

Report on Residual Radioactive and Beryllium Contamination at Atomic Weapons Employer Facilities and Beryllium Vendor Facilities

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I. Summary of Results

This update to the Report on Residual Radioactive and Beryllium Contamination at Atomic Weapons Employer Facilities and Beryllium Vendor Facilities is the third revision to the original study reported in November, 2002 and revised in October, 2003 and December, 2006.

NIOSH has reviewed all Atomic Weapons Employer (AWE) and Beryllium Vendor Facilities that were posted on the Department of Energy (DOE) Office of Health, Safety and Security Website. NIOSH evaluated information that had been identified since NIOSH's last report. The documents reviewed did not indicate the existence of a current, unrecognized occupational or public health threat. NIOSH also based its findings on information posted on the Department of Energy (DOE) Office of Health, Safety and Security Website as of October 31, 2008 (changes made to the DOE Office of Health, Safety and Security Website after October 31, 2008 are not reflected in this report).

In cases where additional information was identified, the potential for significant residual contamination was re-evaluated.

The results for the 208 AWEs evaluated are as follows:

- 5 of the previously listed AWE sites (Albany Research Center; General Electric Evandale, Ohio; Naval Research Laboratory; Philadelphia Naval Yard; and the University of California, Berkeley) are no longer listed as AWEs. The remaining 203 were evaluated.
- 98 of the 203 AWE facilities have little potential for significant residual contamination outside of the periods in which weapons-related production occurred.
- 105 of the 203 AWE facilities have the potential for significant residual contamination outside of the periods in which weapons-related production occurred.

Individual results for the 75 Beryllium Vendor Facilities evaluated are as follows:

- 10 of the 75 beryllium vendor facilities have little potential for significant residual contamination outside of the periods in which weapons-related production occurred.
- 65 of the 75 beryllium vendor facilities have the potential for significant residual contamination outside of the periods in which weapons-related production occurred.

II. Background and Purpose

The Energy Employees Occupational Illness Compensation Program Act of 2000 (EEOICPA), 42 U.S.C. §§ 7384-7385, established a program to compensate individuals who developed illnesses as a result of their employment in nuclear weapons production-related activities at certain facilities in which radioactive materials or beryllium was processed. DOE was directed by Executive Order 13,179 to publish in the Federal Register a list of facilities covered by the Act. On January 17, 2001, DOE published a list of AWEs, DOE facilities, and beryllium vendors in the Federal Register; the list was revised on December 27, 2002 (67 Fed Reg. 79,068). Updates to the list (corrections, additions, and deletions) have since been made periodically by DOE and DOL. This update to the Report on Residual Radioactive and Beryllium Contamination at Atomic Weapons Employer Facilities and Beryllium Vendor Facilities is the third revision to the original report. The report was first issued in November 2002, updated and reissued in June 2004, and again updated and reissued in December 2006.

The DOE Office of Health, Safety and Security website, (<http://www.hss.energy.gov/healthsafety/fwsp/advocacy/faclist/findfacility.cfm>) provides synopses of the work performed at each facility, including a listing of periods during which DOE believes, based on current information, that weapons-related processing was conducted. In determining these periods, DOE has applied the definitions in EEOICPA to the known facts about the time and conditions of weapons-related processing at each facility. DOE revises the entries in its database as additional information is obtained. These periods are referred to in this report as “Periods in which weapons-related production occurred.” It should be noted that the Department of Labor (DOL) is responsible for determining actual periods of covered employment, based upon DOE’s findings as well as information from claimants and other sources.

This study consisted primarily of an evaluation of documents pertaining to AWEs. These include documents compiled by DOE ES&H, documents obtained through NIOSH data capture efforts, and documents located on the Formerly Utilized Sites Remediation Action Program (FUSRAP) and U.S. Army Corps of Engineers websites. NIOSH also requested documents from state and local authorities. The quantity and quality of the information available for each site varied substantially. Examples of documentation reviewed include radiological surveys, descriptions of production operations, contractual agreements, and interoffice correspondence.

NIOSH believes that contamination levels at designated facilities in excess of those indicated in 10 C.F.R. pt. 835, Appendix D (Occupational Radiation Protection, Surface Contamination Values), indicate that there is “significant contamination” remaining in those facilities. Available documentation for each facility was reviewed to determine if there was an indication that residual radioactive contamination was present outside of the periods in which weapons-related production occurred. Those levels were then compared to current radiation protection limits listed in 10 C.F.R. pt. 835 to determine if there was “significant contamination.” If there was no, or limited, documentation on radiation levels at specified facilities, NIOSH made a professional judgment regarding the residual contamination. If NIOSH determined there was

“the potential for significant contamination” at a designated facility, then NIOSH determined, pursuant to the National Defense Authorization Act (NDAA), that such contamination “could have caused or substantially contributed to the cancer of a covered employee with cancer.”

