EPA COMMENTS ON ROCKY FLATS PLANT
FEASIBILITY STUDY REPORT
881 HILLSIDE AREA
SUBMITTED 1 MARCH 1988

General Comment

The major deficiency of the FS report is that it is based on an incomplete RI. The information presented in the RI lacks a clear definition of the nature and extent of site contamination, is inadequate in characterizing the known sources of contamination, postulates unknown sources of contamination, presents ill-defined background concentration levels, misinterprets analytical results and lacks an understanding of contaminant migration and possible natural attenuation. DOE/Rockwell is refered to the specific comments made by EPA concerning the Remedial Investigation of 881 Hillside.

Specific Comments

Section 1.0: Introduction

1. The assessment of the feasibility study (FS) proposed alternatives should also consider short term effectiveness, long term effectiveness and permanence, community acceptance, state acceptance and reduction of toxicity, mobility or volume. These elements of the remedial alternative assessment should be included and be addressed to each alternative in addition to the five elements proposed on page 1-3 of the FS.

2. The data presented in the RI do not support the statement made in section 1.2.1 that groundwater in the bedrock appears non-impacted by the activities at the SWMUs of 881 Hillside. The division of 881 Hillside into two general areas of contamination may not be appropriate in light of the poor characterization of SWMUs 104, 130, 119.2. The statement made in section 1.2.3 that SWMUs other than 103, 106, 107 and 119.1 are not contaminating groundwater is doubtful.

3. The statements made in section 1.2.1.1 concerning the chemical conditions south of building 881 are qualitative and do not reflect the reality of the data presented in the RI. The different geochemical environment postulated as the cause for elevated selenium is probably a result of the past waste management practices at the hillside. The statements concerning elevated volatiles and uranium levels are unsupported by the data

presented in the RI. If other sources are responsible for elevated constituents, then these sources should be characterized. If background data for the colluvium systems mantling the 881 Hillside have not been characterized, then no conclusions can be made concerning the characterization of the contamination of the hillside and the FS becomes unsupportable.

4. The statements made in section 1.2.1.2 concerning the chemical conditions in the vicinity of SWMU 119.1 are qualitative and unsupported by the data presented in the RI. Differing chemical makeup of groundwater in different geologic formations can be a result of the differences in the mineral content of the different formations and does not necessarily reflect poor connection between groundwater systems. The designation of geochemical environment as being responsible for the elevated strontium and uranium is subjective and unsupported by the data. The conclusion that volatile compounds were non-detectable in the most shallow permeable zone in the bedrock, does not allow the conclusion that bedrock groundwater is uncontaminated.

5. The disregard of the organics detected at surface water stations south of the 881 Hillside is inappropriate. DOE/Rockwell must provide quantitative evidence that the surface water is not affected by organic contamination prior to discounting the data. The data presented in the RI to eliminate the 881 Hillside as the source of the elevated uranium in the surface water are inconclusive. The data presented in the RI indicate that the sediments have elevated tritium, plutonium and uranium levels. Since the risk assessment attached as an appendix to the FS does not address the surface water transport of contaminants, it is unclear how it was determined that chemical conditions of the surface water do not pose a hazard to public health or the environment.

6. The statement that contamination does not extend to the Woman Creek Alluvium is unsupported. What is meant by the statement that groundwater contamination does not extend into the permeable horizons of the bedrock? The Arapahoe formation is permeable. Drawdown recovery tests of the weathered claystone indicate hydraulic conductivities in the 10^{-6} range. Groundwater contained in the Arapahoe will migrate, possibly into deeper, more productive aquifers of the Arapahoe.

7. The conclusions presented concerning the location of volatile soil contamination are incorrect and unsubstantiated. Volatile and semi-volatile organic contamination is widespread and generally not attributable to laboratory artifact.

8. The major ion levels detected in pond C-2 are elevated with respect to SW-35. The levels of radioactive constituents, metals and inorganics detected in pond C-2 are elevated with

respect to station SW-42. The statements made in section 1.2.5 are dubious.

9. The detection of PCE in the air cannot be attributed to building 952, as this building is a gas cylinder storage unit. No solvents are supposed to be stored at this unit.

