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Operable Unit 1 Phase III Draft RFI/RI Comments

General Comments

In general, this report falls short of fulfilling its intended purpose in virtually every section Although some data gaps still exist the primary reason for the inadequacy of the report is that optimal use and evaluation of all existing data including data from previous investigations, did not occur In many cases this was evidenced and compounded by the fact that adequate data summaries were not presented or data sets were not properly identified that would allow the reader to understand and verify conclusions that were made in the report

Regarding validation of Phase III data no discussion of the subject could be found in the report other than the statement that 53% of all data have been validated Does this mean that only 53% of the data were found to be valid or that 53% of the data have undergone validation procedures? Further discussion must be included in this report regarding such questions and specifying the percentage of the data which was rejected as well as the percentage of data that was used No indication is given in the data tables of Appendix C of validation results other than lab qualifiers for any of the data presented

Overall some basic and simple improvements to the report format and presentation would make it much more user friendly This would include such items as including labelled tabs between sections throughout the entire report presenting maps on larger pages or plates so that all information can be easily seen improving quality control to eliminate mistakes in tables figures and text and providing additional summary data tables

Volume I

Executive Summary

Page xix pp 3 The second sentence states that SVOCs in surface soils are "derived from road dust vehicle exhausts and other combustion sources" Nothing is presented in this report that provides a solid basis for determining the most likely source of these SVOCs so this statement is misleading and unsubstantiated The statement must be revised to reflect the fact that the source of the SVOCs is unknown

Page xix last sentence Migration of VOCs in ground water at

IHSS 119 1 appears to be extremely limited " Unfortunately no attempt was made in the report to define on a map the actual extent of VOC contamination in ground water migrating from this IHSS In addition monitoring wells were not properly placed and/or sampled down gradient to help define the extent of this contamination More comments will follow regarding this matter

Page xx pp 1 The last sentence attributes VOC contamination in well 6286 to OU 2 sources Although this is possible it is not as likely as migration from IHSS 119 2 which is much closer to the well The report does not present data that would support an OU 2 source and therefore this statement must be revised or deleted

Page xx pp 4 Comparing the elevated cancer risk due to contaminants present at OU 1 with what is stated to be the Denver metropolitan cancer "risk" is not appropriate and must be removed from the report The cited number 33 is the incidence of cancer in the Denver metro area resulting from numerous types of exposures to carcinogens including the effect of smoking among the general population This not a relevant comparison and is an obvious attempt to downplay the potential effects of contamination present at the site

Page xxi pp 2 The fact that future commercial or residential development may alter or destroy ecological habitat has no bearing on future remedial decisions to manage the risks posed by contaminants at the site The argument suggested here seems to be that contaminants at the site have lesser impact on the ecology than on public health and therefore remediation for public health risks should not be conducted This rationale is not acceptable for determining remediation goals especially since commercial/residential development may in fact occur in the future at this site This paragraph is inappropriate for an executive summary of this report and must be removed

Section 1 0 Introduction

Sec 1 0 page 1 3 pp 1 It is stated here that fieldwork for this report began in April 1991 and was completed in January 1992 EPA was under the impression that the fieldwork was actually conducted from August 1991 through April 1992 The time period for fieldwork must be verified and corrected

Sec 1 2 2 1 page 1-7, pp 4 Although it is stated here that the location for IHSS 102 was relocated based upon further historical research no attempt was made to investigate the relocated location In addition the area that was investigated for this IHSS did not detect significant contamination which supports the relocated site as being the area where 30 to 50 drums of nonradioactive sludge may have been dumped As there was no

sampling of subsurface soils or ground water at the relocated site this must be done in order to characterize IHSS 102 unless it can be proven through some other means that the suspected disposal did not occur at this location At least one borehole and one monitoring well are needed at the relocated site from which samples can be taken In addition downgradient boreholes and/or monitoring wells may be necessary to define the extent of the potential contamination

Sec 1 2 2 7 page 1 11 pp 1 This section discusses the disposal history of IHSSs 119 1 and 119 2 based on findings in the Historical Release Report and speculates that the solvents found in ground water at these sites could have come from IHSS 109 For IHSS 119 1 speculations such as this do not belong in a section that is presenting recently discovered documented evidence of disposal histories The statement must be deleted

Sec 1 3 7 page 1 29 pp 3 This discussion states that ground water modeling is not recommended due to the pathway being incomplete This reasoning fails to consider a number of other valid reasons to conduct such modelling and the benefits that could be derived Since the extent of ground water contamination was not completely defined by sampling modeling seems to be an appropriate action to supplement field data It would also be useful to model contaminant migration without the French Drain in order to show a true no action scenario The modelling should also be applied to the current situation to estimate a point in time when the French Drain and Collection Well system will achieve desired levels of ground water cleanup

Sec 1 4 page 1 37 This subsection gives a brief summary of the contents of the report and its appendices Unfortunately using the appendices is very difficult since they lack accurate volume specific table of contents and tabs that guide the user to different sections This must be corrected for each volume (except volumes 1 and 2) so that the report can be used easily and effectively

Section 2 0 OU 1 Field Investigation

Sec 2 1 page 2 3 pp 3 A total of 26 monitoring wells and 5 piezometers were installed during the Phase III field investigation although the work plan called for 37 monitoring wells and 6 piezometers No explanation is given in this section for the missing wells but Appendix A 1 goes into some detail on the subject citing insufficient alluvial thickness as being the most common reason that wells were not completed Although this is a valid reason for not completing a well at a specific location at least one offset location should have been attempted for each unsuccessful site Of most concern are the four wells that were to have been installed in or near IHSS 119 1 which

would have provided important information regarding the extent of ground water contamination According to Figure 3 9 which shows alluvial thickness MW25 and MW26 could have been offset in locations less than 50' from the original location to encounter bedrock below six feet Other wells would have required more distant offsets but probably no further than 100' The decision not to install wells required by the work plan must be approved by the regulatory agencies at the time fieldwork is being conducted Failure to do so may result in remobilization of field crews to drill and install missing wells

Sec 2 5 page 2-10 pp 2 This paragraph discusses two separate surface soil sampling investigations and states that data from these investigations will be used for determining the extent and mean concentrations of contaminants in surface soils This seems to be incorrect since none of the analytical data from the OU 2 investigation (described here in section 2 5 1) appears in Appendix C or apparently in Table 4 17 which summarizes results from OU 1 sampling at 26 locations This paragraph must be clarified regarding which data sets are actually being used for what purposes

Sec 2 5 1 pages 2 10 to 2 12 If none of the results from the OU 2 surface soil investigation described in section 2 5 1 are actually being used quantitatively for this report this entire subsection is irrelevant and must be deleted

Sec 2 5 2 page 2 12 pp 3 The sampling scheme used at Rock Creek is stated as being <u>similar</u> to that at OU 1 Any differences in sampling methods must be discussed here so that they may be evaluated Tech memo 5 stated that the RFP method was to be used for both Rock Creek and OU 1

Sec 2 6 page 2 13 pp 3 It is stated here that four wells were sampled for DNAPLs but the results of this sampling were never presented The results must be stated here or in the appropriate section of section 4

