

SEC Petition Evaluation Report Petition SEC-00102

Report Rev # 0

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Subject Expert(s):	Monica Harrison-Maples
Site Expert(s):	N/A

Petitioner Administrative Summary			
Petition Under Evaluation			
Petition #	Petition Type	Petition A Receipt Date	DOE/AWE Facility Name
SEC-00102	83.14	November 19, 2007	SAM Laboratories, Columbia University

Proposed Class Definition
<p>All employees of the Department of Energy (DOE), its predecessor agencies, and DOE contractors or subcontractors who worked in the Pupin, Schermerhorn, Havemeyer, Nash, or Prentiss buildings at the SAM Laboratories of Columbia University in New York City, New York, from August 13, 1942 through December 31, 1947, 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 SEC.</p>

Related Petition Summary Information			
SEC Petition Tracking #(s)	Petition Type	DOE/AWE Facility Name	Petition Status
None			

Related Evaluation Report Information	
Report Title	DOE/AWE Facility Name
None	

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Evaluation Report Summary: SEC-00102, SAM Laboratories

This evaluation report by the National Institute for Occupational Safety and Health (NIOSH) addresses a class of employees proposed for addition to the Special Exposure Cohort (SEC) per the *Energy Employees Occupational Illness Compensation Program Act of 2000*, as amended, 42 U.S.C. § 7384 *et seq.* (EEOICPA) and 42 C.F.R. pt. 83, *Procedures for Designating Classes of Employees as Members of the Special Exposure Cohort Under the Energy Employees Occupational Illness Compensation Program Act of 2000*.

NIOSH-Proposed Class Definition

The NIOSH-proposed class includes all employees of the DOE, its predecessor agencies, and DOE contractors or subcontractors who worked in the Pupin, Schermerhorn, Havemeyer, Nash, or Prentiss buildings at the SAM Laboratories of Columbia University in New York City, New York, from August 13, 1942 through December 31, 1947, 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 SEC.

Feasibility of Dose Reconstruction

Per EEOICPA and 42 C.F.R. § 83.14(b), NIOSH has established that it does not have sufficient information to complete dose reconstructions for individual members of the class with sufficient accuracy. NIOSH lacks personnel monitoring, area monitoring, and source term data for SAM Laboratories, making reconstruction of internal and external radiation doses infeasible.

Health Endangerment Determination

The NIOSH evaluation did not identify evidence supplied by the petitioners or from other sources that would establish the class was exposed to radiation during a discrete incident likely to have involved exceptionally high-level exposures, such as nuclear criticality incidents or other events involving similarly high levels of exposures. However, the evidence reviewed in this evaluation indicates that some workers in the class may have received external exposure to ionizing radiation as well as potential internal exposures to radiation through the intake of radiological materials. Therefore, 42 C.F.R. § 83.13(c)(3)(ii) requires NIOSH to specify 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.

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SEC Petition Evaluation Report for SEC-00102

1.0 Purpose and Scope

ATTRIBUTION AND ANNOTATION: This is a single-author document. All conclusions drawn from the data presented in this evaluation were made by the Oak Ridge Associated Universities Team Lead Technical Evaluator: Monica Harrison-Maples; Oak Ridge Associated Universities. These conclusions were peer-reviewed by the individuals listed on the cover page. The rationales for all conclusions in this document are explained in the associated text.

This report evaluates the feasibility of reconstructing doses for employees who worked at a specific facility during a specified time. It provides information and analysis germane to considering a petition for adding a class of employees to the Congressionally-created SEC.

This report does not make any determinations concerning the feasibility of dose reconstruction that necessarily apply to any individual energy employee who might require a dose reconstruction from NIOSH, with the exception of the employee whose dose reconstruction could not be completed, and whose claim consequently led to this petition evaluation. The finding in this report is not the final determination as to whether or not the proposed class will be added to the SEC. This report will be considered by the Advisory Board on Radiation and Worker Health (the Board) and by the Secretary of Health and Human Services (HHS). The Secretary of HHS will make final decisions concerning whether or not to add one or more classes to the SEC in response to the petition addressed by this report.

This evaluation, in which NIOSH provides its findings on both the feasibility of estimating radiation doses of members of this class with sufficient accuracy and on health endangerment, was conducted in accordance with the requirements of EEOICPA and 42 C.F.R. § 83.14.

