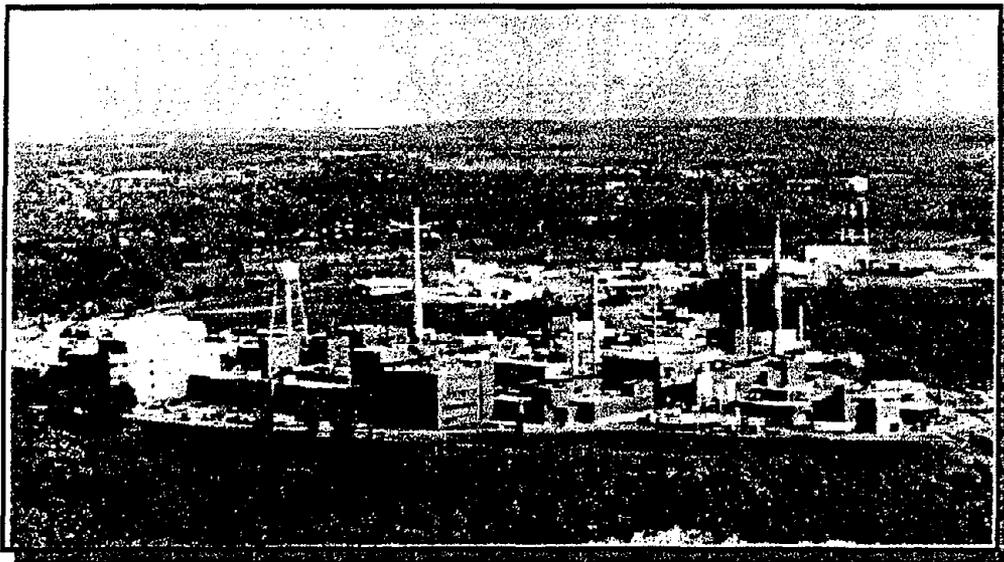


Remediation Workers' Exposure Assessment Feasibility Study at the Department of Energy's Mound Site

Phase I



Study Initiated under Contract With:
Dynamic Science Incorporated (DSI)
1821 Summit Road, Suite 010
Cincinnati, OH. 45237
Contract Number 200-92-2559

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TRI-S Incorporated
4960 Ridge Road, Suite 2
Cincinnati, OH. 45213
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Contributing Authors on the Research Team:
Gentry W. Stevens, B.A.
David A. Back, B.A.

Clerical Support for the Research Team:
Steve Davisson, B.A.
Relada Miller, A.A.B.

NIOSH Technical Monitor:
Steven Ahrenholz, M.S., Ph.D., CIH
Timothy D. Taulbee, B.S.

PREFACE

The Department of Health and Human Services (DHHS), subsequent to the implementation of a Memorandum of Understanding (MOU) between the Departments of Energy (DOE) and Health and Human Services, conducts a program of independent occupational and environmental research studies with funding from DOE. Research conducted under this MOU focuses on the examination of health effects that may have resulted from past or current DOE operations. The National Institute for Occupational Safety and Health (NIOSH) within the Centers for Disease Control and Prevention, DHHS is charged with the conduct of the occupational health research component of this MOU. This document on the DOE Mound site represents the second background site document prepared for the development of the NIOSH project entitled: Exposure Assessment of Hazardous Waste (HW), Decontamination (De), Dismantlement (Di), and Clean Up Workers (CW).

The purpose of this document is to assemble information relevant to Remediation Workers performing HW, De, Di, and CW task activities at the DOE Mound site addressing four primary objectives. The objectives are: identification of Remediation Workers performing HW, De, Di, and CW task activities anticipated or in progress from the recent past through the next five to 10 years; demographic definition of the workforce performing these activities; identification of the technologies in use or proposed to be used (including considerations regarding health and safety impact upon the workforce); and assembly of summary information for potential chemical, mixed, and radiological contaminant exposures that may be encountered during these processes. The information is drawn predominantly from existing DOE and contractor documents or reports. Other source documents may include those assembled for compliance purposes or to define activities dictated by site Decontamination & Decommissioning, restoration, transition, and cleanup agreements with local, state, and federal authorities or as mandated by DOE. This assembly of information is to support research hypothesis development in the next phase of this project. It will also provide insight and initial data for study feasibility and planning considerations.

The depth and scope of the information assembled provides a midrange presentation of data. Grappling with the needs for substantive information while avoiding premature detail and acknowledging changes in data relevance as time elapses influenced both the character and decisions that went into the assembly of this document. The data collection process limited the need for intensive site involvement. This document is descriptive in nature. The resource documents used to assemble the information are referenced. Information that could not be obtained or which did not exist in an accessible form is also identified.

The intended application of this document is to provide an overview of Remediation Workers performing HW, De, Di, and CW task activities at the DOE Mound site. The information is presented in two ways, a text assembly of information with references and a tabular presentation. The intent of this approach is to permit disassembly of the document to facilitate combining similar information for different sites, ideally facilitating an assessment of the feasibility of involving multiple sites in a research study.

The limitations of this document should be recognized. The rate of change in organizational structure, workforce composition, and site activities at the DOE sites involving Remediation Workers performing HW, De, Di, and CW tasks appears to be increasing in frequency and complexity. This coincides with a compression of the time frame committed to cleaning up sites by DOE, resource reductions, and an increase in the use of autonomous multitiered subcontracting. Numerical data is presented as found in the cited references. No verification of summary data provided by the sites or obtained from pre-existing documents has been performed. Obstacles that may become substantial regarding exposure characterization of workforces on site include cessation of centralized data collection systems; introduction of “just in time” contaminant characterization on an as-justified basis; modification of site programs documenting worker exposures; shifts away from a stable, long-term workforce; and changes in the structure of site management. The information presented may also constitute tangential information related to the objectives specified for this phase of the project.

DISCLAIMER

Mention of any company or product does not constitute endorsement by the National Institute for Occupational Safety and Health.

ACKNOWLEDGMENTS

The majority of this background document addressing remediation worker activities at the Department of Energy (DOE) Mound site was prepared by Dynamic Science, Inc., 1821 Summit Road, Suite 010, Cincinnati, OH 45237 under the authority of Dynamic Science, Incorporated, 8433 North Black Canyon Highway, Suite 200 Phoenix, AZ 85021, for the National Institute for Occupational Safety and Health (NIOSH) under contract no. 200-92-2559. The first draft revision and final assembly phases of this document were prepared by TRI-S Incorporated, 323 South Union Avenue, Havre de Grace, Maryland 21078, for the National Institute for Occupational Safety and Health (NIOSH) under contract no. 200-98-2006. The NIOSH project officer responsible for the management and technical direction of this document is Dr. Steven H. Ahrenholz. Assistance with document review and comment was provided by Mr. Timothy D. Taulbee, NIOSH. The Dynamic Science Technical Information Specialists responsible for the acquisition and assembly of data into this final report were Gentry W. Stevens and David A. Back. This document is the deliverable for this site for Phase I of the Hazardous Waste, Decontamination and Decommission and Cleanup Workers Exposure Assessment Study being conducted by the NIOSH Division of Surveillance, Hazard Evaluations and Field Studies - Health-Related Energy Research Branch. NIOSH conducts worker health studies at the various DOE sites through a Memorandum of Understanding executed by the DOE and the Department of Health and Human Services (DHHS) in 1990 and renewed in 1996. NIOSH is one of the Centers for Disease Control and Prevention, within DHHS.

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REMEDIATION WORKERS EXPOSURE ASSESSMENT FEASIBILITY STUDY AT THE DEPARTMENT OF ENERGYS' MOUND SITE

1.0 ABSTRACT

The focus of this study is on Remediation Workers at the United States Department of Energy's (DOE) Mound site with regard to past, present, and proposed future worker group activities, exposures, demographics, and technologies.

This study addresses historic (November 21, 1989 to present), present (May-August, 1997), and proposed (August 1997 and beyond) Remediation Worker group exposure data. In many cases, accelerated clean up schedules are planned for DOE sites across the country with the intention of site remediation within the scope of a ten year period. This worker group, which might encounter hazards that it's predecessors (i.e., production workers) were not exposed to, may vanish upon completion of these tasks. The first phase of this study will address, identify, and summarize documentation regarding this work force for use as a foundation upon which further studies will be built.

For the purpose of this study, only workers with "hands-on" or full involvement/participation in site remediation activities will be addressed; no casual support (i.e., pre or post-job IH or Radiological safety technicians that do not remain while the work is being performed), administrative support (i.e., office managers, clerical support, etc.), or bench-scale support (i.e., lab or technology research and development technicians) will be included in the defined worker group or subtasks. Site remediation efforts undertaken prior to November 21, 1989, when Mound was included on the National Priorities List, are not addressed in this study. Workers that utilize buildings or structures which have been "free released" for public or private industry will not be addressed in this study.

2.0 PURPOSE

This study involves the assembly of background information necessary to address health hazards to Remediation Workers involved with waste streams at the Mound site. The objectives of this study are:

1. Identify and catalog historic, in progress, and anticipated Remediation Worker activities at the site.
2. Define and characterize the Remediation Worker workforce demographically.
3. Identify past, present, and proposed future technologies DOE will use for the work categories.
4. Determine if exposure characterization data exists and categorize the available exposure information into the following groups: chemical, mixed, and radiological.

Information assembled as a result of this study will serve as a catalyst for subsequent exposure assessment and epidemiological studies of this work force.

3.0 METHODOLOGY

Information Resources

Information utilized to fulfill the objectives of this study was collected primarily from publicly available documents and Mound site contacts.

Publicly available documents were obtained from Internet sites, the National Institute for Occupational Safety and Health (NIOSH) Health-related Energy Research Branch (HERB) Library, and from the Mound Freedom of Information Act (FOIA), and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Public Reading Rooms.

The CERCLA Public Reading Room serves as a repository for the Administrative Record which was established under Section 113 (k) of CERCLA. The administrative record is the body of documents that “forms the basis” for the selection of a particular response (remedial response action) at a site. Section 113 (k) requires that the administrative record act as a vehicle for public participation in selecting a remedial response action. All DOE Superfund sites must maintain a CERCLA Public Reading Room. Information available from public information sources includes documents pertaining to past, present, and proposed future Remediation Worker activities and technologies⁽¹⁾.

NIOSH identified DOE site contacts acted as a liaison between NIOSH contracted study personnel and EG&G Mound Applied Technologies, Inc., the Mound site operations contractor. These site contacts provided information not available from public information sources, i.e., documents pertaining to past, present, and proposed future Remediation Worker demographics and exposures.

Format considerations

Information gathered to fulfill the objectives stated earlier is presented using two complimentary approaches. These are descriptive “fact or information sheets” and “tables” which present in an overview fashion the categories and type of information necessary to address each objective.

Site Information

A general description of the site was developed to include site facts, years of operation, site activity during production, a brief description of key facilities, current mission, and future disposition of the site.

Regulatory Drivers

An overview of driving forces (legal) behind the project is presented which includes regulatory agencies and applicable legislation governing site remediation.

Mound Site Environmental Management Program

This section provides an overview of management programs currently involved in oversight of environmental remediation at the Mound site.

Definition of the Remediation Worker Group

The Remediation Worker group definition was based on worker functions (i.e., the performance of Hazardous Waste [HW], Deactivation [De], Dismantlement [Di], and Cleanup Worker [CW] tasks associated with site remediation activities) and the types of waste streams handled. These definitions may vary from site to site. The definitions were developed by the Authors using a combination of personal process knowledge, information gleaned from publicly available documents, and site contacts. Definition of and general management practice for each type of waste generated at the site is also presented.

Remediation Worker Group Demographics

This section provides a demographic description of the Remediation Worker group at the facility and includes, but is not limited to: overall numbers of Remediation Workers, union information, numbers of workers per contractor, turnover rates, job titles, tasks or categories, number of workers per job task or category, indication of where workers came from [e.g., former site workers, young unskilled laborers, etc.], industry profiles, construction trades, equipment operators, health and safety support and any unconventional work groups, location of worker activity on site, tracking mechanisms/availability of past, present, and proposed future information on these workers, primary site location of activity, generic job title groups, etc.

Identification of Historic, In-progress, and Anticipated Remediation Worker Activities and Exposures

This section presents 25 independent historic, in-progress, and anticipated Remediation Worker activities and exposures which are described and defined relative to worker tasks and the physical location of those activities. While each of the 25 independent activities presented identify the major contaminant of concern expected to be encountered at each operation, it is likely that additional, unrecognized contaminants of concern may be encountered with some of these activities. Historic and current Remediation Worker exposure data was accessed, defined, and delineated into the following groups: chemical (i.e. hazardous), mixed, and radiological. Regulatory drivers specific to Remediation Worker group activities, activity duration, and number of workers per activity are also presented.

Remediation Worker Group Technologies

Provided is a listing of 20 independent past, present and proposed future technologies for Remediation Workers. The list was indexed according to worker task and includes a brief description of technologies used, the number of workers required/proposed to use the technology, exposure risks (remote versus hands-on, Personal Protective Equipment (PPE) requirements, etc), and perceived advantages and disadvantages of each technology.

Exhibits

This section presents, in a table format, information relative to worker group activities, demographics, technologies, and exposures. See Section 8.0, page 87.

Tables

The tabular presentation of the data accompanies and summarizes in an overview fashion the material presented in the written text which is written with greater detail, explanatory information, sources, limitations, etc. See Section 9.0, page 147.

Works Cited/References

Section 10.0, page 170, presents a listing of sources of information from points of contact and publicly available documents.

Points of Contact

Section 11.0, page 179, presents names, addresses, and phone numbers of Mound site DOE representatives and site contractor personnel that were contacted for information necessary to fulfill the objectives of this study.

Acronyms/Glossary of Terms

Section 12.0, page 185, presents a definition of acronyms and terms used.

4.0 SITE INFORMATION

Overview

The DOE's Mound Plant is located in Montgomery County, Ohio, on 306 acres in the southwest section of Miamisburg, Ohio. EG&G Mound Applied Technologies, Inc. is the Maintenance and Operating contractor for the Mound Plant under contract with the DOE. It is responsible for completing work on Environmental Management programs at the site, as the DOE directs. The existing contract with EG&G Mound will expire in September 1997⁽²⁾. On October 1, 1997, Babcock and Wilcox (B&W) will become the new prime contractor at the Mound site. At the time of this study, B&W's Environmental Management Plan for the Mound facility was in development and not available. The Plan is scheduled to be completed in October, 1998 and will be available through DOE's Ohio Field Office.

Mound was established as the first permanent Atomic Energy Commission facility in support of atomic weapons research when the site was first occupied in May, 1948. The Dayton area had supported secret operations for the War Department during World War II. Known only as the Dayton Project, extensive chemical and metallurgical research had been done in support of the Manhattan Engineering District. At the end of the war, that work was moved from facilities in Dayton to permanent facilities in Miamisburg. The plant (then called Mound Laboratory) was operated by Monsanto Chemical Company from its opening until 1988, when Monsanto decided not to seek renewal of its management contract. EG&G Mound won the contract to run the facility and began its tenure in 1988.

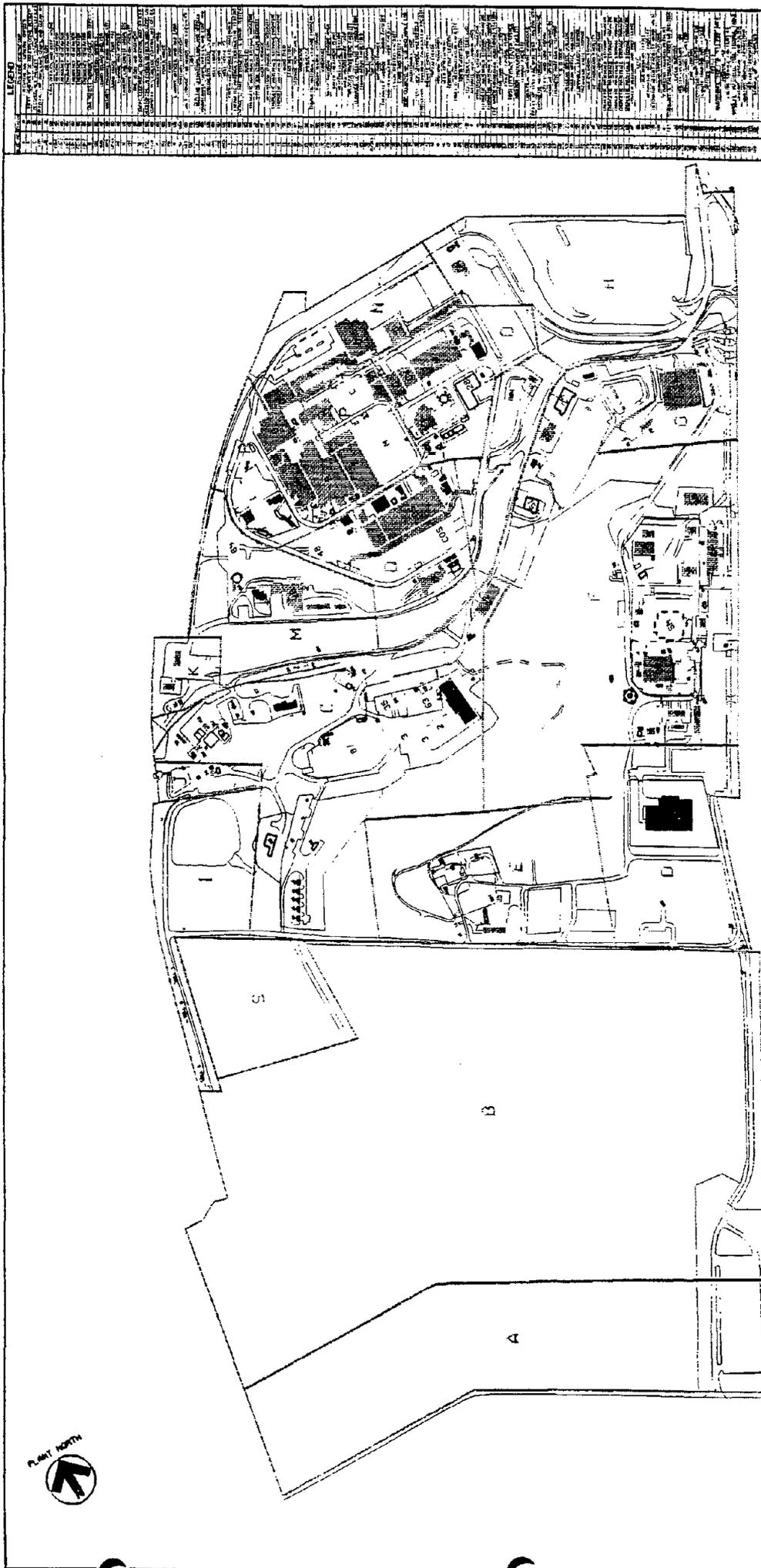
The plantsite contains 132 buildings, including a power generating facility, it's own water supply, and wastewater treatment facilities. The site also houses DOE's Ohio Field Office, which began operations in October of 1994. Prior to this date, the Mound was under the direction of the DOE's Albuquerque Field Office. Figure 1, page 7, presents a map of the Mound Site depicting Release Blocks A - R.

Over the years, Mound grew to become an integrated research, development, and production facility. It's primary mission was the process development, production engineering, manufacturing, surveillance, and evaluation of explosive components for the U.S. nuclear defense stockpile. It's secondary missions included nuclear material safeguard, radioactive waste management and recovery, the building and testing of nuclear generators, and the purification of non-radioactive isotopes for medical, industrial, and agricultural research.

In 1989, with the end of the cold war, Mound was added to the National Priorities List (Superfund) and the DOE initiated a reconfiguration process that called for environmental restoration (ER) and the eventual closing of the Mound Plant. ER work includes facility stabilization, disposition of excess nuclear material and ancillary equipment, decommissioning, and waste management.

Figure 1: Site Map

BEST AVAILABLE COPY



LEGEND

1	ASPHALT DRIVEWAY
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BUILDING COLOR CODES	
COLOR	DESCRIPTION
[Solid Black]	LEASED (LSD)
[Hatched]	PENDING OPERATIONS (PO)
[Solid Grey]	SOLD (SD)
[Dotted]	SAFE SHOOTING (SS)
[White]	O & D (OD)
[Light Grey]	READY FOR SALE (RFS)
[Medium Grey]	AWAITING FUNDING (AF)
[Dark Grey]	DEMOLISHED/REMOVED (D/R)
[White]	RELEASE BLOCK (RYMNT)

FACILITY STATUS AS OF 10/1/95

LEGEND	
LINE NO.	DESCRIPTION
1	MONTHLY AND QUARTERLY CHECKS
2	VENT SYSTEMS OF THE RESEARCH CENTER
3	RESEARCH AND DEVELOPMENT (R&D) AND OFFICE
4	OFFICE, CONFERENCE, LABS, CHOP, AND CLEAN ROOM
5	RESEARCH
6	LABS, OFFICES, AND CONF ROOMS
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200	EMERGENCY GENERATOR

Process Description

Past production operations at the Mound site were very diverse and were conducted in more than 100 buildings that were utilized in a number of weapon and non-weapon programs in fulfilling the missions of the Mound. A wide variety of activities were performed for the following major programs:

- Weapons programs - Activities associated with weapons programs included research, development, and production of detonators; timers, transducers and switches; firesets, actuators; and nuclear components. Surveillance was also performed on various components of weapons taken from stockpiles. In addition, 36 products on 9 different types of ordinance were procured for other sites involved in the program.
- Safeguards Program - The safeguards program at the Mound plant includes research and development for nuclear measurements instruments and methodology and provides site assistance for nuclear material accountability and calorimeter reimbursable materials.
- Tritium Recovery Program - The Mound plant received tritium-containing scrap materials from other DOE sites and recovered and purified the tritium for future use⁽³⁾.

Exhibit 8.1, page 87, presents a chronological summary of key programs at the Mound site⁽⁴⁾.

Key Facilities

At the Mound, there are six key facilities. Of the six, five are nuclear or radiological facilities: the SWR Tritium Complex, the T Building, and Buildings 38, 50, and 22. The sixth building is a non-nuclear hazardous chemical storage facility, Building 72. Following is a brief description of each key facility⁽⁵⁾.

Semi-Works (SW/R) Tritium Complex

This two-story facility is used primarily for handling tritium. Four major operations are currently performed in the SW/R Tritium Complex: component development, component evaluation operations, tritium recovery, and materials analysis. The SW/R was constructed in 1950 and has undergone 13 major additions. One corridor of rooms in the adjacent building, Research (R), has been converted to tritium operations and, together with the SW building and Building 58, form the SW/R complex. This facility will eventually be demolished as part of decontamination and decommissioning activities.

Technical (T) Building

The T Building was originally used to purify Po-210 for use in nuclear weapons initiators. The current mission is to support tritium programs for reconfiguration, safe shutdown, and remaining operations. The facility has also been used to extract radionuclides, to house the plutonium verification facility, and to store Transuranic (TRU) materials. Since 1980, the KYLE (classified), Tritium Emission Recovery Facility (TERF), Hydrogen Isotope Separations System (HISS), and other tritium facilities large enough to handle multi-kilogram quantities were added to T Building. T Building is expected to remain in either operational or standby mode for several years.

Special Nuclear Material (SNM), primarily Pu-239, is stored in T Building storage areas A and B prior to transfer to Building-38 for repackaging. The SNM is in the form of metal, metal oxide, residue, and/or combinations thereof; these materials are contained in sealed drums and other metal containers and are approximately twenty years old. Some containers include small amounts of other SNM, such as U-233, Pu-238, mixed oxides of plutonium, and normal or slightly enriched uranium.

Building 38

Building 38 was originally designed to be a radiochemical processing facility for Pu-238, used in the oxide form as a fuel for Radioisotopic Thermoelectric Generators (RTGs). RTGs, or "space batteries," are utilized in support of NASA missions. Building design began in 1965, and construction was completed in December 1967. The assembly and disassembly operations associated with manufacturing Pu-238 heat source modules for RTGs is the primary operation conducted in Building 38. Other programs conducted in Building 38 include the assembly of three types of heat sources and two types of RTGs and general-purpose radionuclide handling. RTG and heat source assembly and disassembly are supported in the F-line operations and involve the Five-watt, High Power Generator Mod 3 and General Purpose Heat Sources (GPHS) programs. This work is funded by the Office of Nuclear Energy. The radiochemical analysis operations, wet chemistry analysis, and "orphan source" (radioactive sources for which DOE does not have ownership) programs are carried out in the A-line. This work supports overall Mound operations.

Under the criteria in previous DOE Order 6430.1A, Building 38 would not meet the definition of a special facility but would be subject to the general requirements for special facilities as well as the general requirements for a "hot lab." Building 38 does not meet the definition of a plutonium processing and handling facility (PPHF). Building 38 has not been a PPHF for several years and it is not planned to again use Building 38 to process large quantities of plutonium.

Building 50

Building 50 is an RTG assembly and test laboratory. Encapsulated Pu-238 fuel received from the primary encapsulating agency is loaded into graphite assemblies in Building 38 and welded into stainless steel containers. They are then transferred to Building 50 for fuel reduction and subsequent installation into electrical converters (which then form the RTG).

Building 22, Waste Staging Facility (WSF)

The WSF facility provides storage and staging for solid low-level radioactive waste (LLRW) containers generated prior to offsite shipment. The facility can store up to 186 metal boxes, stage lined and unlined 30 gallon or 55 gallon metal drums with or without overpack, and stage closed wooden boxes that contain LLRW. The drums are stacked on pallets. The transition to the WSF was completed in June 1995. Building 22, constructed in 1967, previously housed a property management, office spaces, and a test facility for glove box operations.

Approximately 99 percent of the waste stored in the facility is low specific activity (LSA) or DOE non-regulated material. The waste includes combustibles, such as wipes and shoe covers, and noncombustibles such as tools, equipment, and sludges solidified in cement. The wastes do not contain liquids, Resource Conservation and Recovery Act (RCRA) hazardous materials, compressed gasses, etiologic chelating agents, or respirable fines. If tritium is stored, the contractor states that radiological controls provide airborne monitoring. If Pu-239 is stored, the quantity is to be maintained below 450 grams to meet criticality requirements (DOE-STD-1027-92).

Building 72

Building 72 is a steel-framed building used to store miscellaneous hazardous wastes generated at Mound until the wastes can be shipped off site for disposal. The wastes are contained in steel drums, plastic drums, plastic and steel containers of various sizes, and gas cylinders. Waste sampling, packaging, and repackaging of some wastes; drum over packing; and container inspection and marking are also conducted in this facility. The quantities of hazardous chemicals in the facility can be up to 13,000 gallons⁽⁵⁾.

