IDAHO DEPARTMENT
OF HEALTH AND WELFARE

DIVISION OF
ENVIRONMENTAL QUALITY

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Cecil D. Andrus, Governor

April 21, 1993 Transmitted via Facsimile

Mr. Don Macdonald
Environmental Restoration & Waste Management
U.S. Department of Energy
Idaho Operations Office
785 DOE Place
Idaho Falls, ID 83402

RE: Review Comments for Draft Remedial Investigation Report for the the Organic Contamination in the Vadose Zone (Operable Unit 7-08), (EGG-ER-10684).

Dear Mr. Macdonald:

The Idaho Department of Health and Welfare, Division of Environmental Quality (IDHW/DEQ) has reviewed the above-referenced report and is submitting the enclosed comments. IDHW/DEQ received the report on March 5, 1993.

Overall, we feel the the draft Remedial Investigation Report is well written and that the modeling represents a good initial effort considering data limitations. IDHW/DEQ is not providing editorial comments unless they add to the technical clarity of the document. Furthermore, the appendices are considered to be supporting information, consequently no technical or editorial comments were submitted.

If you have any questions regarding the comments please feel free to contact me at (208) 334-5860 or Dave Frederick at (208) 528-2658.

Sincerely,

Dean Nygard
Manager
Federal Facilities Section
Community Programs

Enclosure

cc: Patty Cleary, DOE-ID w/enc.
M.J. Nearman, EPA Region 10 w/enc.
File, DEQ-Boise
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REVIEW COMMENTS
DRAFT RI REPORT FOR THE ORGANIC CONTAMINATION
IN THE VADOSE ZONE (Operable Unit 7-08)
February 1993

GENERAL COMMENT

The report (chapter 5) does not adequately address the possibility that other conceptual models of vapor transport are valid given existing data. The report does not address the possibility that advective transport may dominate vapor transport in the basalt. Some monitoring wells completed around the RWMC are reported to have inflows and outflows of air (discussed in FFA/CO meetings, Idaho Falls, March 31, 1993) which strongly indicates that diffusion may not be the dominant transport mechanism. It should be noted that the approach used in the report is a reasonable first cut approximation given the current data base that the author had to work with to conduct this modeling. The issue is that alternate conceptual models should be discussed and that the limitations of the presented model need to be discussed.

SPECIFIC COMMENTS

1) Page i, Paragraph 3 -

The lateral extent of the OCVZ operable unit is not 1,000 feet.

2) Page vi of Executive Summary, Last Paragraph -

The likelihood of the risk being over- or under-estimated is dependent on the assumptions and potential errors in the risk assessment, and a statement such as this cannot be made without expending considerable resources in an attempt to **quantify** the uncertainty in the risk assessment process. Recommend deleting this statement.

3) Page 1-12, Paragraph 3 -

Please clarify in the text by whom the RCRA plan for the SDA was approved in 1989. Also, indicate what is meant by "plan" (e.g. RFI work plan).

4) Page 1-14, Paragraph 2 -

The text states that "...aqueous transport is minimized by the dry nature of the site..." which may be a valid conceptual model in a semi-arid environment; however, this theory has not

been conclusively tested. For example, the perched water sampling (Appendix F) suggested elevated levels of magnesium chloride in well 8802D. If these ions were derived from dust control efforts at the RWMC, initiated in 1984, aqueous phase transport may also be important.

5) Page 1-17, Paragraph 2 -

See comment #58.

6) Page 2-2, Paragraph 2 -

a) The text states that 5% of the vapor samples were sent to the Environmental Chemistry Unit Laboratory (ECU) at the INEL for verification; however, page 2-17 states that approximately 10% of the samples were sent to ECU for verification. Please clarify.

b) To illustrate the precision of the GC data, please include a comparative discussion of the analytical results of the verification samples sent to ECU Laboratory. A summary of the QA/QC data, including an analyte list and corresponding detection limits, should also be included in this report for independent interpretation of the results.

