

# Sandia National Laboratories – Livermore

## Special Exposure Cohort Petition

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# Background

- NIOSH determines it is not feasible to complete the dose reconstruction for a worker class due to lack of sufficient dosimetry-related information at Sandia National Laboratory-Livermore (SNL-L)
- On August 14, 2013 – NIOSH notifies claimant and provides a copy of Special Exposure Cohort (SEC) petition
- August 22, 2013 – Petition form received
- October 7, 2013 – Evaluation Report issued

# NIOSH-Evaluated Class

- Department of Energy, its predecessor agencies, and their contractors and subcontractors
- Who worked in any area at Sandia National Laboratories-Livermore in Livermore, California
- October 1, 1957 through December 31, 1994

# Background

- Early 1956 – Sandia National Laboratory establishes Livermore site to provide direct support to the Lawrence Livermore National Laboratory (LLNL), which was originally located only at the LLNL site
- End of 1956 – plans made for a much larger support effort adjacent to LLNL, which would employ about 1000 workers
- October 1957 – facility opens
- 1958 – Employs about 800 workers to develop W38 warhead for the Titan I and Atlas missiles
  - Develops to consist of about 70 buildings on 410 acres adjacent to LLNL
  - Number of employees typically ranges from 1000 to 1100
- Site continuously operated by Sandia Corporation