2.0 Introduction

Both EEOICPA and 42 C.F.R. pt. 83 require NIOSH to evaluate qualified petitions requesting the Department of Health and Human Services to add a class of employees to the SEC. The evaluation is intended to provide a fair, science-based determination of whether it is feasible to estimate, with sufficient accuracy, the radiation doses of the proposed class of employees through NIOSH dose reconstructions.¹

NIOSH is required to document its evaluation in a report, and to do so, relies upon both its own dose reconstruction expertise as well as technical support from its contractor, Oak Ridge Associated Universities (ORAU). Once completed, NIOSH provides the report to both the petitioners and the Advisory Board on Radiation and Worker Health. The Board will consider the NIOSH evaluation

¹ NIOSH dose reconstructions under EEOICPA are performed using the methods promulgated under 42 C.F.R. pt. 82 and the detailed implementation guidelines available at <http://www.cdc.gov/niosh/ocas>.

report, together with the petition, comments of the petitioner(s) and such other information as the Board considers appropriate, to make recommendations to the Secretary of HHS on whether or not to add one or more classes of employees to the SEC. Once NIOSH has received and considered the advice of the Board, the Director of NIOSH will propose a decision on behalf of HHS. The Secretary of HHS will make the final decision, taking into account the NIOSH evaluation, the advice of the Board, and the proposed decision issued by NIOSH. As part of this final decision process, the petitioner(s) may seek a review of certain types of final decisions issued by the Secretary of HHS.²

3.0 NIOSH-Proposed Class Definition and Petition Basis

The NIOSH-proposed class includes all employees of the DOE, its predecessor agencies, and DOE contractors or subcontractors who worked in the Pupin, Schermerhorn, Havemeyer, Nash, or Prentiss buildings at the SAM Laboratories of Columbia University in New York City, New York, from August 13, 1942 through December 31, 1947, 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 SEC. During this period, employees at the SAM Laboratories (SAM Labs) facility were involved in nuclear research, including uranium chemistry, uranium hexafluoride work, cyclotron research, and gaseous diffusion research. NIOSH has not located specific information describing the details of the nuclear research at SAM Labs, but available information does indicate that during such work, employees may have been exposed to various forms of uranium, radium, thorium, plutonium, fission products, other radionuclides used as tracers, and other exotic radionuclides sent to SAM Laboratories by other facilities for material identification and analysis.

The evaluation responds to the Petition SEC-00102 which was submitted by an EEOICPA claimant whose dose reconstruction could not be completed by NIOSH due to a lack of sufficient dosimetry-related information. This claimant was employed as a Research Scientist/Chemist from 1944 through 1946. NIOSH's determination that it is unable to complete a dose reconstruction for an EEOICPA claimant is a qualified basis for submitting an SEC petition pursuant to 42 C.F.R. § 83.9(b).

4.0 Radiological Operations Relevant to the Proposed Class

The following subsections summarize the radiological operations at the SAM Laboratories from August 13, 1942 to December 31, 1947 and the information available to NIOSH to characterize particular processes and radioactive source materials. Using available sources, NIOSH has attempted to gather process and source descriptions, information regarding the identity and quantities of radionuclides of concern, and information describing processes through which the radiation exposures of concern may have occurred and the physical environment in which they may have occurred. The information included within this evaluation report is meant only to be a summary of the available information.

² See 42 C.F.R. pt. 83 for a full description of the procedures summarized here. Additional internal procedures are available at <http://www.cdc.gov/niosh/ocas>.

4.1 Operations Description

Columbia University was a major contributor throughout the early years of atomic research and development. Columbia University was involved in nuclear research prior to the creation of the Manhattan Engineer District (MED), established August 13, 1942. Absorption experiments to determine the feasibility of nuclear chain reactions began at Columbia in 1939 and the National Research Defense Committee began contracting with the university for nuclear research in 1940 (FUSRAP Elimination, 1985). MED-related research included work on isotope separation, nuclear chain reaction, and an atomic pile. This work was conducted at the SAM Laboratories, also known as the Special Alloyed Materials Laboratories, or the Substitute Alloy Materials Laboratories. SAM Labs was comprised of five buildings: Pupin, Schermerhorn, Havemeyer, Nash, and Prentiss. All buildings were owned by Columbia University except Nash, which was leased for MED work from 1943 to 1944 (FUSRAP Elimination, 1985).

