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ALUMINUM COMPANY OF AMERICA – PENNSYLVANIA

R.1 Introduction

This document serves as an appendix to Battelle-TBD-6000, Site Profiles for Atomic Weapons Employers that Worked Uranium and Thorium Metals. This appendix describes the results of document research specific to this site. Where specific information is lacking, research into similar facilities described in the body of this Site Profile is used.

R.2 Site Description

The Atomic Weapons Employer Aluminum Company of America (ALCOA) had one site located in New Kensington, Pennsylvania. The facility was also known as Aluminum Research Laboratories; or the New Kensington Works (of ALCOA) on Pine and 9th Streets. It is listed as an Atomic Weapons Employer from 1943 through 1945. ALCOA was one of 14 facilities in the early 1940s that produced nuclear fuel for the X-10 pilot plant reactor in Oak Ridge, Tennessee and the production reactors at Hanford, Washington. The work was conducted in two buildings (#29 and #44) both of which are still standing with relatively little remodeling. (Reference 9557, Pages 8-10)

R.2.1 Site Activities

Alcoa used a unique welding process to "can" and seal uranium slugs produced by other facilities. Initiated in the spring of 1943, the work preceded under 15 purchase orders that resulted in the canning of approximately 100,000 slugs through 1945. Actual machining of uranium metal was apparently limited to experimental machine shop and laboratory situations. (Reference 9557, Pages 8-10)

R.2.2 Job Categories

Each claim will be evaluated to determine the most appropriate Job Category from the list below.

- Plant Floor High (Involved directly in operations)
 - Machinist (in shop)*
 - Unknown*
- Plant Floor Low (Involved in support of operations)
 - Inspector*
 - Mechanic (for Fork Lift trucks)*
- Supervisor
- Clerk

R.3 Occupational Medical Dose

No information regarding occupational medical dose specific to ALCOA-PA was found. Information to be used in dose reconstructions for which no specific information is available is provided in ORAUT-OTIB-0006, the dose reconstruction project technical information bulletin covering diagnostic x-ray procedures.

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R.4 Occupational Internal Dose

No data was found in the Site Research database related to occupational internal dose during AEC work. The work performed at ALCOA-PA involved canning uranium slugs. Therefore, the internal doses are derived using air concentration values in the TBD for "Slug Production and Canning."

Tables R.1 and R.2 present these internal dose estimates in pCi per calendar day to be used for each calendar year listed.

R.5 Occupational External Dose

No data was found in the Site Research database related to occupational external dose during AEC work. The work performed at ALCOA-PA involved canning uranium slugs. Therefore, the external dose values in the TBD for "Slug Production and Canning" should be used.

Tables R.3 and R.4 present these external dose estimates in mrem per calendar day to be used for each calendar year listed.

R.6 Residual Contamination

A FUSRAP survey of ALCOA-PA was conducted on November 12, 1991. The survey consisted of direct readings of gamma, alpha and beta-gamma levels and dust samples for radionuclide analysis. The results demonstrated no measured levels above DOE-FUSRAP guidelines and radionuclide distributions were not significantly different from typical background levels for the area. Therefore, no exposure to residual contamination is assumed after 1991. (Reference 16445, Page 10). A potential exists, however, for exposure due to residual contamination between 1946 and 1991², so this is evaluated assuming deposition of the plant floor high air concentration and resuspension assuming no cleanup.

R.7 References

1. DOE Office of Health, Safety and Security, EEOICPA web site.
<http://www.hss.energy.gov/healthsafety/fwsp/advocacy/faclist/findfacility.cfm>
2. Report on Residual Radioactive and Beryllium Contamination at Atomic Weapons Employer Facilities and Beryllium Vender Facilities.
<http://www.cdc.gov/niosh/ocas/pdfs/tbd/rescon/rcontam1206.pdf>

Table R.1 INTERNAL DOSE PATHWAYS - Inhalation of Airborne Radionuclides**Assumptions:**Operational Period Daily Weighted Average Air Concentration, Plant Floor High: 198 dpm/m³Residual Period Daily Weighted Average Air Concentration: 1.28 dpm/m³

TBD GSD Default is 5

Conversion Factor: 2.22 dpm/pCi

Breathing Rate: 1.2 m³/hour

All intakes and doses assume full-time employment for the given year.

