

Rocky Flats Plant SEC Petition 192

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Oakland, California**

Petition Overview

- **August 23, 2011: NIOSH received an 83.13 petition for period of April 1, 1952 to December 31, 1989 covering tritium exposures. Designated as SEC-192.**
- **February 9, 2012: Petition qualified for evaluation and petition period revised to extend to December 31, 2005.**

Petition Overview -contd.

- **October 17, 2013: Evaluation Report Rev. 1 expanded investigation to cover Thorium, U-233 and Np-237.**
- **Board then extended existing SEC-30 (up to 1966) to cover all employees w at least 250 workdays between April 1, 1952 and Dec. 31, 1983.**
- **SEC extension based on inability to estimate dose with sufficient accuracy exposures to Th, U-233 and Np.**

Petition Overview -contd.

- **At its 10/17/13 meeting Board voted to extend investigations for SEC-192 beyond 12/31/83 to:**
 - 1. Evaluate the use and exposure potential for Mg-Th alloy at Rocky Flats**
 - 2. Continue to evaluate 1984-1988 period for Neptunium exposure potential**
 - 3. Resolve open questions with SC&A and the work group concerning tritium**
 - 4. Examine implications of Data Falsification issues**
 - 5. Examine exposures at the Critical Mass Lab**

1. Mg-Th Alloy

- Issue raised in 2007. Allegedly shipped to RF to be used in plates to bullet-proof military trucks.
- In 2013 NIOSH did another review of Site Research Database (SRDB) for RF/Mg-Th link. More evidence of Dow/Mg-Th link, but no corroborating evidence for RF link.
- Other site visits undertaken. No direct RF link.

Mg-Th Alloy-contd.

- **However worker at Dow-Madison plant reports shipping Mg-Th materials to RF.**
- **NIOSH interviews individual. Person stands by report but not aware of other Dow facilities in Denver area.**
- **Dow-Madison co-petitioner alleges additional affidavits supporting RF/Mg-Th link claim.**

Mg-Th Alloy-contd.

- **RF petitioner: RF worker (anonymous) says Mg-Th used at RF.**
- **NIOSH conclusion: Cannot find corroborating documentation of RF/Mg-Th link.**
- **Additional NIOSH observation: If undocumented Mg-Th use at RF, all alleged use take place between 1956 and 1976, during covered SEC period.**

Mg-Th Alloy-contd.

- **SC&A disagrees with NIOSH:**
- **The worker interviewed both by NIOSH and SC&A provided a high level of “clarity and detail”.**
- **He specifically named 5 different Mg-Th alloy specifications, only two of which were searched for.**
- **Rather than “confusion”, “it is just as ‘possible’ that the worker had it right all along.”**

Mg-Th Alloy-contd.

- **SC&A continued:**
- **Dow co-petitioner reported that 400 boxes of RF records sit at LANL according to DOE and would have to be hand-searched. Estimated search time: 2 years.**
- **DOE project mgr noted that 2%–3% thorium in Mg-Th alloy at RF may not have been considered to be a reportable quantity.**
- **SC&A conclusion: “the receipt and use of Mg-Th alloy material at RFP remains inconclusive”.**

Mg-Th Alloy-contd.

- **Given this disagreement, the RF Working Group decided not to ask NIOSH or SC&A to pursue this investigation further. Our reasons:**
 - 1. The failure of the intensive, years-long search for documentation at the plant and agency levels.**
 - 2. The vast majority of cancers during yrs. of possible Mg-Th use compensible under existing SEC. (Only those with non-compensible cancers, thus not in SEC, might be negatively affected.)**
 - 3. Consideration of limited NIOSH resources of staff time and funding.**

2. Neptunium-237

- **NIOSH search concluded that Np-237 was used at RF after the 1983 SEC date, perhaps until 1988:**
- **“evidence points to a series of discrete tasks performed from 1962 through 1983, involving a few gms. to a few hundred gms”, usually at request of other DOE facilities. Max: 300 gms in 1966.**

Neptunium-237-contd.

- **The only processing operation in the post-1983 period involving Neptunium was the Plutonium-Neptunium Separation and Residue recovery operation from late 1985 to the end of 1987.**
- **This was a glove box operation involving 5 operators and one engineer.**

Neptunium-237-contd.