10. The air and biota section should present and reference important sections of the reports conducted by CSU which were directed towards identifying the impacts posed by RFP on the biota. DOE and Rockwell should review the CSU studies and consider developing a document which would be available for review and would be referenced in the RI/FS documents for Rocky Flats. Such a document should be reviewed and approved by the Colorado Division of Wildlife, and U.S. Fish and Wildlife Service (contact John Spinks Jr., Deputy Regional Director).

11. The assessment of public health impact must be based on the facts presented in the RI, not on conjecture and unsubstantiated conclusions regarding the presence or non-presence of contamination at the 881 Hillside. The results of the risk assessment indicate that there is potential for risk associated with this site.

12. The discussion of state ARARs correctly indicates that state advisories, guidance, or other non-binding policies, as well as standards that are not of general application, cannot be treated as requirements under CERCLA. However, they may fall into the "to be considered" category, and cannot be summarily excluded. (A separate review of the ARARs screened in Appendix 2 is presented as an attachment to this document.)

13. Although institutional control is inappropriate as the sole 881 remedy, the discussion of institutional control will be predicated on resolution of future land use issues. DOE and Rockwell may be required to resolve future land use issues regarding the plant and buffer zone with the U.S. Department of the Interior. Discussion of this matter and initial contact with the Department of the Interior should be made as soon as possible.

Section 2.0: Screening of Remedial Action Technologies

1. The initial selection and screening of remedial technologies is to be based on the developed remedial action objectives, which in turn are based on nature and extent of contamination, risk assessment and ARARs identification. Subsequent to the RI and the ARAR and risk assessment evaluation presented in Appendix 2, the remedial action objectives should be stated in Section 2.0 of the FS, specifying the contaminants and media of interest, exposure pathways and remediation goals so that the basis for initial selection and screening of remedial

technologies is identified. The general remedial technologies to be screened and further refined are selected for each medium of interest which will satisfy the remedial action objectives. This means that the volume of media to be addressed must be defined and presented in the FS subsequent to the ARAR and risk assessment so that the remedial action objectives can be defined.

2. The second phase of the screening process evaluates the response technology types in light of medium specific technical implementability. Contaminant types and concentrations and onsite characteristics such as depth to bedrock, degree of fracture and aquifers (alluvial and/or bedrock) affected are examples of the information which should be used to make these determinations.

If the elevated metals, inorganics and radionuclides found in the hillside groundwater are above ARAR or impart unacceptable risk, then the process options to address these contaminants must be discussed. This again requires that the FS define the media and contaminants of concern, so that the basis for proposal of response technology types can be understood. The ARAR evaluation and risk assessment should address the bedrock groundwater contamination at the hillside in order to assess the implementability of the technology types proposed.

The resulting technology types are refined to more specific process options within each technology type. The process options within potential technology types are evaluated in greater detail prior to selecting one process to represent the technology type. Process options are evaluated using the implementability, effectiveness and cost criteria. In general, Rockwell and DOE did not follow the basic procedures for screening of remedial action technologies as it is described above.

3. The "conclusion" presented in the RI, and referenced in section 2.2.2.2, that radionuclide concentrations in soils are at or near background levels is questionable. Prior to determination that the soils need not be disposed of at a mixed waste facility, a more thorough determination of radiation level of the soils impacted must be made or the soils would have to be disposed of at a mixed waste disposal facility.

4. The screening of technology types, specifically well arrays as presented in section 2.2.3.1, is to be based on technical implementability. The section indicates that pumping is most effective in homogeneous materials with relatively high intergranular hydraulic conductivities. This may not be appropriate for the contaminated groundwater in the 881 Hillside alluvial and weathered claystone bedrock.

5. The technical implementability of subsurface drains and barriers is dependent on the depth of affected groundwater. The FS must address the contaminated groundwater in the weathered

horizons of the bedrock prior to determining whether these technology types are implementable at the hillside.

What hydrologic impact would result from utilization of a subsurface barrier on the hillside? Upgradient mounding and flow net changes should be considered when evaluating this technology type.

6. It is unclear why capping is being considered and retained as a technology type when it has been stated that the leaching of contaminants from the soils is not anticipated to be a problem, and the soils themselves have been determined in the risk assessment not to pose significant hazards. The reduction of infiltration will not reduce the concentration of contaminants in the groundwater.

