

SEC Petition Evaluation Report

Petition SEC-00034

Report Rev # 0

Report Submittal Date: 09-12-2005

Petition Administrative Summary											
Petition Under Evaluation											
Petition #		Petition Type		Submittal Date		DOE/AWE Facility Name					
SEC-00034		83.13		05-09-2005		National Bureau of Standards, Van Ness Street					
Feasible to Estimate Doses with Sufficient Accuracy?											
Single Class				Multiple Classes				Determination Established for All Classes			
Yes		No	X	Yes		No		Yes	X	No	

Initial Class Definition
All physicists that worked in the Radioactivity Lab - East Building - Building #2 at the National Bureau of Standards, Van Ness Street, Washington, DC, from 1943 through 1952.

Proposed Class Definition (Abbreviated)
All AWE employees who worked in Building #2 at the National Bureau of Standards, Van Ness Street, Washington, DC, from 1943 through 1952.

Related Petition Summary Information			
SEC Petition Tracking #(s)	Petition Type	DOE/AWE Facility Name	Petition Status
NA	NA	NA	NA

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Reviewed By:	Signature on File _____ <i>James W. Neton</i>	9/12/2005 _____ <i>Date</i>
Approved By:	Signature on File _____ <i>Larry J. Elliott</i>	9/12/2005 _____ <i>Date</i>

Evaluation Summary

This SEC Evaluation Report by the National Institute for Occupational Safety and Health (NIOSH) covers all employees proposed as a class for addition to the Special Exposure Cohort (SEC) in SEC Petition SEC00034, qualified on June 27, 2005. The petition requested NIOSH to consider all physicists that worked in the Radioactivity Lab - East Building - Building #2, at the National Bureau of Standards (NBS), Van Ness Street, Washington, DC, from 1943 through 1952.

In this SEC Evaluation Report, NIOSH provides its findings on the feasibility of estimating radiation doses of members of this class with sufficient accuracy (i.e., the feasibility of dose reconstruction) and on related matters, as required for NIOSH evaluations of SEC petitions under the Energy Employees Occupational Illness Compensation Program Act of 2000 (EEOICPA) and 42 C.F.R. pt. 83. This report will be considered by the Advisory Board on Radiation and Worker Health 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.

Feasibility of Dose Reconstruction

The feasibility determination for the class of employees covered by this SEC Evaluation Report is governed by the requirements of EEOICPA and 42 C.F.R. § Part 83(c)(1). This section of the rule states that “Radiation doses can be estimated with sufficient accuracy if NIOSH has established that it has access to sufficient information to estimate the maximum radiation dose, for every type of cancer for which radiation doses are reconstructed, that could have been incurred in plausible circumstances by any member of the class, or if NIOSH has established that it has access to sufficient information to estimate radiation doses of members of the class more precisely than an estimate of the maximum radiation dose.” If NIOSH were to have access to sufficient information for either case, then dose reconstruction would be feasible.

NIOSH has established in this evaluation that it lacks access to sufficient information to estimate either the maximum radiation dose incurred by any member of the class being evaluated, or to estimate such radiation doses more precisely than a maximum dose estimate. Members of this class may have had intakes of radium, uranium, and thorium compounds, and/or associated decay products or progeny, associated with the pilot studies, sampling activities, and analysis activities (oversight and quality control) performed at the laboratory. In addition, members of this class may have had intakes of radionuclides and external radiation exposures associated with other radiological activities summarized in this report. Furthermore, there is evidence of substantial radiological contamination of non-radiological areas of the facility, which would have exposed other employees in the facility.

There are no in-process area monitoring data, personal monitoring data, source term, or process information for these radiological activities to permit estimating the maximum radiation doses associated with these activities.

On these bases, NIOSH finds that it is not feasible to estimate radiation doses with sufficient accuracy for members of the class. NIOSH also finds that the class defined by the petitioners to include only physicists in the Radioactivity Lab should be expanded to include all Atomic Weapons Employer (AWE) employees who worked in Building #2, based on the apparently extensive and potentially serious radiological contamination of non-radiological areas of the facility.

Health Endangerment

The health endangerment determination for the class of employees covered by this SEC Evaluation Report is governed by EEOICPA and 42 C.F.R. § 83(c)(3). Under these requirements, if it is not feasible to estimate with sufficient accuracy radiation doses for members of the class, NIOSH must also make a determination whether or not there is a reasonable likelihood that such radiation doses may have endangered the health of members of the class. The regulation requires 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.

The NIOSH evaluation did not identify any evidence from the petitioners or from other resources that would establish that the class was exposed to radiation during a discrete incident likely to have involved exceptionally high level exposures, as described above. The evidence reviewed in this evaluation indicates that some workers in the class may have accumulated substantial chronic exposures through episodic intakes of radionuclides, combined with external exposures to gamma, beta, and neutron radiation. Consequently, NIOSH has specified 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.