- **With a Pu:Np mass ratio of 6.4 and the far greater specific activity of Pu, Np operations and later waste clean-up were monitored via Pu air sampling, contamination surveys and bioassays (urine & body counts), which were consistently implemented in the post-1983 period.**

Neptunium-237-contd.

- **SC&A studies independently confirmed the results of the NIOSH White Paper.**
- **CONCLUSION: Only one processing operation in the post-1983 period involved neptunium, and the co-presence of neptunium with plutonium enables radiological monitoring to account for any neptunium exposure component in a claimant-favorable manner.**

3. Tritium Exposure

- **This was the original basis for accepting SEC petition 192.**
- **Tritium emits soft beta's and hence internal exposures are the main health concern.**
- **Prior to the 70's the RF radiological program did very little monitoring for tritium because they felt they had limited tritium exposure potential. However in a 1973 incident returned triggers (pits) were found to emit 500-2000 Ci of tritium.**

Tritium Exposure-contd.

Changes in this program were implemented as a result. These included:

- Increased numbers of H3 bubblers and swipe samples**
- Air sampling on opening incoming used pit containers**
- Urine samples for 250 workers thought to be most affected, followed two years later by sampling only among job-specific categories because the results showed zero positive samples**
- 10% of urine samples for Pu were tested for tritium.**

RESULT: Greatly reduced levels of H3 exposure by the 1980's.

Tritium Exposure-contd.

- **Since virtually all RF workers before 1983 covered by SEC, the crucial issue for NIOSH/ORAU, SC&A and the RF WG was whether the post-1983 tritium exposure control program was adequate and individual H3 exposures appropriately assessed.**
- **After extensive group discussion about the placement of bubblers, their efficacy and H3 sampling procedures, the WG agreed that the exposure control program after 1983 was adequate to protect workers exposed to H3.**

Tritium Exposure-contd.

- **Partial dose reconstructions for workers before 1973 will be assessed as chronic doses based on measurements just after the 1974 H3 incident (37.5 mr/yr), which are believed to be claimant-friendly over-estimates.**
- **Exposure measurements taken in 1975 and thereafter were consistently found to be less than 1 mr/yr, due to the control measures enacted after 1973 and the short lifetime of H3 (12.3 yrs).**

Thus the WG agreed that H3 exposure at RF does not add materially to the radiation exposure burden of plant workers post-1983 and thus of itself does not constitute a basis for an SEC category beyond 1983.

4. Data Falsification Issues

An FBI raid was conducted at RF in 1989 concerning alleged data falsification, improper bioassay processing and document destruction. Soon after a related 1989 DOE study was conducted. In 2015 the FBI released its report.

- 1. NIOSH and SC&A interviewed a worker at RF who reported being ordered to destroy records, as well as 12 other employees. SC&A found no loss in “essential records” which would interfere with radiation dose reconstruction, nor evidence of data falsification.**

Data Falsification Issues-contd.

- 2. Another interviewee made statements about the inadequacy of fume hoods, stack samples and improper handling and/or preparation of environmental samples. “From a radiological perspective, NIOSH finds no scientific basis for concluding that the issues raised regarding environmental samples would compromise radiological count results.”**

Data Falsification Issues-contd.

- 3. Yet another interviewee raised the issue of dosimetry technicians writing down dose rate information in pencil, which would allow RFP management later to direct changes to keep production going. This impacts field survey instruments, used for comparisons only. The primary sources of dose reconstruction data are personnel dosimeters and bioassays, assessed in labs.**

Data Falsification Issues-contd.

- 4. SC&A reviewed 8 documents mentioned in the NIOSH White Paper. It concluded “the documents were concerned with other aspects of RFP operations or environmental issues, rather than data falsification, record destruction, or bioassay data, that would potentially impact the ability to perform adequate dose reconstructions.”**

Data Falsification Issues-contd.

- **Based on its interviews, analyses and evaluation of the 1989 FBI raid report, NIOSH concluded that “there exists a sufficient quantity of individual external monitoring data to support the assessment of RFP personnel external doses.” SC&A corroborated this conclusion.**

Data Falsification Issues-contd.

- **In addition to its basic support of the conclusions of the NIOSH White Paper, SC&A expressed concern that data used to generate radionuclide intakes were impacted by the environmental sampling/data issues that surfaced after the 1989 FBI raid and the 1989 DOE investigation & evaluation that followed.**
- **The RF WG having read the associated White Papers & heard the presentations agreed with the NIOSH conclusions and referred the env./occ linkage issue to the Subcommittee on Procedures Review.**

Data Falsification Issues-contd.