Section 3 0 Physical Characteristics of OU 1

General

There are two fundamental problems with this section of the report Time and again statements or conclusions are made without presenting sufficient supporting data to justify the interpretation expressed in the report In some cases this is due to data gaps that may or may not be filled by recently gathered information such as data from the french drain monitoring wells In other instances the raw data seems to exist but it is not effectively utilized in the report text or figures Secondly there seems to be an intent to downplay the

importance or presence of ground water, especially in the eastern portion of the hillside The hydrogeological conditions are not always presented objectively, resulting in exaggerated statements or figures in some cases It is especially critical in this portion of the report to make the most valid and objective interpretation possible using all available data Otherwise, later aspects of the report may be based on false premises, invalidating the final assessment

Specific Comments

Sec 3 2 1, page 3-4, pp 2 The third sentence states that "Future uses of OU 1 will be limited". Is this in reference to the stability of the hillside or other factors? The limiting factor(s) for future use must be more clearly specified here, and in fact, it is speculative to assume future limitations will occur

Sec 3 3, page 3-5, pp 1 Delete the word "remote" Since Denver is in the predominant downwind direction, it is more than a remote possibility that atmospheric releases from RFP would affect the Denver metro area

Sec 3 4, page 3-6, pp 3 Table 3-2 is referred to here as summarizing surface water flow rate measurements for 1990 There are only two flow rates presented in this table from a total of ten stations that were monitored monthly from April to December of that year This either indicates that virtually no flows occurred or that a more sensitive method should be used for measuring flow rates, and this should have been done in 1991 As a result, there is basically no data presented for surface water flow rates at these stations

Sec 3 4 1, page 3-7, pp 1 The statement that there was no surface water flow at the 881 foundation drain discharge (SW045) and two other stations from April to December 1990 contradicts EPA's general impression that the foundation drain flows almost continuously Further detail is needed here to explain this apparent inconsistancy

Sec 3 4 2, page 3-7, pp 2 It is stated here that most monitoring stations for flow measurement are located in areas of standing water Are these areas appropriate for flow measurement? Flow measurement locations and techniques may need to be modified to meet the needs of the situation

Sec 3 6 1, page 3-11, pp 2, 3, and 4 The generalizations made on this page concerning the areal distribution and relative abundances of clay, silt, and sand in the colluvium are not well supported and are also somewhat illogical and meaningless The cross sections cited do not consistently show the patterns that

are suggested here i e clay and sand most common between the security fence and the South Interceptor Ditch whereas silt common north of the fence The statements that sand and clay are most common in the same area is not logical from a depositional standpoint and an attempt to explain this occurrence must be made in order to support such a conclusion

Sec 3 6 2 page 3 16 pp 4 Well #31891 should be added to this list of locations where sandstones subcrop beneath the alluvium Figure 3 23 should also be revised to indicate this occurrence

Sec 3 7 page 3 20 pp 2 This paragraph discusses the terms aquifer and HSU concluding that water bearing units at OU 1 are not aquifers This conclusion is actually based on several factors that can also support applying the term aquifer to the unconfined water bearing unit at OU 1 Freeze and Cherry (1979) define aquifer as "a saturated permeable geologic unit that can transmit significant quantifies of water They also state that definitions of aquifer and aquitard are purposely imprecise with respect to hydraulic conductivity but that these values for most aquifers are equal or greater than 5 x 10E 5 cm/sec Using the average of values presented in Figure 3 38 of this report the hydraulic conductivity of the colluvium at OU 1 is 5 4 x 10E 5 cm/sec which is sufficient to fit the term aquifer Regarding the quantity of water contained in this unit the report states here that it is insufficient to sustain even low volume use Nevertheless on page 3 34 it is stated that the volume of ground water available for yield in the upper unit within OU 1 is between 815 000 and 1 630 000 gallons enough to support between 9 and 18 households Therefore these calculations which probably underestimate the quantity available actually show that there is sufficient volume for domestic use As a result it seems more appropriate to refer to the unconfined unit as an aquifer and the lower unit as an aquitard The upper unit consists of colluvium Rocky Flats Alluvium artificial fill subcropping sandstone and weathered bedrock

Sec 3 7 1 page 3 23 pp 2 This paragraph refers to Figure 3 28 the water table elevation map for January 1992 and states that " little water exists in the upper HSU during the first quarter of the year" Although there are a number of dry wells in the eastern portion of the hillside this portion of the map appears to be drawn with the assumption that the unconfined aquifer is dry unless proven otherwise The large central dry area depicted on the map has no supporting dry well locations and would be more appropriately drawn with a band of saturated area extending from upgradient wet wells 37791 and 37591 down gradient to wet wells 37191 and 38191 In addition although well 0687 was destroyed during the French Drain construction it was never found to be dry as the map indicates averaging 6 7' of saturated thickness This well must be spotted on the map depicted with its average January water level of 5901' and

surrounded with an estimated area of saturation Therefore the statement quoted above and the maps in Figures 3 28 and 3 29 must be revised to more accurately depict the situation

Sec 3 7 1 page 3 24 pp 3 Measurable water levels were found in well 36691 six out of the eight times that it was monitored between Dec 1991 and July 1992 The statement that this well is dry must be corrected

Sec 3 7 1 page 3 25 pp 1 This paragraph refers to cross section F F' shown in Figures 3 16 and 3 36 which incorrectly shows well 38291 as being south of well 4387 These wells have almost identical north south coordinates but 38291 is actually 1 5 feet north of 4387 according to the coordinates found on the well logs This little mistake leads to a very misleading cross section creating the false impression of a down dip bedrock high that is damming ground water in the unconfined aquifer during low water level conditions In fact there appears to be a NW SE trending bedrock high or ridge that would merely channel the direction of ground water flow during low water level conditions and not actually prevent a down gradient flow from occurring Therefore cross section F F must be corrected on these two figures either by leaving out one of these two wells or reversing their order In addition the last sentence in this paragraph must be revised since it is not correct to state that only during high water level conditions can ground water in the unconfined aquifer flow south of 119 1

Sec 3 7 2 page 3 26 pp 1 The data in Table 3-10 does not adequately substantiate the statement that "permeability is generally lowest in the interval just below the upper HSU/lower HSU contact" This type of conclusion cannot be made based on a few discrete values from four wells and besides that the only significant differences in permeabilities are between claystones and siltstones Certainly bedrock claystone has generally lower permeability than the colluvium but that does not provide any basis for stating that the colluvial ground water is perched as is done here Perched colluvial ground water would mean that an unsaturated zone exists below a saturated zone within the colluvium a condition that is not demonstrated here Both sentences in this paragraph must be revised to agree with actual conditions

Sec 3 7 2 page 3 28 pp 3 The last sentence refers to the lower unconfined bedrock water table in the vicinity of IHSS 119 1" Is this actually referring to the confined bedrock piezometric surface? If so, it needs revision and if not it needs further explanation

Sec 3 7 2 page 3 28 pp 4 Well 31891 is screened across a subcropping sandstone therefore it should not be termed a bedrock monitoring well since subcropping sandstones are actually a part

the unconfined aquifer The fact that permeable subcropping bedrock (whether sandstone siltstone or weathered claystone) is actually in direct hydraulic communication with overlying colluvial or alluvial deposits seems to be forgotten in this report For this reason well 31891 must be included in all maps showing unconfined aquifer (upper HSU) conditions i e Figures 3 28 3 29 3 44 as well as Figure 3 23 which shows subcropping sandstones