Proposed Class Definition

This evaluation defines a single class of employees for which NIOSH cannot estimate radiation doses with sufficient accuracy and whose health may have been endangered by such radiation doses. This class includes all AWE employees who worked in Building #2 at the National Bureau of Standards, Van Ness Street, Washington, DC, from 1943 through 1952 and who were employed for a number of work days aggregating at least 250 work days, occurring either solely under this employment or in combination with work days of employment occurring within the parameters (excluding aggregate work days) established for other classes of employees included in the SEC.

1.0 Purpose

The purpose of this report is to provide an evaluation of the feasibility of reconstructing the dose for the employees proposed as a class in SEC Petition 00034. The petition covered all physicists that worked in the NBS Radioactivity Lab - East Building - Building #2 on Van Ness Street, Washington, DC, from 1943 through 1952.

This evaluation was conducted in accordance with 42 C.F.R. pt. 83 and the guidance contained in NIOSH's Internal Procedures for SEC evaluations, OCAS-PR-004. It provides information and analyses germane to considering a petition for adding a class of employees to the SEC. It does not provide any determinations concerning the feasibility of dose reconstruction that necessarily apply in the particular case of any individual energy employee who might require a dose reconstruction from NIOSH.

2.0 Introduction

Title 42 of the Code of Federal Regulations (C.F.R.) Part 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*, requires NIOSH to evaluate qualified petitions requesting HHS to add a class of employees to the SEC. The evaluation is intended to provide a fair, science-based determination of whether or not it is feasible to estimate with sufficient accuracy the radiation doses of the class of employees through NIOSH dose reconstructions¹. If it is not feasible, the evaluation is further required to make a determination with respect to the health endangerment of the class of employees.

NIOSH is required to document the evaluation in a report, which is provided to the petitioners and to the Advisory Board on Radiation and Worker Health (the Board). The Board will consider the NIOSH SEC Evaluation Report, together with the petition and any comments of the petitioner(s), 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 decisions on behalf of HHS. The Secretary of HHS will make final decisions, 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 decisions.²

This present NIOSH report provides a summary of the methods and findings of the NIOSH SEC petition evaluation for all AWE employees that worked in the Radioactivity Lab - East Building - Building #2 at the National Bureau of Standards, Van Ness Street, Washington, DC, from 1943 through 1952. During this period, employees at this facility conducted a variety of radiological research, testing, measurement, analyses, and technology development for the Manhattan Engineering District and Atomic Energy Commission in support of the U.S. nuclear weapons production program.

3.0 Initial Class Definition and Petition Basis

The class definition as specified within SEC Petition SEC00034, which qualified for evaluation on June 27, 2005, requested HHS to consider the addition to the SEC of a class of employees including all physicists

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 www.cdc.gov/niosh/ocas.

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

that worked in the Radioactivity Lab - East Building - Building #2 at the National Bureau of Standards, Van Ness Street, Washington, DC, from 1943 through 1952.

Of the evidence provided by the petitioner, the following evidence met the criteria in the rule to provide support of their belief that dose reconstruction would not be feasible for this proposed class of employees, to qualify the submission as a petition to receive consideration by NIOSH, the Board, and HHS:

- As of the time of qualification, no data or documentation had been located indicating any results or program to monitor for external radiation exposure hazards or internal exposure due to ingested or inhaled radioactive material. The petitioner provided a declaration that there was no personal monitoring performed and that samples were brought into their respective laboratories without information as to the nature of the materials delivered.

The petitioner supplied 56 supporting documents and an affidavit in support of this basis and documenting potential radiation exposures of the class covered by the petition.

4.0 Data Resources

NIOSH identified and reviewed the available data resources recognized as germane to this site to determine the availability of information relevant to determining the feasibility of dose reconstruction for the class of employees covered by the petition. This included determining the availability of information on personal monitoring, area monitoring, testing processes, and radiation source materials. The following sections describe the resources identified and reviewed.

Individual Claims Submitted for Dose Reconstruction

A review was done of the NIOSH dose reconstruction database, NIOSH OCAS Claims Tracking System (NOCTS), to identify dose reconstruction cases under EEOICPA that might provide information relevant to the petition evaluation. Table 4.1 below provides the results of this review of NOCTS for the proposed class.

Table 4.1 NOCTS Review – NBS Claims Submitted Under Dose Reconstruction Rule for 1943-1952

	Total	Individuals with External monitoring records	Individuals with Internal Monitoring records
NBS Individual Claims in NOCTS	1*	0	0

*Individual dose reconstruction not complete.

