

Colorado Department of Public Health and Environment
Hazardous Materials and Waste Management Division

Comments

Revised Final Phase III RFI/RI Report
Rocky Flats Plant 881 Hillside, Operable Unit 1, June 1994

COMMENTS

Incomplete Response to Comments: The Division disagrees with the DOE's conclusion that it is not an efficient use of resources to produce specific responses to all comments submitted by the Agencies to this report. Without a specific response to a comment, it is difficult for the Division to verify that each comment was correctly interpreted and adequately addressed in the revised report. This is evident in the comments below, where the Division was unable to verify that revisions to the report were completed for several comments that were not included in the response to comments. Therefore, the Division is specifically requesting that formal responses be submitted for each of the Division's comments to this revised report. The response to comments should include the DOE's response and a listing of all applicable modifications to the report.

External Irradiation Not Evaluated Quantitatively: The Division's comments specifically required a quantitative evaluation of the external radiation pathway be included in the PHE. The Division has reviewed the discussion of external radiation presented in section F4.5.1, Site-Wide Negligible or Incomplete Pathways, and finds that it does not adequately address the Division's concerns.

The Division considered DOE's simple dismissal of external irradiation at the environmental concentrations found at OUI as insignificant to be inappropriate for a public document. The DOE has not proven this route of exposure to be truly insignificant before arbitrarily dropping it from the risk assessment. Not including external radiation in the risk calculations will result in an unnecessary underestimation of risk. The Division's request is supported both by ICRP 26 and 30 which recommend that exposures to radionuclides be evaluated from all sources for all pathways.

From the risk estimation equation presented on page F4-17, a site-wide Am-241 concentration of 6.8 pCi/g would represent an unacceptable risk (1×10^{-6}). A review of Figure 4-19 reveals several surficial soil sampling locations near the north-east edge of OU 1 with Am-241 concentrations at or above the unacceptable risk level. Obviously, if Am-241 soil concentrations are above unacceptable risk based levels in or near the operable unit it is not appropriate to dismiss the exposure pathway as insignificant.

In previous versions of this document DOE contended simply that at the environmental concentrations of plutonium and americium found at OUI the risks from external gamma exposure were insignificant. In the most recent version, DOE has added to its excuse that EPA's external radiation slope factors were calculated assuming uniform contamination over at least a 200 m² area, and therefore are not appropriate for calculating risks from small hotspots. The Division does not know where DOE came up with the 200 m² value. Information obtained from HEAST and from Milton Lammering, EPA Region 8 Branch Chief, Radiation and Indoor Air Program, who is referenced in HEAST, indicated that the slope factors were indeed calculated assuming a uniform concentration of radioactivity, but the radioactivity was assumed to be simply spread over an infinite plane in a thick layer of soil. Neither Mr. Lammering nor HEAST mention a 200 m² area.

DOE did the example risk calculations presented in Appendix F4 for a 30 year exposure to the "OUI site-wide concentration of 0.41 pCi/g Am-241" and for the OUI-site-wide concentrations of Pu-239,240 and U-233,234 and U-238, but did not do similar calculations for the hotspot concentrations as specifically requested by the Division. The external radiation risks for the hottest Pu hotspot (11,100 pCi/g) is 6×10^{-6} and for the hottest Am hotspot (2,650 pCi/g) is 4×10^{-4} . This calculation was made using the unlikely assumption that a receptor would spend 30 years on a

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relatively small (1 m²) hotspot. While it may not be likely that someone would spend all their life on such a small area, it would not be unreasonable to group the hotspots found on IHSS 119.1, for example, into the average size of a backyard and calculate the external radiation risks from exposure to the average concentration in that area.

DOE may be strictly correct in that EPA's slope factors were not intended to be used to assess risk from small hotspots. However, the Division does not agree that these slope factors simply cannot be used for this purpose. Using these slope factors to calculate risk from a small hot spot would just add a little more uncertainty to the assessment, which could be addressed in the Uncertainty Section. Moreover, doing this calculation on a group of hotspots in an area the average size of a backyard would avoid the whole problem and would address the State's request that external radiation exposure for hotspots be assessed.

Estimation of Inhalation RfCs from Oral RfDs: The Division commented on previous versions of this document that DOE did not consider exposure to chemicals by inhalation of dust particles in this risk assessment because of the lack of published inhalation RfCs. We requested that DOE convert available oral RfD values to inhalation toxicity factors for those chemicals where no evidence exists in the literature that they cause irritant or localized effects and that DOE calculate intake values for chemicals that as yet do not have toxicity values.

