has been incorporated in Item 3 as part of site characterization. Geologic cores from the six proposed bedrock borings will be visually inspected for fractures.

Item 5 has been deleted from Table 4.1 because it is out of the scope of this Phase I investigation.

Item 7 has been modified in response to this comment.

CDH-S14 Section 5.3.1: This section specifies that "new ground water data will be reviewed to verify that proposed cluster well locations are upgradient of OU-4." What data will be used, along with the ground water levels from the new wells, to evaluate whether or not these wells are actually upgradient of the unit?

This section also states "one ground water sample will be collected from each well and analyzed for the full list of parameters analyzed in the RCRA Monitoring Program." Which monitoring program is this referring to? (Please compare to previous comments on Section 2.5.3 and Table 4.1, Item 5.)

Response: As discussed in the January 8th meeting, installation of upgradient ground water monitor wells will be deferred to the Phase II investigation because it is out of the scope of Phase I RFI/RI focus on sources and soils, and in part due to budgetary and scheduling constraints.

CDH-S15 Section 5.3.2: The "more dense" grid alluded to in this section may be best described as "a 100' x 100' block centered grid superimposed upon a 100′ x 100′ mesh centered grid as shown on Figure 7-2."

Response: The plan has been modified to include reference to Figure 7-2.

CDH-S16 Section 5.3.5: Although it is acceptable to place boreholes at both cracked and competent liner locations, DOE must acknowledge that previous liner replacement may result in drilling of holes where earlier leaks occurred rather than at presumed pristine locations. Also, lateral migration of contaminants from cracks to areas beneath competent liner needs to be considered.

Response: The plan has been modified to acknowledge that lateral migration of contaminants beneath the current liner may have occurred as a result of cracks in the old liner.

CDH-S17 Section 5.5.2: Reference to the 1989 Background Geochemical Characterization Report should be amended. Reference should be made to the forthcoming 1990 report or the "most recent revision."

Response: The plan has been modified to include reference to the "most recent revision".

CDH-S18 Section 7.0: The Division requests that the term "site-wide" be reserved for true activities planned or being conducted relative to the entire Rocky Flats Plant site. Please change the affected bulleted items to read OU-wide.

Paragraph 3, page 7-1, states that a "geographic approach" is intended to allow flexibility in implementing the Phase I sampling program concurrent with the Pondcrete activities. The division, in reviewing the entire FSP, was unable to determine how the activities can support the completion schedule for field activities (August 19, 1992, Figure 6-1) when the current schedule for completion of the cleanout is September, 1992. The Division is especially concerned since

spring is approaching and construction has yet to begin on the three water holding tanks of the IM/IRA. The Division wishes to know whether the schedule is realistic and can be maintained through the "geographic approach." If the schedule cannot be maintained, what is DOE's intent?

Response: Site-wide has been change to OU-wide in the applicable sections of 7.0. The term "geographic approach" has been deleted from the work plan. (Schedule?)

CDH-S19 Section 7.1: Regarding Item 5, page 7-2, the Division acknowledges the difficulty in locating wells to establish background conditions for the Solar Ponds. The Division proposes that CDH and EPA approve or disapprove, on a contaminant specific and hydrostratigraphic unit basis, whether the wells may serve as background. In this manner, above background levels of specific contaminants in a hydrostratigraphic unit will not be cause to reject the well, and all data from it, as background. The Division would still expect that what constitutes background would be determined through the Background Geochemical Characterization Report, and the applicable statistical methods, to ensure statewide consistency of remediation goals.

For future reference, the requirements of the Phase II portion of the RFI/RI Work Plan that deal with determination of the rate and extent of contamination, as well as contaminant fate and transport, should either be similar to or complement the objectives stated in the Ground Water Assessment Plan required under CO 89-06-07-01.

Response: See response to comment CDH-S14.

CDH-S20 Section 7.2: Under Field Sampling Plan Rationale, first paragraph, the instruments or the appropriate SOPs to be used in field screening must be specified.

In the same paragraph, it is stated that analysis of the asphalt pond liner materials would be appropriate if the liners are to be characterized for waste disposal. DOE should consider a limited sampling plan to verify results of field screening.

The Division believes that vadose monitoring techniques (last paragraph, page 7-4) should be included in this work plan rather than deferred to a later date. However, the Division does not wish to delay unaffected activities. If the techniques can be identified before the work plan is amended they should be included. If this would result in a delay in resubmitting the work plan, then a technical memorandum should be submitted as soon as possible to finalize the proposed activities.

The Division questions the proposal (paragraph 2, page 7-5) to use "downhole geophysics . . . to log gamma radiation with respect to depth." For example, a radionuclide contaminated sandstone may register as a clayey sandstone or claystone rather than as a naturally-occurring, lower-gamma lithology. Although more extreme levels of activity may be discernible, there is question whether a downhole geophysical sonde is sensitive enough to differentiate between background and lower levels of contamination.

The next to last paragraph, page 7-5, states that the proposed upgradient wells were in response to a request from CDH. The upgradient monitoring wells scheduled to be installed in this plan should not be considered a "request." They are part of the RCRA ground water monitoring upgrade for IHSS 101 and other RCRA units as ordered by CDH under CO 89-06-07-01.

It is stated on page 7-2 that pond liners will be steam cleaned after the removal of liquids and sludges. Please specify the waste management practice to be used to dispose of the rinsate.