NIOSH has completed a review of NOCTS to determine whether internal and/or external personal monitoring records for NBS employees, or any other personal or area monitoring records, were available. NIOSH has not been able to obtain any personal or area monitoring records for the period defined in the proposed class definition from the NOCTS data source.

NIOSH and ORAU Research Documents

A search of the NIOSH and ORAU site research database was conducted for documentation relating to NBS and seven resulting documents were evaluated for pertinence to this petition. These documents contained a sparsely described history of activities performed at NBS, with some process information but no in-process internal or external personal or area monitoring data for the period evaluated in this report.

Related data reviewed for this evaluation included a report containing pre and post-decontamination radiological survey information from a building decontamination effort that occurred in 1968. The data specifically included radon air sample data, alpha contamination survey data, and gamma radiation dose rate data for all affected rooms in the former NBS Building #2 (**NBS 1968**). The report also discussed the performance of a decontamination that took place in 1952 (when the NBS moved from this location). No radiological monitoring data for the 1952 decontamination effort were discovered in the research performed for this SEC Evaluation Report, nor was there indication in the 1968 report that building radiological monitoring data exist for pre-1968 periods.

The information from these documents relevant to the class, as evaluated in this report, is summarized in sections 5.0 and 7.0 of this report.

Searches for Document from Sources External to the EEOICPA Project

NIOSH searched the National Institute of Standards and Technology (NIST, formerly the NBS) library and the NIST publicly accessible website for all documents pertaining to NBS operations during the period applicable to this proposed class definition. This search identified one document (**NBS 1966**) that provided corroborative information regarding the operations at the NBS, but did not provide any additional or new information regarding individual or area radiological monitoring practices at the facility for the time period evaluated in this report.

The information from the document relevant to the class, as evaluated in this report, is summarized in sections 5.0 and 7.0 of this report.

Documentation and/or affidavits provided by the petitioner

In qualifying and evaluating the petition, NIOSH reviewed the following documents submitted or referenced by the petitioners (NOTE: these documents are stored in the SEC Information System which is the project SEC electronic file management system (not currently available on the OCAS web site); the numbers listed within the parenthesis are the names of the applicable electronic files):

- 1) Letter from the petitioner [20050511\{B0F4FBA5-8344-491C-B632-331DBAAF903B}_s002.pdf] received May 9, 2005.
- 2) 55 separate documents [20050511\{B0F4FBA5-8344-491C-B632-331DBAAF903B}_s003.pdf] received May 9, 2005.
 - Forty (40) of the documents that were provided by the applicant included only background information – not directly related to the support of the submission basis or not provided as affidavits for the petition. These documents included newspaper articles, pictures of NBS individuals, non-affidavit emails and correspondence, individual claim process descriptions/information, weather balloon and detection instrument research papers and documentation, background information/documentation for the co-worker that provided an affidavit for this petition, and a work summary for the former Energy Employee (EE);
 - One (1) document was an email from a co-worker of the EE, which was re-submitted as an affidavit;
 - Fourteen (14) of the documents provided general information regarding the handling of radioactive materials at the National Bureau of Standards.
- 3) Affidavit from co-worker and petitioner [20050606\{F645D459-FE12-4A3E-960A-FEEB00B3B1E6}.pdf] received June 6, 2005.

These documents were reviewed as to the relevance to the petitioning class. The information from these documents relevant to the petitioning class has been summarized in sections 5.0 and 7.0 of this report.

5.0 Summary of Available Monitoring Data

Based on a review of the available information for the NBS, there is no indication that any type of radiological monitoring data exists for the period of the NBS facility's operations. Some radiological data does exist in the form of a 1968 Building #2 decontamination report, as previously described. The available documentation suggests that no health physicists were involved at the facility, nor were there any radiation exposure monitoring programs (**NBS 1968**).

The former NBS facilities (including Building #2) were transferred to General Services Administration (GSA) in 1952, when NBS moved from this site to a new facility in Gaithersburg, MD. Although NBS conducted a decontamination activity prior to the transfer, the decontamination appears to have been directed by the laboratory physicists (**NBS 1968**).

In 1968, operation of six of the buildings at the former NBS site (including Building #2) was transferred to the District of Columbia, for use by the Washington Technical Institute, under a permit agreement with GSA. Shortly after this transfer, the District of Columbia (Radiological Health Division), in coordination with the NBS (Health Physics Section) performed a formal radiological safety survey and evaluation, which resulted in a second decontamination activity in Building #2.

NIOSH has pre- and post-decontamination survey information from this 1968 decontamination activity (**NBS 1968**). It includes pre- and post-decontamination radon-222 air sample information, contamination survey information, and area radiation dose information for Building #2. As previously indicated, no radiological area monitoring data for the operational period of the facility was available for this evaluation. Furthermore, due to the previous, undocumented radiological decontamination efforts in 1952, no direct correlation between the contamination levels that may have existed in 1943-1952 and those identified in 1968 can be established.

