Los Alamos National Laboratory
Revision to the
Special Exposure Cohort
Petition Evaluation Report
SEC-00109

James W. Neton, Ph.D., CHP
Associate Director for Science
National Institute for Occupational Safety and Health
Division of Compensation Analysis and Support

September 2012
Denver, CO

Background

- Previous NIOSH evaluations (SEC-00051, SEC-00061, and SEC-00170) have established SECs that include all employees from March 15, 1943 through December 31, 1975
- Basis for the class was infeasibility of internal dose reconstruction for a number of radionuclides, including:
  - Am, Cm, Np, Th, Sr
  - Mixed fission and activation products

Background—cont.

- The evaluation report for SEC-00051 recognized that the identified dose reconstruction issues might still exist for the post-1975 period

- On this basis, NIOSH qualified the current petition (SEC-00109) for evaluation

LANL Operations: 1976-2005

- Weapons development and testing
- Critical assemblies, reactors, and reactor development
- Accelerators, x-ray equipment, and radiography sources
- Biomedical research
- Project Sherwood and fusion research
- Waste treatment and disposal

Potential Radiation Exposure During the Class Period

- Internal sources of exposure
  - Primary radionuclides
    - —Cs-137, H-3, Pu-238, Pu-239, uranium
  - Exotic radionuclides as defined in SEC-00051
    - —Mixed fission and mixed activation products
    - —Ac-227, Am-241, Cm-244, Np-237, Pa-231, Sr-90/Y-90, Th-230, Th-232
- External sources of exposure
  - Photon, beta, and neutron exposure from accelerators, reactors, x-ray machines, and radioactive materials

Previous Dose Reconstructions

NIOSH OCAS Claims Tracking System

Information available as of August 8, 2012

- **LANL claims submitted to NIOSH** **1361**
- **Claims with employment during the period evaluated (01/01/1976-12/31/2005)** **863**
  - **Dose Reconstructions completed** **627 (73%)**
- **Claims with start dates after 12/31/1975** **386**
- **Claims containing internal monitoring data** **736**
- **Claims containing external monitoring data** **495**

Petition Overview

- April 3, 2008: 42 CFR Part 83.13 petition received (SEC-00109)
- May 29, 2008: Petition qualified for evaluation
- January 22, 2009: NIOSH issued the initial SEC-00109 Petition Evaluation Report (Rev. 0)
  - Class evaluated: Service Support Workers from January 1, 1976 through December 31, 2005
  - NIOSH concluded that sufficient information was available for dose reconstructions
  - No additional SEC class was recommended at that time

Petition Overview—cont.

- Following additional review of the available data, NIOSH now finds that it lacks sufficient information to demonstrate feasibility of internal dose reconstruction for some radionuclides, including:
  - Certain tritium compounds
  - Fission and activation products
  - Thorium
  - Exotic alpha emitters, e.g., Am-241, Np-237, Ac-227, Pa-231, and Cm-244

Petition Overview—cont.

- August 13, 2012: NIOSH issued a revision to the SEC-00109 Petition Evaluation Report (Rev. 1)
  - Revised previous decision to not recommend a class
  - Class now recommended for all workers at LANL from January 1, 1976 through December 31, 1995
  - End date selection is based on NIOSH's presumption that LANL would have been in full compliance with 10 CFR 835 by that date
  - NIOSH is continuing to evaluate the post-1995 period

Proposed Approach to Internal Dose Reconstruction (rev. 0)

- Extensive monitoring data available for routinely handled radionuclides (i.e., U, Pu, Cs, and tritium)
  - Coworker models established in OTIB-0062
- Sparse monitoring data available for non-routinely handled radionucldes (i.e., exotics, mixed fission, and activation products)
- Approach to reconstruction relied on use of Pu, U, and Cs coworker data as surrogates for expsosure to non-routinely handled radionuclides

Issues with Proposed Approach

- Original assumption that exotic radionuclides were handled, controlled, and monitored in a similar manner to U, Pu, and Cs could not be substantiated
- Exposures to exotics might be on an intermittent experimental basis leading to episodic exposures that are not represented by a chronic exposure model
- Comparability of operations that used exotics has not been established
- Short duration exposures might not have similar engineering controls in place as well-established operations

Feasibility of Internal Dose Reconstruction

- The available monitoring records, process descriptions, and source-term data are inadequate to complete internal dose reconstructions with sufficient accuracy for the evaluated class of employees during the period January 1, 1976 through December 31, 1995
- Based on a presumption of compliance with 10 CFR 835, NIOSH finds that dose reconstruction is likely feasible by January 1, 1996
- NIOSH is continuing to evaluate feasibility for the post-1995 period

Feasibility of External Dose Reconstruction

- Majority of all workers monitored for photons after 1975
- Personnel dosimeters were capable of measuring beta exposures
- Field beta measurements were taken in conjunction with photon surveys
- Neutrons monitored prior to 1980 can be assessed using appropriate N/P ratios
- Neutron exposures after 1980 measured using a combination of albedo and NTA film
- Occupational medical dose reconstruction possible using ORAU-TBKS-0013

Summary of Feasibility Findings (1976-1995)

Source of Exposure	Reconstruction Feasible	Reconstruction Not Feasible
Internal		X
- Pu, U	X	
- H-3, MFP, MAP, Th, Am-241, Np-237, Ac-227, Pa-231, Cm-244		X
External	X	
- Gamma	X	
- Beta	X	
- Neutron	X	
- Occupational Medical X-ray	X	

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.

- 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.

NIOSH Recommendation

All employees of the Department of Energy, its predecessor agencies, and their contractors and subcontractors who worked at the Los Alamos National Laboratory in Los Alamos, New Mexico from January 1, 1976 through December 31, 1995, 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-cont.

- Rationale for including all workers:
  - NIOSH has determined that, due to undocumented worker movements across the site and limited claimant-specific information pertaining to work locations, it is unable to eliminate any specific worker from potential exposure scenarios based on assigned work location.

NIOSH Recommendation-cont.

- For those 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, partial dose reconstructions for individuals employed at Los Alamos National Laboratory during the period from January, 1976 through December 31, 1995, but who do not qualify for inclusion in the Special Exposure Cohort, may be performed using these data as appropriate.

NIOSH Recommendation-cont.

Class	Feasibility	Health Endangerment
January 1, 1976 to December 31, 1995	No	Yes