

SEC Petition Evaluation Report Petition SEC-00159

Report Rev #: 0

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Petitioner Administrative Summary			
Petition Under Evaluation			
Petition #	Petition Type	Petition A Receipt Date	DOE/AWE Facility Name
SEC-00159	83.14	December 18, 2009	Westinghouse Electric Corp., Bloomfield, New Jersey

NIOSH-Proposed Class Definition
All Atomic Weapons Employer employees who worked at Westinghouse Electric Corp., Bloomfield, New Jersey, from August 13, 1942 through December 31, 1949, for a number of work days aggregating at least 250 work days, occurring either solely under this employment, or in combination with work days within the parameters established for one or more other classes of employees included in the Special Exposure Cohort.

Related Petition Summary Information			
SEC Petition Tracking #(s)	Petition Type	DOE/AWE Facility Name	Petition Status
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Related Evaluation Report Information	
Report Title	DOE/AWE Facility Name
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Evaluation Report Summary: SEC-00159, Westinghouse Electric Corp.

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

All Atomic Weapons Employer employees who worked at Westinghouse Electric Corp. in Bloomfield, New Jersey, from August 13, 1942 through December 31, 1949, for a number of work days aggregating at least 250 work days, occurring either solely under this employment, or in combination with work days within the parameters established for one or more other classes of employees included in the Special Exposure Cohort.

Feasibility of Dose Reconstruction Findings

NIOSH lacks sufficient information, which includes biological monitoring data, air monitoring information, and process and radiological source information, to estimate with sufficient accuracy the potential internal and external exposures to uranium, thorium, and their respective progeny to which the proposed class may have been subjected.

NIOSH finds that it is likely feasible to reconstruct occupational medical dose for Westinghouse Electric Corp., Bloomfield, New Jersey (WEC-NJ), workers with sufficient accuracy.

- Principal sources of internal and external radiation for members of the proposed class included exposures to uranium and thorium and their respective progeny. During their production of uranium and thorium metal, the main uranium processes employed at the facility included green salt production, uranium metal production, uranium metal powder production, pressing and sintering uranium metal powder, and the production of uranium metal buttons.^{9, 16} It should be noted that when “green salt” is referred to in the documents on WEC-NJ they are referring to potassium uranium pentafluoride (KUF₅) and not uranium tetrafluoride (UF₄), which is more commonly referred to as green salt.

Health Endangerment Determination

The NIOSH evaluation did not identify any evidence supplied by 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, 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 accumulated chronic radiation exposures through intakes of uranium and thorium and their respective progeny and from direct exposure to radioactive 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 Special Exposure Cohort.

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SEC Petition Evaluation Report for SEC-00159

ATTRIBUTION AND ANNOTATION: This is a single-author document. All conclusions drawn from the data presented in this evaluation were made by the OCAS Team Lead Technical Evaluator: Beth Rolfes; NIOSH. 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.

1.0 Purpose and Scope

This report evaluates the feasibility of reconstructing doses for employees who worked at Westinghouse Electric Corp., Bloomfield, New Jersey (WEC-NJ) during a specified time. It provides information and analysis germane to considering a petition for adding a class of employees to the Congressionally-created Special Exposure Cohort (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 both on 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 that HHS 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 members (the Board). The Board will consider the NIOSH evaluation 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.

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>.

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 Atomic Weapons Employer employees who worked at Westinghouse Electric Corp., Bloomfield, New Jersey, from August 13, 1942 through December 31, 1949, for a number of work days aggregating at least 250 work days, occurring either solely under this employment, or in combination with work days within the parameters established for one or more other classes of employees included in the Special Exposure Cohort.” During this period, employees at this facility were involved in the production of uranium and thorium metal for the MED (Manhattan Engineering District).

The evaluation responds to Petition SEC-00159, 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 foreman and supervisor from 1941 through 1949. 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 WEC-NJ from August 13, 1942 through December 31, 1949 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.