DOE has not incorporated this Division comment. Moreover, the DOE did not calculate inhalation intakes for semivolatile chemicals (PAHs and PCBs). The Division requested this information so as not to present a misleading picture of potential exposures. These chemicals are present and exposure is possible by inhalation. In addition, DOE has failed to even qualitatively discuss the elimination of semivolatiles from the risk assessment for the inhalation of dust particles pathway in either the toxicity section or the uncertainty section.

If the DOE had conducted a review of the toxicity literature on PAHs and PCBs, as suggested in the Division's comments, it would have revealed that it may not be strictly appropriate to do route-to-route extrapolation from oral toxicity values to inhalation toxicity values for these two groups of chemicals. According to ATSDR's Toxicologic Profile on PCBs, this group of chemicals can cause irritant effects on the respiratory system when inhaled. ATSDR's Toxicologic Profile on PAHs reports that this group of chemicals appears to cause cancer in those organs that have direct contact with them e.g., dermal contact results in dermal cancers, inhalation exposure results in respiratory tract cancers and oral exposure results in GI cancers. Therefore, extrapolation of oral toxicity factors to inhalation toxicity factors may not be strictly appropriate for this group of chemicals either.

If after conducting a complete toxicity literature review, the DOE agrees with the findings discussed above, it may be sufficient for the DOE to thoroughly discuss the toxicity of PCBs and PAHs qualitatively in the Toxicity Section and the underestimation of risk that results from not calculating the risks from exposure to these chemicals in the Uncertainty Section. A good, readily available source of information that DOE can reference are the ATSDR Toxicity Profiles.

Inhalation is a major route of exposure for humans to both PAHs and PCBs (ATSDR Toxicity Profiles for PAHs and PCBs, respectively). Inhalation of PCBs as well as oral ingestion of PCBs results in both hepatic and hemopoietic toxicity in animals (ATSDR Toxicity Profile for PCBs). Both of these groups of chemicals are demonstrated carcinogens in animals. In addition, many of the maximum PAH concentrations at RFP equal or exceed the RfCs for residential soil developed by EPA Region 3 toxicologist, Roy Smith, though DOE's modeled air concentrations do not

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exceed the RBCs for air in the Region 3 document.

The DOE has still failed to prove that they are not the source of either of these two groups of chemicals. PCBs could have contaminated some of the oil used in the past at RFP. There were two large fires at the plant in 1957 and 1969 that could have contributed to the PAH pollution. Though the risks may eventually prove to be low, the Division believes that the air pathway is complete and the potential toxic effects are serious for these chemicals. Therefore, at a minimum a qualitative discussion on the health effects and on the underestimation of risks by not quantitatively evaluating these two groups of chemicals needs to be thoroughly discussed in the text.

In addition, the Division requires the DOE to calculate the intakes of all of these chemicals so that it is obvious that a receptor would be exposed, by inhalation of particulates, to these chemicals and so that intake values are available to estimate the risk once inhalation toxicity factors become available. Leaving the chemicals completely out of the risk assessment, as the DOE has done, is inappropriate since it potentially results in an underestimation of risk.

Treatment of Chemicals without Toxicity Values: CDH previously commented that we would like to see at a minimum a complete list of all chemicals and pathways that were present but were not considered in this risk assessment due to a lack of toxicity values. DOE provided a table showing why chemicals were eliminated as contaminants or COCs. However, there are still several chemicals, including anthracene, benzo(ghi)perylene, chrysene, indeno(1,2,3-cd)pyrene, acenaphthylene, and phenanthrene that appear to have been eliminated because of a lack of toxicity data. This was inappropriate. In addition, we also previously asked that contaminants dropped from the quantitative PHE because toxicity values were not available should be carried through the intake calculations so that if toxicity values become available in the future they can be quantitatively evaluated and so that it is obvious that there is exposure. DOE has not done this to date.

Some of these concerns may indeed wind up contributing insignificant amounts of risk in the end, but because this is a public document, DOE cannot simply dismiss routes of exposure or chemicals as insignificant without going through the agreed upon methodologies for evaluating them.

Exposure Pathways not Evaluated: CDH requested that future construction worker exposure to surface soils as well as to subsurface soils be evaluated. DOE still has not incorporated this comment. Does DOE think that there would be no dust at a construction site?

CDH also requires that office and ecological worker dermal contact with surface water be evaluated. DOE has agreed to evaluate surface water in OU5 instead of in OU1.

Preliminary Benchmark Tables: The Division's comment regarding preliminary benchmark tables has not been adequately addressed. The Division specifically requested that the finalized and approved Sitewide Benchmark Tables be incorporated into this report. The deletion of the benchmark tables from the report is not an acceptable response. The Division requires that the finalized and approved Sitewide Benchmark Tables be incorporated into this report.