Response: The specific SOPs to be used in field screening has been incorporated into the Work Plan. Sampling pond liner material will not be conducted under this Phase I investigation, but will most likely occur for waste disposal purposes.

Section 7.3.3 has been expanded to reflect objectives and potential methodologies for vadose zone investigations. Specific monitoring locations and methods have not been identified, however. A detailed work plan will be developed as a work element within the OU4 Phase I RI/RFI effort, and will be presented as a technical memorandum. Standard operating procedures for vadose zone investigations will be developed in coordination with other OUs to ensure consistency.

The use of downhole geophysics to delineate subsurface zones contaminated by radionuclides has been eliminated. (See also response to Comment CDH-G7.) Geophysical logging will be conducted in all boreholes advanced for geologic investigation to further characterize subsurface materials and groundwater.

Pond liquids and sludge will be removed and pond liners decontaminated as part of the Solar Ponds IM/IRA. Disposal of these liquids and sludges is beyond the scope of this work plan.

See also response to comment CDH-S14.

CDH-S21 Section 7.3: Items 2 and 3, page 7-6, should be re-identified as OU wide versus sitewide activities.

The frequency of sampling, i.e. the number of sample sites, borehole locations, piezometers and grid sizes, etc., must be summarized in a table comparable to Table 7-3 of the approved OU-7 RFI/RI work plan (OU-7's DQO Table 4-1 also included sample frequency). No such summary now exists in this work plan; it is spread across the subsections of Section 7.3 and shown on various maps. A summary is needed to enhance the Division's understanding and would be very helpful during implementation.

Response: Site wide has been changed to OU wide, where applicable.

A new Table 7-5 titled "Summary of Activities Phase I RFI/RI OU4" will be added to Section 7 that is comparable to Table 7-3 of the approved OU-7 RFI/RI work plan.

CDH-S22 Section 7.3.1: Again, the wells here are not being installed due to a "request" by CDH; they are part of the upgrade of the ground water assessment plan as specified in CO 89-06-07-01.

Although these wells are not "within or immediately downgradient of an IHSS," it is important that they be potentiometrically upgradient of the waste management unit and should be as close to the designated unit boundary as possible. Were these items considered when the proposed locations for the wells were selected? Were there other considerations for the site selections for these wells? Please clarify.

According to potentiometric data presented in this plan and previous reports on the ground water quality of OU-4, the potentiometric gradient in the area is mostly to the northeast with some localized northerly components.

Response: See response to comment CDH-S14.

CDH-S23 Section 7.3.2: In the second paragraph of the section, it appears that Document Change Notice and Procedural Change Notice, referenced in earlier sections, are the same. Has not DCN been changed to PCN to update SOPs?

The Division is concerned that potential radiation hot spots between the PSZ fences may not be fully investigated. If radiation survey stations adjoining the fence detect activity, steps will have to be taken to investigate the excluded area.

The third paragraph, page 7-9, states that alpha readings will be taken 4-6 inches off the ground surface. This is unacceptable. Alpha radiation attenuates rapidly with distance and usually is not easily detected at distances greater than 3 - 5 cm (1½ - 2 inches). Since the distance specified in this plan is four to six inches (10 - 15 cm), it is likely that any alpha radiation, even large amounts, will be missed under the current plan.

Under Surficial Sampling, first paragraph, page 7-10, a 1" sampling depth is proposed. SOP GT.8 specifies that the CDH method will be employed for all Interagency Agreement (IAG) projects unless the CDH method does not apply. The CDH method specifies a ¼-inch depth not 1 inch. Is DOE proposing an alternate (grab) method as opposed to the CDH method? If so, a clear rationale must be provided indicating the need to switch methods.

Regarding the radiological survey, page 7-8, the Division is under the impression that areas with elevated levels of radionuclides have already been identified in the vicinity of the ponds. Smaller grids should be used in previously identified "hot spots" so that more definite boundaries for the contamination can be established.

Response: Reference to a Document Change Notice and Procedural Change Notice has been removed from the text because the radiological survey will be conducted in accordance with SOP FO.16.

Sampling within the PA (PSZ) fenced area will be considered, however, sampling within the exclusion zone is unlikely.

The text has been revised to be consistent with SOP FO .16. The alpha counter will be held parallel to and within one quarter inch of the surface being screened.

The FSP has been revised to be consistent with SOP GT .8 using the CDH soil sampling method. Duplicate samples will also be collected using the Grab Sample method, which is also outlined in SOP GT .8, at 10-20 percent of the sample locations to evaluate comparability between methods.

Radioactive "hot spots" were not identified during previous investigations. Previous surveys only confirmed elevated radionuclide content in Pond 207-A liquids and sludge. The survey grid has been designed accordingly and should adequately characterize radionuclide distribution.

CDH-S24 Section 7.3.3: In Table 4.1 (and other narrative sections) vadose zone monitoring is proposed pending a determination of the applicable techniques. Suddenly, in

this section, vadose monitoring will be incorporated into the activities "if deemed appropriate." This statement provides further reason for including the vadose zone monitoring techniques in the work plan or through a scheduled technical memorandum. This activity cannot be left to chance; the chance that it will not be fully researched and implemented.