7. The initial screening of technology types is to be based on implementability. The feasibility of vitrification, lack of commercial availability and limited previous applications are not the screening elements to be used at this stage in the FS. Also if soils are not of concern and vitrification would most likely volatilize the organics, why is this technology type being considered?

8. If soils do not pose a significant health hazard, as determined in the risk assessment, and leaching of soils will not significantly affect the groundwater concentrations of contaminants, then why is soil flushing being considered and retained? The leachability of the soils and/or the distribution of contaminants between soil and groundwater should be evaluated in order to verify the low significance of leaching of contaminants from the soil. The permeability and clay content of the soils in conjunction with the hardness of the groundwater would indicate that this technology type may not be implementable at the 881 Hillside.

9. The FS should state the reasons that in-situ aeration is not implementable at the 881 Hillside. Application of the geologic information developed in the RI should provide the information needed to assess this technology type.

10. The FS should state why in-situ anaerobic conditions would be difficult to maintain at the 881 Hillside. The absence of conclusive demonstrations of the effectiveness of this technology for treating soils and groundwater contaminated with organics is not a valid reason for dismissing this technology type.

11. The fact that in-situ carbon adsorption is in the research and development stage is not a valid reason to dismiss this technology type. The initial screening process evaluates implementability of the technology type. The hydraulic impact of implementation of this technology should be discussed.

12. The complete oxidation of 1,1,1-trichloroethane results in the production of carbon dioxide and hydrogen chloride. The dismissal of wet air oxidation and supercritical water based solely on costs is not consistent with the NCP. Costs are to be considered only after it is determined that adequate protection of public health, welfare and the environment will be achieved. The initial screening of technology types is to be based on implementability, not on cost. Only after alternatives comprising process options have been developed should the costs be considered and then costs can only be considered after it is determined that the alternative provides the adequate level of protectiveness.

13. The chemicals associated with 881 Hillside should be analyzed for compatibility with the reverse osmosis membrane in order to dismiss this technology as not implementable. It seems that the volume of the concentrate would be low for wastes treated by reverse osmosis considering the concentration of the contaminants in the groundwater.

14. Chemical oxidation should be evaluated for implementability as a technology prior to evaluation of process options within this genre of treatment.

15. The dismissal of steam stripping only because of cost is inappropriate. The steam stripping and air stripping process options must first achieve the same level of effectiveness prior to consideration of costs.

Section 3: Screening of Remedial Alternatives

1. The remedial alternatives are to be analyzed in light of effectiveness, implementability and cost. Is acceptable engineering practice the same as implementability? Alternatives are to be further refined by quantifying the areas and volumes of media to be addressed and the sizes and capacities of the process options making up each remedial alternative. The media and pathways of exposure to be addressed are the same for all alternatives. The media and pathways of exposure to be addressed are considered during development of remedial action objectives. Effectiveness is evaluated based on protectiveness and reductions in toxicity, mobility or volume achieved.

After identifying the alternatives to be analyzed in detail, treatability testing should be initiated if necessary and additional site characterization should be conducted as appropriate, in order to support the detailed analysis of remedial alternatives.

2. The dismissal of treatment for contaminants other than the volatile organics must be based on the ARAR evaluation and/or

the risk assessment. This must be explicitly stated so that the basis for the proposed remedial alternatives can be understood. Otherwise, incorporating reinjection of groundwater or discharging to the surface water after only treating the organics is possibly unacceptable.

3. No Action. The hazard posed by SWMU 107 has not been evaluated separately. Groundwater downgradient of SWMU 107 has been degraded. The hazard posed by SWMU 119.1 has not been separately evaluated. The determination of extent of contamination resultant to SWMU 119.1 has not been accurately presented in the RI. Borehole soil samples indicate that VOCs are present in the weathered horizons of the claystone bedrock. VOCs have been detected in the surface waters of the South Interceptor Ditch and Woman Creek. Thus the monitoring program proposed will only detect changes to the present contaminated conditions of the groundwater of 881 Hillside. The ability of the soils to naturally attenuate contaminant plumes should be substantiated. Attenuative processes may reach some capacity level, which could allow further migration of the plume.

