Colorado Department of Health

Review and Comment

Draft Phase III RFI/RI Report for OU 1
October 1992

General Comments

1 DOE should carefully read the requirements in Sections VI B 2 and VII of the IAG Statement of Work (SOW) for RFI/RI Reports Each requirement in these sections should be specifically satisfied in the OU 1 Phase III RFI/RI Report While existing data collected during all phases of the OU 1 investigation should support these IAG requirements DOE and its contractors have not completely interpreted or utilized the data as many of the following comments describe As such the IAG requirements have not been fulfilled Therefore until this occurs this report will not comply with IAG stipulations for RFI/RI Reports will be unable to support a remedy decision and will not be approved

2 Section 3 of the report draws some very tenuous conclusions which are generally not supported elsewhere in the section Since Section 3 is the basis for much of the report remainder untenable conclusions are perpetuated and problems become amplified as more and more interpretation depends on original concepts It is vital that this section present only technically sound and supportable conclusions and that remaining data or interpretational gaps be properly identified Internal inconsistencies within this section must be resolved

3 Section 4 of the report does not define the extent of contamination There are no maps which make any effort to delineate plumes in the ground water and no maps which estimate the extent of soil contamination (except Pu/Am in surface soils) This must be done Basing a CMS/FS on the maps included in this version of the Report is not possible

4 Section 5 of the report compares the fate and transport of contaminants in the field only to theoretical mechanisms The report makes little or no effort to 1) compare what is seen today with what the theoretical mechanisms would predict and 2) adjust the theoretical mechanisms to accurately portray the present so that additional confidence can be applied to the future

5 Section 6 of the report and its supporting text in Volume XIV (Appendix F) do not present the human health risk assessment in a manner consistent with Division or EPA guidance (provided in both written and verbal form on several occasions) Critical assumptions and calculations leading to the final risk characterization are very difficult to follow, do not present dependent data and in some cases are incorrect

6 As is detailed in the following comments geology stratigraphy hydrology, etc should be done both on an OU-wide scale and on an IHSS-specific or IHSS group-specific scale Those IHSSs needing specific treatment are 119 1 and 119 2, those that can be grouped are 1) 130, 104, and 103 and 2) all IHSSs south of Bldg 881

7 In general this report does a poor job of incorporating data from the Phase I and II RFI/RIs Many of the older wells and boreholes are not spotted on maps nor is relevant information and data included We can only conclude from this that the geologic hydrologic and contaminant information these wells provided was not utilized In addition information from the previous geophysical surveys and soil gas survey was apparently not incorporated into this report

8 None of the data for the French Drain monitoring wells centerline borings or the water extraction well in IHSS 119 1 has been incorporated into the Report This is very important data and needs to be used On the other hand as the purpose of this report is to characterize **baseline** conditions, any reference to the effect of the French Drain on hydrology pathway mitigation contaminant migration etc should be removed from the text

9 The Division urges DOE to undertake a complete and thorough search of available vertical and oblique aerial photos of the 881 Hillside area for incorporation into the final version of this report Many questions as to IHSS location size, and existence remain Until these questions are answered, remedy selection is impossible It is our understanding that a significant number of historical oblique photos have recently been located by those implementing the OU 5 RFI/RI Workplan These photos could be used as a possible starting point

10 Many of the OU 1 area-wide maps included in this report particularly those with a lot of data included are of too small a scale to be effectively used These maps should either be expanded to a larger scale or segmented into several maps

11 Many figures and appendices are never cross-referenced within the document This needs to be done Even those that are referenced could benefit from expanded treatment in the text

12 Major subdivisions within the appendices need to have tabbed

divisions for easier reference

Specific Comments

Executive Summary, page xviii Many statements are made in the third paragraph on this page that are obviously not supported by the body of the report These statements include 1) ground water in OU 1 considered 'sparse", 2) recharge considered "depression-focused" 3) "large portions of the upper HSU are dry ", and 4) ground water flow contained laterally by bedrock limiting continuous ground water flow pathways to Woman Creek Either data or interpretations of data in Sections 3 and 4 of the report contradict these statements and they must, therefore, be corrected

Executive Summary, page xix The second paragraph on this page strongly implies that only three areas were identified that have been impacted by contamination This is not the case Contamination was found at various locations in the OU, a fact clarified in subsequent portions of both the Executive Summary and the report The wording in question needs to be modified

Executive Summary, page xx. The last sentence in the third paragraph and the first sentence in the last paragraph appear to contradict one another If the risk to future on-site residents was 'slightly elevated," it had to be measurable and have an impact Please clarify this discrepancy

The last sentence on this page is incorrect Assuming that the cited value of increased cancer risk from OU 1 is correct at 4 x 10^{-5} calculation of this value has already considered the restricted distribution and low quantities of the contaminants involved Therefore to state that the risks are "further reduced" is misleading and wrong In fact, when the risk of the hot-spots is calculated in Appendix F the risk is shown to be substantially higher

Executive Summary, page xxi Given that the exposure scenarios included in the risk assessment are not satisfactory to the Division we want to point out to DOE that we (the State) are not limited by the NCP "risk range " OU 1 is both a CERCLA site and a RCRA site Therefore, both the Division and EPA will determine the remedial or risk management criteria which will govern OU 1

We note, significantly, that non-carcinogenic risks are not discussed anywhere in the Executive Summary

It is not the role of the RFI/RI Report to direct how risk management decisions should be made The report should only present an accurate and complete risk assessment of each potential credible land use Discussions on the relative merits of different

future land-use scenarios and their effects one on another are premature and irrelevant Therefore the last paragraph should be deleted

Section 1 2 2 1 From the text of this section and from Figures 1-2 and 2-1 it is clear that IHSS 102 has not been investigated Please clarify for the Division what DOE plans to do to investigate this site

Section 1 2.2.4. The text implies that these two tanks lie side by side in an east-west direction However Figure 1-2 shows the IHSSs oriented end to end in a north-south direction Please clarify this discrepancy

Section 1 2 2 7 From aerial photo interpretations done previously for these two IHSSs, is it possible to delineate areas of scrap metal storage from areas of drum storage? If so, please indicate the different uses on Figure 1-2 (Also see general comment 8 above)

Section 3 2 1 The last paragraph of this section states that future uses of the OU 1 area will be limited From the context, we assume that this is because of the geologic instability of the hillside material The Division would like to point out that many areas in the Denver-metro area presented identical problems before they were developed These types of problems are not insurmountable

Section 3 7 Text within this section states that "shallow water bearing units at OU 1 do not contain the quantity of water necessary to sustain even low-volume use nor do they possess physical characteristics required for substantial ground water movement or efficient ground water extraction Therefore water-bearing units at OU 1 cannot be economically exploited and are not aquifers " The Division does not believe that remainder of the section verifies these statements Regarding water volume Figures 3-29 and 3-44 both show an extensive saturated area within OU 1 and Section 3 7 3 4 states that the volume of ground water in OU 1 could if replenished each year support 9 to 18 households As to the physical characteristics of the alluvial materials, the high rate of ground water influx into the French Drain during construction certainly contradicts low transmissivity In addition, comparing Figure 2-9 with Figures 3-29 and 3-44 reveals that less than half of the 13 well tests conducted in OU 1 occurred in the extensively saturated areas

Section 3 7 3 2 The text states that only a limited amount of ground water in the upper HSU actually reaches Woman Creek The text further states that this conclusion is based on the limited amount of ground water recharge, high evapotranspiration rates,

discharge boundaries and physical barriers to flow The Division has several problems with these statements 1) Ground water recharge is not understood well enough to be labelled "limited " Obviously in the western portion of OU 1 recharge is not limited Even in the eastern portions of the OU the "ponded" areas must be receiving recharge from some as yet uncharacterized source 2) The only discharge boundary in OU 1 is Woman Creek itself (the French Drain cannot be considered since it does not represent "baseline" conditions) The seeps do not constitute discharge boundaries since the water is probably reinfiltrating 3) The only documented physical barriers to flow are bedrock ridges which parallel the ground water flow direction but do not block it 4) This report never quantifies evapotranspiration