Sec 3 7 3 page 3 29 pp 3 The unconfined aquifer is definitely not a homogeneous aquifer and therefore one would not expect that ground water would move in it as it would in such an aquifer The first sentence in this paragraph must be corrected to accurately portray known conditions

Sec 3 7 3 1 page 3 30, pp 1 The upper HSU is described as having slow percolation rates Data must be provided to support this statement

Sec 3 7 3 1 page 3 31 pp 1 Leaking discharge pipes are mentioned here in connection with a possible seep located near IHSS 103 Further discussion is needed to describe these pipes in regards to what they might be leaking and where exactly they are located

Sec 3 7 3 2 page 3 31 pp 3 The statement that "only a limited amount of ground water in the upper HSU actually reaches Woman Creek is not correct unless the effect of the French Drain is being considered here Otherwise this report presents no hard evidence to substantiate such a conclusion This statement must be deleted or modified by mentioning the effect of the French Drain

Sec 3 7 3 2 page 3-32 pp 1 Although some limited areas of perched ground water may exist under portions of the hillside the term perched is being applied incorrectly in some cases and too broadly at other times with little specific supporting evidence Actual examples of this condition must be presented in order to substantiate the use of the term

Sec 3 7 3 3 page 3 33 pp 1 Referring to IHSS 119 1 it is stated here that "this area appears hydrogeologically isolated and no net flow is expected Without properly placed monitoring wells upgradient and downgradient of this area it is incorrect to make such a blanket statement and therefore it must be deleted

Sec 3 7 3 4 page 3 33, pp 2 Using the area of saturation shown in Figure 3 28 actually provides a smaller than reasonable area for calculating the volume of ground water present Not only is the map that was used from January when water levels are traditionally at or near the low point for the year but as

stated in a previous comment the map seems to have been drawn with the intent to underestimate saturated areas Therefore the volume of water calculated cannot represent a reasonable estimate of the actual volume but instead can only represent the lowest volume of a range that can certainly be demonstrated to be much higher Calculations must also be made using an area of saturation and alluvial thickness that accurately portray high water level conditions in order to present a range of calculated volumes

Sec 3 7 3 4 page 3 33 pp 3 This paragraph calculates a transmissivity value for the upper HSU and then concludes that this ground water moves slowly or not at all Such a conclusion is not a logical result of these calculations and it also contradicts the statement on the previous page which gives a range ground water flow velocity of 37 to 73 feet/year for colluvial materials at IHSS 119 1 Although this ground water movement may be relatively slow the last four words (or not at all) of this paragraph must be deleted

Sec 3 7 3 8 page 3 39 pp 1 Unfortunately very little data is presented that can substantiate the effectiveness of the french drain primarily due to the fact that the french drain monitoring wells were not drilled until late August 1992 In fact two of the three wells that were installed prior to the french drain (31491 and 4787) actually showed increased water levels after the french drain began operation in April 1992 Water level data from the wells that were installed according to the french drain monitoring plan must be presented in conjunction with data from other pertinent wells prior to drawing any conclusions regarding the effectiveness of the drain

Sec 3 7 4 pages 3 39 and 3 40 Seven bullets with conclusions pertaining to the upper HSU are presented here Almost every conclusion is made without adequate supporting data requiring each one to be rewritten or deleted as below

Bullet #1 delete use of upper HSU and replace with unconfined aquifer delete last four words "or not at all"

Bullet #2 The area of ground water saturation probably is not as localized as stated here and insufficient monitoring wells exist to make such a statement

Bullet #3 Again this has not been definitely demonstrated with sufficient subsurface data

Bullet #4 Discharge from the Building 881 footing drain is only one source of ground water in the western portion of OU1

Bullet #5 Ground water flow paths may also have existed

from eastern OU1 IHSSs but definitive data is lacking

Bullet #6 This is an assumption not verified by any data presented but is probably true It must be qualified as an assumption

Bullet #7 Again data that supports the effectiveness of the french drain and extraction well are not presented in this report Such data is necessary to support a conclusion such as this

Sec 3 8 1 page 3 41 pp 4 The percentages of the various vegetative habitats listed here are assumed to be slightly changed due to habitat damage that occurred during construction of the french drain Such changes in habitat percentages must be discussed and at least estimated in the document

Figure 3 9 This figure is much more useful when the different thickness intervals are shaded with different colors Also BH 31691 is listed as ND on this map but logs and cross sections show it as having an alluvial thickness of 29 feet

Figures 3 11 and 3 31 The configuration of the bedrock surface shown in cross section A A' Figures 3 11 and 3 31 should probably be redrawn to more accurately agree with the bedrock topography map in Figure 3 24 The cross section should show a bedrock high between well 35691 and BH 0687 flanked by bedrock lows or channels on either side of it

Figure 3 18 This map is labelled Bedrock Geology at OU1 and therefore it should show the approximate contact of the Arapahoe and Laramie Formations, and the area where each subcrops below surficial deposits The Rocky Flats Alluvium is an unconsolidated surficial deposit and its extent should not be confused with contacts between bedrock formations

Figure 3 27 This map shows four piezometers located down gradient of IHSS 119 2 (B303390 B303490 B303590 B303690), however none of these are shown on the water table elevation or saturated thickness maps Water levels from these piezometers must be incorporated in the appropriate maps and data tables to fill in data gaps If this data was never collected or is unavailable for some other reason this must be stated for the record

Figure 3 44 As stated in previous comments, much of the area designated as dry in this figure is more likely to actually be saturated In particular the former locations of wells 0687 and 0287 which were historically never dry, must be shown as saturated Designating the entire length south of the french drain as being dry is not substantiated by water level data Since well 31491 which is about 50' south of the drain does

have a measurable water level in April 1992 it would make more sense to delete the dry area near this well and extending to the western terminus of the french drain

4 0 Nature and Extent of Contamination

General

There is very little attempt to describe or map the extent of contamination other than by displaying detection values for contaminants on maps that lack any form of contouring except for Pu and Am in surface soils This is partly due to data gaps in some cases and/or not using all available data i e data from Phases I and II The result is a report that presents a large amount of data but is unsuccessful in many cases in completing its purpose of defining the nature and extent of contamination

Over and over it is stated that only detections that are greater than ten times background are considered to indicate contamination There is never any reference or explanation given for using this definition of contamination and in fact this definition is contrary to threshold definitions discussed in the Background Reports This ten times rule is arbitrary and the same rationale as presented in approved Background workplans and reports must be presented for the purpose of discerning background constituents from contaminants

It seems that a significantly large number of the discrete samples taken from boreholes for VOC analysis were not obtained The most common reason cited on well logs was "core retained in VOA sleeve If there was an equipment or method problem it should have been corrected at the time As a result characterization of the nature and extent of VOC contamination in subsurface soils is not nearly as complete as it should have been

Specific Comments

Sec 4 0 page 4 1 pp 2 It is stated here that site conditions were evaluated based on Phase III data available as of August 3 1992 In some cases for SVOCs in particular sample analysis was not conducted in Phase III because it was determined that sufficient data already existed from the previous investigations However the Phase III data was needed to fill in data gaps from Phases I and II and therefore if only data from Phase III were used in evaluating site conditions the evaluation would be incomplete This report must be based upon all previously collected data that has been found to be valid in addition to the data that was derived during Phase III In addition invalidated data may still have value in the final analyses depending upon

the reason it was found invalid

Sec 4 0 page 4 3 pp 2 The statement is made here that " surface soils ground water these media are not associated with historical waste disposal" This statement is obviously false since surface soils were in many cases, the first media upon which contaminants were released and it is well documented that ground water under IHSS 119 1 is contaminated Therefore the statement these media are not associated with hazardous waste disposal must be corrected