4. Line of Wells with Treatment. The depth of the groundwater wells proposed in the FS must be predicated on the risk assessment and ARAR review for contaminants in the bedrock groundwater. A more prudent treatment alternative would pump the 8 gpm to building 374 post treatment in the new treatment facility. See comment number 2 above. The location of 165 wells located on 10 foot centers will have to be verified for ability to intercept groundwater. The number and placement of wells should assure that overlapping cones of depression provide complete cut-off of groundwater flow. The FS must evaluate the depth requirements to meet ARAR and/or acceptable risk levels for remediation of groundwater. This will have to be done prior to elimination of well placement as an alternative. The french drain system is constrained to shallow remediation, and may not provide the level of protection required if bedrock groundwater must be considered. The location of these wells must also be evaluated in light of the extent of contamination. The location of these wells must be based on quantitative information. Risk isopleths would allow proper determination of well placement. Sampling the influent and effluent on a monthly basis may not provide adequate information to assess the performance of this unit. These sampling events must also be coordinated. The statements regarding effectiveness and meeting of ARARs are poorly justified.

5. French Drain. Comments made above are applicable to this alternative. (i.e. depth of trench, location on the hillside, feasibility determinations, extent of contamination and contaminants to treat, etc.) The soils which will be excavated will have to be tested to determine whether they can be used as backfill materials in light of land disposal restrictions. The

soils will also have to be evaluated to ensure that subsurface structures will be geotechnically stable. Capital costs for this alternative should include the costs of the above tests. The statements regarding effectiveness are poorly justified.

6. French Drain with Soil Flushing. The reason for considering soil flushing should be stated in section 2 as it is in section 3. The design discharge for soil flushing of 0.8 gpm should be presented based on effective porosity, surface area and depth of the drainfield. The evaluation of effectiveness and acceptable engineering practice is poorly justified. The additional cost for soil flushing is estimated at about $52,000. Soil flushing will considerably shorten the remedial process at a relatively small initial cost increase, if effective. Use of innovative technologies is encouraged by SARA. This process option should be further evaluated to see if the hardness of the groundwater and/or the subsurface conditions will allow effective use of this technology.

7. Total Encapsulation. The alternative does not totally encapsulate the 881 Hillside. No discussion of the existing treatment process is presented. The encapsulation will not address the geochemical changes in groundwater resultant to the past waste disposal practices at 881 Hillside. The statements concerning dilution and attenuation of contaminated groundwater not encapsulated is unsupported. Dilution is prohibited as a substitute for treatment and release of contaminants above background will degrade water quality. This solution may not meet ARARs.

8. Treat Source Well and Footing Drain Flow. The RI has not characterized the sources in sufficient detail to allow conclusions to be made that treatment of the footing drain flow and 9-74 source well will significantly minimize any threats to public health. The RI never determined that the footing drain collected all the VOCs in the area adjacent to the 881 building. Will pumping at a steady flow of only 0.04 gpm provide a cone of depression great enough to prevent the majority of the contaminated groundwater from migrating or even to collect the contaminants which are present in the area? The reasons presented for retention of this alternative have no support in the document.

9. French Drain with Soil Removal. This alternative must address the same considerations as presented in comments 4 and 5 above. The FS does not present justifications for the dimensions and volume of soil to be removed. The FS does not consider the possibility that the excavated soils will have to be treated to meet Land Disposal Restrictions.

10. Summary of Screening Results. Total encapsulation should not be retained. Soil flushing options should be further

evaluated to determine effectiveness at the 881 Hillside. Soil removal should be retained, as until the effectiveness of each retained option is more thoroughly evaluated, soil removal may provide the greatest level of protection to human health and the environment. The pump source well and collect footing drain flow option does not provide the same level of protection as the other options under consideration.

Section 4: Detailed Evaluation of Remedial Alternatives

1. Before performing the detailed evaluation of remedial alternatives, post-screening investigations should be conducted to ensure that the post-screen remedial alternatives can meet the remedial action objectives. These studies may include the collection of additional site characterization data, treatability studies, and/or bench scale testing.