7) Page 2-4, Table 2-1 -

There appears to be some discrepancy between the analyte list presented here and the data in Appendix E. For example, Table 3 of Appendix E lists "NA" for several of the compounds listed in Table 2-1, including chloroform, tetrachloroethene (PCE), Freon 113, 1,1,1-trichloroethane, acetone, and methylene chloride. Please indicate if "NA" represents "not analyzed", and also indicate the detection limits for the portable GC.

8) Page 2-13, Paragraph 3 -

Recommend including a discussion of the criteria used to select vapor port locations and/or a reference to the applicable section of the work plan.

9) Page 2-23, Paragraph 4 -

The text discusses the methodology for the basalt tracer studies, which were conducted to generate diffusion coefficients; however, there is no mention of the results of this study and how the estimated diffusion coefficients were applied to the vadose zone model.

10) Page 2-23, Paragraph 5 -

Typographical error: Table 2-4 indicates that port 3 in well 77-1 is at 150 feet.

11) Page 4-22, Paragraph 3 -

Until additional data are collected to determine the impact of soil temperature on vapor concentrations, it may useful to perform a qualitative study using the 1987 and 1992 soil gas survey data. The 1987 survey was conducted in October and November and the 1992 survey was performed in January and February. Note that it is our experience that the time of day the survey was performed influences the results.

12) Page 3-7, Paragraph 2 -

Add Dames and Moore (1992) to the reference list.

13) Page 3-18, Paragraph 1 -

If possible, quantify the statement that "...the ground beneath the INEL moved very little as the earthquake waves passed through the site."

14) Page 3-35, Table 3-5 -

Indicate what the values listed under clay mineralogy pertain to (e.g. percent of total).

15) Page 3-36, Paragraph 2 -

For the purposes of this study, it would be beneficial to indicate if any trends in moisture content and depth were observed in samples collected during the 1985 and 1986 drilling programs.

16) Page 3-52, Figure 3-15 -

Drafting error: This figure depicts the RWMC as being located northeast of the Idaho Chemical Processing Plant and should be corrected.

17) Page 3-70, Paragraph 3 -

Quantify the statement that "A small amount of recharge occurs directly from infiltration and precipitation."

18) Page 4-34, Table 4-8 -

Typographical error: The detection frequency for carbon tetrachloride is listed as 25/125. Based on Table 4-9, it would seem it should be 125/125.

19) Page 4-38, Table 4-10 -

Indicate the units of concentration for the data in this table (appears to be ppm).

20) Figures 4-17 to 4-25 -

Indicate the source of the data for VOC concentrations in ground water presented in these figures. Also, state whether a blank next to a vapor port indicates that no data is currently available.

21) Page 4-61, Paragraph 3 -

List the compounds which are considered to be common laboratory contaminants (i.e. page 5-16; EPA, 1989).

22) Page 4-62, Paragraph 2 -

It seems that the increased concentrations of volatile organic compounds in the perched water wells may be indicative of a "active" source. A discussion of this phenomena, as related to the modeling results, may be beneficial. For example, this may suggest that the drum failure rate used in the model is incorrect or possibly that aqueous phase movement is a important transport process.

23) Page 4-62, Section 4.2.3 -

The surface soil sampling locations cited in this section are along the perimeter of the Acid Pit and Pit 9, where contaminant levels are expected to be minimal. Furthermore, the Acid Pit is not considered a source for the volatile organic compounds in the vadose zone. Therefore, IDHW does not agree that the surficial soil sampling locations are adequate to characterize the presence of volatiles in the surficial soils over the pits and trenches.

24) Page 5-2, Paragraph 2 -

The paragraph should reference the limited data on air monitoring presented in section 4.3 to put the statement that "...monitoring has not detected adverse atmospheric concentrations" into proper perspective.

25) Page 5-3, Paragraph 2 -

Expand the discussion of Texas Regal Oil, Santo Wax, and waste oil to include the compounds which are believed to be present in these materials. This will allow the reviewer to determine the appropriateness of eliminating these wastes as VOC sources. Also, quantify what is considered "small volumes of other organic compounds" and the nature of these "compounds".