The isotope separation research at SAM Labs included the centrifuge process in which the lighter uranium-235 isotope concentrates near the center of a spinning centrifuge of gaseous uranium hexafluoride, from where it is removed. SAM Labs also did research on the gaseous diffusion process which exploited the different rates at which uranium isotopes in gaseous uranium hexafluoride diffuse through a porous barrier. SAM Labs helped develop an effective corrosion-resistant membrane for separating uranium isotopes and contributed significantly to the development of the large-scale gaseous diffusion process later employed for uranium enrichment (FUSRAP Columbia, pdf p. 91). NIOSH has not located documentation providing specific details of the isotopic separation research and processes at SAM Laboratories.

SAM Labs conducted neutron cross-section research with plutonium shipped from what is now known as the Los Alamos National Laboratory (LANL). However, NIOSH has not been able to locate documentation specific to cross-section research operations.

Generally, SAM Labs processes deemed successful were relatively well-documented; however, NIOSH has been unable to locate comprehensive records regarding work that was conducted but not adopted as part of the nuclear weaponization effort. This situation may be an outcome of the compartmentalized organization of SAM Labs and the entire MED effort. The administration of work was defined and segregated by project (Advisory Board, 1947).

Weapons-related work at SAM Labs ended in 1947. Subsequent nuclear and radiological research at Columbia University included work focused on health effects and basic nuclear physics that were not directly related to the production of nuclear weapons.

4.2 Radiation Exposure Potential from Operations

The potential for external radiation dose existed at the five buildings of the SAM Labs facility: Pupin, Schermerhorn, Havemeyer, Nash, and Prentiss. Based on the site operations outlined in Section 4.1, sources of external exposure included alpha and beta particles, photons, and neutrons emitted from materials containing uranium, radium, thorium (FUSRAP Columbia, pdf p. 18), plutonium (Plutonium, 1949), polonium, strontium, potassium, phosphorous, carbon, iodine, fission products, and other radionuclides used in nuclear research (Requests, 1947-48; Scope, 1945). Contractual documentation defining the scope of work for SAM Labs indicates research with “artificial radioactive materials used as tracers” (Scope, 1945, pdf p. 5), but NIOSH has not located documentation defining these materials. Columbia University also operated a cyclotron that was used in SAM Labs research.

NIOSH has been unable to locate sufficient information to completely define the potential for internal radiation exposure at SAM Labs. NIOSH located a small number of air monitoring results taken in Pupin Hall a few years after the SAM Labs operational period. These air monitoring results were analyzed for radon concentration in the work spaces (Radon, 1950); however, no air monitoring results have been located for the 1942 through 1947 time period. NIOSH has located no contamination survey results, analyses of isotopic sources, or documentation of the physical state of radiological materials to which workers could have been internally exposed.

4.3 Time Period Associated with Radiological Operations

Per the DOE Office of Health, Safety and Security, the time period associated with EEOICPA-covered operations at SAM Laboratories is from 1942 through 1947 (DOE, 2007). EEOICPA-related work at SAM Labs is assumed to have started with the creation of the Manhattan Engineer District on August 13, 1942. NIOSH has been unable to locate information sufficient to determine a specific date in 1947 when MED-related radiological operations ceased; therefore, this evaluation assumes that the covered operations at SAM Labs ceased on December 31, 1947.

4.4 Site Locations Associated with Radiological Operations

NIOSH has found Formerly Utilized Sites Remedial Action Program (FUSRAP) documents indicating that the Pupin, Schermerhorn, Havemeyer, and Nash buildings were used for conducting nuclear research and development (FUSRAP Columbia, pdf pp. 23-26; FUSRAP Elimination, 1985). The history found in the FUSRAP Columbia database calls into question the inclusion of the Prentiss building as a radiological operations site (FUSRAP Columbia, pdf p. 25). The FUSRAP report of findings states that there is no evidence that MED-sponsored work was performed at Prentiss; furthermore, NIOSH has not located any documentation providing information about radiological work or storage at Prentiss. However, the DOE Office of Health Safety and Security website (DOE, 2007) includes Prentiss in its description of MED-related sites at Columbia.