2. The specific CERCLA requirements to be supported in the FS include protection of human health and the environment, ARAR attainment, cost-effectiveness, permanence and use of innovative technologies as practicable and satisfaction of the preference for treatment which reduces toxicity, mobility or volume. In addition, CERCLA places emphasis on consideration of the long term uncertainties associated with land disposal, the requirements of the Solid Waste Disposal Act, the characteristics of the hazardous substances and their tendency to bioaccumulate, short and long term health effects from human exposure, long term maintenance costs, failure of proposed remediation and the potential threat to human health and welfare associated with excavation and redisposal. The criteria to be used to address these requirements and considerations are short term effectiveness, long term effectiveness and permanence, reduction of toxicity, mobility and volume, implementability, cost, compliance with ARARs, protection of human health and the environment, state acceptance and community acceptance. These evaluation criteria should be used as opposed to the criteria proposed in section 4.1 of the FS.

3. The groundwater treatment section focuses only on treating organics in the groundwater. The RI and FS must address the other elevated constituents, namely the elevated radionuclides, inorganics and metals. If these constituents must be addressed by the remedial alternative, as determined through ARAR and risk assessment, then the FS must propose remedial alternatives which will meet the requirements.

4. The FS should evaluate the specific efficiencies of treatment for each contaminant of concern.

5. Implementability of carbon adsorption may be affected by the potential problems associated with radionuclides in the groundwater. The effects, safety problems and disposal

implications of the radionuclides should be determined in this section before the technology can be evaluated.

6. The data resulting from the bench scale testing of 881 Hillside groundwater should be presented in the section discussing the UV/peroxide treatment system. The production of hydrogen chloride in the offgas post treatment with UV/peroxide should be addressed technically.

7. The expectation that a french drain will be highly effective in containing and collecting contaminated groundwater at the 881 Hillside needs to be substantiated. The determination of extent of contamination into bedrock and the risks associated with this contamination is prerequisite to evaluating this alternative. The implementability of this type of structure to depths greater than 10 feet is at issue. How is it known that the footing drain at Building 881 has not clogged partially? What is the life expectancy of the low permeability barrier to be placed on the downgradient side of the trench? What will this material be? The alternative as proposed does not address the contaminated groundwater in the weathered horizons of the claystone bedrock.

8. The underlying weathered claystone may adversely affect the performance of the total encapsulation alternative. It is unclear how the internal sump system incorporated in this alternative would be expected to maintain an inward gradient, especially given the slope of the hillside. The expectations that the compacted soil walls will provide performance equal to the slurry wall needs to be substantiated. The statement that the released contaminants will not pose a hazard to public health or the environment is unsupported. Dilution is prohibited from being substituted for treatment. Contaminated groundwater must be mitigated prior to release. The statement that soil excavated must be returned to the area from which it was removed in order to avoid triggering the land disposal restrictions is incorrect. Contaminated soil can not be used for backfill material.

9. The source well and footing drain option will not address the risks associated with the plume downgradient of these two sources.

10. If the treatment technologies will not meet ARARs for manganese, selenium, total dissolved solids, alpha and beta then the FS should address technologies which will meet these requirements. The action specific ARARs should address the offgas emissions from the treatment of the groundwater.

11. The calculations presented in Appendix 3 are inconsistent with the narrative discussion of Appendix 3. Table A3-2 includes a lump sum cost for the UV/peroxide treatment system. Table A3-3, page 1 is titled UV/peroxide, while all

subsequent pages are titled carbon adsorption and the total cost is estimated at $780,000, not $291,000. This may significantly affect the evaluation of cost/benefit and present worth calculations.

Appendix 1: Risk Assessment

1. The method utilized to evaluate risk associated with the 881 Hillside is appropriate and good information is derived from this study. However, statements made in the text of the report are inconsistent with the data and the appendix should be edited accordingly. The majority of the comments concerning this risk evaluation are directed towards these inconsistencies.

2. Although the risk assessment does not seem to be predicated on this basis, the statement is made that constituents will be eliminated from selection as an indicator chemical because there is insufficient evidence that the constituent originated from prior disposal practices. There is evidence that past waste management activities at 881 Hillside may have altered the groundwater chemistry of the hillside. This is not addressed by the RI. The data suggest that the elevated metals, inorganics and radionuclides at the hillside may be symptomatic of a problem at the hillside. No effort is made to understand the problem and the symptoms are written off as attributable to geochemical variability. This is unacceptable, as the proposed remedy cannot be evaluated as to effectiveness in solving the problem, if the problem is not understood.