26) Page 5-9, Paragraph 2 -

The statement that vapor phase diffusion is "an important mode of transport" for migration of VOCs at the RWMC may or may not be true. See general comment.

27) Page 5-10, Paragraph 3 -

The statement that "the organic compounds of interest have relatively low solubilities in water" is little more than a personal opinion. For example, carbon tetrachloride has a solubility limit of approximately 800 mg/l (Montgomery and Welkom, 1989). To some this may be considered a high solubility, particularly since it is several orders of magnitude greater than the Maximum Contaminant Level of 5 ug/l.

28) Page 5-10, Paragraph 3 -

Organic carbon content is frequently related to depth, as most soils will develop a relatively organic rich zone at the surface. Therefore, it would be useful to indicate the depth of the "surface soils" at which this parameter was measured by Colwell (1988).

29) Page 5-16, Paragraph 1 -

a) The rational for assuming that the layers are homogeneous, horizontal, and continuous layers because the plume extends over several thousand feet is not explained or justified. It is further assumed that small scale heterogeneities can be ignored because of the size of the plume. This assumption is not adequately explained or alternate conceptual models

explored such as the presence of a preferential pathway(s) that can be created by different hydrogeologic property values.

b) The assumption that all sources can be conservatively portrayed as a single disk source is not explained nor is the radius selected for the disk. Does the size of the area selected induce a dilution factor into the source that would not occur if a smaller source area is selected? Some discussion of this subject appears on page 5-26, but does not address the subject in detail.

30) Page 5-16, Paragraph 3 -

See comment #26.

31) Page 5-16, Paragraph 4 -

Please expand the discussion to clearly indicate which model parameters were based on data collection and which were developed during calibration of the model.

32) Page 5-20, Table 5-2 -

The reference cited for effective porosity is interoffice correspondence. Please submit a copy of this reference to IDHW so that the source of the raw data and the analyses can be reviewed.

33) Page 5-21, Table 5-3 -

The interpretation of vapor port monitoring data on page 4-41 states that the 240-foot interbed (Interbed C-D) appears to provide more of a barrier to vapor-phase transport than the 110-foot interbed (Interbed B-C). However, the retardation coefficients listed in Table 5-3 imply that the reverse of this was used for the modeling. Please explain this apparent discrepancy. Also include references for the values presented in this table.

34) Page 5-22, Paragraph 1 -

This section of text states that the porosity data come from Knutson et al (1990) which contradicts the reference in Table 5-2. Please clarify.

35) Page 5-27, Table 5-4 -

Please indicate the assumptions (e.g. source compounds) used to calculate the number of moles of Texas Regal Oil and miscellaneous oils which were disposed in the SDA.

36) Page 5-30, Paragraph 1 -

The statement that "The net effect of not simulating discontinuities in the interbeds is to underestimate concentrations in the SRPA" appears to be correct using this particular conceptual model; however, other conceptual models may be appropriate, depending on the assumed transport mechanisms (e.g. aqueous phase transport, advective transport due to density and/or barometric pumping). Conservation of mass dictates that a given volume of contaminant must be maintained either concentrated in a small volume of affected material or dispersed throughout a larger volume of affected material. Further discussion is warranted.

37) Page 5-31, Section 5.3.1.4 -

The results of the soil gas survey should also be used for model calibration. This exercise may be particularly beneficial for evaluating the effectiveness of the model in determining near-surface concentrations, and, consequently, atmospheric emissions.

38) Page 5-35, Paragraph 1 -

Well M7S is located approximately 2000 feet upgradient of the SDA (see Figure 3-23), therefore it seems unlikely that VOCs in the vapor phase at this location resulted from volatilization from the Snake River Plain Aquifer. Please explain.

39) Page 5-36, paragraph 3 -

The report states that "For transport the model was most sensitive to moisture content although moisture content was not input directly in the model." This statement appears contradictory to that in the preceding statement. The parameter(s) that was actually varied in the model should be more clearly discussed.

It is not stated why other parameters, such as hydraulic conductivity, were not varied to conduct additional sensitivity analyses. It appears other sensitivity analyses need to be conducted or an explanation provided as to why they

are not needed.