4.1 Operations Description

The covered facility designated as Westinghouse Electric Corp. was located in Bloomfield, New Jersey, and began EEOICPA-covered operations in 1942. NIOSH found little documentation that provides detailed process and operational information for the operations period from August 13, 1942 through December 31, 1949. Most information available regarding MED activities is based on documentation that contains Westinghouse Electric Corp. contracts information relating to the production of uranium and thorium. Under a Manhattan Engineer District (MED) contract, Westinghouse Electric Corp.’s work primarily involved uranium processing; the main uranium processes employed at WEC-NJ included green salt production, uranium metal production, uranium metal powder production, pressing and sintering uranium metal powder, and the production of

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>.

uranium metal buttons.^{7, 12} Several documents include the statement “Under the best weather conditions with good sunlight, the process could produce 1 ton/month.”⁵ It was also stated that WEC-NJ, “not only kept up with but exceeded the contract dates for producing pure bulk uranium.”¹¹ Another document helps to support the determination that the 1 ton/month level was most likely a production rate specification in the contract, because it reports that WEC-NJ produced 150,000 lb of uranium for the U.S. Government between 1942 and 1943.⁹ No information could be found regarding the processes that were used to produce the thorium metal. Specific information related to thorium production is unknown, except that WEC-NJ produced a total of 200 lb of thorium metal in early 1945.¹⁰ During the uranium metal production era, a limited amount of thoria (ThO₂) was used to line the crucibles that were used to fuse the sintered uranium metal buttons. However, no information could be found regarding the quantities of thoria that were used for the fusing process. The available procedure indicated that the beryllia crucibles were only wiped with a layer of thoria prior to fusing the uranium buttons.¹²

WEC-NJ is unique for a number of reasons. It was the only site that processed uranium on the rooftop of a building and it employed a unique uranium production process. The facility was not built specifically for the purpose of uranium and thorium production, but was modified to produce uranium and thorium to support wartime efforts and the site was chosen because at the time Westinghouse had the only practical process for producing high-purity uranium metal. The Westinghouse Electric Corp.’s uranium process is unlike any other facility. There are no comparable facilities to model WEC-NJ after, due to the fact that there is a lack of source term and process information. Westinghouse Electric Corp. was contracted to refine uranium to support the Stagg Field Reactor.⁷

Processing on the roof was necessary because this unique method of manufacturing “green salt” required sunlight. The potassium uranium pentafluoride (KUF₅), referred to as green salt in WEC-NJ documents, was formed by adding supernatant liquor (a liquid mixture of uranyl nitrate, potassium fluoride, hydrofluoric acid, sucrose, and formic acid) to a series of seven trays that were located on the roof of Building 7.^{8, 12} There the sun’s ultraviolet rays were used to convert the transparent liquid by photosynthesis into small crystals of potassium uranium fluoride.^{7, 8, 13} Initially, production was limited to the amount of sunshine available each day, but eventually sunlamps were employed on cloudy and rainy days to produce the ultraviolet light that was needed.^{10, 13} During the photosynthesis process, the trays were manually stirred for two minutes of each hour during the day using a wooden rake.¹²

In the basement of Building 7, the green salt was filtered under a vacuum to remove any remaining supernatant liquor. Each batch of green salt on a filter was washed three times or more with distilled water. Then, after all the water was vacuumed out, the green salt was washed with alcohol and vacuum-dried again. The filter-dried green salt was then placed on small trays and dried in an oven. After being removed from the oven, the green salt was packaged into “carpenter drums” until it was needed for the metal production process.¹²

4.2 Radiation Exposure Potential from Operations

The potential for external radiation dose existed at WEC-NJ. Based on the site operations, which are outlined in Section 4.1, sources of exposure included photons and electrons emitted from uranium and thorium and their respective progeny, and direct exposure to radioactive materials.