Response: Per discussions with CDH and EPA, the text has been revised to incorporate a discussion of vadose zone monitoring objectives and potentially applicable vadose zone monitoring techniques for the OU4 Phase I RFI/RI. The site-specific vadose zone monitoring plan will be developed and presented as a technical memorandum prior to implementation. This information is presented in Section 7.3.2 and is now consistent with narrative regarding vadose zone monitoring in Table 4.1 and Section 2.0.

CDH-S25 Section 7.3.4.1: Under Field Methodology (second paragraph, page 7-12), DOE should discuss or propose, in general terms, alternate methods in the event the GPR survey is unsuccessful.

Response: Ground Penetrating Radar (GPR) is the surface geophysical method which offers the best opportunity to delineate subsurface stratigraphy and structure. (See response to CDH-S28.) GPR will be discontinued if initial surveys are unsuccessful. Extent of the original solar pond will then be derived from site plans and air photos and subsurface stratigraphy and structure will be based on information from borings.

Section 7.3.4 describes a series of research and field activities proposed for the original solar ponds area. Prospective references include aerial photographs, engineering drawings, and other historical documentation. Historical documentation reviewed to date suggests that following removal of the clay liner, the berms and underlying soils were regraded and possibly incorporated into the berm of Pond 207-C. In this event, the proposed surface radiological survey and surficial soil sampling described in Section 7.3.2, as well as the boring program described in Section 7.3.4.2, will probably yield more useful information than the surface geophysical survey or historical review.

CDH-S26 Section 7.3.4.2: Reference is made to abandonment of boreholes in the fourth paragraph, page 7-14. Has DOE considered the completion of these wells to support Phase II activities?

Response: See response to comment CDH-S14.

CDH-S27 Section 7.3.5.3: The Division requires clarification on the process and procedures for delineation of paleochannels and fracture sets (re: Items 3 & 4, Table 4.1). The subset of proposed borings to be advanced deeper to collect bedrock structure and stratigraphic data, paragraph four, page 7-16, should be defined or the selection process should be described. Without this number or the process, the Division cannot determine whether the paleochannels are likely to be delineated. Also, delineation of fracture sets would appear to dictate the need for oriented core; however, coring versus drilling has not even been specified except in Table 4.1. The Division believes that implementation of the plan will be difficult unless these issues are clarified.

Response: See response to comment CDH-S12.

CDH-S28 Section 7.3.6: The second paragraph of this section states that seismic refraction and reflection were considered for investigation of the ITS and that geophysics would be ineffective. Were other survey techniques such as a gravimeter, electromagnetic and GPR surveys, or combinations of surveys, considered? What problems arise in investigating the ITS vs. delineating the original Solar Pond with GPR? Both were constructed through or in alluvium.

Response: Surface geophysical investigation methods were examined for usefulness in evaluating the extent to which the ITS was keyed into bedrock and therefore its effectiveness in intercepting solar pond contaminants in ground water. The known thickness of unconsolidated materials in the area of the ITS ranges from approximately 2 feet to about 21 feet. This thickness is generally too thin for seismic methods and in some areas unconsolidated materials are too thick for GPR. Other surveys such as gravity and electromagnetic were discounted due to lack of precision in defining the bedrock contact. In addition, the location of the ITS with respect to the PSZ makes a large portion of this extent inaccessible to any surface geophysical method. The known thickness of the unconsolidated material in the Original Solar Pond area is generally less than 10 feet and within range of GPR.

CDH-S29 Section 7.3.6.2: Figure 7-5, which shows the locations of the proposed piezometers, should be referenced. Please note that the figure shows the locations of only two of the three proposed parallel-to-flow piezometers. Please amend this figure and caption the Primary Interceptor Trench.

The first paragraph of this section also states that analytical modeling of aquifer drawdown will be used to determine piezometer spacing. What data are required to prepare the analytical model? Are pump or slug tests planned for the proposed

unconsolidated material boreholes, as a Phase I activity, to provide the necessary data? The Division does not believe that a clear path has been planned to determine the piezometer spacings.

Response: The plan has been corrected to show that two parallel-to-flow piezometer nests will be installed. Several originally proposed piezometer clusters were removed from the program because their locations were in areas of previously observed dry alluvium. The text has been revised to accurately describe the figure.

To optimize information regarding performance of the ITS, piezometers should be located to best represent the hydraulically impacted area of the aquifer. Determination of proper piezometer spacing will therefore require estimation of the area of hydraulic influence associated with the trenches. Existing data will be used to simulate water table drawdown and area of influence (please refer to response to comment CDH-G8). No additional data collection activities are proposed in support of this task. Specific simulation methods will be selected on the basis of their applicability to available data. Simulation of aquifer response near the trench will be used only as an approximation to formulate an initial estimate of piezometer spacing. Locations may be subsequently modified following installation of several piezometers and measurement of actual water table configuration. Evaluation of these data collected during the Phase I program can be used to more precisely define a Phase II investigation.

CDH-S30 Section 7.4.2: The Division questions why semi-volatiles are excluded from surficial soil samples (second list of page 7-19). The term semi-volatiles would suggest that residues may still be present. (Note that in the first list, TCL semi-volatiles are not limited to subsurface samples as they are for TCL volatiles.)

Response: TCL semi-volatiles have been added to the surficial soil analytical suite.