The Division is confused about the perched" terminology used in this section and others throughout the report As depicted in this report the areas in question are not perched in the classic sense They are simply ponded areas of saturation within an otherwise unsaturated aquifer The fact that they overlie lower permeability bedrock is no different than other areas of alluvial ground water at Rocky Flats The Division does not believe that sufficient geological interpretation has been done on these ponded areas to determine the "ponding" mechanism Furthermore until the mechanism is understood, pathway evaluation is impossible

Section 3 7 3 4. This section of text is pure speculation and its inclusion in this report is inappropriate The water quantity calculations presented are by DOE's own admission only rough estimates Though the agencies have repeatedly asked for one DOE has consistently avoided constructing a ground water model and/or water budget for the 881 Hillside Until a model or budget is constructed speculative estimates such as those included in this section do nothing to further characterize the physical characteristics of the site and should be deleted

To state that the concepts presented in this section were confirmed by the Colorado State Engineer is an obviously biased distortion of the truth The comments from the State Engineer's office were written by an individual who was totally unfamiliar with the Rocky Flats Plant and the latest interpretation of plant-site geology This individual stated within his comments that they were specific to Appendix B of TM 6 only Subsequently, both EPA and the Division disapproved this version of TM 6 In addition the comments from the State Engineer were requested by DOE under Natural Resource Trustee auspices The Trustees have a completely different set of priorities and commenting criteria than what the IAG requires (even though TM 6 was prepared for IAG purposes) The Natural Resource Trustees are commenting on these early IAG documents as a courtesy to DOE in hopes that resource damage can be minimized by early cooperation This relationship is voluntary from the Trustees perspective and if this relationship is used by DOE for other purposes, termination could result For these

reasons, reference to the State Engineer's comments on TM 6 should be deleted from this report and Van Slyke 1992 should be removed from the bibliography

Section 3 7 3 8 This section makes several predictions about the performance of the French Drain which are inappropriate at this time The RFI/RI Report must evaluate "baseline" conditions which do not include the installation of the French Drain In addition until French Drain performance is evaluated DOE must wait to draw conclusions on its effectiveness

Section 3.7 4 The Division has the following concerns with the conclusions presented in this section

1) The values calculated in Section 3 7 3 4 for the ground water flow velocity do not indicate particularly slow or non-existent ground water movement If ground water is expected to move slowly or not at all why does recharge in the Spring occur so rapidly (ie why do water levels rise so rapidly)? In addition, how can the hypothesized ground water from OU 2 travel so rapidly into the OU 1 area?
2) Ground water saturation may be variable but it is not "sparse " "Stranded" ground water has not been sufficiently characterized to conclude that it is confined to bedrock depressions In fact, if it is confined, it could very easily also be confined by stratigraphic and lithologic changes in the alluvium
3) The hydrology of the eastern portion of the OU is not sufficiently characterized to conclude that there are no flow paths for ground water from the IHSSs to Woman Creek
4) The western portion of OU 1 has not been sufficiently characterized to conclude that the only source of the ground water in this area is the Building 881 footing drain
5) Post-French Drain characterization is not sufficient to conclude that the volume of ground water in the upper HSU has diminished
6) Post-French Drain characterization is not sufficient to conclude that the French Drain and the extraction well intercept all identified ground water flow paths north of the South Interceptor Ditch

Figures 3-11 through 3-17 Concerning particularly the topographical dip sections included in these figures the Division does not believe that the lithologic contacts for the various unit should be horizontal Please change this interpretation on the appropriate sections

Figures 3-28, 3-29, and 3-44 Both the January 1992, and April, 1992, head maps included on these figures become vague in the northern portions of OU 1 Large "dry" areas appear where there is no data to either substantiate or refute that assumption Surely a site-wide head map exists that would aid in the evaluation of the northern OU 1 margins These areas are critical to the

substantiation in other portions of the text that limited recharge occurs from higher on the hillside in the eastern portions of OU 1 and the stated conclusion that no complete ground water pathways exist

Figure 3-27 Please add the IHSS boundaries to this figure

Section 4 0 General Comments

1 This section of the Report does not define the extent of contamination There are no maps which make any effort to delineate plumes in the ground water and no maps which estimate the extent of soil contamination This must be done Maps with flags of contaminant detections are not sufficient Section VI of the IAG SOW requires that DOE define the boundaries of the contaminant sources both from a horizontal and vertical perspective

2 There is no map included in this section that delineates the results of radionuclide analyses in ground water Even if all measurements are non-detect, such a map needs to be developed

3 No bedrock work has been included in this section even though bedrock contamination is indicated in wells 37891 37991 and 39191 Please include contaminant-extent maps for the bedrock

4 All wells, piezometers, and boreholes from all phases of RFI/RI investigation should be shown on all maps (including the IHSS-specific maps) in this section

5 Please include in Appendix A copies of the geologic logs and wellbore diagrams for all wells and boreholes in OU 1, not just the wells and boreholes drilled for the Phase III RFI/RI (include the same information as already is contained in Appendix A for the Phase III wells and boreholes) This would include the boreholes drilled along the centerline of the French Drain prior to its construction In addition while it is not necessary to include all previous analytical data from previous phases in appropriate appendices in this report all maps in this section should include potential contamination information from previous investigations

6 If Tables 4-7 through 4-15 do not include data from the Phase I and Phase II investigations, the previous data should be incorporated

7 Please clarify near the beginning of this section exactly how the term "background" is being used When a sample exceeds "background", we need to know whether it exceeds the mean background value or the upper tolerance level We also need to know the source of the background data used (The discussion on the top of page 4-7 seems to be confined only to surface soil sample analytical comparisons) The Division does not consider the

contaminated/noncontaminated threshold to be an exceedance of background by an order of magnitude Our threshold for naturally occurring constituents is the mean background plus two standard deviations which is approximately equal to DOE's upper tolerance level representing 95% of the data Our threshold for non-naturally occurring constituents is non-detection with appropriate detection limits

8 Clarification needs to be added to all applicable figures in Section 4 0 regarding the use of NS' and "ND" Subdivisions of each of these designations should be developed which more accurately describe possible situations NS should include at least

NS1 - Not sampled in accordance with Workplan
NS2 - Not sampled, deviation from Workplan
NS3 - Interval not sampled due to off-normal sample interval
NS4 - Interval sampled, no analytical results
NS5 - Not sampled due to dry conditions
NDE - Not sampled because well or borehole is not deep enough

ND should include, at least

ND1 - Included in sample analysis but not detected
ND2 - Not included in sample analysis, therefore not detected

In addition related to general comment 7 above please clarify "NE" relating to mean background upper tolerance level background or "background plus one order of magnitude "

9 Section 5 9 4 (page 5-23) of EPA's Risk Assessment Guidance for Superfund (RAGS) delineates the correct method of evaluating essential nutrients The Division does not believe that the text presented on page 4-4 of the RFI/RI Report satisfies the RAGS methodology referenced above Therefore until better background values are formulated or the affected elements found in OU 1 can be demonstrated to be present at levels that are not associated with adverse health effects, elements considered nutrients or common rock-forming constituents may not be eliminated from consideration as potential contaminants

Section 4 2 1 IHSS 102 The Division is concerned about the remaining discrepancies regarding the location of IHSS 102 Part of this investigation should have been to research available information, make a decision regarding the most likely location and dimensions for the IHSS, and design an investigation It appears that this was not accomplished and that the proper location for the site was not investigated For this reason Section 4 2 1 of the text seems meaningless A discussion of contamination at the wrong location only indicates a problem from a different source

Section 4.2 2. IHSS 103 This IHSS is also plagued by discrepancies as to its location and/or existence The text states that 1963 aerial photos show a pit in the area now known as IHSS 103 However the Historical Release Report (HRR) questions the existence of the site and did not include it on the IHSS maps for the 800 Area What is going on? Is the IHSS located correctly to investigate the pit seen on aerial photos? Is the information presented in this section of the text meaningful?

