

**Colorado Department of Health**

**Review and Comment**

**Historical Information Summary and Preliminary Health  
Risk Assessment for OU 3, Final Draft, November, 1990**

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General Comments

1) Many of the comments on this document are identical or similar to the comments on the "Remedy Report - Operable Unit 3, SWMU 199," Final Draft, October, 1990 (hereafter called RR-OU3). To avoid re-stating these comments here as they apply to the Historical Information Summary, they are referenced.

2) Once again, the Division is concerned that because this document only contains a qualitative health risk assessment, it does not fulfill the requirements of the IAG (general comment 1; RR-OU3). Please summarize more completely the data quality, data quantity, needed but missing data, and reasons why a quantitative health risk assessment can not be completed. This document is entitled, in part, "Preliminary Health Risk Assessment" and it is unclear why a quantitative risk assessment can not be attempted in this document with the text clearly stating the shortcomings of the calculations and that the results are very preliminary.

3) Many of the following comments ask for data and/or maps of data that need to be included in the text or added as appendices. As with the comment to the RR-OU3 (general comment 3), this document is to be a summary of all historical information on the sites. The Division does not consider a two or three sentence paragraph of a major data collection and analysis to be a complete summary. For a reader to understand completely and confidently both the strengths and short-comings of any study, well chosen maps and tables of data would be a tremendous help and would still remain within the limited scope of this document. Just because this data has not been validated and, in fact, would probably not stand up to rigorous QA/QC protocol does not mean it is valueless and should be hidden.

4) The distinction between soluble and insoluble plutonium needs to be made throughout this document (general comment 4; RR-OU3).

5) General comment 5 to the RR-OU3 mentions the on-going dose reconstruction and toxicological review being conducted by the Colorado Health Department and funded by DOE. Please refer to that comment and determine how that study will impact this report.

6) General comments 6 and 7 to the RR-OU3 are also applicable to this document and need to be addressed.

### Specific Comments

Executive Summary, page ES-2: The third paragraph on this page states that the releases to the reservoirs were the result, primarily, of routine RFP operations during the 1950's and 1960's. The text should note that significant releases occurred after this time frame. An example would be when the B series ponds were reconstructed. Also, releases from the 903 pad area were not a result of routine operations!

Executive Summary, page ES-3: The first bullet on the top of page ES-3 could be expanded to include the fact that the HASL/EML chronological dating of sediment deposits in Standley Lake identified the period of greatest plutonium deposition as 1958-1968. This corresponds to the time when the 903 pad was in operation.

Executive Summary, page ES-3: Mower Reservoir was sampled and the sediment concentrations reported by EPA and CDH in their respective 1970 efforts.

Executive Summary, page ES-4: The value of 0.02 pCu/m<sup>3</sup> is a DOE order value which is consistent with the same values in NRC and CDH regulations.

Section 1.2: Please see the comment regarding OU re-prioritization under the IAG in the comments to the RR-OU3.

Section 2.0: Please describe how the flow from the main production facility is diverted around and/or prevented from reaching the reservoirs.

Section 2.0: The third paragraph of this section states that sections 3 and 4 of this document are based on the conclusion that radionuclides (plutonium and americium) are the only contaminants of concern. This may be true, but most (if not all) of the sampling done to date has only sampled for these two constituents and there is no knowledge of what other contaminants may also be present in the reservoir sediments. Therefore, the assumptions made in this document may invalidate sections 3 and 4.

Section 2.0: While individual data points may not be validated,

the abundance of data points over time is a form of validation in itself. The data can definitely be used to identify the magnitude and range of contaminant values related to these IHSS's. Any new data set will also probably be out-dated and un-useable years from now. Please remove statements like "existing data are of unknown quality" and "the specificity and quality of these data is insufficient . . ." and replace them with statements that recognize that the data was accumulated under proper QA/QC procedures at the time and was of high quality. Then explain that these procedures have been updated and changed since this data was collected and that, while still useful for certain analyses, new data must replace the old for rigorous quantitative health risk assessment (please see general comment 7 to the RR-OU3).