40) Page 5-37, Figure 5-12 -

Indicate if blanks next to the vapor ports means that carbon tetrachloride was not detected or that no data are currently available.

41) Page 5-49, Section 5.3.1.6 -

As an aid to the development of the remedial alternatives, it would be useful to define the percentages of the source contaminants which a) migrate to the aquifer, and b) migrate to the atmosphere.

42) Page 5-67, Paragraph 4 -

Add Lewis et al (1992) to the reference list.

43) Page 5-68, Third Bullet Item -

See previous comment. In addition, it should be noted that dispersivity values are scale-dependent (e.g. Luckner and Schestakow, 1991), and hence the values used in the model may not be appropriate at some of the receptor locations. Furthermore, please discuss the impact, if any, that the percolation ponds at the TRA would have on the estimation of dispersivity values (e.g. effects of possible ground-water mounding). Please explain how TRA is analagous to the RWMC.

44) Page 5-72, Third Bullet Item -

In fact there is a large body of evidence that the Snake River Plain Aquifer is heterogeneous. For example, section 3.5.3.1 of this report discusses the range of transmissivity values determined from aquifer tests. Furthermore, Wood (1989) has postulated that the abnormal water levels in USGS 88 may in part be due to a zone of low transmissivity. As transmissivity is a function of both hydraulic conductivity and thickness, these variations may be attributable to heterogeneity.

45) Page 5-72, Fourth Bullet Item -

The text states that the typical screened interval of a domestic water well is around 50 ft; however, the fourth bullet item on page 5-73 indicates that 100 ft approximates the typical screened interval of a domestic well. Please clarify. Furthermore, as discussed in the Pad A RI (Halford et al, 1992), it is unlikely that contaminants have been mixed

over a large vertical section of the aquifer at locations near the source.

45) Page 5-75, Paragraph 3 -

Quantify the statement (e.g. show results of the sensitivity analysis) that "A variation in dispersion has only a minor effect in concentration estimates".

46) Page 5-76, paragraph 4 -

a) The document states that "assumptions made in the model are generally conservative and, therefore, the predicted concentrations are considered to represent an upper bound of potential ground-water concentrations." This statement contradicts the statements in the preceding paragraph that "A smaller source and/or a smaller active thickness of the SRPA yields higher ground-water concentrations." The source size (disk diameter) used in the report may not be conservative; uncertainty about the size of the source and the impact of changes in the size needs further evaluation.

b) IDHW concurs with the statement that "the overall degree of uncertainty associated with model results and predictive simulations is moderate to high". Consequently, it is premature to state that the modeling results are conservative and representative. Particularly since other conceptual site models utilizing different parameters and/or transport mechanisms may yield equally valid results. Therefore, it seems appropriate to utilize data from the treatability study and ongoing monitoring activities to further refine the vadose zone model. Please explain the impact the delay in start-up of the treatability study will have on data collection efforts needed to refine the model in the RI report.

47) Page 5-84, Paragraph 1 -

In addition to providing a reference, also indicate the values used for dimensions and ventilation rates.

48) Page 5-90, Section 5.3.4 -

This section would benefit from inclusion of a map illustrating receptor locations. In addition, please indicate which version of ISCLT was used, and note that problems with the source algorithms in the model make predicted impacts nears the source questionable. Furthermore, the model should address receptors at locations where Idaho ambient air quality standards apply (i.e. nearby highways, EBR-1).

49) Page 5-92, Paragraph 4 -

The on-site airborne transport model assumes that the length of the source area can be based on the area of the source used in the vadose zone model (Section 5.3.1). It is not clear whether or not this is conservative or addresses other appropriate conceptual models.

50) Page 5-94, Paragraph 4 -

State the default values for temperature gradients and wind profile exponents which were used in the modeling.

51) Page 5-95, Paragraph 1 -

The off-site model uses a modeled area for the source that is smaller than that predicted by the vadose zone model (Section 5.3.1) which is reported to provide conservatively high concentrations. Please explain the rationale for this approach.