Section 4.2 3 IHSS 104 Once again there are discrepancies with the location and/or existence of IHSS 104 The text states that a discolored area can be seen on 1965 aerial photos but states that there is a possible shadow What is the source of the shadow? Is the discoloration on the photo consistent with a shadow? The text further states that the waste disposal attributed to this site may have actually occurred in IHSS 103 However given what we know (or do not know) about IHSS 103 the Division questions this statement Resolution of these and related issues is required for the Final RFI/RI Report

Section 4.2 4 IHSS 119 1

1 As an example of general comment 4 to Section 4 above, at least the following wells and boreholes should be added to Figures 4-27 through 4-32

Boreholes	Wells	Fr. Drain BHs
BH0887	Well 0487	FD300290
BH0987	0587	300390
BH1087	0687	300490
BH1287	0687A	300590
BH1487	0787A	300690
BH2287	4387	300790
BH2587	4987	300890
BH4787	0974	300990
BH4887	1074	301090
BH5087	Pz 39291	303790
BH5587A	Pz 38891	303890
BH6187	Pz 38991	303990
BH35791		
BH37191		

These are needed because the geologic and hydrologic boundaries are not congruent with the IHSS boundaries To characterize the extent and potential pathways of contamination, all vicinity wells and boreholes should be considered To further emphasize this, the text explains that, in the Phase II investigation six boreholes were drilled in and around the unit These boreholes apparently picked up significant contamination at depths up to 20 feet and in weathered bedrock Unless this analytical contaminant information is incorporated into the Phase III RFI/RI Report, a complete an accurate representation of the

extent of contamination is impossible

2 The presentations on Figures 4-27 through 4-32 are very hard to interpret For instance, on Figure 4-28 BH33091 lists analysis results for the 6-10 foot interval but does not list any data for the 2-6 foot interval Checking Appendix C reveals that the 2-6 foot interval was not sampled Why not? BH34991 has no results listed for the 6-10 foot interval even though it was drilled to 16 3 feet Checking Appendix C reveals that this occurred because the sampling intervals taken during drilling missed this interval, picking up an extra sample from 11 65-11 90 feet No explanation for this appears anywhere in the report and it is not indicated on Figure 4-28 The Division notes at least 14 missing samples on Figure 4-27, 18 on 4-28, and 8 on 4-29 where we stopped counting Some of these may have legitimate explanations, but none were found in the report (Refer to general comment 8 to Section 4 above)

In addition much of the information presented is misleading For instance on Figure 4-29 many wells have "ND" data labels This would indicate according to the map key that contaminants were "Not Detected" at these locations However checking in Appendices A and C reveals that most of these wells did not penetrate the 10-18 foot interval or did not penetrate far enough to trigger the next VOC sampling depth At least two wells (37891 and 37991) labelled "ND" were not sampled in this interval but should have been It is the Division's preference that only wells that penetrate to a particular depth should appear on the respective depth map with the others having been deleted The Division also expects that errors of posting ND instead of NS and other equivalent "misplots" be found and removed (Refer to general comment 8 to Section 4 above)

3 Additional maps of this IHSS need to be developed including a site-specific topographic map bedrock surface structure map alluvial and bedrock stratigraphy maps, ground water contamination map(s) showing (with iso-concentration lines) the <u>extent</u> of contamination in alluvial and bedrock ground water, soil contamination map(s) showing <u>extent</u> of contamination both in the subsurface and at the surface maps summarizing or incorporating contamination data from past investigations, underground utility and surface feature map(s), and a general information map including well and borehole TDs surface elevations and screened intervals (Refer to general comments 1 through 4 to Section 4 above)

4 More detailed cross-sections need to be constructed for IHSS 119 1 At least two NNW-SSE and two WSW-ENE sections should be constructed at a horizontal scale of at most 1"=50' and a vertical scale of at most 1"=10' for a vertical exaggeration of no more than 5 Obviously, these should utilize all Phase I, II, and III wells and boreholes

5 Figure 4-30 (Semivols from 0 to 6 feet) is the only

semivolatile map included in the report even though there are wells in the IHSS 119 1 vicinity that penetrate much deeper and should have been sampled for semivolatiles Please explain why no other semivolatile maps were generated for IHSS 119 1

6 The text states that six boreholes were drilled in and around IHSS 119 1 during the Phase II investigation Please delineate which boreholes are being referred to here

7 The text states that 10 soil borings were drilled in IHSS 119 1 during the Phase III investigation However 12 are shown on Figures 4-27 through 4-32 This does not include the wells or piezometers which were sampled in the same manner as boreholes Please clarify this discrepancy

8 As outlined earlier in these comments, the Division does not agree that only concentrations of the four common lab contaminants exceeding detection limits by an order of magnitude will be considered potential contamination This is not the way the Division determines extent of contamination

Section 4 3 1 Contrary to the text of this section, the Division has not made a final determination as to the validity of the Rock Creek drainage as a background area We allowed it to be used because of the time constraints placed on the surface soil sampling program by impending OU 1 milestones and DOE imposed administrative constraints In fact TM 5 (Surface Soil Sampling) acknowledges

> "It is recognized that due to variability in wind direction the selected background area may not provide sample data representative of true background concentrations, however the collected data will provide useful information for comparison with data collected at OU 1 Although an off-site location may provide better data, administrative constraints currently prevent off-site sampling "

We have repeatedly stated that a separate comprehensive surface soil sampling plan needs to be developed as part of the Background Geochemical Characterization Report to establish soil background It is a given that any such program will expand on the Rock Creek sampling done for OU 1 and may in part validate or invalidate Rock Creek as a background area

The Division does not understand the reference to Figures 4-79 and 4-80 in the text on the bottom of page 4-32 and the top of page 4-33 These figures do not compare background values greater than Rock Creek values They simply present the analytical data from the Rock Creek samples

Section 4 3 2 The Division does not agree that Copper at a concentration of ten times background can be ruled out as a potential contaminant in OU 1 simply because it has not been historically processed at RFP and disposal of copper is unknown There is a lot DOE does not know about historical activities at

RFP If DOE knew everything they could drastically simplify investigation of these sites Therefore if copper is found at high levels regardless of whether or not there is an explanation DOE must address it as contamination This would be true of all analytes that exceed background

This same argument can be applied to beryllium The text states that because the maximum concentration of beryllium only exceeds background by a factor of six and because the occurrence is localized, it is not contamination The Division does not apply these criteria to potential contamination

Section 4 4 This section gives the impression that all air pollutants are being sampled This is not correct as the samples are only analyzed for radionuclides RFP does not sample air for VOCs nor are the particulate samples analyzed for metals (e g , Be) The text should be revise to clarify this point

Section 4 6 2 This section needs to be expanded to include a section describing the inorganic parameter results for ground water

Section 4 8 1 The statement in the text indicating that air has shown only sporadic contaminants is misleading since air samples are only analyzed for radionuclides No off-gas work has been done except with specific subsurface soil samples

Section 4 8 1 1 The paragraph at the bottom of page 4-56 and continuing on the top of page 4-57 appears to be placed incorrectly in Section 4 8 1 2 and should actually be placed in Section 4 8 1 1

We reiterate our disagreement with the conclusions drawn in this paragraph that copper and beryllium do not represent potential contamination in OU 1

The text of Section 4 8 1 1 states that SVOCs are from traffic deposition While this may be a major contributor to the levels of SVOCs found other plant activities have also contributed

Section 4 8 1 2 While it is true that toluene is recognized as a common laboratory contaminant the fact that it occurs in such a ubiquitous manner across OU 1 leads the Division to conclude that some sort of problem exists Either the toluene is real, in which case DOE must deal address it, or it is phantom, in which case there is a substantial QA/QC problem that needs to be dealt with The text states that toluene was found at low concentrations in trip blanks Was it found in equipment blanks, field blanks and QA/QC sample replicates? Was it found in 95% of the blanks similar to the percentage of positives in the borehole analyses? How do the analytical levels in the blanks compare to the RI sample data? Have the analytical methods or analytical laboratories

changed since the Phase II RFI/RI data was analyzed (where toluene was not a problem)? How was the "order-of-magnitude" criteria developed for real' versus "false" contamination? These types of questions need to be answered before the toluene question is put to rest from the Division's perspective

