Sandia National Laboratories-Albuquerque Special Exposure Cohort Petition Evaluation Report

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Petition Overview

- Petition received on January 19, 2010
- Petitioner proposed class definition:
  - All employees who worked within the Sandia National Laboratory Reactor Division from January 1, 1957 through December 31, 1962

Petition Overview—cont.

- Petition qualified for evaluation on April 13, 2010
- Petition basis: Radiation monitoring records for members of the proposed class have been lost, falsified, or destroyed
  - Monitoring data retrieval problems incurred by NIOSH while processing individual claims and performing site data capture work supported the petition basis

Petition Overview—cont.

- **NIOSH evaluated class:**
  - **All employees who worked at Sandia National Laboratories, Albuquerque, New Mexico, from January 1, 1949 through December 31, 1962**
- **NIOSH will address the period covering 1963 through the early 1990s in a separate report**

Sources of Available Information

- ORAU Team Technical Basis Documents (TBDs)
- ORAU Team Technical Information Bulletins (TIBs) and Procedures
- Interviews with former employees
- Existing claimant files
- Documentation provided by petitioner

Data Capture Efforts

- NIOSH Site Research Database (over 2400 documents)
- Twelve data capture visits at Sandia
- Data capture of Sandia related records at facilities across the DOE complex
- DOE Opennet (OSTI database)
- Internet search

Previous Dose Reconstructions

NIOSH OCAS Claims Tracking System

Information available as of March 22, 2011

- **Sandia National Laboratory claims submitted to NIOSH** — **346**
- **Claims with employment during the period evaluated (1949-1962)** — **193**
- **Dose reconstructions completed for claims with employment during the period** — **154**
- **Claims containing internal dosimetry** — **11**
- **Claims containing external dosimetry** — **88**

Background

- In 1945, Z-Division of Los Alamos moved to what was to become the Sandia National Laboratory
- Covered period for Sandia National Laboratory, Albuquerque as established by the Department of Labor began in 1949
- Weapons assembly, weapon ordnance engineering, and production coordination amongst various Atomic Energy Commission facilities (such as Clarksville, Medina, Pantex)

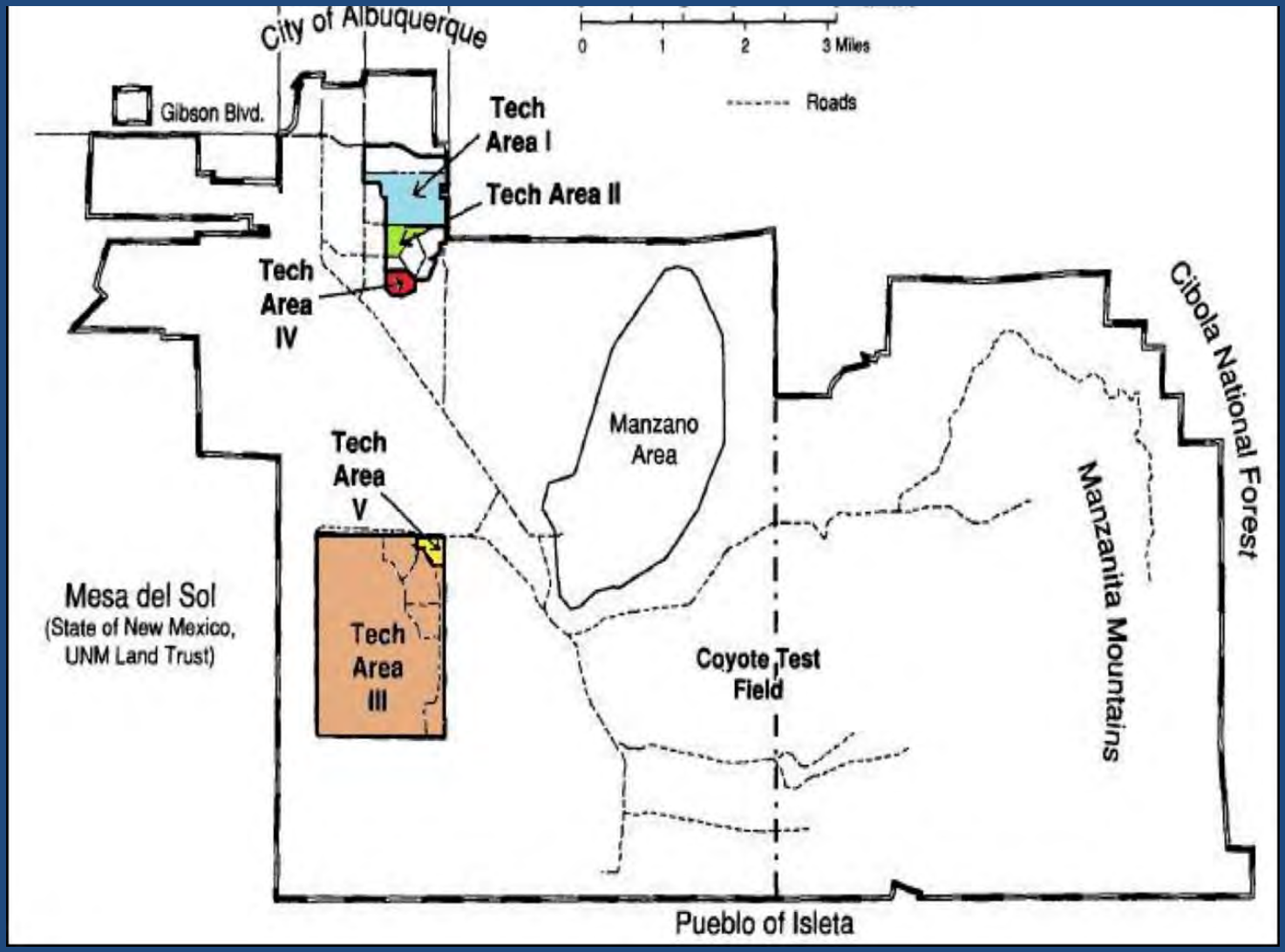
Background—cont.