6.0 Summary of Radiological Operations Relevant to the Initial Proposed Class

The following subsection summarizes the information NIOSH was able to obtain describing the radiological operations at the National Bureau of Standards from 1943 through 1952, which were conducted for the Manhattan Engineering District (MED) and Atomic Energy Commission (AEC).

6.1 The National Bureau of Standards Process Descriptions

Between 1943 and 1952, the NBS provided laboratory support for the MED and the AEC atomic energy and nuclear development activities. These radiological activities, which occurred in Building #2, included support of pilot studies for uranium processing, limited thorium handling/processing, the development of analytical procedures and quality control oversight for controlling the purity of critical materials for reactors and weapons, radium studies and sample analysis, and the development of radiological monitoring instrumentation and other radiological safety technology (**NBS 1946, NBS 1966**).

The MED support activities performed by the NBS were considered highly confidential and secrecy of the activities was meticulously maintained. As indicated in the affidavit provided by a co-worker of the energy employee, in many cases the individuals performing the tests and studies were not informed of the types of materials that they were working with. They were directed to perform limited scope studies and tests after

which they would turn over the results and directly proceed with another directed test or study. Information from the NIST web site indicated that the NBS had so many confidential projects under way that the program director obtained authority to close the street running through the NBS campus and installed fences around the grounds.

After the war (WWII), the MED and AEC reduced the amount of work directed to the NBS because of the limitations in work space and available support personnel (**NBS 1966**). The post-war work at the NBS was limited to quality control oversight and small scale laboratory analysis (**ACOE 1946**). This is likely to have reduced the extent and diversity of radiological hazards at the NBS (other than for radium) after the 1945-1946 timeframe.

6.1.1 Uranium Handling and Processing Studies

The NBS provided pilot study support for the MED uranium refining and enrichment activities for the early years in the development of the atomic bomb. This work included sample analysis of critical materials for reactors and weapons at that time and the development of related analytical procedures. These NBS activities included the determination of the physical and chemical properties of uranium and the development of methods to refine uranium, including development of the thermal diffusion method for uranium isotope separation (**NBS 1966**).

6.1.2 Thorium Handling and Processing Studies

Although NIOSH has been unable to obtain any specific process descriptions or handling procedures for thorium, NBS was accountable for 5.24 pounds of thorium at the end of 1946 (**MED 1946b, MED 1946c**). Thorium was probably provided for sample analysis, since this was the primary focus of NBS activities at that time.

6.1.3 Development of Analytical Procedures and Quality Control Oversight

NBS developed analytical procedures and provided quality control oversight for MED and AEC during the war, and these became primary support functions of NBS after the war. The NBS developed radioanalytic techniques that were instrumental to monitoring the efficiency of the uranium isotope separation process and for controlling the purity of the critical materials in reactors and weapons (**NBS 1966**).

Because of the value of uranium materials and because of the necessity for high purity of these materials for the MED project use, it was necessary that careful, precise analytical control of impurity level be maintained throughout the production processes. NIOSH has not identified any specific analytic support procedures but available documentation indicates that some of the materials evaluated by NBS required as many as 20 individual chemical analyses, and spectrographic determinations of as many as 30 elements in the raw state (**NBS 1966**). These extensive analyses would have involved a variety of potential radiological exposures to the NBS laboratory physicists and, depending on the controls implemented during the performance of the analyses (i.e.; use of ventilation hoods or filtration/containment of radioactive materials), to individuals in surrounding laboratories/rooms in Building #2.

6.1.4 Radium Sample Analysis

The NBS's primary experience with radioactive materials in the years preceding the war efforts through 1952, involved work associated with radium sampling and analysis. In addition to the MED and AEC work during this period, the NBS also measured all radium samples in the United States to be used for medical

purposes. Since the technology of sealing sources was in development during the period of time that the NBS performed laboratory operations in Building #2, it was not uncommon for the NBS to receive sources for analysis that were leaking. The Radiological Health Division of the District of Columbia and the NBS Health Physics Section considered the receipt of such leaking sources as one of the factors contributing to the spread of radiological contamination in Building #2 and to the exposure potential for individuals working in the laboratories (NBS 1968).

The NBS was also instrumental in developing technologies to improve the safety of handling and labeling radioactive sources at the NBS. For example, NBS developed an instrument that permitted scientists to maintain a distance from sources while inscribing sample information on the radium sources. The need for development of these types of instruments indicates the NBS physicists were likely to have handled relatively high activity source materials.

