Battelle Memorial Institute – King Avenue
SEC Petition Evaluation Report SEC00208

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Petition Overview

- NIOSH determined it was not feasible to complete the dose reconstruction for an existing Battelle Memorial Insititute – King Avenue claim
- On October 18, 2012, claimant notified and provided with a copy of Special Exposure Cohort (SEC) Petition Form A
- October 25, 2012: Petition (83.14) submitted to NIOSH
- November 19, 2012: NIOSH Evaluation Report issued

Proposed Class

All Atomic Weapons Employees who worked at the King Avenue facility owned by Battelle Laboratories in Columbus, Ohio, during the period from April 16, 1943 through June 30, 1956, 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

Background

- EEOICPA covered facility from 1943-1986 (Atomic Weapons Employer-AWE)
- The 58.3-acre site, accommodating 13 buildings bordered by King Avenue, Battelle Boulevard, Perry Street, Third Avenue, and the Olentangy River
- Performed atomic energy research and development for Atomic Energy Commission (AEC), Department of Energy (DOE), Nuclear Regulatory Commission (NRC), Department of Defense (DOD), commercial entities
- Owned and operated by Battelle Memorial Institute (BMI)

Sources of Available Information

- ORAU Team Site Profiles and Technical Information Bulletins (TIBs) and Procedures
- NIOSH Site Research Database
- Existing claimant files
- Data captures

Data Capture Efforts

- Data captures onsite at Battelle
  - 2011 (January, April, September)
  - 2012 (January)
- DOE Legacy Management database
- Opennet (Office of Scientific and Technical Information – OSTI - database)
- Energy Citations database
- Hanford Declassified Document Retrieval System (DDRS)
- Internet search
- Nuclear Regulatory Commission's Agency-wide Documents Access and Management System (ADAMS) Database

NOSH/OCAS Claims Tracking System

(information as of October 15, 2012)

- Battelle claims submitted to NIOSH 62
- Claims that meet the recommended class years 25
- Dose reconstructions completed for claims that meet the class definition 19
- Claims containing some internal dosimetry 0
- Claims containing some external dosimetry 6