“Mound Site Radionuclides by Location”, (Technical Manual MD-22153, Issue 1, 6-22-95), provides a detailed listing of the radionuclides used in each of the rooms for each of the buildings at the Mound. All radionuclides listed in this manual are ranked according to the degree of concern for uptake and the amount of activity for internal dosimetry considerations.

Current Mission

Because of the diversity of production operations at the Mound site, DOE developed a strategy whereby buildings and facilities were recycled to support emerging programs. For example, if it were deemed necessary to re-use a facility to support an emerging DOE program, Decontamination and Decommissioning (D&D) activities were conducted to recycle the facility. D&D activities took facilities to a “re-use” criteria which was different than a “restoration criteria”. If a building is no longer required by a DOE program, DOE must decide if the building is truly surplus to its needs. If the building is surplus, it can be offered to the private and commercial sector for re-use through the City of Miamisburg/Miamisburg Mound Community Improvement Corporation (MMCIC). Because the focus of this study involves post November 21, 1989 Remediation Worker activities, it is not within the scope of this study to address facilities re-use and ER activities that occurred prior to this date. Post November 21, 1989 Remediation Worker facilities re-use and ER activities will be addressed⁽³⁾.

Today, Mound’s mission includes the transitioning of Mound facilities to commercial use (primarily with leased facilities to the City of Miamisburg), and continued support of DOE’s Nuclear Energy programs⁽⁶⁾. Nuclear Energy programs includes assembly and testing of RTGs⁽⁷⁾.

Contaminants of Concern at the Mound Site

Mound site historical projects have included research and production of polonium-210 and plutonium-238, thorium and protactinium-231, radium-226 and actinium-227, and stable isotopes of noble gases such as helium, argon, neon, krypton, and xenon. Tritium recovery has been a large part of plant operations since the 1950’s and high levels of tritium within deteriorating glove boxes present a growing radiological threat. Starting in the early 1980’s, tritium research and development was performed as well as experimentation with metal tritides and deuterides such as uranium tritide and lithium tritide. Developmental studies with tritiated water and its handling were also done. Information relative to possible Remediation Worker exposures to tritides was not available to the Authors during the course of this study. Radioactive contaminants of greatest concern at the Mound are plutonium and thorium⁽⁸⁾.

MLM-MU-93-63-0003, “History of Mound Bioassay Programs,” H. Meyer, 9/92, documents every type of radioactive material used at the Mound, the type of measurements that were employed to monitor workers, and identifies the buildings in which radioactive materials were used.

Other contaminants of concern include asbestos, vials of waste xylene and waste oils, lead waste, liquid mercury, polychlorinated biphenyls (PCBs), and liquid corrosives⁽⁹⁾.

5.0 ASSIGNMENT OF POTENTIAL RELEASE SITES (PRS) TO REGULATORY AUTHORITIES

Mound 2000 Process

The Mound site doesn't conform to typical assumptions about the expanse of contamination at most Superfund sites. Rather than being dispersed over large areas, contamination at Mound occurs at small, separate release sites peppered across the facility. This pattern emerged after site personnel had completed reams of paperwork through the standard CERCLA remedial investigation/feasibility study (RI/FS) process. In 1995, DOE, the United States Environmental Protection Agency (USEPA), and Ohio EPA (OEPA) began using a modified Removal Site Evaluation (RSE) process, informally known as Mound 2000, to accelerate the cleanup and to involve stakeholders earlier in the process. As part of the Mound 2000 process, the original six Operable Units (OU) created at the Mound site to address site remediation goals during the RI/FS process were reexamined in light of preliminary characterization data and historical information⁽¹⁰⁾. An OU is "a discrete action that comprises an incremental step toward comprehensively addressing site problems. OUs may address geographical portions of a site, specific site problems, or initial phases of an action performed over time, or any actions that are concurrent but located in different parts of the site"⁽¹¹⁾.

The Mound 2000 process replaced the six OUs with 19 Release Blocks containing more than 400 Potential Release Sites (PRSs). Release Blocks were utilized as distinct geographic areas from which the associated worker activities, demographics, exposures, and technologies parameters of this study could be addressed. A PRS is a small area of concern where knowledge of historic or current use indicates that the site may be considered a Solid Waste Management Unit (SWMU) or has been identified as an area with potential releases of concern. SWMUs are defined areas associated with production processes at facilities which had become contaminated as a result of routine, systematic, and deliberate release of wastes or constituents, noting that a product could become a waste if it is discarded or abandoned (50 Federal Register 28702). The PRSs at the Mound can be grouped into five types of primary sources from which contaminants have entered or may enter the environment. These are:

- drums, tanks, and waste lines.
- landfills, the old cave, and other covered disposal sites
- retention basins/wastewater treatment system
- surface disposal sites
- operations or buildings

Approximately 200 PRSs are concerned with potentially contaminated soils, and the balance with potential contamination in buildings⁽¹²⁾. Each PRS is evaluated individually with a focus on remedial action, not study. If cleanup at a PRS is necessary, it is conducted through a CERCLA Removal Action (RA) instead of the much longer RI/FS process. If there is not enough information to determine if a given PRS poses a problem, the costs of collecting data are weighed against the cost of performing RAs at the PRS. The most cost-effective approach then becomes the method of choice for addressing PRS cleanup. A core team that includes one representative from DOE, USEPA, and OEPA guides the RSE process for each PRS. Drawing on the extensive RI/FS data already compiled for the operable units, this team assembles a small information packet on each PRS. Concise and to the point, the package is the basis for decision making. However, stakeholder involvement and documentation of the decisions are not compromised for the sake of speed. These information packets and the preliminary recommendations of the core team are distributed for public review and comment. Recommended response actions at a PRS may be modified based on public input. Final disposition of a site in the RSE process is documented through an Action Memorandum, rather than a Record of Decision. Thus, Mound 2000 fulfills the intent of CERCLA while tailoring the process to better suit its specific needs⁽¹⁰⁾.

Regulatory Framework For Evaluation of PRS's

The purpose of this section is to define the environmental regulatory program that is applicable to each PRS, if any; to identify the regulated units; and to assign each PRS to the ER Program Federal Facilities Agreement (FFA) or other regulatory authority, as appropriate. A regulated unit is defined in the FFA as a unit operating under conditions imposed by a regulation or permit by any federal or state regulatory body.

As an operating facility, Mound Plant maintains compliance with applicable regulatory programs. This section provides an initial determination of the Applicable or Relevant and Appropriate Requirements (ARARs) applicable to activities involving the PRSs. Compliance with both federal and state environmental regulatory programs is necessary in the ER Program FFA, as directed by the provisions of the FFA and to the extent required by CERCLA. The following subsections generally describe each of the regulatory programs evaluated for applicability to the PRSs at Mound Plant and their interactions with CERCLA activities. While other programs might also be applicable in some cases, the review was limited to the Atomic Energy Act (AEA), Resources Conservation and Recovery Act (RCRA), CERCLA, Clean Water Act (CWA), and Clean Air Act (CAA) and the corresponding Ohio programs, as appropriate. In discussing the regulatory programs, this section addresses only the assignment of the PRSs to the appropriate programs, and does not provide the requirements for site or equipment usage or their associated activities.

RCRA Hazardous Wastes

The Resources Conservation and Recovery Act (RCRA) of 1976, is the most complex and far-reaching regulatory statute. RCRA Subtitle C provides requirements for the management of hazardous wastes, as defined in 40 Code of Federal Regulations (CFR) Part 261 Subparts C and D of the Ohio Administrative Code (OAC). These requirements include standards for collection and storage of hazardous wastes.

In order to become subject to RCRA hazardous waste regulations, a site must first have been determined to contain hazardous wastes. Hazardous wastes may be identified by first establishing that the materials in question are solid wastes. Materials exempt from solid wastes are domestic sewage, CWA point source discharges (see subsection below), irrigation return flow, in-situ mining wastes, and SNM, source material, and product material, defined under the AEA. Once a waste has been identified, it must be evaluated by reviewing the lists of hazardous wastes presented in 40 CFR Part 261 Subpart D. If the waste is determined not to be a “listed hazardous waste,” it must then be assessed to determine if it exhibits what the EPA has defined as qualities or “characteristics” of a hazardous waste, as set forth in 40 CFR Part 261 Subpart C. Except where a waste is specifically excluded by the EPA, if it is found to be “listed” or “characteristic,” it must be managed in accordance with RCRA hazardous waste management regulations. Conversely, if a waste is determined not to be a hazardous waste, it is not subject to the hazardous waste management regulations, nor is the unit containing it (such as a tank) subject to hazardous waste management regulations.

It should also be noted that hazardous waste units must have been managed since 1980 to be subject to RCRA hazardous waste management regulations. Hazardous Waste Management Units (HWMUs, e.g., tanks) closed prior to 1980 are not subject to these regulations. However, there are RCRA requirements that do address old (pre-1980) waste units that may pose a threat to human health and the environment through releases of hazardous wastes or constituents. RCRA’s corrective action program requires corrective measures at SWMUs present at hazardous waste management facilities.

These requirements may be applied to former storage tanks from which hazardous wastes or constituents may have been released. Hazardous constituents are identified in 40 CFR Part 261, Appendix VIII. The corrective action provisions of RCRA are explicitly included within the jurisdiction of the FFA. Most of the PRSs considered in this document are not subject to RCRA hazardous waste requirements, either because they do not contain RCRA defined hazardous waste or because they fall into an excluded category. This reasoning is discussed further in the following paragraphs.

Many of the PRSs were described as containing either sanitary or alpha radionuclide-bearing wastewaters. In general, unless such wastewaters are hazardous wastes or mixed with hazardous wastes, these wastewaters would not be subject to RCRA hazardous waste requirements. There are several exclusions and exemptions for these materials or the units in which they are managed. For example, 40 CFR 261.4(a)(4) provides a solid waste exclusion from regulation for source, special nuclear or by-product material as defined by the AEA of 1954. Consequently, wastewaters that fit this exclusion are not solid wastes and therefore cannot be hazardous wastes subject to RCRA; however, if hazardous wastes are mixed with such wastewaters, the resulting wastes become subject to RCRA. An exemption in 40 CFR 264.1(g)(6) provides that wastewater treatment units are not subject to hazardous waste management regulations, including those applicable to hazardous waste tanks. A wastewater treatment unit is defined in 40 CFR 260.10 as:

“...a device which: (1) is part of a wastewater treatment facility which is subject to regulation under either Section 402 or 307(b) of the Clean Water Act; and (2) receives and treats or stores an influent wastewater which is a hazardous waste as defined in Section 261.3 of this chapter, or generates and accumulates a wastewater treatment sludge which is a hazardous waste.... or treats or stores a wastewater treatment sludge which is a hazardous waste...; and (3) meets the definition of tank in Section 260.10 of this chapter.”

It should be noted that the definition of “wastewater treatment unit” is a misnomer because it specifically includes tanks that collect and store wastewaters, in addition to those in which treatment takes place. Also defined in 40 CFR 260.10, a tank is “a stationary device, designed to contain an accumulation of hazardous waste which is constructed primarily of non-earthen materials....” Ohio regulations provide similar definitions in OAC 3745-50-10. Several of the PRSs (e.g., the 30,000-gallon, alpha-wastewater influent tanks at the Waste Disposal [WD] Building) can be defined as wastewater treatment systems which discharge pursuant to a National Pollutant Discharge Elimination System (NPDES) permit issued under Section 402 of the CWA. These systems are excluded from RCRA hazardous waste tank regulations.

Some wastewater treatment tanks (e.g., the 3,750-gallon, beta-wastewater influent tanks at WD Building Annex) are not part of a system which discharges pursuant to a NPDES permit issued under the CWA. Such wastewater treatment tanks would be subject to RCRA hazardous waste regulation if a RCRA-regulated waste was introduced into the system. A thorough review was previously conducted of all possible waste stream contributors to the alpha- and beta-wastewater treatment systems. No RCRA hazardous wastes were found being directed to these systems.

The RCRA hazardous waste requirements apply to hazardous wastes that must be identified as waste materials before being evaluated for hazardous waste determination. Most of the non-wastewater-related tanks are product tanks, such as the petroleum product Tank 118, and are therefore not subject to RCRA hazardous waste management regulations. If, however, a tank was closed with remaining product, the residual product may be considered a solid waste and, therefore, could be a hazardous waste, thereby making the tank subject to RCRA hazardous waste management regulations. In addition, contaminated media resulting from a leak of a product tank is considered hazardous waste and would be subject to RCRA regulations.

It is important to note that the State of Ohio has developed a hazardous waste regulatory program to implement the provisions of Subtitle C of RCRA. The Ohio program has been reviewed by EPA and was found to be at least as stringent as the corresponding federal program. Pursuant to its authority under Section 3006 of RCRA, EPA has authorized the State of Ohio to implement the hazardous waste regulatory program in lieu of USEPA.

As an operating facility, Mound Plant operates a hazardous waste treatment and storage facility under interim status. Several of the PRSs are currently active and are part of the routine plant operations. Eight of the PRSs are permitted as HWMUs and are included in the RCRA Part B permit application. Many of the PRSs are, however, considered satellite accumulation areas and, in accordance with 40 CFR 262.34, are not formally permitted, but are considered "permitted by rule" (i.e., their operations are regulated under RCRA). These areas (e.g., DS Building solvent storage shed) require closure under RCRA regulations, but are not required to comply with a closure plan. Although no closure reports are required, as a matter of good operating practice documentation of the closure of these areas is maintained as part of the operating record. Equipment that routinely utilizes hazardous materials (e.g., vapor degreaser) is considered a generator activity and is also subject to closure regulations under 40 CFR 262.34.

Mound Plant Active Underground Storage Tank Plan

The Mound Plant Active Underground Storage Tank (AUST) Plan provides the basis for the current Active UST Program at the Mound Plant. The program builds on the Mound Plant Underground Storage Tank (UST) Program Plan and Regulatory Status Review. As a result of a field survey and document review conducted in early 1994, 19 additional USTs, both inactive and in service, were identified and included in a draft report.

RCRA Underground Tanks

RCRA Subtitle I provides requirements for the management of USTs, as defined in 40 CFR Part 280. These regulations apply to any UST determined to contain a regulated substance. 40 CFR 280.12 defines a UST as:

“...any one or a combination of tanks (including underground pipes connected thereto) that is used to contain an accumulation of regulated substances, and the volume of which... is 10 percent or more beneath the surface of the ground....”

40 CFR 280.12 defines a regulated substance as:

“(a) Any substance defined in Section 101 (14) of... (CERCLA)... (but not including any substance regulated as a hazardous waste under Subtitle C), and (b) Petroleum, including crude oil or any fraction thereof....”

According to the above definitions, any underground tanks determined to contain regulated substances at Mound Plant are subject to 40 CFR Part 280. At Mound Plant, regulated substances found in USTs include radionuclide-bearing wastewater and petroleum substances (e.g., diesel fuel, fuel oil, etc.).

Some tanks found at Mound Plant are subject to certain exclusions or exemptions under the 40 CFR Part 280 regulations. Several tanks are considered to be excluded wastewater treatment tank systems, such as the 30,000-gallon alpha-influent tanks at the WD Building. As stated in 40 CFR 280.10(b)(2), “any wastewater treatment tank system that is part of a wastewater treatment facility regulated under Section 402 or 307(b) of the CWA” is excluded from regulation. Other tanks, such as the 3,750-gallon beta-wastewater influent tanks at the WD Building Annex, are subject to a limited deferral under 40 CFR 280.10(c), which states that any “UST systems containing radioactive material that are regulated under the AEA of 1954...” are subject to only the requirements of release response and corrective action. The State of Ohio, under a cooperative agreement with EPA, is authorized to clean up petroleum releases from UST systems or to require owners and operators to do so. USTs containing radioactive materials regulated under the AEA are currently exempted from Ohio UST regulations.

RCRA Subtitle I and the corresponding OAC 1301: 7-9 govern the management of USTs containing regulated substances, as discussed above. These regulatory programs dictate the management practices to be followed by Mound Plant personnel responsible for the operational use of such tanks.

CERCLA

The CERCLA was originally enacted in 1980 and was amended in 1986. CERCLA provides requirements for the cleanup of sites at which the presence of hazardous substances poses a threat or potential threat to human health or the environment. This federal law was primarily enacted to address sites where hazardous substances threaten the environment or the surrounding population because of hazardous substance releases (40 CFR Parts 300-311). As such, CERCLA generally differs from RCRA in that it addresses past management sites (pre-1980), for example, tanks that stored hazardous wastes but were closed prior to 1980. RCRA generally deals with more recent or active management sites (post-1980). Hazardous substances are listed in Table 302.4 of 40 CFR Part 300; a material is identified as a hazardous substance by being included on this table, and the term specifically excludes petroleum or any petroleum fractions.

It must also be recognized that the term “hazardous substance” has a significantly broader meaning in the FFA than in CERCLA. The FFA defines a hazardous substance as a substance including all CERCLA hazardous substances and any element, substance, compound or mixture, or combination thereof, including solids, liquids, semi-solids, or contained gases, and including oil and gasoline, that after release to the environment may result in exposure to any living organisms through any route of entry. Such exposure to a substance must cause or be reasonably anticipated to cause death, disease, behavior abnormalities, cancer, genetic mutation, physiological malfunctions or physical deformities in such organisms or their offspring, or pose a real or potential hazard to human health and safety or the environment. Unless otherwise specified, references to hazardous substances made in this document refer to those substances as defined in the FFA.

Neither CERCLA nor the FFA provide specific requirements for the management and closure of USTs and other PRS's. CERCLA and the FFA do provide for appropriate responses to releases of hazardous substances, as defined by the FFA, that pose a threat to human health or the environment. In operating its facilities at Mound Plant, the DOE fully intends to comply with applicable laws and regulations, including those that provide management and closure requirements.

In 1986, Congress passed the Emergency Planning and Community Right-to-Know Act (EPCRA), also known as Title III of the Superfund Amendments and Reauthorization Act (SARA). EPCRA, or SARA Title III requires states to establish state and local emergency planning groups to prepare for coordinated plans for responding to emergency releases of hazardous chemicals. The statute imposes numerous annual reporting requirements to ensure that state and local authorities are aware of the types and quantities of hazardous substances on facility premises, as well as the types and quantities of hazardous materials released to the environment from the facility. The statute requires facility operators to report immediately accidental releases to the environment of designated chemicals exceeding threshold amounts established by the EPA. Regulations under 40 CFR 302 establish a list of hazardous substances and reportable quantities and set forth the notification requirements for release of these substances. The regulation also establishes reportable quantities for hazardous substances under Section 311 (b)(A) of the CWA.

As an operating facility, Mound Plant maintains compliance with SARA Title III reporting requirements defined in 40 CFR 302.6⁽¹³⁾.

NOTE: Certain hazardous (chemical) substances were used in the day to day operations of the Mound during post production activities. Examples of such chemicals that are used include the use of chlorine as a disinfectant in the waste water treatment process and diesel fuel used in motor vehicle operations. Exhibit 8.2, page 88, presents a List of Chemicals Reported on the SARA Title III, 312 Report for 1995 for the DOE's Mound Facility⁽¹⁴⁾.

AEA/CERCLA Integration

The DOE has legal authority derived from the AEA [42 United States Code (USC) 2011] to conduct routine operations involving, among other things, underground tanks, equipment and other facilities. Routine operations include both the operation of currently active sites and the D&D of surplus sites. Environmental contamination may be known or may be discovered for both active and inactive tanks. The DOE has authority under the AEA to respond to any such contamination. Because the DOE has signed an FFA, it also has authority and responsibility derived from CERCLA and the FFA. The authorities of the AEA and CERCLA overlap, but the integration of overlapping authorities is explicitly recognized by CERCLA, and there is a criterion to determine how to apply authorities that overlap. A D&D/ER Program agreement defines the soil activity responsibilities between the two programs.

The AEA is the legal authority by which the DOE conducts its routine operations. These routine operations may result in either minor or major releases (as defined in 40 CFR 300.5 of the National Contingency Plan). Minor releases of hazardous substances are those that pose a minimal threat to the public health or welfare or the environment.

Typically, the DOE will use criteria such as its derived concentration guides for airborne contamination or its as low as reasonably achievable policy to determine whether a release was minor or major. The DOE can use its AEA authority to respond to minor releases. For major releases, the DOE has the authority under CERCLA to “take any appropriate removal action to abate, prevent, minimize, stabilize, mitigate or eliminate the release” [40 CFR 300.415(b)(1)].

Responsibility for addressing radioactive contamination, pursuant to the AEA at Mound Plant, rests with the D&D Program. This includes the responsibility for providing corrective actions for released radionuclides from underground tanks, soils and other facilities. Underground radionuclide tank sites are considered closed under the AEA when all radionuclide-contaminated materials (soils, etc.) have been removed to DOE thresholds.

Clean Water Act

Wastewater discharges are regulated under the Federal Water Pollution Control Act, as amended, also known as the Clean Water Act. The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the surface waters. This objective is achieved through the control of discharges of pollutants, including direct discharges to waters of the United States, indirect discharges to publicly owned treatment works (POTW) and discharges of dredge and fill materials to waters and wetlands of the United States. Under Section 404 of the CWA, waters of the United States are defined as:

“All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; all interstate waters, including interstate wetlands; all other waters such as intrastate lakes, rivers, streams, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds; all impoundments of waters; tributaries of waters above; the territorial sea; wetlands adjacent to waters above” (40 CFR 230.3).

Wetlands are additionally defined as:

“Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas” (40 CFR 230.3 and 33 CFR 328.3).

The CWA has distinct regulatory features that include site-specific pollutant limitations and performance standards promulgated for protection of surface waters quality (e.g., regulation of point and non-point source discharges to surface waters). Control of discharges is implemented through the application of Federal, state and local discharge standards. The CWA prohibits the unpermitted discharge of any pollutant or combination of pollutants to waters of the United States from any point source. A point source is defined as:

“... any discernible, confined and discrete conveyance, including, but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container... from which any pollutants are or may be discharged” (40 CFR 122.2).

A pollutant is defined to include:

“... dredged spoil, solid waste, incinerator residue, filter backwash, garbage, sewer sludge, munitions, chemical wastes, ... and industrial; municipal and agricultural waste discharged in water” (40 CFR 122.2).

All pollutants are regulated under the CWA according to their category, priority pollutants, conventional pollutants and nonconventional pollutants, as follows:

Priority pollutants: Include the 126 individual toxic pollutants contained in the 65 toxic compounds or classes of toxic compounds, including organics and metals adopted by EPA pursuant to Section 307(a)(1) of the CWA.

Conventional pollutants: Are classified as biochemical oxygen demand, total suspended solids, fecal coliform, oil and grease and pH pursuant to Section 304(a)(4) of the CWA.

Nonconventional pollutants: Include any pollutant not identified as either priority or conventional (i.e., ammonia, nitrogen, chemical oxygen demand, total organic carbon, total solids and nonpriority toxic pollutants) (40 CFR 122.21(I)(2)).

The NPDES program is the promulgated program for issuing, monitoring and enforcing permits for direct discharges to surface waters. The CWA established the NPDES program under Section 402 of the CWA to implement the regulations, limitations and standards promulgated pursuant to Sections 301, 304, 306, 307, 308, and 403 for point source direct discharges. The NPDES program is implemented under 40 CFR 122-125. NPDES permits contain applicable effluent standards (that are either technology based or waste-quality based), monitoring requirements and standard or special conditions for discharge. The NPDES program for the state of Ohio is administered by the OEPA under the Ohio Water Pollution Control Act (Ohio Revised Code 6111).

CWA Section 404 regulates the discharge of dredge and fill materials into waters of the United States, as implemented through regulations set forth in 33 CFR 320 through 330. Guidelines for discharge of dredge and fill materials are promulgated as regulations in 40 CFR 230.10. These regulations provide that no discharges of dredge or fill materials shall be permitted that will cause or contribute to significant degradation of the waters of the United States [40 CFR 230.10(c)]. The degradation or destruction of wetlands and other special aquatic sites should be avoided to the extent possible. Under the CWA guidelines [Section 404(b)(1)] no discharge of dredge or fill materials shall be permitted if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences [40 CFR 230.10(a)]. Pursuant to 40 CFR 230.10(b), no discharges of dredge and fill materials shall be allowed if the discharge:

- Causes or contributes to violations of any additional state water quality standard;
- Violates any applicable toxic effluent standard or discharge prohibition under CWS Section 307; or
- Jeopardizes endangered or threatened species specified under the Endangered Species Act of 1973.

As an operating facility, Mound Plant has an NPDES permit issued by the state of Ohio under the Ohio Water Pollution Control Act (ORC 6111). This permit establishes conditions of wastewater discharge from four onsite sources and two outfalls to the Great Miami river. Results of self-monitoring sampling and analysis are required to be submitted to the OEPA monthly. Summaries of the sampling are published annually in the Mound Plant environmental monitoring reports.

PRs include wastewater treatment tanks that discharge in accordance with the NPDES permit and tanks that do not discharge an effluent. PRs that are considered part of a wastewater treatment facility that discharges in accordance with Section 402 of the CWA are exempt from RCRA regulation, as discussed above. Although regulation under the NPDES permit establishes conditions of discharge, there are no provisions in the CWA for closure of the units after operations cease. Closure of units can be considered a normal part of routine operations and may be an appropriate response mechanism. DOE can respond to both releases and closures of wastewater PRs under its AEA authority. The DOE will apply the CERCLA criteria and respond to releases in the most timely and cost-effective manner.

PRs may also be regulated under the CWA as waters of the United States and as wetlands. Portions of the Miami-Erie canal, the plant drainage ditch and the onsite ponds are, on a preliminary basis, considered to be waters of the United States. Other PRs may be considered a wetland pending a jurisdictional determination from the U.S. Army Corps of Engineers.

The CWA regulations that may be considered ARARs under the CERCLA program at Mound Plant are the requirements for 1) surface water quality; 2) direct discharges to surface waters; 3) indirect discharges to POTWs; and 4) discharges of dredge and fill materials to waters of the United States, including wetlands. Onsite discharge from a CERCLA release site to surface waters must meet the substantive requirements, but need not obtain an NPDES permit nor comply with the administrative requirements of the permitting process, consistent with CERCLA Section 121(e)(1). An offsite discharge, however, from a PRS to surface waters is required to obtain an NPDES permit and to meet both the substantive and the administrative NPDES requirements. CERCLA activities considered to be direct discharges from a point source include:

- Onsite waste treatment where wastewater is discharged from a treatment plant directly into or in very close proximity to a surface water body through a discernible conveyance such as a pipe, ditch, channel, tunnel, or well;
- Off site treatment where wastewater from the site is piped or otherwise discharged through a discernible conveyance to an offsite surface water body; and
- Any remedial action in which site runoff is channeled directly to a surface water body through a ditch, culvert, storm sewer, or other means.

