Hanford
Special Exposure Cohort
Petition Evaluation Report

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Petition Overview

- **83.14 petition received on May 3, 2012**
- **Proposed class definition:**
  - **All employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Hanford Engineer Works in Richland, Washington, from July 1, 1972 through December 31, 1983**

Petition Overview—cont.

- **Three existing SEC classes previously established at Hanford:**

  1. **October 1, 1943 through August 31, 1946, for selected areas of Hanford (Petition 57)**
  2. **September 1, 1946 through December 31, 1968, for selected areas of Hanford (Petition 57)**
  3. **October 1, 1943 through June 30, 1972, for all areas of Hanford (this class subsumed previous two classes; Petition 152)**

Petition Overview—cont.

- **Petition 57 requested the SEC class be continued through 1990**
  - **Petition 201 (this report) represents the research NIOSH conducted as part of the post 1972 review**
  - **The remaining time period (1984 thru 1990) remains a subject of continuing investigation**

Petition Overview—cont.

- **Petition 155 also remains before the Advisory Board**
  - **The petitioner's specific evidence of accusations by the U.S. EPA of purposeful wrong doing by US Testing resulted in NIOSH determining that issues regarding quality of bioassay data required further investigation as a separate issue from the continuing Board evaluation of Petition 57 (1987-1989)**
  - **The intent of NIOSH's separate evaluation of Petition 155 was to ensure that issues identified with US Testing's non-bioassay analytical programs did not also adversely affect the company's bioassay analysis operations in Richland, WA**
  - **SC&A is currently preparing a report regarding the review of Petition 155**

Update of Activities

- The Advisory Board had previously identified three focus areas (Am/Th/U) for Petition 152
- NIOSH prepared a number of draft reports for various nuclides which were used to develop Petition 152 and update the TBD
- NIOSH focused on activities in the post-June 1972 timeframe, concentrating on neptunium (Np), uranium (HEU, ^{233}U), and thorium (Th)
  - Results of these investigations led to class proposed by NIOSH in the evaluation report for Petition 201
  - Data gained from additional data captures will be used to update the TBD

Update of Activities—cont.

- **Sources of Available Information**
  - **ORAU Team Technical Basis Documents (TBDs)**
  - **ORAU Team Technical Information Bulletins (TIBs) and Procedures**
  - **19 additional interviews with former employees**
  - **Existing claimant files**
  - **NIOSH Site Research Database (over 32000 Hanford related documents)**
  - **10 additional data captures at Hanford related to SEC 201**

Update of Activities—cont.

- **Research at Hanford has been challenging**
  - **Changes in contractors and missions often change the entire research strategy and documentation available and even personnel related to processes**
  - **Theses challenges have led to focused efforts involving the review of large numbers of classified and unclassified documents**
  - **NIOSH and the Advisory Board, with the support of DOE Richland, have worked to review this complex facility with a view to timeliness and accuracy**

Neptunium

- **At the conclusion of Petition 152, NIOSH's research to that point indicated that the programs related to neptunium had ceased. Activities before July 1, 1972, as described in Petition 152 included:**
  - **Area 200 from May 1, 1948 through June 30, 1972: Area 200 neptunium-237 operations began with the crude separation of neptunium from metal wastes, first reported in May 1948. Production of neptunium nitrate in the 200 Area ceased with the shutdown of PUREX in June 1972.**
  - **Area 300 from January 1, 1966 through December 31, 1970: Neptunium work in the 300 Area began with target-element fabrication beginning in 1966. Neptunium/plutonium separations continued into 1970.**

Neptunium—cont.

- Continued research at Hanford led NIOSH to follow a series of activities that were located in the 200 and 300 areas involving neptunium operations that were not addressed by Petition 152 (activities conducted after June 1972)
- Partial material inventories show that neptunium was used after June 1972 by a variety of departments at Hanford (e.g. Metallurgical Development, Chemical Technology, and Fuels Design and Development)

Neptunium—cont.

- **A number of buildings were identified as having continued neptunium operations after 1972 including (partial listing):**
  - **Defense related metallurgical work at 231Z**
  - **Fuels Design and Development in 308**
  - **Research in 325 and 329**
  - **Entries into the Q cell and J cells of Purex**

Neptunium—cont.

- **Monitoring**
  - **No bioassay prior to 1972**
  - **Only four in vitro bioassay measurements in the Petition 201 time-period**
  - **All were collected the same day in September 1972**
  - **A single wound count for 237Np was identified in the Hanford REX database (for a wound)**

Thorium

- **At the conclusion of Petition 152, NIOSH's research to that point indicated that the programs related to thorium had ceased**
  - **Area 100 from January 1, 1965 through December 31, 1968: Fuel element failures associated with the irradiation of thorium fuel occurred during the 1965-1970 campaigns to produce uranium-233**
  - **Area 200 from January 1, 1965 through December 31, 1970: Major thorium operations in Area 200 began with a test of the THOREX process in 1965, and continued through the final major campaign to fabricate, irradiate, and process pelletized thorium-oxide targets in 1970**

Thorium—cont.

- **Area 300 from October 1, 1945 through December 31, 1970: Site thorium operations began with trial canning in October 1945 and continued through the final major campaign to fabricate, irradiate, and process pelletized thorium-oxide targets in 1970**

- **Continued research at Hanford led NIOSH to follow a series of activities that were located in the 200 and 300 areas involving thorium operations that were not addressed by Petition 152 (activities conducted after June 1972)**

Thorium—cont.

