

<p>ORAU Team Dose Reconstruction Project for NIOSH</p> <p>Technical Basis Document for the Mound Site – Introduction</p>	<p>Document Number: ORAUT-TKBS-0016-1 Effective Date: 09/09/2004 Revision No.: 00 Controlled Copy No.: _____ Page 1 of 6</p>
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TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
Record of Issue/Revisions	2
Acronyms and Abbreviations	3
1.0 Introduction	4
1.1 Purpose	4
1.2 Scope	4

RECORD OF ISSUE/REVISIONS

ISSUE AUTHORIZATION DATE	EFFECTIVE DATE	REV. NO.	DESCRIPTION
Draft	07/21/2004	00-A	New technical basis document for the Mound Site – Introduction. Initiated by Jeffrey S. Vollmer.
Draft	09/02/2004	00-B	Incorporates NIOSH review comments. Initiated by Jeffrey S. Vollmer.
Draft	09/07/2004	00-C	Incorporates additional NIOSH review comments. Initiated by Jeffrey S. Vollmer.
09/09/2004	09/09/2004	00	First approved issue. Initiated by Jeffrey S. Vollmer.

ACRONYMS AND ABBREVIATIONS

AEC	U.S. Atomic Energy Commission
EEOICPA	Energy Employees Occupational Illness Compensation Program Act
IMBA	Integrated Modules for Bioassay Analysis (program)
IREP	Interactive RadioEpidemiological Program
LSA	Low Specific Activity
NASA	National Aeronautics and Space Administration
NDT	nondestructive testing
NIOSH	National Institute for Occupational Safety and Health
ORAU	Oak Ridge Associated Universities
R&D	research and development
RTG	radioisotopic thermoelectric generator
SRP	Savannah River Plant
sOBT	physiologically soluble organically-bound tritium
TBD	technical basis document

1.0 INTRODUCTION

This technical basis document (TBD) represents support to the ORAU Team on documentation of historic practices at the Mound Laboratory site in Miamisburg, Ohio and the Dayton Project sites that preceded it. It is an evaluation of internal and external dosimetry data, site monitoring and other pertinent data for unmonitored and monitored workers for use as a supplement to individual monitoring data.

Technical Basis Documents (TBDs) and Site Profile Documents are general working documents that provide guidance concerning the preparation of dose reconstructions at particular sites or categories of sites. They will be revised in the event additional relevant information is obtained about the affected site(s). These documents may be used to assist the National Institute for Occupational Safety and Health (NIOSH) in the completion of the individual work required for each dose reconstruction.

In this document the word "facility" is used as a general term for an area, building, or group of buildings that served a specific purpose at a site. It does not necessarily connote an "atomic weapons employer facility" or a "Department of Energy facility" as defined in the Energy Employees Occupational Illness Compensation Program Act of 2000 [EEOICPA; 42 U.S.C. § 7384I (5) and (12)].

1.1 PURPOSE

The purpose of this document is to provide a Mound Laboratory Site Profile that contains technical basis information to be used to evaluate the total occupational dose for EEOICPA claimants.

1.2 SCOPE

Mound Laboratory played an important role in the U.S. nuclear weapons program. Originally established in Dayton, Ohio, in the summer of 1943, the original location was selected to produce large quantities of polonium. This role grew to include nuclear weapons component development and production, and such secondary missions as radioactive waste management and recovery, the use of radioactive materials for nonweapons purposes and the purification of nonradioactive isotopes for scientific and commercial research. This TBD contains supporting documentation to assist in the evaluation of worker dose from these processes, using the methodology in NIOSH implementation guides (NIOSH 2002a,b).

Methods and concepts of measuring radiation exposure to workers have evolved since the beginning of Mound operations in 1943. This TBD provides supporting technical data to evaluate the total Mound occupational dose that can reasonably be associated with the worker's radiation exposure. This dose includes occupational internal and external exposures, occupationally required diagnostic X-ray examinations, and onsite exposure to site environmental releases. Consistent with NIOSH (2002a,b), this document identifies how to adjust the historic occupational dose to account for current scientific methods and protection factors.

