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## LaPointe Machine & Tool Company

### BO.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.

### BO.2 Site Description

The LaPointe Machine and Tool Company operated a machine shop in Hudson, Massachusetts. In 1956, the National Lead of Ohio Company (Fernald) conducted a single test involving the use of uranium metal on a broaching machine and an arbor press at this facility.<sup>1</sup>

#### BO.2.1 Site Activities

Broaching is a metal removal process that uses an elongated tool having a number of teeth of successively increasing size that cut in a fixed path. The broaching tool is pulled or pushed along a fixed path so that each tooth removes successively more metal. The final dimension is achieved by the cut of the last tooth. Broaching machines may be either horizontal or vertical, and may operate either internally or externally to a work piece. Broaching is done with coolant flooded onto the tool and work piece, thus particulate emissions are similar to those of other metalworking processes such as shaping, planing and drilling. An arbor press is a mechanical press similar to a drill press in which a lever is used to apply pressure to a work piece in order to force one piece into another. Both of these machining operations are generally low emissions processes.

#### BO.2.2 Job Categories

Table BO.1 assigns LaPointe Machine Tool Company claimants' job titles as of the effective date of this appendix to the Job Categories listed in **Bold Text** below. One claimant was a precision grinder (form grinder), and the other was involved in inventory control. The precision grinder is a machine operator, and although there is no indication in the files Concerning which machines he actually operated, a favorable assumption is that he was the operator of the broaching machine on the day of the test. As such, he is considered to have "plant floor high" exposure potential. The inventory control clerk is assumed to have minimal likelihood of exposure. His job would have been to maintain inventory records, possibly including the control of uranium metal shipped to and from the facility. However, it should be noted that this claimant began his employment on 4/1/1957, more than one year after the only known work with uranium at this facility.

<b>Plant Floor High</b>	<b>(Involved directly in operations)</b>
Plant Floor Low	(Involved in support of operations)
Supervisor	(Assumed to spend some time in the production areas)
<b>Clerk</b>	<b>(Assumed to have minimal exposure)</b>

Claims forwarded to NIOSH by the Department of Labor after the effective date of this appendix will be evaluated during the dose reconstruction process to determine the most appropriate of the four Job Categories.

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### **BO.3 Occupational Medical Dose**

No information regarding occupational medical dose specific to LaPointe Machine & Tool Company was found. One of the claimants indicated in the CATI interview that medical x-rays were conducted annually. There was no information regarding medical x-rays in the second claimant's CATI interview. Nevertheless, 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.

### **BO.4 Occupational Internal Dose**

There were no data found in the site research data base regarding dust levels associated with the work performed at LaPointe Machine and Tool Company. The body of this TBD, specifically table 7.5, provides air sampling data for facilities involved in machining uranium. While broaching operations are not presented in the table, the dust exposures associated with this operation would be similar to those associated with drilling operations and this level should be used. Thus, we estimate that an operator performing broaching of uranium metal would have a daily weighted average exposure of 20 dpm/m<sup>3</sup>. This would represent "plant floor high" exposure levels. Other job categories should be scaled as follows:

- Plant floor low—50% of plant floor high exposure
- Supervisor—25% of plant floor high exposure
- Clerical—10% of supervisor exposure (2.5% of plant floor high)

Tables BO.1 and BO.2 contain inhalation and ingestion intakes in terms for pCi per day for each job category and each year.

### **BO.5 Occupational External Dose**

There was no information in the site research database with respect to external exposures. No radiation surveys were performed during the tests, and only one survey was performed several months after the test. In this survey, the area around the broaching machine and arbor press were found to be clean, however there was a bit of contamination found on the equipment. At that time, contamination levels measured slightly above background at 0.25 mrep/hr  $\beta/\gamma$ . This contamination was apparently removed with one swipe of a rag (which was sent back to NLO, on whose behalf the tests were run).<sup>2</sup>

Given the lack of contemporaneous survey data, external doses are calculated based on airborne contamination levels as described above. This Battelle TBD provides guidance for calculating external doses associated with submersion and surface loading based on airborne contamination levels. External dose rates for working with uranium metal are taken from TBD Sections 6.2 and 6.3.

Tables BO.3 and BO.4 contain external doses associated with the work at this facility.

### **BO.6 Residual Contamination**

The NIOSH "Report on Residual Radioactive and Beryllium Contamination at Atomic Weapons Employer Facilities and Beryllium Vender Facilities" indicates "Documentation exists which shows that the facility was effectively decontaminated immediately after DOE work was completed." Additionally, "there is little potential for

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significant residual contamination outside of the period in which weapons-related production occurred.”<sup>3</sup> It is assumed that there was no cleanup of contamination during the year of operation, so exposure to residual contamination was calculated for an 11-month period in 1956.