# Background<sub>-cont.</sub>

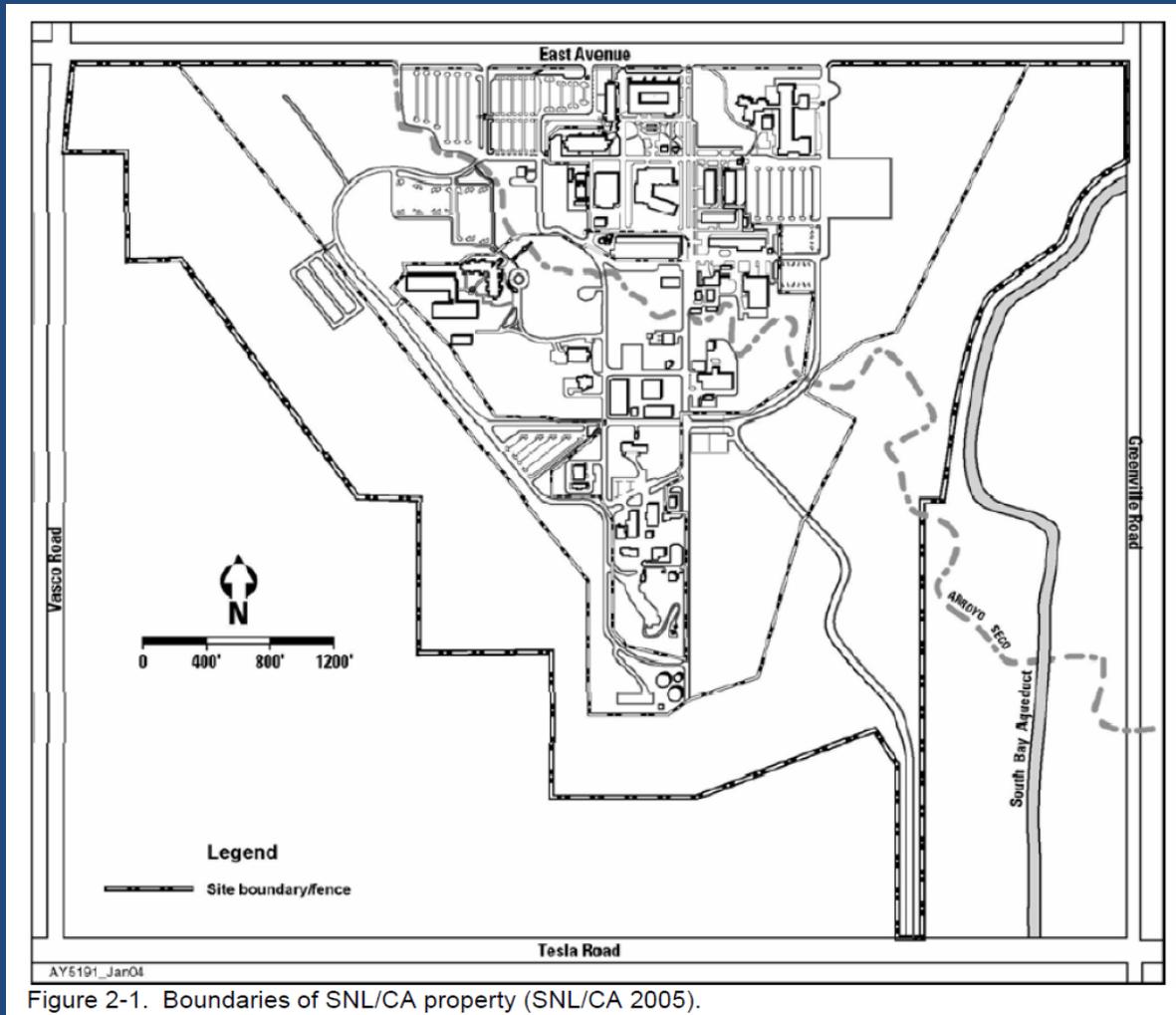


Figure 2-1. Boundaries of SNL/CA property (SNL/CA 2005).

# Background<sub>-cont.</sub>

- Primary mission of SNL-L included
  - Engineer or “weaponize” the nuclear physics package designed by LLNL (production of parts and final weapons accomplished at other sites)
    - Design and test non-nuclear components of the nuclear weapons package designed by LLNL
    - Ensure that the other 95% of the weapon’s parts work perfectly at every point of contact with the delivery systems
    - Weaponization includes arming, fuzing and firing systems; neutron generators; gas transfer systems; and surety systems
  - SNL-L support for LLNL later expanded to include effects of test analyses and telemetry for LLNL tests
  - From 1959 to the early 1970’s SNL-L participated in evaluation of the Plowshare Program nuclear detonations

# Background<sub>-cont.</sub>

- Facilities and operations supporting these core missions included:
  - Weapons Facility Complex (test/repair neutron detectors, wet machining of uranium, radiography of weapons components, ion beam analysis of materials, tritium storage studies, etc.)
  - Micro and Nano Technologies Laboratories (Radiography for material science studies)
  - Centrifuge and explosive test facility

# Background<sub>-cont.</sub>

- **Additional facilities and activities**
  - **Former Tritium Research Laboratory (now known as the Chemical and Radiological Detection Laboratory)**
  - **Explosive and Environmental Testing Complex (environmental testing of mock-up weapons and components)**
  - **Additional classified activities involving thorium and highly enriched uranium**
  - **Proximity of LLNL to SNL-L allowed workers to wheel test devices across the street**

# Sources of Available Information

- Oak Ridge Associated Universities Team (ORAUT)
  - Technical Basis Document(s) (TBD), Technical Information Bulletins (TIBs), and Procedures
- Interviews with former employees
- Existing claimant files
- NIOSH Site Research Database (more than 1,000 documents)
- Multiple data capture visits to SNL-L and Sandia Albuquerque (SNL-A) related to SNL-L
- Data capture of Sandia-related records at facilities across the Department of Energy (DOE) complex
- DOE OpenNet (Office of Science and Technical Information database)
- Internet searches

# Previous Dose Reconstructions

Description as of October 3, 2013	Total
Total number of SNL-Livermore claims submitted for dose reconstruction	132
Claims completed with a Probability of Causation (POC) above 50%	15
Claims completed with a POC less than 50%	100
Claims with employment during the period evaluated	123
Number of dose reconstructions completed with employment during the period	105
Claims in evaluation period containing internal dosimetry records	25
Claims in evaluation period containing external dosimetry records	112