Section 2.1.1: Please provide a map showing the location of the two boreholes that the U.S. Army Corps of Engineers used in the 1989 evaluation of a surface water interceptor system.

Section 2.1.1: Please provide a detailed map of the Great Western Reservoir area that shows the complete surface water system: Lower Church Ditch, the Broomfield diversion ditch, the Walnut Creek drainage with the "A" and "B" series ponds and their respective purposes, other ditches like the McKay Ditch, etc. The Broomfield Diversion ditch was not constructed west of GW reservoir, as is indicated in the text, but constructed to begin on the west side of the reservoir and continue around the south side of the reservoir to empty in to the drainage below the reservoir outlet.

Section 2.1.2.1: A map should be included that shows the location and data values for the bottom sediment sampling done by the EPA in 1970. How deep was the contaminated sediment layer at that point?

Section 2.1.2.1: A map should be included that shows the location and data values for the sampling that EPA did in 1973. The time frame of the pond reconstruction should be specifically referenced as well (1972-1973).

Section 2.1.2.1: What is the location of the cores used by Battelle in 1974 that age-dated the lake sediment. Where were the lake and stream sediment samples taken that established higher-than-background levels for radionuclides?

Section 2.1.2.1: Please provide a map of the location and data values for the sampling that Dow Chemical did in 1975.

Section 2.1.2.1: Can it be concluded from the Rockwell International study of the spillway sediments that no plutonium ever migrated or was released over the spillway? Does this mean that no plutonium contamination that was water borne ever went downstream of the GW reservoir dam?

Values for the samples split with Broomfield and CDH did exceed the

state soil standard. Please review this data. Broomfield had a concern about the disposal of this dredged sediment because it exceed the standard.

Section 2.1.2.1: Please provide a map of the location and data values for the sampling done by Rockwell International in 1983. How deep and thick was the plutonium contaminated layer at the time of this study?

Section 2.1.2.1: From the studies summarized, is it possible to verify the sedimentation rates given for the 1983 Rockwell International study? From the text, it is unclear whether this value was based on 60 core samples or if 60 samples were taken, some of which (no number given) were sediment cores.

Section 2.1.2.1: This section would be aided by the same introductory maps that the Division asked to be included in the RR-OU3. The first of these would be similar to Figure 2-1, but would include adjacent land ownership and zoning to the reservoirs. The second should show the wind blown plutonium soil contamination plume that emanated from the 903 Pad and continues off-site to the east in and around the three reservoirs. Comparisons could then be made of the relative contamination levels in the surrounding soils and the lake sediments and an estimation could be made as to how much of the plutonium in the lake sediments came from surface waters exiting the plant and how much came from wind blown dust settling into the lake.

Section 2.1.2.2: The Rocky Flats Program Unit does not maintain all of the data from CDH, the City of Broomfield, and RFP.

Section 2.1.2.2: There is a discussion in the text on the formulation and verification of the baseline value for plutonium levels in soil and sediment samples. However, there is no discussion on how the baseline value was formulated for water samples. Please include an explanation of this baseline value.

Section 2.1.2.2: Regarding the tritium release to GW reservoir, it would be helpful to refernce the fact that it took four years for the reservoir to return to background levels based on CDH and RFP surveillance.

Section 2.1.2.2: The text states that the latest surface water quality data is presented in the 1988 RFP annual environmental monitoring report and says that all of this latest data is below the EPA and CDH drinking water standards. What are these standards and how far below them were the sample data values?

Section 2 1.2.2. Several ongoing sampling programs are mentioned in the last paragraphs of this section but no discussion in the text presents what these programs are finding. Please summarize the results of these sampling programs to date.