- **Activities included**
  - **Preparation and shipping of 350 tons of thorium to Fernald (this material was left over from the THOREX campaigns and were slightly contaminated with ^{233}U)**
    - **—Conducted at 203-A, 241-WR and204-S facilities**
    - **—Shipments occurred during the period 1977 through 1979 (33 shipments total)**
    - **—Facilities required cleanup after material removal**
  - **Other included processes which generated plutonium/uranium/thorium scrap which was sent to LANL**
  - **300 Area work included reactor fuels research**
  - **The Thorium Oxide Fuel Development Laboratory was completed in mid-1979 (located in the 306-W building)**

Thorium—cont.

- **Monitoring**
  - **Very little data is available and can not be tied to operations at the site.**
  - **There are only 11 in vitro bioassay (urinalysis) results for elemental thorium or Th-232 in the REX database in the July 1972 through December 1983 period. There is one record in 1979, seven in 1980, and three in 1981 (the years reflect the sample collection dates).**
  - **The REX database contains 16 in vivo bioassay results for Th-232 during the period under evaluation: one in 1972, one in 1973, two in 1977, seven in 1979, and five in 1983. The four counts from 1972 through 1977 were whole body counts. All of the others were chest counts.**

Uranium

- At the conclusion of SEC-00152, NIOSH's research to that point indicated that very little HEU and ^{233}U work was done after June 30, 1972
- Continued research at Hanford led NIOSH to follow a series of activities that were located in the 200 and 300 areas involving HEU and ^{233}U conducted after June 30, 1972

Uranium—cont.

- **These activities included**
  - **Research by the Nuclear Experiments Group**
  - **Defense-related metallurgical research at the 231Z, Plutonium Finishing Plant (234-5Z) and likely other facilities**
  - **Research located in the 300 area including at the 325, 303-C, 305, 313, 314, 324, 326, 327, and 333 buildings**
  - **Criticality studies and associated fabrication of HEU for criticality studies in the 306 building**

Uranium—cont.

- **Monitoring**
  - **Hanford monitored workers for natural uranium exposure using total uranium (fluorimetric) and lung counting methods during this time period**
  - **At the end of 1983 Hanford implemented and began to utilize methods for the determination of isotopic uranium in urine (alpha spectrometry)**
  - **NIOSH has determined that it is unable to use natural uranium monitoring from this period to cover the types of work and research being conducted at Hanford during the proposed time period.**

Conclusion from Research

- **NIOSH has evaluated the available information and determined that it does not have access to sufficient personnel monitoring, workplace monitoring, or source-term data to sufficiently estimate potential internal exposures to HEU, U-233, thorium, or neptunium during the period from July 1, 1972 through December 31, 1983.**

Hanford SEC Petition 201

- **Why the class?**
  - **Workers were potentially exposed to thorium, neptunium, highly enriched uranium and ^{233}U who were not monitored nor does a suitable dose reconstruction method exist.**
  - **Several infeasibilities exist during the timeframe in question, and are presented in the form which provides broad coverage to the infeasibility (thorium, neptunium, highly enriched uranium, and ^{233}U).**
  - **Decision was based on lack of adequate biological monitoring data, sufficient air monitoring information, and/or sufficient process and radiological source-term data to reconstruct dose with sufficient accuracy.**

Hanford SEC Petition 201—cont.

- **Why everyone?**
  - **Based on dose reconstruction experience and records, NIOSH further determined that there is not sufficient information available to enable NIOSH to accurately assess whether an energy employee, or class of employees, did, or did not, potentially enter specific areas of Hanford during the time periods associated with Petition 201.**

Hanford SEC Petition 201—cont.

- **What about employees not included in the SEC?**
  - **NIOSH intends to use any internal and external monitoring data, and medical doses that may become available for an individual claim (and that can be interpreted using existing dose reconstruction processes or procedures). Therefore, dose reconstructions for individuals employed at the Hanford site during the period from July 1, 1972 through December 31, 1983, but who do not qualify for inclusion in the Special Exposure Cohort, may be performed using these data as appropriate.**

Health Endangerment

- **The evidence reviewed in this evaluation indicates that some workers in the class may have accumulated chronic radiation exposures through intakes of radionuclides and direct exposure to radioactive materials.**
- **Consequently, NIOSH is specifying that health may have been endangered for those workers covered by this evaluation who were employed for a number of work days aggregating at least 250 work days within the parameters established for this class or in combination with work days within the parameters established for one or more other classes of employees in the SEC.**

Proposed Class

All employees of the Department of Energy, its predecessor agencies, and its contractors and subcontractors who worked at the Hanford site in Richland, Washington, from July 1, 1972 through December 31, 1983, for a number of work days aggregating at least 250 work days, occurring either solely under this employment or in combination with work days within the parameters established for one or more other classes of employees included in the Special Exposure Cohort.

Potential Impact of SEC

(Current Cases)

- **Total number of Hanford and PNNL cases: 4479**
- **Number withdrawn (SEC): 865**
- **Total number with a DR (at DOL): 3958**
- **Total number claims with employment in proposed class:**
  - **Number of claims with presumptive cancer during the proposed SEC: 1522**
  - **Number of claims with non-presumptive cancer during the proposed SEC: 1082**
  - **Number of claims at NIOSH with a presumptive cancer: 59**

Recommendation

- **For the period July 1, 1972 through December 31, 1983, NIOSH finds that radiation dose estimates cannot be reconstructed for compensation purposes**

Class	Feasibility	Health Endangerment
July 1, 1972 – December 31, 1983	No	Yes