Job Category	Year	Operation Phase	Hr/Yr	Relevant Nuclide	Intake (pCi/d)	GSD	TBD Reference or Research Justification
Plant Floor High	1943	Operations	2400	U234	7.04E+02	5	Based on Metal TBD for Slug Production
Plant Floor High	1944	Operations	2400	U234	7.04E+02	5	Based on Metal TBD for Slug Production
Plant Floor High	1945	Operations	2400	U234	7.04E+02	5	Based on Metal TBD for Slug Production
Plant Floor High	1946 - '50	Residual	2400	U234	4.56E+00	5	Based on resuspension of 1945 air concentrations
Plant Floor High	1951 - '55	Residual	2200	U234	4.18E+00	5	Based on resuspension of 1945 air concentrations
Plant Floor High	'56 - 11/91	Residual	2000	U234	3.80E+00	5	Based on resuspension of 1945 air concentrations
Plant Floor Low	1943	Operations	2400	U234	3.52E+02	5	Based on Metal TBD for Slug Production
Plant Floor Low	1944	Operations	2400	U234	3.52E+02	5	Based on Metal TBD for Slug Production
Plant Floor Low	1945	Operations	2400	U234	3.52E+02	5	Based on Metal TBD for Slug Production
Plant Floor Low	1946 - '50	Residual	2400	U234	4.56E+00	5	Based on resuspension of 1945 air concentrations
Plant Floor Low	1951 - '55	Residual	2200	U234	4.18E+00	5	Based on resuspension of 1945 air concentrations
Plant Floor Low	'56 - 11/91	Residual	2000	U234	3.80E+00	5	Based on resuspension of 1945 air concentrations
Supervisor	1943	Operations	2400	U234	1.76E+02	5	Based on Metal TBD for Slug Production
Supervisor	1944	Operations	2400	U234	1.76E+02	5	Based on Metal TBD for Slug Production
Supervisor	1945	Operations	2400	U234	1.76E+02	5	Based on Metal TBD for Slug Production
Supervisor	1946 - '50	Residual	2400	U234	4.56E+00	5	Based on resuspension of 1945 air concentrations
Supervisor	1951 - '55	Residual	2200	U234	4.18E+00	5	Based on resuspension of 1945 air concentrations
Supervisor	'56 - 11/91	Residual	2000	U234	3.80E+00	5	Based on resuspension of 1945 air concentrations
Clerical	1943	Operations	2400	U234	1.76E+01	5	Based on Metal TBD for Slug Production
Clerical	1944	Operations	2400	U234	1.76E+01	5	Based on Metal TBD for Slug Production
Clerical	1945	Operations	2400	U234	1.76E+01	5	Based on Metal TBD for Slug Production
Clerical	1946 - '50	Residual	2400	U234	4.56E+00	5	Based on resuspension of 1945 air concentrations

Job Category	Year	Operation Phase	Hr/Yr	Relevant Nuclide	Intake (pCi/d)	GSD	TBD Reference or Research Justification
Clerical	1951 - '55	Residual	2200	U234	4.18E+00	5	Based on resuspension of 1945 air concentrations
Clerical	'56 - 11/91	Residual	2000	U234	3.80E+00	5	Based on resuspension of 1945 air concentrations

Table R.2 INTERNAL DOSE PATHWAYS - Ingestion of Airborne Radionuclides**Assumptions:**Air Concentration to Intake Conversion Factor: $3.06E-05 (M^3/d)/(hr/y)$ - see 7.1.6 TBD-6000

Deposition velocity: 0.00075 m/s

Resuspension Factor: $1.00E-06 1/m$

Job Category	Year	Operation Phase	Hr/Yr	Relevant Nuclide	Intake (pCi/d)	GSD	TBD Reference or Research Justification
Plant Floor High	1943	Operations	2400	U234	6.55E+00	5	Based on Metal TBD for Slug Production
Plant Floor High	1944	Operations	2400	U234	6.55E+00	5	Based on Metal TBD for Slug Production
Plant Floor High	1945	Operations	2400	U234	6.55E+00	5	Based on Metal TBD for Slug Production
Plant Floor High	1946 - '50	Residual	2400	U234	4.25E-02	5	Based on resuspension of 1945 air concentrations
Plant Floor High	1951 - '55	Residual	2200	U234	3.89E-02	5	Based on resuspension of 1945 air concentrations
Plant Floor High	'56 - 11/91	Residual	2000	U234	3.54E-02	5	Based on resuspension of 1945 air concentrations
Plant Floor Low	1943	Operations	2400	U234	3.28E+00	5	Based on Metal TBD for Slug Production
Plant Floor Low	1944	Operations	2400	U234	3.28E+00	5	Based on Metal TBD for Slug Production
Plant Floor Low	1945	Operations	2400	U234	3.28E+00	5	Based on Metal TBD for Slug Production
Plant Floor Low	1946 - '50	Residual	2400	U234	4.25E-02	5	Based on resuspension of 1945 air concentrations
Plant Floor Low	1951 - '55	Residual	2200	U234	3.89E-02	5	Based on resuspension of 1945 air concentrations
Plant Floor Low	'56 - 11/91	Residual	2000	U234	3.54E-02	5	Based on resuspension of 1945 air concentrations
Supervisor	1943	Operations	2400	U234	1.64E+00	5	Based on Metal TBD for Slug Production
Supervisor	1944	Operations	2400	U234	1.64E+00	5	Based on Metal TBD for Slug Production
Supervisor	1945	Operations	2400	U234	1.64E+00	5	Based on Metal TBD for Slug Production
Supervisor	1946 - '50	Residual	2400	U234	4.25E-02	5	Based on resuspension of 1945 air concentrations
Supervisor	1951 - '55	Residual	2200	U234	3.89E-02	5	Based on resuspension of 1945 air concentrations
Supervisor	'56 - 11/91	Residual	2000	U234	3.54E-02	5	Based on resuspension of 1945 air concentrations
Clerical	1943	Operations	2400	U234	1.64E-01	5	Based on Metal TBD for Slug Production
Clerical	1944	Operations	2400	U234	1.64E-01	5	Based on Metal TBD for Slug Production
Clerical	1945	Operations	2400	U234	1.64E-01	5	Based on Metal TBD for Slug Production
Clerical	1946 - '50	Residual	2400	U234	4.25E-02	5	Based on resuspension of 1945 air concentrations
Clerical	1951 - '55	Residual	2200	U234	3.89E-02	5	Based on resuspension of 1945 air concentrations
Clerical	'56 - 11/91	Residual	2000	U234	3.54E-02	5	Based on resuspension of 1945 air concentrations