Section 4 8 2 1 The Division does not agree that this report can state that the probable source for ground water contamination in well 6286 is located in OU 2 No verification characterization for this concept has been conducted

Section 5 0 General Comments

1) The discussion in several sections of the text and several figures refer to the French Drain and the extraction well as mitigating factors to potential pathways The French Drain and extraction well are not baseline conditions and must be removed from the text

2) Please clarify at some point in this section the conditions under which VOCs degrade and whether these conditions are present in OU 1

Section 5 1 1 4 The text of this section states that air is not considered a significant pathway for volatile gas-phase contaminants While there is rapid degradation and dispersion and the total effluent is probably low there is no real data to support this statement

Section 5 2 Part of the purpose of the "Fate and Transport" section of any RFI/RI Report is to help delineate the present and future extent of contamination Assumed and/or predicted exposure point concentrations must be matched and coordinated with actual contemporary data in "history-matching " We know the approximate date of contaminant release in the various OU 1 IHSSs Applying the assumptions and predictions and working forward in time from the release the predicted concentrations can be compared to current conditions If the comparison is found to be within tolerance criteria then the assumptions can be used with confidence to predict future concentrations thereby eliminating dependence on strictly theoretical or assumed migration rates, degradation rates, contaminant-media interactions, dispersion, dilution etc , etc Text in the introduction to Section 5 states that Section 5 2 will contrast the predicted and observed behavior of OU 1 contaminants For VOCs, this does occur However for the remaining classes of contaminants only generalized statements are made which are not tied to data The Division suggests that the format of of Section 5 2 be changed to clearly include, for each class of contaminants both a discussion of the predicted and theoretical mechanisms that could be affecting the contaminant and a discussion of the data The data discussion would clarify what

has been found and what that means in terms of the relative importance of the transport mechanism(s)

Section 5 2 1 Based on our interpretation of the available data the Division does not believe this section of the text adequately describes the potentially contaminated areas of OU 1 For instance there is a significant soil gas anomaly located in the southwest corner of IHSS 119 2 indicating subsurface soil contamination No Phase III boreholes encountered contamination, but none were drilled in the central part of the soil gas anomaly Ground water probably does not saturate this area of IHSS 119 2 except in rare "high-water" years This may be the reason for the lower levels of contamination in well 6286 downgradient of the unit

In addition the Division does not feel that the data from areas downgradient of Building 881 indicate only "traces" of contamination in the ground water Again, there is a significant soil gas anomaly in the vicinity of borehole 0187 which coincides with some ground water contamination This indicates a vadose zone source (probably chlorinated solvents in very localized areas that were released in an insufficient volume to penetrate the vadose zone fully) that is bound by capillary forces and not located in any existing boreholes Also west and south of IHSS 103 there are coincident soil gas subsurface soil and ground water anomalies indicating an incompletely characterized source (possibly related to the revised location if IHSS 102)

As we have illustrated in previous comments the Division does not believe that enough geologic and hydrologic interpretation has been completed to conclude that the (incorrectly labelled) "perched" ground water in IHSS 119 1 occurs in a bedrock depression This is certainly not indicated on any maps in Sections 3 or 4

Section 5 2 1 2 How will the varying depth to the water table, both from a temporal and lateral perspective affect the amount of volatilized VOCs from ground water?

Section 5 2 2 4 Text at the end of this section implies that while most metals may be inhibited from migration by the chemical regime some metals may still migrate Please include a list of the metals which are not inhibited

Section 5 3 This section states that ground water flow modeling was not conducted because the French Drain intercepts any ground water and makes exposure pathways incomplete As we have stated repeatedly in these comments, the French Drain does not represent baseline conditions Decisions as to which pathways are, or may become, complete should not consider the French Drain The Division does not support therefore, the decision not to do ground water modeling

Figure 5-1. This figure incorrectly indicates that the fate of the upper HSU ground water is capture by the French Drain Since the French Drain does not represent baseline conditions it can not be included on this figure Therefore the fate of upper HSU ground water should be migration further down the hillside emerging to the surface in Woman Creek

Figures 5-14 and 5-15 As indicated in Section 5 text these figures conceptually represent "typical" high and low water conditions The Division is concerned about not only typical conditions but also extreme conditions It may be the 100-year conditions or storm-event conditions which contribute most to contaminant transport

Tables 5-8, 5-16, and 5-17 These tables show negative numbers which are not acceptable Either the tables should show zero or positive numbers or should indicate analytical results below the detection limits

Section 6 No comments are being forwarded on Section 6 However, changes to Section 6 will be necessary based on our comments to the Public Health Evaluation in Appendix F

Section 7 1 1 Concerning Objective 1 in this section although the text states that water level data from Phases I, II, and III were used in this report, the Division is unclear how this data was used As we have stated elsewhere in these comments when where and how Phase I and II data are incorporated needs to be clarified and mapped

Characterization of saturation and ground water flow directions, both temporally and spatially, has not been accomplished as well as available data would allow The report does not reference and therefore probably did not use any pre-1989 data which shows that water levels across the plant have dropped significantly in some areas since ditch water was re-routed Not only that, but the Report concentrates on low level conditions in January, 1992 This is the only time-frame which is discussed in detail within the text and for which hydrologic cross-sections were constructed Both the January, 1992 and April, 1992, head maps become vague in the northern portions of OU 1 Large "dry" areas appear where there is no data to either substantiate or refute that assumption Surely a site-wide head map exists that would aid in the evaluation of the northern OU 1 margins Additionally, high water levels are attributed solely to recharge from precipitation No evidence is offered regarding results from infiltration tests or meteorologic comparisons of incident precipitation to water levels and no water budget was attempted to quantify recharges and discharges to the operable unit

The discussion regarding Objective 2 does not discuss infiltration test results Though runoff calculations were performed for areas of the plant, discussion of these results is not included

The discussion under Objective 4 makes no mention of the fault discovered during construction of the French Drain

With regard to Objective 5 this Report confines its discussion of hydrology to only OU 1 and does not discuss ground water flow into the operable unit As such it is fundamentally flawed The hydrologic model is used to extrapolate to future use scenarios, but without more incorporation of the available site-wide data it cannot validly do so

Section 7 1 2 The Division takes issue with two items in this section First the specific areas in OU 1 that could be considered contaminant sources are not delineated Second, the text states that no lateral or vertical trends were found in OU 1 soils that would reflect dispersion from a contaminant source This statement is contradicted by the data Certainly, there are several examples of multi-media contamination in OU 1 where given the contaminating mechanism dispersion from a source must have occurred to cross media boundaries

The text indicates that new and existing wells were sampled for this investigation It is then further stated that the current contamination assessment for ground water is based on only fourth quarter 1991 and first quarter 1992 sampling What happened to all the previously collected ground water data from the existing wells? Was it incorporated or not?

The data suggests that soils in IHSS 119 1 are not the only residual source of contamination in OU 1

Section 7 1.3 The Division does not agree that any of the numbered items listed in the first paragraph of this section have been characterized

Section 7 1 4 Given the probable contamination mechanism of most of the OU 1 IHSSs that being spillage or dumping of contaminants directly on the ground surface, contaminants could have reached ground water directly without having to leach or desorb into percolating meteoric water

The western IHSSs show significant levels of soil gas contamination and subsurface soil contamination in addition to the surface soil and ground water contamination indicated in the text

The Division does not concur with the statement made in the text that the migration processes identified in the western portion of the OU are insignificant We also do not concur that ground water movement is slow In addition reference to the French Drain must

be removed

The Division does not agree that there is sufficient data to conclude that ground water under IHSS 119 1 is constrained in all directions by bedrock As we have stated previously in these comments if it is confined stratigraphic and lithologic changes within the alluvium could also play a role

As we have stated previously IHSS 119 2 does have some contamination indicated and could be acting as the source for contamination in well 6286 If OU 2 is acting as the source an explanation needs to be formulated as to how OU 2 ground water can move so far and fast during the relatively short high-water season contradicting other hydrologic statements in this report

Appendix A Table A1-1 in Appendix A should be expanded to include survey coordinates for all wells and boreholes within OU 1

Appendix A-4 - French Drain Data

Section A4 1 2 Please include the gas transmission line which interfered with construction on the maps