CDH-S31 Section 8.0: Reviewed; no comment.

Response: No comment.

CDH-S32 Section 9.1.3.1: This section indicates that small seeps and seasonal wetlands occur within the OU-4 study area; however, there is no mention of seeps in Section 2.0. Although a Phase II issue, be aware that the Division believes that sampling and analysis of seeps must be included in the subsequent Phase II work plan.

Response: Comment is noted; OU 4 seeps will be sampled and analyzed during Phase II.

CDH-S33 Section 10.0: Please note that the Quality Assurance Addendum was submitted without management approval.

Response: No comment.

CDH-S34 Section 10.2: Figure 1 references OU-10 in the title, not OU-4.

Response: Figure 1 title has been revised to reference OU-4.

CDH-S35 Section 11.0: See comment to Section 7.3.2 regarding PCNs vs. DCNs. Is DCN the correct term?

Response: The text has been corrected.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION VII
DRAFT FINAL, PHASE I RFI/RI WORK PLAN
SOLAR EVAPORATION PONDS
OPERABLE UNIT NO. 4

GENERAL COMMENTS

EPA-G1 A subset of surface soil sampling locations must be located on areas found to exhibit high counts levels during the radiological survey and a separate subset of locations to be randomly chosen.

Response: The text has been corrected to include two surficial soil sample subsets. One subset, ten surficial soil samples, will be collected in areas identified as hot spots during the radiological survey. The second subset, twenty five surficial soil samples, will collected in randomly chosen locations throughout the remainder of the site.

EPA-G2 The CDH method must be used for collection of surface soil samples to ensure comparability with data from other OUs.

Response: The FSP has been changed to indicate that SOP GT.8 using a CDH sampler will be used to collect surficial soil samples. In addition, the Grab method will be used for duplicate samples, also included in SOP GT.8, at 10-20 percent of the locations to evaluate comparability between methods.

EPA-G3 Protocol for use of the Ludlum Model 12-1A alpha monitor for radiological survey must be consistent with SOP FO 1.16 or a justification for using a different protocol must be included in the work plan.

Response: The text has been amended to state that the radiological survey will be conducted in accordance with SPO FO 1.16.

EPA-G4 The work plan needs to explain how the risk assessment and environmental evaluations, and the phase I/phase II scheme set up in the IAG fit together.

Response: The Phase I portion of the investigation will only characterize soil contamination. Therefore it will not be possible to produce a BRA document from the data collected during Phase I. A rudimentary risk assessment can be performed, but the numerical result will contain a very high degree of uncertainty.

EPA-G5 The BRA portion of this document must include and discuss site-specific methods for dealing with site-specific conditions.

Response: Only soils will be characterized during the Phase I investigation. All other site-specific parameters will be characterized during Phase II.

SPECIFIC COMMENTS

EPA-S1 Section 1.3.3.8, Hydrology, page 1-13. The text states that the hydraulic conductivity of the Rocky Flats Alluvium and the Arapahoe No. 1 Sandstone is approximately 6×10^{-5} centimeters per second (cm/s). Although the upper hydrostratigraphic unit consists of both the alluvial and the Arapahoe No. 1 Sandstone, apparently separate values of hydraulic conductivity have been measured for each member of this unit. Table 2.1 indicates hydraulic conductivity ranging from 1×10^{-2} to 4×10^{-8} cm/s for the Rocky Flats Alluvium. It also presents a combined measurement of the Rocky Flats Alluvium and the Arapahoe No. 1 Sandstone, 6×10^{-5} cm/s. The method(s) or assumption(s) in deriving this combined measurement of hydraulic conductivity should be explained. The text should also clarify the distinction between these lithologic units and provide ranges of values for measurements of hydraulic conductivity for members within the upper hydrostratigraphic unit, if applicable.

Response: Table 2.1 is a summary of existing information collected on hydraulic conductivities of the lithologic units in the SEP area. The stratigraphic location and method used to determine hydraulic conductivity vary greatly between each report. The large variation between the hydraulic conductivities in lithologic units is beyond the scope of this Phase I RFI/RI investigation and should be addressed during the Phase II investigation.

EPA-S2 Section 2.3, Previous Investigations, page 2-10. Although a report is not available summarizing the 1989 soil sampling program at the solar ponds, Appendix E provides 1989 soil analytical results. The text should reference Appendix E accordingly.

Response: The text has been corrected to include reference to Appendix E.

EPA-S3 Section 2.4.2.1, Groundwater, page 2-17. Out of the 40 borehole logs included in Appendix B, well completion records for only eight monitoring wells are included in this appendix. The text should be clarified to indicate which information is presented in Appendix B. Additionally, well completion records and construction details should be provided for all alluvial or bedrock monitoring wells depicted in Figure 2-15 and those included in the 1989 drilling program. Construction details, tabulated in Table 2.4, are not provided for all monitoring wells depicted in Figure 2-15. This section needs to state if these construction details are unavailable or why they are not being provided.

Similarly, groundwater data included in Appendix F correspond to only 20 of the borehole logs included in Appendix B. It also includes data from three monitoring wells apparently included in the 1989 drilling program (P209189, P210189, and P20889), which were not included in Appendix B. A summary of previous field programs, similar to that described on page 2-28 (Section 2.5.2) for soils, is required in Section 2.4.2 for groundwater. EPA suggested that a tabular format depicting the previous characterization programs and the associated soil borings or monitoring wells be included in the phase I RI report.