In the case of beryllium contamination, if there was no evidence that the beryllium areas had been decontaminated, it was determined that this material could have caused or substantially contributed to the beryllium illness of an employee. Because beryllium sensitization can occur at very low levels of exposure, the level of residual beryllium contamination remaining was not included in the determination.

During the course of the radiation dose reconstruction process, data capture efforts were focused on processes and conditions relative to radioactive materials. Therefore, data associated with beryllium were not intentionally sought or captured.

Some of the periods in which weapons-related production occurred have been changed on the DOE ES&H website since the previous NIOSH report. Appendices A-1 and B-1 provide the current status and evaluations for all AWE and Beryllium Vendor facilities, respectively. Appendices A-2 and B-2 provide descriptions of each facility, the data reviewed as a part of this evaluation, and the final findings.

Periods of Residual Contamination

The evaluations focused on determining whether the potential for significant residual contamination existed outside of the periods in which weapons-related production occurred. In many cases, no records of decontamination were found. In others, surveys performed outside of the period in which weapons-related production occurred indicated the existence of significant residual contamination. However, some of the documentation provided dates of decontamination, dates of demolition of the facility, or descriptions of the radiological controls in place during operations. For sites that exhibited a potential for significant residual radioactive contamination outside of the periods in which weapons-related production occurred, and for which an indication of a more accurate period was available, this time period was provided. For sites that exhibited a potential for significant residual radioactive contamination outside of the periods in which weapons-related production occurred, and for which an indication of a more accurate period was not available, it was assumed that significant residual contamination existed until the time which the facility was demolished or until the present (defined as November 2008, when this report was written).

Some sites performed work with radioactive material and/or beryllium for commercial purposes, in addition to work for the Atomic Energy Commission (AEC)/DOE. When it was impossible to distinguish residual contamination resulting from AEC/DOE activities from the contamination resulting from commercial activities, it was assumed that the contamination was attributable to weapons-related activities.

III. Residual Radioactive Contamination Evaluation

This study consisted primarily of an evaluation of documents pertaining to AWEs. These include documents compiled by DOE ES&H, documents obtained through data capture efforts of NIOSH, and documents located on the FUSRAP and U.S. Army Corps of Engineers websites. In all cases, the individual site finding is based on the available information. The finding on any single site was based on the quantity and completeness of the information available regarding that site and professional judgment as necessary.

In this evaluation of residual radioactive contamination, as in the previous report, the following factors were considered:

- 1) The radionuclides involved;
- 2) The quantity of radioactive material processed;
- 3) The physical form of the radioactive material processed (i.e., solid, liquid, or gas);
- 4) The operations performed and their potential for radiation/radioactivity exposure;
- 5) Documented radiological control and monitoring programs that were in place during operations; and
- 6) Documented decontamination of facilities

These factors were used to estimate the potential for radiation exposure both during operations and after production/processing had ceased. For example, a facility for which a decontamination survey was documented was classified as having little potential for residual radioactive contamination after the decontamination date, while a facility with a high potential for residual radioactive contamination during operations and no documented decontamination data was classified as having a potential for residual contamination after operations had ceased.

Each site was assigned to one of two categories:

1. Documentation reviewed indicates there is little potential for significant residual contamination outside the period in which weapons-related production occurred.
A site was assigned to this category if the documentation available for the facility indicated one or more of the following characteristics:
 - a) The facility was decontaminated within the periods in which weapons-related production occurred,
 - b) The facility had very little potential for residual contamination during actual operations, or
 - c) The facility is still in operation and the end date is listed as “present.”
2. Documentation reviewed indicates there is a potential for significant residual contamination outside the period in which weapons-related production occurred.
A site was assigned to this category if there was documentation indicating the following:
 - a) Radioactive material was present in quantities or forms which could have caused or substantially contributed to the cancer of a covered employee, and

- b) Radioactive material was processed or present outside of the dates listed on the DOE Office of Health, Safety and Security Website.

This type of documentation often included FUSRAP surveys conducted after Manhattan Engineering District (MED)/AEC/DOE operations were complete, which indicated the presence of residual radioactive contamination that could be attributed to those activities.

In some cases, the facilities processed radioactive material not only for nuclear weapons production, but also for commercial, non-DOE contracts. Sometimes the material processed for nuclear weapons production was indistinguishable from material processed for commercial purposes. Wherever residual radioactive contamination due to DOE operations was not clearly distinguishable from that resulting from commercial operations, it was assumed that the contamination was the result of weapons production activities. As a result, in these cases, the findings were that the potential for significant residual contamination existed outside of the periods in which weapons-related production occurred. For sites that exhibited a potential for significant residual radioactive contamination outside of the periods in which weapons-related production occurred, and for which an end date could not be determined, it was assumed that significant residual contamination existed until the time the facility was demolished or until the present (defined as the date this report was written).