CERCLA activities considered to be direct discharges from a non point-source include unchanneled runoff from a site into a surface water body.

Under the CWA, all discharges by nondomestic users into a POTW must meet pretreatment standards. The purpose is to avoid the introduction of pollutants into municipal wastewater treatment plants that pass through, interfere with, or are otherwise incompatible with such treatment standards. Any discharge from a CERCLA site to a POTW is considered an offsite activity. It is, therefore, subject to both the substantive and administrative requirements of the national pretreatment program and all applicable state and local pretreatment regulations.

Clean Air Act

The Clean Air Act (CAA) establishes requirements for emissions into the atmosphere. Controls on stationary and mobile sources of emissions are implemented through combined Federal, state and local programs. Pursuant to the CAA, EPA promulgates National Ambient Air Quality Standards (NAAQS), National Emission Standards for Hazardous Air Pollutants (NESHAP), and New Source Performance Standards. Under Section 109 of the CAA, EPA promulgates the NAAQS under regulations 40 CFR Part 50. Primary and secondary standards are established to protect the public health and the public welfare, respectively. NAAQS promulgates six criteria pollutants: particulate matter equal to or less than 10 microns particle size, sulfur dioxide, carbon monoxide, ozone (which results from the photochemical oxidation of volatile organic compounds [VOCs]), nitrogen dioxide and lead. Pursuant to Section 107 of the CAA, the OEPA has the primary responsibility for assuring that NAAQS are attained and maintained in the state of Ohio.

Pursuant to Section 112 of the CAA, EPA promulgates the NESHAP under 40 CFR Part 61. NESHAPs identifies hazardous pollutants for which no ambient air quality standard exists. Hazardous air pollutants are those for which no ambient air quality standard exists, but which cause or contribute to air pollution that may reasonably be anticipated to result in an increase in mortality or in serious, irreversible, or incapacitating reversible illness. EPA first lists a pollutant as hazardous and then establishes emission standards for source types. NESHAPs are promulgated for specific source types that emit the following pollutants: arsenic, asbestos, benzene, beryllium, mercury, radionuclides, and vinyl chloride (40 CFR 61). Under 40 CFR 61 Subpart H - National Emission Standards for Emissions of Radionuclides Other Than Radon from DOE Facilities, EPA regulates specific radiation dose limits to the public.

Section 111 of the CAA requires EPA to promulgate standards for new sources of air emissions, referred to as New Source Performance Standards (NSPS). The purpose is to ensure the new stationary sources are designed, built, equipped, operated, and maintained in a manner that reduces emissions to a minimum. The CAA requires EPA to promulgate standards for categories of stationary sources that emit particular pollutants that cause, or may contribute significantly to, air pollution that may reasonably be anticipated to endanger public health or welfare. Pollutants regulated under NSPS for which EPA has promulgated neither NAAQS nor NESHAPs are referred to as designated pollutants. Emission controls are to be based on the best demonstrated technology, which is the degree of emission limitation achievable through the application of the best technological systems of continuous emission reduction that EPA determines by regulation has been adequately demonstrated, taking into consideration the costs of achieving such emission reduction, any air quality health and environmental impacts, and energy requirements.

As an operating facility, Mound Plant maintains permits to operate air contaminant sources under permits issued by the OEPA and the Regional Air Pollution Control Agency in accordance with OAC 3745-19-03(D). The permits for open burning establish conditions of control of operation, such as the total quantity of hazardous materials handled or the time of operation, but do not establish emission standards. There are no promulgated standards for particulate emissions from burning of explosives or the fire fighter training exercises. Emission limitations for particulates, sulfur oxide and volatile organic compounds are established by permit conditions.

Under 40 CFR 61. Subpart H - National Emission Standards for Emissions of Radionuclides Other Than Radon from DOE Facilities, Mound Plant is required to report to EPA the results of environmental monitoring and modeling of the effective dose equivalent to the public using the AIRDOS-EPA and CAP-88 computer codes. For Mound Plant, the radionuclides include tritium, plutonium-238, plutonium-239, uranium-238 and uranium-234. Emissions from 10 stacks are monitored and modeled, and the results are published annually in the environmental monitoring reports.

Although regulation under the permits establish conditions or limitations of discharge, there are no provisions in the CAA for closure of the units after operations cease. Closure of units may be required under RCRA for devices that process hazardous wastes. DOE may respond to closure of PRSs that did not include hazardous materials, as defined by RCRA, under its AEA authority for routine operations. As with other response actions, the DOE will apply the CERCLA criteria and respond to releases in the most timely and cost-effective manner.

Actions under CERCLA may be relevant or appropriate during remedial activities. Emissions from CERCLA activities are not generally considered “major sources” of air emissions and are therefore, not expected to qualify for attainment of NAAQS. Under Section 121(e) of CERCLA, substantive requirements will only apply to major sources of air emissions, considering the aggregate of all sources of emissions at the site. Regions of the United States have been designated as attainment or nonattainment areas for each of the criteria pollutants. The Prevention of Significant Deterioration (PSD) program promulgates requirements for attainment areas that apply to new stationary sources and major modifications in areas designated as being in attainment of the NAAQS for criteria pollutants. The purpose of the PSD program is to ensure that air quality in attainment areas does not significantly deteriorate. A CERCLA site would not be considered a major source unless it was expected to emit 25 tons or more of any regulated pollutant. An area may be designated non-attainment for any of the NAAQS. Non-attainment permits are issued by the state. A CERCLA site would not be considered a major source unless it was expected to emit 10 tons or more per year (t/yr) of the pollutant for which the area is designated non-attainment. Pollutant limits are reduced to 50, 25, and 10 t/yr in areas determined to be serious, severe, and extreme, respectively. Smaller sources are designated under the CAA of 1990 as “area sources”. Attainment and non-attainment areas are designated in 40 CFR 81. Montgomery County, Ohio, is designated non-attainment for ozone (40 CFR 817-1-91). Montgomery County does not meet the primary standard for total suspended particulates, but is better than the national standard for sulfur dioxide (40 CFR 817-1-91).

During CERCLA activities, the requirements in 40 CFR 61 Subpart H, may be applicable to emissions of radionuclides. The current standard (10 millirem/year effective dose equivalent) must be maintained during CERCLA activities, but would not be relevant for air emissions from residual contamination after cleanup (when the facility is no longer in operation) as the standards were developed to limit radiation doses caused by operations that yield a beneficial product. The relevance of Subpart H must consider the aggregate of all source emissions at the site, including operations D&D and CERCLA activities.

The CAA amendments of 1990 added paragraph (r) to section 112 for the prevention of chemical accidents. The goals of the chemical accident prevention provisions are to focus on chemicals that pose a significant hazard to the community should an accident occur, to prevent their accidental release, and to minimize the consequences of such releases. Section 112(r) establishes a general duty for owners and operators of stationary sources, who produce, process, handle, or store substances listed under Section 112(r)(3) and any other extremely hazardous substances, to comply with and perform specific activities to prevent and mitigate accidental releases. The general duty requirements apply to stationary sources regardless of the quantity of substance managed at the facility, as a general matter of business practice. On January 19, 1993, EPA proposed a list of 100 acutely toxic substances, 62 flammable gases and volatile flammable liquids, and high explosives (List of Regulated Substances and Thresholds for Accidental Release Prevention; Requirements for Petitions under Section 112(r) of the CAA as Amended, Federal Register, Vol. 58, 1/19/93. pp 5102-5125).

The list, when final, will identify stationary sources that will be covered by the chemical accident prevention regulations subsequently adopted under Section 112(r). The list is intended to focus accidental release prevention efforts on those stationary sources and substances that pose significant hazards to the community in keeping with EPCRA. The accident prevention regulations will apply to stationary sources that present more than a threshold quantity of a regulated substance.

In reviewing the proposed list and the proposed threshold quantities, it is apparent that Mound Plant does not operate or manage facilities with quantities of substances near to exceeding the quantities listed. Radionuclides were not included in the proposed list, but EPA additionally requested information to determine the need and appropriateness of listing radionuclides under the proposed rule making.

Safe Drinking Water Act

The Safe Drinking Water Act (SDWA), as most recently amended in 1986, establishes regulations to protect human health from contaminants in drinking water. Under the SDWA, the EPA has established 1) drinking water standards; 2) a permit program for underground injection of wastes; and 3) groundwater protection programs, including the Sole Source Aquifer Program and the Wellhead Protection Program. Enforcement of standards is authorized to state environmental agencies.

Drinking water regulations are promulgated under 40 CFR 141-149. The drinking water regulations are applicable to community water systems that serve at least 25 people on a year round basis and 15 or more service connections. EPA has developed two sets of standards, referred to as the primary and secondary standards, to protect human health and ensure the aesthetic quality of drinking water, respectively. National primary standards (40 CFR 142) consist of contaminant-specific standards known as maximum contaminant levels (MCLs). MCLs are set as close as feasible to maximum contaminant level goals (MCLGs), which are purely health-based goals. MCLs are enforceable standards that apply to specific contaminants that EPA has determined to have adverse effects on human health above a given level (40 CFR 141.11-141.16). MCLGs are non-enforceable health-based goals established at levels at which no known or anticipated adverse effects on the health of persons will occur and which will allow an adequate margin of safety. No feasibility of attainment is considered for MCLGS.

To date, MCLs are promulgated for 90 specific chemicals (24 inorganics and 66 organics including pesticides, total trihalomethanes, certain radionuclides, coliform bacteria and turbidity). Sixty-eight MCLs are considered final, 15 are proposed, and the remaining are tentative. All radionuclides are proposed and are not final. MCLGs are proposed for 62 additional organic and inorganic contaminants (40 CFR 141.50). If the MCLG is equal to zero, the EPA believes that it is not appropriate to set cleanup levels and the corresponding MCL will be the potential applicable or relevant and appropriate requirement (ARAR). The Drinking Water Regulations and Health Advisories are published semiannually by the EPA, Office of Water, Washington, D.C.

Secondary drinking water regulations consist of secondary maximum contaminant levels (SMCLS) for specific contaminants or water characteristics that may affect the aesthetic qualities of drinking water such as color, taste, and odor (40 CFR 143). SMCLS are non-enforceable limits intended as guidelines for use by states in regulating water supplies. They are typically measured at the tap. EPA has proposed a list of 15 contaminants to be used as guides for public water systems, including chloride, copper, corrosivity, fluoride, aluminum, iron, manganese, zinc, silver, sulfate, odor, color, ph, and total dissolved solids.

Underground injection wells are subject to control under the Underground Injection Control Program (UIC). Under the UIC program (40 CFR 144), owners and operators of certain classes of underground injection wells are required to obtain and adhere to the requirements of operating Permits issued by the State authority. The operator must prove to the permitting authority that operation of the injection well does not endanger drinking water sources.

According to 40 CFR 146.43, an underground source of drinking water is defined as;

“any aquifer or its portion that 1) supplies any public water supply or contains a sufficient quantity of water to supply a public water system, and currently supplies drinking water for human consumption or contains fewer than 10,000 milligrams per liter total dissolved solids, and 2) is not an exempted aquifer according to 40 CFR 146.4.”

An aquifer that is not currently used for drinking purposes, and cannot be used for drinking purposes in the future due to insufficient yield or excessive contamination, may be officially designated an “exempted aquifer” by EPA or the authorized State agency (subject to EPA approval) (40 CFR 146.4).

Underground injection wells are divided into five general classes of wells for permitting purpose. The State of Ohio program is outlined in 40 CFR 147.1801. The applicable UIC technical and procedural standards and criteria vary according to the class of well. The five classes are defined as:

- Class I: Wells used to inject industrial hazardous and municipal wastes beneath the lowermost formation containing, within a quarter mile of the well bore, an underground drinking water source.
- Class II: Wells used to dispose of fluids which are brought to the surface in connection with oil and gas production, to inject -fluids for the enhanced recovery of oil and gas, or to store liquid hydrocarbons.
- Class III: Wells used to inject fluids for the extraction of minerals.
- Class IV: Wells used to inject hazardous wastes or radioactive wastes into or above a formation that, within one-quarter mile of the well, contains an underground drinking water source. Operation or construction of Class IV wells is prohibited and allowed only for the reinjection of treated wastes as part of a CERCLA or RCRA remedial action.
- Class V: Includes all wells not incorporated in Classes I-IV. Typical examples are recharge wells, septic system wells, and shallow industrial (non-hazardous) disposal wells.

Mound Plant does not have any injection wells. Of the five classes of injection wells, Classes I, IV and V may generally be associated with CERCLA actions. For example, a CERCLA site cleanup could involve the reinjection of wastewater that is not defined as hazardous (i.e., the wastewater would not meet the definition of hazardous waste) to a Class V well. For the purposes of the UIC Program, hazardous waste is defined in 40 CFR 264.3.

Under Section 1424(e) the SDWA permits EPA to designate as “sole source aquifer,” aquifers that are the sole or principal source of drinking water for an area, and which, if contaminated, would present a significant hazard to human health. Criteria for identifying critical protection areas is presented in 40 CFR 149 Subpart A. Under the Sole Source Aquifer Program, Federal financial assistance may not be committed for any project that may contaminate a sole source aquifer so as to create a significant public health hazard. Federal funding may, however, be committed to design a project to avoid contamination of the aquifer.

The 1986 amendments to the SDWA directs States to develop and implement programs to protect wells and recharge areas that supply public drinking water from contaminants that flow into the well from the surface and subsurface. The EPA was instructed to implement guidance and to review State programs to ensure that they comply with the provisions of the SDWA, including the identification of all anthropogenic sources of contaminants, outlines of programs for protecting wells from such contaminants, and description of contingency plans for replacing wells affected by contaminants.

Because the Well Head Protection (WHP) program is designed to be run by the states, the program involves no federal ARAR provisions. State WHP programs may impose requirements with which a federal agency must comply, unless specifically exempted by the President. Thus, there may be ARARs under the State WHP program with which CERCLA response actions must comply.

In Ohio, the SDWA requirements are enforced by the OEPA Division of Drinking Water and Groundwater. The Mound Plant water supply is considered a non-transient non-community water system because it has fewer than 15 service connections with year round service, but regularly serves over 25 persons over six months per year. Monitoring requirements are established by USEPA and enforced by OEPA. DOE Order 5400.1 additionally requires an Environmental Monitoring Plan that demonstrates compliance with all applicable federal, state and local regulations. A Groundwater Protection Management Program Plan for the Mound Plant was implemented in 1990. This plan establishes the schedule, monitoring network, constituents required or identified to be monitored, sampling methods, analytical methods and data management. Results of monitoring for tritium and VOCs are published annually in the Mound Plant Environmental Monitoring Report.

In May 1990, the OEPA presented a comprehensive bill to the Ohio legislature for implementation of the WHP Program, but the legislation failed to pass. The program is currently being implemented across the state on a voluntary basis by public water purveyors. The Ohio WHP Program consists of six elements, as follows:

- Delineation of the WHP area using the method most applicable to the type, setting, and resources of the public water system.
- Identification of potential pollution sources by determination of the past, present, and proposed land use activities in and adjacent to the WHP area.
- Development of management strategies that initiate policies and procedures to prevent contamination of present or proposed water supplies from the identified potential sources.
- Development of a groundwater monitoring plan that will adequately determine the need for monitoring and will provide early warning if implemented.
- Development or modification of contingency plans for emergency response and identification of alternative short- and long-term water sources.
- Development of public involvement and education programs to inform and allow participation by the public in planning efforts.

Many of the elements of the Ohio WHP Program are being addressed by monitoring conducted under the FFA. The Groundwater Protection Management Program Plan is under evaluation for implementation of elements not currently being conducted by the ER Program.

The Buried Valley aquifer from which Mound Plant obtains its drinking water was designated as a sole source aquifer on July 8, 1983 (53 Federal Register 25670). The Mound Plant production wells, as well as many of the monitoring wells, are completed in the Buried Valley aquifer. Construction details are included in the Site Scoping Report: Volume 2 - Geologic Log and Well Information Report. A review of existing contamination is given in the Operable Unit 9 Site-Wide RI/FS work plan. Releases from the Historic Landfill have contaminated the Buried Valley aquifer with VOCs. Under CERCLA, MCLs are relevant and appropriate as in-situ cleanup standards where either surface water or groundwater is or may be used for drinking purposes. In general, CERCLA remedial actions would not in and of themselves be expected to increase pre-existing contamination of sole source aquifers. It is therefore unlikely that there would be federal funding restrictions. Nevertheless, a review of any potential problems associated with the Buried Valley aquifer should be part of the Mound Plant RI/FS.

Through the efforts of the Potable Water Standards Project (Dames and Moore 1976a; Styron and Meyer 1981) and the Buried Valley Aquifer Evaluation Project (Dames and Moore 1976b), tritium levels emanating from PRSs in the Buried Valley aquifer have been maintained in compliance with regulatory standards (40 CFR Part 141). As a follow-up to these projects, Mound Plant monitors tritium levels in the groundwater in the vicinity of the plant production wells on a weekly basis to maintain compliance as a non-public potable water supply under the SDWA. Sampling of an off-site abandoned Miamisburg production well is conducted at least monthly. When the tritium contamination exceeds the standard of 20 nCi/L, the well is pumped until concentrations are below 10 nCi/L. The discharge is routed through a closed pipeline to the Great Miami River to NPDES outfall 001. Historic data are discussed in Operable Unit 9 Site-Wide RI/FS work plan. Monitoring data are published annually in the Mound Plant Environmental Monitoring Report⁽¹³⁾.

Toxic Substances Control Act (TSCA)

The goal of the Toxic Substances Control Act (TSCA) of 1976 is to protect human health and the environment from unreasonable risks associated with toxic chemical substances. The Act gave the U.S. EPA authority to govern the manufacture and use of chemicals deemed to present significant toxicity risks. Mound does not generate TSCA waste streams on a regular basis. However, efforts continue at Mound to remove TSCA wastes associated with past practices. The two primary areas comprising this category of Plant wastes are polychlorinated biphenyls (PCBs) and asbestos.

PCB's.

PCB-contaminated materials that are not suspected of being radioactive are stored on-site pending their shipment to an EPA-approved facility for disposal. "Suspect" PCB wastes are retained on-site for waste characterization. Radioactively contaminated PCB wastes are also retained on-site. Because no disposal options are currently available for TSCA mixed wastes, they have been stored on-site in excess of the time limitations imposed by the Act. Disposal options are currently being explored for PCB contaminated mixed waste.

Asbestos.

The use of asbestos in pipes, panels, and as an additive to diallyl phthalate in parts production, has been discontinued at Mound. Residual asbestos is handled, packaged, and shipped offsite to an approved disposal facility in compliance with TSCA regulations.

Asbestos removal projects continue in connection with building renovation activities. All such projects are carefully monitored by the Industrial Hygiene Section to ensure compliance with TSCA and Mound's Safety and Hygiene Manual⁽¹⁵⁾.

Agency for Toxic Substances and Disease Registry (ATSDR)

It is a requirement of CERCLA that the ATSDR evaluate each site listed on the NPL. The Agency examines health data to seek out abnormal rates or types of illnesses. If any such problems are suspected, the Agency attempts to determine if a correlation exists between the illness and the site. Presently, ATSDR staff do not recommend conducting further Mound worker studies because they have not identified any public health issues that such studies might address⁽¹⁶⁾.

Assignment of PRSs to Regulatory Authorities

Mound Plant is an operating facility and has numerous processes and process units that it uses to perform its mission. In using these processes/units, Mound Plant maintains compliance with applicable regulatory programs, including facilities, equipment and tank maintenance, as well as monitoring, upgrade and closure activities. In general, nearly all of the PRSs at Mound Plant contain or have contained hazardous substances. Any releases of these hazardous substances that could threaten human health and the environment are subject to the jurisdiction of the FFA, which requires CERCLA compliance for all such releases. This jurisdiction does not specifically include the management or removal/closure of sites, but does include the investigation and remediation of sites that have released or may have released hazardous substances that may pose a threat to human health and the environment.

If hazardous substances were released from a site or were suspected to have been released, CERCLA could require any necessary investigation or remediation to mitigate the actual or potential hazards posed by the substances. In requiring investigation or cleanup of hazardous substances areas, CERCLA would mandate compliance with all ARARs that affect the specific investigation or cleanup activities and the hazardous substances involved. For example, if cleanup involved the excavation of a hazardous substance that could be identified as hazardous waste, CERCLA could require compliance with RCRA regulations.

The complex interaction of the CERCLA RI/FS at Mound Plant within an operational facility requires an integration of effort for active units that may require remedial actions for historic activities, as well as closure activities for units currently in service, but which may be inactivated during the period of performance of the FFA. Any releases of hazardous substances that could threaten human health and the environment are subject to the jurisdiction of the FFA, which requires CERCLA compliance for all such releases. However, DOE and EPA believe corrective action at Mound Plant should be taken under whatever authority allows for the most expeditious or economical cleanup while maintaining effective coordination and consistency (e.g., cleanup standards) among the different authorities. This is consistent with the National Contingency Plan that states that the availability of other appropriate federal or state response mechanisms shall be considered in responding to a release (40 CFR 300.415). Therefore, DOE has determined that releases from operational or active PRSs will be addressed under an applicable statutory or regulatory program, rather than the FFA. Operational PRSs are those that are currently subject to regulatory control as active management units. These sites will continue to be subject to regulatory control other than the FFA until the applicable compliance period is over, usually when the system is properly closed. Accordingly, the FFA will be applied to PRSs after the sites are closed. Exhibit 8.3, page 89, "Regulatory Authorities for Release Response," summarizes the regulatory authorities for release response. Releases from PRSs assigned to the ER Program will be subject to response under the FFA. For PRSs where there is no reason to believe hazardous substances as defined by the FFA have been released to the environment, the DOE believes the sites are not subject to the FFA or CERCLA.

The methodology for determining whether a PRS is assigned to the ER Program or another regulatory authority is adopted directly from the strategy developed for the Mound Plant UST Program Plan and Regulatory Status Review. The status for any PRS can be followed through a flow diagram to establish the appropriate authorities for operation, spill response, remedial investigation (if any), and closure authority. The decision tree also distinguishes between sites that are active and still operational, but may require a response to current spills, as well as historic releases⁽¹⁷⁾.

Table A.2, "Assignment of Regulatory Authorities to Potential Release Sites and Recommendations for Further Action," in Appendix A of the Operable Unit 9, Site Scoping Report- Final, Vol. 12- Site Summary subdivides PRSs into in service, inactive, surplus, grounds, and historical. Also provided in Table A.2 of the OU 9 Site Scoping Report are regulatory drivers associated with each PRS and recommendations for further remedial action⁽¹⁸⁾. In service are those PRSs that are now active and operational and part of Mound operations (e.g., Building 72 Hazardous waste storage). Inactive are those PRSs that are still in existence but not currently operational, but that may become operational again or may be declared surplus at some time in the future (e.g., glass melter furnace is not currently operational, but is in standby awaiting RCRA Part B permit approval). Surplus are those PRSs that still physically exist, but are not required for future operations (e.g., Building 27 leach pit, sump, concrete flume and filtration system). Grounds are those PRSs that are part of the facility grounds and are not considered restricted access areas or have been declared surplus. Historical are those PRSs that no longer exist in the form in which they were active, i.e., areas or facilities that have been modified or removed (e.g., lithium burn area, the area now occupied by Building 34 and other structures)⁽¹⁷⁾.

Exhibit 8.4, page 90, (Table A1 of the OU 9 Site Scoping Report) presents a "Comprehensive Tabulation of Potential Release Sites," as presented in Table A.1, Appendix A, of the Operable Unit 9, Site Scoping Report- Final, Vol. 12- Site Summary Report. This exhibit provides a listing and location of each PRS, potential hazardous substances associated with each PRS, and hazardous conditions and incidents (releases), where applicable, attributed to each PRS⁽¹⁸⁾.

PRSs that are still active and in service may require corrective actions in response to a spill or release as a result of upset of operations. As shown in Table A.2 of the OU 9 Site Scoping Report, routine emissions may be regulated under the CWA or the CAA, but releases to the environment beyond routine operations, such as the overflow of a tank onto surrounding soil, may require a response under the AEA authority. In the case of units regulated by RCRA, for example, the corrective actions will be conducted under that authority. If the threat of the release is large enough, no response under other authorities may be appropriate and CERCLA may respond. Under Title III of SARA, CERCLA may be the appropriate response to spills or other releases of significant consequences. Although not stated explicitly in Table A.2 of the OU 9 Site Scoping Report, SARA Title III is inherently part of the plant response to environmental releases as part of operations. In general, response under the FFA is not appropriate for releases from currently operational activities. PRSs that are appropriately managed by plant operations are assigned to operations and maintenance. PRSs such as the powerhouse fuel tanks are assigned to the Mound Plant AUST Program for further remedial action. Operable Unit assignments are not appropriate for PRSs that are to be maintained by Operations and Maintenance. If it is evident, however, that a release is due to historic practices, such as the B-Building solvent storage shed, the appropriate response authority is the FFA. The PRS may or may not remain active through this process⁽¹⁷⁾.

The assignment of tanks in Table A-2 follows exactly the assignments approved in the Mound Plant UST Program Plan and Regulatory Status Review. Tanks assigned to the AUST Program include active tanks, inactive tanks that are not surplus, and inactive tanks that have not been closed. A “closed UST system” is defined as a tank and its associated piping that have been closed in accordance with the statutory and regulatory requirements applicable to the tank. For tanks subject to RCRA or Bureau of UST Regulation, there are well-defined closure requirements that must be met. For tanks subject to the AEA, the DOE considers the systems closed when the D&D Program has completed its cleanup activities. D&D activities such as inerting a tank by filling it with concrete or sand are intended to serve as interim measures to allow reuse of an area or to minimize the release of any radiological constituents that may be present in AEA tanks. Tanks for which such interim D&D measures have been taken are not considered “closed UST systems.” For tanks whose effluents are subject to regulation under the CWA, spill response and closure requirements are not defined, so the authority reverts to the AEA and the policy for DOE to operate in an environmentally safe manner. DOE will consider such CWA systems to be “closed UST systems” when the systems are cleaned and taken out of service, and are not intended to be returned to service. In order for a tank system to be considered a closed UST system, the system must not be part of a building structure that is currently in use (e.g., tank that is a part of the interior floor of the building), or exhibit evidence of a release from the system that may pose a threat to human health or the environment. Where evidence of a release exists for tanks that are part of a building structure, the DOE will investigate and remediate the release as appropriate.