Section A4 2 4 1 The text states that ground water occurs in silty sand and gravel units which resemble channel deposits Please expand the description of the units including their occurrence on the hillside vertical and horizontal and the hypothesized origin of the deposits

Section A4 2 4 3 The evidence of previously existing water is important in the development of the risk assessment assumptions Please explain where this water came from how long ago the water level dropped, and whether or not this higher water table can be correlated and mapped

Appendix B

Section 2 2 1 4 Error analysis for this test is lacking The Hantush-Biershenk solution assumes equal time periods for steps, but the actual data does not show equal time steps Is this a possible cause for the data scatter on Figure B2-6? If possible please provide a reference for extending aquifer test solution models to these low saturated thickness/low pumping rate problems

Section 2 2 2 4 Error analysis for this test is lacking The problem with establishing correct pumping rate is probably due to heterogeneity - 30 feet is too far in this situation It might have been better to test 03, then install the rest of the test array In addition, these wells are so closely spaced that vertical flow in the aquifer was probably enhanced

On page B2-54 mention was made to an adjustment made to (recovery) data to compensate for falling water levels not caused by the test What was the evidence of falling water levels and what caused them? It is standard practice to monitor surrounding wells and discuss background conditions affecting the test However no discussion of this was found in the text

Appendix B3

Hydrographs go off the top of the chart in places This appears to be related to the N/A code Sometimes it has been corrected and sometimes not Wells marked with an N/A are later sampled successfully so is an obstruction the only reason for using this code? The RFEDS water level data received by CDH contains three codes -1 0 00 and 9983 How do these codes relate to "dry" wells and N/A? Please clarify these issues

Appendix F Public Health Evaluation

General Comments

1) This baseline risk assessment lacks a qualitative evaluation of those chemicals not identified as contaminants of concern The reviewer is unable to assess whether chemicals were eliminated on the basis of concentration detection frequency or due to a lack of an RfD or slope factor and to what extent the exclusion of potential contaminants under or over-estimates the final risk estimates

2) This health evaluation fails to present the data clearly and completely either in the text in table form or in graphic form For example, it is difficult to determine whether an individual analysis uses all or part of the Phase I Phase II Phase III and/or data obtained between Phase II and III Moreover very rarely does DOE present the quality of the data, the minimum and maximum values the standard deviations the number of samples taken at a site the sampling locations the sampling and analysis methods the season in which sampling took place the quantitation limits the number and treatment of outliers and the QA/QC qualifiers characterizing the data used for this evaluation were often simply not presented in this document This insufficient presentation of the data prevents the State from adequately reviewing this document and must be remedied before it can be approved Many of the questions raised by the State could be answered by an adequate presentation of the data already collected by DOE

3) DOE has repeatedly advanced its own theories of the risk assessment process and often ignored EPA and CDH guidance in the process For example, the discussion on pg F4-11 does not belong in a public health evaluation of a baseline risk assessment

4) DOE has presented a biased assessment Only key" chemicals and dominant exposure pathways were used to calculate the final risk estimates The rationale for the choice of key" COCs in the summary of risk section (F-7) is neither clearly presented nor consistent A comprehensive qualitative discussion of any uncertainties was never presented When chosen procedures underestimated the risks uncertainties were simply never discussed The repeated failure to list all the chemicals analyzed for and detected in each media including ground water subsurface soil sediment and surface water as well as soil the consistent underestimation of cancer risks by not using a lifetime (70 yr) exposure duration and the failure to assess "special cases" such as acute portal of entry effects and dermal carcinogenesis at the point of contact for certain chemicals are further examples of the biased information presented in this assessment It can only be concluded that many of the choices were arbitrary and biased and that they have the potential to underestimate the risk

5) Model application still has not addressed the need to include meteorological monitoring in OU 1 or the Woman Creek drainage

F2 IDENTIFICATION OF CONTAMINANTS OF CONCERN

Data used for the identification of contaminants of concern is not clearly described or sufficiently detailed The development of a COC list should be medium specific A list of all chemicals detected in each medium should be provided and included in the screening process The datasets for each medium should be described with respect to sample quantitation limits to qualifiers and codes and to blanks In addition the quantification methods used to analyze each chemical in each media must be briefly described so that the data limitations and comparibility can be evaluated Please refer to pages Chapter 5 of RAGS and Chapter 3 of EPA's Guidance for Data Useability in Risk Assessment Interim Final (EPA/540/G-90/008) RAGS (5 10 1 p 5-27) specifically states, 'for each medium, identify in the report the chemicals for which samples were analyzed and list the analytes that were detected in at least one sample' Exhibits 5-6 and 5-7 in RAGS are good examples of the way this information should be presented for surface soil, subsoil, ground water surface water and sediment data and for estimates of indoor and outdoor air and vegetable concentrations obtained from the models Specific comments follow

F2 1 The COC lists from each media should be kept separate rather than aggregated If they are kept separate, future risk and remediation decisions will be more clear Our main concern is that carcinogens are not eliminated hot spots are dealt with separately and chemicals associated with likely pathways are not dropped

A better description of the data validation must be provided How

were samples selected for validation? What percentage of validated samples were used in each analysis? A good example of a clear format for presentation of this information is found in Exhibit 5-2 in RAGS

Use of chemicals identified in the surface soils to characterize surface water and sediment contamination is not justified What specific contaminants were found in surface water and sediment?

It is not valid to limit subsurface soil COCs to those contaminants identified in surface soils with corresponding detections in the subsurface soils Contaminants in the subsurface soil should be considered separately

Were the same data sets that were used for contaminant identification also used for quantitative risk assessment? How representative of OU1 were the actual data used for the quantitative risk assessment?

Figure F2-1 The treatment of hotspots is incorrect If a contaminant is identified in a waste-related hot spot it should automatically become a contaminant of concern It should not be eliminated on the basis of percentage risk as indicated by the figure

F2 2 1 As noted in CDH comments to DOE on TM 6 (August 5 1992) the State continues to believe that there are many technical reasons why direct exposure to groundwater should be considered in the baseline risk assessment even after the installation of the French Drain One the BRA must assess baseline conditions, assuming no further action Two direct exposure to ground water must be considered per Federal Register, Volume 52, Number 53, Thursday, March 19, 1987, pp. 8704-8709 The Division expects a ground water exposure scenario to be incorporated into the quantitative treatment already being given to other aspects of the future on-site residential use scenario

F2 2 3 An elevated concentration should not be determined using 100 times the mean without considering the statisitical distribution of the data or comparing the data to background data

F2 2 4 The distribution of the data should be determined prior to selecting other statistical tests

The comparison of background values to literature values can not be used to eliminate chemicals Background values should be site-specific Moreover, no literature references were listed, so sources cannot be verified

F2 2 5 Refer to comment on Figure F2 1

F2 2 6 RAGS explicitly states 'the rationale for eliminating

chemicals from the quantitative risk assessment must be clearly stated in the risk assessment report" (RAGS Section 5 9) The complete list of detected chemicals on OU1 was never clearly presented let alone a rationale for why particular chemicals were eliminated from the COC list e g acetone Without a list of all chemicals considered for the "Chemicals of Concern" it is difficult to determine whether or not chemicals were eliminated appropriately Chloroform and methylene chloride were retained, because they were detected in more than 5 percent of the samples, are carcinogens and are potential transformation products from other COCs Were any other carcinogens not retained and if so on what basis were they eliminated?