- In the early 1950s, Sandia National Laboratory expanded activities to support field testing and atmospheric tests
- Sandia National Laboratory further expanded its capabilities in the late 1950s when testing moratoriums were set in place by adding accelerators and reactors to test weapons components

Background—cont.

- Sandia National Laboratory is divided into 5 technical areas
  - TA-I: Electron and ion beam accelerators/Toxic metals machine shop
  - TA-II: Weapon component assembly and waste handling/burial
  - TA-III: Radioactive and mixed waste landfills
  - TA-IV: Neutron generator test equipment
  - TA-V: Reactors and hot cell facility

Background—cont.



Potential External Radiological Exposures During the Class Period

- **Full spectrum of external hazards**
  - **Photon exposures related to weapons assembly (1949-1958), generators, accelerators, materials returned from weapons testing**
  - **Beta exposures from activated components, materials returned from weapons testing and air filters from cloud sampling**
  - **Neutron: Weapons assembly, accelerators, reactors, neutron sources**
    - **—Sandia National Laboratory dosimeters did not measure neutrons until 1958**

Potential Internal Radiological Exposures During the Class Period

- Broad spectrum of activities resulted in numerous radionuclides of concern
  - Plutonium
  - Tritium
  - Uranium
  - Americium
  - Fission and activation products
  - Other radionuclides including ^{54}Mn, ^{65}Zn, ^{22}Na, ^{57}Co, thorium, ^{210}Po, ^{226}Ra, and ^{14}C were identified in various documents and analyses at the site

Health Physics at SNL

- Health physics was the responsibility of industrial hygiene division prior to 1957 at which point a health physics section was formed
- NIOSH located minimal documentation of the practices and requirements during the evaluation period
- Monitoring requirements were developed based on the judgment of departments, divisions, and supervisors
- Interviews indicate that coverage was temporal and ad hoc in nature

Personal Monitoring Data

- Availability of monitoring data a significant concern
- November 2009: NIOSH notified DOE that case responses were incomplete, particularly as related to internal dosimetry data
  - NIOSH acquired some individual data during data captures which were not provided in the responses

Personal Monitoring Data—cont.