3. Tables 2-10 through 2-12 identifying radionuclide levels in alluvial and bedrock wells and surface waters should identify what the minimum detectable activity is for each radioisotope below minimum detectable activity. Why have only 3 beta/gamma emitting fission products Cs137, Sr89,90 been selected for monitoring in the groundwater? Do the surface water concentrations refer to total or dissolved only? The data may be more explainable if both total and dissolved activities were presented.

4. In the identification of indicator chemicals, the significance of the chemicals which ranked in the upper 50% for carcinogenic and non-carcinogenic effects is not understood. EPA guidance does not offer this as an alternative and evaluation of risk associated with all elevated constituents is advantageous to the determination of risk and remedial action objectives. For constituents where toxicity constants are not available, EPA recognizes, as acceptable, the use of lowest observable effects numbers or numbers derived from these numbers.

5. The exclusion of the downgradient surface water stations other than SW-31 and SW-32 is not justified by postulating that

other areas of RFP may be impacting the South Interceptor Ditch downgradient of SW-31 and SW-32. Conservative estimation of risk associated with the 881 Hillside should assume that the constituents found in the South Interceptor Ditch are a result of 881 Hillside past waste disposal activities. Further studies of the 903 Pad and old landfill may better identify the sources of impact associated with the South Interceptor Ditch.

6. Why is it unlikely that the PCE detections in ambient air east of the 881 Hillside are related to past disposal activities at 881 Hillside? PCE was widely detected in soils at the 881 Hillside. Composite soil samples may dilute the peak concentrations found in soils. Building 952 is a storage facility for gas cylinders, mostly empty, not solvents.

7. Why are there instances where background ranges are presented as single numbers?

8. If the same analysis of radioactive contamination is utilized in the risk assessment as was offered in the RI, then possibly elevated radionuclides, Sr89,90, Cs137 and Pu239,240 may be incorrectly eliminated from the evaluation presented in the risk assessment. Detection limitations may preclude the accurate determination of elevation with respect to background for radionuclides. The background determination for all constituents at the site is subjective and does not allow accurate evaluation of elevation with respect to background (See comments on RI). How are Sr89,90 and Cs137 eliminated from consideration when no background data exist? How are Pu239,240 and Am241 eliminated from being considered as elevated in bedrock and alluvial groundwater when background is below minimum detectable activity?

9. The statement made in section 3.2.2 that none of the organic indicator chemicals were detected above detection limits in surface water samples downgradient of the hillside is incorrect. Carbon tetrachloride was detected at surface water stations SW-32, 29 and 30. Tetrachloroethene was detected at surface water station SW-45. Trichloroethene was detected in surface water at SW-32, 29, 45 and 64.

The ranges presented for strontium concentrations do not correlate with the data presented in the RI. Surface water station SW-42 samples contained undetectable concentrations of strontium. Downstream samples from surface water stations SW-27, 28, 30, 31, 62, 64, 32 and 34 were all elevated with respect to background, some of which are considerably higher than the range presented in this section. Where was the background for sediment concentration of strontium determined? It is not presented in the data of the RI. The comparison to a referenced "usual" level of strontium in the sediment is irrelevant.

The U238 concentrations decrease from surface water station SW-36 to SW-35 to SW-44. No analysis of U235 is presented for SW-36, but U235 concentrations decrease from SW-35 to SW-44. U235 and U238 concentrations increase from station SW-44 to SW-31. Trends for U233,234 are hard to recognize given the data. Uranium levels may increase at SW-30 and this may be due to the SWMUs north of this station, however the conservative determination of risk associated wwith 881 Hillside should not assume that these constituents are the result of some other source. Ponds C-1 and C-2 are elevated with respect to surface water sampled at SW-32 and SW-42. The data presented could indicate 881 Hillside impacts the South Interceptor Ditch.

10. The facts that ponds C-1 and C-2 contain elevated levels of uranium with respect to proposed background ranges and both ponds are elevated for inorganics with respect to SW-42 indicate that surface transport of contaminants is probable. The reasons for discounting this pathway must be related to concentration of constituents and not because it will not transport contaminants.

