

DOE Review 03/13/2014

Division of Compensation Analysis and Support	Document Number: Battelle-TBD-6000 - Appendix R Effective Date: 03/20/2014 Revision No. 1
Site Profiles for Atomic Weapons Employers that Worked Uranium Metals	Page 1 of 5
Appendix R – Aluminum Company of America - Pennsylvania (ALCOA-PA)	
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RECORD OF ISSUE/REVISIONS			
ISSUE AUTHORIZATION DATE	EFFECTIVE DATE	REV. NO.	DESCRIPTION
9/8/2008	9/8/2008	0	Appendix to Battelle-TBD-6000 describing the use of the TBD for uranium exposures at ALCOA-Pennsylvania
02/27/2014	03/20/2014	1	Revised to incorporate changes made during the revision of the base document TBD-6000. Revisions include changes to external dose value from contaminated surfaces, conversion factor for photon and beta dose rates, and intakes from resuspension. Additionally, job classes were eliminated, OTIB-70 depletion factor used during residual period, slug production dose rates match Table 6.4 of TBD-6000, and minor editorial changes.

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 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.

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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 (DOE Web site). 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. (Young, 1987)

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. (Young, 1987)

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 (ORAU 2011), the dose reconstruction project technical information bulletin covering diagnostic x-ray procedures.

R.4 Occupational Internal Dose

No data were 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."

Table R.1 presents these intake estimates in pCi per calendar day to be used for each calendar year listed.

R.5 Occupational External Dose

No data were 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" will be used.

Table R.2 presents these external dose estimates for each calendar year listed.

R.6 Dose from 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

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is assumed after 1991. (Foley and Brown, 1992). A potential exists, however, for exposure due to residual contamination between 1946 and 1991 (NIOSH 2011).

Internal and external exposure estimates for the residual contamination period are based on the airborne levels from section R.4. The value was used to calculate the surface contamination using the technique in section 3.4.2 of the TBD. From this contamination, the inhalation intake was estimated using techniques from section 7.1.5 and the external dose was estimated using the conversion factors in section 3.4.2. The ingestion values used the ingestion value at the end of the operational period.

Each of these values were decreased throughout the residual contamination period utilizing techniques from ORAUT-OTIB-0070. The intake values and external dose values for each year are contained in tables R.1 and R2 respectively.

R.7 References

DOE web site, Department of Energy, Office of Health, Safety and Security, Find a Facility website, <http://hsspublic.energy.gov/search/facility/findfacility.aspx>

Foley and Brown, 1992. *Results of the Radiological Survey at the former ALCOA New Kensington Works, Pine and Ninth Streets, New Kensington, Pennsylvania*, R.D. Foley and K.S. Brown, Oak Ridge National Laboratory, October 1992. ORNL/RASA-92/5 (SRDB #16445).

NIOSH 2011, *Report on Residual Radioactive and Beryllium Contamination at Atomic Weapons Employer Facilities and Beryllium Vendor Facilities*, NIOSH, August 2011.
<http://www.cdc.gov/niosh/ocas/pdfs/tbd/rescon/rcontam0811.pdf>

ORAU 2011, Dose Reconstruction from Occupational Medical X-Ray Procedures, ORAUT-OTIB-0006 revision 3PC-1, Oak Ridge Associated Universities, June 20, 2011.

Young, 1987. Letter to Wallo, *Recommendation For Site Visit Aluminum Company of America Site New Kensington, Pennsylvania*, Charles D. Young, The Aerospace Corporation, November 18, 1987 (SRDB #9557, pp 8-10)

Table R.1 INTERNAL DOSE PATHWAYS - Inhalation and Ingestion of Uranium

All intakes assume full-time employment for the given year.
 Values represent the geometric mean of a lognormal distribution with a geometric standard deviation of 5

Year	Operation Phase	Inhalation (pCi/d)	Ingestion (pCi/d)	GSD	TBD Reference or Research Justification
1943-1945	Operations	710	15	5	Table 7.8 and 7.9 slug production
1946	Residual	1.38	15	5	See text
1947	Residual	1.08	12	5	See text
1948	Residual	0.85	9.20	5	See text
1949	Residual	0.66	7.20	5	See text
1950	Residual	0.52	5.64	5	See text
1951	Residual	0.41	4.42	5	See text
1952	Residual	0.32	3.46	5	See text
1953	Residual	0.25	2.71	5	See text
1954	Residual	0.20	2.12	5	See text
1955	Residual	0.15	1.66	5	See text
1956	Residual	0.12	1.30	5	See text
1957	Residual	0.09	1.02	5	See text
1958	Residual	0.07	0.80	5	See text
1959	Residual	0.06	0.62	5	See text
1960 – 1969	Residual	0.04	0.49	5	See text
1970 – 1979	Residual	0.0039	0.042	5	See text
1980 – 1991	Residual	0.00034	0.0037	5	See text

Table R.2 EXTERNAL DOSE PATHWAYS

All DOSES assume full-time employment for the given year.
 Values represent the geometric mean of a lognormal distribution with a geometric standard deviation of 5

OPERATION PERIOD

Year	Photon (mr/yr)	Skin (rad/yr)	Hand & Forearms (rad/yr)	GSD	TBD Reference or Research Justification
1943-1945	2500	25	276	5	Table 6.4 slug production

RESIDUAL PERIOD

Year	Photon (mr/yr)	Skin (mrad/yr)	Skin (mrad/yr)	GSD	TBD Reference or Research Justification
1946	0.364	35.3	35.3	5	See text
1947	0.285	27.6	27.6	5	See text
1948	0.223	21.6	21.6	5	See text
1949	0.175	16.9	16.9	5	See text
1950	0.137	13.3	13.3	5	See text
1951	0.107	10.4	10.4	5	See text
1952	0.084	8.1	8.1	5	See text
1953	0.066	6.4	6.4	5	See text
1954	0.051	5.0	5.0	5	See text
1955	0.040	3.9	3.9	5	See text
1956	0.032	3.1	3.1	5	See text
1957	0.025	2.4	2.4	5	See text
1958	0.019	1.9	1.9	5	See text
1959	0.015	1.5	1.5	5	See text
1960 – 1969	0.012	1.2	1.2	5	See text
1970 – 1979	0.001	0.10	0.10	5	See text
1980 – 1991	0.00009	0.009	0.009	5	See text