- The Nash Building, located at 3280 Broadway at 133rd Street, was not owned by Columbia University, but was leased specifically for MED-related uranium hexafluoride work (FUSRAP Elimination, 1985, pdf p. 4). Some gaseous diffusion test cascade work involving uranium hexafluoride was performed at the Nash Building, but on a smaller scale than that conducted at the

Pupin (physics) Building (FUSRAP Columbia, pdf p. 24). The operation of a barrier production pilot plant (involving no radiological materials) was also explored at the Nash Building (FUSRAP Columbia).

- The Pupin Building was used for nuclear research and storage of research quantities of radioactive materials (FUSRAP Columbia). A small cyclotron in Lab Room 128 was where fission was first demonstrated in the U.S. Gaseous diffusion research was conducted in Lab Room 110. Pupin also housed a 12-stage test cascade involving small quantities of uranium hexafluoride. Prior to 1940, radium research was conducted on the 13th floor of the Pupin Building (FUSRAP Elimination, 1985, pdf pp. 8-9).
- The Schermerhorn Building was the location of the earliest U.S. pile research (FUSRAP Elimination, 1985, pdf p. 9). Gaseous diffusion research and development and a barrier production pilot plant were located in a courtyard at Schermerhorn.
- The Havemeyer Building housed some laboratory-scale research, and some chemistry work (FUSRAP Elimination, 1985, pdf p. 10). From the FUSRAP histories, it is unclear when SAM Labs work started in Havemeyer.
- NIOSH has been unable to locate documentation on any MED-related radiological work performed in the Prentiss Building.

NIOSH is unable to determine the locations of nuclear research operations with more specificity than the buildings themselves. NIOSH has found no information that either details or restricts the use of radionuclides in particular areas of the SAM Laboratories facilities. Without such information, NIOSH is unable to limit the SEC class based on work locations within SAM Labs. Consequently, the entire SAM Laboratories facility is included in the proposed SEC class.

4.5 Job Descriptions Affected by Radiological Operations

Very little is known about job titles, job descriptions, and/or job assignments related to the radiological research at SAM Labs. Available reports include references to chemical research, nuclear research, engineering design work, and medical research related to neutron dosimetry conducted with the Columbia College of Physicians and Surgeons. From these references, NIOSH assumes chemists, physicists, engineers, biologists or other medical professionals were employed by SAM Labs. NIOSH has minimal documentation regarding other job titles and/or job assignments associated with specific radiological locations at SAM Labs. Without additional specific information that links known worker job descriptions with specific work locations, it is not feasible to narrow listed job descriptions to only those workers with potential exposures to MED-related radiological operations. Therefore, it is not possible to determine that any specific work group was not potentially exposed to the MED-related exposures defined in this report, nor is it possible to use job descriptions to define the proposed SEC class.

5.0 Summary of Available Monitoring Data for the Proposed Class

The primary data used for determining internal exposures are derived from personal monitoring data, such as urinalyses, fecal samples, and whole-body counting results. If these are unavailable, the air monitoring data from breathing zone and general area monitoring are used to estimate the potential internal exposure. If personal monitoring and breathing zone area monitoring are unavailable, internal exposures can sometimes be estimated using more general area monitoring, process information, and information characterizing and quantifying the source term.

This same hierarchy is used for determining the external exposures to the cancer site. Personal monitoring data from film badges or thermoluminescent dosimeters (TLDs) are the primary data used to determine such external exposures. If there are no personal monitoring data, exposure rate surveys, process knowledge, and source term modeling can sometimes be used to reconstruct the potential exposure.

A more detailed discussion of the information required for dose reconstruction can be found in OCAS-IG-001, *External Dose Reconstruction Implementation Guideline*, and OCAS-IG-002, *Internal Dose Reconstruction Implementation Guideline*. These documents are available at: <http://www.cdc.gov/niosh/ocas/ocasdose.html>.