Findings of Evaluation of Facilities for Residual Radioactive Contamination

The results of this study indicate that there are atomic weapons employer facilities for which the potential for significant residual radiological contamination exists outside of the periods in which weapons-related production occurred as listed on the DOE Office of Health, Safety and Security Website.

Appendix A-1 lists all of the AWE facilities and the findings for potential residual radioactive contamination. Appendix A-2 describes each facility evaluated for residual radioactive contamination, the data reviewed as a part of this evaluation, and the ultimate findings.

IV. Residual Beryllium Contamination Evaluation

The primary sources of information used to evaluate each site were the individual facility files compiled on the DOE Office of Health, Safety and Security Website. In addition, interviews with current and past employees of these facilities were conducted to obtain information not contained in available documentation.

When characterizing facilities for the purpose of radiation dose reconstruction, data capture efforts are focused on processes and conditions relative to radioactive materials. Therefore, data associated with beryllium were not intentionally sought or captured during this process. The beryllium sections of this report therefore reflect mostly an update of dates appearing on the DOE Office of Health, Safety and Security Website (<http://www.hss.energy.gov/healthsafety/fwsp/advocacy/faclist/findfacility.cfm>).

The finding for any single site was based on the quantity and completeness of the information available regarding that site and professional judgment as necessary.

In this evaluation of residual radioactive contamination, as in the previous report, the following factors were considered:

- 1) If beryllium was actually handled at the site; and
- 2) If there was evidence of decontamination of the facility.

These factors were used to estimate the potential for beryllium exposure both during operations and after production/processing had ceased. For example a facility, for which a decontamination survey was documented or for which personal interviews indicated that decontamination was performed, was classified as having little potential for residual beryllium contamination after the decontamination date; a facility without such evidence of decontamination was classified as having a potential for residual beryllium contamination after operations had ceased.

Each site was assigned to one of two categories:

1. Documentation reviewed indicates there is little potential for significant residual contamination outside the period in which weapons-related production occurred.
A site was assigned to this category if the documentation available for the facility indicated one or more of the following characteristics:
 - a) Evidence of decontamination and/or beryllium contamination survey data,
 - b) The facility had very little potential for residual contamination during actual operations, or
 - c) The facility is still in operation and the end date is listed as “present.”
2. Documentation reviewed indicates there is a potential for significant residual contamination outside the period in which weapons-related production occurred.
A site was assigned to this category if either of the following conditions existed:
 - a) Documentation was available indicating that beryllium was processed or present outside of the dates listed on the DOE Office of Health, Safety and Security Website, such that it could have caused or substantially contributed to the beryllium illness of a covered employee.
 - b) There was no evidence of a decontamination of the facility or area where beryllium was processed.

In some cases, the facilities processed beryllium material not only for nuclear weapons production, but also for commercial, non-DOE contracts. Sometimes the material processed for nuclear weapons production was indistinguishable from material processed for commercial purposes. Wherever residual beryllium contamination due to DOE operations was not clearly distinguishable from that resulting from commercial operations, it was assumed that the contamination was the result of weapons production activities. As a result, in these cases, the

findings were that the potential for significant residual contamination existed outside of the periods in which weapons-related production occurred. For sites that exhibited a potential for significant residual beryllium contamination outside of the periods in which weapons-related production occurred, and for which an end date could not be determined, it was assumed that significant residual contamination existed until the time the facility was demolished or until the present (defined as the date this report was written).

Findings of Evaluation of Facilities for Residual Beryllium Contamination

The results of this study are that there are Beryllium Vendor Facilities for which the potential for significant residual beryllium contamination exists outside of the periods in which weapons-related production occurred as listed on the DOE Office of Health, Safety and Security Website.

Appendix B-1 lists all Beryllium Vendor Facilities and the findings for potential residual beryllium contamination. Appendix B-2 describes each facility evaluated for residual beryllium contamination, the data reviewed as a part of this evaluation, and the ultimate findings.

V. Conclusions

The findings of this study are as follows:

- 1.) Some atomic weapons employer facilities and beryllium vendor facilities have the potential for significant residual radiological and beryllium contamination outside of the periods in which weapons-related production occurred.
- 2.) For the purposes of this report, NIOSH believes that facilities having “significant contamination” had quantities of radioactive material that “could have caused or substantially contributed to the cancer of a covered employee with cancer.”
- 3.) The documents reviewed did not indicate the existence of a current, unrecognized occupational or public health threat.