The primary sources of internal radiation exposure at the site were airborne uranium and thorium contamination generated during uranium and thorium processing.

4.3 Time Period Associated with Radiological Operations

Westinghouse Electric Corporation's New Jersey site was located in Bloomfield, New Jersey. Based on the DOE's Office of Worker Advocacy information, WEC-NJ performed work for the Manhattan Engineer District (MED), commonly referred to as the Manhattan Project, during the years of 1942 through 1949, and had a residual radiation period of 1950 through July 2006.

In August 1942, Westinghouse was contracted by the MED to produce uranium metal at WEC-NJ, because it had the only practical process for producing high-purity uranium metal at that time.^{7, 8} This was referred to at the site as the Tuballoy Program.⁷ In October 1943, the MED discontinued its uranium metal production contracts with Westinghouse because the latter's process for creating uranium metal was insufficient for meeting MED production needs.^{5, 10} In August 1944, Westinghouse was contracted by the MED (Contract W-7409-ENG-31) to produce thorium metal at WEC-NJ.^{5, 10} WEC-NJ produced a total of 200 lb of thorium metal in the form of bars, tubes, sheet, and wire in early 1945. Based on available contract information, the exact contract end-date is unknown. Thorium metal was also used at WEC-NJ between 1964 and 1984; however, the thorium work performed during that period was not related to atomic weapons production.⁶

4.4 Site Locations Associated with Radiological Operations

WEC-NJ was comprised of eleven principal buildings and several lesser structures located on a 14-acre property.⁶ The site is divided into two parcels by Arlington Avenue, which runs generally southwest to northeast.⁶ Most of the principal buildings have multiple floors and were constructed between 1907 and 1930.⁶ Building 7 is a 5-story building with a basement.¹⁶ The MED work primarily took place on the roof and in the basement of Building 7.⁵ The uranium that was processed on the roof was pipe-fed to the basement for further processing.⁵ After the MED contract work was discontinued in 1943, the pipe used for transferring uranium from the roof to the basement, along with the processing equipment, was stripped from the facility.⁵ Since then, Building 7 has been primarily used as a research testing laboratory.⁵

In October 1976, the known or suspected areas at WEC-NJ involved with the MED work were surveyed by Oak Ridge Operations office and Oak Ridge National Laboratory personnel, and several surface areas were found to have radioactive contamination in excess of Nuclear Regulatory Commission (NRC) guidelines.⁵ Subsequently, Westinghouse decontaminated those areas at its own expense and resurveyed the areas.⁵ While radioactivity levels reported to the Energy Research and Development Administration (ERDA) showed no health hazards, certain basement and connecting sub-floor piping plus some loading dock support members were still contaminated above NRC's unrestricted use guidelines at that time.⁵ In November 1979, a Westinghouse contractor performed remediation in the identified contaminated areas.⁶ Additional remediation was conducted in April 1980 following the discovery of several contaminated areas during an NRC survey performed in February 1980.⁶ Following a January 1981 survey, the NRC indicated in a letter to Westinghouse that the Building 7 basement had been satisfactorily decontaminated.⁶ In February 1989, the NRC issued a license to Westinghouse for decommissioning the site, including areas that did not involve MED

work.⁶ A confirmatory survey was performed by the Oak Ridge Institute for Science and Education (ORISE) in 1993.¹⁴ The 1993 survey results confirmed that the removable contamination levels were below the regulatory criteria; however, two areas exhibited direct radiation levels in excess of the regulatory criteria for unrestricted use.¹⁴ Additional decontamination work was being performed as late as June 1994;⁹ however, no documentation was found regarding the radiological status of this facility after June 1994.

4.5 Job Descriptions Affected by Radiological Operations

NIOSH has found no documentation associating job titles and/or job assignments with specific radiological operations or conditions. Without such information, NIOSH is unable to define the proposed SEC class based on worker job descriptions.

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>.

