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# **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 (AWE) facilities and Beryllium Vendor facilities is the fourth revision to the original study reported in November 2002 and revised in October 2003, December 2006, and October 2009.

The National Institute for Occupational Safety and Health (NIOSH) has reviewed all AWE facilities and all Beryllium Vendor facilities that were posted on the Department of Energy's (DOE) Office of Health, Safety and Security (OHSS) website. NIOSH evaluated information that has 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 DOE OHSS website as of March 1, 2011 (changes made to the DOE OHSS website after March 1, 2011 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 203 AWEs evaluated are as follows:

- 2 of the previously listed AWE facilities are no longer listed as AWEs. The remaining 201 facilities were evaluated.
- 98 of the 201 AWE facilities have little potential for significant residual contamination outside of the periods in which weapons-related production occurred.
- 103 of the 201 AWE facilities have the potential for significant residual contamination outside of the periods in which weapons-related production occurred.

Changes in AWE facilities since the last revision of this report:

- The end dates of residual contamination periods for 40 of the AWEs were listed as "present" in the previous revision of this report. Because that revision was issued in October, 2009, "present" was defined as October 2009. These 40 facilities still have end dates of residual contamination periods listed as "present" in this version of the report. Therefore, these end dates will be extended to March 1, 2011.

- The covered operational periods of 8 of the AWEs were modified by DOE. These sites are:

<b>Facility</b>	<b>Location</b>	<b>Covered Operational Period Currently Listed on DOE OHSS Website</b>
Blockson Chemical Co.	Joliet, IL	1951 - June 1960
Carborundum Company	Niagara Falls, NY	1943-1944; 1959-1967
Revere Copper and Brass	Detroit, MI	1943-1954
Simonds Saw and Steel Company	Lockport, NY	1948-1957
Texas City Chemicals, Inc.	Texas City, TX	October 5, 1953 - September 1955
Vitro Manufacturing Company	Canonsburg, PA	1942-1959
Wah Chang	Albany, OR	1971-1972
Westinghouse Electric Corp.	Bloomfield, NJ	1942 -1949

- Two of the facilities previously listed as AWEs are no longer listed as such. These facilities are:

<b>Facility</b>	<b>Location</b>	<b>Comment</b>
Painesville Site.	Painesville, OH	No longer listed as a covered facility
St. Louis Airport Storage Site	St. Louis, MO	No longer listed as an AWE. It is listed as Department of Energy facility only.

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.

Changes in Beryllium Vendor facilities since the last revision of this report:

- The covered operational period of one of the Beryllium Vendor facilities was changed. The previous covered period was 1971 – 2005. The current covered period is 1971 - 2009.

## 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 EEOICPA. On January 17, 2001, DOE published a list of AWEs, DOE facilities, and beryllium vendors in the Federal Register (66 Fed Reg. 4003). Updates to the list (corrections, additions, and deletions) are made periodically by DOE; ten updates have been published since the initial list was published. This update to the Report on Residual Radioactive and Beryllium Contamination at Atomic Weapons Employer Facilities and Beryllium Vendor Facilities is the fourth revision to the original report. The report was first issued in November 2002, and updated and reissued in June 2004, December 2006 and October 2009.

The DOE OHSS 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) has assumed responsibility 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 OHSS, 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 requirements of the National Defense Authorization Act for Fiscal Year 2005 (NDAA) (Pub. L. 108-375), that “it is at least as likely as not that such contamination could have caused an employee who was employed at such facility only during the residual contamination period to contract a cancer.”

In the case of beryllium contamination, if there was no evidence that the beryllium areas had been decontaminated, it was determined that “it is at least as likely as not that such contamination could have caused an employee who was employed at such facility only during the residual contamination period to contract a beryllium illness.” Because beryllium sensitization can occur at very low levels of exposure, the level of residual beryllium contamination remaining was not considered 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 OHSS 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, NIOSH assumed that significant residual contamination existed until the time which the facility was demolished or until the present time (defined as the date 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, NIOSH 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 OHSS, 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 such that it is more likely than not that such contamination could have caused an employee who was

- employed at such facility only during the residual contamination period to contract a cancer; and
- b) Radioactive material was processed or present outside of the dates listed on the DOE OHSS website.

This type of documentation often included FUSRAP surveys conducted after Manhattan Engineer 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, NIOSH 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, NIOSH assumed that significant residual contamination existed until the time the facility was demolished or until the present time (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 AWE 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 OHSS 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 OHSS 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 OHSS 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 OHSS website, such that it is more likely than not that such contamination could have caused an employee who was employed at such facility only during the residual contamination period to contract a beryllium-related illness; or
  - b) There was no evidence of 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, NIOSH 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, NIOSH assumed that significant residual contamination existed until the time the facility was demolished or until the present time (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 OHSS 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 AWE 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 for facilities having “significant contamination” it is at least as likely as not that such contamination could have caused an employee who was employed at such facility only during the residual contamination period to contract a cancer or beryllium illness.
- 3.) The documents reviewed did not indicate the existence of a current, unrecognized occupational or public health threat.