To locate relevant records for SAM Labs, NIOSH conducted data capture efforts that included: visits to the National Archive and Records Administration (NARA) facilities in Atlanta, Georgia; and queries of the Fernald Legal Database, the OpenNet database, the Nuclear Regulatory Commission (NRC) Agency-wide Documents Access and Management System (ADAMS) database, and the Office of Scientific & Technical Information (OSTI) database. NIOSH sent a letter to the State of New York and contacted the state by telephone to determine if the state had any historical records relevant to SAM Laboratories; no relevant documents were identified. SAM Laboratories no longer exists, but the Columbia University Associate General Counsel and the Radiation Safety Officer were approached for any SAM Labs records; they stated that the university has none.

5.1 Internal Personnel Monitoring Data

As of December 26, 2007, there are eight SAM Labs claimants in the NIOSH claimant tracking system. None of the NIOSH claimant files have internal exposure monitoring records associated with employment at SAM Labs. NIOSH has not located any urinalysis results, breath samples, *in vivo* counting, fecal monitoring, or other bioassay monitoring results for SAM Labs employees.

5.2 External Personnel Monitoring Data

The only external personnel monitoring data located by NIOSH are film badge reports and film badge cards for individuals employed by Columbia University. The earliest of these reports dates from 1950, three years beyond the end of the SAM Labs operational period. NIOSH has not located any external personnel monitoring data for SAM Labs employees.

5.3 Workplace Monitoring Data

NIOSH has located minimal documentation of workplace monitoring at SAM Labs. The only air monitoring results located by NIOSH (Air, 1952; Radon, 1950) are two reports with only 12 radon sample results, all of which are from the 1950s (beyond the SAM Labs operational period). No contamination survey results for SAM Labs were located, and only one area monitoring report was located. This report (Survey, 1947) documents radiation levels monitored in areas and rooms surrounding the cyclotron on November 5, 1947. No further area monitoring for the cyclotron has been located. A proposal for building a Van De Graff generator was located (FUSRAP Columbia, pdf pp. 5-6); however, NIOSH located no confirmation that it was built or any monitoring data pertaining to this device.

5.4 Radiological Source Term Data

NIOSH has not located radiological source term documentation for SAM Labs of sufficient detail to assist in the development of dose reconstructions. SAM Labs was involved with a very broad scope of problems being investigated during the Manhattan Project. NIOSH is unable to identify with confidence the isotopes, material form, or quantities handled at SAM Labs. NIOSH has located some monthly accountability reports for April 1943 through January 1945, and a yearly summary for 1944. Because SAM Labs was managed as a very compartmentalized organization (Advisory Board, 1947, pdf pp. 9-10), the accountability reports tended to be by project and were more concerned with uranium-bearing materials shipped to or from the university (Accountability, 1943-45; Accountability, 1945).

The accountability reports located by NIOSH do not give a clear picture of the inventory of all radiological materials across SAM Labs. Reference is made to the following materials requested from Oak Ridge: polonium-210 derived from bismuth-210 (Requests, 1947-48, pdf p. 152); phosphorus-32, sodium-24, calcium-45 and potassium-42 (Requests, 1947-48, pdf p. 166); strontium-89, carbon-14, and iodine-131 (Requests, 1947-48, pdf p. 191); and indium-113 (Requests, 1947-48, pdf p. 78). No specific accountability or inventory information has been found regarding these radionuclides. Lacking further information, NIOSH assumes these materials were part of the SAM Labs MED-related research.

NIOSH has also located documentation indicating the presence of deuterium (Requests, 1947-48, pdf p. 156), thorium (FUSRAP Columbia, pdf p. 18; Requests, 1947-48, pdf pp. 15-18), radium (Ra-Be Receipt, 1943, pdf p. 3), plutonium-239, and plutonium-240 (Plutonium, 1949; FUSRAP Columbia, pdf p. 64). During research on isotope separation, experimentation involving uranium ores, uranium slurries, uranium oxides, and uranium hexafluoride was conducted. The weekly reports for September 1943 describe experiments to remove fission products from uranium oxide slurries (Bi-weekly, 1943, pdf p. 5).

6.0 Feasibility of Dose Reconstruction for the Proposed Class

42 C.F.R. § 83.14(b) states that HHS will consider a NIOSH determination that there was insufficient information to complete a dose reconstruction, as indicated in this present case, to be sufficient, without further consideration, to conclude that it is not feasible to estimate the levels of radiation doses of individual members of the class with sufficient accuracy.