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SPECIFIC COMMENTS:

Detection Limits: The Division could not find where this comment was addressed in the revised report. The Division requires documentation of how this comment was addressed and what modifications have been made to the report.

Table D1 and Appendix C Summary Tables: The Division does not believe that this comment has been addressed in the revised Report. A review of Table D1 and Appendix C indicates that the type of statistical distribution assumed in calculating statistical summaries has not been reported. The Division requires documentation of how this comment was addressed and what modifications have been made to the report.

Units on Figures in Section D: This comment was intended to identify Figures in Section 4, Nature and Extent of Contamination, as missing unit designations for borehole depth. The Division errantly referred this comment to Section D on the report. The Division is disappointed that the DOE did not ask for clarification of this comment when figures matching the description provided could not be found, especially given that this comment was discussed at the 24 January 1994 meeting.

Regardless of the errant reference in the Division's comments, the following figures still do not list units for the depth of borehole sample results and must be revised; figures 4-2, 4-3, 4-4, 4-12, 4-13, 4-14. Given the previous confusion over depth units associated with hotspot sampling results, the Division is requiring the revision of these figures.

Quality Control of Section F Tables: The citation of the reference to [Smith 1993] in Table F6-1 is still not listed in the references section F9. The Division requires that a full citation for this reference be added to section F9 of this report. Additionally, notes 4 through 9 are missing from the footnote in Table F6-2 and must be corrected.

Table F3-28. Contaminant and COC Screening Process, Groundwater Organics - Several OUI contaminants were eliminated as OUI COCs by the 1000xRBC Screen because of a lack of an RBC. This is inappropriate. If no toxicity values are available for a chemical, that chemical should be included in the qualitative risk assessment. It should not be dropped (US-EPA, 1989. RAGS, page 5-24). These chemicals include: 2-butanone, 2-hexanone, 4-methyl-2-pentanone, 1,2,4-trimethylbenzene, naphthalene, p-chlorotoluene, p-cymene, and tert-butylbenzene.

Table F3-31. Contaminant and COC Screening Process, Geologic Materials Total Radiochemistry - Uranium-235 cannot be screened out due to less than 1% of the carcinogenic risk when no noncarcinogenic toxicity data is available for it.

Page F7-14, F7.3.1. Sources of Uncertainty - The lack of inhalation RfCs or RfDs for PAHs, and the reasons why DOE did not calculate inhalation intakes of these chemicals in airborne dust were not discussed as sources of uncertainty. DOE is commended, however, on finally including a discussion of many of the other chemicals which do not yet have toxicity values in this section.

Table F3-32. Contaminant and COC Screening Process, Geologic Materials Organics - Phenanthrene should not have been screened out because of a lack of toxicity data.

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Table F3-36. Contaminant and COC Screening Process, Surface Soil Organics - Anthracene, benzo(ghi)perylene, chrysene, indeno(1,2,3-cd)pyrene, and phenanthrene should not have been eliminated as OUI COCs simply because of a lack of toxicity data. They need to be discussed in the qualitative risk assessment. Acenaphthylene should not have been eliminated by the 1000xRBC Screen as an OUI contaminant of concern simply because of a lack of toxicity data. The Division does not understand why the spatial/temporal considerations were "not applicable" (NA) for so many of the chemicals found in the surface soil.

Page F4-18 - The exposure because of external irradiation should be calculated regardless of whether DOE considers this to be a significant pathway or not and regardless of whether EPA's current external radiation risk values are applicable to small hotspots or not. Not calculating the intakes from this pathway downplays any potential risk that might result from exposures by this route.

Tables F5-4 & F5-5; F5-8,9,10,11; F5-14,15,16,17; F5-20 & F5-21; F5-24,25,26; F5-29,30,31; F5-34,35,36; F5-39,40,41; F4-44,45,46 RME Carcinogenic and Noncarcinogenic Intakes for all receptors - Why were intakes from inhalation of nonradionuclides in dust particles not calculated? DOE agreed to calculate inhalation of airborne particulate matter for these receptors as shown in the Conceptual Site Model and as mentioned in the text on pages F4-20,21,23,24 & 26. Moreover, DOE has modeled the airborne particulate RME concentrations of the chemical COCs as shown in Tables F5-3, F5-7, F5-12, F5-19, F5-23, F5-28, F5-33, F5-38 & F5-43. Furthermore, because intakes were not calculated for this pathway, risks from inhalation of chemicals were not calculated, potentially resulting in a large underestimation of risk. Inhalation toxicity values for many of these chemicals are not yet available. However, as mentioned in the general comments, intakes should still be calculated, otherwise, a misleading picture of potential exposures and risks is presented.