5.1 Data Capture Efforts and Sources Reviewed

In addition to examining its Site Research Database (SRDB) to locate documents supporting the evaluation of the proposed class, NIOSH identified and reviewed numerous data sources to locate information relevant to determining the feasibility of dose reconstruction for the class of employees proposed for this petition. This included determining the availability of information on personnel monitoring, workplace monitoring, and radiological source term data.

NIOSH data capture efforts for WEC-NJ focused on the Nuclear Regulatory Commission (including the ADAMS electronic records repository), DOE, and records from the Westinghouse collection at the Senator John Heinz History Center in Pittsburgh. Attachment One contains a summary of Westinghouse Electric Corp. documents. The summary specifically identifies specific data capture details for each document retrieved.

5.2 Worker Interviews

Based on the sparse data available for the WEC-NJ facility, NIOSH determined that worker interviews would neither change the feasibility determination nor allow NIOSH to limit the class to specific locations. Currently there is one claim for the Westinghouse Electric Corp., and for that claim the Westinghouse Electric Corp. employee is deceased.

5.3 Internal Personnel Monitoring Data

NIOSH reviewed its NIOSH OCAS Claims Tracking System (NOCTS) to determine whether internal personal monitoring records have been obtained for EEOICPA claimants. No internal data have been supplied for any Westinghouse Electric Corp. claimants. The available documents in SRDB contained no evidence of any internal dose monitoring that can be attributed to Westinghouse Electric Corp. operations.

5.4 External Personnel Monitoring Data

NIOSH reviewed NOCTS to determine whether or not external personal monitoring records have been obtained for EEOICPA claimants. No external data have been supplied for any Westinghouse Electric Corp. claimants. The available documents in Site Research Database (SRDB) contained no evidence of any external dose monitoring that can be attributed to Westinghouse Electric Corp. operations.

5.5 Workplace Monitoring Data

For the operational years (1942-1949), NIOSH has not located any air monitoring data or surface contamination monitoring data for Westinghouse Electric Corp.

5.6 Radiological Source Term Data

In August 1942, Westinghouse was contracted by the MED to produce uranium metal at WEC-NJ, because it had the only practical process for producing high-purity uranium metal at that time.^{7, 8} In October 1943, the MED discontinued its uranium metal production contracts with Westinghouse because its process for creating uranium metal was insufficient for meeting the MED's production needs.^{5, 10} WEC-NJ's MED work primarily involved uranium processing; the main uranium processes employed at WEC-NJ included green salt production, uranium metal production, uranium metal powder production, pressing and sintering uranium metal powder, and the production of uranium metal buttons.^{7, 12} As indicated in section 4.1, Westinghouse's process for producing bulk uranium was unique in that it required the use of ultraviolet light. Several documents include the statement "Under the best weather conditions with good sunlight, the process could produce 1 ton/month."⁵ It was also stated that WEC-NJ "not only kept up with but exceeded the contract dates for producing pure bulk uranium."¹¹ Another document helps to support the determination that the 1 ton/month level was most likely a production rate specification in the contract, because it reports that WEC-NJ produced 150,000 lb of uranium for the U.S. Government between 1942 and 1943.⁹ The Westinghouse Electric Corp.'s uranium enriching process is unlike any other facility. The

photochemical technique of producing uranium is unique to WEC-NJ; no other facilities are known to have processed uranium in a similar manner.

In August 1944, Westinghouse was contracted by the MED (Contract W-7409-ENG-31) to produce thorium metal at WEC-NJ.^{5,10} Based on available information, it appears WEC-NJ produced a total of 200 lb of thorium metal in the form of bars, tubes, sheet, and wire in early 1945.¹⁰ By December 1946, 102.38 lb of the produced thorium metal remained at the site.¹⁵ No information could be found regarding the processes that were used to produce the thorium metal. During the uranium metal production era, a limited amount of thoria (ThO₂) was used to line the crucibles that were used to fuse the sintered uranium metal buttons. However, no information could be found regarding the quantities of thoria that were used for the fusing process. The available procedure indicated that the beryllia crucibles were only wiped with a layer of thoria prior to fusing the uranium buttons.¹² Although, it is unclear when thorium processing stopped at WEC-NJ, documents show there was still an inventory of thorium at the facility in 1949.⁵