In the case of a petition submitted to NIOSH under 42 C.F.R. § 83.9(b), NIOSH has already determined that a dose reconstruction cannot be completed for an employee at the DOE or AWE facility. This determination by NIOSH provides the basis for the petition by the affected claimant. Per § 83.14(a), the NIOSH-proposed class defines those employees who, based on completed research, are similarly affected and for whom, as a class, dose reconstruction is similarly not feasible.

In accordance with § 83.14(a), NIOSH may establish a second class of co-workers at the facility for whom NIOSH believes that dose reconstruction is similarly infeasible, but for whom additional research and analysis is required. If so identified, NIOSH would address this second class in a separate SEC evaluation rather than delay consideration of the claim currently under evaluation (see Section 10). This would allow NIOSH, the Board, and HHS to complete, without delay, their consideration of the class that includes a claimant for whom NIOSH has already determined a dose reconstruction cannot be completed, and whose only possible remedy under EEOICPA is the addition of a class of employees to the SEC.

This section of the report summarizes research findings by which NIOSH determined that it lacked sufficient information to complete the relevant dose reconstruction and on which basis it has defined the class of employees for which dose reconstruction is not feasible. NIOSH's determination relies on the same statutory and regulatory criteria that govern consideration of all SEC petitions.

6.1 Feasibility of Estimating Internal Exposures

As indicated in Sections 5.1, 5.3, and 5.4, NIOSH does not have access to sufficient personnel monitoring, workplace monitoring, or source term data to estimate or bound internal exposures. NIOSH has not found bioassay data or relevant air monitoring data, and does not have enough information to develop credible internal exposure scenarios for SAM Labs employees. The available data are insufficient to support conclusions regarding the potential magnitude of any internal dose. Consequently, NIOSH is unable to estimate internal exposures based on the data available.

NIOSH also lacks sufficient source term and process information relevant to the research conducted at SAM Labs. In order to estimate exposures using source term information, NIOSH needs information such as the quantity and physical form of the radioisotopes used in order to develop internal exposure pathways and bound potential internal exposure.

Given the lack of personal internal monitoring data, workplace monitoring data, and complete source term descriptions for the various radiological hazards, it is not feasible for NIOSH to reconstruct with sufficient accuracy the internal doses that may have been received from potential exposures to radionuclides during the covered operational period at SAM Laboratories from August 13, 1942 through December 31, 1947.

6.2 Feasibility of Estimating External Exposures

As indicated in Sections 5.2, 5.3, and 5.4, NIOSH does not have access to sufficient personnel monitoring, workplace monitoring, or source term data to estimate or bound external exposures. The only external monitoring results located by NIOSH are film badge reports for work conducted after the SAM Labs covered period. NIOSH has no external personnel monitoring results related to the SAM Labs covered period. Consequently, NIOSH is unable to estimate external exposures based on the monitoring data available.

NIOSH also lacks specific documentation on workplace monitoring, the research and process operations, and source term data. In order to estimate exposures using process knowledge and source term data, NIOSH needs information such as the identity of the radioisotopes, their quantity and form, and potential exposure scenarios (e.g., area monitoring data) to determine the highest exposure potential.

Given the lack of personal external monitoring data, workplace monitoring data, and complete source term descriptions for the various external radiological hazards at SAM Laboratories, it is not feasible to reconstruct with sufficient accuracy the total external doses that may have been received from potential exposures to radionuclides during the covered operational period at SAM Laboratories from August 13, 1942 through December 31, 1947.

NIOSH considers the adequate reconstruction of medical dose for SAM Labs feasible by using claimant-favorable assumptions as well as the applicable protocols in the complex-wide Technical Information Bulletin, *Dose Reconstruction from Occupationally Related Diagnostic X-Ray Procedures* (ORAUT-OTIB-0006).

7.0 Summary of Feasibility Findings for Petition SEC-00102

This report evaluated the feasibility for estimating the dose, with sufficient accuracy, for all employees of the DOE, its predecessor agencies, and DOE contractors or subcontractors who worked in the Pupin, Schermerhorn, Havemeyer, Nash, or Prentiss buildings at the SAM Laboratories of Columbia University from August 13, 1942 through December 31, 1947. NIOSH determined that it lacks the necessary personal and area monitoring data, source term data, and knowledge of potential exposure scenarios to reconstruct the total internal or external radiation doses at the facility during this time period. Consequently, NIOSH finds that it is not feasible to estimate with sufficient accuracy the total radiation dose received by members of this class of employees.