52) Page 5-96, Paragraph 3 -

Please state the logic for placing the industrial receptor at a distance of 500 m from the source.

53) Page 5-98, Table 5-17 -

The mixing height (800 m) used in the model may not be conservative, since observations have indicated mixing heights as low as 100 m in stable situations.

54) Page 6-1, First Paragraph -

Residential development might indeed have an adverse effect on ecological habitats, or it might have a beneficial effect. The purpose of a BRA, however, is to address the potential health and ecological effects of the contaminants under the no-action alternative, not to address hypothetical (and debatable) effects of future land use.

55) Page 6-3, Paragraph 3 -

See comment #60.

56) Page 6-5, Paragraph 1 -

According to the text, the COCs were determined "based on the detection frequencies of individual chemicals". The text should explain what specific criteria (i.e. detected in 10% of the samples) were utilized in this approach. Furthermore, this methodology may not be appropriate as it does not consider the toxicity of the contaminants. Therefore, the contaminant screening procedure should be performed using approved EPA methods (e.g EPA, 1989; EPA, 1991).

57) Page 6-5, Paragraph 2 -

The text states that transformation products were not included in the risk assessment because they "...were not consistently detected in soil, well, or vapor port samples...". However, of the potential transformation products listed in Table 6-2, three compounds (cis 1,2-dichloroethylene, vinyl chloride, and chloromethane) were not included in the GC target analyte list for samples collected from vapor ports (Table 2-1). DOE maintains that vapor diffusion is the dominant transport mechanism, therefore the absence of analytical data from vapor ports for these compounds may impact the risk assessment. Also note that chloroform was detected in ground water and perched water at concentrations of 42 ug/l and 1500 ug/l, respectively (Tables 4-20 and 4-21).

58) Page 6-8, Second Bullet Item -

Please state the logic for assuming 100 years of institutional control. Also, DOE's requirement for 100 years of control will need to be documented in the ROD, along with the specific agency which would be given responsibility to ensure institutional control is maintained. In addition, recommend refering to specific time periods rather than listing specific scenarios to reduce confusion. For example, the "post-institutional control period" would technically extend to infinity.

59) Page 6-15, Paragraph 2 -

See comments #60 and #61.

60) Page 6-16, Table 6-4 -

With respect to all soil pathways, IDHW does not agree that the surficial soil has been adequately characterized, particularly since very little data has been collected from

the surface soils over the contaminated pits and trenches. As the soil pathways are part of the CSM, and may contribute a portion of the total risk, it is not appropriate to eliminate them.

61) Page 6-16, Table 6-4, administrative controls -

According to page 2-51 of Chatwin et al (1992), "the primary uses of ground water at the RWMC include fire safety, drinking water, and showers for workers". Analytical data from the RWMC production well presented in Table 4-18 indicates that contamination is present in the ground-water supply well. Unless other sources of potable water have already been utilized at the RWMC, IDHW does not agree that administrative controls can be relied upon to limit exposure in occupational scenarios as it would appear that additive effects may already warrant consideration. See also 55 FR 8710.

62) Page 6-18, Table 6-4 -

IDHW agrees that some VOCs would volatilize from ground water used for irrigation; however, residual concentrations may remain in the water. Recommend addressing this issue in the uncertainty section.

63) Page 6-21, Second Paragraph -

The reasoning for discussing the impact of using 95% upper confidence limits is unclear considering the risk assessment utilized average concentrations derived from the modeling.

64) Page 6-22, Last Paragraph -

Please explain why it is conservative to assume that indoor concentrations are the same as outdoor concentrations. It would seem that indoor air, without the potential for dilution effects, could have considerably higher concentrations than outdoor air. Also, it is unclear how the three inhalation pathways discussed in the report were addressed and what contaminant concentrations were developed for each pathway.

65) Page 6-27, Table 6-8 -

The EPA source cited in Chatwin et al (1992) is not listed in the reference list for that document. Please explain how the ground-water ingestion rates were developed.

66) Page 6-42, Fourth Paragraph -

Although there are limitations to the standard approach of summing risks, in this particular case the limitations should be minimal, as the contaminants have similar toxic effects.