Section 2.2.1: As with the comment above concerning Great Western reservoir, there needs to be a map included in this portion of the text that shows a detailed diagram of the surface water system that includes Standley Lake reservoir. This map should show the water supply ditch coming from Clear Creek, the entire Woman Creek drainage with the "C" series ponds and their respective uses, the interceptor ditch south of the plant site, the above-ground pipeline to the NPDES treatment facility, the Mower reservoir ditch, etc.

Section 2.2.1: The final sentence on page 13 says that Standley Lake is fed by Woman Creek. Earlier in the text, on page 4, the text states that surface water control measures now prevent flow from the main production facility from reaching the reservoirs. Please clarify this apparent contradiction.

Section 2.2.1: In the third paragraph of this section, the text discusses the above-ground pipeline that transfers water from the Woman Creek drainage to the Broomfield Diversion Ditch. This pipeline is not presently transporting any water and has not for some months. In addition, the agreement between DOE and the City of Broomfield has now expired. What are the current plans for this pipeline and will the DOE-Broomfield agreement be extended?

Section 2.2.2.1: In a similar fashion to the comments on Great Western reservoir above, please include maps of sample locations and data values for the various studies done on water quality and sediment sampling for Standley Lake reservoir. This should include, but is not limited to, the 1970 and 1973 EPA studies, the 1974 Battelle study, and the 1984 Rockwell International study.

Please emphasize the fact that the inferences made from the single core taken during the Battelle study have severe limitations. Reservoir wide conclusions on a single data point could be very inaccurate.

Section 2.2.2.2: Throughout this report, values need to be referenced in any discussion of baseline values or EPA and CDH water, soil, sediment, or air standards.

Section 2.2.2.2: What have the ongoing sampling programs found in the way of plutonium contamination?

Section 2.3: In the first paragraph of this section, the text states that Mower reservoir is located on land which was the subject of a lawsuit against RFP. According to the maps provided in the RR-OU3, it does not appear that Mower reservoir was included in this land. Please clarify this apparent contradiction.

Section 2.3: As stated earlier, Mower Reservoir has been sampled by both EPA and CDH (1970).

Section 3.0: Please include a reference to the information in the USGS reports on plutonium in ground water by Jess Cleveland (a former RFP/Dow employee).

Section 3.2: How deep within the lake sediments is the plutonium contaminated layer? How does this depth affect the availability of the plutonium to the release mechanisms?

Section 3.3: The mobilization of sediments from recreational uses can be significant, particularly in the shallower reaches of the reservoirs. The City of Broomfield stopped recreational use of GW Reservoir because of the increased treatment necessary.

Section 3.3: On page 25, reference again needs to be made to the USGS reports on plutonium in the ground water referred to in the comment on section 3.0 above.

Section 4.0: Referring to the third paragraph of this section, dosimetric considerations for plutonium at RFP that are used by both RFP and CDH (see FEIS 1980) use AM-241 at 20% of the PU-239+240 radiometric concentrations. Because of the long-term residency of these sediments and soils, use of the maximum ingrowth values is required in any assessment.

The final sentence of this section is correct if both Pu and Am have the same GI absorption ( $1E-3$ ). Am-241 needs to be included because of the long-term residency using the maximum transient equilibrium values. Additionally, a statement needs to be included regarding the potential of past releases of non-radioactive hazardous materials.

Section 4.2: Please refer to the two comments regarding proposed ARAR's in the comments to the RR-OU3 and address them here as they relate to this document.

Section 4.2: Please see the comment regarding the Memorandum of Understanding and the Mutual Cooperation Agreement in the comments on the RR-OU3 and address it relative to this document.

Section 4.2: Mower Reservoir was sampled. Please see previous comments.

Section 4.2: The CDH values of 0.03 and 0.05 pCu/l have been exceeded in the past. As an example, see the data for the time period that includes the B series ponds reconstruction.