Sec 4 0 page 4 4 pp 1 It is stated here that when results exceed background by an order of magnitude it is a likely indication of contamination While this is true it begs the question of how much less than an order of magnitude might indicate contamination These threshold definitions must be consistent with already approved Background Workplan and Report definitions A discussion of what levels above background constitute contamination supported by scientific rationale, is needed here to provide a basis for conclusions that are reached later in this section

Sec 4 2 page 4 8 pp 3 The rationale is stated here for presenting data on maps according to depth intervals Since VOCs were sampled at specific depths and not composited over intervals, the maps showing VOC data must be labelled with the exact depth for each listed value or nondetection instead of showing a depth interval This can be accomplished very easily and will greatly improve the quality of these maps

Sec 4 2 1 page 4 10 pp 3 The statement that two boreholes were drilled within IHSS 102 is incorrect and must be revised BH 37391 was drilled at the southeast corner of the IHSS outline and BH 36491 was drilled approximately 35' west of this IHSS location Therefore the subsurface soils and bedrock directly under this location were not investigated Had these boreholes been drilled within the IHSS as planned, sample analysis might have determined whether or not this location was actually where the suspected oil sludge disposal occurred As stated in an earlier comment according to the Historical Release Report (HRR) the location of IHSS 102 is suspected to be approximately 300' north of this location Since the investigation that was conducted did not result in a definitive determination regarding the location of IHSS 102, it is necessary that additional sampling be conducted in the location identified in the HRR Further sampling at the location already investigated would have inconclusive results since this area was completely excavated and then backfilled during construction of the french drain

Sec 4 2 2 page 4 13 pp 3 It is not correct to state that there is no consistent areal or vertical distribution trend for toluene at IHSS 103 In fact an areal trend exists at each

interval with the highest levels present in BH 36791 followed by BH 36891 and BH 36991 A vertical trend is exhibited by peak readings occurring in the 2-6' interval and decreasing with depth The statement must be corrected and the trends discussed in this section

Sec 4 2 4 page 4 18 pp 3 The detections of chlorinated solvents attributed to 38291 for the 14' to 18' interval are false since this piezometer was not sampled below 9 8' The results cited here and shown on Figure 4 29 for this interval are valid for 38191 from which they were somehow mistakenly repeated on the figure for 38291 as well In addition the solvents detected in 38191 are actually from a sample taken one foot below the top of bedrock A close look finds that the only other locations with significant detections of chlorinated solvents (35291 and 38291) are also from bedrock samples In summary the Phase III sampling failed to detect VOCs in any subsurface soils at this IHSS which has the most severe ground water contamination in OU1 Rather than conclude that all VOCs have migrated into the bedrock from deposits above this fact indicates that sampling conducted at this IHSS and probably others does not completely characterize the nature and extent of contamination The mistakes noted above must be corrected in the text and the figure

Sec 4 2 4 page 4 19 The log of 38191 noted that metal shavings were found at a depth of 10' to 11' and stated that they were probably from the drill Although this is a likely explanation under the circumstances it seems prudent to analyze this portion of the core for metals and radionuclides Such an analysis is necessary to remove any doubt concerning the source and composition of these metal shavings

Sec 4 2 7 page 4 26 pp 2 None of the four boreholes that were planned for the vicinity of IHSSs 105 1 and 105 2 were drilled at the locations specified in the work plan due to rig access problems Although three of the boreholes were drilled their locations may not adequately characterize subsurface soils near these IHSSs Either further sampling needs to be conducted closer to these IHSSs or rationale must be presented in this report that can support the adequacy of this portion of the investigation

Sec 4 3 1 pages 4 32 and 4 33 The last two sentences in this subsection are confusing and present circular logic Both sentences must be revised and/or expanded upon so as to clarify the intended message

Sec 4 3 2 page 4 34 pp 1 The suggestion that the 903 pad is the source of the plutonium and americium in surface soils may be correct However in order to further support this theory the concentration isopleths need to be extended to cover the area of

the 903 pad as well as the OU1 area and the radioactive hot spot recently delineated in IHSS 119 1 soils must be explained

Sec 4 5 page 4 36 pp 3 Rather than discuss all the mistakes in this paragraph here are the facts Stations SED037 SED038 and SED039 were sampled in November 1991 and only the data from these three stations are presented in Appendix C4 The next page also has mistakes on the same subject

Sec 4 5 1 page 4 39 pp 3 It is noted here that different grab samples are taken to analyze total and dissolved plutonium and that this is probably why results often show dissolved concentrations as being greater than total concentrations Either this practice must be discontinued or a valid reason to collect separate grab samples for this purpose must be presented

Sec 4 5 3 page 4 42 pp 3 Phenanthrene is incorrectly listed here as one of the SVOCs detected in sediments Fluoranthene was detected and must replace phenanthrene in this sentence

Sec 4 6 page 4-42 pp 4 The ground water monitoring wells that were installed are consistent with the work plan locations however there are eleven locations at which monitoring wells were not installed as specified in the work plan This must be clarified here so that the reader is not given the impression that all monitoring wells called for in the work plan were actually installed

Sec 4 6 2 page 4 46 pp 2 Simply writing off concentrations that are less than an order of magnitude as not indicating contamination is not appropriate The threshold must be consistent with the Background Workplan and Reports A map must also be presented showing radionuclide concentrations in ground water

Sec 4 6 2 page 4 46 pp 3 Several discrepancies were found between the text regarding metals in ground water corresponding tables 4 26 and 4 27 and figures 4 95 and 4 97 These must all be in agreement with each other and consistent with data reported in Appendix C

Sec 4 6 3 page 4 48, pp 1 If radionuclide data for the first quarter of 1992 is available as stated the results need to be presented and discussed here

Sec 4 8 1 2 page 4-56 pp 5 This paragraph discusses metals in surface soils and belongs in the previous subsection 4 8 1 1

Sec 4 8 1 3 page 4 62 pp 5 Radium 226 is stated here as being the only radionuclide detected in ground water that exceeds background This must be verified since it was stated on page 4 46 that there were eight other radionuclides that exceeded

background levels

Sec 4 8 2 1 page 4 65 pp 3 It must be stated here that the extent of VOC contamination both up and down gradient from 119 1 remains very undefined due to the lack of monitoring wells and/or sampling Well 0687 which was destroyed during the french drain construction was downgradient from 119 1 and consistently showed detections of TCE

Sec 4 8 2 1 page 4 66 pp 2 Suggesting that chlorinated solvents in bedrock well 6286 have migrated from OU2 instead of 119 2 which is closer and directly upgradient is not well supported This conclusion is based in part by a lack of subsurface data between 6286 and 119 2 which could be used to make such a determination if it were available This discussion must either be better supported with data or deleted

Sec 4 8 2 2 page 4 66 pp 5 Another possible source for the SVOCs detected in surface soils could have been from past on site incineration Since no source has been positively identified for these contaminants this possible source must also be discussed