11. The borehole analyses as presented in the RI do not allow determination that volatile organics were not widely distributed. Ambient air sampling did detect PCE above detection limits. Soil gas sampling detected PCE above detection limits throughout the 881 Hillside. Although the risks associated with the air migration pathway are likely to be low, the reasons presented for discounting this pathway are incorrect.

Appendix 2: ARARs

Chemical Specific ARARs Analysis

1. The use of geometric mean for averaging alluvial groundwater well contaminant concentration is incorrect. Since all SWMU/operable units at the 881 Hillside affect the same alluvial system, the ARAR evaluation should consider maximum concentration detected for each constituent considered. The FS should also utilize an acceptable range for background for each constituent and compare the high constituent concentration to this range. The background and data interpretation concerns expressed in this document extend into the development and analysis of ARARs presented in the FS. We are concerned that an adequate ARARs analysis cannot be done if the same subjective, and we believe arguable, interpretations of data are utilized in the ARAR analysis as are presented in the RI/FS.

2. The ARAR review for soils is missing, as is an ARAR review of the bedrock groundwater. Bis(2-ethylhexyl)phthalate, di-n-butyl phthalate, fluorene, phenanthrene, anthracene,

fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene, benzo(g,h,i)perylene and diethylphthalate should be included with the volatiles detected for the soil ARAR analysis. Elevated metals, inorganics and radionuclides should also be evaluated in the soil ARAR analysis. All elevated constituents in the bedrock groundwater should be evaluated in an ARAR analysis.

3. A "to be considered" column should be included in the FS presentation of the ARAR analysis. The health advisory level for t-1,2 dichloroethane is 70 microgram/liter lifetime intake for a 70 kg adult. The health advisory level for methyl ethyl ketone is 170 microgram/liter lifetime intake for a 70 kg adult, not 860 microgram/liter as stated in the report.

4. It is unclear how the distinction between applicable and relevant and appropriate is made in the FS presentation of chemical specific ARARs in Appendix 3. For example, why are the SDWA MCLs for carbon tetrachloride, 1,2 dichloroethane, 1,1 dichloroethene, trichloroethene, 1,1,1 trichlorethane considered relevant and appropriate and not applicable? Also, since Rocky Flats Plant is a RCRA facility, the ground water protection standards are applicable. The groundwater protection standards are background, MCLs (as specified in 40 CFR 264.94) or ACLs (alternate concentration limits) proposed by the facility. Since volatile organics are not listed in Table 1 of 40 CFR 264.94, the ARAR for organics should be background, ie. 0.0 ppb. The ARAR for volatile organics would therefore not be met for any volatile compound detected in the groundwater. The FS presentation of chemical specific ARAR should utilize a column of RCRA background under the potential ARAR requirements. This would make the screening results more clear.

5. All of the volatile organics detected in the groundwater should be evaluated in the chemical specific ARAR analysis. This includes 2-butanone and acetone in addition to the volatiles already evaluated. The SDWA MCL for chloroform is 100ppb if no other trihalomethanes are present in significant concentrations in the groundwater.

6. Why is the ambient water quality criteria for t-1,2 dichlorothene not protective of human health? Are CDH agricultural groundwater standards published or proposed for organic chemicals, conventional pollutants and the radionuclides presented?

7. Section 121(d)(2)(a) of CERCLA states that MCLGs can be relevant and appropriate, and are not limited to being considered. DOE and Rockwell need to explain why MCLGs are relevant and appropriate "under the circumstances of the release or threatened release".

8. Comment number 2 above is applicable to the metals analysis of ARARs. The RCRA groundwater protection standards are applicable. Background would be the applicable RCRA requirement in the case that the contaminant MCL is not listed in Table 1 of 40 CFR 264.94 or background is higher than the MCL listed in Table 1. Thus unless the CDH groundwater standard, CDH water quality limited standard or MCLG is more stringent than the background requirements, the RCRA background requirements must be the level of protection for remediation in the case that an MCL listed in Table 1 is not applicable. The ARAR analysis should address the Federal ambient water quality criteria proposed and published for metals.

9. When the MCLs, etc., have not been exceeded, and the constituent is within or below the background range, then the remediation need not address the specific constituent, provided the concentration present does not pose an unacceptable risk.