Section 4.2: In the last paragraph of this section, please note that the  $0.02 \text{ pCu/m}^3$  is based on the ICRP recommendations and has been incorporated in to the regulations of DOE, NRC, and CDH

Section 4.2: Also in the last paragraph, the Division is unaware of any measurement data that unequivocally indicates that the

airborne plutonium at RFP is Class Y. If this is an assumption, so indicate.

Section 4.4: Once again, please re-word the text to indicate that past sampling met past QA/QC requirements, even though it does not meet today's protocols.

Section 4.5.2.1: While there may be three categories in which soil particles can be dislodged from the ground surface, there are more than three specific mechanisms. Please clarify the text on this item.

Section 4.5.2.2: Please remove iodine from the list of elements with no known metabolic function. Iodine plays an important role in thyroid activity, which, in turn, plays a large role in body metabolism.

Section 4.5.2.2: In the fourth paragraph of this section, reference is made to "first crops." What about second, third, etc. crops?

Section 4.5.2.3: Referring to the first paragraph of this section, plutonium resides predominantly in a discrete layer, but is present in all layers of these sediments.

Section 4.5.3: Since no values accompany the rankings (high-negligible), this section is meaningless.

Section 4.5.3.1: Item 2 in the text must be qualified to indicate that only bio-accumulation in fish has been specifically referenced in this document. Item 3 should be re-worded to say "Plutonium, in amounts of significance in the sediments . . ."

Section 4.5.4: Item 4 should be re-worded to say "Apparently, the plutonium is strongly bound . . ."

Section 4.6.2: Contrary to the DOE 1988 quote, the absorption of Pu and Am in the GI track used by DOE is  $1E-3$ . This is cited in the DOE orders and the MOU and MCA with the State. There is no specific data from the RFP environment that indicates otherwise.

Section 4.7.1: The narrative descriptors are useless without quantifiers. One definition of "negligible" may be orders of magnitude different from another.

Section 4.7.2: The assumption for risk that is used (and needs to be referenced in the text) is  $1E-3$  which is the f1 factor for GI absorption. There is no specific data to the contrary and it is the value of preference in DOE Orders.

Section 4.7.2: Limiting the discussion to only Class Y plutonium is inappropriate because there is no specific data demonstrating

the absence of Class W.

Section 4.8.1.4: There is a viable scenario of unknown significance. If sediments of greater than 2 dpm/g were dredged and stored in piles with no wind protection, some plutonium would be re-entrained.

Section 5.0: In addition to the data types listed as needed for a quantitative health risk assessment, please add stratified water samples from within the reservoirs and biota sampling. These are addressed within EPA guidance documents for RFI workplan preparation.

Section 5.0: There are localized areas in GW Reservoir where the state standard is exceeded. The average value would be below the standard.

Section 5.0: Mower Reservoir was sampled by EPA and CDH.

Section 5.0: Ingestion is a viable pathway and was important for the construction of ponds B-5 and A-4, the Broomfield Diversion Ditch, and the sampling prior to discharge.

Section 5.0: The Division is not aware of any specific studies relative to these reservoirs that would support the last bullet.

Section 6: There are 12 references included that are not given an "identifier." Are these references cited in the text? If not, they should either be removed, or relocated and their purpose specified.

Table 2.1: This table is a very good addition to this document. It could be expanded to discuss the various data set short-comings and QA/QC problems associated with each study. This would help explain why a quantitative health risk assessment is not possible at the present time. Please put a similar table in the RR-OU3. It would be very helpful there, as well.

There are some data sets missing from Table 2.1. For GW Reservoir, the Broomfield and CDH data are missing. From the Standley Lake section, CDH data is missing. The EPA and CDH data have not been cited for Mower Reservoir, and CDH monthly data summaries and special reports are not listed for general data sources. Please remember! CDH data is significant. The CDH lab certifies other labs within Colorado for all analyses, participates in various inter-laboratory comparisons, and has independent and valid data (contrary to DOE and DOE contractor opinion)