Figures 4 21 through 4 26 and 4-40 through 4 48 Due to the fact that IHSSs 104 and 130 are immediately adjacent to each other it seems that it would be logical to combine the figures showing analytical results in subsurface soils for both IHSSs In this way data from nearby boreholes can be more easily related to each other giving a better understanding of the extent of contamination

Figure 4 29 Wells 38291 32791 and 34391 were not sampled in this interval and must be designated NS instead of ND or the values that are incorrectly assigned to them All other boreholes wells and piezometers must be checked to determine whether values or symbols are correct

Figure 4 93 This map is missing at least 4 monitoring wells possibly more and needs to be corrected

Table 4 1 This table contains total and dissolved concentrations for surface water and ground water For a number of analytes the dissolved concentrations exceed total concentrations calling into question the validity of the data For surface water analytes showing such problems are antimony cesium cobalt molybdenum nickel strontium americium plutonium 239/240 tritium and uranium 235 For alluvial ground water the following analytes show greater dissolved concentrations than total concentrations cesium magnesium sodium strontium thallium tin and americium In bedrock ground water cesium radium 226 and uranium 233 234 have the same problem This data must be checked and if the listed concentrations are not typos an explanation must be presented

for each occurrence of this type In addition the background concentrations for mercury in surface water seem to be at a significant level and should also be checked

Tables 4 26 and 4 27 These tables lump together detections from alluvial and bedrock ground water Separate tables are needed to distinguish between detections found in alluvial ground water versus bedrock ground water

Table 4 33 This table does not agree with tables 4 26 and 4 27 regarding concentrations of metals in OU1 for example Se Pb and Ba All the data presented in these tables must be checked and corrected where necessary

Section 5 0 Contaminant Fate and Transport

Sec 5 1 1 2 page 5 5 pp 1 It is not completely clear whether the report is inferring that free phase solvents existed only in the past or also at the present time This statement must be clarified

Sec 5 1 1 2 page 5-5 pp 2 and 3 Due to shortcomings in sections 3 and 4 of this report dispersion of contaminants by ground water cannot be written off as insignificant Presentation of additional data from the french drain monitoring wells and other pertinent wells in the area of 119 1 is necessary to support this statement And although the collection well was designed to capture contaminated ground water no data has been presented that substantiates this Therefore these statements must either be revised better supported or deleted from the report

Sec 5 2 1 2 page 5-26 pp 3 The units for aqueous solubility should be mg/l as shown in table 5 9 not ug/l as listed here for specific compounds

Sec 5 2 2 1 page 5 30 pp 2 This paragraph uses the wrong value for maximum concentration of chlorinated solvents in subsurface soils at 119 1 The correct value is 18 ug/l for carbon tetrachloride In addition are vadose zone soils applicable here?

Sec 5 2 2 1 page 5-31 pp 1 Actually according to Phase III data the only significant detections of chlorinated solvents in boreholes at 119 1 occurred in bedrock The implications of this fact must be discussed in this portion of the report

Sec 5 2 3 page 5 48 pp 5 This paragraph exaggerates the isolation of ground water in the eastern portion of OU1 As shown in the bedrock topography map ground water is found in channels incised into the top of bedrock which are probably only

isolated during periods of low water levels As a result greater consideration must be given to lateral flows of ground water in the eastern areas of OU1

Sec 5 3 1 2 page 5 55 pp 2 Calculations and assumptions presented here conclude that there is no ground water flow beyond a 10 to 20 foot range from 119 1 There is evidence to the contrary in the fact that many of the same contaminants are present in ground water from well 0487 located approximately 100' downgradient Unfortunately this is the only downgradient well that has been sampled, making it difficult to determine the actual extent of contaminant migration in ground water The conclusions presented here must be modified based on all information available including Phase I and II data

Sec 5 3 1 2 page 5 55 pp 3 To support the statement that VOC concentrations tend to increase during low water table conditions the data must be presented in a table This situation did not seem to occur in wells 0974 and 1074 during 1991

Sec 5 3 2 page 5 59 pp 3 Even though the french drain exists ground water flow and transport should be modelled if possible Such modelling would be valuable in evaluating the need for additional collection wells and also to evaluate the need for continued operation of the french drain

Sec 5 3 2 3 pages 5 62 to 63 The confusion regarding sediment stations that were sampled is evident here If data from SED037 SED038 SED039 was not used what was?

Section 6 0 Baseline Risk Assessment

Sec 6 2 3 page 6 6 pp 1 The "minimal uptake of lead" stated here must be quantified

Sec 6 2 3 page 6 6 pp 3 The fourth sentence in this paragraph must be rewritten to make sense to the reader

Sec 6 2 3 page 6 7 pp 3 The South Interceptor Ditch was constructed as a surface water collection system not a wastewater collection system

Section 7 0 Summary and Conclusions

The seventeen site specific objectives outlined in the work plan and listed here have only been partially fulfilled Besides the previous comments and the comments listed below see PRC's comments that summarize the major deficiencies in each of the listed objectives

Sec 7 1 2 page 7 4 pp 3 As mentioned in an earlier comment the core containing metal shavings from drilling piezometer 38191 was not analyzed for metals or radionuclides This must be done if possible

Sec 7 1 3 page 7 7 pp 3 Characterizing radionuclides in sediments was not achieved and is not even discussed in the paragraph allotted to it As is mentioned on page 7 13 this is due to a data gap since virtually no radionuclide analysis was conducted on sediment samples

Appendix A-1

Appendix A 1 page A1 19 pp 4 It is stated here that radiological screening samples were analyzed at a lab (presumably onsite) prior to the shipment of corresponding samples to offsite labs How long did this screening process take and did it result in contributing to the delays in sample analysis that necessitated an extension to this report? Was anything of significance detected by the rad screening? A discussion of these subjects must be added to the document

Appendix A 1 Table A1 2 This table is confusing and does not agree with the text in regards to the actual numbers of monitoring wells <u>installed</u> (26 total) and the number of piezometers required by the work plan (6 total) The table lists the number of holes drilled by category regardless of whether such holes were completed as monitoring wells and gives the false impression that more monitoring wells were installed than were called for in the work plan In fact the net deviation from the work plan for all monitoring wells is 11 and for piezometers 1 This table must be corrected to show these results

Volume XIII Environmental Evaluation (Appendix E)

A DOE unilaterally decided to conduct the environmental evaluation (EE) for OU 1 using methods and procedures inconsistent with the approved final Phase III RFI/RI Environmental Evaluation Work Plan for OU 1 (EE Work Plan) The resulting EE presents unsubstantiated conclusions and the methodology used appears scientifically flawed The following specific comments illustrate these problems

1 <u>Approach.</u> Page E 1 In the second paragraph DOE states that the EE is not intended to prove cause and effect This conflicts with the EE Work Plan Page 6 2 of that document states that "the planned approach is also based to the greatest extent possible on providing objective estimates of ecological damage and establishing a

f_rm causal relationship between contamination and ecological effects"