6.1.5 Radiological Monitoring and Survey Instrumentation and Radiological Safety Development

Another function of the NBS applicable to this petition was the development of radiological monitoring and survey instrumentation. Much work was done at the NBS toward establishing radioactivity measurements and safety procedures for the handling atomic weapons materials. The instrumentation development work included the research and development of improved electronic devices and components used in the detection of radiation (NBS 1966). The development and testing of specific radiological monitoring instrumentation would have involved the use of, and potential exposure to, various radiological sources among NBS laboratory personnel.

6.1.6 Neutron Related Activities at the NBS

Exposure to neutron radiation was a potential external exposure hazard at the NBS during the period covered by this SEC Evaluation Report. The NBS handbook for "Protection Against Neutron Radiation up to 30 Million Electron Volts," published in 1957 provides an example of some of the neutron research performed by the NBS (NBS 1957). NIOSH has not located any monitoring or source term data concerning the dose rates associated with this type of research during the period covered in this SEC Evaluation Report.

6.1.7 Radon Exposures Associated with NBS Radiological Operations

Exposure to radon was a potential internal exposure hazard at the NBS during the period covered by this SEC Evaluation Report. Based on the radiological work history at the NBS and the radiological survey information in the 1968 decontamination report, the potential for significant radon exposures existed during the handling and analysis of radium, radioactive samples, and other MED related radioactive materials in the laboratories at the NBS during the period covered in this evaluation (NBS 1968). As indicated in the affidavit provided by a co-worker for this petition, it was believed that the buildup of decay gases may have caused some of the radium sample vials to burst contributing to the spread of radium contamination and radon in the laboratories, and potentially other non-radiological areas, within the NBS Building #2. NIOSH has not located records of area radon concentrations for the NBS during the period covered in this SEC Evaluation Report.

6.2 On-Site and Off-Site Radiological Control

Although the NBS provided much in the field of radiological safety development, as indicated in the published documents on this topic from the NBS, NIOSH has not located any documentation indicating that any formal on-site or off-site radiological control programs existed at the facility. The 1968

decontamination document (**NBS 1968**) indicates that NBS did not employ any health physicists at the facility.

According to the 1968 decontamination document, there was contamination of many non-radiological areas of Building #2 (areas not designated for radiological work during the NBS years). This included rooms not designated for radium work and extensive contamination of a fourth floor hallway, including portions in front of the fourth floor lecture room. The investigation revealed that one source of the contamination spread to the fourth floor hallway may have been a physicist's venting of radium ampoules through a laboratory window. The fact that such a practice occurred raises serious questions about the quality of any radiological control procedures that may have existed at the facility.

Four rooms in Building #2 (Room 507, 518, 519, and 520) were sealed off in 1952. These rooms had "Caution-Radioactive Material" (CRM) signs installed when the 1968 decontamination took place. Based on information from the 1968 report, Room 507 contained the worst radiological conditions (highest contamination and radiation levels) in the facility at the time of that decontamination effort. The decontamination effort 1968 resulted in the generation of approximately one hundred 55-gallon drums of radioactive waste and took four weeks to complete.

7.0 Evaluation of Feasibility of Dose Reconstruction

The feasibility determination for the class of employees covered by this SEC Evaluation Report is governed by EEOICPA and 42 CFR § 83.13(c)(1). Under the Act and rule, NIOSH must establish whether or not it has access to sufficient information to either estimate the maximum radiation dose that could have been incurred under plausible circumstances by any member of the class, or to estimate the radiation doses of members of the class more precisely than a maximum dose estimate. If NIOSH were to have access to the information sufficient for either case, then dose reconstruction would be considered feasible.

In making determinations of feasibility, NIOSH begins by evaluating whether current or completed NIOSH dose reconstructions demonstrate the feasibility of estimating with sufficient accuracy the potential radiation doses of the class (identified in section 6.0 of this report). If not, NIOSH systematically evaluates the sufficiency of different types of monitoring data and process and source or source term data, which together or individually might assure NIOSH that it can estimate either the maximum doses members of the class might have incurred, or more precise quantities that reflect the variability of exposures experienced by groups or individual members of the class. This approach is specified in the SEC Petition Evaluation Internal Procedures (OCAS-PR-004) available at www.cdc.gov/niosh/ocas.

The evaluation that follows examines separately the availability of information necessary for reconstructing internal and external radiation doses of members of the class. As documented in Section 4.0, NIOSH has not completed any dose reconstructions nor collected information in the process of dose reconstruction that demonstrates the feasibility of estimating the radiation doses of the class.