Since some of the active PRSs may exhibit evidence for a historic release that is appropriately responsive under the FFA, evidence of historic release was evaluated from data compiled in Exhibit 8.4, page 90. These data included review of records of the Mound Plant safety office, health physics records, personnel interviews and other data used to compile the scoping report. The appropriate authority for response to historic releases may be either CERCLA under the FFA, or the D&D Program under the AEA. In those cases where the appropriate response is CERCLA under the FFA, assignment is made to an operable unit according to the geographic location of the PRS. For the cases where the appropriate response is the AEA, no operable unit assignments are made unless the site is currently scheduled as part of former Operable Unit 6, but recommendations are made that the PRS be evaluated and incorporated into the D&D program. At the point in time when the contaminated soil areas are scheduled for D&D cleanup, verification is still required by CERCLA⁽¹⁷⁾.

Identification of Solid Waste Management Units

A requirement of the FFA, in addition to all regulated units and all areas suspected of contamination, is the identification of all SWMUs. Table A.2 of the OU 9 Site Scoping Report lists all PRSs that should be considered SWMUs. This list includes all SWMUs identified in the RFA as well as additional sites identified since that inspection. A total of 134 SWMUs are identified in accordance with the definition. The increase from the 86 identified in the RFA is due to increased detail of the sanitary waste lines, increased recognition of the number of units within the WD treatment facility, and newly identified solvent storage facilities.

Potential Release Sites Recommended For No Further Action

For PRSs where there is no reason for the DOE to believe hazardous substances have been released to the environment, the DOE believes the PRS are not subject to the FFA or CERCLA, but are subject to regulatory programs such as the AEA and RCRA. When a release of a hazardous substance as defined by the FFA is found or suspected, the DOE will respond as directed by the FFA, RCRA, the Toxic Substance Control Act, etc., to ensure that human health and the environment are protected. Table A.2 of the OU 9 Site Scoping Report tabulates PRSs that are recommended for further remedial action. The list of PRSs recommended for No Further Action (NFA) includes PRSs that have no evidence of release or exhibit evidence of minor release that are of such a nature that they pose no threat to human health or the environment. Table A.2 of the OU 9 Site Scoping Report presents evidence of release (yes or no) and further action recommended (yes or no) data relative to PRS Historic Activities. Where PRSs are designated NFA, operable unit assignments are made for administrative purposes only. As required by the FFA, additional evaluations of the PRSs recommended for NFA will be documented in the RI work plans, as appropriate.

Relative to anticipated operational activities, T-Building presents a unique situation. Constructed in the late 1940's for atomic materials production, T-Building was built underground for defense purposes. The entire building is made of reinforced concrete including the floor, which is 10 ft thick. All of the 22 USTs in T-Building were formed in the concrete floor when the building was constructed. For this reason, T-Building USTs are not considered to be potential release sources. Any piping or other ancillary equipment external to T-Building may represent a threat of release and will be investigated, as appropriate.

Site Conceptual Model

The site conceptual model was developed during the initial scoping phase of the remedial investigation and represents an initial environmental assessment of Mound Plant. The former Operable Unit 9 site-wide remedial investigation work plan presents specific conceptual models developed for each operable unit. The models include the identification of primary and secondary sources, primary and secondary release mechanisms, predicted pathways and potential receptors. The Operable Unit 9 site-wide RI work plan also presents a description of the community surrounding Mound Plant including demography, groundwater and surface water use and land use.

As stated earlier, the PRSs at Mound Plant can be grouped into five types of primary sources from which contaminants have entered or may enter the environment. Each of these primary sources may have contaminated surrounding soils through primary release mechanisms that include spills or leaks, leaching, infiltration, overflow, and runoff. These primary releases may lead to contaminated soil as a secondary source for further contaminant releases and potential exposures. The comprehensive tabulation of PRSs in Exhibit 8.4, page 90, includes data on the anticipated contaminants and hazardous substances at each PRS, releases from each to the extent known and the currently available environmental data at each PRS.

Contaminated soil represents a potential direct route of exposure to humans and biota through incidental ingestion, dermal contact, and direct radiation. Secondary routes of exposure may occur due to uptake by plants, resuspension of dust, vapor transfer into the air, and surface and groundwater contamination. Both flora and fauna may incorporate contaminants from soil and may provide a route of exposure to humans and other terrestrial biota through ingestion. Descriptions of Mound Plant geology, pedology, hydrogeology, physiology, hydrology, water quality, meteorology, and air quality are presented in the Operable Unit 9 site-wide RI work plan.

Air exposure pathways result from contaminated soil that may be resuspended into air by the natural action of wind or by actions of man. Activities such as plowing and other agricultural field work can raise significant amounts of dust, as can such current activities as vehicle traffic, construction, and mowing. Additionally, certain contaminants such as volatile organics, tritium, or radon may directly enter the breathing zone. These vapors or gases may pass through an environmental medium first (e.g., soil), or they may enter air directly from the source.

Groundwater can become contaminated by the leaching and further percolation of hazardous material from contaminated soil. Contamination in the groundwater represents potential exposure pathways, including ingestion, inhalation, and dermal contact, from use of current onsite and offsite wells and from hypothetical future development of onsite residential wells. Terrestrial biota are not considered receptors in this scenario since they do not have access to groundwater from anthropogenic sources. Surface water and associated sediments can become contaminated as a result of runoff and erosion from areas of contaminated soil, from seepage of contaminated groundwater, or historically from direct spills and effluent releases. Surface water exposure routes to be considered include ingestion of fish that have fed in contaminated areas, incidental of sediment, dermal contact with surface water and sediments, direct radiation from contaminated sediments and canal banks, and ingestion of livestock (beef and milk) watered with contaminated surface water.

Potential exposure routes for terrestrial biota are ingestion of contaminated surface water, including water from seeps, and ingestion of biota from contaminated surface water. Exposure of aquatic biota can occur through contact with contaminated water and sediments and through bioaccumulation from other organisms lower in the food chain.

PRS/Regulatory Drivers Conclusion

Through a systematic investigation of the points of current and historic waste handling and contaminant emissions, 325 potential releases sites are identified. These include regulated units, SWMUs and other areas of suspected contamination. Details of each site are tabulated in Exhibit 8.4, page 90, (Table A.1 of the OU 9 Site Scoping Report) and Table A.2 of the OU 9 Site Scoping Report. Not all of the 325 PRSs will be addressed by the ER Program. As Mound is an operating facility, other laws and regulatory programs are relevant and applicable. The complex interaction of the CERCLA RI/FS at Mound Plant within an operational facility requires an integration of effort for active units that may require remedial actions for historic activities, as well as closure activities for units currently in service, but which may be inactivated during the period of performance of the FFA. Any releases of hazardous substances that could threaten human health and the environment are subject to the jurisdiction of the FFA which require CERCLA compliance for all such releases. However, DOE, EPA, and OEPA believe corrective action at Mound Plant should be taken under whatever authority allows for the most expeditious or economical cleanup, while maintaining effective coordination and consistency (e.g., cleanup standards) among the different authorities. Therefore, DOE has determined that releases from active PRSs will be addressed under an applicable statutory or regulatory program rather than the FFA.

Exhibit 8.5, page 139, lists the PRSs recommended for inclusion into the ER Program. The PRSs listed include those recommended for further remedial action, as well as those recommended for NFA.

Exhibit 8.6, page 140, lists the PRSs recommended for exclusion from the ER program as they are currently in service or are inactive and may be reactivated. The further remedial action recommended is that facility operations and maintenance provide for the proper administration and closure of these facilities. Two PRSs (the cooling tower basins and Building 28 solvent storage shed) are currently in service, but exhibit evidence of release that will be addressed under the FFA.

Exhibit 8.7, page 141, lists the PRSs currently in the D&D Program and those recommended for inclusion into the D&D Program⁽¹⁷⁾.

6.0 MOUND SITE ENVIRONMENTAL MANAGEMENT PROGRAM

The Office of Defense Programs has transferred all Mound's production activities to other DOE sites and transferred landlord responsibilities to Environmental Management. The current mission for the Environmental Management program at Mound is to "make Mound real property, equipment and facilities available for development as a commercial industrial site as safely, economically and timely as possible." This mission includes extensive ER, transitioning select Mound facilities for commercial use, and continued waste management support for the DOE Office of Nuclear Energy as its mission at the site comes to an end⁽¹⁹⁾.

Nuclear Material and Facility Stabilization Program

The Nuclear Material and Facility Stabilization program is responsible for transitioning all 132 buildings at the Mound Plant. This program includes stabilizing and deactivating facilities to reduce the recurring costs associated with maintenance, record keeping, and maintaining inventories that are no longer required by the DOE. When facilities or assets are declared surplus, the building is assigned to the Nuclear Material and Facility Stabilization program, and a survey of the liability, usefulness, and contamination levels is performed. This estimate assumes that 69 buildings will require stabilization actions. During this phase of the process, removal of excess inventory and equipment occurs. If the building or adjacent area is contaminated, it will transfer to the ER Decommissioning program.

This estimate also assumes that approximately 38 buildings will require decommissioning. After decommissioning, the facilities will transfer back to Nuclear Material and Facility Stabilization where their ultimate disposition will be determined. Approximately 55 buildings will be transferred to the MMCIC for lease. The remainder will be dismantled or demolished. Modular buildings and trailers will be sold and removed from the site.

The dispositioning of excess energetic components and materials, excess inert components, and excess chemicals in the nonradiological areas were complete at the end of FY 1995. Radiological materials are scheduled to be removed by FY 2000; however, the Department is studying options to accelerate that date. After the removal of chemicals and ancillary equipment the Department will transfer buildings with either facility or surrounding media contamination to the ER decommissioning program⁽⁶⁾.

Environmental Restoration Program

The Environmental Restoration Program at the Mound oversees remediation of soils and ground water, facility D&D, and associated environmental monitoring⁽⁹⁾. These activities include removing contaminated soils associated with a building or process system, and decommissioning underground tanks and piping previously involved with nuclear operations.

Waste Management Program

The Waste Management Program is responsible for disposing of waste generated by the ER program remedial actions and D&D activities. In addition, the Waste Management program receives, on an intermittent basis, chemical waste generated from the safe shutdown activities performed by the Nuclear Material and Facility Stabilization programs. The principal waste types at the Mound Plant are LLRW, hazardous chemical waste from laboratories, sanitary waste, and small amounts of low-level mixed waste (LLMW) and TRU waste. The LLRW consists of contaminated soils from decommissioning, sludge from the processing of wastewater contaminated with alpha-emitting radionuclides, and water contaminated with beta-emitting radionuclides. The Waste Management program accounts for all costs associated with treatment, storage, and disposal for all waste that the Environmental Management program generates, with the exception of the decommissioning waste treatment, storage, and disposal costs, which are accounted for in the ER Activity Costs table under Decommissioning⁽²⁰⁾. Through mid-FY 1995, LLRW was exclusively transported for disposal at the Nevada Test Site. Currently, LLRW is also transported to Envirocare of Clive, Utah, a commercial disposal site. Uncontaminated waste from ER activities is transported to a construction or sanitary landfill⁽²¹⁾.

Intersite/Interstate Interactions

The following waste shipments will be made to other DOE sites⁽²²⁾:

FY 1997:	1,700 m ³ LLRW to NTS or Envirocare for disposal.
FY 1998:	1,349 m ³ LLRW to NTS or Envirocare for disposal.
FY 1999:	972 m ³ LLRW to NTS or Envirocare for disposal.
FY 2000:	153 m ³ LLRW to NTS or Envirocare for disposal.
FY 2000:	467 m ³ TRU waste to WIPP for disposal or other DOE sites for storage.
FY 2001:	879 m ³ LLRW to NTS or Envirocare for disposal.
FY 2002:	1,530 m ³ LLRW to NTS or Envirocare for disposal.
FY 2003:	1,530 m ³ LLRW to NTS or Envirocare for disposal.
FY 2004:	1,530 m ³ LLRW to NTS or Envirocare for disposal.
FY 2005:	1,530 m ³ LLRW to NTS or Envirocare for disposal.

Under the Waste Management Program the Mound Waste Minimization/Pollution Prevention Program (WM/PP) was established to reduce the volume and toxicity of hazardous, radioactive, mixed and solid waste generated at the site. This is accomplished by preventing waste generation, by recycling and reclamation, and by a variety of treatment techniques. In 1996, the Mound recycled over 17 tons of waste paper, 6.3 tons of lead-acid batteries, and 1.3 tons of scrap lead. Additionally, over 92 tons of scrap metal was recycled⁽²³⁾.

Transuranic Mixed/Transuranic Waste

Previous mission assignments for the DOE at Mound have generated TRU and TRU-mixed waste. Major mission assignments have included development of nuclear weapons processes, space and terrestrial heat source programs, and subsequent cleanup of those facilities which have supported these missions.

There is no projection for additional TRU or TRU-mixed waste generated at Mound. As defined by Waste Isolation Pilot Plant (WIPP) guidance, Mound's waste is contact-handled and retrievable. As of June 1995, the WIPP TRU Waste Baseline Inventory Report contained data reporting that Mound has approximately 272 cubic meters (359 cubic yards) of TRU and TRU-mixed waste. There are approximately 1,300 drum equivalents of TRU waste (stored in Building 31); 15 of those drum equivalents are in the form of TRU-mixed or TSCA TRU waste (stored in Building 23, which is a RCRA-permitted facility). The TRU-mixed waste stream is made up of leaded gloves and will not require treatment. The TSCA stream contains liquid polychlorinated biphenyls, which will require treatment by incineration prior to storage or disposal. This report assumes that the TSCA waste will be treated at the Toxic Substance Control Act Incinerator in Oak Ridge, Tennessee. This estimate also assumes that TRU waste will be shipped to the Idaho National Engineering Laboratory for treatment and then shipped to the WIPP for disposal. All disposal costs for TRU and TRU-mixed waste are included in the WIPP program estimate. The costs included in this estimate are for managing TRU and TRU-mixed waste and include retrieval, characterization, treatment, and packaging to meet the WIPP waste acceptance criteria.

Low-Level Mixed Waste

Approximately 100 cubic meters (131 cubic yards) of low-level mixed waste (LLMW) is being stored on-site as a result of the previous Mound defense program mission. Future generation is expected to total less than five cubic meters (6.6 cubic yards). Tritium and plutonium-238 are the major radioactive contaminants present, although several dozen other isotopes have been used at the site. The LLMW streams include the following streams and volumes: scintillation cocktail, 43.3 cubic meters; waste oils, 27.4 cubic meters; lead shapes, 5 cubic meters; lead-loaded gloves; trace amounts of metallic mercury; polychlorinated biphenyl contaminated kerosene, 1.1 cubic meters; and lab packs and other materials, 20 cubic meters.

The LLMW waste at Mound will be treated by a combination of small on-site units with output from the larger waste streams transported to commercial treatment facilities or to the TSCA Incinerator in Oak Ridge, Tennessee. Scintillation cocktails and the waste oils will be treated and sent to a commercial mixed waste thermal treatment unit. Lead will be decontaminated and macroencapsulated, and mercury will be amalgamated. The polychlorinated biphenyl kerosene will be shipped to the TSCA incinerator. Lab packs will be sorted and surveyed.

Building 23 is the Mound LLMW storage facility. This RCRA compliant storage unit is in interim status and has sufficient capacity for the current inventory of mixed waste as well as anticipated future generation. Additionally, Building 23 has sufficient capacity to store, on a short-term basis, residuals generated from the treatment of inventoried waste. Residuals from waste treated offsite will be transported directly to the Nevada Test Site or a commercial disposal facility. In addition, any mixed waste treated on-site, such as the mixed waste mercury being amalgamated in an on-site treatability study, will be sent to a commercial or a DOE disposal site.

Low-Level Waste

Eighty percent of the low-level waste generated in FY 1995 was the result of ER activities. The Nuclear Material and Facility Stabilization program generated the remaining 20 percent. All of Mound Plant's low-level waste is generated on-site. The current backlog of low-level waste is 6,339 cubic meters and the projected future generation over the life cycle of this baseline estimate is 147,141 cubic meters.

Mound treats wastewater contaminated with alpha- and beta-emitting radionuclides at the Waste Disposal (WD) Building. Various on-site process and decontamination operations constitute the source of this liquid waste. The beta-emitting liquids are solidified in 55-gallon steel drums with Portland cement and absorbent clay for disposal. The alpha-emitting contaminated liquids are treated by co-precipitation/flocculation and the resulting sludge is solidified with Portland cement for disposal. The waste treatment at the Waste Disposal building is the only low-level waste treatment at Mound. Presently, 220 cubic meters of this solidified low-level waste are generated per year.

The inventory of this low-level waste is temporarily stored in on-site trailers, except for steel-boxed soils and sludges (which are stored outside until staged for shipment) and solidified high-activity tritium (which is stored in the Waste Disposal and Semi Works buildings). The boxes of soil and sludge are stored on a concrete pad west of Building 105 and along the road near the Sewage Disposal Building, respectively. A new low-level waste storage and staging facility became operational in FY 1996. This new facility, combined with the anticipated disposal of most backlog waste, enabled Mound to eliminate all or most all of the trailers that were used for storage during FY 1996. By FY 1997, the vast majority of Mound's low-level waste was stored for just a short duration, allowing for characterization of the waste before shipment for offsite disposal.

Hazardous Waste

The current major generators of hazardous waste include plant-wide safe shutdown activities, garage vehicle maintenance, and general facility maintenance. The wide variety of hazardous wastes generated includes: laboratory/reagent-grade chemicals (acids, bases, oxidizers, flammable liquids, flammable solids, and miscellaneous toxins); waste oils (not regulated as hazardous waste in Ohio); polychlorinated biphenyl oils and transformers from a current site-wide replacement project; and various hazardous debris generated from process clean out/tear down projects.

The Retort and Open Burn Unit Treatment Facility was used for the destruction of explosive components and secondary explosive waste. This unit ceased operation in FY 1996. Hazardous waste is collected and managed in a RCRA interim status storage facility until it is shipped offsite to commercial treatment and/or disposal facilities⁽²⁴⁾.

Sanitary Waste

Mound generates approximately 2,360 metric tons of solid sanitary waste annually. This number is expected to steadily decrease as the transition of the site is completed. All sanitary waste is disposed of shortly after the time of collection at permitted commercial landfills.

Direct Program Management/Support

EG&G Mound Applied Technologies, Inc. is responsible for operating the Radioactive, Hazardous and Mixed Waste Management programs at Mound. Waste addressed by these activities includes all TRU and LLRW, all RCRA and TSCA hazardous waste, and all TRU-mixed and LLMW. Activities include treatment, storage, and disposal of all of the above waste streams in accordance with applicable laws and DOE Orders; generation, collection, and maintenance of required records; maintenance of storage facilities; communication of waste acceptance criteria to plant generators; and preparation of National Environmental Policy Act (NEPA) and Safety Analysis Report documentation. In addition, the Waste Management oversight of the Mound Waste Management program identifies activities necessary to maintain and train an adequate staff of qualified personnel to perform the tasks required⁽²⁵⁾.

7.0 DEFINITION OF THE REMEDIATION WORKER GROUP

Overview

Some DOE sites currently undergoing cleanup possess a large union worker pool from which to pull workers for tasks related to cleanup activities. Examples of tasks associated with site cleanup include transportation, treatment, storage, and disposal of hazardous waste, safe shutdown activities, building dismantlement, etc. The eligibility of the worker to perform a task at these sites depends on the completion of task-specific training. For example, if a worker is not trained in the packaging of hazardous waste, he/she cannot perform that task. The utilization of similarly trained workers to perform training-specific tasks at these sites has led to the creation of specific worker groups which are dedicated to a particular training-specific task.

The relatively small union worker pool (117 workers) at the Mound has allowed almost all union workers to receive an equal degree of training. This equality allows a single worker to perform many tasks relative to site cleanup. Specific worker groups or job categories which are dedicated to a particular waste stream or training-specific remediation activity do not exist.

Therefore, Remediation Workers at the Mound are defined as that portion of the Mound wage workforce that perform the following tasks:

Hazardous Waste Tasks

Hazardous waste tasks include sampling, surveying, containerization, treatment, transportation, storage, and disposal of hazardous waste (i.e., chemically contaminated wood, metal, concrete, asphalt, debris, process residues, discarded product, discarded PPE, etc.) associated with PRS's, SWMU's, and HWMU's. HWMU's encompass a contiguous area of land on or in which hazardous waste has been placed, or the largest area in which there is significant likelihood of mixing hazardous waste constituents in the same area. Examples of HWMU's include surface impoundments, waste piles, land treatment areas, landfill cells, incinerators, tanks and associated piping and container storage areas (40 CFR, Part 260.10, Subpart B definitions).

Hazardous waste tasks may also involve hazardous waste with a radiological component. If a radiological component exists above the DOE action level the waste will be construed as mixed waste (some Mound wastes are mixed waste). In this case, efforts are made to remove or treat either the radiological or hazardous component to allow for disposal options (most mixed waste at this time is stored on-site due to a lack of approved storage facilities). If the radiological component is removed successfully then the hazardous waste that remains can be safely treated on or off-site to render it non-hazardous. Conversely, if the hazardous component can be treated on-site the remaining radiological waste can be shipped to the LLRW storage facility.

Deactivation Tasks

Deactivation tasks involve placing a facility in a safe and stable condition to minimize the long-term cost of a surveillance and maintenance program that is protective of workers, the public, and the environment until decommissioning is complete. Tasks include the removal of fuel, draining and/or de-energizing of non-essential systems, removal of stored radioactive, mixed, and hazardous waste materials, and related actions. As a bridge between operations and decommissioning, based on facility-specific conditions and final disposition plans, deactivation can accomplish operations such as final process runs and decontamination activities aimed at placing the facility in a safe and stable condition.

Decommissioning takes place after deactivation and includes surveillance and maintenance, decontamination, and/or small-scale dismantlement of process lines, tanks, and equipment. Decommissioning takes place at the end of the life of the facility to retire it from service with adequate regard for the health and safety of the workers, the public, and protection of the environment. The ultimate goal of decommissioning is the unrestricted release or restricted use of the site.

Dismantlement Tasks

Dismantlement tasks involve the disassembly or demolition and removal of any structure, system, or component, and satisfactory interim or long-term disposal of the residue from all portions of the facility. Dismantlement tasks also involve final large-scale (superstructure) dismantlement, disassembly and/or demolition of the facility subsequent to facility deactivation.

Cleanup Tasks

Cleanup tasks involve systems operation and maintenance (treatment, transportation, storage and disposal of LLRW generated during day-to-day activities at the Mound site). Workers involved with Cleanup tasks will identify, weigh, sample, survey, containerize, store, and prepare LLRW for shipment to the Nevada Test Site (NTS) and the Envirocare facility in Clive, Utah.

Examples of Tasks Performed by Remediation Workers

Under a RA or closure action, Remediation Workers performing HW tasks will remediate any HWMU's within a building prior to facility deactivation. Upon completion of this task and disposition of the removed hazardous waste, Remediation Workers performing De tasks will enter the building to be deactivated and remove any salvageable equipment, loose radiological gross contamination, or "holdup material" (material left in process lines, machinery, equipment etc.) and perform general cleanup activities. At this point a contract is let to a dismantlement company for the final phase of the process. Remediation Workers performing Di tasks perform activities such as removing asbestos and Asbestos Containing Material (ACM), encapsulation of fixed radiologically contaminated surfaces using latex paint, removal and staging for proper disposal of structural components, and containerization of materials for shipment to the proper storage/disposal area.

7.1 IDENTIFICATION OF HISTORIC, IN-PROGRESS, AND ANTICIPATED REMEDIATION WORKER GROUP DEMOGRAPHICS AT THE MOUND

According to the EG&G Industrial Relations Department, the Mound post-production Remediation workforce, which has fluctuated in number over the years, peaked in 1992 at 500 workers. These workers are represented by a single union, the Oil, Chemical, and Atomic Workers Union Local 7-4200. In late 1992, Remediation Workers underwent Hazardous Waste Operations and Emergency Response (HAZWOPER) training. HAZWOPER training is health and safety training imposed by OSHA regulation 29 CFR 1910.120e. At this time 100% of Remediation Workers at the Mound are HAZWOPERs. The normal operating shift of these workers is 4 days a week, 10 hours a days (start times are adjusted for prevailing weather conditions, i.e., a 2 A.M. start time during the heat of the summer). Only those personnel involved with wastewater treatment, power plant operation, and emergency response perform second and third shift activities. Remediation Workers are required to change into company issued clothing prior to reporting to their work station and must doff company issued clothing and shower prior to exiting. Due to potential contact with chemical and radiological contaminants, the donning of PPE specified by the Industrial Hygiene and Radiological Engineering departments is required prior to entry into the areas of chemical, mixed or radiological contamination where work is being performed⁽²⁶⁾.

Prior to 1994 the site employed workers to launder contaminated process clothing, this practice has been discontinued and contaminated clothing are now sent offsite for treatment and/or disposal. Exhibit 8.8, page 142, identifies Mound site-specific PPE levels and the types of protective clothing and equipment associated with each level.

In August 1997, EG&G employed approximately 117 Remediation Workers; 20 females and 97 males. Exhibit 8.9, page 143, presents Mound OCAW Members Breakdown by Job Title and Gender as of August, 1997. The function of this worker group involves the removal, decontamination, treatment, storage, transportation and disposal of hazardous, mixed, and LLRW waste, demolition, asbestos abatement, and systems maintenance and operation. The top five job titles associated with this worker group are Decontamination (30 workers), RadCon Crafts (24 workers), RadCon Fabrication/Mechanical (15 workers), Welders and Pipefitter (14 workers), and Hazmat Laborers (12 workers). Industry profiles (comparable worker groups in the private sector) include, but are not limited to, solid, hazardous and mixed waste treatment storage and disposal workers, nuclear power plant maintenance personnel, demolition workers, asbestos abatement personnel, and Power and Wastewater treatment Plant operators.

Turnover rates for the Remediation worker group are as follows: no rate is available for 1989-1995, 1996 = 2.5%, the first half of 1997 = 2.0%. Exhibit 8.10, page 144, provides Remediation Worker historic employee numbers and annual turnover rates by calendar year^(26, 27).

Future Full-Time Equivalent Needs

Beginning in FY 1999 and continuing throughout final remediation and transition of the Mound plant, the mix of Full-Time Equivalents for the site will reduce and change. As Mound continues its nuclear material and facility stabilization disposition activities through FY 1999, the number of Full-Time Equivalents associated with this area will continue to decline and then drop off dramatically with the completion of these activities in FY 2002. Conversely, as facilities shut down and become part of the ER and decommissioning efforts, an increase in Full-Time Equivalents will occur. ER activities and the Full-Time Equivalents associated with these efforts will peak at about the same time as full completion of facility stabilization activities in FY 2002 and decrease through completion of restoration activities. Waste management activities and Full-Time Equivalents will continue to decline through FY 1999, after which time a minimal staff will be maintained. Landlord activities and the Full-Time Equivalents associated with these programs will continue to decline through FY 1999, after which time they are expected to remain relatively constant until the sale of the site. The existing unionized labor force will remain specialized, will stabilize in about FY 2000, and will remain fairly constant through the completion of the contract. The focus during this period will be on decommissioning and final remediation of the site⁽²⁸⁾. Exhibit 8.11, page 145, provides proposed employee levels as presented in the Mound Ten Year Plan.