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 coworkers 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

NIOSH has evaluated the available personnel and workplace monitoring data and source term information and has determined that there are insufficient data for estimating internal exposures, as described below. NIOSH does not have access to sufficient personnel monitoring, workplace

monitoring, or process information to estimate potential internal exposures to uranium and thorium during the period of AWE operations. Consequently, NIOSH finds that it is not feasible to estimate, with sufficient accuracy, internal exposures to radionuclide(s) and resulting doses for the class of employees covered by this evaluation.

6.2 Feasibility of Estimating External Exposures

Westinghouse Electric Corp. is a unique facility in that it was the only site that processed uranium on the rooftop of a building. The facility was not built specifically for this purpose, but was chosen because the site had the only practical process for producing high-purity uranium metal at that time. Because the process was so unique, data from other facilities cannot be used to develop external exposure models for this facility. Because there are no available data for the radiological operations performed at WEC-NJ, and because there are no sites/operations that could serve as a surrogate for the purpose of establishing a bounding external dose reconstruction method, no method can be readily established to support bounding or reconstructing the occupational external dose at WEC-NJ for this evaluation.

NIOSH has evaluated the available personnel and workplace monitoring data and source term information and has determined that there are data insufficiencies for estimating external exposures, as described below. NIOSH does not have access to sufficient personnel monitoring, workplace monitoring, or process information to estimate potential external exposures to uranium and thorium during the period of AWE operations. Consequently, NIOSH finds that it is not feasible to estimate with sufficient accuracy external exposures to uranium and thorium and resulting doses for the class of employees covered by this evaluation.

NIOSH has not found any records indicating that employees at WEC-NJ were required to complete medical examinations, including chest X-rays prior to beginning work, on a periodic basis (e.g., annually), or following termination. Although no records have been identified that indicate occupational medical X-rays were required, for the purpose of partial dose reconstructions during the time period evaluated in this report, X-ray exams are assumed to have been required at termination. Organ doses from posterior-anterior chest X-rays for all time periods are available in ORAUT-OTIB-0006. NIOSH believes that by using this methodology, occupational medical X-ray doses can be reconstructed. NIOSH therefore finds that it is likely feasible to reconstruct occupational medical dose for Westinghouse Electric Corp. workers with sufficient accuracy.

6.3 Class Parameters Associated with Infeasibility

This report evaluates the feasibility for completing dose reconstructions for employees at Westinghouse Electric Corp. from August 13, 1942 through December 31, 1949, during AWE operations. NIOSH found that due to the lack of monitoring records, process descriptions, and source term data, there is not sufficient information to complete dose reconstructions for the proposed class of employees. NIOSH has not discovered any data to support more specific dates for the beginning and end of uranium and thorium operations. NIOSH therefore recommends that the proposed class include the entire AWE-covered period of August 13, 1942 through December 31, 1949.

NIOSH has no documentation to demonstrate that radioactive materials were restricted to specific areas or that contamination was adequately controlled. NIOSH therefore has insufficient data to limit

the SEC class by site location, and assumes that the potential for exposure to radioactive materials existed in all Westinghouse Electric Corp. buildings and areas during the AWE operations period. NIOSH therefore recommends that the proposed class definition include all Westinghouse Electric Corp. buildings and areas during the specified time period.

NIOSH has found insufficient documentation associating job titles and/or job assignments with specific radiological operations or conditions. Although NIOSH has identified the site locations where radiological operations were likely to have been conducted, NIOSH does not have information defining the access controls that were in place across the site. Without such information, NIOSH is unable to determine which workers or work groups may or may not have entered the identified radiological areas; NIOSH is thus unable to define the proposed SEC class based on worker job descriptions. Therefore, NIOSH recommends that the proposed class definition include all Atomic Weapons Employees who worked at WEC-NJ during the specified time period.