Table 2-1. Are these all the chemicals that were assessed, or just a summary of key chemicals

Table F2-2 1 1 1 trichlorethane and acetone were identified in hot spots and should be included in this table

Table 2-5 Toxicity screen If the slope factor or RfD is unknown, it cannot necessarily be assumed that the percentage of risk contributed by that chemical is 0% The use of zero here is misleading Certainly, these zeros should not be added into a sum of total risk They also should not be used to eliminate COCs

F3 EXPOSURE ASSESSMENT

1) The selection of all receptors should be justified in the text What makes each receptor the most reasonable and/or conservative? In addition the rational for all exposure scenario assumptions needs to be incorporated into the text

2) A table clearly presenting the receptor locations for each scenario should be added instead of having this information buried in the text as it is now

3) The specific sediment and surface water data that were used to estimate intakes were presented in this section of the document Estimated soil concentrations in sediments of the South Interceptor ditch are presented in Table F3-8 however this modeled information was not used to calculate intakes Because of the extensive discussion of the surface water transport model it was difficult to discern which values were used actual or modeled estimates The sediment and surface water sampling data including the sampling locations and the dates it was collected must be presented Preferably, a table (including all chemicals analyzed and those detected the quantitation limits, the frequency of detection, and the range of values detected) should be provided An example of such a table is presented in Exhibit 5-6 (p 5-25) in RAGS Since the surface water transport model estimates were not actually used to calculate intakes this discussion should be

deleted except for the rationale for using measured data instead of modeled estimates

4) All exposure pathways (i e ingestion inhalation and dermal contact) for the future on-site resident exposure scenarios must be evaluated These exposure pathways must be considered for all appropriate media

F3 1 1 "Studies of air flow and dispersion characteristics indicated that winds come down from the mountains to the west turn and move toward the north and northwest along the South Platte River valley and pass to the west and north of Brighton, Colorado (DOE) which is just north of Denver " **The diagram does not indicate that there is a significant difference in any direction** Page F3-24 suggests that the higher velocity winds flow to the southeast but 45% of the year the winds flow through the western sectors This does not really constitute a minor portion of the year and the State is concerned that receptors other than those that are considered in this assessment will be potentially affected by emissions from OU1 (see Exposure Assessment general comment #2)

F3 3 1 An individual wading in Woman Creek would be exposed by both the oral and dermal routes (see F3 3 3)

Please present the information that indicates that currently used wells off-site are uncontaminated

F3 3 4 In its response to comments from the Environmental Protection Agency (August 1992) DOE stated that "Emission rates from excavation for hypothetical future commercial construction will be considered in the PHE " In fact future commercial construction is not addressed for inhalation of soil vapors or for ingestion and dermal contact of subsurface soil surface water, and groundwater It only addresses inhalaltion of dusts This is insufficient treatment of this exposure scenario

An individual who comes into direct contact with soil, surface water ground water or sediments during operation and maintenance activities may absorb contaminants via the dermal pathway This is also true for a research biologist and future on-site residents

Figure F3 4 On-site discharge to Woman Creek would be received by a future on-site residential receptor and the box labelled 'Discharge to Potential Future On-site Facility Mixing with Clean Air in Facility" should include a line to the future on-site ecological-reserve receptor The french drain is not acceptable as a FATE for on-site contaminated shallow ground water (see general comment #8 and comment for section 3 7 3 8)

F3 5 1 1 CDH has stated in several letters and meetings that the baseline risk assessment evaluates contaminants in the absence of interim measures such as the french drain Thus data from the

french drain may be used to help characterize the site under baseline conditions but the french drain cannot be treated as part of the site

Figure F3 5 and F3 6 These figures should depict groundwater transport without the french drain

Page F3-20 To state that water would eventually be captured by the french drain is inappropriate in a baseline risk assessment

Page F3-20 "Uranium also occurs in groundwater at OU1 (EG&G, 1991)" This statement is followed by an argument that the radionuclides are so tightly bound to soil particles that they are essentially immobile However, since all metal and radionuclide groundwater samples are filtered and uranium is still detected in the water it either must be bound to tiny particles (smaller than 0 45 um) or in an ionic form both of which are mobile Therefore uranium which is a class A carcinogen cannot be eliminated from the groundwater COCs unless the concentration of all naturally occurring isotopes is at or below background The risk of dermal, ingestion and inhalation exposure to uranium in the groundwater must be considered Not including uranium in the assessment of possible hazards after exposure to groundwater may underestimate the risk

Page F3-32 Why was a United Nations study used to derive the dimension and ventilation rates for residential structures rather than more applicable local and state building codes?

F3 5 2 1 This section is seriously flawed Data is not presented for each model used Models are presented but not validated If the model cannot be quantitatively validated a qualitative evaluation of the assumptions made and the results should be discussed

The discussion on the residential/commercial structure associated with the future on-site receptor is immaterial to the assessment of baseline risks

Figure F3-8 See comment F3 5 and F3 6

F3 5 2 1 1 The definition of L_T in the Johnson and Ettinger model is unclear The text states that the water table fluctuates Consequently, one would assume that L_T is not fixed What values are used for L_T?

Table F3-2 The methods for handling left-censored data sets lacks appropriate detail in the text Why was the MDL used rather than the CRQL? What was the detection limit value? Does the table represent a complete accounting of all data sets with left-censored data or were some chemicals not included because the use of quantitation limits would have been inappropriate?

Table F3-4. The column labeled 'Value' does not have units Also, in a residential building 250 seems low It represents only one air exchange per hour

Table F3-6 This table has no units which makes interpretation of the presented data difficult Negative values are illogical and meaningless, a concentration is either positive or zero Consequently the results of the model as presented here are highly suspect

Table F3-7 The column entitled "Mean" includes negative values See comment for Table F3-6

F3 5 2 2 See comments F3 5 1 1

Table F3-10-10 The table does not include groundwater ingestion Given the high probability that frequent interaction between groundwater and surface water takes place on OU1 (p F3-22), how representative of the "true" hazard is the limitation of COCs in surface water to only the radionuclides? Only radionuclide concentration estimates are listed in Table F3 10 under surface water However the discussion in Attachment F4 of parameters used to estimate intakes for dermal contact with surface water includes a table of chemical specific dermal permeability constants (Table 8) that includes all the COCs Inclusion of this table implies that surface water was analyzed for all the COCs Was it? Or were only radionuclides evaluated in surface water? If only radionuclides were analyzed the risks presented for dermal and oral exposure to surface water could be significantly underestimated

Where is the subsurface soil data or evaluation applicable to the excavation scenario? Page 1 of F1-1 Summary of Changes Intended for the PHE states that this information was to be added to the PHE since publication of the original issue of Tech Memo 8, Contaminant Identification Table 9 of Attachment F4 "Summary of Intakes" indicates that only airborne dust was considered under the construction scenario This is insufficient, and underestimates the risk after inadvertant soil ingestion dermal contact to soil, inhalation of soil gases during excavation etc Also, there is no discussion in the text regarding this scenario at all

F4-4 TOXICITY ASSESSMENT

In general DOE did not correctly calculate the noncarcinogenic hazard indices for inhalation exposure Noncarcinogenic hazard indices for oral and dermal exposure are calculated correctly in most cases In addition they did not consistently choose chronic RfD values from either IRIS or HEAST Moreover, the chosen values are not documented as to source in the tables

DOE needs to make the following adjustments to its method of calculating noncarcinogenic hazards for OU1

1) DOE did not address the possibility that any of the chemicals at OU1 could have acute effects Some chemicals such as skin and eye irritants and developmental toxicants can produce an effect after a single or very short term exposure to relatively low concentrations (RAGs 6 4 2) Specifically DOE failed to assess the possibility that short term exposures to soil gases emanating from ground water and contaminated soil at hot spots may have adverse health effects RAGS (6 4 2) recommends that exposure to high concentrations <u>such as occur at hot spots</u> "should be determined for the shortest period of time that could produce an effect" Since dichloroethene and 1 1 1-trichloroethane for example are two OU1 ground water contaminants that are known to produce portal of entry effects shorter term (i e , 24 hour) hazard index calculations for the concentrations of these COCs estimated to be possible in a residence built over a hot spot are also necessary