Table 9.1, page 147, presents a Demographic Description of the Workers at the Mound Facility as of August, 1997. This table identifies contractors, numbers of workers associated with each worker group, industry profiles, the top five job titles and the primary task titles.

Description of Mound Industrial Hygiene, Occupational Safety and Health, and Radiological Control Programs

Industrial Hygiene Program

The purpose of the Mound Industrial Hygiene (IH) Program is to ensure that physical, biological and chemical hazards to employees are recognized, evaluated and controlled⁽²⁹⁾.

EG&G Mound manages its IH Program through formal policies and procedures, which are contained in the Mound Safety and Hygiene Manual (MD-10286). The Mound Safety and Hygiene Manual designates the Safety and Hygiene requirements that shall be adhered to for all work performed at the Mound. Information related to the following topics is included in this manual: safety program, personal protective equipment, industrial hygiene, fire protection, Hazwoper, pressure safety, loss prevention, inspections, reports and investigations.

Each and every task at the Mound requires a Health and Safety Plan (HASP) for designated scopes of work identified in MD-10286. A task-specific HASP addresses the following, as applicable: safety documentation requirements, interface with the different safety organizations, safety evaluation of job scheduling, hazard analysis, preventive measures, employee selection and training, as well as ongoing safety evaluation and close-out procedures⁽³⁰⁾. The actual number of workers can be obtained from the HASP, since each worker entering the job must be identified and their exposures tracked via the HASP.

The DOE's ES&H Technical Information Service (TIS) Internet Resource Directory Performance Data-DOE-Industrial Hygiene Website contains information on a variety of methods and systems which the DOE uses to track industrial hygiene performance on an individual site or field office level. Those methods and systems which are relevant to the mound site include: Comprehensive Epidemiologic Data Resource (CEDR), DOE Lessons Learned Program, Facility Profile Information Management System (FPIMS), Occupational Injury and Property Damage Summary Reports, Computerized Accident/Incident Reporting System (CAIRS), and Occurrence Reporting and Processing System (ORPS)⁽³¹⁾.

Occupational Safety and Health (OS&H) Program

The ES&H Environmental Restoration and Waste Management (ER&WM) Branch of EG&G Mound provides EG&G line management with day-to-day support of sitewide occupational safety and health matters.

An effective occupational safety and health management program includes provisions for the systematic identification, evaluation, and prevention or control of general workplace hazards, specific job hazards, and potential hazards that may arise from foreseeable conditions. An effective program addresses not only specific regulations but goes beyond specific requirements of law to consider all hazards. It will seek to prevent injuries and illnesses, whether or not compliance is an issue. As the size of a work site or the complexity of a hazardous operation increases, the need for written guidance increases to ensure clear communication of policies and priorities and consistent and fair application of rules.

Success of the overall site occupational safety and health programs hinges on active employee involvement in the total safety process, such as participation in walk around inspections of their work areas. For example, EG&G Mound has initiated Area Safety and Health committees to perform inspections in each specific work area and on-the-job training and evaluation for employees and management⁽³²⁾.

Radiological Control (RadCon) Program

It is the policy of Mound to conduct its radiological operations in a manner that ensures the health and safety of all employees, contractors and the general public. In achieving this objective, Mound shall insure that radiation exposure to workers and the public and releases of radioactivity to the environment are maintained below regulatory limits. Deliberate efforts are taken to further reduce exposures and releases in accordance with a process that seeks to make any such exposures or releases as low as reasonably achievable. Mound is fully committed to implementing a radiological control program that consistently reflects this policy.

The Mound Site Radiological Control Manual (RCM) establishes the fundamental requirements and procedures to meet this policy and commitment. It contains the requirements of the DOE Radiological Control Manual (DOE-RCM) with the text reformatted to emphasize and highlight the incorporation of 10 CFR Part 835 requirements.

The policies and procedures of this manual are applicable to all Mound operations. The Site RCM program requirements established in this manual take precedence over all other contractor policies, procedures, manuals, or practices for radiological protection.

It is the intent of Mound to establish and maintain radiological protection operations that are technically defensible, consistent throughout the site, and compliant with the requirements of this manual. Where full compliance with any requirement of this manual is not immediately achievable in any program element, approved interim compensatory measures shall be implemented to provide equivalent protection and an implementation plan shall be developed and initiated to bring the program into full compliance. Requests for exceptions to any requirements or recommendation for change to the manual (which require DOE Headquarters approval) will be approved by the Radiological Control Manager and Senior Site Executive prior to forwarding to DOE Ohio Field Office and/or the appropriate Program Office⁽³³⁾.

Examples of DOE Monitoring in the Workplace requirements (10 CFR 835 Appendix A, Subpart E) include individual and area monitoring, verification of the effectiveness of engineering and process controls, instrumentation, contamination and access control, and PPE⁽³⁴⁾.

An important source of information about Remediation Workers who are involved in tasks associated with radioactive material or radiation exposure can be obtained from the Radiation Work Permit (RWP). The RWP is generated by Radiological Control program personnel at the start of any site remediation task that is expected to involve worker radiological exposure. The actual number of workers can be obtained from the RWP, since each worker entering the job must be identified and their exposures tracked via the RWP.

Engineering and Administrative Controls

The Mound defines an engineering control as those controls which eliminate hazards by mechanical means or by process design, including apparatus and mechanisms which physically prevent entry, minimize hazards, or create some kind of physical barrier.

The Mound defines an administrative control as those controls which eliminate hazards by altering work habits such as Standard Operating Procedures (SOP's), management directives, exposure tracking, and limitations on actual exposure.

Both engineering and administrative controls are in place with regard to the work at the Mound. In most cases regarding chemical and radiological exposures, the administrative controls utilized by the Mound Contractor are more restrictive than exposure limits implemented by the DOE. Because of these controls, actual personal exposures are expected to be conservative relative to general area survey results.

Description of Mound Records Systems

Chemical and radiological exposure data for Remediation Workers is collected by Industrial Hygiene and Radiological Control program personnel. Exposure data is task-specific and is reported on an individual basis. No summary data for any particular worker group or task is available.

A. Medical/Radiological Records

The Mound maintains personnel medical records in individual file folders by employee social security number as well as an Oracle® database application known as “Mound Environmental Safety and Health” (MESH)⁽³⁵⁾. These records include information obtained from HASPs and RWPs, pre-employment and annual physicals and accident reports. Annual physicals include chest X-rays, drug screen, audiogram, vision test, blood test, baseline urinalysis, blood workup, spirometry, Thermoluminescent Dosimetry (TLD) results, urine, fecal and blood sampling results and Invivo (“in the body”) dosimetry information. Site-specific radioisotope uptake and exposure data is maintained at the Oak Ridge National Engineering Laboratory by Science Applications International Corporation (SAIC). Exhibit 8.12, page 146, presents 1989-1996 Mound Dosimetry Rates among Remediation Workers.

B. Personnel Training Records

Since 1991, the Mound has maintained personnel training records in a database format entitled “Training Records and Information Network” (TRAIN). The information contained in this database includes site and job specific training as identified in applicable DOE, Occupational Safety and Health Administration (OSHA), Department of Transportation (DOT), and EPA regulations. Examples include Radiological Worker, HAZWOPER, Waste Management, and heavy equipment certification training records. Prior to 1991, Supervisors maintained personnel training records in individual file folders⁽³⁶⁾.

C. Industrial Hygiene Records

The Mound Industrial Hygiene Department maintains chemical and physical agent exposure on the MESH database. Industrial Hygiene chemical and physical agent exposure records are also available in paper file folders by program and project. These industrial hygiene records include information concerning asbestos, nuisance dust, PCB's, and various chemicals used on-site.

D. Integrated Environmental Management Project (IEMP)

The IEMP was initiated by EG&G Mound in November of 1995. Comprehensive environmental assessments for all facilities on site were conducted in the first quarter of 1996. The assessments focused on regulatory compliance and best management practices. A final twelve-volume report was submitted to DOE in March of 1996. The project established an Oracle® environmental database with respect to regulatory compliance and a mechanism for tracking corrective actions and improvement initiatives⁽³⁷⁾.

E. Mound Site Records Center

Data concerning production era worker activities, demographics, technologies and exposures at the Mound exists in the archives at the Records Center Building 40, Room 212. Prior to 1995, records retention practices were employed whereby Mound related records were retained for specified period of time and then sent to the Dayton Federal Records Center, National Archives of Records, Office of Regional Records, SVC 3150 Springboro Road, Dayton, Ohio 45439-1867, Point of contact is Jim Hurst Phone # (937) 225-2852. Due to the threat of litigation, beginning in 1995, EG&G Mound placed a moratorium on this practice and all records stored at the Dayton Federal Records Center (853 boxes) were retrieved for onsite storage. At the time of this writing, documents stored at the Mound numbered 6800 boxes. All records generated at the Mound are now permanently retained at the Records Center under the direction of the Site-Records Manager⁽³⁸⁾.

Records available at the Records Center include, but are not limited to:

- General Administrative files
- Acquisition and Controller files
- Personnel, Medical and Training files
- Health and Safety Department records
- Security records
- Industrial Hygiene and Radiological Department records
- Fire and Safety Department records
- Old Standard Operating Procedures (SOP's)
- Old Production records

7.2 IDENTIFICATION OF HISTORIC, IN-PROGRESS AND ANTICIPATED REMEDIATION WORKER ACTIVITIES AND EXPOSURES AT THE MOUND

This section will define Remediation Worker historic, proposed, and anticipated activities, waste categories, contacts, exposure types, regulatory drivers, time line and number of workers per task.

Remediation Worker activities 1 through 25 described below are those activities which have either been completed, are in progress, or are scheduled to be undertaken in the near future. Where applicable, PRS numbers and associated Release Block designations are utilized to define the physical location of the activity.

The activities are described in relationship to the types of HW, De, Di, or CW task performed by Remediation Workers during the activity. For example, an activity performed by Remediation Workers that involves HW tasks will be defined as a HW task.

Table 9.2, page 148, presents Remediation Worker Contacts, Activity Descriptions and Exposure Types.

Remediation Worker HW Tasks

Activity 1: PRS 111, Oil Contamination, Monitoring Well 0034. Release Block Q

Activities associated with this RA included pumping approximately 110 gallons of water from well 0034, cleaning of the well, and disposal of the pumped material to a permanent off-site treatment/disposal facility. The types of HW tasks associated with this RA were containerization, transportation, storage, and disposal of hazardous waste. Contaminants of concern include petroleum hydrocarbon contaminated water. The number of workers necessary to complete this task was medium: 11 - 75. Task duration was 1.5 years. CERCLA was the regulatory driver behind this task⁽⁴⁹⁾.

Activity 2: PRS 408, Prism System. Lubricating Oil Contamination, Release Block R

PRS 408 is the blowdown area for the nitrogen tanks of the "Prism" nitrogen production membrane system which supplied house nitrogen to R and SW buildings. The system operated for about two years from 1989 to 1991. Pump/compressor oil was observed to have been released into the ground when blowdown was performed to relieve pressure in the tanks.

Activities associated with this RA included the removal of petroleum hydrocarbon contaminated soil and on-site bioremediation treatment. The remediated soil was then disposed of in the Mound spoils area. HW tasks associated with this RA included excavation, transportation, and treatment of hazardous waste. The number of workers necessary to complete this task was medium: 11 - 75. Task duration was 4 months. CERCLA was the regulatory driver behind this task⁽⁵⁰⁾.

Activity 3: PRS 114-117, Fuel Oil Storage Removal Action (FOSRA), Release Block O

In 1947, a storage system was installed for fuel oil for use in firing the heating plant boilers at the Mound Plant. This system consisted of a 315,000-gallon above-ground tank and four, 25,000-gallon underground tanks located east of "P" Building. In the time between installation and 1965, leaks developed in the underground tank system. Since 1965, three of the four underground tanks have been removed.

Activities associated with this RA included the removal, storage and treatment of fuel oil contaminated soils from a 60 ft by 80 ft area to a depth of 9 feet below base elevation of 870.50 ft. The interim storage and treatment of soils was done at the on-site bioremediation treatment facility. The remediated soil was then disposed of in the Mound spoils area. HW tasks associated with this RA included excavation, transportation, treatment, storage, and disposal of hazardous waste. Contaminants of concern associated with this task are petroleum hydrocarbons. The number of workers necessary to complete this task was medium: 11 - 75. Task duration was 11 months. CERCLA was the regulatory driver behind this task⁽⁵¹⁾.

Activity 4: PRS 18, Fire Fighting Training Area (FFTA) Response Action, Release Block J

The FFTA consisted of two concrete pits. These pits were used to conduct fire-fighting training operations for Mound Plant personnel. The concrete slab floors in both pits were cracked and broken in various locations, and partially covered with sediment.

During routine training exercises at the FFTA, undetermined amounts of pure petroleum hydrocarbon product and residues from incomplete combustion of diesel fuel were released into the soils due to the cracks in the floor of the FFTA pits.

The RA, in an effort to mitigate contamination migration, was the removal and treatment of petroleum hydrocarbon contaminated soils and the demolition and disposal off-site of the concrete pits. Ex-situ biological remediation of the soils was the preferred treatment option. HW tasks associated with this RA included excavation, transportation, treatment, storage, and disposal of hazardous waste. Contaminants of concern associated with this task are petroleum hydrocarbons. The number of workers necessary to complete this task was medium: 11 - 75. Task duration was 5.5 months. CERCLA was the regulatory driver behind this task⁽⁵²⁾.

Activity 5: West Powerhouse Polychlorinated Biphenyl (PCB) Site, Release Block O

On April 27, 1990, a PCB release involving a spare transformer occurred in an area on the west side of the Mound Plant Powerhouse, which is located on the Mound Plant Main Hill, Release Block O. Clean-up tasks resulting from the April 1990 release were conducted according to TSCA standards by an on-call environmental response contractor, Enroserv Inc. of Dayton, Ohio.

The transformer and contaminated oil were removed and sent offsite for disposal at ENSCO in El Dorado, Arkansas. Removal of contaminated soil and concrete continued through November 1990. On October 31, 1990, a pocket of oil and water was encountered at a depth of 5 to 6 feet below grade surface. Samples taken of this liquid contained a maximum of 230,000 ppm of PCBs (Aroclor 1260). It was determined that this oil pocket was not from the original spill and therefore the problem fell under CERCLA.

Roy F. Weston, Inc. was selected to perform the RA according to CERCLA RA Standards, which resulted in the removal and disposal of all PCB-contaminated soil with a concentration of 10 parts per million or greater and all PCB-contaminated water. HW tasks associated with this RA were excavation, containerization, storage, and disposal of PCB contaminated soils and water. All wastes were disposed of by incineration at ENSCO. TSCA/CERCLA were the regulatory drivers behind this RA. Contaminants of concern associated with this task were PCBs. The number of workers necessary to complete this task was medium: 11 - 75. Project duration was 2 weeks⁽⁵³⁾.

Activity 6: Operable Unit 1 Remedial Action. (Release Block I)

OU 1 occupies approximately 4 acres in the southwestern portion of the Mound Plant. OU 1 includes a historic landfill site that was used by the Mound Plant from 1948 to 1974. Plant waste materials that were disposed of in OU 1 included general trash and liquid waste. The main concerns at this site are known releases of volatile organic compounds (VOCs) that may be migrating into the groundwater. Contaminants of concern associated with this remedial action include 1,2-Dichloroethane; 1,2-cis-DCE; vinyl chloride; and tetrachloromethane.

HW tasks associated with this action will include the collection and treatment of contaminated groundwater and disposal of treated water. The major components of the selected remedy include installation of two groundwater extraction wells and treatment of the extracted groundwater to remove VOCs and other constituents. Treatment technologies will include cascade aeration, UV oxidation, and conventional air stripping. CERCLA will be the regulatory driver behind this remedial action. The number of workers necessary to complete this task will be medium: 11 - 75. Project duration is unknown⁽⁵⁴⁾.

Activity 7: PRS 17, Oil Burn Structure

HW tasks associated with this action will include the identification and removal of chemically contaminated soils and materials for offsite transportation, storage, and disposal. Contaminants of concern will be aviation fuel, benzene, toluene, ethyl benzene, xylenes. The number of workers necessary to complete this task will be medium: 11 - 75. Project duration is expected to be 2.5 years. CERCLA will be the regulatory drivers behind this task.

Activity 8: PRS 153, Radioactive Waste Line Break

HW tasks associated with this action included the identification and removal of chemically/radiologically contaminated soils and materials for offsite transportation, storage, and disposal. Contaminants of concern were Sodium Nitrate, Pu-238, Cs-137, Th, Cs-60. The number of workers necessary to complete this task was medium: 11 - 75. Project duration was 1.5 years. The AEA and RCRA were the regulatory drivers behind this task.

Remediation Worker De Tasks

Activity 9: Semi-Works Building Areas D&D Project

The Semi-Works (SW) Building D&D Project is designed to clean five radioactively contaminated, inactive, surplus rooms and support areas and provide extensive D&D of inactive Basic Energy Sciences Program areas in the SW Cave, a concrete-walled room (process cell) previously used for unconfined operations. The SW Cave was used to recover protactinium-231, thorium-230, and thorium-229 from Cotter concentrates and uranium-233. The other five rooms contain gloveboxes contaminated with tritium and other radioisotopes; fumehoods, process piping, and internal non-load-bearing structures. A total of 4,500 ft² of SW building will undergo D&D. Approximately two liters of containerized tritiated mercury, a radioactive mixed waste, is present. Asbestos is also present on piping and equipment.

De tasks associated with these projects will include, but are not limited to: cleaning and removal of radioactively contaminated equipment, fumehoods, a large manipulator box, and the associated piping and equipment; structural decontamination; and disposal of the wastes generated by the D&D operations. The number of workers necessary to complete this task will be medium: 11 - 75. This project will begin upon completion of NEPA review and end in March, 2010. The AEA will be the regulatory driver behind this task⁽⁴⁶⁾.

Activity 10: Waste Disposal (WD) Annex Building D&D Project (proposed)

The WD Annex Building D&D Project is designed to decontaminate seven radioactively contaminated, inactive, surplus rooms, occupying approximately 4,290 ft² of the WD Building Annex. These rooms contain tritium and plutonium contaminated gloveboxes, clariflocculators, holding tanks, piping, and internal non-load-bearing structures. Other radioactive materials, including americium, cobalt, thorium, and cesium, may be present. Asbestos is also present on piping and equipment. De tasks associated with these projects will include, but are not limited to: cleaning and removal of radioactively contaminated equipment, structural decontamination, and disposal of the wastes generated by the D&D operations. The number of workers necessary to complete this task will be medium: 11 - 75. This project will begin upon completion of NEPA review and end in January, 1999. The AEA will be the regulatory driver behind this task⁽⁴⁴⁾.

Activity 11: Sanitary Disposal (SD) Plant D&D Project

The SD Plant is a 500 ft², two-floor, reinforced concrete and concrete-block structure built in 1948 to process sanitary waste. It was replaced in 1972. Associated equipment includes reinforced-concrete tanks, open concrete drying basins, and approximately one acre of contaminated soil drying beds. The facility became contaminated with plutonium-238, polonium-210 daughter products, cobalt-60, and isotopes of bismuth due to leaks into sanitary lines from defense radioactive material processing areas. De tasks associated with this project will include, but are not limited to: decontamination and demolition (small-scale) of the pumping building, enclosed equipment, underground tanks, and contaminated sanitary lines, as required; excavation of drying beds and associated soil; and disposal of the wastes generated by the D&D operations. The number of workers necessary to complete this task will be medium: 11 - 75. This project will begin upon completion of NEPA review and end in December, 1999. The AEA will be the regulatory driver behind this task⁽⁴⁴⁾.

Activity 12: Building 21 D&D Project (proposed)

De tasks associated with the Building 21 D&D Project will consist of the decontamination and decommissioning of a reinforced concrete building and the removal of adjacent radioactively contaminated soil. The surrounding area of contaminated soil covers approximately four acres. The soil contamination resulted from leakage of the thorium-232 and staging of plutonium-238 waste containers near the building during the 1970s. Sampling has shown no evidence of nonradioactive hazardous materials. De tasks associated with this project will include, but are not limited to: decontamination and decommissioning of the reinforced concrete building and the removal of adjacent radioactively contaminated soil. The number of workers necessary to complete this task will be medium: 11 - 75. Project duration is expected to be 8 years. The AEA will be the regulatory driver behind this task⁽⁴⁴⁾.

Remediation Worker De/CW Tasks

Activity 13: R-Building D&D Project

The R-Building contains laboratories for both radioactive and nonradioactive work, offices, and service rooms. The building is currently in use and surplus laboratories are being decommissioned individually. Room decontamination will allow restricted use of the rooms. De tasks associated with the decommissioning of laboratories 120, 127, 130, 131, 143, and 147 included, but were not limited to: cleaning and removal of radioactively contaminated equipment, structural decontamination, asbestos removal, and disposal of the wastes generated by the D&D operations. LSA radioactive waste was shipped to NTS. CW tasks associated with this project included placing TRU wastes into retrievable storage at Idaho National Engineering Laboratory (INEL). Plutonium-238 was the contaminant of concern. The number of workers necessary to complete this task was medium: 11 - 75. Duration was two years. The AEA was the regulatory driver behind this task⁽⁴⁵⁾.

Remediation Worker Di/HW Tasks

Activity 14: PRS 129/130, B-Building Solvent Storage Shed Demolition, Release Block R

The B-Building Solvent Storage Shed was demolished in February 1994. This included the metal shed and utility services associated with the shed. Also, the concrete slab and footer system supporting the shed was removed. Contaminants of concern associated with this demolition were Freon 113; trans-1,2 dichloroethene; 1,1,1-trichloroethane; trichloroethene; and toluene. The types of Di/HW tasks associated with this demolition were excavation, transportation, storage, and disposal of hazardous waste. The number of workers necessary to complete this task was medium: 11 - 75. Task duration was 1 year. CERCLA was the regulatory driver behind this task⁽⁴⁷⁾.

Remediation Worker Di/CW Tasks

Activity 15: SM Building

The Special Metallurgical Building (SM) was utilized in support of the radioisotopic thermoelectric generator (RTG) program. A gradual decommissioning process began in August 1968 and lasted until 1983. In 1993, this building was functionally disconnected from the SM/PP stack. The final structure was totally removed in March 1995. Di/CW tasks associated with this dismantlement were excavation, transportation, storage, and disposal of radioactive waste. Contaminant of concern was Pu - 238. The number of workers necessary to complete this task was medium: 11 - 75. Task duration was 2 years. The AEA was the regulatory driver behind this task⁽⁴⁸⁾.

Remediation Worker CW Tasks

Activity 16: PRS 86, Removal of Septic Tank and Associated Soils, Release Block F

This RA involved the removal of a radiologically contaminated septic tank and associated radiologically contaminated soils in a 20 ft by 20 ft area to a depth of 16 ft below grade, using on-site interim storage and future off-site permanent disposal. The contaminants of concern were actinium-227 and thorium-232. The types of CW tasks associated with this action were excavation, transportation, storage, and disposal of radioactive waste. The AEA was the regulatory driver behind this task. The number of workers necessary to complete this task was medium: 11 - 75. Duration was 21 months⁽³⁹⁾.

Activity 17: PRS 266, Thorium Contaminated Soil, Release Block F

This RA involved the removal, storage, and disposal of radiologically contaminated soils consisting of approximately 6,000 cubic yards. The removal used in-site interim storage and off-site permanent disposal. The contaminant of concern associated with this action was thorium-232. The types of CW tasks associated with this action were excavation of soils, interim storage, shipment of LSA containers, and off-site disposal of the contaminated soil. The AEA was the regulatory driver behind this task. The number of workers necessary to complete this task was medium: 11 - 75. Duration was 21 months⁽⁴⁰⁾.

Activity 18: OU 4, Miami-Erie Canal Removal Action (Includes PRSs 1 - 6)

Historic operations and accidental releases from Mound Plant have resulted in the discharge of contamination into the Miami-Erie Canal. The extent of this contamination consists primarily of plutonium-238 and tritium. The Miami-Erie Canal is immediately off-site and is not associated with any Release Block.

The proposed action, in an effort to mitigate source migration, is the removal and disposal off-site of all radiologically contaminated soils associated with the Miami-Erie Canal. The types of CW tasks associated with this RA are excavation of contaminated soils and transportation of contaminated soil to an off-site disposal facility. CERCLA is the regulatory driver behind this task. The number of workers necessary to complete this task is medium: 11 - 75. Duration will be 2 years⁽⁴¹⁾.

Activity 19: Drainage Control Interim Response Action, Release Blocks K and E

As a result of operational incidents at Mound involving radioactive materials, a portion of the site has been radiologically contaminated. In an effort to mitigate potential radionuclide contamination migration to off-site areas, two drainage control systems were constructed. One drainage control system was constructed in the west-central portion of the Mound Plant near Building 19 (Release Block K), and the other was constructed at the southern boundary of the OU 5 Old Property (Release Block E).

The Response Actions began on June 26, 1995 and were completed on October 12, 1995. Soils excavated as a result of these actions were disposed of in the Mound spoils area. CW tasks associated with this RA included excavation, transportation, and disposal of radioactive waste. Contaminants of concern associated with this task were plutonium- 238, thorium - 232, and asbestos-containing concrete pipe. The number of workers necessary to complete this task was medium: 11 - 75. Duration was 4 months. CERCLA was the regulatory driver behind this task⁽⁴²⁾.

Activity 20: Waste Transfer System (WTS) Decommissioning Project. Release Block

The Waste Transfer System (WTS) D&D project involved the removal and disposal of contaminated soil, equipment and materials associated with the system used to transfer liquid wastes from the Special Metallurgical (SM) and Plutonium Processing (PP) Buildings to the Waste Disposal (WD) facility. This system consisted of two (2) underground transfer lines (~5100 feet total) and a 350 ft² building (Building 41) containing two (2) 3500-gallon tanks and a pumping system.

Equipment and materials removal and disposal operations began in 1982 and were completed in 1987. Removal of radiologically contaminated soils continued until early 1991, when the project soil excavation was completed. Most of the radioactive soil waste generated after April of 1990 was shipped for burial in FY 1992 and FY 1993. CW tasks associated with this project included excavation, transportation, and disposal of radioactive waste. The contaminant of concern associated with this task was plutonium - 238. The number of workers necessary to complete this task was medium: 11 - 75. Duration was 9 years. CERCLA was the regulatory driver behind this task⁽⁴³⁾.