2 Conceptual Model.

a Page E 16 During the conceptual model development (Task 200 in the EE Work Plan) DOE eliminates exposure via inhalation of contaminants from further consideration A qualitative rationale is provided Fowever Page 6 47 of the EE Work Plan states that where the inhalation pathway is considered to be significant in the case of OU 1 biota a detailed pathways analysis and assessment of potential adverse effects using transport model data will be performed " The radionuclide contamination and beryllium in the surface soils of OU 1 primarily affect ecological receptors via inhalation This pathway was eliminated without justification It must be reconsidered by DOE in the systematic manner outlined in the EE Work Plan

b Page E 21 Again as part of the conceptual model development DOE decided that evaluation of contaminant uptake by plants and animals would be carried out by comparison of tissue samples from OU 1 with samples from areas upgradient of OU 1 and reference areas According to the EE Work Plan contaminant uptake was to be accomplished via a pathways model Page 6 53 of the EE Work Plan states The contamination assessment process will include the development of a site specific pathways model to quantify the potential for contaminant exposure and adverse effects ir biota " Page 6 55 of the same document elaborates on the precise methodology which was to be used to perform the analysis The pathways analysis model (Reagan and Fordham 1991 Thomann 1981) will be used to establish relationships between concentrations of a chemical in different media with concentrations known to cause adverse effects " The fact that DOE did not follow the peer reviewed and approved process for evaluating contaminant uptake raises serious concerns about the results DOE must evaluate contaminant uptake via the pathways model

3 Data Collection.

a Page E 22 The selection of reference areas was supposed to follow a spec_fic procedure using specific criteria developed by the risk assessment technical work_ng group and documented in the EE SOPs DOE made a commitment in the risk assessment technical working group meetings that the selection of reference areas would be fully documented in the RI report (May 21 1991 EE Risk Assessment Technical Working Group meeting minutes) The brief description of the selection of the OU 1 reference area on page E 22 does not adequately demonstrate that selection criteria were

satisfied The conclusions regarding ecosystem health which are based on comparison of data from OU 1 and the reference areas are rebuttable EPA does not support these conclusions DOE must provide the data and analysis to support its choice of reference area If a suitable reference area is not available, DOE must rely on the alternatives outlined in the EE Work Plan to assess ecological health

b The EE and RFI/RI report text indicate that the differences between the Rock Creek reference areas and the OU 1 sites are the result of the semiarid climate and not because the OU 1 sites have been affected by RFP operations or releases These differences however also indicate that the reference sites are not well suited for comparison with OU 1 For example an intermittent stream (Rock Creek) will not have the same community structure as a perennial stream (Woman Creek) and a comparison of the two assumes a similarity that does not exist Similarly, comparing a vegetative community growing on undisturbed soils with one growing on extremely compacted soils is inappropriate The use of reference areas should not be relied on exclusively to determine impact on the OU 1 communities During the discussions leading to the OU 1 EE the possibility that the two areas may not be suitable for comparison was identified and alternative analyses were recognized as likely to be required A decision must be agreed upon as to which alternative will be utilized for the EE

4 Data Evaluations.

a Page E 30 DOE s application of the selection criteria for contaminants of concern ignores organic compounds particularly PAHs and polychlorinated biphenyls (PCBs) These compounds were found in surficial soil samples and are likely to affect OU 1 biota especially those organisms living in close contact with the soil surface or burrowing beneath it DOE must perform this analysis again using all available data

b Page E 31 DOE used a two step screening process to identify ecological contaminants of concern This conflicts with (1) the process described on page 6 37 in the EE Work Plan (2) the selection criteria developed by the risk assessment technical working group, and (3) commitments made by DOE The concept of second screen is not mentioned in the EE Work Plan, nor was it discussed at the numerous technical meetings between DOE and the regulatory agencies On the contrary DOE stated that subsequent phases of data would be screened using the same COC selection criteria (September 5 1991 EE Risk Assessment Technical Working Group meeting minutes) As a result of the second screen

all COCs with the exception of chromium lead mercury and zinc were inappropriately excluded

The appropriate method of identifying the contaminants of concern and assessing the associated risks is detailed in Section 6 2 4 of the EE Work Plan and EPA guidelines contained in "Framework for Ecological Risk Assessment " DOE should have used the criteria developed by the risk assessment technical working group to identify the COCs then completed a toxicity assessment and exposure assessment for each The exposure assessment should have taken into account effects from direct exposure and bioaccumulation effects as appropriate This necessarily requires determination of exposure points exposure point concentrations frequency and duration of exposure and use of the pathways model The actual and potential risks to Rocky Flats specific ecological receptors should have been determined for each COC

The second screen which relied heavily on comparisons to twofold background concentrations provided some dubious results The comparison to Background must be as defined within the approved Background Work Plan and Reports For example

i The radionuclides were excluded from further consideration based on background concentrations (Figure E4 1 1) However the surficial soils Phase III data shows that plutonium and americium were detected above background concentrations The mean plutonium concentration of 2 6 pCi/g is 52 times the background concentration The mean americium concentration of 0 4354 pCi/g is 22 times the background concentration Not only was the second screen undertaken unilaterally and inappropriately by DOE it appears that it was not conducted correctly

ii The results of the background comparisons done as part of the initial COC screening conflict with the results of the background comparisons done for the human health risk assessment COC selection DOE states that aluminum arsenic beryllium cadmium, chromium copper iron lead manganese mercury silver zinc and cyanide are present above background concentrations in OU 1 The data contained in Volume I support this Yet in Volume XIV the Public Health Evaluation DOE eliminates these contaminants from consideration based on a comparison to background The same abiotic data should have been used for both comparisons This conflict raises serious doubts about the credibility of either conclusion

iii The screening criterion of twofold background concentrations is unacceptable to EPA The criterion agreed upon was a comparison to background as defined in the Background Report not twice background

iv On page E 31 DOE indicates that Phase III sediment and groundwater data were not considered in the selection of COCs Yet contaminants which were initially identified as COCs based partly or wholly on sediment data were eliminated from further consideration in the second screen These contaminants are aluminum beryllium copper, manganese and silver DOE must conduct the selection of COCs again this time considering all available data

5 Exposure Assessment.

a Throughout the EE protocol development special status species were identified as a concern On page E 14 Preble s Meadow Jumping Mouse is described as a resident of OU 1 riparian habitat Subsequent discussions of impacts, however do not discuss this animal or potential effects on it as a result of OU 1 operation or OU 1 cleanup These discussions should be added to the text

b Toxicity tests were conducted on Woman Creek water as part of the surface water exposure assessment Protocols for these tests were briefly described in Section E3 3 2 but data quality objectives were not defined The text referred the reader to Peltier and Weber (1985) for protocols It is not clear from the results if the protocols were followed whether control tests were run concurrently or whether the results of any control tests indicated other sources of stress In addition it is not clear whether alkalinity and hardness were measured before or after the water sample was split and if those parameters were assumed to be the same for the *Ceriodaphnia* sp studies and the fathead minnow studies Furthermore the measured pH for several pairs of studies varies considerably Finally the number of deaths considered "significant" is not defined and the lack of control sample information leads to the questionable assumption that any deaths resulted from toxic constituents in the water More information must be provided to make the results of these studies usable

c Section E4 2 1 contains subsections on the geochemistry of chromium mercury lead and zinc without references to the scientific literature or quantitative discussions of the Eh and pH conditions

that exist in the soil and water at OU 1 For this section to be credible such information must be added to the discussion In addition the discussion should concentrate on the effects the low organic carbon containing soils and the oxidizing and alkaline conditions found at OU 1 will have on element fate and transport