7.1 Internal Radiation Exposure

The principal potential source of internal radiation doses for members of the proposed class at the NBS would have been inhalation and ingestion of radiological contaminants during the performance of pilot studies and laboratory sample analysis at the NBS. Information from documentation in the NIOSH site research database, and information in the affidavit provided by the petitioner, indicates the potential for employees to have inhaled or ingested radium, thorium, and uranium (and their progeny), as well as radon,

during the performance of work at the facility. Additionally, the potential for significant radon exposures existed during the applicable time period.

There is no evidence that NBS performed any internal monitoring, or area monitoring relevant to evaluating personnel internal exposures, at the facility. There is little, very general information on radiological processes and no information on specific laboratory procedures or directives concerning radiological processes and controls. There is no internal dose monitoring information, nor indication that such monitoring occurred. There is little radiological source information and no information from the initial radiological decontamination effort at the end of the facility's operation serving MED and AEC. Lacking any of this information, it is not feasible to estimate the internal radiation doses that may have been received by employees at the facility.

7.2 External Radiation Exposure

The principal potential source of external radiation doses for members of the proposed class at the facility would have been due to exposures to photon and electron (beta) radiation, although the class may also have been exposed to neutron radiation. The potential existed for external radiation exposures from the handling of radioactive materials during pilot operation studies and MED/AEC support activities, the use of radioactive sources, and laboratory sample analysis. Employees could have been exposed to neutron radiation from (α, n) reactions and the handling of neutron emitting sources (e.g., Po-Be, Pu-Be, Ra-Be, and Am-Be). The potential for neutron exposures may have also existed during the development of radiological monitoring instrumentation and during the performance of neutron studies noted in Section 6.0 of this report.

There is no evidence that employees were monitored for beta-gamma external radiation exposure. Given the lack of internal dose information as well, NIOSH did not evaluate further the availability of neutron dose information or information on occupational medical exposures.

7.3 Summary of Feasibility Findings

This report evaluated the feasibility for estimating the dose, with sufficient accuracy, for all Atomic Weapons Employees that worked in the Radioactivity Lab - East Building - Building #2 at the National Bureau of Standards, Van Ness Street, Washington, DC, from 1943 through 1952. NIOSH finds that it lacks monitoring, process, or source information to estimate the internal or external radiation doses of this class of employees.

Furthermore, NIOSH finds substantial evidence that radiological contamination of Building #2 extended beyond the prescribed radiological laboratories in which the physicists worked. As discussed in this report, it is not possible for NIOSH to determine the full extent and severity of such contamination, as NIOSH has been unable to obtain the results of the first decontamination effort for the facility, concluded in 1953. The second decontamination effort, with documented results, suggests the original extent and severity of contamination was substantial. On this basis, NIOSH also finds that the class covered by this SEC evaluation should be expanded to include all employees of Building #2.

The table below summarizes the results of the feasibility findings for each exposure source.

TABLE 7.3.1 FEASIBILITY FINDINGS

Source of Exposure	Maximum Exposure can be determined	Maximum Exposure cannot be determined
Internal		X
- Ingestion		X
- Inhalation		X
External		X
- Gamma		X
- Beta		X
- Neutron	Not Evaluated	Not Evaluated
Occupational Medical	Not Evaluated	Not Evaluated

8.0 Evaluation of Health Endangerment

The health endangerment determination for the class of employees covered by this SEC Evaluation Report is governed by EEOCIPA and 42 C.F.R. § 83.13(c)(3). Under these requirements, if it is not feasible to estimate with sufficient accuracy radiation doses for members of the class, NIOSH must also make a determination whether or not there is a reasonable likelihood that such radiation doses may have endangered the health of members of the class. The regulation requires 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 determined that it is not feasible to estimate with sufficient accuracy radiation doses, including that from potential internal and external exposures, and that the health of the employees covered by the proposed class definition provided in section 9.0 of this evaluation may have been endangered.

The NIOSH evaluation did not identify any evidence from the petitioners or from other resources that would establish that the class was exposed to radiation during a discrete incident or similar conditions resulting from the failure of radiation exposure controls and likely to have produced levels of exposure similarly high to those occurring during nuclear criticality incidents. The evidence reviewed in this evaluation indicates that some workers in the class may have accumulated substantial chronic exposures through episodic intakes of radionuclides, combined with external exposures to gamma, beta, and neutron radiation. 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 Proposed Class Definition

This evaluation defines a single class of employees for which NIOSH cannot estimate radiation doses with sufficient accuracy and whose health may have been endangered by such radiation doses. This class includes all Atomic Weapons Employees who worked in Building #2 at the National Bureau of Standards, Van Ness Street, Washington, DC, from 1943 through 1952 and whom were employed for a number of work days aggregating at least 250 work days, occurring either solely under this employment or in combination with work days of employment occurring within the parameters (excluding aggregate work days) established for other classes of employees included in the SEC.