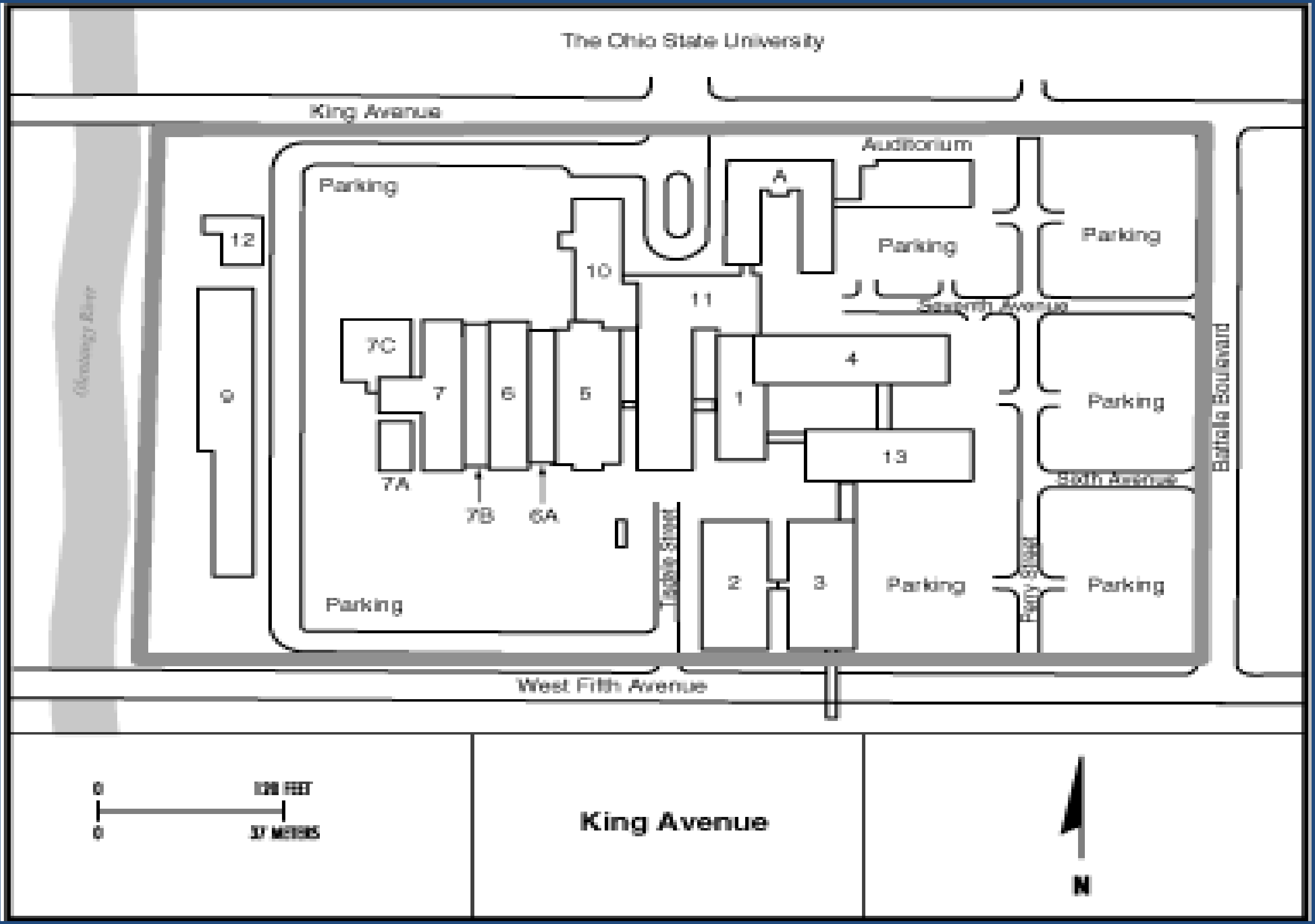
Radiological Operations for AEC

- April 16, 1943 - Initial contract with Manhattan Engineering District to perform atomic energy research and development activities
- Initial work was for the fabrication, rolling, forging, and extrusion of uranium metal
- Mid to late 1940 through early 1950 work with uranium and thorium metal (forging)
- Research in the extraction of uranium and thorium from phosphate ores (Chattanooga shale deposits) and then from monazite sands

Radiological Buildings

- Building A – Corporate Office (Small Laboratories)
- Building 1 – Foundry
- Building 2 – Metalworking Building
- Building 3 – Materials Building
- Building 4 – Radiochemistry Laboratory
- Building 5 – Machine shop
- Building 6 – Chemistry Building
- Building 7 – Chemistry Building
- Building 9 – Mechanical Engineering

Battelle – King Avenue



Potential Radiation Exposures

- Internal
  - Uranium
  - Enriched Uranium
  - Thorium
  - Special “Samples”
- External
  - Beta/gamma exposures from
    - Uranium
    - Thorium
    - Special Samples (radium)

Uranium Operations

- **MED Trip Report (1943)**
  - Heating pellets
  - Extrusion of small billets into rods
  - Hammering of heated billets into rods
  - Rolling of heated billets into rods
  - Experiments to prevent oxidation
  - Machining under oil
  - Nickel plating
- **Metallurgy of Tuballoy Report (1945)**

Uranium Operations – cont.

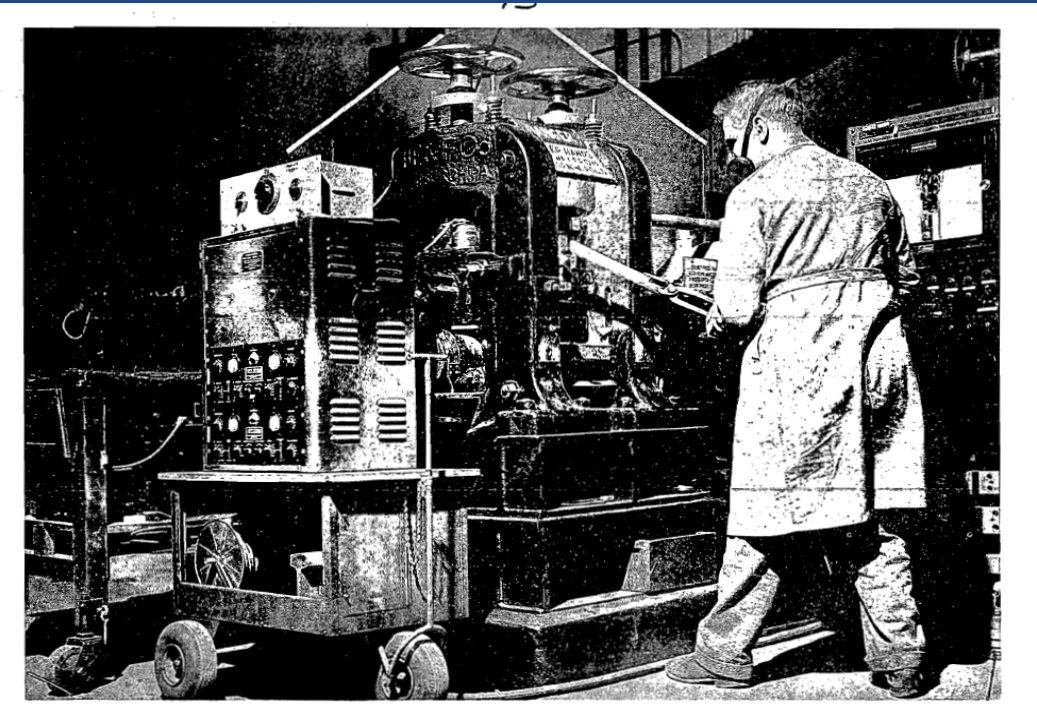
- Minimal large scale radiological work immediately after the war
- Research on uranium and thorium extraction from ores and sands
- Emphasis on beryllium work in 1945-1946