6 Toxicity Assessment.

a Page E 38 The evaluation of ecological risks at OU 1 using the Hazard Quotient (HQ) methodology is inconsistent with the methodology established on page 6 42 of the EE Work Plan As indicated in that document The primary element used in the assessment of environmental effects or risk is a set of environmental criteria to which measured and or predicted concentrations of hazardous constituents in abiotic media are compared" Development of this criteria was to be based on the results of the pathways model (never completed by DOE) as well as available data which document potential adverse effects from COCs on key biological receptors The HQ method is based on Toxicity Reference Values (TRVs) and Final Reference Values (FRVs) described in the draft final RFI/RI Report for OU 1 The method of deriving these values is inconsistent with Figure 6 5 in the EE Work Plan For example the remediation criteria as described in the Work Plan is based on the lowest of ARAR values values based on protection from direct effects and values based on the pathways analysis DOE's TRVs are based on ARARs when available without any consideration of whether they are protective as determined by a site specific risk assessment DOE s FRVs are based on the highest of TRVs or RFP background To compound this problem no reference is provided for the TRVs for the radionuclides It is impossible to verify DOE's conclusions. It is EPA's position that this analysis should be re done according to the methods outlined in the approved OU 1 Work Plan

b Page E-42 DOE's statement that because of naturally occurring high concentrations of metals, the background concentration is an approximation of the NOAEL is completely unsubstantiated It is EPA's position that DOE must adhere to the methodology outlined in the EE Work Plan to generate ecologically protective abiotic criteria

7 U.S. Fish and Wildlife Service Concerns By letter dated December 2 1992 the U S Fish and Wildlife Service provided technical comments to EPA on the OU 1 Environmental

Evaluation A copy of these comments was also forwarded to DOE EPA believes that the majority of the cited concerns resulted from DOE's decision to diverge from the approved approach to conducting the EE We believe that the comments can and must be adequately addressed by strict adherence to the approved EE Work Plan COC selection criteria target taxa selection criteria and EE SOPs Frequent communication among the participants in the risk assessment technical working group is also essential

B While the preceding comments address the problems associated with the evaluation framework the following comments indicate inaccuracies and technical deficiencies which also must be addressed by DOE

1 Page E 53, Third Paragraph This paragraph discusses the presence of trace elements in soil and water at OU 1 and states that elevated values are most likely outliers relative to background levels This statement must be supported by comparison to the Background Report or removed from this paragraph

2 Page E 55, Second Paragraph This paragraph states that, at alkaline pH values in OU 1 soils the solid chromium (III) hydroxide is stable However Figures 5 11a and 5-11b show that the subsurface soils at OU 1 are highly oxidized In addition the Eh pH diagrams presented by Richard and Bourg (1991) indicate that hexavalent chromium (VI) may be stable under such conditions The discussion of hexavalent chromium stability should be expanded to include this information

4 Table E4 2 3 The RFP background values for site MA01A species POC01 (sample BI00289EB) and site MA02A species ME0F1 (sample BI00311EB) do not correspond to background concentrations listed for vegetation in Table E4 2 2 The values in Table E4 2 2 should be checked for accuracy and revised as necessary

5 Table E4.2 3 This table presents duplicate analytical results for several metals from sites MG02A and MG03A These duplicate data are not presented in the raw data listing for metals in Attachment E B Duplicate data should be presented in the raw data tables

6 Figure 3.7 1 This figure associates hazard quotient values with relative levels of risk However no reference is provided to support these associations The source for these risk determinations should be identified

7 Attachment E.B Undefined data qualifiers are used throughout this attachment Definitions should be provided

for all information provided

Volume XIV Public Health Evaluation (Appendix F)

CHAPTER 2 IDENTIFICATION OF CONTAMINANTS OF CONCERN (COCS)

General

The purpose of Chapter 2 was to identify those contaminants at OU 1 that are of concern to human health (i e contaminants that are present in a high enough concentration and in a pathway which is accessible which could potentially cause adverse health effects) Typically this involves evaluation of the quality of the data collected with respect to analytical methods sample quantitation limits, data qualifiers blanks and comparison with background concentrations to identify COCs for use in the risk assessment If appropriate a screening method is used to limit the number of COCs to be quantitatively evaluated in the risk assessment This COC selection process was initially outlined by DOE in Tech Memo #8

My primary concern with Chapter 2 was that EPA's and CDH's previous comments on Tech Memo #8 were not taken into consideration In general, these were the exclusion of probable pathways (and hence potential COCs) and the screening method used to eliminate COC's from further consideration Specifically

Site specific Data to Derive COC List

Presently the COC list is for ingestion of surface soil contaminants and volatilization from groundwater to basements This list must be expanded to include volatilization from subsurface soil to basements and ingestion of groundwater

Hot Spot Delineation

In comments to Tech Memo #8 EPA and CDH had suggested using the minimum value instead of the central tendency to determine if a hot spot existed This suggestion was not considered in Chapter 2

Background

EPA's/CDH's response to Tech Memo #8 commented on the appropriateness of the statistical test used to differentiate chemical concentrations from background None of these suggestions were incorporated into Chapter 2

Also EPA/CDH had requested information on mean, standard

deviation etc to evaluate chemical concentrations from background concentrations A lot of statistics were provided in Section F1 however no chemical names identified what was what

Although the document discusses the use of literature values and "background" sampling from Rock Creek Drainage to delineate COC concentrations from background levels it is not clear which method was eventually used The Rock Creek drainage area where background" samples were taken is located on the Rocky Flats Site There are serious concerns about the appropriateness of this location for the use of background sampling

Toxicity Screen

Table 2 4 in Tech Memo 8 compares ground water concentrations (ug/l) with inhalation reference concentrations (mg/cu m) to derive a risk factor The comparison must be made only on a similar basis (i e ppm mg/kg etc) To compare the chemical concentration in the water the amount which will volatilize must be calculated first

The slope factor for Benzo[a]pyrene and consequently the remaining PAH's is incorrect in Section F 1 The correct oral slope factor for B[a]P is 7 3 (mg/kg/day)^{1}

The COC screen must allow for the inclusion of Class A carcinogens in the COC list regardless of toxicity or concentration

CHAPTER 3 EXPOSURE ASSESSMENT

General

The purpose of the exposure chapter was to define the exposure setting identify the exposure pathways, and quantify exposure The first two objectives were met however the third objective was poorly attempted in a manner which was confusing, convoluted and haphazard Intake calculations are a function of contaminant concentration in the media intake rates body weight and time dependent variables The intake rates body weights and time dependent variables for each pathway (except groundwater ingestion) were presented in Attachment F-4 "Receptor Intake Calculations" Instead of being relegated to an attachment this information should have been part of the exposure chapter At the very least this information must be better referenced in Chapter 3

The value used in the intake equations for exposure point concentration (chemical concentration) is perhaps the most important component of exposure This chapter however failed

to adequately describe how this value would be obtained For example how was an exposure point concentration obtained for ingestion of surface soil? Was the 95th percent upper confidence limit of the arithmetic mean used as specified in "Supplemental Guidance to RAGS Calculating the Concentration Term (EPA Publication 9285 7 08I 1992)? If kreiging was used as suggested in Attachment F3 3 "Model Application" this must be more clearly stated in Chapter 3