Occupational medical exposures may be reasonably estimated by using claimant-favorable assumptions as well as the applicable protocols in the complex-wide Technical Information Bulletin, *Dose Reconstruction from Occupationally Related Diagnostic X-Ray Procedures* (ORAUT-OTIB-0006).

NIOSH has documented herein that it cannot complete the dose reconstruction related to this petition. The basis of this finding is specified in this report, which demonstrates that NIOSH does not have access to sufficient information to estimate either the maximum radiation dose incurred by any member of the class or to estimate such radiation doses more precisely than a maximum dose estimate.

Members of this class at the SAM Laboratories Columbia University facilities may have received unmonitored internal and external radiological exposures from various fission products, thorium, uranium, and transuranic radionuclides. NIOSH lacks sufficient information, including sufficient personnel and workplace monitoring data and radiological source term information, which would allow it to estimate the potential total internal and external exposures to which the proposed class may have been exposed.

8.0 Evaluation of Health Endangerment for Petition SEC-00102

The health endangerment determination for the class of employees covered by this evaluation report is governed by EEOICPA and 42 C.F.R. § 83.14(c) and § 83.13(c)(3). Pursuant to these requirements, if it is not feasible to estimate with sufficient accuracy radiation doses for members of the class, NIOSH must determine that there is a reasonable likelihood that such radiation doses may have endangered the health of members of the class. The regulations require NIOSH to assume that any duration of unprotected exposure may have endangered the health of members of a class when it has been established that the class may have been exposed to radiation during a discrete incident likely to have involved levels of exposure similarly high to those occurring during nuclear criticality incidents. If the occurrence of such an exceptionally high-level exposure has not been established, then NIOSH is required to specify that health was endangered for those workers who were employed for a number of work days aggregating at least 250 work days within the parameters established for the class or in combination with work days within the parameters established for one or more other classes of employees in the SEC.

NIOSH has not obtained evidence from any source to indicate that members of the class were not exposed to radiation during a discrete incident likely to have involved levels of exposure similarly high to those occurring during nuclear criticality incidents. However, the evidence reviewed in this evaluation indicates that some workers in the class may have accumulated chronic radiation exposures through intakes of radionuclides and from direct exposure to radioactive materials. Consequently, NIOSH is specifying that health was 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.

9.0 NIOSH-Proposed Class for Petition SEC-00102

The evaluation defines a single class of employees for which NIOSH cannot estimate radiation doses with sufficient accuracy. This class includes all employees of the DOE, its predecessor agencies, and DOE contractors or subcontractors who worked in the Pupin, Schermerhorn, Havemeyer, Nash, or Prentiss buildings at the SAM Laboratories of Columbia University in New York City, New York, from August 13, 1942 through December 31, 1947, 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 SEC.

10.0 Evaluation of Second Similar Class

In accordance with § 83.14(a), NIOSH may establish a second class of co-workers at the facility, similar to the class defined in Section 9.0, for whom NIOSH believes that dose reconstruction may not be feasible, and for whom additional research and analyses are required. If a second class is identified, it would require additional research and analyses. Such a class would be addressed in a separate SEC evaluation rather than delay consideration of the current claim. At this time, NIOSH has not identified a second similar class of employees at the SAM Laboratories for whom dose reconstruction may not be feasible.

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11.0 References

42 C.F.R. pt. 81, *Guidelines for Determining the Probability of Causation Under the Energy Employees Occupational Illness Compensation Program Act of 2000*; Final Rule, Federal Register/Vol. 67, No. 85/Thursday, p 22,296; May 2, 2002; SRDB Ref ID: 19391

42 C.F.R. pt. 82, *Methods for Radiation Dose Reconstruction Under the Energy Employees Occupational Illness Compensation Program Act of 2000*; Final Rule; May 2, 2002; SRDB Ref ID: 19392

42 C.F.R. pt. 83, *Procedures for Designating Classes of Employees as Members of the Special Exposure Cohort Under the Energy Employees Occupational Illness Compensation Program Act of 2000*; Final Rule; May 28, 2004; SRDB Ref ID: 22001

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