10.0 References

EEOICPA (Energy Employees Occupational Illness Program Act of 2000, as amended, 42 U.S.C. §§ 7384-7385).

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

42 C.F.R. pt. 83. Procedures for Designating Class of Employees as Members of the Special Exposure Cohort Under the Energy Employees Occupational Illness Program Act of 2000; Final Rule, May 28, 2004.

NIOSH (National Institute for Occupational Safety and Health) 2004, Internal Procedures for the Evaluation of Special Exposure Cohort Petitions, OCAS-PR-004, Revision 0, Cincinnati, Ohio, September 23, 2004.

ACOE 1946, Kelley, W. E.; Cox, James A.; “Work Required by Other Sites to be done by the Bureau of Standards” U. S Army Corps of Engineers Memorandum, April 11, 1946.

ACOE 1943, Ferry, John L.; “Inspection of Laboratories at National Bureau of Standards” U. S Army Corps of Engineers Memorandum, December 3, 1943

AERO 1981, Wallo, Andrew, III; “Investigations Regarding Former Thorium Sites Rare Earth’s Inc., Pompton, New Jersey and Maywood Chemical Co., Maywood, New Jersey” The Aerospace Corporation letter, March 2, 1981

DOE, Department of Energy, Office of Nuclear Energy, Office of Remedial Action and Waste Technology, Division of Facility and Site Decommissioning Projects “Formerly Utilized Sites Remedial Action Program, Elimination Report for The Former National Bureau of Standards Buildings, Van Ness Street, Washington, D. C.” DOE FUSRAP Elimination Report with supporting attachments

MED 1946a, DeBlois, Lewis A., Jr.; “Madison Square Area, Uranium Inventory as of 31 December 1946” Manhattan Engineering District Uranium Inventory, December 31, 1946

MED1946b, DeBlois, Lewis A., Jr.; “Madison Square Area, Thorium Inventory as of 31 December 1946” Manhattan Engineering District Thorium Inventory, December 31, 1946

MED 1946c, DeBlois, Lewis A., Jr.; “Madison Square Area, Historical Summary as of 31 December 1946” Manhattan Engineering District Thorium Procurement Schedule, December 31, 1946

MED 1978, Whitman, Arthur J.; Mott, William E.; “Decontamination and Decommissioning: Review Manhattan District History” Summary of Manhattan Project Uranium Flow Sheet, February 1, 1978

NBS 1946, Briggs, Lyman J., PhD, NBS War Research – The National Bureau of Standards in World War II, Report, August 15, 1946.

NBS 1955, National Bureau of Standards; “Intercomparison of Film Badge Interpretations, A Study Sponsored by the Isotopes Division and Radiation Instruments Branch U. S. Atomic Energy Commission” Staff Report, April 1955

NBS 1957, National Bureau of Standards; “Protection Against Neutron Radiation up to 30 Million Electron Volts” Handbook 63, November 22, 1957

NBS 1966, Cochrane, Rexmond C.; Newman, James R.; “Measures for Progress: A History of the National Bureau of Standards” NBS Book, 1966 and 1974

NBS 1968, Schwebel, Abraham; “Release of Building at Van Ness Street after Decontamination” National Bureau of Standards Memorandum, March 22, 1968

NBSa, “The Former National Bureau of Standards Buildings, Van Ness Street, Washington, D.C.”

NBSb, “The Former National Bureau of Standards Building 2, Van Ness Street, Washington, D.C.”

NBSc, <http://www.nist.gov/>, National Institute of Standards and Technology (formerly the National Bureau of Standards) web site.

Attachment 1
National Bureau of Standards, Van Ness Street
Listing of Documents in the Site Research Database
August 1, 2005

The enclosed listing of documents relating to the National Bureau of Standards, Van Ness Street, was compiled from the contents of the National Institute of Occupational Safety and Health (NIOSH) Site Research Database (SRDB), which is a repository of electronic images of documents that have been recovered from a variety of sources and were thought to have potential relevance to radiation dose reconstruction activities under the Energy Employees Occupational Illness Compensation Program Act (EEOICPA).

This listing is not, strictly speaking, a bibliography, in that some of the listed documents are memos, notes, or other types of working documents whose title, date of origin and authorship may not be apparent within the document itself. Also, some of the titles shown in this listing are descriptive titles for a set of documents contained within a "folder" whose contents are related in some way. The folders are indicated in bold type. The following system is used in this listing to identify documents within a folder or set of documents:

- 1.) Folder name (in bold), including the SRDB Reference ID Number
- 2.) List of documents after the folder name and (pdf) page range for each document
- 3.) The term "Unrelated site document, blank, or duplicate, p. xx" was used to note pages where reiterative or unrelated pages occurred within a folder of documents.