Activity 21: OMA Contaminated Soils Areas Decontamination and Decommissioning Project (proposed)

The OMA Soils D&D Project consists of the characterization and removal of radioactively contaminated soil at ten individual sites ranging in size from 0.1 to 1.6 acres and totaling approximately 7 acres. The soils were contaminated by site operations, pipeline leakage, and waste management operations. Sampling is planned to verify the assumption that no nonradioactive hazardous material is present. CW tasks associated with this project will consist of the removal of radioactively contaminated soil. The principal contaminants are plutonium and thorium, with some minor amounts of cesium, cobalt, actinium, and radium. Some asbestos contaminated soil may be present. The number of workers necessary to complete this task will be medium: 11 - 75. This project will begin upon completion of NEPA review and end in January, 2005. The AEA will be the regulatory driver behind this task⁽⁴⁴⁾.

Activity 22: PRS 75, Railroad Siding

CW tasks associated with this proposed action include the identification and removal of radiologically contaminated soils and materials for offsite transportation, storage, and disposal. Contaminants of concern are Thorium and daughters. The number of workers necessary to complete this task will be medium: 11 - 75. Project duration is expected to be 9 years. The AEA will be the regulatory driver behind this task.

Activity 23: PRS 76, Warehouse 9

CW tasks associated with this proposed action include the identification and removal of radiologically contaminated soils and materials for offsite transportation, storage, and disposal. Contaminant of concern is Thorium-232. The number of workers necessary to complete this task will be medium: 11 - 75. Project duration is expected to be 2 years. The AEA will be the regulatory driver behind this task.

Activity 24: PRS 40, Building 66 Parking lot.

CW tasks associated with this proposed action include the identification and removal of radiologically contaminated soils and materials for offsite transportation, storage, and disposal. Contaminant of concern is Pu - 238. The number of workers necessary to complete this task will be medium: 11 - 75. Project duration is expected to be 1.5 years. The AEA will be the regulatory driver behind this task.

Activity 25: PRS 273, Thorium Contaminated Soils

CW tasks associated with this proposed action include the identification and removal of radiologically contaminated soils and materials for offsite transportation, storage, and disposal. Contaminants of concern are thorium and Pu - 238. The number of workers necessary to complete this task will be medium: 11 - 75. Project duration is expected to be 1 year. The AEA will be the regulatory driver behind this task.

7.3 IDENTIFICATION OF HISTORIC, IN-PROGRESS, AND ANTICIPATED REMEDIATION WORKER GROUP TECHNOLOGIES AT THE MOUND

The basis for the use of advancing technologies at the Mound is to reduce or eliminate worker radiological and chemical exposure, as well as facilitating the proper disposition of waste from the site. The Mound is driven by the DOE to develop and utilize a Site Treatment Plan (STP). In October 1993, EG&G Mound prepared a Conceptual STP which was submitted to the OEPA. Following discussions with OEPA and public stakeholders, EG&G Mound revised the plan and resubmitted a Draft STP to OEPA in August, 1994. The Final STP was submitted to DOE in March of 1995. This living document is designed to identify developing technologies and allow them to be assessed in terms of applicability for the accelerated site clean-up. A Director's Findings and Orders (DF&O) was signed on October 4, 1995. The DF&O establishes schedules and treatment technologies for the Mound's mixed waste stream. During 1996 the volume of mixed waste at the site was reduced sixty percent utilizing offsite treatment methods⁽⁵⁴⁾.

Table 9.3, page 162, presents Past and Present and Proposed Future Technologies for Remediation Workers at the Mound Site as of August, 1997.

Remediation Worker HW Technologies

Technology 1: Hazardous and Mixed Waste Disposal and Transportation - Incinerator Technology

Incinerator Technology involves the incineration of liquid and sludge mixed wastes and is performed off-site at a TSCA approved incinerator. This process eliminates mixed wastes by exposing the waste to extreme heat in a rotary kiln with a secondary combustion chamber. Incineration is the preferred Land Disposal Restriction (LDR) treatment method for destroying organic-laden hazardous waste (i.e., low level radiological spent solvents and PCB wastes). Tasks associated with this technology include bulking (mixing contents of different on-site tanks), sampling and shipping of mixed waste. Exposure potential encountered during the bulking, sampling and shipping process involves limited contact and is performed outdoors while wearing "Level B" PPE. Exposure potential encountered during the incineration process involves limited contact using a closed loop system with a scrubber and facility HEPA filtration. Advantages of bulking include reduced potential for contact with hazardous waste sludges and solids due to a reduction in the amount of sampling needed. No disadvantages are noted. The number of workers necessary to utilize this technology are between 1 and 10. The use of Incinerator Technology occurred between 1996 and 1997 and is expected to continue from 1997 - 2001^(67, 69).

Technology 2: Water Treatment Technologies

Volatile Organic Compound (VOC) contaminated groundwater will be remediated prior to FY 2005 by using Air Sparging and High Vapor Extraction technologies to supplement pumping and treatment. Implementation of the technologies will begin in calendar year 1997 or before. The Air Sparging well pumps air into the groundwater which flushes dissolved VOC's out of the water. The installation of vapor extraction wells above the groundwater source allows the VOC's to be extracted, treated, and then released into the atmosphere. This technology has been used since the 1970's to remove volatile organic compounds (VOCs) from landfills. The DOE will be responsible for an evaluation required by the Record of Decision (ROD) to occur in FY 2010 and FY 2015. It is assumed that the evaluation will not require additional response action. No advantages or disadvantages associated with the use of this technology in terms of worker exposure are noted. The number of workers necessary to utilize this technology is not noted^(58, 59).

Technology 3: Amalgamation Technology

This mixed/hazardous waste technology was used at the site to treat radiologically contaminated mercury to meet standards for land disposal. Operation was small-scale and performed in an engineering controlled environment (i.e. lab hood). Advantages include a controlled environment to reduce personnel exposure. No disadvantages associated with the use of this technology in terms of worker exposure are noted. The number of workers necessary to utilize this technology are not noted. This system has operated in 1995 and is expected to continue until 1997.

Technology 4: Transportation and Storage.

Transportation and storage are past and present technologies utilized for interim storage and disposal of mixed and hazardous wastes. The numbers of workers necessary to accomplish these technologies is medium at 11 - 75. Descriptive exposure potential associated with these wastes involves contact with the waste, the requirement of PPE, possible airborne contamination and indoor/outdoor work. No advantages with these technologies in terms of worker exposure are noted. Disadvantages include potential for incidental exposure due to accident, continuous surveillance and maintenance, and the technology is labor intensive.

Technology 5: Hazardous and Mixed Waste Treatment - Soil Separation/Treatment

Soil Separation/Treatment is an ex-situ, physical extraction/separation process for the removal of organic, inorganic, and radiologically contaminated soil by physical means (mass action) or chemically by complexing, chelating, reducing, oxidizing or ion-exchange. Exposure potential encountered during the Soil Separation/Treatment process involves limited contact due to a closed loop system. Work is performed indoors using facility HEPA ventilation and off-gas scrubbers. "Level B" PPE is worn. Advantages of Soil Separation/Treatment technology include reduced potential for skin contact with hazardous or mixed waste in a closed loop treatment system.

Disadvantages of Soil Separation/Treatment technology include the utilization of phosphates and sulfates as additives. Radon control issues are noted. The number of workers necessary to utilize this technology full scale are between 50 and 100 total. Soil Separation/Treatment technology was tested for a short time in 1997 as a pilot program. In 1996 Soil Separation/Treatment technology was also utilized. The use of Soil Separation/Treatment technology is expected to continue from 1998-2007.

Technology 6: Bio-remediation of petroleum contamination

Contaminated soils such as those at the fire fighting area in OU5, are trucked to a covered handling area where bacteria are used to naturally breakdown organic (carbon-containing) materials. Oxygen is added to the soil through bi-weekly tilling. The oxygen and nutrients produce carbon dioxide and water.^[96] No advantages or disadvantages associated with the use of this technology in terms of worker exposure are noted. The number of workers necessary to utilize this technology are low at 1-10. This practice began in 1975 and is expected to continue until 1999^(57, 70).

Technology 7: Beta Wastewater Solidification Facility

This technology is utilized to treat radiologically contaminated wastewater. A “concrete-like” additive (Aquaset®) is mixed with the wastewater which subsequently solidifies. The solidified matrix is then containerized and can be shipped offsite for disposal. Advantages include contaminant immobility factors. No disadvantages associated with the use of this technology in terms of worker exposure are noted. The number of workers necessary to utilize this technology are low at between 1 and 10. This system has been in operation since 1973 and is expected to continue until FY 2000⁽⁶⁴⁾.

Remediation Worker HW/De Technologies

Technology 8: Pipe Crawler

Science Applications International Corporation has been awarded a contract to characterize 1100 linear feet of underground pipe. The Pipe Crawler system traverses the inside of a pipe with a variety of radiation and other detectors and provides a survey of the pipes' contents. Advantages include remote determination of PPE levels and reduction of worker stay times and containment measures. No disadvantages associated with the use of this technology in terms of worker exposure are noted. The number of workers necessary to utilize this technology are not noted but are presumed to be low at 1-10. The technology was tested for a short time in 1994 as a pilot program. The use of this technology is expected to continue from 1997-2000⁽⁵⁸⁾.

Remediation Worker HW/De/CW Technologies

Technology 9: Baseline Decontamination Technologies

Baseline decontamination technologies are past and present Mixed and Hazardous Waste decontamination technologies that include chemical or electrochemical technique, thermal technique and mechanical cleaning and washing. Advantages in terms of worker exposures associated with the use of these technologies are that they are versatile and easy to control. Disadvantages in terms of worker exposures associated with the use of these technologies include: generation of airborne contaminants and/or secondary wastes, inefficiencies and expense of intensive labor, time consuming, high risk of worker exposure, and inability to efficiently decontaminate components having complex geometries or surface irregularities (e.g., welds in steel and concrete cracks and crevices). The number of workers necessary to utilize these technologies is medium at 11 to 75⁽⁶⁰⁾.

Remediation Worker HW/CW Technologies

Technology 10: Hazardous and Mixed Waste Disposal and Transportation - Standard Excavation Technology

Standard Excavation Technology remediates hazardous and mixed wastes by excavation and removal of hazardous waste solids. Exposure potential using this technology involves limited contact with the waste and outdoor contact with the waste. Level of PPE worn is dependant upon area contamination conditions. Advantages of using Standard Excavation Technology include reduced potential for skin contact with hazardous waste solids. Disadvantages noted were exposure to weather conditions while wearing PPE. The number of workers necessary to utilize this technology will be between 1 and 10. The use of Standard Excavation Technology is expected to occur from 1989-2001⁽⁶⁸⁾.

Technology 11: Dig Face System/Warthog[®]

This technology was developed as an ex-situ waste site characterization tool. The technology reduces exposures to workers by eliminating the standard practice of excavation with continued monitoring and sampling to determine the concentration and extent of contamination. Advantages of this technology include removal of the worker from an "unknown" contaminant environment, reduced PPE, and cost savings thru the segregation of radiological and mixed or hazardous waste. No disadvantages associated with the use of this technology in terms of worker exposure are noted. The number of workers necessary to utilize this technology are considered low at between 1 and 10. The Dig Face technology was tested for a short time in August of 1995 as a pilot program on a 20' x 20' x 5' waste site. In 1997 the unit was enhanced by mounting it on a trackhoe (known as Warthog[®]) which will again be utilized as part of a full scale technology deployment at the Mound in 1998. The use of this technology is expected to continue from 1998-2004^(57, 58).

Remediation Worker Di Technologies

Technology 12: Encapsulation - Standard Application of Latex Paint to Contaminated Surfaces (Fixed Radiological).

This technology involves the application of latex paint to encapsulate fixed radiological contamination. Exposure potential involves limited contact and is performed indoors while using "Level B" PPE. Advantages of encapsulation include reduced worker exposure to airborne chemical or radiological contaminants. No disadvantages are noted. The number of workers necessary to utilize this technology is low at 5 to 10.

Technology 13: Baseline Technologies for Dismantlement.

Baseline Technologies for Dismantlement are past/present Radioactive Waste treatment technologies which utilize manual and hydraulic tools to cut, shear, lift, and move structural materials and process equipment. These tools include overhead cranes, high-pressure water jets, saws, laser cutters, and plasma and acetylene torches. Advantages of utilizing these technologies in terms of worker exposures include versatility and ease of control. Disadvantages of utilizing these technologies in terms of worker exposures include: generation of secondary wastes which must be handled, requirement of manual intervention/operation, and exposure of workers to industrial and radiological safety and health hazards. The numbers of workers necessary to utilize these technologies are not noted but is anticipated to be Low 1-10⁽⁶⁰⁾.

Remediation Worker CW Technologies

Technology 14: ISOTRON® Electrokinetics Technology

The Isotron® company has expertise with the removal of organic and inorganic contaminants in soils, groundwater, and concrete surfaces using electrokinetics (an anode and a cathode to move particles). Building 21 was used for storing thorium during the production era, resulting in a concrete pad contaminated with radionuclides. This site was chosen to demonstrate this technology. The commentary on the demonstration is as follows; “This methodology only worked on “perfect” concrete that was flat (with no imperfections) and horizontal.” No advantages or disadvantages associated with the use of this technology in terms of worker exposure are noted. This technology will not be utilized at the site in the future. The number of workers necessary to utilize this technology are presumed to be low at 1 to 10⁽⁵⁶⁾.

Technology 15: Brickmaker® Technology

This technology reduces the volume of clayish soils sent to the NTS by extruding the soil into columns, called bricks, that are 8 inches by 8 inches by five feet long, and weigh 300 pounds.^[94] A thirty-percent reduction in soils volume was realized saving landfill space and money in this volume/cost based contract.

Presently, a rail car delivery system is being utilized which will reduce the impact of the Brickmaker technology. The current plan is to sell this technology to a site which can take full advantage of its applications. No advantages or disadvantages associated with the use of this technology in terms of worker exposure are noted. The number of workers necessary to utilize this technology are not noted⁽⁵⁶⁾.

Technology 16: Equipment and Internal Building Component Removal - Seamist® Method for Stabilization of Hazardous and LLRW in Piping, Ducts and Vent Lines.

This technology utilizes an adhesive fabric liner which is placed on the equipment, trapping the hazardous and LLRW in-place. The trapped contamination can then be removed or left in-place. Exposure potential involves limited contact with the waste, indoor contact and “Level B” PPE. Advantages of this technology include reduction of worker exposure to airborne chemical or radiological contaminants. A disadvantage of this technology is that it cannot be utilized in ducts and pipes that step down or contain baffles. The number of workers necessary to utilize this technology is low at 4⁽⁷¹⁾.

Technology 17: Chemical Extraction Decontamination

Chemical extraction techniques were tested on the clay-like tile floor of Building H. These test results indicated that radiological contamination was removed from the grout between the tiles but the tiles themselves were not penetrated. After five cleanings the tiles were still contaminated. It was determined that this technology would be more useful on porous floor surfaces. No advantages or disadvantages associated with the use of this technology in terms of worker exposure are noted. The number of workers necessary to utilize this technology are not noted⁽⁵⁶⁾

Technology 18: CO₂ Blasting

Concrete surface contamination inside of buildings and structures is one of the most serious problems at DOE facilities. New technologies are required to remove concrete surface contamination so that buildings and structures can be reused or dismantled. Concrete surface decontamination allows the majority of concrete waste to be disposed of as nonhazardous, nonradioactive solid waste, a major cost savings. CO₂ Blasting is an innovation which was used in the SW Cave project to reduce the amount of blasting media and the substrate generated. Advantages: Remotely controlled systems equipped with vacuum/filtration/containment subsystems reduce personnel exposure by removing the worker from the contamination zone and eliminating the need for PPE. No disadvantages associated with the use of this technology in terms of worker exposure are noted. The number of workers necessary to utilize this technology is low at 1-10. CO₂ Blasting technology was tested for a short time in 1994 as a pilot program. The use of this technology is expected to continue from 1997-2002⁽⁶¹⁾.

Technology 19: Tritium Effluent Removal System/Tritium Solidification

The tritium effluent removal system is located in the SW/R area and treats wastewater from gloveboxes and other containment devices located in SW/R and T- buildings. Selentech Corp. was awarded a contract by the DOE to perform a large-scale demonstration project for tritium treatment technology relative to D&D efforts. No advantages or disadvantages associated with the use of this technology in terms of worker exposure are noted. The number of workers necessary to utilize this technology are not noted. This system has been in operation since 1965 and is expected to continue until 1999⁽⁶²⁾.

Technology 20: Alpha Wastewater Treatment System (WD Building)

This clarifier/flocculation-based wastewater treatment technology is utilized widely throughout the country to treat alpha-bearing radioactively contaminated wastewater. At the Mound, this technology allows the final effluent to be safely discharged into the Great Miami river. Advantages include a closed loop system. No disadvantages associated with the use of this technology in terms of worker exposure are noted. The number of workers necessary to utilize this technology are low at between 1 and 10. This system has been in operation since 1970 and is expected to continue until FY 2000⁽⁶³⁾.

Mound Future Technology Needs/Opportunities Statement Outline

Certain remediation technologies have not been fully developed to date. The following is a list of Mound site-specific remediation technologies in need of development⁽⁶⁵⁾:

Fixative Spray For Porous Materials

Description: Develop a fixative spray that will attach and be absorbed into porous material that would preclude the need for surface decontamination of a building prior to demolition. This fixing of contaminants would significantly reduce airborne contamination released into the environment during demolition. This fixative spray should be applied remotely. This should also be applied to large pieces of equipment prior to removal.

Schedule Requirements: Need is now, but will be significantly greater in FY-98.

Problem Description: The process of surface decontamination of buildings prior to demolition is a significant percent of the effort to demolish the buildings. By using a fixative spray, these costs could be avoided.

Technical Justification for Need: The spray must be able to be used on a large scale. It must not result in the creation of mixed waste, and it must be applied remotely.

Environmental Safety and Health: Worker exposure during the surface decontamination of the building could be eliminated. The release fraction could be significantly reduced, thus reducing exposure to the public and environment.

Current Baseline Technology: The surface of the building is decontaminated by various processes. This results in the formation of dust and debris. During the final demolition of the building, that contamination not removed becomes a part of the release fraction.

Misting Frame for Buildings

Description: Develop a misting frame that can be erected around a building easily and be lightweight and reusable.

Schedule Requirements: FY-99.

Problem Description: A misting frame would eliminate the need for hand misting. This would reduce worker exposure and provide a more uniform spray.

Technical Justification for Need: The misting frame must be easy to erect, lightweight, reusable and allow for the maneuverability of heavy equipment typical of D&D projects.

Environmental Safety and Health: Worker exposure would be reduced. This would result in an engineering control for building demolition.

Current Baseline Technology: Hand sprayers are used now.

Pipe Removal

Description: Develop a device that can be snaked into a pipe or drain and then be removed while filling the pipe with a solidifying substance, thus permitting the safe size reduction and removal of the pipe.

Schedule Requirements: FY-98.

Problem Description: The process for removing radiologically contaminated pipes is labor intensive and may require a bubble suit. This process would reduce the time it takes to perform the task as well as potentially lowering PPE requirements and worker exposure.

Technical Justification for Need: The solidifying material must not create mixed waste.

Environmental Safety and Health: Worker exposure would be reduced.

Current Baseline Technology: Pipes are removed by cutting sections by hand.

Remediation Technologies for Tritiated Soils

Schedule Requirements: FY-98.

Problem Descriptions: Currently tritiated soils are to be remediated by digging up the soil and shipping the soil off site as LSA waste. This is very costly and contributes to a significant part of the costs to decommission the Mound Tritium Complex.

Technical Justification for Need: The remediation technology must be cost competitive with the baseline technology.

Environmental Safety and Health: Worker exposure will be reduced as the treatment would eliminate digging up the soil and shipping it.

Current Baseline Technology: Tritiated soil is shipped offsite.

Process Piping Characterization, Decontamination, and Disposal Methods

Description: Develop characterization, decontamination and disposal techniques for tritiated process piping.

Schedule Requirements: FY-98.

Problem Description: Cost effective methods for disposal of copper and stainless steel piping. Develop cost effective methods for removal of piping. Develop methods to characterize process piping.

Justification for Need: None noted

Environmental Safety and Health: Ensure worker safety and decrease potential of any environmental impact.

Current Baseline Technology: Alpha decontamination methods.

Improved PPE for Working in Various Temperature Environments

Description: Worker productivity is degraded with high temperature environments.

Schedule Requirements: FY-97.

Problem Description: Workers in PPE during hot, humid conditions may have stay times as low as 10 minutes with cool down periods of 50 minutes or more.

Justification for Need: None noted

Environmental Safety and Health: Reduce worker risk.

Current Baseline Technology: Ice vests.

Decon/Disposal Methods for Tritiated Oils and Mercury

Schedule Requirements: FY-98.

Problem Description: Various pumps in these facilities have tritiated pump oils. A better method for decontamination and disposal needs to be developed. Mound also has over 10 gallons of tritiated mercury that must be handled.

Technical Justification: There is no way to dispose of these mixed wastes now.

Environmental Safety and Health: Ensure worker safety and decrease potential of any environmental impact.

Current Baseline Technology: Store until disposal site becomes available.

Decontamination Techniques for Tritiated Gloveboxes

Description: Decontamination techniques, size reduction methods, and contaminated sealant techniques.

Schedule Requirements: FY-98.

Problem Description: 1000 linear feet of tritiated gloveboxes need to be decontaminated and disposed of in a cost effective manner.

Technical Justification for Need: Need to replace “brute force” method of D&D. Replace alpha decontamination methods.

Environmental Safety and Health: Ensure worker safety and decrease potential of any environmental impact.

Current Baseline Technology: Alpha decontamination methods.

7.4 PATH FORWARD/SITE SPECIFIC STRATEGIES

The following assumptions are utilized to focus on cost savings and schedule to achieve an end state by FY 2005:

- Ownership of the entire site by the MMCIC by September 30, 2005 with DOE/Mound Environmental Management Program (MEMP) exited from the site.
- Tritium (T) Bldg. Disposition: Radionuclide contamination will be removed to the extent human health and the environment are protected. Radionuclide contamination will be removed to the extent which will permit transition of the facility to the MMCIC with restricted access and to enable no further monitoring requirements. In the restricted access areas, the remaining radionuclide (tritium) will be allowed to naturally decay.
- A new operating contractor for MEMP activities is expected to be awarded and in-place between by the fourth quarter of FY 1997 with a minimum of 25% reduction in overhead and administration costs. All TRU waste will be dispositioned to the WIPP by September 30, 2005. A total of 68 oversized waste boxes containing TRU will be repackaged in a refurbished existing facility on-site. A total of 117 drums (55 gallon) containing TRU and repackaged box waste will be characterized and packaged to WIPP Waste Acceptance Criteria (WAC) at the Mound site utilizing the mobile system capabilities being developed by the Carlsbad Area Office. Preliminary evaluation has indicated direct shipment of Mound TRU waste, as is, via ATMX railcar to another DOE site for characterization and repackaging to WIPP WAC could potentially avoid costs amounting to \$4.5 million and remove the waste from the Mound prior to FY 2000. This option will be pursued further and may ultimately be selected. Implementation of intersite shipping will require DOE/HQ and DOE/Carlsbad Administrative Office (CAO) involvement to reach agreement with other sites/states. No new significant quantities of Mixed Waste or TRU Waste will be generated in the next nine years (<10 percent of inventory).
- Nuclear Materials and Tritium operations will be complete by March, 1998.

- The DOE/Nuclear Energy (NE) program has a continuing mission at Mound extending past FY 2005. Buildings (EG-2, 36, 37, 39, 44, 50, and 102) will continue to be used by the Heat Source/Radioisotopic Thermoelectric Generator program, a DOE/NE program. DOE/NE will be responsible for the application of landlord costs, safe shutdown, cleanup and disposition requirements for these buildings. Buildings 46, 88, and 101 are currently used by the DOE/NE program, but will be transferred to the DOE/EM program prior to FY 2001. The equipment within Building 46 will be removed by DOE/NE prior to transfer to DOE/EM, and remaining applicable safe shutdown, cleanup, and final disposition for these buildings will be the responsibility of DOE/EM. PRSs associated with these buildings will be addressed by DOE/EM.
- All leased buildings impacting the cleanup program will officially return to DOE starting in FY 1999, allowing DOE to perform final disposition prior to title transfer to the MMCIC prior to FY 2005. Other leased buildings will not require significant effort (i.e., no equipment removal) related to title transfer.
- Regulators will not impose additional requirements to complete the site transition. Existing agreements will not be modified. No future regulations will be enacted which adversely impact cost or schedule.
- Volatile Organic Compound (VOC) contaminated groundwater will be remediated prior to FY 2005 by using Air Sparging and High Vapor Extraction technologies to supplement pump and treat (Installation to be in CY 1997 or before). DOE will be responsible for an evaluation required by the Record of Decision (ROD) to occur in FY 2010 and FY 2015. It is assumed that the evaluation will not require additional response action. (General Note: all response actions are the responsibility of DOE).
- Schedules to accomplish safe shutdown and decommissioning of T and SW/R buildings assume the use of multiple crews and double shifts beginning in FY 2000, or before, in order to complete all work by FY 2005.
- The MMCIC issued the "Mound Comprehensive Reuse Plan (CRP) Development Options Summary" - Draft - dated July 23, 1996. Significant discrepancies exist between the preferred development alternative cited in the CRP and the end state in the DOE/MEMP Ten Year Plan, issued January 1997 (e.g., specific discrepancies exist concerning end disposition of buildings and economic development funding plans). It is assumed that costs and schedules cited in the DOE/MEMP Ten Year Plan are not adversely impacted by future resolutions to these discrepancies.

- The DOE Under Secretary clarified the use of funds for EM versus Economic Development.
- It is assumed that EM funds presently in the Ten Year Plan will be required to be reallocated for workforce restructuring.
- DOE Nuclear Energy (NE) organization will pay for its proportionate share landlord costs from FY 1997 through the conclusion of any joint DOE/EM and DOE/NE agreement.
- All buildings at the site have not been fully characterized. It is assumed that future characterization data will reveal less contamination than presently estimated. As a result, applicable costs will be reduced 30% in FY 1998 and beyond. Included in this cost reduction improvements in developments such as railcar bulk shipments of Low Level Waste (LLW). Program baselines will be revised to match results of future characterizations.
- Historic Disposal Areas (Spoils Area, Historic OUI Disposal Area, Orphan Soils Area) do not require cleanup (only assessment). It is assumed that agreement with the regulators will be obtained⁽⁶⁶⁾.