Occasional "samples" from Chicago and. Clinton Laboratories are received. These are of low radioactivity. Intensity of radioactivity is measured before leaving Chicago or Clinton Laboratories and results accompany the "samples. An example of this was a radium compound measuring 0.1R for 50 hours at one foot distance. Up to the present time no "samples" have been received which reveal any significant degree of radiation. (August 1946)

The Battelle Institute has no radiation counters and is equipped in no way to work with radioactive materials. This officer advised that, should an occasion arise where the handling of "hot" material is necessary, the necessary counters, film badges, etc., should be obtained.

Uranium Operations – cont.

- BMI-800 Rolling of uranium (1952)
  - "Uranium rods and strips were rolled under various conditions and the roll-separating force measured"



Rolling mill with Load-Measuring Equipment in Place

Incomplete Inventory Information

Year	Uranium (kg)	Enriched U (kg)	Thorium (kg)
1943	1507	?	?
1944	1579	?	?
1945	?	?	?
1946	?	?	?
1947	360	0.24	871
1948	1809	4.73	665
1949	1595[(a)]	0.28[(a)]	262[(a)]
1950	1905	1.26	268
1951	2003	0.16	509

a) Beginning inventory on 1/1/1950 unknown remainder

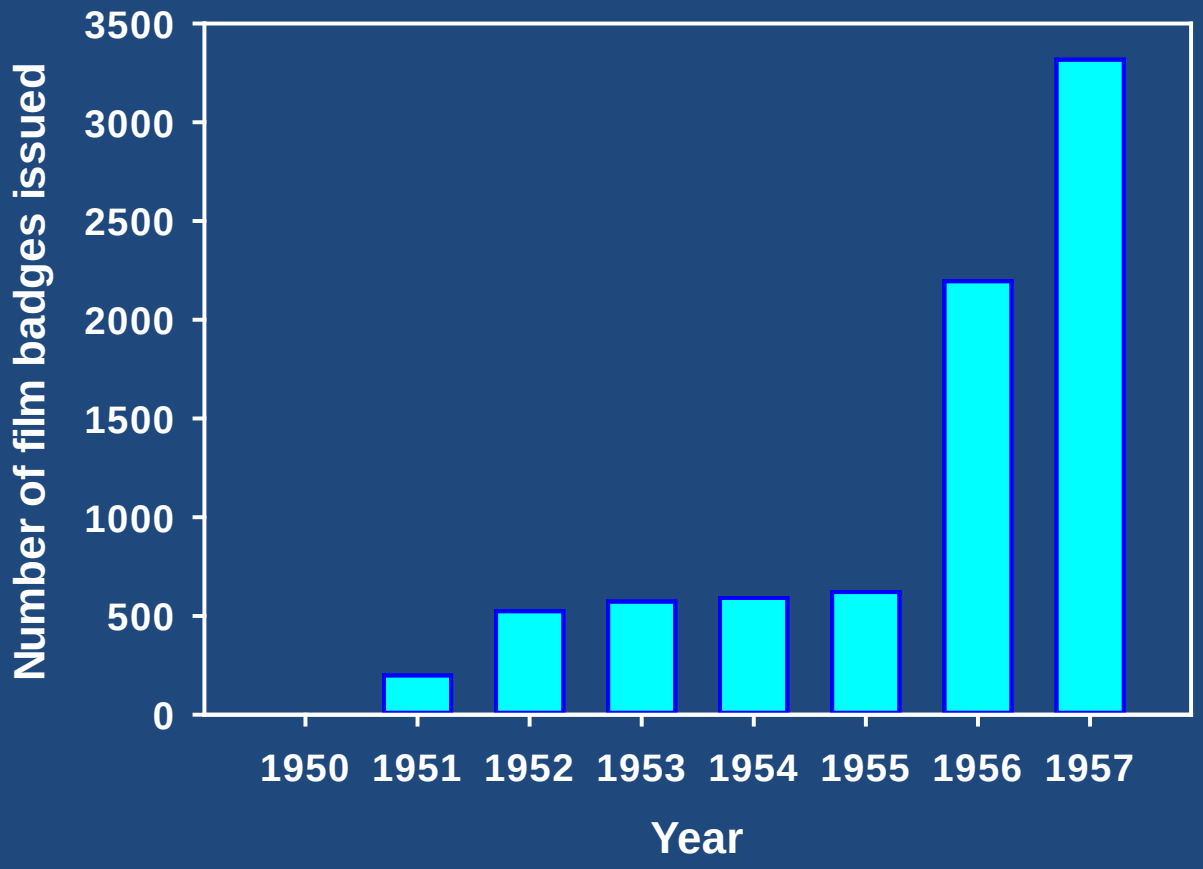
Thorium Operations

- 1948 – Memo from Westinghouse
  - Discusses rolling of approximately 900 lbs. of myrnaloy received from Battelle Memorial Institute
- 1951 – The Technology of Thorium
  - Discusses production of metal, physical properties, fabrication, chemical properties, mechanical properties, etc.
- 1951 - Interim Report on Metallurgy of Thorium and Thorium Alloys (Oak Ridge National Laboratory-1090)
  - States “This metal was cast at Ames Laboratory, forged at Battelle Memorial Institute, rolled and machined at Westinghouse.”

Personal Monitoring Data

- Internal monitoring data
  - No internal bioassay prior to 1955
  - One result in 1955
  - 1956 Uranium urinalysis
- External monitoring data
  - No external monitoring data until February 1951
  - Some monitoring from 1951 to 1955

Personal Monitoring Data – cont.



Non-routine Radiological Surveys

- 1943 - First mention of Health and Safety
  - Respirators used in dusty places only
- 1947 - Radiological survey appears to be the first survey
  - Alpha contamination on laboratory work table top 2000 dpm