67) Pages 6-58 and 6-59 -

The time periods in the subheadings for these sections do not agree with those listed on page 6-13.

68) Page 6-61, Table 6-18 -

Recommend adding the following items to the uncertainty analysis:
- vertical dispersion values used in modeling
- unreported quantities of volatile organic compounds which may have been disposed at the SDA
- advective transport
- degradation products
- biotic and abiotic decay

69) Page 6-62, Table 6-18, subheading Exposure Estimation -

Please explain what parameters are considered to be "non-specific chemical constants".

70) Page 6-62, Table 6-18, subheading Toxicological Data -

The question of the exclusion of potential transformation products needs to be addressed, especially as the list includes the Class A carcinogen vinyl chloride. This represents an uncertainty that would lead to underestimation of risk.

71) Page 6-62, Table 6-18, subheading Toxicological Data -

The uncertainty associated with the omission of chloroform needs to be addressed. The last sentence on page 6-64 provides a way to estimate the amount of chloroform, so it would seem that a qualitative assessment could have been performed using this estimate.

74) Page 6-63, Table 6-18 -

Please explain why the lack of an inhalation RfD for trichloroethylene is only expected to have a "slight" impact on the risk assessment, and quantify what is meant by "slight".

75) Page 6-65, First Paragraph -

The reference (CDH, 1992) does not appear in the reference list in Section 8.

76) Page 6-67, final bullet -

There is not a strong case to be made that summing risks in this case is particularly health-protective or upper-bound. See comment #66.

77) Page 6-68, Section 6.2, First Paragraph -

The first sentence states that an Ecological Evaluation (EE) is typically part of a Baseline Risk Assessment; it does not state that an EE is only performed if immediately dangerous exposures are thought to exist. Also, it is unclear at what concentrations the contaminants would be considered to be "immediately dangerous". Please explain.

78) Page 6-69, Second Paragraph -

Implicit in the last sentence is the unfounded idea that humans are a sensitive indicator species, and that if risks to human health are low, it follows that ecological risks are also low. In all probability there are ecological receptors which are more sensitive than humans. In short, this paragraph is apparently a justification for the dismissal of any surface pathway as being of possible concern, and appears to be unwarranted.

79) Page 6-69, Paragraph 3 -

At present, four water production wells are located downgradient (south-southwest) of the RWMC (page 2-52; Chatwin et al, 1992). These wells are used by livestock and wildlife, and are also used for irrigation (Chatwin et al, 1992). Therefore, ground water is currently an ecological exposure pathway, and its use could increase considerably if land near the RWMC is used for agricultural purposes in the future.

80) Page 6-69, Fourth Paragraph -

As IDHW does not believe the presence of contaminants in surficial soil has been adequately addressed, and that risk-based concentrations may not be appropriate for all species, the question of contact by burrowing animals and plant roots cannot be dismissed.

81) Appendix F -

Appendices D and E, which are supposed to contain the analytical results of the semivolatile organic compounds and gamma spectroscopy data, have been omitted from the report. Please add these appendices to the Draft RI/FS.

References

Chatwin and others, 1992, Final Work Plan for Organic Contamination in the Vadose Zone, Operable Unit 7-08 Focused Remedial Investigation/Feasibility Studt, EGG-WM-10049, June 1992.

EPA, 1989, Risk Assessment Guidance for Superfund, vol. 1: Human Health Evaluation Maunual, Part A, EPA/540/1-89/002.

EPA, 1991, Supplemental guidance for Superfund risk assessments in Region 10.

Halford, V.E., and others, 1992, Remedial Investigation/Feasibility Study for Pad A Operable Unit 7-12, Waste Area Group 7, Radioactive Waste Management Complex.

Luckner, L., and Schestakow, W.M., 1991, Migration processes in the soil and groundwater zone, Lewis Publishers, Inc., 485 p.

Montgomery, J.H., and Welkom, L.M., 1989, Groundwater chemicals desk reference, Lewis Publishers, Inc., 640 p.