10. Why is the CDH water quality limited standard for cadmium not applicable? How was it determined that the CDH human health standard for chromium, lead, manganese, mercury, silver and copper is applicable and not the CDH water quality limited standard? Why is strontium not considered in the chemical specific ARARs analysis? Why is background proposed as the GWPS for chromium VI when a RCRA MCL is applicable?

11. The published lifetime health advisorys for nickel, cadmium and lead are 0.150 mg/l, 0.005 mg/l and 0.020 mg/l respectively. These are less than the CDH groundwater standards for agriculture and human health, which are proposed in the FS as applicable.

12. The November, 1985 proposed MCLGs for arsenic, chromium, lead, nitrate and nitrite are 0.05 mg/l, 0.12 mg/l, 0.020 mg/l, 10.0 mg/l and 1.0 mg/l respectively. It should be noted that these were proposed in November of 1985 and new proposals are anticipated.

13. Are the CDH groundwater standards presented in the conventional pollutants analysis for human health or agriculture? There is a SDWA MCL for nitrate equal to 10 mg/l as nitrogen. Total coliform should be considered in the ARAR analysis as this is what the standard addresses. How will the analytes which have not been measured be evaluated, (ie. coliform, dissolved oxygen, ammonia, sulfide and free cyanide)?

14. How will the proposed remedial alternative affect the temperature of the aquifer (ie. will there be a temperature increase associated after reinjection)? Will pH be affected by the remediation? These considerations must be analyzed prior to

dismissing the requirement in light of the proposed remedial alternative.

15. If the geometric mean for gross alpha measured at the 881 Hillside includes uranium and radon, then the numbers cannot be compared to the SDWA MCL. Why is the SDWA MCL for gross beta relevant and appropriate and not applicable? The MCL indicated in the FS for gross beta is 50 pCi/l. This is incorrect. 40 CFR 141.16 establishes the MCL for beta particle and photon radioactivity from man-made radionuclides at a total annual dose not greater than 4 millirem/year. If two or more radionuclides are present, the sum of their annual dose equivalent to the body or to any organ shall not exceed 4 millirem/year.

16. 40 pCi/l can be considered an MCL for Pu239 only if Pu239 is the only beta/photon emitter present. This same comment is applicable to the Am241, tritium, Cs137 and strontium90 SDWA MCLs. Why are Cs134, Ra226/Ra228 and Th230/Th232 addressed in the ARAR analysis? Should the radioactive analysis for groundwater at 881 Hillside include the entire "laundry list" of man-made radionuclides? Justification for the analyses proposed should be made. Again, the SDWA MCL for cesium is only appropriate if it is the only man-made beta/photon emitter present. The correct MCL is the total of combined Ra226 and Ra228 not to exceed 5 pCi/l. There is a 1983 health advisory for uranium setting a limit on chronic exposure to 10 pCi/l. The analysis of ARAR for beta/photon emitters at the 881 Hillside should consider the maximum concentrations detected and cumulatively evaluate the level in light of the 4 millirem/year dose equivalent. Why has the ARARs analysis not evaluated the CDH soil standard of 2 dpm/gm?

Action Specific ARARs Analysis

1. It would be helpful to separate the action specific ARARs analysis into those dealing with the soils and those dealing with groundwater.

2. Considering the interconnection between the alluvial groundwater and the surface water flow in Woman Creek, direct groundwater discharge of treatment system effluent should be considered in the ARAR analysis. Which contaminants may not be controlled to levels required by in-stream standards due to limitations of Best Available Technology?

3. Why are the RCRA requirements not applicable for hazardous waste injection wells (40 CFR 144.16)?

4. Why are the RCRA requirements for treatment of storage in tanks and storage in containers relevant and appropriate and not applicable?

5. EPA's offsite policy, codified in SARA section 121(d)(3), should be considered for offsite treatment, storage or disposal.

6. The RCRA disposal requirements are applicable for current disposal. The chart should state that the disposal requirements are both applicable and relevant and appropriate considering the past and present releases associated with the 881 Hillside. The detection monitoring program is applicable, but has been complied with.

Location Specific ARARs Analysis

1. If the wastes associated with the 881 Hillside are hazardous and subsequently treated or disposed of, then the siting requirements would be applicable, not relevant and appropriate.