- DOE and Sandia National Laboratory have implemented a massive records indexing effort which they feel will fix the issue
  - ~1.1 million records
  - Scanning completed (but not verified)
  - Indexing approximately 40% complete at this time
  - Expected completion 6-9 months
- January 2010: NIOSH re-requested the records for open Sandia National Laboratory cases

Internal Dosimetry Data Availability

- Unlike many DOE facilities, Sandia National Laboratory did not report the number of bioassay samples analyzed
- Based on interviews, it is thought to be a small number per year
- NIOSH has obtained copies of some bioassay records as part of its site data captures and claim data requests
- Number of samples, by year, from NIOSH records are provided in the following table

Summary of *In Vitro* Bioassay Samples Obtained by NIOSH

Summary of Individual *In Vitro* Bioassay Results					
Year	Beta/Gamma[1]	Tritium	Uranium[2]	Plutonium	Polonium-210
1949	-	-	-	-	-
1950	-	-	-	-	-
1951	-	-	-	-	-
1952	-	-	-	-	-
1953	-	-	-	-	-
1954	-	-	-	-	-
1955	-	52	-	28	-
1956	-	1	-	42	-
1957	-	1	-	-	-
1958	-	-	-	-	-
1959	4	18	3	80	-
1960	40	41	67	96	-
1961	6	30		3	6
1962	7	91	16	3	2

External Monitoring Data

- External dosimetry results were centralized from the beginning at Sandia National Laboratory
  - Personal data requests seem fairly complete for external dosimetry data based on NIOSH records
  - Atomic Energy Commission monitoring reports available during this early time period
- Documentation of the pre-1957 external dosimetry program was not obtained by NIOSH
- Post-1957 documentation indicates all workers in radiation areas were to be badged

External Dosimetry Monitoring at SNL

Exposure Data Submitted as Annual report to AEC												
Year	Total No. Employees	No. Employees NOT monitored	No. Employees Monitored	< 1 rem	1-2 rem	2-3 rem	3-4 rem	4-5 rem	5-15 rem	>15 rem	Max. Dose	SRDB Ref. ID
1949	-	-	51	45	5	1					2.09	23833
1950	-	-	182	175	3	2	1	1			4.063	23833
1951	-	-	293	291	2						1.293	23833
1952	-	-	312	308	1	2	1				3.072	23833
1953	-	-	322	321	1						1.823	23833
1954	-	-	370	369			1				3.841	23833
1955	-	-	534	530	3	1					2.52	23833
1956	-	-	669	608	42	10	4	2	3		6.022	23833
1957	-	-	1,262	1,178	84						4.570	23864
1958	7,828	7,000	828	769	41	13	5				<4	23833
1959	7,133	5,950	1,183	1,169	13	1					<3	23833
1960	6,780	5,509	1,271	1,256	10	2		1		2	>15	13786/ 23833
1961	6,903	4,997	1,906	1,889	12	4					<3	13789/ 23833
1962	6,983	4,451	2,532	2,501	17	12	1	1			<5	23833
1963	7,104	4,022	3,082	3,066	14	2					<3	23833

Feasibility of Dose Reconstructions

- **NIOSH has determined that monitoring data, process information, and monitoring program information are insufficient to support bounding internal doses for the evaluated class.**
  - **There are indications that additional data exist (microfilm/microfiche record set), but these data are not readily accessible.**
  - **Based on a lack of internal monitoring program documentation and source term information data for the evaluated period, NIOSH feels it cannot establish a bounding approach even if the microfilm/microfiche records were to become available.**
- **NIOSH concludes it cannot bound internal doses for the period from January 1, 1949 through December 31, 1962, but will continue to assess post-1962 dose reconstruction feasibility in a subsequent evaluation for SNL.**

NIOSH Recommendation Regarding Non-SEC Claims

Although NIOSH found that it is not possible to completely reconstruct internal radiation doses for the proposed class, NIOSH intends to use any internal and external monitoring data that may become available for an individual claim (and that can be interpreted using existing NIOSH dose reconstruction processes or procedures)

NIOSH Recommended Class

All employees of the Department of Energy, its predecessor agencies, and its contractors and subcontractors who worked in any area at Sandia National Laboratories in Albuquerque, New Mexico, from January 1, 1949 through December 31, 1962, 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 in the Special Exposure Cohort

NIOSH Recommendation

Summary of Feasibility Findings for SEC-00162 (January 1, 1949 through December 31, 1962)		
Sources of Exposure	**Reconstruction Feasible**	**Reconstruction Not Feasible**
Internal		X
External	X	
- Gamma	X	
- Beta	X	
- Neutron	X	
- Occupational Medical X-ray	X	