Table R.3 EXTERNAL DOSE PATHWAYS - Whole Body**Assumptions:**Submersion Dose Conversion Factor: 2.462E-09 mrem/h/dpm/m³

Deposition velocity: 0.0008

Contaminated Surface Dose Conversion Factor: 5.615E-10 mrem/h/dpm/m²

All external dose from estimated exposure to uranium slugs

Residual period: Assume no handling of U metal - only exposure is from residual contamination on floor and in air

Job Category	Year	Operation Phase	Hr/Yr	Relevant Nuclide	External Whole Body (mR/d)	GSD	TBD Reference or Research Justification
Plant Floor High	1943	Operations	2400	U234	3.49E-01	5	Generic Metal TBD, Section 6.3
Plant Floor High	1944	Operations	2400	U234	3.49E-01	5	Generic Metal TBD, Section 6.3
Plant Floor High	1945	Operations	2400	U234	3.49E-01	5	Generic Metal TBD, Section 6.3
Plant Floor High	1946 - '50	Residual	2400	U234	3.07E-05	5	Generic Metal TBD, Section 6.3
Plant Floor High	1951 - '55	Residual	2200	U234	2.58E-05	5	Generic Metal TBD, Section 6.3
Plant Floor High	'56 - 11/91	Residual	2000	U234	2.13E-05	5	Generic Metal TBD, Section 6.3
Plant Floor Low	1943	Operations	2400	U234	1.75E-01	5	Generic Metal TBD, Section 6.3
Plant Floor Low	1944	Operations	2400	U234	1.75E-01	5	Generic Metal TBD, Section 6.3
Plant Floor Low	1945	Operations	2400	U234	1.75E-01	5	Generic Metal TBD, Section 6.3
Plant Floor Low	1946 - '50	Residual	2400	U234	3.07E-05	5	Generic Metal TBD, Section 6.3
Plant Floor Low	1951 - '55	Residual	2200	U234	2.58E-05	5	Generic Metal TBD, Section 6.3
Plant Floor Low	'56 - 11/91	Residual	2000	U234	2.13E-05	5	Generic Metal TBD, Section 6.3
Supervisor	1943	Operations	2400	U234	1.84E-02	5	Generic Metal TBD, Section 6.3
Supervisor	1944	Operations	2400	U234	1.84E-02	5	Generic Metal TBD, Section 6.3
Supervisor	1945	Operations	2400	U234	1.84E-02	5	Generic Metal TBD, Section 6.3
Supervisor	1946 - '50	Residual	2400	U234	3.07E-05	5	Generic Metal TBD, Section 6.3
Supervisor	1951 - '55	Residual	2200	U234	2.58E-05	5	Generic Metal TBD, Section 6.3
Supervisor	'56 - 11/91	Residual	2000	U234	2.13E-05	5	Generic Metal TBD, Section 6.3
Clerical	1943	Operations	2400	U234	1.18E-04	5	Generic Metal TBD, Section 6.3
Clerical	1944	Operations	2400	U234	1.18E-04	5	Generic Metal TBD, Section 6.3
Clerical	1945	Operations	2400	U234	1.18E-04	5	Generic Metal TBD, Section 6.3