Exhibit 8.1: Chronological Summary of Key Programs at the Mound Site

Activity	Start-End Dates
Polonium-210 D&D	1949 - 1971 (peak 1954) 1974
Radium-226/Actinium-227 D&D	1949 - 1953 (peak 1953) 1955 - 1959
Biological Studies Actinium-227 Polonium-210	1952 - 1954 1949 - 1955
Purex Pilot Plant	1952 - 1953
Reactor Waste Research	1949 - 1953
Tritium	1955 - present
Thorium-232 Refinery D&D	1955 1965 - present
Explosive Detonators (Plastics, ceramics and adhesives)	1956 - present
Neutron Sources Polonium-210 Plutonium-239	1949 - 1971 1956 - 1962
Plutonium-238 D&D	1960 - 1978 present
Reactor Fuels	1953 - 1966
Rare Isotopes Polonium-208, -209 Thorium-228, -229, -230 Uranium-233, -234 Thorium-230 (ionium) Protactinium-231	1956 - 1983 1956 - 1957 1957, 1972 - 1983
Stable Isotopes	1957 - present

**Exhibit 8.2: List of Chemicals Reported on SARA Title III, 312 Report for 1995 for the
DOE's Mound Facility As Reported June, 1996**

CHEMICAL NAME	CAN #	CERCLA-Extremely Hazardous Substance (EHS) & CERCLA-Hazardous Substances (HS) Threshold Planning Quantity (pounds)
Diesel Fuel	68476-34-6	①
Ethylene glycol	110-80-5	①
Nitric Acid	7697-37-2	EHS= 500
Nitrogen ,liquid	7727-37-9	①
Helium, liquid	7440-59-7	①
Argon, liquid	7440-3-71	①
No.2 Fuel oil	68476-30-2	①
Chlorine	7782-50-5	EHS= 100
Sulfuric Acid	7664-93-9	EHS= 500
Unleaded Gasoline (Gasohol)	86290-81-5	①

①The reportable quantity for all HS chemicals is 10,000 pounds, the Mound site retains less than that amount.

Exhibit 8.3: Regulatory Authorities for Release Response

Release Type	Primary Release Response Regulatory Authority Reference	Comments
Radionuclide-bearing Wastes	AEA	DOE policy to operate in an environmentally safe manner (general duty clauses, e.g., DOE Order 5400.1) constitutes an appropriate federal response mechanism to the release (40 CFR 400.415). If the character of the release is such that continued response is more appropriate under a different authority, response may be continued under the FFA.
Non-radionuclide-bearing Wastes	AEA	DOE policy to operate in an environmentally safe manner (general duty clauses, e.g., DOE Order 5400.1) constitutes an appropriate federal response mechanism to the release (40 CFR 400.415). If the character of the release is such that continued response is more appropriate under a different authority, response may be continued under the FFA.
Petroleum or Other Regulated Substance	RCRA 40 CFR 280 Subpart F/BUSTR O.A.C. 1303: 7-7-36 and 7-9-13	Releases of petroleum substances that could reach navigable waters are also subject to Mound's Spill Prevention, Controls, and Countermeasures Plan.
Hazardous Waste	RCRA 40 CFR 264 Subpart J/O.A.C. 3745-51-20 et seq.	Releases of petroleum substances that could reach navigable waters are also subject to Mound's Spill Prevention, Controls, and Countermeasures Plan.

AEA - Atomic Energy Act

DOE - U.S. Department of Energy

FFA - Federal Facility Agreement

RCRA - Resource Conservation and Recovery Act

Exhibit 8.4: Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences	
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases	
1	Miami-Erie Canal (north pond)	C-5	Historical	Plutonium-238, Tritium	Plutonium-238	
2	Miami-Erie Canal (south pond)	C-5	Waters of the U.S.			
3	Miami-Erie Canal (north canal)	D-4, E-4, F-4, G-4	Waters of the U.S.			
4	Miami-Erie Canal (runoff hollow)	G-4	Tributary Drainage			Tritium
5	Miami-Erie Canal (south canal)	I-4, J-4, K-4, L-4	Waters of the U.S.			
6	Miami-Erie Canal (overflow creek)	M-4, N-4	Waters of the U.S.			
7	Plant Sanitary Pipeline	H-5, I-3, I-4	In Service	Plutonium-238	Suspected	
8	Site Sanitary Landfill	I-5	Historical	Contaminants listed under historic landfill	None Suspected	
9	Area 18, Site Sanitary Landfill Cover	I-5	In Service	Plutonium-238, Thorium	(Information not cited in reference material)	

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
10	Historic Landfill	I-4, I-5	Historical	Administrative and laboratory trash Beryllium, Mercury, Nickel Carbonyl, Trichloroethene, Carbon Tetrachloride, Lithium Hydride, Benzene, Alcohol, Acetone, Polychlorinated Biphenyl Oils, Waste Antifreeze, Waste Oil, Paints, Solvents, Photo-processing Solutions, Plating Solutions, Sediment from plant drainage ditch, Bioassay samples, Scintillation "Cocktails"	Suspected VOCs
11	Area 2, Thorium and Polonium-Contaminated Wastes (AKA Crusted Drums)	I-4, I-5	Historical	Polonium-210, thorium-contaminated drums, Polonium-210 contaminated sand and debris Thorium sludge constituents, Plutonium-238	Thorium and daughters
12	Area B Drum Storage Area	I-5	Historical	Chemical wastes	None Suspected
13	Trash Incinerator	J-5	Historical	Solid Waste	None Suspected
14	Area C, Waste Storage Area (AKA Drum Staging Area and Chemical Waste Storage area)	H-6	Historical	VOCs	Suspected, not confirmed
15	Area C, Lithium Burn Area (AKA Lithium Carbonate Disposal)	H-5	Historical	Lithium Hydride	Possible lithium residues, not confirmed

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
16	Area C, Past Hazardous Waste Storage Area (AKA old Building 72) see related site 345	H-6	Historical	Potential contaminants listed under Hazardous Waste Storage Area	Minor, historically remediated
17	Oil Burn Structure	H-5	Inactive	Aviation fuel benzene, toluene, ethyl benzene, xylenes	Confirmed EPH, dioxin/furans
18	Building 34, Fire Fighting Training Facility Pits	H-5	Inactive	Diesel Fuel	Confirmed EPH
19	Building 34, Historical Firefighting Training Pit	H-5	Historical	Diesel Fuel	Suspected Confirmed dioxin/furan
20	Building 34 Aviation Fuel Storage Tank (Tank 219)	H-5	Historical	Aviation fuel	Tank removed, VOC residuals
21	Building 1 Leach Pit (Area I)	G-6	Surplus	Wastewater from explosives processes Organic solvents (primarily acetone)	Suspected, not confirmed
22	Building 1 Explosives Wastewater Settling Basin (Tank 200)	G-6	Surplus	Wastewater from explosives processes Organic solvents	Suspected
23	Building 43 Explosives Wastewater Settling Basin (Tank 201)	G-6	Surplus	Explosives production process wastes	Suspected

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
24	Building 43 Solvent Storage Tank (Tank 221)	G-6	Never used Removed	None suspected (never used)	Suspected
25	Building 27 Leach Pit (Area 1)	H-6	Surplus	Wastewater from explosives processes Organic solvents (primarily acetone)	Suspected, not confirmed
26	Building 27 Concrete Flume (Tank 217)	G-6	Surplus	Wastewater from explosives processes Organic solvents (primarily acetone)	Suspected, not confirmed
27	Building 27 Settling Sump (Tank 218)	G-6	Surplus	Wastewater from explosives processes Organic solvents (primarily acetone)	Suspected, not confirmed
28	Building 27 Solvent/Drum Storage Area	G-6	Surplus	Wastewater from explosives processes Organic solvents (primarily acetone and ethanol)	Suspected, not confirmed
29	Building 27 Filtration System	G-6	Surplus	Wastewater from explosives processes Organic solvents	Suspected, not confirmed
30	Building 27 Diesel Fuel Storage Tank (Tank 123) (AKA Building 27 Propane Tank)	G-6	Inactive	Tank is actually above ground	(Information not cited in reference material)

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
31	Underground Sanitary Sewer Line G5	H-5	In service	Organic solvents	(Information not cited in reference material)
32	Underground Sanitary Sewer Line G12	F-8, G-8		Plating solutions, Laboratory chemicals	Suspected, not confirmed
33	Underground Sanitary Sewer Line G14 EAST	H-5, H-6		Nitric acid, Hydrochloric acid	
34	Underground Sanitary Sewer Line G14 WEST	H-5, H-6		Methylene chloride	
35	Underground Sanitary Sewer Line G19 and G14	G-5		Strong acids and bases	
36	Underground Sanitary Sewer Line G15	E-9			
37	Building 51 Waste Solvent Storage Tank (Tank 220)	F-8	Historical	Organic solvents, Paints, Waste oils	Tank Removed 1991, VOC residuals

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
38	Building 51 Waste Incinerator	F-8	Historical	Contaminants listed under Bldg. 51 Waste Solvent Storage Tank (Tank 220)	(Information not cited in reference material)
39	Building 51 Waste Incinerator Scrubber	F-8	Historical	Combustion products from Bldg. 51 Waste Incinerator	Water released to plant drainage ditch
40	Building 66 Lot	F-8	Grounds	Plutonium-238 from unknown source	Plutonium-238
41	Area 3, Thorium Drum Storage and Redrumming Area	G-5, H-5	Grounds	Thorium-232 and daughters	Thorium dust
42	Area A, Construction Soils from T Building	H-5	Grounds	Construction soil from T Bldg.	None Suspected
43	Wastewater Treatment plant Building 57 Grit Chamber (Tank 101)	H-5	In service	Sanitary waste waters	None Suspected Treatment effluent released to Great Miami River via closed pipeline NPDES permitted outfall 001
44	Building 57 Grit Conveyor			Water softener backwashes discharged to storm sewer	
				Plutonium-238 and other radionuclides	

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
45	Building 57 Comminuter (Tank 102)	H-5	In Service	Sanitary waste waters	None Suspected Treatment effluent released to Great Miami River via closed pipeline NPDES permitted outfall 001
46	Building 57 Equalization Basin (Tank 103)			Water softener backwashes discharged to storm sewer	
47	Building 57 Equalization Basin (Tank 104)			Plutonium-238 and other radionuclides	
48	Building 57 Equalization Basin (Tank 105)				
49	Building 57 Equalization Basin (Tank 106)				
50	Building 57 Aeration Basin (Tank 107)				
51	Building 57 Aeration Basin (Tank 108)				

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
52	Building 57 Clarifier (Tank 109)	H-5	In service	Sanitary waste waters Water softener backwashes discharged to storm sewer Plutonium-238 and other radionuclides	None Suspected Treatment effluent released to Great Miami River via closed pipeline NPDES permitted outfall 001
53	Building 57 Clarifier (Tank 110)				
54	Building 57 Sand Filters (2 units)				
55	Building 57 Chlorine contact chamber (Tank 111)				
56	Building 57 Chlorine contact chamber (Tank 112)				
57	Sludge Drying Beds	H-5	Historical	Plutonium-238	Suspected
58	Dredge Spoil Drying Beds	H-5	Surplus	Contaminants listed under Asphalt-Lined Pond	Suspected

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
59	Contaminated Soil Box Storage Area	G-6	Historical	Plutonium-238	Suspected
60	Hazardous Waste Storage Area (Building 72)	G-5	In service	Combustible and flammable liquids, Waste oils, Solvent-containing wastes, Ignitable wastes, Plating wastes, Photo-processing wastes, Polymeric wastes, Toxic wastes	None Suspected
61	Building 72 Outdoor Hazardous Waste Storage Area		Inactive	Waste oils	
62	Building 72 empty Drum Storage Area		In service	None suspected	
63	Building 19 Soils	G-5	Grounds	Cobalt-60	Cobalt-60
64	Building 19 Historic Gasoline Tank (Tank 238)	G-5	Historical	Gasoline	No information on when tanks were removed
65	Building 61 Area, Former Heavy Equipment Area	E-10	Historical	Waste oil	Suspected

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
66	Area 7, Thorium and Polonium Wastes	E-8, E-9 F-8, f-9	Historical	Plutonium-238, Thorium-232 and -238, Polonium-210, Actinium-227, Radium-226, Cesium-137	Suspected
67	Plant Drainage Ditch	F-4, F-5 F-6, F-7 F-8, G-4 G-5, G-6 G-7, G-8 H-4, H-5 H-6, H-7	in service, Waters of the U.S.	Plutonium-238, Thorium, Tritium Fuel oil, boiler blowdown water, ethylene glycol, sodium sulfite, sodium phosphate, octadecylamin, cyclohexylamine Effluent from asphalt-lined pond	Plutonium-238, Oil Zinc chromate Calcium chloride Ethylene glycol
68	Asphalt-Lined Pond	E-9	in service, Waters of the U.S.	Wastewater from SM/PP Hill Storm Sewers Plutonium-238 Non-contact cooling water - cooling tower blowdown, regeneration of zeolite water softeners	Effluent to Plant Drainage Ditch
69	Overflow Pond	H-5, I-5	in service, Waters of the U.S.	Site sanitary landfill leachate, plutonium-238 Effluent from plant drainage ditch Stormwater runoff	Zinc Chromate Calcium chloride Ethylene glycol
70	Retention Basins and Weir Basin	H-5	in service, Waters of the U.S.	Stormwater runoff Effluent from Plant Drainage Ditch Plutonium-238	(Information not cited in reference material)
71	Building 85 Waste Solvent Tank (Tank 136)	I-5	Inactive	None (never used)	Never used

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
72	Area 13 Polonium-Contaminated Wood from Dayton Unit IV	H-7	Historical	Polonium-210	None Suspected
73	Evaporator Storage Area (AKA Lower storage area)	H-7	Historical	Actinium-227, Cesium-137, Radium-226	(Information not cited in reference material)
74	Quonset hut (former)	H-7	Historical	Polonium-210, cobalt-60, bismuth	(Information not cited in reference material)
75	Railroad Siding	G-6, G-7	Inactive	Thorium and daughters	Suspected thorium
76	Warehouse 9	G-7	Historical	Thorium-232	Suspected thorium
77	Warehouse 10	G-9	Historical	Polonium-210	None suspected
78	Warehouse 13	G-9	Historical	Reactor waste including Strontium-90, Cesium-137, and Nickel-63	Cesium 137

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
79	Warehouse 15	E-8	Historical	Radioactive Waste Plutonium-238 wastes and sludge Thorium sludge constituents ©	Suspected
80	Warehouse 15A	F-8	Historical	Plutonium-238, thorium	
81	Drilling Mud Drum Storage Areas (3 locations)	H-5, I-4	Historical	Barium	None Suspected
82	Building 57 Diesel Fuel Storage Tank (Tank 118)	H-5	In service	Diesel fuel	(Information not cited in reference material)
83	Building 2 Propane Storage Tank (Tank 118)	H-7	Inactive	Propane	(Information not cited in reference material)
84	Building 56 Diesel Fuel Storage Tank (Tank 223)	F-5	Historical	Diesel fuel	Tank Removed
85	Building 29 Solvent Storage Shed	E-8	Inactive	Acetone	Suspected

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
86	Building 29 Septic Tank (Tank 224)	E-9	Historical	Actinium-227, Radon-222, Thorium-228, Radium-226	Suspected
87	Building 49 Solvent Storage Shed	G-7	Inactive	Organic solvents (including trichloroethene, isopropanol, ethanol, freon-TF, hexane)	Suspected
88	Tritium in Buried Valley Aquifer	H-4	Historical	Tritium	Tritium, historically remediated
89	Test Fire Residual Storage Area	H-7	In service	Unexploded detonation devices	None Suspected
90	Site Survey Project Potential Hot Spot Location S0425	G-8	Grounds	Thorium	Unknown
91	Main Hill Seep 0601	F-5	NA	Tritium, VOCs	Tritium, VOCs
92	Main Hill Seep 0602	G-7	NA	Tritium, VOCs	Tritium, VOCs

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
93	Main Hill Seep 0603	D-8	NA	Tritium, VOCs	Tritium, VOCs
94	Main Hill Seep 0604	D-6	NA	Tritium, VOCs	Tritium, VOCs
95	Main Hill Seep 0605	D-6	NA	Tritium, VOCs	Tritium, VOCs
96	Main Hill Seep 0606	D-6	NA	Tritium, VOCs	Tritium, VOCs
97	Main Hill Seep 0607	C-7	NA	Tritium, VOCs	Tritium, VOCs
98	Main Hill Seep 0608	C-7	NA	Tritium, VOCs	Tritium, VOCs
99	Area 6, WD Building Filter-Cleaning Waste	D-8	Historical	Polonium-210, Cobalt-60, Radium-226	Suspected

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
100	Area F, Chromium Trench	D-8	Historical	Chromium plating bath solution treated with sodium bisulfide, cadmium, nickel, silver	Suspected
101	Cooling Tower Basins	E-7, E-8	In service	<p>Sulfuric Acid</p> <p>Chromates</p> <p>NALCO 2575 (phosphonate base, tolytriazole, polyacrylate, sodium chromate)</p> <p>NALCO 2532 (bistributyltin) oxide, n-alkyldimethylbenzyl ammonium chloride, potassium hydroxide)</p> <p>NALCO 2590 (calcium hypochlorite)</p> <p>ANCO CSA (phosphonate base, tolytriazole, polyacrylate)</p> <p>MICROBICIDE 77 (5-chloro-2 methyl-4-isothiazolin-3-one, 2-methyl-4-isothiazolin-3-one)</p> <p>ANCO ALGAECIDE No. 1 (2-benzyl-4-chlorophenol, sodium hydroxide)</p> <p>SILTEX (sodium polyacrylate)</p> <p>ANCOCIDE 4020 (glutaraldehyde)</p> <p>ANCOSPERSE 3830 (polyalkylene glycol, n-alkyldimethylbenzylammonium chloride)</p> <p>ANCOOL 3310 (phosphonate triazole, sodium molybdate, sodium hydroxide)</p>	Blowdown water is released to storm sewer and drainage ditch.

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
102	Cooling Tower Drum Storage Area	E-7, E-8	In service	Contaminants listed under Cooling Tower Basins Ethylene glycol	(Information not cited in reference material)
103	E Building Soils	E-6, E-7 F-7	Grounds		Indicated by Soil Gas Survey
104	Scintillation Vial Storage Area	E-6	service	Tritium, Trimethylbenzene	None suspected (within E Building)
105	E Building Solvent Storage Shed	F-6	Historical	Trichloroethene, Ethanol, Methanol	Closed before construction of E Building Annex, soil removed
106	G Building Soils (AKA Garage Area)	E-7	Grounds	Waste oil, Waste antifreeze, Automotive batteries Asbestos	Suspected petroleum products
107	G Building Gasoline Tank (Tank 202)	E-7	Historical	Gasoline	Tanks removed 1986, petroleum contaminated soils removed
108	G Building Gasoline Tank (Tank 203)	E-7	Historical		

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
109	G Building Gasoline Tank (Tank 204)	E-7	Historical	Gasoline	Tanks removed 1986, petroleum contaminated soils removed
110	I Building Soils	E-6, F-6	Grounds	Toluene acetone, Freon	Indicated by Soil Gas Survey
111	Monitor Well 0034	F-7	Surplus	Waste oil	Suspected
112	Paint Shop Area	E-7	In service	Paints, Thinners, Solvents (including toluene and methylene chloride) Lead, Chromates	Suspected, confirmed lead
113	Powerhouse Soils	E-7	Grounds	Calcium chloride, magnesium chloride, zinc chromate, PCBs	Indicated by Soil Gas Survey
114	Powerhouse Fuel Oil Storage Tank (Tank 113)	E-7	In service	Fuel oil	Fuel Oil, confirmed EPH
115	Powerhouse Fuel Oil Storage Tank (Tank 114)				

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
116	Powerhouse Fuel Oil Storage Tank (Tank 115)	E-7	In service	Fuel oil	Fuel Oil, confirmed EPH
117	Powerhouse Fuel Oil Storage Tank (Tank 116)				
118	M Building Soils	E-7	Grounds	Copper Cyanide, Silver Cyanide Machine oils, Solvents	Oils, Copper cyanide, Silver cyanide
119	Room M-38 Metal Plating Rinse Water Sump (Tank 225)	E-7	Surplus	Rinse waters from metal plating operations. Possible contaminants include nickel, cadmium, silver, gold, manganese, cyanide, and aluminum. Sodium hydroxide solution Potassium permanganate	None Suspected
120	Room M-108 Metal Plating Rinse Water Tank (Tank 119)	E-7	In service	Rinse waters from metal plating operations. Copper, gold, silver, nickel, aluminum, and uranium.	Silver cyanide
121	Vapor Degreasers	E-7	In service	Perclene D (perchloroethylene)	None Suspected
122	Underground Radioactive Waste Lines (Main Hill)	E-6, F-6	Inactive	Alpha wastes from SW Bldg., R Bldg., and H Bldg. Wastewater from B Building. Plutonium-238, Cobalt-60	Suspected

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
123	Area 5, Radioactive Waste Line Break	F-6, F-7	Grounds	Cobalt-60, Cesium-137, Plutonium-238	Cobalt-60
124	Building 48 Hillside	F-6	Inactive	Plutonium-238	Plutonium-238
125	Underground Sanitary Sewer Line G24	F-6	In service	Organic solvents, Plating Solutions, Laboratory chemicals, Nitric acid, Hydrochloric acid, Methylene chloride, Strong acids and bases	Suspected
126	Building 28 Solvent Storage Area	E-6	Grounds	Organic solvents (including alcohol, methylene chloride, and acetone)	Suspected
127	Building 28 Solvent Storage Shed	E-8	In Service	Organic solvents (including alcohol, methylene chloride, and acetone)	Suspected
128	DS Building Solvent Storage Shed	F-7	In Service	Organic solvents (including 1, 1, 1-trichloroethane, trichlorofluoromethane, ethanol, and trichloroethane)	Suspected
129	B Building Solvent Storage Shed	E-6	Inactive	Organic solvents (including trichloroethene, trichlorofluoromethane, ethanol, methonal, isopropanol, acetone, methylene chloride, toluelene) Oils	Suspected

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substances	Releases
130	B Building Temporary Drum Storage Area	E-8	Inactive	Waste Solvents, waste oil, and trash from E and B Bldgs.	Suspected
131	SW Building Soils	F-7	Grounds	Tritium, Radium-226, Actinium-227, Thorium-232	Tritium beneath the building
132	Area 15, Entombed SW Cave (Room SW 1-B)	E-6	Historical	Radon-222, Radium-226, Actinium-227, Thorium-228	Radon-222
133	SW Building Room 1-A	E-6	Historical	High-activity wastewater from radium and actinium processing, reactor waste including Radium-226, Actinium-227, Cesium-137, Plutonium-238, and Uranium-238.	Cesium-137 (sealed in concrete in building floor)
134	SW Building Storage Area	E-6, F-6	In Service	Hazardous wastes Asbestos, Waste oils, Antifreeze	(Information not cited in reference material)
135	Room SW-8 Beta Wastewater Tank (Tank 20)	F-6	In Service	Tritium	(Information not cited in reference material)
136	Room SW-125 Beta Wastewater Tank (Tank 21)	F-6	In Service	Tritium	Suspected

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
137	Room SW-143 Beta Wastewater Tank (Tank 21)	F-6	In service	Tritium	Suspected historical leaks Tanks lined
138	Room SW-137 Beta Wastewater Sump (Tank 23)	E-6, F-6	Inactive	Alpha wastewater from drains, sinks, and processes in SW Bldg - Uranium-238.	Suspected uranium-233
139	Room SW-10 Beta Wastewater Sump (Tank 226)	F-6	Inactive	tritium	Suspected historical leaks, tank lined
140	Beta Waste Solidification Facility - SW Building	E-6, F-6	In service	tritium Waste oils including vacuum pump, gear box, and diffusion pump oils.	(Information not cited in reference material)
141	Tritium Effluent Removal System	E-6	In service	Vacuum pump oils Organic solvents Tritium wastewater	tritium
142	SW/R Building Solid Radioactive Waste Compactor	E-6, F-6	In service	Tritium	(Information not cited in reference material)
143	R/SW/T Building Stack Diesel Fuel Storage Tank (Tank 117)	F-6	In service	Diesel fuel	(Information not cited in reference material)

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
144	R Building Sanitary Waste Collection Tank (Tank 120)	F-6	In service	Sanitary wastes	(Information not cited in reference material)
145	Room R-128 Alpha Wastewater Tank (Tank 19)	E-6	In service	Alpha Wastewater generated in R Bldg. Possible contaminants include Pu-238, 239, Ra-226, and Ac-227	(Information not cited in reference material)
146	R Building Rooms 121, 144, 146, and 148 entombed drains	F-6	Historical	Radium-226, Actinium-227	Sealed in concrete in building floor drains
147	HH Building Soils	F-7	Grounds	Polonium-210, cobalt-60, tritium	Indicated by Solid Gas Survey
148	HH Building Solidification Unit	F-7	Historical	Cobalt-60, Polonium-210	Unknown
149	HH Building Pilot Incinerator	F-7	Historical	Polonium-210	Probable air releases in 1951
150	Room HH-6 Alpha Wastewater Sump (Tank 236)	F-7	Inactive	Beta wastewater from restrooms and process area floor drains - tritium	Unknown

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
151	Room HH-6 Alpha Wastewater Sump (Tank 237)	F-7	Historical	Alpha wastewater from process area floor drains. Possible contaminants include polonium-210, cobalt-60, and bismuth.	Unknown - filled with concrete
152	HH Building Beta Wastewater Sump (Tank 24)	F-7	In service	Beta wastewater from process area sinks and floor drains	Unknown
153	Area 20, Radioactive Waste Line Break	G-7	Grounds	Sodium nitrate, Plutonium-238, Cesium-137, Thorium, Cobalt-60	Cobalt-60
154	Area 23, Thorium Contaminated Soil	F-6, G-6	Grounds	Thorium-230	Thorium-230
155	Old Sanitary Disposal (SD) Plant (AKA Old Sanitary Wastewater Treatment Plant)	F-6	Surplus	Chromic acid, Calcium cyanide, Nickel sulfate, Nickel Chloride, Black Oxide, Copper Cyanide Polonium-210, Cobalt-60	Unknown
156	Old SD plant Tank (Tank 205)	F-6	Surplus		
157	Old SD plant Tank (Tank 206)	F-6	Surplus	Photo-processing solutions Metal Finishing Rinse Water	Unknown

