

Brookhaven National Laboratory Special Exposure Cohort Petition Evaluation Report

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Petition Overview

- **October 27, 2011:** NIOSH informed a Brookhaven National Laboratory (BNL) claimant that we were unable to reconstruct the radiation dose for the claim
- **November 3, 2011:** NIOSH received an 83.14 SEC petition
- **November 4, 2011:** petition qualified for evaluation
- **January 11, 2012:** NIOSH Evaluation Report issued

Petition Overview—cont.

- **NIOSH proposed class to be added to the SEC:**

All employees of the Department of Energy, its predecessor agencies, and its contractors and subcontractors who worked in any area at Brookhaven National Laboratory in Upton, New York, from January 1, 1980 to December 31, 1993, 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

Background

- BNL is located in Upton, New York on a 5,265 acre site
- BNL's early research focused on advanced physics, but expanded into its current suite of research in the fields of medicine, biology, chemistry, physics, materials science, nuclear engineering, and environmental research
- BNL was organized into departments that provided research nuclear reactors, particle accelerators, and engineering facilities in support of the Biology, Chemistry, Physics, Medical, Applied Science, Accelerator, and Applied Mathematics Departments

Background—cont.

- The major scientific facilities operated at BNL to carry out the various scientific programs during the time period under evaluation were:
 - The High Flux Beam Reactor (HFBR) that was fueled with enriched uranium, moderated and cooled by heavy water, and operated at a routine power level of 40 MW
 - The Medical Research Reactor (MRR), an integral part of the Medical Research Center (MRC), that was fueled with enriched uranium, moderated and cooled by natural water, and operated intermittently at power levels up to 3 MW

Background—cont.

- The Alternating Gradient Synchrotron (AGS), a proton accelerator that operated at energies up to 33 GeV
- The 200 MeV Proton Linac, that served as an injector for the AGS, was supplied a continuous beam of protons for radionuclide production by spallation reactions in the Brookhaven Linac Isotopes Production Facility (BLIP) and in the Chemistry Linac Irradiation Facility (CLIF)

Background—cont.

- The Tandem Van de Graaff, Vertical Accelerator, and Chemistry Van de Graaff, were used in medium-energy physics investigations as well as for special radionuclide production
- The National Synchrotron Light Source project that used a linear accelerator and booster synchrotron as an injection system for two electron storage rings operating at energies of 700 MeV vacuum ultraviolet (VUV) and 2.5 GeV (X-ray) was used for spectroscopy in the VUV ring and for diffraction studies in the X-ray ring

Background—cont.

- There is currently one other SEC class associated with Brookhaven National Laboratory:
 - All employees of the Department of Energy, its predecessor agencies, and its contractors and subcontractors who worked at Brookhaven National Laboratory in Upton, New York, from January 1, 1947 to December 31, 1979, 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 (SEC-00113)

Background—cont.

- SEC-00113 Evaluation Report was presented at the October 2009 Advisory Board meeting
- NIOSH recommended a class of “all employees” for the period of 1947 through 1979
 - The end date was based on improved internal monitoring data availability starting in 1980
 - NIOSH committed to continue to review the information to ensure a proper end date for the class

Feasibility of Dose Reconstruction

- Site-specific and claimant-specific data available for BNL for the time period under evaluation are insufficient to allow NIOSH to determine that any specific work group was not potentially exposed to radioactive material releases or possible subsequent contamination

Feasibility of Dose Reconstruction

- Personnel were monitored for external exposures from the very beginning of operations in early 1947 and external monitoring records are available
- Annual summary data has been collected from 1958 to the present
- This data identifies the maximum exposure for each year, thus bounding the external exposures

Feasibility of Dose Reconstruction—cont.

- The external exposure data submitted in response to claims is very complete for the monitored population
- The monitored population includes all of those that would have been expected to receive exposure over the history of operations at BNL

Feasibility of Dose Reconstruction—cont.

- There are insufficient monitoring and source-term data from which to draw conclusions regarding potential magnitude of internal doses for the period from January 1, 1980 through December 31, 1993
- Due to undocumented worker movements across the site and limited claimant-specific information pertaining to work locations, NIOSH is unable to eliminate any specific worker from potential exposure scenarios based on assigned work location

Feasibility of Dose Reconstruction—cont.

- Although an internal monitoring program appears to have been active throughout the period under evaluation, the program was not formally documented
- Documentation available to NIOSH suggests that there was an operational internal monitoring program during the period under evaluation, personnel data management practices (i.e., lack of centralized databases) preclude the summarization and presentation of total internal monitoring data availability

Feasibility Summary

Feasibility Findings for BNL from January 1, 1980 through December 31, 1993		
Source of Exposure	Dose Reconstruction Feasible	Dose Reconstruction NOT Feasible
Internal		
		X
External		
- Beta-Gamma	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 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 in any area at Brookhaven National Laboratory in Upton, New York, from January 1, 1980 to December 31, 1993, 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.

Recommendation

- For the period January 1, 1980 through December 31, 1993, NIOSH finds that radiation dose estimates cannot be reconstructed for compensation purposes

Class	Feasibility	Health Endangerment
January 1, 1980 – December 31, 1993	No	Yes