## **BO.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. Reference No. 9760, pg. 7
3. 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>  
<http://www.cdc.gov/niosh/ocas/pdfs/tbd/rescon/appen-2.pdf>

**Table BO.1 INTERNAL DOSE PATHWAYS - Inhalation of Airborne Radionuclides**

**Assumptions:**

Operational Period Daily Weighted Average Air Concentration, Plant Floor High: 9 dpm/m<sup>3</sup>  
 Residual Period Daily Weighted Average Air Concentration: 0 dpm/m<sup>3</sup>  
 TBD GSD Default is 5  
 Conversion Factor: 2.22 dpm/pCi  
 Breathing Rate: 1.2 m<sup>3</sup>/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	1956	Operations	8	U234	1.07E-01	5.0	Metal TBD Table 7.5, Drill
Plant Floor High	1956	Residual	1833	U234	5.28E-04	5.0	Resuspension of contamination deposited during operations, no cleanup
Plant Floor Low	1956	Operations	8	U234	5.33E-02	5.0	Ratio from Plant Floor High
Plant Floor Low	1956	Residual	1833	U234	5.28E-04	5.0	Resuspension of contamination deposited during operations, no cleanup
Supervisor	1956	Operations	8	U234	2.67E-02	5.0	Ratio from Plant Floor High
Supervisor	1956	Residual	1833	U234	5.28E-04	5.0	Resuspension of contamination deposited during operations, no cleanup
Clerical	1956	Operations	8	U234	2.67E-03	5.0	Ratio from Plant Floor High
Clerical	1956	Residual	1833	U234	5.28E-04	5.0	Resuspension of contamination deposited during operations, no cleanup

**Table BO.2 INTERNAL DOSE PATHWAYS - Ingestion of Airborne Radionuclides****Assumptions:**Air Concentration to Intake Conversion Factor:  $3.06E-05$  (M<sup>3</sup>/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	1956	Operations	8	U234	9.93E-04	5.0	Metal TBD Table 7.5, Drill
Plant Floor High	1956	Residual	1833	U234	4.92E-06	5.0	Resuspension of contamination deposited during operations, no cleanup
Plant Floor Low	1956	Operations	8	U234	4.97E-04	5.0	Ratio from Plant Floor High
Plant Floor Low	1956	Residual	1833	U234	4.92E-06	5.0	Resuspension of contamination deposited during operations, no cleanup
Supervisor	1956	Operations	8	U234	2.48E-04	5.0	Ratio from Plant Floor High
Supervisor	1956	Residual	1833	U234	4.92E-06	5.0	Resuspension of contamination deposited during operations, no cleanup
Clerical	1956	Operations	8	U234	2.48E-05	5.0	Ratio from Plant Floor High
Clerical	1956	Residual	1833	U234	4.92E-06	5.0	Resuspension of contamination deposited during operations, no cleanup

**Table BO.3 EXTERNAL DOSE PATHWAYS - Whole Body****Assumptions:**Submersion Dose Conversion Factor: 2.462E-09 mrem/h/dpm/m<sup>3</sup>

Deposition velocity: 0.0008

Contaminated Surface Dose Conversion Factor: 5.615E-10 mrem/h/dpm/m<sup>2</sup>

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	1956	Operations	8	U234	5.06E-03	5.0	Generic Metal TBD, Section 6.3
Plant Floor High	1956	Residual	1833	U234	5.48E-07	0.0	Generic Metal TBD, Section 6.3
Plant Floor Low	1956	Operations	8	U234	2.53E-03	5.0	Generic Metal TBD, Section 6.3
Plant Floor Low	1956	Residual	1833	U234	5.48E-07	5.0	Generic Metal TBD, Section 6.3
Supervisor	1956	Operations	8	U234	2.53E-04	5.0	Generic Metal TBD, Section 6.3
Supervisor	1956	Residual	1833	U234	5.48E-07	5.0	Generic Metal TBD, Section 6.3
Clerical	1956	Operations	8	U234	2.40E-09	5.0	Generic Metal TBD, Section 6.3
Clerical	1956	Residual	1833	U234	5.48E-07	0.0	Generic Metal TBD, Section 6.3



**Table BO.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	Skin: Hands & Forearms (mR/d)	Skin – Other (mR/d)	GSD	TBD Reference or Research Justification
Plant Floor High	1956	Operations	8	U234	2.52E+00	2.28E-01	5	Generic Metal TBD, Section 6.3
Plant Floor High	1956	Residual	1833	U234	5.48E-06	5.48E-06	5	Generic Metal TBD, Section 6.3
Plant Floor Low	1956	Operations	4	U234	1.26E+00	1.14E-01	5	Generic Metal TBD, Section 6.3
Plant Floor Low	1956	Residual	1833	U234	5.48E-06	5.48E-06	5	Generic Metal TBD, Section 6.3
Supervisor	1956	Operations	0.4	U234	1.26E-01	1.14E-02	5	Generic Metal TBD, Section 6.3
Supervisor	1956	Residual	1833	U234	5.48E-06	5.48E-06	5	Generic Metal TBD, Section 6.3
Clerical	1956	Operations	0	U234	0.00E+00	0.00E+00	5	Generic Metal TBD, Section 6.3
Clerical	1956	Residual	1833	U234	5.48E-06	5.48E-06	5	Generic Metal TBD, Section 6.3