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Project for NIOSH

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ALUMINUM COMPANY OF AMERICA – NEW JERSEY

S.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.

S.2 Site Description

The Atomic Weapons Employer Aluminum Company of America (ALCOA) had one site located in Garwood, New Jersey. It is listed as an Atomic Weapons Employer for 1944. Under subcontract to the Metallurgical Laboratory (University of Chicago), the Garwood facility manufactured casting dies and used them in the experimental die casting of Aluminum-Silica coatings on uranium slugs. (Reference 9557, Pages 8-10)

S.2.1 Site Activities

The experimental coating of uranium slugs with aluminum-silica required planning as one machine line had to be shut down and the new dies inserted. The process involved pickling the uranium slugs in nitric acid solution, and then dipping and die-casting them in an aluminum and silica bath. This work was conducted intermittently between July and November of 1944 for an estimated total of 15 days. (Reference 9557, Pages 14, 23)

S.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)
Plant Floor Low	(Involved in support of operations)
Supervisor	
Clerk	

S.3 Occupational Medical Dose

No information regarding occupational medical dose specific to ALCOA-NJ 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.

S.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-NJ involved canning uranium slugs. Therefore, the air concentration values in the TBD for "Slug Production and Canning" are used to calculate internal doses.

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

S.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-NJ involved canning uranium slugs. Therefore, the external dose values in the TBD for "Slug Production and Canning" should be used.

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

S.6 Residual Contamination

No surveys for residual contamination were performed at the ALCOA site in New Jersey. However, little potential exists for exposure from residual contamination[2].

S.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 S.1 INTERNAL DOSE PATHWAYS - Inhalation of Airborne Radionuclides

Assumptions:
Operational Period Daily Weighted Average Air Concentration, Plant Floor High: 198 dpm/m^3
Residual Period Daily Weighted Average Air Concentration: 0.080 dpm/m^3
TBD GSD Default is 5
Conversion Factor: 2.22 dpm/pCi
Breathing Rate: 1.2 m^3/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	1944	Operations	150	U234	4.40E+01	5	Based on Metal TBD for Slug Production
Plant Floor Low	1944	Operations	150	U234	2.20E+01	5	Based on Metal TBD for Slug Production
Supervisor	1944	Operations	150	U234	1.10E+01	5	Based on Metal TBD for Slug Production
Clerical	1944	Operations	150	U234	1.10E+00	5	Based on Metal TBD for Slug Production

Table S.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

TBD GSD Default is 5

Job Category	Year	Operation Phase	Hr/Yr	Relevant Nuclide	Intake (pCi/d)	GSD	TBD Reference or Research Justification
Plant Floor High	1944	Operations	150	U234	4.10E-01	5	Based on Metal TBD for Slug Production
Plant Floor Low	1944	Operations	150	U234	2.05E-01	5	Based on Metal TBD for Slug Production
Supervisor	1944	Operations	150	U234	1.02E-01	5	Based on Metal TBD for Slug Production
Clerical	1944	Operations	150	U234	1.02E-02	5	Based on Metal TBD for Slug Production

Table S.3 EXTERNAL DOSE PATHWAYS - Whole Body

Asumptions:
Submersion Dose Conversion Factor: 2.462E-09 mrem/h/dpm/m^3
Deposition velocity: 0.0008
Contaminated Surface Dose Conversion Factor: 5.615E-10 mrem/h/dpm/m^2
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	1944	Operations	150	U234	2.16E-02	5	Generic Metal TBD, Section 6.3
Plant Floor Low	1944	Operations	150	U234	1.08E-02	5	Generic Metal TBD, Section 6.3
Supervisor	1944	Operations	150	U234	1.08E-03	5	Generic Metal TBD, Section 6.3
Clerical	1944	Operations	150	U234	4.68E-07	5	Generic Metal TBD, Section 6.3

Table S.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	1944	Operations	150	U234	4.73E+01	4.27E+00	5	Generic Metal TBD, Section 6.3
Plant Floor Low	1944	Operations	150	U234	2.36E+01	2.14E+00	5	Generic Metal TBD, Section 6.3
Supervisor	1944	Operations	150	U234	2.36E+00	2.14E-01	5	Generic Metal TBD, Section 6.3
Clerical	1944	Operations	150	U234	0.00E+00	0.00E+00	5	Generic Metal TBD, Section 6.3