A lot of time was spent in chapter 3 discussing the soil gas models and air models to be used and their uncertainty analysis This is interesting information but does not necessarily belong here A detailed description of the models used belongs in an attachment (such as F3 3) and any discussion of uncertainty analysis belongs in chapter 5 The exposure chapter should restrict itself to discussing how an exposure point concentration was obtained for each pathway to include soil and groundwater ingestion If models are used to derive an exposure point concentration (i e airborne particulates volatilization of VOC s from soil and groundwater to basements and ingestion of homegrown produce) a short description of the model must be provided and the RME and/or typical inputs to the model must be listed to show how a concentration value was obtained DOE must go back even one step further and list the concentration data and sampling locations which would go into the exposure point concentration terms

Soil Gas Calculations

Calculation of risk from volatilization of VOC's into basements should include the subsurface soil as a source as well as the groundwater In addition the exposure chapter must discuss RME and/or typical inputs to the soil gas model only Any references to quantitative uncertainty analysis (F3 38 to F3 43) must be removed from this chapter and relegated to Chapter 5 Uncertainty Analysis

Site conceptual Model

It is unclear from the site conceptual model on page F3 15 if soil ingestion to current on site workers and future on site residents is to be calculated as a direct exposure without modelling fate and transport This must be clarified

Groundwater Pathways

The ingestion of groundwater must be evaluated as a pathway of exposure to future residents If MCL's and/or health based standards are to be met for the groundwater then leaching of soil contaminants to ground water must be evaluated This chapter must include a discussion of the model to be used to evaluate the leaching process

which have compared calculations based on the RfD approach with actual animal or human data have found that the 10 fold uncertainty factors did not account for all of the inter and intra species variability resulting from exposure to a chemical [Dourson and Stara Reg Tox Pharm 3 (1983) Hattis et al Risk Anal 7 4 (1987)] EPA's RfD approach more accurately represents an upper bound estimate of toxicity The document must be changed to reflect these findings

Page F4 23 attempts to convert the inhalation Reference Concentration for Methylene Chloride to a Reference Dose by a route to route extrapolation This is inappropriate and must be removed from the text Route to route extrapolations must not be attempted for chemicals which exhibit portal of entry effects In the case of dichloromethane this is manifested as upper respiratory tract irritation The situations under which route to route extrapolation can or cannot be attempted are outlined in EPA's 1990 "Interim Methods for Development of Inhalation Reference Concentrations" Furthermore the inhalation Reference Concentration for dichloromethane was based on extensive pharmacokinetic modelling Simplified attempts to convert this Reference Concentration to a Reference Dose without the chemical specific pharmacokinetic information would result in a meaningless number

CHAPTER 5 and ATTACHMENT F 7 - UNCERTAINTY ANALYSIS

General

This is without a doubt the most controversial section of this document DOE EPA and CDH agree that Monte Carlo analysis can be of value to a risk manager when evaluating the extent of uncertainty involved with a risk assessment however the agreement appears to end there DOE believes that probabilistic analysis should be applied to the toxicity assessment whereas EPA/CDH do not No agreement has been reached on the central tendency values or the shape of the distribution curves for each exposure equation parameter Finally no agreement has been reached on the ultimate use of the Monte Carlo analysis In the time span available to us it is unlikely that agreement can be reached For these reasons it would be best to remove any statements regarding uncertainty analysis from the Toxicity Exposure and Risk Characterization Chapters and restrict them to the Uncertainty Chapter Specific comments are as follows

Page F5 2 Table F5 1 states that the likelihood of a future on site resident is improbable and that this would overestimate risk This is a risk management decision and does not belong in this document

Page F5 4 5 states that Attachment F4 presents the results of the estimated variation in the observed contaminant concentrations Please identify where in Attachment F4 this information is located

Page F5 7 discusses the application of uncertainty analysis to the toxicity assessment The results show that the MLE is an unstable quantity therefore the 95th percentile value must be used

Page 5-15 states that "the RME value commonly lies above the 95th percentile" After reviewing the "inputs" used for the Monte Carlo analysis in Attachment F 7 it is not difficult to understand why The inputs chronically underestimate the exposure parameters in the numerator of the exposure equations and overestimate the parameters in the denominator At other Superfund sites where Monte Carlo analysis has been applied we have found that the RME either approximates the 95th percentile or is less than the 95th percentile Comments on the individual parameters

1) Body Weight

This input only uses adult males in it's estimate of body weight This serves to increase the denominator of the exposure calculations Adult females must also be in the estimate A mean of 72 kg instead of 77 kg is more appropriate

2) Inhalation rates

The EPA Exposure Factors handbook (1991) identifies 20 cu m /day as the <u>average</u> breathing rate of an adult resident, not the highest weekly inhalation rate" Assuming a normal distribution with a standard deviation of 6 cu m /day, this would yield a 95th percentile estimate of 30 cu m /day The value of 12 9 cu m /day identified in Attachment F 7 is incorrect and must be changed to 20 cu m /day

3) Averaging Time

Averaging time is different for carcinogens and non carcinogens however this is not differentiated in Attachment F 7 Averaging time must be set equal to exposure duration for non carcinogens For example if the average exposure duration was 12 years then the averaging time should be 12 years also not 75 Also in each iteration of the Monte Carlo simulation the averaging time for non carcinogens should be equal to the value selected for the probability distribution function for duration This ensures that the ratio of exposure duration to non cancer averaging time is always 1 1 regardless of the value selected for duration

CHAPTER 6 - RISK CHARACTERIZATION

General

The risk characterization chapter requires extensive revision It contains very little useful information on the RME risk and contains speculative statements regarding the RME approach which are supported by incorrectly manipulated data This section must contain risks calculated by the RME methodology only Specifically it must (1) list carcinogenic risks and Hazard Indices (HI's) for each pathway within an exposure scenario (2) which chemicals are the drivers for that pathway and (3) combine pathways to show total risk within each exposure scenario For the non carcinogens the total HIs must be presented first Segregation of HI's exceeding 1 0 is appropriate however it must be presented in a separate table after the total HI's are shown

The quantitative analysis results must be removed from this chapter and restricted to the uncertainty chapter The risk manager should have a clear picture of the risk to a reasonably maximum exposed individual before he can evaluate the extent of the uncertainty in that picture A suggestion would be to place the risk characterization information (as described in the first paragraph without uncertainty information) in Chapter 5 and the uncertainty information in Chapter 6 Information pertaining to the voracity of the methodology used to derive EPA toxicity values background cancer risks comparisons to occupational standards and the toxicity of radionuclides at low doses must also be removed from the risk characterization chapter and placed in the uncertainty chapter

Additional Comments

When the HI exceeds 1 0 it is appropriate to segregate the contaminants by effect and/or mechanism of action According to RAGS Part A (EPA 1989) "Segregation of HIs requires identification of the major effects of each chemical including those seen at higher doses than the critical effect This was not done in the OU 1 risk characterization Chapter 6 identified only one adverse effect for each non-carcinogen presumably the critical effect used to establish the RfD This is not appropriate For example if the adverse effect used to establish the Rfd for a chemical is hepatotoxicity yet the chemical is also neurotoxic and nephrotoxic all of the effects should be evaluated when segregating the HI According to RAGS Part A (EPA 1989) "Although higher exposure levels may be required to produce adverse health effects other than the critical effect the RfD can be used as the toxicity value for each effect category" Attached is guidance from the Superfund Technical Support Center providing additional clarification on

how to segregate HIs greater than 1 0

The final statement on page F 25 suggesting that the RME approach is too uncertain to base regulatory decisions on is irresponsible and speculative This statement must be removed from the document

FCD January 27, 1993 OU1RICOM GRK