Response: The text has been corrected to clarify that Appendix B contains well completion records and borehole logs for the 1989 drilling program. A number of well completion records and borehole logs were inadvertently left out of the Draft Final Work Plan. These records have been added to Appendix B of the Final Work Plan.

Appendix F contains the most recent ground water quality information from the 1990 Annual RCRA Groundwater Monitoring Report for Regulated Units and the Rocky Flats Environmental Data Base (RFEDS) only. Appendix B has been amended to include borehole logs from P209189, P210189 and P208889. It was not our intent to include a comprehensive set of ground water quality data because it will be addressed in the Phase II investigation. To remain in the scope of the Phase I RI/RFI, we have concentrated the field investigations in the Solar Ponds area pertaining to soil sampling only.

EPA-S4 Section 2.4.2.1, Lower Hydrostratigraphic (Confined) Unit, page 2-19. The discussion of anomalous water levels in bedrock well 2786 requires further explanation. Additional water level readings similar to the May 1990 levels are shown in Appendix C, particularly in October 1986, and intermittently thereafter. In fact, several 40 to 50-foot water level variations have occurred in this well. It is evident that there exists some problems with this bedrock well. DOE should reevaluate the usability of this bedrock well and maybe consider it for abandonment.

Response: Possible causes of the water level fluctuations in well No. 2786 are infiltration of surface water run-off through the well annulus due to a poor surface seal, physical damage of well casing, or poor well construction. The surface seal was inspected by field personnel and found to be intact and currently there is no evidence to show that the well is damaged. We recommend that this will be further evaluated to determine the cause of water level fluctuations.

EPA-S5 Table 2.4, second page. Well number B310489 is indicated on this table. It appears that this well should be B210489, as no other references to B310489 have been located.

Response: The table has been corrected.

EPA-S6 Figure 2-30. EPA suggests that this conceptual model defines what constitutes a phase I and a phase II conceptual model. This will help to evaluate whether the activities proposed during this phase I investigations are adequate to support the phase I BRA.

Soils can serve as a source of contamination, as well as a transport medium. This conceptual model needs to account for soils as a potential source of contamination.

In addition, it is not clear whether this conceptual model accounts for groundwater which is not collected in the ITS and is flowing downgradient. This conceptual model needs to provide an optional pathway for groundwater not being collected by the ITS even though this may be a minor component of groundwater flow.

Response: The conceptual model has been revised in response to these comments. The conceptual model figure acknowledges that groundwater can bypass the ITS. Soils are now shown in this figure as a contaminant source. An exposure pathway summary has been added to the text that describes the extent to which each pathway can be evaluated during the Phase I RFI/RI.

EPA-S7 Section 3.0, Applicable or Relevant and Appropriate Requirements. DOE is in the process of preparing a site-wide document defining all potential ARARs. EPA reserves the right to comment on this section until the draft document of potential site-wide ARARs is completed and submitted to the regulatory agencies.

Response: No comment.

EPA-S8 Section 4.1.3, Develop Conceptual Model, page 4-4. This section needs to address groundwater flowing downgradient beyond the ITS.

Response: The conceptual model was revised to acknowledge that groundwater can bypass the ITS (see response to comment EPA-S6).

EPA-S9 Section 5.3.6, Interceptor Trench System and Remainder of Site, page 5-4. It is not clear whether geophysical surveys are to be conducted in the ITS area. Section 4.2.3, page 4-7, mentions that geophysical surveys will be conducted in

areas of the ITS. However, this section does not include geophysical surveys as part of the investigation tasks for the ITS. This needs to be clarified.

Response: Geophysical surveys will not be performed in the ITS area. References to such surveys have been eliminated from the plan. (See also response to CDH-S28.)

EPA-S10 Section 5.6, Phase I Baseline Risk Assessment, page 5-6. This section explains that the BRA for phase I is going to be performed at the source/soils of contamination. However, the BRA information included in sections 8 and 9 of this work plan does not differentiate between the two phases. Instead, the BRA consists of an overall generic plan to be used in evaluating human health risk and environmental impacts posed by the site. This section needs to explain this discrepancy.

Response: Only pathways involving soils will be evaluated in Phase I. The remaining pathways will be evaluated during Phase II.

EPA-S11 Section 7.1, Characterize Original and Existing Solar Ponds, Objective 4, page 7-2. The presence of perched water should be considered when conducting vadose zone investigations.

Response: Sediment characteristics, stratigraphy, and sample moisture content will be evaluated to define potential perched water horizons. In addition, neutron logging will be considered as a method for evaluation of moisture content in selected boreholes.

EPA-S12 Section 7.2, Background and Field Sampling Plan Rationale, page 7-3. The usefulness of geophysics investigations proposed in the areas of the ITS needs to be justified and explained.

Response: See response to EPA-S9. The reference to geophysical investigations in Section 7.2 is with respect to the entire OU and is not specific to the ITS.

EPA-S13 Section 7.2, Sampling Plan Rationale, page 7-4 and 7-5. This section states that a subset of previous radiological survey points will be selected for surficial sampling and laboratory analysis (page 7-4). It is not clear what radiological survey points this section is referring to. This needs to be clarified.