7.0 Summary of Feasibility Findings for Petition SEC-00159

This report evaluates the feasibility for completing dose reconstructions for employees at Westinghouse Electric Corp from August 13, 1942 through December 31, 1949. NIOSH determined that members of this class may have received radiation exposures from uranium and thorium, and their respective progeny. NIOSH lacks sufficient information, which includes biological monitoring data, air monitoring information, and process and radiological source information that would allow it to estimate the potential exposure(s) to which the proposed class may have been subjected.

As of the date of this evaluation, NIOSH has been unable to find any records of internal or external monitoring for WEC-NJ employees; this includes bioassay, air monitoring, dosimetry, and area radiation monitoring data. Therefore, NIOSH has concluded that it is not possible to determine the magnitude of any potentially unmonitored external or internal doses at WEC-NJ. NIOSH has documented herein that it cannot complete the dose reconstruction(s) related to this petition. The basis of this finding 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. However, for the purposes of partial dose reconstructions (for workers with non-presumptive cancers or with less than 250 work days of employment) NIOSH can reconstruct the medical X-ray exposures using ORAUT-OTIB-0006.

8.0 Evaluation of Health Endangerment for Petition SEC-00159

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(b) 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 determined 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 uranium and thorium, and their respective progeny. 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-00159

The evaluation defines a single class of employees for which NIOSH cannot estimate radiation doses with sufficient accuracy. This class includes “All Atomic Weapons Employer employees who worked at Westinghouse Electric Corp. in Bloomfield, New Jersey, from August 13, 1942 through December 31, 1949, for a number of work days aggregating at least 250 work days, occurring either solely under this employment, or in combination with work days within the parameters established for one or more other classes of employees included in the Special Exposure Cohort.”

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 is 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 Hanford site for whom dose reconstruction may not be feasible.

11.0 References

1. 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
2. 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
3. 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
4. 42 U.S.C. §§ 7384-7385 [EEOICPA], *Energy Employees Occupational Illness Compensation Program Act of 2000*; as amended; OCAS Web site.
5. *Documents Pertaining to the Production of Uranium and Thorium at Westinghouse Electric Corporation, Bloomfield, New Jersey*, SRDB Reference ID 16858 pp. 1-14, 38, 50, 63.
6. NRC (Nuclear Regulatory Commission), May 1993, *Amendment to NRC Material License: Safety Evaluation Report Release for Unrestricted Use – Bloomfield Lamp Plant, Buildings 1-6 and the Garage, Westinghouse Electric Company, Bloomfield, New Jersey*, SRDB Reference ID 41638 pp. 1-20.
7. Walsh J, 1981, “A Manhattan Project Postscript,” *Science*, 212:1369–1371, SRDB Reference ID 41635 pp.1-4.
8. *Response to DOE Regarding Program to Characterize the Radiological Condition of Sites Formerly Used by the Manhattan Engineering District and/or Atomic Energy Commission in the Development of Nuclear Energy* (letter to William E. Mott from George W. Caplis, Westinghouse Electric Corporation, Bloomfield, New Jersey, October 9, 1979), SRDB Reference ID 42478 pp. 1-3.
9. *Summary Fact Sheet for Westinghouse/North American Philips* (Westinghouse Electric Corporation, Bloomfield, New Jersey, June 1994), SRDB Reference ID 42437 pp.1-7.
10. *Uranium and Thorium Production by Westinghouse Electric Corporation under the Manhattan Project*, SRDB Reference ID 39850 pp. 1-7.
11. Woodbury D.O., 1948, “Uranium,” *Battlefronts of Industry: Westinghouse in World War II*, John Wiley & Sons, New York, New York, pp 293–306, SRDB Reference ID 39853 pp.1-17.
12. *Process Procedures* (Westinghouse Electric Corporation, Bloomfield, New Jersey, July 7, 1942), SRDB Reference ID 44654 pp.1-35.