Some of the documents contained in the NIOSH SRDB contain information that may be covered by the Privacy Act. If a document title contained information that appeared to potentially identify employees by name or other identifiers, it was replaced by "NAME REDACTED" or "BADGE NUMBER REDACTED."

Finally, the listing of documents presented her comprises a "snapshot" of what was included in the SRDB at the time that the listing was produced. The report date is listed with the subject of this page. The SRDB is dynamic, with new documents being added, and the listing of documents may change over time.

1.) Inspection of Laboratories at National Bureau of Standards, Ferry, J. L., December 03, 1943
Reference ID: 16361

2.) Inter-Comparison of Film Badge Interpretations, Isotopes Division and Radiation Instruments Branch, April 1955
Reference ID: 3640

3.) NBS Handbook 63 - Protection against Neutron Radiation up to 30 Million Electron Volts, National Bureau of Standards, November 22, 1957
Reference ID: 10025

4.) ORAU Project National Bureau of Standards Spreadsheet for Thorium in May 1946, Author Unknown, No Date
Reference ID: 10021

5.) National Bureau of Standards Site Historical Information and Inventory
Reference ID: 11293

5-1.) Facility Description, Author Unknown, No Date, p. 1

5-2.) Unrelated site document, blank, or duplicate, p. 2-3

5-3.) Facility Description from FUSRAP Considered Sites Database, Department of Energy, December 15, 2000, p. 4-5

5-4.) Unrelated site document, blank, or duplicate, p. 6-7

5-5.) Excerpt from Directory of Federal Historical Programs and Activities Circa 2000, Author Unknown, No Date, p. 8

5-6.) Excerpt from Linking Legacies, Appendix B - Flow Chart - Material through the Nuclear Weapons Complex, Department of Energy, January 1977, p. 9-11

5-7.) Unrelated site document, blank, or duplicate, p. 12-13

5-8.) Uranium Inventory, as of December 31, 1946 - Madison Square Area, De Blois, L. A. Jr., No Date, p. 14-15

5-9.) Thorium Inventory, as of December 31, 1946 - Madison Square Area, Year End, De Blois, L. A. Jr., No Date, p. 16-19

5-10.) Unrelated site document, blank, or duplicate, p. 20-21

5-11.) Summary of Manhattan Project Flow Sheet, Mott, W. E., February 01, 1978, p. 22

5-12.) Unrelated site document, blank, or duplicate, p. 23

- 5-13.) Decontamination and Decommissioning: Review of Manhattan District History from August 16, 1942 through December 31, 1946, Whitman, A. J., No Date, p. 24-27
- 5-14.) Unrelated site document, blank, or duplicate, p. 28-29
- 5-15.) Investigations Regarding Former Thorium Sites, Rare Earth's Inc., Pompton, New Jersey & Maywood Chemical Co., Maywood, New Jersey, Wallo III, A., March 02, 1981, p. 30-34
- 5-16.) Unrelated site document, blank, or duplicate, p. 35-36
- 5-17.) The Former National Bureau of Standards, Van Ness Street from the 1920s through 1977, Author Unknown, No Date, p. 37
- 5-18.) Unrelated site document, blank, or duplicate, p. 38-39
- 5-19.) The Former National Bureau of Standards - Building 2 from the 1920s through 1977, Author Unknown, No Date, p. 40-43
- 5-20.) Release of Buildings at Van Ness Street after Decontamination, Schwebel, A., March 22, 1968, p. 44-53
- 5-21.) Unrelated site document, blank, or duplicate, p. 54-55
- 5-22.) Elimination Report for the Former National Bureau of Standards Buildings, Van Ness Street, Washington, D. C., Department of Energy, No Date, p. 56-61
- 5-23.) Final Report of Radiation Protection Evaluation of Washington Technical Institute Buildings, Formerly Occupied by NBS, Author Unknown, April 18, 1968, p. 62-63
- 5-24.) Request for Comprehensive Monitoring of NBS Buildings, Brink, J. V., February 14, 1968, p. 64-65
- 5-25.) Memo Regarding Release of Buildings at Van Ness Street after Decontamination, Schwebel, A., March 22, 1968, p. 66-77
- 5-26.) National Bureau of Standards Building History, Wallo, III, A., April 18, 1978, p. 77-78

6.) Summary of Manhattan Project: Decontamination and Decommissioning and Historical Project Uranium Flow

Reference ID: 9769

- 6-1.) Unrelated site document, blank, or duplicate, p. 1
- 6-2.) Decontamination and Decommissioning: Review of Manhattan District History - Prior to August 16, 1942 through December 31, 1946, Whitman, A. J., No Date, p. 2-5
- 7.) Work Required by Other Sites to be Done by the Bureau of Standards, Cox, J., et al., April 11, 1946
Reference ID: 13672