# Health Physics at SNL-L

- Health physics was the responsibility of SNL-L until 1989-94 timeframe when SNL-A assumed responsibility
- NIOSH located minimal documentation of the practices and requirements during the evaluation period; in general, very little information regarding the program is available
- Documentation was kept at SNL-L and records have been transferred ad hoc over the past few decades (and still occurs as they find additional information)

# Potential External Radiological Exposures during the Class Period

- **Broad spectrum of external hazards**
  - Photon exposures related to radiography, x-ray diffraction and materials characterization studies (from radioactive sources and from generators)
  - Exposures (beta/photon) while working with thorium and uranium metals and compounds
  - Neutron exposures from radiography sources and test, repair and research of neutron and x-ray detectors
  - Exposures (beta/photon) while working with storage and packaging of waste materials

# Potential External Radiological Exposures during the Class Period<sub>-cont.</sub>

- **Materials and activities included**
  - **Depleted uranium and alloys from machining**
    - Surrogates for test devices were fabricated on the order of 50-100 specimens per month for SNL-L activities
  - **Highly enriched uranium**
  - **Thorium**
  - **Preparation of samples for tests**
  - **Gram quantities of tritium at the TRL and lesser amount in other facilities**

# Availability of Records

- Record retrieval and review significantly more complicated at SNL-L due to historic records storage practices
  - Some Health Physics records transferred to SNL-L, others have been transferred over time with little or no documentation of transfers
  - Provide very little or no information useful in selecting records for review
  - Available records are stored both California and New Mexico with little or no documentation of transfers

# Personal Monitoring Data

- **Availability of data remains significant concern for the Sandia sites**
  - **November 2009 - NIOSH notified DOE about incomplete case responses for both Sandia sites (especially internal dosimetry data)**
  - **January 2010 - NIOSH again requested SNL's records of open cases**
  - **Backlog of cases shows difficulties faced by the site to obtain these records**
  - **DOE and SNL continue efforts to improve records searches and requests for claimant monitoring data**
  - **NIOSH continues to provide feedback to both SNL-L and DOE about the availability of complete monitoring records**

# 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 relatively small number of samples per year
- NIOSH has obtained copies of some bioassay records as part of its site data captures and claim data requests
- However, as with SNL-A, it is clear that Sandia is not able to produce all the records nor are they sure of how much should be there

# External Monitoring Data

- NIOSH has identified numerous cases with data not provided by the site (similar to internal data)
- NIOSH has provided the site with copies of all the data that we have retrieved; however, we are unable to:
  - Conclude that we have captured all the data
  - Understand all the source terms to overcome the loss of personnel monitoring data

# Dose Reconstruction Feasibility

- Cannot bound internal or external doses from October 1, 1957 through December 31, 1994
  - Lack of the availability of monitoring data, process information, and monitoring program information are insufficient to support estimation of the potential internal or external exposures to radiation and radioactive materials
  - Lack of internal monitoring program documentation and source term information data for the evaluated period
  - Available records suggest only some workers participated in an internal dosimetry bioassay program while some workers only participated in an external dosimetry program
  - Even if the additional records become available, NIOSH could not establish a bounding approach

# Recommended Class

**“All employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked in any area at Sandia National Laboratories-Livermore in Livermore, California, from October 1, 1957 through December 31, 1994, 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 ”**

# Recommendation for Non-SEC Claims

- Although NIOSH found that it is not possible to completely reconstruct 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 finds that it is likely feasible to reconstruct occupational medical dose for Sandia National Laboratories-Livermore workers with sufficient accuracy up through 1989. After 1989, medical X-rays are not applicable because they were performed offsite
- Therefore, dose reconstructions for individuals employed at Sandia National Laboratories-Livermore during the period from October 1, 1957 through December 31, 1994, but who do not qualify for inclusion in the SEC, may be performed using these data as appropriate

# NIOSH Recommendation

## Summary of Feasibility Findings for SEC-00214 (October 1, 1957 through December 31, 1994)

Sources of Exposure	Reconstruction Feasible	Reconstruction Not Feasible
Internal		X
External		X
- Gamma		X
- Beta		X
- Neutron		X
- Occupational Medical X-ray	X	