Ground penetrating radar is often found to be inefficient in providing an accurate lithology of the subsurface. If this turns out to be the case, then other techniques need to be considered. Therefore, this work plan needs to identify and describe

other available techniques that may provide better information on the profile of the subsurface. See comment on Section 7.3.4.1.

Vadose zone monitoring should be consistent with the sophisticated vadose zone monitoring program currently being developed at Rocky Flats Plant.

The use of ground water tracers should also be considered in the area of the ITS, as discussed in Section 7.3.6.2. Tracer studies would provide information on flow paths and travel times.

Response: The text has been corrected to include two surficial soil sample subsets. One subset, ten surficial soil samples, will be collected in areas identified as hot spots during the radiological survey. The second subset, twenty five surficial soil samples, will collected in randomly chosen locations throughout the remainder of the site.

Ground penetrating radar (GPR) is proposed in addition to drilling and a review of historical records and air photographs in an attempt to delineate the original extent and any remaining portions of the Original Solar Pond. Unconsolidated materials are generally less than 10 feet thick in this area and GPR is the surface geophysical method which offers the best chance of successfully delineating subsurface and stratigraphy structure. (See response to CDH-S28.) Note that at least two antennas will be tested and the survey will be initially limited with expansion based on success.

Vadose zone investigations will utilize standard operating procedures that will be developed as part of this and other plant-wide monitoring programs.

Tracer studies in the area of the ITS should be considered for the Phase II investigation once all information from Phase I has been evaluated.

EPA-S14 Section 7.2, Analytical Methods Rationale, page 7-6. The text should state that changes to the analytical suite are contingent upon EPA and CDH approval.

Response: The text has been corrected.

EPA-S15 Section 7.3.2, Sitewide Radiological Survey and Surficial Sampling Program, page 7-8. This section mentions that the Ludlum Model 12-1A alpha monitor will be held 4 to 6 inches off ground surface. This is inconsistent with SOP FO 1.16 which establishes that alpha monitors must be held parallel to and within one-quarter inch of the surface screened. This needs to be corrected. In addition, the

gamma survey should also provide the option of using a collimator to shield gamma radiation from external influences and to better define elevated readings at the survey nodes.

This section proposes 35 surface soil sample locations which are to be selected at random. These surface soil sampling locations should all not be randomly chosen, but a subset of these locations should be correlated to those locations exhibiting highest count levels in the radiological survey. For example, 10 sampling locations can be located on hot spots identified during the radiological survey and the remaining 25 sampling locations can be selected at random. This will provide a better profile of surface soil contamination and will minimize to an extent the possibility of missing a contaminated surface area.

In addition, the CDH surface soil collection method described in SOP GT.8 is the preferred method for collection of surface soil samples for radionuclide analysis. This section needs to justify why the surface soil collection method described in this section is to be used instead.

Response: The text has been revised to be consistent with SOP FO 1.16 and include ten surficial soil sampling locations exhibiting count levels above 250 cpm. The text has also been revised to incorporate the CDH sampling method specified in SOP GT.8. RFP currently is developing an SOP for surface gamma radiation surveys that will be followed during the FSP as appropriate.

EPA-S16 Section 7.3.3, Site-wide Vadose Zone Monitoring, page 7-10. The use of the BAT system for vadose zone monitoring should be investigated more thoroughly because it may not be appropriate where soil moisture has not already been determined or encountered. The BAT system is designed to instantaneously collect a water or gas sample from specific depths; however, unlike a lysimeter, it will not maintain a pressure differential between the sample vessel and the surrounding environment.

Response: Use of the BAT system was envisioned in collecting soil vapor samples from the vadose zone, where the quantitation of soil moisture content is not critical. We agree, however, that better methods may be available for characterizing vadose zone conditions. The text has been revised and expanded to reflect objectives and potential methodology for vadose zone investigation.

EPA-S17 Section 7.3.4, Original Pond Area, page 7-10. Figure 7-2 shows an approximate location of the original pond. In this figure a portion of the original pond is shown to be beneath a building. The building may present some difficulties when

delineating the perimeter of the original pond. This work plan needs to explain what is to be done to solve this problem.

Response: Investigations beneath presently operating buildings will not commence until decommissioning of that building takes place.

EPA-S18 Section 7.3.4.1, Geophysical Investigation,page 7-11. The GPR investigation may provide useful subsurface information, but only relative shallow depths depending ont eh radar frequency employed. It is an excellent tool for the clearing boreholes of potential obstructions to depths of approximately 10 feet, but the resolution below these depths may be quite variable. It is particularly useful in identifying shallow pipelines, which exhibit distinct signals; however, the reflection of the signals across the soil horizons or boundaries may be much less distinct. Other techniques may need to be evaluated to determine the lithology of the subsurface.

Response: See response to EPA-S13.

EPA-S19 Section 7.3.4.2, Unconsolidated Materials Investigation, page 7-13. The work plan should include the contingency to collect ground water samples from boreholes where saturated conditions are encountered. One approach would include the installation of a temporary casing in boreholes and subsequent conversion of these boreholes into ground water monitoring wells. This approach would also allow ground water levels to equilibrate to natural levels prior to installation of monitoring wells, particularly in low-permeability formations.

Alternatively, in situ methods of collecting perched water or ground water from boreholes should be included as contingency. These methods include a BAT system, temporary well points, or HydroPunch sampling methods.