2) Page F4-4 correctly states that the "default adult body weight and inhalation rate of 70 kg and 20m^3/day can be used to convert a reference concentration to an inhaled intake (RfD)" However, this adjustment was <u>not</u> made in the Attachment 6 Risk Calculations for either the noncarcinogenic volatiles or dusts Instead the unchanged <u>oral</u> RfDs exclusively were used to calculate hazard indexes not only for oral and dermal exposures but also for inhalation routes of exposure This was true whether an RfC was available or not (i e , dichlorodifluoromethane) Extrapolation among routes is highly uncertain if data suggests that contact toxicity can occur or if there is evidence that the absorbed or target organ dose is different by different routes of exposure (Principles of Route-to-Route Extrapolation for Risk Assessment, 1990) The correct inhalation RfC value should be used when available or the inhaled intake adjustment should be made when only oral RfDs are available <u>and</u> portal of entry effects (contact toxicity) can be excluded for that particular chemical If a chemical produces portal of entry effects and no RfC is available, ECAO should be contacted for guidance on route to route extrapolation If toxicity information is not available from ECAO the chemical should be evaluated only qualitatively, not quantitatively and the absence of this chemical from the quantitative risk assessment should be discussed in the Uncertainty Section (RAGS 7 5 1)

The use of the most conservative toxicity values in the concentration-toxicity screen regardless of whether they are for oral or inhalation exposures is recommended by RAGS (5 9 5, p 5-24) However this is the only situation where that is appropriate If exposure to only one medium is evaluated even in the toxicity screen then the toxicity values corresponding to that particular medium should be used

3) In some cases noncarcinogenic and carcinogenic risks from dermal exposure to chemicals can be evaluated using oral slope factors or oral RfDs However this does not apply to all chemicals RAGS (p 7-16) recommends contacting ECAO for guidance for ways to treat specific chemicals RAGs (p 7-16) states, It is inappropriate to use the oral slope factor to evaluate the risks associated with dermal exposure to carcinogens such as benzo(a)pyrene which cause skin cancer through a direct action at the point of application" DOE incorrectly used the oral slope factor for benzo(a)pyrene as well as those for its related chemicals to calculate the risks for dermal soil contact The risk of exposure to these chemicals is thus miscalculated and underestimated

Example of Portal of Entry Effects
Acenaphthene
IRIS The confidence in the RfD is low
Inflamatory changes in lungs with administration of acenaphthene acenaphthylene and naphthalene Study concluded that chronic inhalation of acenaphthene has toxic effects on the lung

Tables F4-1 and F4-2 These tables are confusing because they don't indicate i e by footnote which values were obtained from IRIS which were obtained from HEAST 1992 or which were calculated from the inhalation unit risk values obtained in IRIS The information in the tables implies all the information comes from IRIS Merely mentioning the correct source in the text is not sufficient It makes the tables less useable and less believable

All values that were obtained from Heast 1992 and were listed in that source as calculated using methods other than the currently accepted ones by EPA should be footnoted This may be another source of uncertainty, and should be discussed in the uncertainty section

It is not clear what criteria were used to choose specific RfD or RfC values listed in the tables Sometimes subchronic values were chosen over chronic, even if the uncertainty for subchronic was greater than for chronic (trichlorofluoromethane and 1 1,1-trichloroethane) and despite the fact that this document is assessing chronic exposures Because in general, this risk assessment is concerned with chronic exposures chronic RfD or RfC values should be listed in the tables and used to calculate hazard indexes

Because the inhalation unit risk factor for methylene chloride was derived using pharmacokinetic data it is inappropriate to derive a slope factor from it (IRIS 1992)

Page F-26 & 27 The text on these two pages lists the external exposure slope factors for plutonium and for americium However

only the oral and ingestion slope factors for these two radionuclides are listed in Table F6-1 "COC Toxicity Constants" (p F6-3) and the oral slope factors were incorrectly used to calculate the risks after dermal exposure to surface water or to soil Oral slope factors are used by convention and recommended by RAGS (Section 7 5 2 p 7-16) for estimating carcinogenic risks after dermal exposure since no dermal slope factors for chemicals are available yet However since the external exposure slope factors for plutonium and americium are available, they should be used to calculate dermal risks The use of the oral slope factors to calculate the risk after dermal exposure will overestimate the risk from alpha radiation since these two radionuclides are alpha emitters, and alpha particles do not penetrate the skin, but will underestimate the risk from gamma and x-radiation Note that for inhalation and ingestion the appropriate inhalation and ingestion slope factors should be used to calculate risk

Page F4-28 The word trigeminal nerve is mispelled

Page F4-29 The last sentence is confusing

Page F4-27 What criteria were used to decide that the gamma decay associated with americium-241's alpha decay was not important at environmental levels?

Page F4-26 Same problem as on p F4-27

Page F4-20 The word 1 1-dichloroethane is substituted for 1 1-dichloroethene throughout the discussion

F-5 UNCERTAINTY ANALYSIS

The uncertainty analysis should evaluate the effects of any missing information on individual analyses and on the calculation of the final risk estimate This health evaluation uses quantitative methods to evaluate chemicals and then fails to qualitatively assess the health effects of those chemicals that were eliminated For example acetone was associated with a hotspot but not evaluated quantitatively As a result, a complete description of the risks is not provided Secondly, when a data set is not complete or available a less appropriate dataset is used in the analysis For example, chemicals identified in the surface soils were used to characterize surface water and sediment contamination As stated earlier, this is unjustified It clearly produces uncertain results which merit discussion

Exposure Assessment Environmental sampling and analysis generates variable results depending on the sampling method, the detection limit of the chemical and other factors Such variability may bias the data and result in an over or underestimate of the risks A more thorough discussion of this bias is warranted in the

uncertainty section

In the fate and transport modeling a discussion of the potential for uncertainty due to the use of the wrong model or equation is needed A qualitative discussion of the parameters chosen for each model should be discussed in greater detail

Toxicity Assessment According to RAGS 'if chemicals with known health effects were eliminated from the risk assessment on the basis of concentration frequency of detection or lack of RfDs and SF one should review and confirm whether or not any of the chemicals previously eliminated should actually be included For substances detected at the site but not included in the quantitative risk assessment because of data limitations, discuss possible consequences of the exlusion on the risk assessment "

The completeness of the overall database is not described How many samples were taken and how many were used? Example?

For each model used, the potential impact of each of the key model assumptions should be provided with respect to both the magnitude and the the direction of any bias

If RfDs are converted to RfCs, a comprehensive discussin of the uncertainties involved in the calculations should be included in the uncertainty analysis

A number of RfD values or slope factors have been withdrawn and new values are pending There is no discussion of how this might contribute to the uncertainty of the values

It is noted that dermal absorption of vapors is considered to be lower than inhalation intakes, and therefore was disregarded, as recommended by RAGS Some discussion of the uncertainty that this underestimation of exposure has on the final estimates of intake and risk should be inserted into the Uncertainty section

Page F5-7 From the information provided the reviewer cannot determine the quality of the data (i e the distribution of inhalation rates)

It seems like DOE mixed up variability in observed concentrations and uncertainty

All values that were obtained from Heast 1992, and were calculated using methods other than the currently accepted ones should be footnoted This is another source of uncertainty

The limitations of the data are not thoroughly described In most cases the MDL underestimates the SQL Is this true for this risk estimate and if so how does it effect the final risk calculations?

DOE used the Monte Carlo but did they have credible distribution data for the key variables? Did they know what the statistical variation was for each variable?

Were there outliers? If so the use of Monte Carlo analysis is not appropriate

Page F5-7 DOE must tell us the distribution of inhalation rates etc

Did DOE use distributions based on time variations in concentrations?

F-6 RISK CHARACTERIZATION

Page F6-2 Statement implies that RfDs (generic term) were used for inhalation and for oral ingestion appropriately when they were not

Page F6-6 The triple negative makes the following sentence very confusing "No situations were identified where it would be unlikely that a receptor could not be exposed by several scenario pathways in combination " Are they saying a receptor is likely to be exposed by more than one pathway? This sentence is critical to the understanding of this section and it must be clarified

F6 4 3 The first sentence is misleading It implies that the HI values for the child receptor in the hot spot were listed in the second sentence In fact the adult values are listed in the second sentence and the child values are not listed Child HI hepatic = 38 4, kidney = 12 0 These are the worst HIs, and their omission implies that DOE is trying to minimize the hazards, rather than present them objectively

This section does not explain which set of calculations the RME, the hot spot or clean area were used to determine the three highest HQ values for future adult resident receptor The numbers cited in the text do not agree with those in Table 2 What data were used to estimate the HQ and HI values for the child receptor (future scenario)? Were they the same as for the adult? Please clarify this whole summary

Page F6-19 Where is Table F6-4? None of the tables presented here are labeled that way

Why are the percentile values for 1 1-dichloroethene in Table F6-6 so high?

