

COLORADO DEPARTMENT OF HEALTH
Radiation Control Division
Environmental Radiation Unit

MEMORANDUM

To: Dr. Normie Morin, RFPU

Date: May 14, 1991

From: R.W. Terry

Subject: FINAL Historical
Information Summary and
Preliminary Health Risk
Assessment -- Operational
Unit No. 3 - IHSS 200 -
202

As per your request, I have reviewed the above-captioned document. It has a number of deficiencies that I think need to be addressed. In its present form the document should be viewed as incomplete; at the same time, the document contains a lot of information, some of which is redundant or unnecessary. This memorandum does not provide a detailed critique of the document. The main areas that require improvement are discussed below.

I. DESCRIPTION OF THE OPERATIONAL UNIT

The document provides a map showing Great Western Reservoir, Mower Reservoir and Standley Lake, IHSS 200 - 202. The document states that IHSS 199 is outside the scope of the report. I have no opinion of whether IHSS 199 should or should not be within the scope of the report, but it would be constructive to define the boundaries of IHSS 199, so that there are definite boundaries on the total scope of activities that are anticipated for Operational Unit No. 3.

II. DESCRIPTION OF THE EXTENT AND DEGREE OF CONTAMINATION WITHIN OU NO 3

The document provides a summary of most of the relevant measurements of plutonium contamination in sediments in the three lakes. While the discussion points out that many of these measurements are from core samples, there is no coherent summary of the depth at which the highest plutonium concentrations are found or of the depth to which plutonium contamination extends.

While the document provides some tabulation of past measurements, no attempt has been made to estimate an average concentration of plutonium in the sediments in each of the lakes.

In the context of the report, the discussion of contamination from worldwide fallout does not appear to be relevant. While worldwide fallout concentrations in shallow reservoir sediments along the Front Range may be a reasonable endpoint for remedial activities, it should be assumed that substantially all of the plutonium within 7 or 10 miles of the Rocky Flats Plant originated from operations at Rocky Flats.

ADMIN RECORD

A-DU03-000016

In short, because there are no definite boundaries shown for IHSS 199, and by extension of OU No 3, and because the depth to which plutonium contamination in the sediments exists is not defined, and because there is no meaningful information about either the presence or absence of contamination in groundwater, the document defines no boundaries on the area for which remedial activity is to be considered

III DESCRIPTION OF THE CONTAMINANTS PRESENT, THAT ORIGINATED FROM ROCKY FLATS

The document makes a cursory mention of the 1973 Broomfield Tritium Incident, yet there is absolutely no information about either past or present tritium concentrations in water or sediment. These concentrations are presumed to be negligible; however, the document should provide hard evidence that such a presumption is correct.

The document provides no information about other types of contaminants that have been considered, if only for the purpose of eliminating them from future discussion.

Practically all of the plutonium measurements that have been made in the vicinity of Rocky Flats have been alpha spectrometric measurements of $^{239+240}\text{Pu}$. As we all know, Rocky Flats Plutonium, or RFPu, is made up of ^{238}Pu , ^{239}Pu , ^{240}Pu , ^{241}Pu and ^{242}Pu , together with ^{241}Am , a product of the radioactive decay of ^{241}Pu . RFPu is well characterized. ^{241}Pu decays relatively quickly, with a half-life of 14.4 years, and americium may move around in the outdoors separately from plutonium; however, reasonable assumptions can be made about the relative concentrations of each of the isotopes of RFPu, including ^{241}Am , once $^{239+240}\text{Pu}$ is known. The document fails to address any isotope other than ^{239}Pu in any meaningful terms. While there may be some disagreement about the selection of ^{241}Pu and ^{241}Am ratios, the ultimate impact of the disagreements on dosimetry and health risk, and finally on any public policy decisions, will be negligible. The total contribution to dose and thereby health risk of these constituents will not be negligible, and they must be addressed.

IV DESCRIPTION OF PATHWAYS CONTRIBUTING TO RADIATION DOSE

The document provides a great deal of discussion of the pathways that must be evaluated. To summarize for the authors, only two pathways need be considered, (1) consumption of water from the reservoir and (2) windblown sediment at times when the reservoirs are low or empty. Uptake through fish might be considered, but virtually no actinides are incorporated into fish (certainly not into the edible portions) and none of the lakes provides any significant fraction of any person's diet.

While these are the only pathways that are important to me, other reviewers may place importance on a variety of pathways, including inhalation, ingestion, groundwater contamination, uptake through irrigated crops and evaporation. Drs. Jess Cleveland and Terry Rees have produced a large body of relevant and useful site-specific information relating to *in situ* chemical form and mobility of actinides. This document should thoroughly address such issues, even if only to put concerns to rest.

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re Operation Unit No 3 - IHSS 200 - 202
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V. DESCRIPTION OF THE BASELINE RISK ASSESSMENT

The information provided ^{by} ~~the~~ the Environmental Protection Agency, in units of risk per pCi, or risk per pCi/gm, or risk per pCi/L, has no value for this application. Furthermore, the work presented is inconsistent with respect to periods of uptake and dose commitments, with values ranging from 30 or 40 to 70 years.

For windblown sediments, reasonable assumptions can be made about suspension factors (a default suspension factor of 10^{-5} uCi/cm³ per uCi/cm³ is a thousand or a million times or more too cautious), particle size distributions and chemical form (oxide). The dosimetry workup follows naturally.

For water, K's etc are unnecessary, since actinide concentrations have been routinely measured at the intakes to various municipal water supplies as well as in the finished water as delivered to the customer. If a design-based evaluation of the sediments is to be made in case the sediments at the bottoms of the reservoirs are ever disrupted, then the document should do so.

Again, the work of Cleveland and Rees, and others, should be useful, particularly for dosimetry associated with water.

Once a good dosimetry evaluation has been made, showing a range of values for each coefficient in the model and a rationale for selection of specific values, a final estimate of dose, together with reasonable sensitivity testing, can feed an evaluation of risk per unit of radiation dose. There is no well-established consensus for risk per unit of radiation dose, but as regulatory staffs produce new risk coefficients, the impact on public policy decisions can be evaluated much more quickly and efficiently.

In summary, the document fails to incorporate a very large amount of useful site-specific information that has been collected by Rocky Flats Plant staff, the United States Geological Survey, Colorado State University, the Colorado Department of Health and the cities of Broomfield and Westminster. The document also fails to place boundaries on the extent and degree of contamination in the area, on the number of contaminants that warrant review, and on the application of dosimetry and/or risk evaluations that may be used. While a consensus on the use of several coefficients seems at the present time to be an impossible task, a tabulation of coefficients and a rationale for their selection should place reasonable upper and lower boundaries on the estimated public health and environmental impacts of decisions relating to remediation.

If you have any questions or comments about the information that I have provided, or if you believe that any of the information that I have provided is in error, or if I can be of any further assistance in this matter, please do not hesitate to call me at x4816.

cf Jake Jacobi
R M Quillin
file 4-8000