- **Claimant representatives have written a lengthy response to the NIOSH White Paper:**
- **‘NIOSH combines all of the issues raised by the petitioners and their relationship to Building 123. Each of the issues raised are separate concerns. Some concerns may be related to Building 123 but not all of the issues are. Therefore, each of the issues needs to be addressed on an individual basis. It is the petitioners’ position that the problems associated with each individual concern is sufficient for NIOSH to determine they cannot reconstruct dose with sufficient accuracy. It is even more evident that, when combining the issues, serious questions are raised with the bioassay documents NIOSH uses to reconstruct dose. ‘**

Data Falsification Issues-contd

- **Claimants also present evidence from the “Final Historical Release Report for the Rocky Flats Plant, June 1992” of additional destruction of RF records.**
- **Finally they assert: “It is clear the accuracy of the dosimetry records NIOSH has for Rocky Flats claimants needs to be questioned. These records are unreliable. Therefore, NIOSH must admit that dose reconstruction cannot be performed with reasonable accuracy, and must recommend expanding the SEC.”**

NIOSH is currently writing a response to this communication.

5. Critical Mass Lab

**Operations in the Critical Mass Lab (CML) took various assemblies and radioactive materials to criticality levels. NIOSH White Paper notes:
“Radioactive materials at the CML included the nuclear fuels and sealed radioactive sources used in criticality experiments. Fission and activation products generated in the fuels, building materials and fixtures as a result of the nuclear criticality experiments conducted there are an additional source of radiological exposure.”**

Critical Mass Lab-contd.

White Paper conclusion: External radiation exposure to CML workers and staff is accounted for by Rocky Flats' personnel dosimetry program, which assigned radiation dosimeters to all workers. The personnel dosimetry program also included periodic bioassay (urinalysis and body counts) that focused primarily on identifying uranium and plutonium intakes. Also finds little radiation from fission & activation products.

The WG accepted the Paper.

Critical Mass Lab-contd.

- **However on the 7/14/15 RF WG conf. call, last surviving of 3 senior scientists of the CML (1964-1986), joined the discussion and expressed strong disagreement with the conclusions of the NIOSH White Paper. He requested a personal interview at a later time, which was agreed to and conducted on 10/13/15.**

Critical Mass Lab-contd.

- **During the interview the CML scientist argued that no one can bound the neutron flux in the lab's near criticality experiments. The radiation levels at CML were not properly documented, he asserted, and RF did not do body counts on the lab's 30-35 employees, only lung counts and (irregularly) urinalyses.**
- **He also disputed the ability to put upper bounds on the neutron flux via reactors' energy output.**

Critical Mass Lab-contd.

- **In addition to exposures to its full-time employees, the CML scientist reported that during the 1980's typically 100-200 non-CML RF employees entered the lab annually to observe ongoing experiments.**
- **At the conclusion of this discussion, NIOSH staff agreed to review and modify as appropriate its White Paper on CML, and is currently drafting its response.**

Critical Mass Lab-contd.

- **As part of this effort NIOSH will do a data capture from LANL re CML. This data is expected to be ready for inspection in January 2016.**

Cobalt-60 Exposure

- **This past Spring claimants raised concerns about radiation exposure from the 600 Ci Cobalt-60 source at RF, and presented information from DOE (via FOIA) as well as employee testimony alleging lack of proper exposure protection during Co-60 removal from RF.**
- **At the 10/28/15 RF WG meeting, NIOSH staff person Rutherford said that proper, standard protective measures were employed during the Co-60 removal. He will respond further at a later time.**

Issues Resolution RF WG (11/19/15)

- At its 10/17/13 meeting the Board charged the RF WG to investigate the following issues for the period beyond 12/31/83 to:
 1. Evaluate the use and exposure potential for Mg-Th alloy at Rocky Flats – CLOSED
 2. Continue to evaluate 1984-1988 period for Neptunium exposure potential – CLOSED
 3. Resolve open questions with SC&A and the work group concerning tritium – CLOSED
 4. Examine implications of Data Falsification issues – CLOSED for WG, with referral to SC on Proc. Review
 5. Examine exposures at the Critical Mass Lab – OPEN . LANL data capture in January, 2016

Additional Issue

- **Cobalt-60 exposures – raised in WG by claimants. IN PROCESS**