F7 SUMMARY

Page F7-3 Where did these risk values come from?
RAGS (Section 8 2 2 p 8-12 and 8-15) states that risk should be calculated by exposure pathway and that the uncertainty about overestimation of the risks from exposure to different weight of evidence carcinogens should be dealt with in the discussion of uncertainty This was not done Instead DOE added only A carcinogens together only B carcinogens together and only C carcinogens together The largest one of these sums of risks was then presented as the dominant risk for each exposure scenario This procedure was followed for all exposure scenarios except the future adult on-site resident For that exposure scenario, the risks for the "predominant" COCs were added together regardless of the weight of evidence to get a risk of 4 E-5 However the list of 'predominant" COCs did not include either plutonium or americium both of which present risks that are in the same range as that of the chemicals that were chosen No explanation was made as to why certain chemicals were considered "predominant" COCs and others were not included Thus the risks presented in the summary are underestimated

This presentation of only the "key" contaminants is unacceptable All data should be presented without any editing The reader can decide what is important, and whether the calculations were done correctly or not Presentation of edited data as the total picture only contributes to the impression that this is a subjective assessment of the risks Cut out the editing

Attachment F-4 Receptor Intake Calculations

Page 1 Current off-site residents were assumed to be potentially exposed as indicated when contaminants were deposited on their property Aren t there open spaces if not organized parks? Surface water exposure should be taken into account Kids are attracted to water and often play in streams

Tables 3,4,5 & 6 Inhalation EPA guidance (Human Health Evaluation Manual Supplemental Guidance Std Default Exposure Factors, Attachment A, 1991) states that 20 m3/day is representative of a reasonably conservative inhalation rate for total (i e , indoor plus outdoor) exposures at home and in the workplace The RHH 1984 reference is outdated

Chronic Exposure Period What about childhood leukemias?

Soil Adherence factor Where did 0 9 mg/cm^2 come from? I can't find this value in the Dermal Exposure Assessment, 1992 I can only find a range of 0 2 mg/cm^2 - 1 5 mg/cm2 Table 8-6 of the above document gives 1 0 mg/cm2 as the upper estimate

The citations in these tables are the same as those in the previous table (Tech Memo 6 Tables 5-3 5-4 5-5, 5-6)

before all changes were made Are these the correct citations?

In Table 6, "Future Ecological Reserve Research Biologist Exposure Assumptions" the Exposure frequency (surface water) is listed as 7 events/yr This value was not used in the intake calculations for exposure to surface water Instead 50 d/yr was used What source (reference) was used to derive the 50 d/yr value? Please update Table 6

To what media is the future research biologist exposed for 100 days?

Table 7 It would help if footnotes denoted which were modeled and which were measured concentrations and if std deviations were included in this table As it is estimation values are difficult to confirm and evaluate

What does the code NA mean? Does it mean that certain chemicals were analyzed for but not detected? OR Does it mean that samples were not tested for these chemicals?

The numbers listed in the "On-site Outside Air" or outside dust column are incorrect The PM-10 standard for Denver is 150 ug/m^3, and the numbers in this column are an order of magnitude greater than this standard The numbers in this column are off by 1 E-8 The text describing how the on-site outside air dust concentrations were calculated (p F3-54) is incorrect These numbers were obtained by multiplying the on-site soil concentration by the respirable dust concentration factor (3 6 E-4 g/m^3) not by multiplying it by any of the 30 year average scaling factors listed in Table F3-9 The respirable dust concentration factor and the correct way it was obtained should be inserted into Table F3-9

What are the numbers listed in the second "On-site crops" column (the furthest column to the right)? Why are so many of them repeats?

Groundwater COC's must be presented in this table too

Averaging time (carcinogenic effects) What about childhood leukemias?

Soil Adherence factor Where did 0 9 mg/cm^2 come from? EPA's Dermal Exposure Assessment, 1992 does not list this value I can only find a range of 0 2 mg/cm^2 - 1 5 mg/cm2 Table 8-6 of this document gives 1 0 mg/cm2 as the upper estimate

Similar comments on tables 5 & 6

Page 11 Where did the assumption that adults and children had only 7 days of contact with sediments/yr come from? Justification?

Page 15 What is the justification for the assumption that the research biologist would ingest 20 ml of surface water on 50 occasions/year?

The values presented for the various exposure scenarios on the sheets marked 881 WKS are never clearly marked as RME values Please clarify these tables

Table 9 Where is sheet B which contains chemical specific ABS factors? It would be helpful if there were a table of these factors

The conditions where NA and where 0 0 E + 00 are used should be described The NA seems to be used for noncarcinogens in the carcinogen tables and vice versa The 0 00 E + 00 seems to be used when it is assumed that there would not be an exposure to that chemical via that particular route This is misleading, the risk may not be 0 A line or letter code would be more appropriate

Attachment F-5 Toxicity constants

The changes in F5-1 have been incorporated into Tables F4-1 2,3,&4 already

There also is no discussion of the amount of confidence the EPA had in the data used to derive particular RfDs

The use of pharmacokinetic data to obtain the oral slope factor for methylene chloride precludes its conversion to an inhalation slope factor since the assumptions that equal internal doses are obtained via either route are not necessarily true (IRIS 1992)

F5-3 The use of the Oak Ridge National Laboratory Toxicity is not appropriate Instead EPA guidance should be followed Given that the mechanism of carcinogenesis is not fully understood, it is more prudent to use the 95% UCL rather than the MEL that this document advocates, despite all the statistics to the contrary What is final EPA opinion?

Attachment F-6 Risk Calculations

A table of the actual monitored or modeled concentrations $\pm$ SD would be very helpful here It would make it much easier to evaluate the collective normalized risk factors and the per capita normalized risk factors

Table 1 It is implied that if compounds don't have an established slope factor then the risk from them is 0 This is misleading Also are these zeros incorporated into any kind of weighted average in the statistical analyses?

Page F4-15 DOE never discussed how they were going to deal with chemicals with no current RfD or SF values Is it appropriate to use the old values even if the current ones have been withdrawn? At least there needs to be some discussion of the uncertainty here

Page F4-26 What criteria were used to decide emissions of various X & gamma rays are unimportant at environmental levels? What range of values?

Table 2 RAGS (8 2 2 p 8-14) cautions that segregation of hazard indices "by effect and mechanism of action can be complex and time-consuming bcause it is necessary to identify ALL of the major effects and target organs for each chemical and then to classify the chemicals according to target organ(s) or mechanism of action This analysis is not simple and should be performed by a toxicologist If the segregation is not carefully done an underestimate of true hazard could result" DOE only identified the risk for four target organs lung liver kidney and blood, while ignoring others The toxicity assessment portion of this document is fairly thorough in its description of toxic effects on the peripheral and central nervous systems the immune system, and on reproduction and development However this information was totally ignored in assessing the hazard Moreover several chemicals produce more than one effect Methylene chloride, for example has been reported to produce kidney toxicity at the same concentration as it produces liver toxicity (ATSDR 1992) DOE listed this compound only under liver toxicity in this table and thus underestimated the risk of exposure to it Other chemicals are listed under categories that are not discussed at all in the toxicity assessment section The noncarcinogenic hazard of 1,1,1-trichloroethane for example was assessed under the blood category However no mention of any blood effects for this chemical were included in the toxicity assessment

Table 3 The same comments apply to Table 3 as for Table 2 In general when a carcinogen produces lesions in more than one target organ it is listed under only one For example trichloroethene produces kidney and lung carcinomas as well as liver cancer, but has only been listed under the hepatic category Thus cancer risk is underestimated in this table

Appendix A Risk screening assessment

Page A-5 Why weren't any organic COC included in this risk screening for workers?

REFERENCES

T R Gerrity and C J Henry (ed) Principles of Route-to-Route Extrapolation for Risk Assessment Proceedings of the Workshops on Principles of Route-to-Route Extrapolation for Risk Assessment March 19-21, 1990 and July 10-11 1990 Elsevier N Y 1990