Response: In the meeting on January 8th it was agreed that groundwater sampling was out of the scope of this Phase I investigation and due in part to budgetary and scheduling constraints is not feasible at the time.

EPA-S20 Section 7.3.5.3, Unconsolidated Material Investigation, page 7-16. This section mentions that 10 perimeter borings will be placed on the pond exteriors. This appears to be incorrect. Seventeen borings are proposed within the existing ponds, leaving only 9 borings (or the 26 total) for the exterior portions of the ponds. In addition, Figure 7-4 shows only 9 perimeter borings. This needs to be corrected.

This section also mentions that a subset of the proposed borings in the solar pond area are to be advanced deeper than is described in standard drilling and sample

collection procedures in order to collect geologic information on bedrock structures and stratigraphy underlying the ponds. If this is done, there exist possibilities of encountering ground water. If this is the case, it would be wise to convert these borings into monitoring wells to be used during phase II field investigations. This would provide preliminary analytical information in ground water to be used when designing the FSP for phase II investigations.

The pond perimeter borings around the embankments could be angle-drilled if an accessibility problem exists, or if the characterization of materials beneath existing or former pond embankments is deemed necessary.

Boreholes within the solar ponds area advanced into bedrock with coring methods will require the installation of surface casing if perched ground water or the water table are encountered. DOE should follow procedure for installation of surface casing including in OU2 Bedrock Work Plan. The surface casing, grouted into place, will prevent the downward migration of alluvial runoff (surface water) and potential contamination of bedrock, and possibly the unconfined water table.

Additionally, the work plan should describe geotechnical analyses that may be performed on bedrock core samples. If geotechnical analyses are not proposed, the work plan should explicitly state that only visual determination will be used to identify bedrock structures, stratigraphy, fracture patterns, or other information.

Response: The text has been corrected to say that nine borings will be placed on the pond exteriors.

Sampling groundwater is beyond the scope of this Phase I RFI/RI Investigation.

Six proposed borings will be advanced through bedrock as agreed upon in the January 8th meeting. The borings will be used to delineate the paleochannels which is a potential contaminant pathway and to further characterize site geology. These borings will be included in section 7.3.6.1 Unconsolidated Material Investigation in the ITS area and the remainder of the site. Proposed borings are identified in green on Figure 7-4. Monitoring ground water is consider to be out of the scope of this Phase I investigation and due in part to budgetary constraints in not feasible at the time. Ground water monitoring will be deferred to the Phase II investigation.

EPA-S21 Section 7.3.6, Interceptor Trench System and Remainder of the Site, page 7-17. It is unclear how cone penetrometer data will aid in the evaluation of the ITS. The cone penetrometer will provide inferred lithologic data based on penetration

resistance of the cone penetrometer probe.

Response: The use of the cone penetrometer to aid in defining the bedrock contact has been eliminated.

EPA-S22 Section 7.3.6.1, Unconsolidated Materials Investigations, page 7-17 and 7-18. Figure 7-5 shows 19 boreholes in the ITS area and remainder of the site instead of 17 boreholes as mentioned in this section. In addition, this section mentions that 9 boreholes will be placed in the ITS area. It is not clear which boreholes this section is referring to and consequently it is not possible to locate them. This needs to be clarified.

Also, it would be wise to convert those boreholes to be drilled into bedrock into monitoring wells.

When collecting soil samples targeted at the capillary fringe, it may be difficult to distinguish saturated properties of the soil or unconsolidated materials. It is difficult to target the capillary fringe with continuous sampling techniques, particularly in low permeability formations, without first establishing the depth of the water table. It is not uncommon when encountering saturated conditions in low permeability formations to allow the borehole to stabilize for several hours, and sometimes days, to establish the equilibrated or true water table depth.

It is also difficult to distinguish perched water zones as compared to the actual water table during continuous sampling. Indeed, it is possible to drill or sample completely through the perched water without recognizing it as such.

The work plan should describe how these or other contingent situations will be approached while continuously sampling through unconsolidated materials and targeting the capillary fringe or water table throughout the total borehole depth.

Response: The text has been modified to state that Figure 7-4 shows the proposed location for the 19 boreholes in the ITS area and the remainder of the site. Six of those boring will be advanced into bedrock and are shown in green on Figure 7-4. Nine of the nineteen borings are located in the ITS area north of PA.

EPA-S23 Section 7.3.6.2, Piezometer Installation, page 7-18. It is not clear how analytical modeling of aquifer drawdown to estimate the area of influence within the ITS will be conducted. The model assumptions should be defined and stated in the test. Additionally, the model will require calibration to existing field conditions. Currently, it is anticipated that more relevant data may be obtained from

measurement of hydraulic parameters from the existing system prior to computer modeling. In addition, the use of hydrologic data from existing monitoring wells within the vicinity of the ITS during system operation may provide preliminary information useful in establishing piezometer spacing, depth, or configuration.

This section mentions that three piezometers are to be installed in the ITS parallel to the assumed ground water flow. Figure 7-5 shows only 2 piezometers parallel to the assumed ground water flow. This discrepancy needs to be corrected.

In addition, the proposed locations are shown only within the eastern portion of the ITS. To determine the effectiveness of the entire system, piezometers may also be necessary near the central and western portions of the ITS. The uniformity of geologic or hydrologic conditions may also dictate the distribution of piezometers throughout the ITS.