Table F5-13. Estimated RME Concentrations of COCs for the Future On-site Construction Worker - Why were no airborne particulate concentrations for chemicals presented for this receptor? Does DOE believe there would not be any dust at a construction site, or are the RME values the same as those for the future office worker? Also, please present the rationale for why a concentration for toluene is presented in the airborne particulate column.

Page F2-15, F2.2.6.3 Semivolatile Organic compounds - DOE persists in ignoring the possibility that PAHs may have come not only from general, widespread sources such as urban fallout from vehicles, asphalt dust and furnace exhaust, but also from incineration at RFP and from the 1957 and 1969 fires at the RFP. Both EPA and the Division have consistently commented on this omission in previous versions of this report. Since there has been no change, the only conclusion is that DOE is deliberately attempting to underplay the possibility that RFP may have contributed to the presence of these pollutants.

F2.2.6.4 Polychlorinated Biphenyls. Page F2-15 - The Division has previously commented that oil may be the source of PCBs found on the RFP. Again DOE has not considered oil used by RFP in industrial or other processes as a possible source.

THE LACK OF INCORPORATION OF THE DIVISION'S COMMENTS ON EXTERNAL EXPOSURE AND INHALATION OF CHEMICALS WITHOUT TOXICITY VALUES AS DUST PARTICLES ALONG WITH THE FOLLOWING 5 COMMENTS GIVE THE GENERAL IMPRESSION THAT DOE IS TRYING TO UNDERPLAY THE RISKS.

Page F7-16 - The Division agrees with DOE that an area weighted average might give a more representative site-wide average. However, it is not clear from DOE's

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explanation why the concentrations of 1,1-DCE and CCl₄ in groundwater are more representative than the concentrations of plutonium and americium are in soil. Didn't the groundwater data also include the detects at the source just like the soil data did? Without some discussion of the size of the groundwater plume relative to the size of the hotspots in soil, DOE's overemphasis on the tiny relative size of the soil hotspots seems overblown, simply because it is repeated so often. Furthermore, Colorado under RCRA requires an estimate of risk at the source in order to get an idea of the risks from the areas that might actually need further action. Therefore, regardless of whether the DOE thinks the hotspots bias the site-wide risks or not, it is useful to determine the hotspot risks.

F7.4.2 Expected Impact to the Community - DOE's opening paragraph in this section gives the impression right off the bat that DOE wants to minimize risks, rather than present them objectively. One should not assume up front that risks are minimal. Rather, the uncertainty of the risks should be presented, and conclusions drawn from that. The first paragraph belongs at the end of this section rather than at the beginning.

Page F7-27 - DOE's presentation of the relative risks to the population at various distances from RFP was not clear at all. Since this is to be a public document, DOE should consider rewriting this section so that it is understandable. Part of the reason for the lack of clarity in this section is that DOE's method for calculating a collective dose is convoluted at best, and is definitely not a standard approach. It is not clear why DOE presented the normalized risk factors (NRFs) and then tried to come up with a per capita average. Simple calculation of the collective dose would show how a dose would decrease with distance. If one wants to present the average risk to an individual, one can do it by dividing the collective dose by the number of people, and plotting the ratio as a fraction for each area. DOE's focus on the NRF, i.e., the collective dose for a population/the maximum dose for an off-site individual, again gives me the impression they are trying very hard to minimize the risks resulting particularly from Pu exposures, rather than just presenting them objectively.

Furthermore, DOE's NRFs as presented in Figures F7-19, F7-20 and F7-21 were calculated based on data from only one year. DOE should total up the risks for a 30 year period and present the relative risks for that time period also. Otherwise, it gives the impression, again, that DOE is trying to minimize the risks.

Page F7-28 - DOE's discussion of the lack of causal links in the literature between radiation exposure from nuclear facilities and noticeable public health effects reinforces the impression that DOE is trying to minimize the risks in this section. What 40 radiological studies were in the review? What is the reference? DOE continues to focus on cancer fatalities, even though cancer incidence is not an insignificant public health effect. It is not appropriate for the DOE to use the current lack of statistical proof in the epidemiological studies performed so far as an indication that there is no effect, when the question is still open.

Page F7-35, Summary of risk characterization - Where is Table F7-31 which presents the quantitative uncertainty analyses of both 1,1-DCE and carbon tetrachloride? It was referred to on this page, but couldn't be found in this document. In the text DOE discusses 1,1-DCE, where the calculated site-wide RME value is higher than the 95th percentile, but does not discuss carbon tetrachloride, where the calculated site-wide RME value was lower than the 95th percentile. Again, by not presenting data or calculations that show that the RME values are not so unrepresentative, DOE has left the impression that they want to minimize the risks.