In addition, this TBD presents technical basis methods used to prepare the Mound worker dose records for input to the NIOSH Interactive RadioEpidemiological Program (IREP) and the Integrated Modules for Bioassay Analysis (IMBA) computer codes used to evaluate worker dose. Because information on measurement uncertainties is an integral component of the NIOSH approach, this document describes how the uncertainty is evaluated for the Mound exposure and dose records.

This TBD describes Mound facilities and processes and historic information related to worker internal and external exposures. Attachments contain critical data and tables required by dose reconstructors to suffice as a standalone document.

This document also supplies supporting technical data used in the evaluation of the occupational dose that may be reasonably associated with a Mound Laboratory workers claim. The source of exposure may have resulted from external and internal radiation sources, required medical x-rays and to onsite releases and ambient exposure. Doses that may have occurred to unmonitored workers or that may have been missed by monitoring are included in this evaluation. Over time, improvements to monitoring devices and techniques as well as new protection standards have been developed. This document also captures these historical changes.

The doses are evaluated using the NIOSH Integrated Modules for Bioassay Analysis (IMBA) and the Interactive Radioepidemiological Program (IREP) computer codes. As part of these evaluations uncertainties associated with the assessment are an integral part of the NIOSH process. Therefore uncertainty analysis of Mound Laboratory exposure is also an essential part of these documents. This site profile is divided into five major sections, Facilities and Processes, Occupational Medical Dose, Occupational Environmental Dose, Occupational Internal Dose and Occupational External Dose. Each section has associated Appendices with relevant data that can be used by the dose reconstructor to evaluate claims.

The Facilities and Processes and potential radiation sources utilized during the history of the Dayton Project and Mound Laboratory are presented in section 2. The tables showing radionuclides of concern and operational histories of the different facilities and sites are presented in this section. This document provides processes, radioisotope forms and other information that may be useful in the completion of dose reconstructions. The dose reconstructor would use this data when monitoring data or other methods of evaluating dose are inadequate.

Section 3 presents information crucial in evaluating Occupational Medical Doses. This includes radiation doses due to medical x-rays that were required for pre-employment, for annual examinations, and for other prescribed examinations. Any changes to techniques or equipment employed at Mound Laboratory are also presented in this section. This section presents the pertinent details to help assist dose reconstructors in determining doses resulting from Occupational Medical sources at Mound Laboratory.

Section 4 is the Occupation Environmental Dose section. This information can be used to reconstruct radiation doses to unmonitored workers. The releases of radionuclides from buildings at Mound Laboratory are related to the methods used to calculate doses to unmonitored workers. Potential internal exposures are presented that might have resulted from air dispersion of radionuclides from the buildings, ground level releases during construction or deconstruction activities and resuspension of radioactive contaminated soil. External radiation sources, from various site facilities, are evaluated for their contribution to this environmental dose. Methodology and equipment for estimating these doses over the years have changed and these changes are taken into account in evaluating doses to unmonitored workers. Section 4 presents the details needed in calculating doses to unmonitored workers at Mound Laboratory.

Occupational Internal Doses are presented in Section 5. The most significant radionuclides are presented in this section. This section also describes historical changes in monitoring methods and equipment. These changes are presented to aid the dose reconstructors in evaluating internal dosimetry records. Tables showing MDA and other pertinent monitoring details are presented for both in vitro and any in vivo bioassay techniques that may have been utilized. This section presents

information that is needed in assisting the dose reconstructor in calculating doses to monitored workers.

Section 6 outlines the details of the Occupation External Dose that will aid the dose reconstructor in evaluating external exposure to monitored workers at Mound Laboratory. Historical techniques and practices are presented and discussed in this section as well as radiation protection standards and practices that may have affected the dosimetry program. Tables are included that give historical exchange frequencies, techniques, exposure levels and other details that will aid the dose reconstructor in evaluating external exposure. The pertinent information that can be utilized by dose reconstructors in evaluating External Dose is in this section.