  - Gamma surveys - 1 mR/hr to 12 mr/hr
  - Beta and Gamma – 0.1 mR/hr to 160 mr/hr
  - Author of trip report recommended that Battelle obtain radiological survey instrumentation
- 1950 – Three Radiological surveys (March through May)
  - 48 Air samples analyzed by Health and Safety laboratory during several conditions (wet sawing, dry grinding) although many are listed as “installation blanks”

Non-routine Radiological Surveys

- 1951 - Radiological Survey conducted in 3 laboratories
  - 77 Smears with contamination results – bkg up to 981 cpm
  - 21 Beta - Gamma surveys – 0.1 mR/hr to 20 mR/hr
  - Desks generally contamination free, work benches and hoods were not

- 1957 – Breathing zone air monitoring survey during rolling of thorium
  - "Please let me know when you forge thorium. I would like to take some air samples."

Feasibility of Dose Reconstructions

- Available internal monitoring records, process descriptions, and source-term data are inadequate to complete dose reconstructions with sufficient accuracy for the evaluated class of employees during the period from April 16, 1943 through June 30, 1956

- Why June 30, 1956?

  A review of the bioassay which started in July 1956 indicates that workers in Buildings A, 1, 2, 3, 4, 5, 6 were included in the urinalysis program

Feasibility of Dose Reconstructions—cont.

- Available external monitoring records, process descriptions, and source-term data are inadequate to complete dose reconstructions with sufficient accuracy for the evaluated class of employees during the period from April 16, 1943 through February 13, 1951

- Based on limited monitoring data, NIOSH may be able to reconstruct doses from February 14, 1951 through June 30, 1956

Feasibility Summary

Feasibility Findings for Battelle Memorial Institute 1943 - 1956		
Source of Exposure	**Dose Reconstruction Feasible**	**Dose Reconstruction NOT Feasible**
Internal		
- Uranium		X
- Thorium		X
External		
- Beta-Gamma	after Feb 1951	until Feb 1951
- Neutron	N/A	
- Occupational Medical X-ray	N/A	

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

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Recommendation

- For the period from April 16, 1943 through June 30, 1956, NIOSH finds that radiation dose estimates cannot be reconstructed for compensation purposes

Class	Feasibility	Health Endangerment
April 16, 1943 –June 30, 1956	No	Yes