Response: To optimize information regarding performance of the ITS, piezometers should be located to best represent the hydraulically impacted area of the aquifer. Determination of proper piezometer spacing will therefore require estimation of the area of hydraulic influence for the trenches. Existing data regarding water table configuration, alluvial hydraulic conductivity, trench geometry, and withdrawal rate will be used to simulate water table drawdown and area of influence. Either analytical or numerical methods can be used to estimate the area of influence. Specific simulation methods will be selected on the basis of their applicability to available data. Simulation of aquifer response near the trench will be used only to formulate an initial estimate of piezometer spacing. Locations may be subsequently modified following installation of several piezometers and measurement of actual water table configuration.

The text has been revised to agree with the number of piezometers depicted in Figure 7-5.

Available data indicate that the alluvial aquifer is unsaturated in the central and western portions of the ITS. Questions regarding the efficiency of the ITS in capturing alluvial ground water can be better evaluated where a greater saturated thickness is available for investigation.

EPA-S24 Section 7.6, Field QC Procedures, page 7-22. This section needs to include a discussion on the use of field blanks and laboratory blanks. These blanks in conjunction with trip blanks will determine or establish where contamination may have occurred.

Response: Field QC samples such as duplicate samples, field blanks, trip blanks and equipment rinsates; have been incorporated into the Work Plan.

EPA-S25 Section 8.1, Overview, page 8-1. Figure 8-1 illustrates a generic Human Health Risk Assessment process and components. While this figure contains all the necessary components to perform a risk assessment, this figure needs to illustrate site specific components associated with the nature of contamination and physical conditions of the solar ponds. In addition, it is suggested that these figures show what activities are going to be considered during phase I and phase II investigations.

Response: The conceptual model that has been included in this document illustrates the site-specific components associated with the nature of contamination and physical condition of the Solar Ponds.

EPA-S26 Section 8.3.4, Potential receptors, page 8-9. The text states, "the exact exposure scenarios to be completed will be selected according to an assessment of future use. . .of the site that may be made prior to completion of the Human Health Risk Assessment." However, there is no discussion of how future use will be assessed and the risk assessment cannot be completed prior to this assessment. A precise description of exposure assessment approaches and actions is important to demonstrate and promote a sound understanding of a proper exposure assessment focus.

Response: It is true that a precise description of exposure pathways and receptors is critical to the development of the risk assessment. However, it is outside the scope of the Phase I investigation to characterize either exposure pathways (except for those involving soils) or potential receptors. The soil pathways to be characterized will also be incomplete because transport by air, water runoff, and biotic movement will not be investigated in Phase I.

EPA-S27 Section 8.3.5, Exposure Point Concentrations, page 8-9. The second paragraph states, "release and transport of contaminants in environmental media may be modeled using basic analytical methods recommended by EPA or the best model available as determined by a model performance evaluation. The models will be calibrated to improve performance using site-specific parameters." The text needs to provide a discussion of the methods.

Response: Only EPA-approved computer modeling programs (AIRDOS, etc.) will be utilized for determination of potential impact on human receptors.

EPA-S28 Section 9.2.2.1, Collect and Evaluate Existing Site Data and Information, page 9-17. The text states that information from studies conducted at Rocky Flats on radionuclide uptake, retention, and effects on plant and animal populations will be used as some of the base information for the site. However, a citation is not provided for those studies. References should be provided for all studies used for basic information.

Response: The citations have been provided in the text and added to references.

EPA-S29 Section 9.2.3.1, Air Quality, page 9-21. The work plan identifies the site-wide air quality monitoring program as an important source of information for the environmental evaluation. However, descriptions of this type of study have been consistently missing from the Rocky Flats RI work plans. Furthermore, SOPs for the collection of air quality data during field investigations have not been approved. A description of the monitoring program and its anticipated data should be provided.

Response: The air monitoring program is site-wide and not appropriate for specific OU descriptions.

EPA-S30 Section 9.2.3.1, Soils, page 15. The text states that surficial soils are a potential source of contaminant ingestion to "soil dwelling animals and invertebrates and their predators." The groups under discussion are not clear since, presumably, they are all animals. The statement should be clarified.

Response: The text has been changed to clarify soil dwelling animals of concern.

EPA-S31 Section 9.3.2, Objectives, page 9-26. The text states the data quality objectives (DQOs) for the environmental evaluations have not been developed. DQO development should be one of the first steps in the plan, including an evaluation of the reasons for collecting samples and uses of the resulting data.

Response: The text has been expanded and edited to include a discussion of reasons for sampling and data collection.

EPA-S32 Section 9.3.3.1, Collection Methods, page 9-38. The text states that quantitative vegetation surveys will only be conducted for production. The general discussion on page 9-37, however, includes cover and height as vegetation parameters to be measured. The text should be clarified and made consistent.

Response: The text has been edited for consistency to include cover and height of vegetation as sampling parameters.

EPA-S33 Section 9.3.3.1, Sampling Intensity, page 9-40. The text states that live-trapping of small mammals will be done in the spring and fall providing the population will support that intensity. The methods to determine whether the population can survive sampling stress should be described.

Response: The text has been edited to include a short discussion on sampling protocol for small mammal live trapping.