13. *Lamp Division 'By-Product' Speeded Bomb*, SRDB Reference ID 39824.
14. *Investigations Regarding Former Thorium Sites – Rare Earths Inc., Pompton, New Jersey, and Maywood Chemical Co., Maywood, New Jersey* (letter to William E. Mott from Andrew Wallo III, Aerospace Corporation)
15. *Floor Plans of Buildings 7, 8, 9, and 10A* (Westinghouse Electric Corporation, Bloomfield, New Jersey), SRDB Reference ID 42436. Final survey plan.

DATA CAPTURE MATRIX FOR WESTINGHOUSE ELECTRIC CORP., BLOOMFIELD, New Jersey

SUMMARY OF HOLDINGS IN THE NIOSH Site Research Database

Data Capture Information	General Description of Documents Captured	Date Completed	Uploaded
Primary Site/Company Name: Westinghouse Electric Corp. AWE 1942 -1943; Residual Radiation 1944-July 2006	Records from the Westinghouse collection at the Senator John Heinz History Center, Pittsburgh, PA were reviewed.	12/20/2007	17
Other Site Names: North American Phillips Lighting	General chronology of Westinghouse accomplishments, history of Lamp Division facility, and uranium processing discussion.		
State Agency Contacted: NJ Department of Environmental Radiation	Various Westinghouse Bloomfield radiological surveys and cleanup plans, nuke start recalled Bloomfield Plant had key atomic bomb role, building floor plans, source material license permit, summary of history, and radiological status of the former MED/AEC sites.	01/31/2008	32
Comprehensive Epidemiologic Data Resource (CEDR)	No relevant documents identified.	04/06/2008	0
DOE Legacy Management - MoundView (Fernald Holdings, includes Fernald Legal Database)	Report on incineration of radioactive solid wastes, various trip reports, and depleted uranium shipment information.	05/30/2008	10
DOE Legacy Management - Grand Junction	Description of the photochemical production of U metal, radiological status of Westinghouse facilities used in the Manhattan Project, uranium metal production, and license SMB-353 material.	04/02/2008	12
DOE Germantown	Air sample and FUSRAP document, thorium information, and accountability reports.	02/23/2004	3
DOE Hanford Declassified Document Retrieval System (DDRS)	No relevant documents identified.	01/21/2008	0
DOE Legacy Management Considered Sites	NRC inspections and building 7 decon and survey report.	10/04/2007	3
DOE OpenNet	No relevant documents identified.	01/21/2008	0
DOE OSTI Energy Citations	No relevant documents identified.	04/06/2008	0
DOE OSTI Information Bridge	No relevant documents identified.	01/21/2008	0
Google	General information, Westinghouse Electrical Company evaluation of residual contamination, and Westinghouse and World War II news article.	02/14/2008	5
NARA Atlanta	Field progress reports, process instructions, and Burns vs. Westinghouse lawsuit.	05/23/2008	6
NARA Kansas City	Preliminary radiological surveys.	04/01/2005	2
National Academies Press (NAP)	No relevant documents identified.	01/21/2008	0

National Nuclear Security Administration (NNSA) - Nevada Site Office	No relevant documents identified.	04/06/2008	0
NRC Agencywide Document Access and Management System (ADAMS)	Various status and release radiological surveys, safety evaluation report, release for unrestricted use of Bloomfield Lamp Plant buildings 1-6 and the garage, and amendment to USNRC license number SMB-1527.	02/15/2008	19
SAIC	Exposure summary.	09/02/2004	1
Washington State University (U.S. Transuranium and Uranium Registries)	No relevant documents identified.	04/06/2008	0
Unknown	NYOO status reports.	Unknown	5
TOTAL			115