Job Category	Year	Operation Phase	Hr/Yr	Relevant Nuclide	External Whole Body (mR/d)	GSD	TBD Reference or Research Justification
Clerical	1946 - '50	Residual	2400	U234	3.07E-05	5	Generic Metal TBD, Section 6.3
Clerical	1951 - '55	Residual	2200	U234	2.58E-05	5	Generic Metal TBD, Section 6.3
Clerical	'56 - 11/91	Residual	2000	U234	2.13E-05	5	Generic Metal TBD, Section 6.3

Table R.4 EXTERNAL DOSE PATHWAYS - Skin**Assumptions:**

All assumptions from TBD-6000 Section 6.3

Operational Period: Non-penetrating dose to skin 115 mR/hour (hands and forearms) 10.4 mR/hour (other)

Plant Floor High: Assume hands in contact with metal 50% of time. Other skin is 100% of dose rate at 1-ft, 20.8 mrem/h

Plant Floor Low: 50% of Plant Floor High

Supervisor: assume 10% of Plant Floor Low for time in contact with metal

Clerical: assume no handling of U metal.

Residual Period: Non-penetrating dose to skin 3.9E-06 mr/hour

Assume no handling of U metal.

Assume 10x the photon whole body dose rate

Job Category	Year	Operation Phase	Hr/Yr	Relevant Nuclide	Hands & Forearms (mR/d)	Other Skin (mR/d)	GSD	TBD Reference or Research Justification
Plant Floor High	1943	Operations	2400	U234	7.56E+02	6.84E+01	5	Generic Metal TBD, Section 6.3
Plant Floor High	1944	Operations	2400	U234	7.56E+02	6.84E+01	5	Generic Metal TBD, Section 6.3
Plant Floor High	1945	Operations	2400	U234	7.56E+02	6.84E+01	5	Generic Metal TBD, Section 6.3
Plant Floor High	1946 - '50	Residual	2400	U234	3.07E-04	3.07E-04	5	Generic Metal TBD, Section 6.3
Plant Floor High	1951 - '55	Residual	2200	U234	2.58E-04	2.58E-04	5	Generic Metal TBD, Section 6.3
Plant Floor High	'56 - 11/91	Residual	2000	U234	2.13E-04	2.13E-04	5	Generic Metal TBD, Section 6.3
Plant Floor Low	1943	Operations	2400	U234	3.78E+02	3.42E+01	5	Generic Metal TBD, Section 6.3
Plant Floor Low	1944	Operations	2400	U234	3.78E+02	3.42E+01	5	Generic Metal TBD, Section 6.3
Plant Floor Low	1945	Operations	2400	U234	3.78E+02	3.42E+01	5	Generic Metal TBD, Section 6.3
Plant Floor Low	1946 - '50	Residual	2400	U234	3.07E-04	3.07E-04	5	Generic Metal TBD, Section 6.3
Plant Floor Low	1951 - '55	Residual	2200	U234	2.58E-04	2.58E-04	5	Generic Metal TBD, Section 6.3
Plant Floor Low	'56 - 11/91	Residual	2000	U234	2.13E-04	2.13E-04	5	Generic Metal TBD, Section 6.3
Supervisor	1943	Operations	2400	U234	3.78E+01	3.42E+00	5	Generic Metal TBD, Section 6.3
Supervisor	1944	Operations	2400	U234	3.78E+01	3.42E+00	5	Generic Metal TBD, Section 6.3
Supervisor	1945	Operations	2400	U234	3.78E+01	3.42E+00	5	Generic Metal TBD, Section 6.3
Supervisor	1946 - '50	Residual	2400	U234	3.07E-04	3.07E-04	5	Generic Metal TBD, Section 6.3
Supervisor	1951 - '55	Residual	2200	U234	2.58E-04	2.58E-04	5	Generic Metal TBD, Section 6.3
Supervisor	'56 - 11/91	Residual	2000	U234	2.13E-04	2.13E-04	5	Generic Metal TBD, Section 6.3
Clerical	1943	Operations	2400	U234	0.00E+00	0.00E+00	5	Generic Metal TBD, Section 6.3
Clerical	1944	Operations	2400	U234	0.00E+00	0.00E+00	5	Generic Metal TBD, Section 6.3

Job Category	Year	Operation Phase	Hr/Yr	Relevant Nuclide	Hands & Forearms (mR/d)	Other Skin (mR/d)	GSD	TBD Reference or Research Justification
Clerical	1945	Operations	2400	U234	0.00E+00	0.00E+00	5	Generic Metal TBD, Section 6.3
Clerical	1946 - '50	Residual	2400	U234	3.07E-04	3.07E-04	5	Generic Metal TBD, Section 6.3
Clerical	1951 - '55	Residual	2200	U234	2.58E-04	2.58E-04	5	Generic Metal TBD, Section 6.3
Clerical	'56 - 11/91	Residual	2000	U234	2.13E-04	2.13E-04	5	Generic Metal TBD, Section 6.3