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
158	Old SD plant Tank (Tank 207)	F-6	Surplus	Photo-processing solutions Metal Finishing Rinse Water	Unknown
159	Area 4A, Sewage Sludge Drying Pits	F-5, F-6 G-5, G-6	Surplus	Sanitary wastewaters Sludge from old sanitary wastewater treatment plant Plutonium-238, Thorium, Cesium-137, Cobalt-60 Calcium cyanide, Nickel Sulfate, Nickel chloride, Black oxide, Copper Cyanide Radioactive wastes, Process effluent, Metal finishing rinse water	SD Plant effluent was released to pit
160	Mixed Waste Storage Area (Building 23)	G-6	In service	Tritium, Thorium compounds, Uranium compounds, Plutonium-238 Trimethylbenzene, Octane, Oils, cleaning materials, Polychlorinated biphenyls, Lead Various chemicals (Including mercury, acids, solvents)	None Suspected
161	Glass Melter Furnace	F-6	Inactive	Ion exchange resins Plutonium-238, Cobalt, Strontium, Cesium SD Building sludge Scintillation fluid constituents Acetonitriles Nitrate salt wastes Liquid solvent wastes	Test burns only
162	Glass Melter Feed Drum				
163	Off-Gas Treatment System Deluge Tank				
164	Off-Gas Treatment System Venturi Scrubber				

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
165	Off-Gas Treatment System Cyclone Demister	F-6	Inactive	Ion exchange resins Plutonium-238, Cobalt, Strontium, Cesium SD Building sludge Scintillation fluid constituents Acetonitriles Nitrate salt wastes Liquid solvent wastes Furnace and Cyclones Incinerator	Tests burns only
166	Off-Gas Treatment System HEPA Filter				
167	Off-Gas Treatment System WD Building Filter Bank				
168	Off-Gas Treatment System Recycle Tank				
169	Off-Gas Treatment System Strainer				
170	Off-Gas Treatment System Leaf Solution Filter	F-6	Historical		Filter removed and replaced
171	Off-Gas Treatment System Iodine Absorption Filter	F-6	Historical	None suspected (never used)	(Information not cited in reference material)

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
172	WDA Building Basement Wash Sump (Tank 11) (AKA Glass Melter Room Sump)	F-6	In service	Alpha wastewater from floor and sink drains in WD annex Bldg. Possible contaminants include acrylonitrile, phenol, acetonitrile, kerosene, chlorobenzene, carbon tetrachloride, xylene, acetone, ethanol, and methylene chloride.	None Suspected beyond routine operation
173	Cyclone Incinerator	F-6, G-6	Historical	Plutonium-238 Tributyl phosphate Kerosene Vacuum pump oils	None Suspected
174	WD Building Drum Staging Area	F-6	In service	Solidified plutonium sludge from the Alpha Wastewater Treatment System Low specific activity decontamination and decommissioning wastes	Suspected, not confirmed
175	Area 4, WD Building Influent Tank Overflow	F-6	Surplus	Plutonium-238	Low risk waste overflowed influent tank
176	Area 14, Radioactive Waste Line Break	G-6, G-6	Historical	Plutonium-238, nitric acid	Plutonium-238
177	Building 41 Alpha Wastewater Tank (Tank 209)	G-6	Historical	Alpha wastewater from SM Bldg. 38 Plutonium-23, nitric acid	Suspected Plutonium-238, removed 1985
178	Building 41 Alpha Wastewater Tank (Tank 209)	F-6	In service		

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
179	WD Building Alpha Wastewater Influent Tank (Tank 3)	F-6	In service	<p>Influent alpha wastewater from H Bldg., SW/R Complex, SM Bldg. And Bldg. 38. Possible contaminants include polonium-210, bismuth, plutonium-238, -239, radium-226, thorium-230, -232, -234, uranium-238, -234, -235, tritium and actinium-227.</p> <p>Supernatant liquids from polonium processes in the HII Bldg. Possible contaminants include Protactinium-231, Cobalt-60, Radium-226, and aluminum chloride and bismuth chloride.</p> <p>Detergents, Organic solvents, waste chemicals, Lubricating oil, Citric acid, Chelating agents, Sodium nitrate, Sodium Nitrate, Sodium hydroxide, Formic acid, Sodium tartrate, Formaldehyde, potassium carbonate, Potassium Sulfate, Copper Sulfate, Calcium carbonate, Oxalic acid, Lithium chloride, Zirconium oxide, Sodium carbonate, Potassium bromide, Nickel sulfate, Asbestos filter, Methylene blue, Mercury, Lead, Beryllium, Cyanides.</p>	Overflow of tanks recorded, see Area 4A.
180	WD Building Alpha Wastewater Influent Tank (Tank 4)	F-6	In service		
181	WD Building Alpha Wastewater Influent Tank (Tank 5)				
182	WD Building Alpha Wastewater Influent Tank (Tank 6)				
183	Room WD-1 Basement Sump (Tank 12)	F-6	In service	Alpha wastewater from floor and sink drains in the WD Bldg. Possible contaminants include Plutonium-238, -239, Thorium-230, -232, -234, Radium-226, tritium and Cobalt-60.	None Suspected
184	Room WD-1 Alpha Wastewater Sump (Tank 17)	F-6	In service		None Suspected
185	Room WD-1 Sanitary Waste Sump (Tank 134)	G-6	In service	Sanitary wastes	

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
186	Room ED-8 Alpha Wastewater Sump (Tank 18)	F-6	In service	Alpha wastewater from floor drains	None Suspected
187	WD Building Alpha Wastewater Clariflocculators (2 units)	F-6, G-6	In service	Contaminants listed under WD Building Alpha Wastewater Influent Tank (Tank 3)	
188	WD Building Alpha Wastewater Mixing Box				
189	WD Building Alpha Wastewater Sand Filters (2 units)				
190	WD Building Alpha Wastewater Bone Char Columns (2 units)				
191	WD Building Alpha Wastewater Effluent Tank (Tank 7)	G-6	In service	Treated alpha wastewater prior to discharge	Released through closed pipeline to Great Miami river NPDES Outfall 001 Effluent less than DOE Effluent release criteria
192	WD Building Alpha Wastewater Effluent Tank (Tank 8)				

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
193	WD Building Alpha Wastewater Effluent Tank (Tank 10)	G-6	In service	Treated alpha wastewater prior to discharge	Released through closed pipeline to Great Miami river NPDES Outfall 001 Effluent less than DOE Effluent release criteria
194	WD Building Alpha Wastewater Effluent Tank (Tank 10)	G-6	In service	Treated alpha wastewater prior to discharge	Ibid
195	WD Building Alpha Wastewater Sludge Pits (2 units)	F-6, G-6	In service	Contaminants listed under WD Building Alpha Wastewater Influent Tank (Tank 3)	None Suspected
196	WD Building Alpha Wastewater Sludge Solidification/Drumming Unit	F-6, G-6	In service	Contaminants listed under WD Building Alpha Wastewater Influent Tank (Tank 3)	None Suspected
197	WD Building Solid Radioactive Waste Compactor	F-6, G-6	In service	Solid alpha wastes	None Suspected
198	WDA Building Basement Sanitary Waste Tank (Tank 135)	F-6	In service	Sanitary wastewater from WD Bldg. Annex Penthouse	None Suspected

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substances	Releases
199	WDA Building Beta Wastewater Influent Tank (Tank 13)	F-6	In service	Beta wastewater from T Bld. Equipment decontamination, floor mopping, and sprinkler system including tritium and solvents	Historical effluent released to plant drainage ditch, effluent less than AEC release criteria
200	WDA Building Beta Wastewater Influent Tank (Tank 14)	F-6	In service	Contaminants listed under WD Bld.. Beta Wastewater Influent Tank (Tank 13)	None Suspected
201	WDA Building Beta Wastewater Metering Station	F-6	In service	Contaminants listed under WD Bld.. Beta Wastewater Influent Tank (Tank 13)	
202	WDA Building Beta Wastewater Mixing/Solidification Unit	F-6	In service	Contaminants listed under WD Bld.. Beta Wastewater Influent Tank (Tank 13)	
203	WDA Building Alpha Wastewater Influent Tank (Tank 15)	F-6	In service	Influent alpha wastewater. Possible contaminants include Polonium-210, Cobalt-60, Plutonium-238, Radium-226, Actinium-227, Cesium-137, thorium, Uranium-238.	
204	WDA Building Alpha Influent Tank (Tank 16)	F-6	In service	Ibid	
205	WDA Building Alpha Effluent Tank (Tank 214)	F-6	In service	Contaminants listed under WD Building Alpha Wastewater Influent Tank (Tank 3)	Effluent released to plant drainage ditch, effluent less than AEA Release criteria
206	WDA Building Alpha Effluent Tank (Tank 215)				

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
207	WDA Building Alpha Effluent Tank (Tank 216)	F-6	Inactive	Contaminants listed under WD Building Alpha Wastewater Influent Tank (Tank 3)	Effluent released to plant drainage ditch, effluent less than AEA Release criteria
208	WDA Building Solidification Unit	F-6	Historical	Plutonium-238	None Suspected
209	Building 62 Stack Deluge Tank (Tank 1)	E-6	In service	None suspected (never used)	None Suspected
210	Room H-131 Laundry Water Tank (Tank 2)	E-6	In service	Alpha wastewater from laundry operations. Possible contaminants include Pu-238, Th-230, -232, -234, tritium, Ra-226, -228, and Ac-227. Ethylene glycol monobutyl ether, Sodium hydroxide, Ammonium bicarbonate, Sodium hexametaphosphate	None Suspected
211	A Building Decontamination Shower Water Tank (Tank 29)	E-6	In service	Wastewater from medical decontamination shower. Plutonium-2387 and -239, Thorium-228, -230, and -232, Radium-226 and -228, and tritium	None Suspected
212	A Building Decontamination Shower Water Tank (Tank 28)	E-6	In service	Wastewater from medical decontamination shower. Plutonium-238 and -239, thorium-228, -230, and -232, Radium-226 and -228, and tritium	None Suspected
213	T Building Solidification Unit	F-7	Historical	Cobalt-60, Polonium-210	None Suspected

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
214	T Building Solid Radioactive Waste Compactor	F-7	In service	Low specific activity beta wastes - tritium	None Suspected
215	Room T-1 Cooling Water Sump (Tank 124)	F-7	In service	Single pass non-contact cooling water	
216	T Building, Corridor 2 Sanitary Wastewater Sump (Tank 125)	F-7	In service	Sanitary wastewaters from restrooms	
217	Room T-11F Sanitary Wastewater Sump (Tank 126)	F-7	In service	Sanitary wastewaters	
218	Room T-15 Sanitary Wastewater Sump (Tank 127)	F-7	In service	Sanitary wastewaters from restrooms and non-work area sinks	
219	T Building, Stair 3 Cooling Water Sump (Tank 128)	F-7	In service	Single pass cooling water from floor drains in air handling area	
220	Room T-78 Steam Condensate Sump (Tank 129)	F-7	In service	Steam condensate from heating system in air handling area	

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
221 thru 230	Information on PRSs 231-130 not included in Operable Unit 9 Site Scoping Report- Final, Vol. 12- Site Summary Report				
231	T Building, Corridor 8 Alpha Wastewater Sump (Tank 233)	F-7	Historical Filled with concrete 1982	Alpha wastewater from process area floor drains	Unknown - filled with concrete
232	T Building, Corridor 7 Alpha Wastewater Sump (Tank 234)	F-7	Historical Filled with concrete 1982	Alpha wastewater from process area floor drains	Unknown - filled with concrete
233	Room T-63 Alpha Wastewater Sump (Tank 235)	F-7	Historical Filled with concrete 1982	Alpha wastewater from process area floor drains	Unknown - filled with concrete
234	Building 58 Diesel Fuel Storage Tank (Tank 222)	E-6	Historical	Diesel Fuel	Tank removed
235	Area of Possible Elevated Thorium Activity	E-6	Grounds	Thorium	Possible fugitive dust

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
236	Site Survey Project Potential Hot Spot Location S0166	F-6	Grounds	Plutonium-238	Isolated activity from unknown sources
237	Site Survey Project Potential Hot Spot Location S0175	E-5, E-6	Grounds	Cobalt-60, Cesium-137	
238	Site Survey Project Potential Hot Spot Location S1092	G-7	Grounds	Thorium	
239	Site Survey Project Potential Hot Spot Location S0208	F-5	Grounds	Plutonium-238	
240	Site Survey Project Potential Hot Spot Location S0472	G-6	Grounds	Thorium	
241	Northwest Parking Lots	D-7	Grounds	Toluene, Freon-113, Trichloroethene	Indicated by Soil Gas Survey
242	VOC Potential Hot Spot Location 1016	D-7	Grounds	Toluene, Trichloroethene	
243	VOC Potential Hot Spot Location 1064	E-7	Grounds	Toluene	

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
244	VOC Potential Hot Spot Locations 1076, 1077, 1079, and 1085	E-6	Grounds	Toluene, Freon-113, 1, 1, 1-Trichloroethene	Indicated by Soil Gas Survey
245	VOC potential Hot Spot Location 1085	F-6	Grounds	Freon-113 Trichloroethene, 1, 1, 1-Trichloroethene	
246	VOC Potential Hot Spot Locations 117 and 1118	G-7	Grounds	Tetrachloroethene	
247	VOC Potential Hot Spot Location 1129	F-8	Grounds	Freon-113, Trichloroethene, 1, 1, 1-Trichloroethene, Tetrachloroethene	Indicated by soil gas survey
248	HH Building Stack	F-7	In service	Polonium-210, Tritium	None suspected beyond routine emissions
249	SW Building Stack (NCPDF)	E-6	In service	Tritium	
250	SW Building Stack (SW1C)	E-6	In service	Uranium-238	

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
251	SW Building Stack (HEFS)	E-6	In service	Tritium	None suspected beyond routine emissions
252	B Building Stack	E-6	Inactive	Polonium-210, Tritium	
253	T Building WEST Stack	F-6	In service	Tritium, Plutonium-238, -239, Uranium-238	
254	T Building EAST Stack	E-7	In service	Tritium, Plutonium-238, Uranium-238	
255	WD Building Stack (ALR)	F-6	In service	Plutonium-238	
256	WD Building Stack (AHR)	F-6	In service	Plutonium-238	
257	WD Building Stack (SS)	F-6	In service	Plutonium-238	

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
258	Area H Open Burn Unit (AKA Pyrotechnic Waste Disposal Area)	I-7	In service	Wastewater from explosives processes Organic solvents (primarily acetone)	Suspected, not confirmed
259	Pyrotechnic Waste Shed	I-7	In service	Pyrotechnic powders Pyrotechnic-contaminated wastes Mineral oil	Suspected, not confirmed
260	Thermal Treatment Shed	I-7	Inactive	Antifreeze Explosives Program waste Mild Detonating cords and fuses Pyrotechnic powders Solid primary explosives	Suspected, not confirmed
261	Trash Burner Area	I-7	Historical	Mild detonating fuses Pyrotechnic material Thermite Freon Acetone	Suspected, not confirmed
262	Retort	I-7	In service	Explosives Program constituents Metals, Asbestos Diallyl-phthalates-based plastic components	Gaseous and particulate emissions released to atmosphere
263	Building 90 Blockhouse				

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
264	Explosive Waste Storage Bunker (Magazine 53)	I-7	In service	Classified, non-explosive wastes Explosive residuals (primary aluminum residuals) Contaminants listed under Explosive Waste Storage Bunker (Magazine 53) Detonators, Detonating cord, Thermite, Pyrotechnic powders, Primary explosives High explosive powder, PETN, PBX, RDX, HMX, HNS, CP HNS (hexanitrostilbene)	None Suspected
265	Biodegradation Unit	I-7	Inactive	Soapy wastewater containing explosives constituents	Suspected
266	Area 8, Thorium-Contaminated Soils from Areas 1 and 9	F-9	Grounds	Thorium-232, Plutonium-238	thorium
267	Area 9, Thorium Storage and Redrumming Area	F-9, G-9	Grounds	Plutonium-238, Thorium Thorium sludge constituents ©	Thorium
268	Building 31, Contaminated Material Storage Building	F-9	In service	Plutonium-238 Thorium Tritium	Non Suspected
269	Building 36 Historic Gasoline Tanks (Tank 239 and 240)	G-10	Historical	Gasoline	No information on when tanks were removed
270	Underground Sanitary Sewer Lines G6 and G7	G-10	In service	Organic solvents, plating solutions, laboratory chemicals, nitric acid, hydrochloric acid, methylene chloride, strong acids and bases	Suspected VOCs

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
271	Building 37 Sanitary Waste Tank (Tank 100)	F-10	In service	Sanitary wastes	None Suspected
272	Area 10, concrete Debris	G-8, G-9	Grounds	Polonium-210, Cobalt-60, Plutonium-238 (from runoff)	Suspected
273	Area 12, Thorium-Contaminated Soil from Area 1	G-9	Grounds	Thorium, Plutonium-238 (from runoff)	Suspected thorium
274	Area 21, Old Bunker	H-9	Grounds	Cesium-137, Strontium-90, Actinium-227, Radium-226	Suspected thorium
275	Area 21, Detonator Shack	H-8	Grounds	Cesium-137, Strontium-90, Actinium-227, Radium-226	Suspected thorium
276	Area 22, Orphan Soil from other Areas	I-8	Inactive	Polonium-210, Radium-226, Cobalt-60, Plutonium-238, Cesium-237	Suspected
277	Area J, Hillside Disposal Area (AKA Dredged Material Disposal Area 11a)	H-8, H-9	Historical	Construction/building debris, Paints, Thinners, Chemical contaminants, Asbestos, Thorium, Plutonium-238	Suspected VOCs

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
278	Area J, Hillside catch basin	H-8	In service	Plutonium-238, (from runoff)	Suspected
279	Old firing Range Drum Storage Area	H-9	Historical	Liquid chemical wastes	Confirmed VOCs
280	Waste Oil drum Field Area	I-8	Historical	Waste oil Plating Operations waste Explosive/solvent waste Herbicides Waste chemicals Photo-processing waste Batteries Kitchen grease Epoxy resins Ethylene glycol Scintillation vials	Confirmed VOCs
281	Area E, Waste Oil Spill	J-8	Historical	Waste oil	Minor oil
282	Spoil Disposal Area/Construction Spoils Area	J-5, K-5	In service	Plutonium-238, Thorium Gasoline contaminated soils from G Building	Plutonium-238 <25 pci/gm Thorium <5 pci/gm
283	Area 1 Bunk Transfer of Thorium Drums (AKA, Plutonium Recoverable Waste Facility)	I to L 6 to 8	Grounds	Thorium sludge constituents, Plutonium-238	Thorium dust, Plutonium-238

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
284	Building 21, Thorium Sludge Storage Facility	J-7, J-8	Surplus	Thorium sludge constituents	Thorium dust
285	Area 11, Contamination from SM Building Operations	G-9	Surplus	Plutonium-238	Plutonium-238
286	Area 16, SM Building Sanitary Sewage Septic Tank Leach Field	F-9, G-9	Surplus	Plutonium-238, Thorium Sanitary wastes from SM Building	Plutonium-238
287	SM Building Historic Septic Tank (Tank 241)	G-7	Historical	Plutonium-238	Plutonium-238
288	Area 17, SM Building Soils	G-9, G-10	Surplus	Plutonium-238, Thorium	Plutonium-238
289	SM Building Alpha Wastewater Tank (Tank 210)	G-9	Historical	Alpha wastewater from plutonium processing	Tanks removed 1986-1988
290	SM Building Alpha Wastewater Tank (Tank 211)				

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
291	SM Building Alpha Wastewater Tank (Tank 212)	G-9	Historical	Alpha wastewater from plutonium processing	Tanks removed 1986-1988
292	SM Building Alpha Wastewater Tank (Tank 213)				
293	SM Building Solidification Unit (Room SM-1)	G-9	Historical	Plutonium-238	None Suspected, equipment removed 1970
294	WS Building Building Solidification Unit	G-9	Historical	Plutonium-238	None Suspected D&D 1983
295	Building 38 Solid Radioactive Waste Compactors (2 units)	G-9, H-9	Inactive	Plutonium-238	None Suspected D&D 1983
296	Building 38 West Dock Sump (Tank 25)	H-9	In service	Precipitation and potentially spilled waste material from a radiological waste drum storage pad - Pu-238	None Suspected
297	Building 38 Alpha Wastewater Sump (Tank)	G-9	In service	Wastewater from floor drains and decontamination showers	None Suspected

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
298	Building 38 Alpha Wastewater Sump (Tank 27)	G-9	In service	Wastewater from floor drains and decontamination showers	None Suspected
299	Building 38 Diesel Fuel Storage Tank (Tank 121)	G-9	In service	Diesel fuel	None Suspected
300	Area 19, Underground Waste Transfer Line	G-6, G-7 G-8, G-9	Historical	Plutonium-238, Nitric acid	Plutonium-238
301	Building 38 In-Line Incinerator	G-9	Historical	Plutonium-238	None Suspected D&D 1986
302	Area D, Acid Leach Field	H-8, H-9 G-8, G-9	Historical	Plutonium-238, Thorium	Plutonium-238
303	Warehouse 14 (AKA Pad 14)	G-9	Grounds	Thorium Sludge constituents Plutonium-238	None Suspected
304	Excavated Materials Disposal Area (AKA Rader's Hill)	I-8	Grounds	Thorium	Thorium <2 pci/gm

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
305	Sm Stack	G-9	In service	Plutonium-238	None suspected beyond routine emissions
306	Sm/PP Hill Seep 0609	L-9	NA	None suspected	None suspected
307	Site Survey Project Potential Hot Spot Location C0007	E-9	Grounds	Thorium	Isolated activity from unknown source
308	Site Survey Project Potential Hot Spot Location C0028	F-10	Grounds	Thorium	
309	Site Survey Project Potential Hot Spot Location S0307	F-9	Grounds	Thorium	
310	Site Survey Project Potential Hot Spot Location S0647	H-9	Grounds	Cesium-137	
311	Site Survey Project Potential Hot Spot Location S0706	I-6	Grounds	Plutonium-238	

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
312	Site Survey Project Potential Hot Spot Location S0971	J-9	Grounds	Thorium	Isolated activity from unknown source
313	Site Survey Project Potential Hot Spot Location S0982	I-8	Grounds	Thorium	
314	Farm Trash Area	M-5	Grounds	waste oil	Suspected, not confirmed
315	Waste Transport Vehicles	SITE-WIDE	Historical	Explosives Programs wastes Mixed wastes Laboratory chemicals Low activity wastewater from SM/PP Complex to WD Building	None Suspected
316	Trash Dumpsters	SITE-WIDE	In service	Solid Wastes	None Suspected
317	Ventilation Hoods	SITE-WIDE	In service	Paint fumes, Acidic and caustic gases Asbestos, Acetone, Trichloroethylene, Benzene, Chloroform, Toluene	None Suspected
318	Transformers	SITE-WIDE	In service	Polychlorinated biphenyls	All PCB oils replaced

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
319	Epoxy Resin Disposal	G-7, H-7	In service	Epoxy resins	None Suspected
320	Dayton Unit I	Dayton	Historical	Radioisotopes (including plutonium-239) Spent acids (including hydrochloric acid)	None Suspected
321	Dayton Unit II	Dayton	Historical	Explosives (including Ammonium picrate and ammonium nitrate) Rocket Propellant	None Suspected
322	Dayton Unit III	Dayton	Historical	Polonium-210, Tellurium, Bismuth, Cobalt, Nickel, Beryllium, Thorium	Suspected Cobalt-60
323	Dayton Unit IV	Dayton	Historical	Contaminants listed under Dayton Unit III	Suspected Cobalt-60
324	Dayton Warehouse	Dayton	Historical	Polonium-210	None Suspected
325	Scioto Facility (Marion)	Scioto	Historical	Facility never used	None Suspected

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
326	Building 38 Sanitary Sump (Tank 254)	G-9	In Service	Sanitary wastewater	None Suspected
327	R-111 Calorimetry Bath (Tank 255)	E-6	Inactive	Deionized water with potential alpha contamination	None Suspected
328	R-111 Calorimetry Bath (Tank 266)				
329	Building 62 Hot Waste Sump (Tank 258)	E-6	In Service	Sanitary wastewater with potential alpha contamination	None Suspected Tank removed
330	Building 2 Fuel Oil Tank (Tank 260)	H-7	Historical	Fuel oil	Unknown
331	Building 2 Tank (Tank 261)	H-7	Historical	Sanitary Wastes	Unknown Closed in place
332	Building G Waste Oil Tank (Tank 262)	E-7	Inactive	Waste oils	Unknown

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substance	Releases
333	Building 87 Explosive Surge Tank (Tank 263)	H-7	In Service	Exhaust air from explosives testing	None Suspected
334	Building 87 Explosive Surge Tank (Tank 264)				
335	Building 87 Explosive Surge Tank (Tank 265)				
336	Building 37 Waste Tank (AKA Low Risk Waste Tank) (Tank 267)	F-10	Inactive	Wastewater	None Suspected Never Used for low-risk wastewaters
337	Building H Condensate Sump (Tank 268)	E-6	In Service	Condensate wastewater	None Suspected
338	Building 29 Septic Tank (Tank 270)	E-9	Inactive	Sanitary wastewater	None Suspected (Abandoned in place?)
339	T-44 Wastewater Sump (Tank 250)	F-7	Historical	Wastewater	Unknown - filled with concrete

Exhibit 8.4(Continued): Comprehensive Tabulation of Potential Release Sites

Description of PRS History and Nature of Waste Handling					Hazardous Conditions and Incidences
PRS No.	Site Name	Location	Status	Potential Hazardous Substances	Releases
340	T-16b Wastewater Sump (Tank 251)	F-7	Historical	Wastewater	Unknown - filled with concrete
341	T-90 Condensate Sump (Tank 269)	F-7	In Service	Condensate wastewater	None Suspected
342	T-1 Hot Side Fire Water Tank (Tank 271)	F-7	In Service	Wastewater/Radioactive wastewater	None Suspected
343	T-20 Fire Water Sump (Tank 272)	F-7	In Service	Wastewater/Radioactive wastewater	None Suspected
344	T-37 Fire Water Sump (Tank 273)	F-7	In Service	Wastewater/Radioactive wastewater	None Suspected
345	Former Equipment Storage Area see related site 16	H-6	Historical	Potential contaminants listed under Hazardous Waste Storage Area	Historically related to site 16

Exhibit 8.5: Potential Release Sites Recommended for Inclusion in the Environmental Restoration Program. September, 1994

Release Blocks	PRS	Status
A through S	13, 119, 126, 1, 2, 4, 14, 15, 16, 20, 21, 22, 23, 25, 26, 27, 28, 38, 39, 42, 71, 73, 74, 81, 261, 269, 281, 314, 330, 338, 345	NFA*
	3, 8, 9, 10, 11, 12, 84, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 103, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 127, 129, 130, 131, 147, 234, 236, 239, 241, 242, 243, 244, 245, 246, 247, 332, 5, 6, 17, 18, 19, 37, 41, 57, 58, 59, 63, 64, 65, 66, 72, 76, 77, 79, 80, 274, 275, 276, 277, 278, 279, 280, 282, 304, 306311, 312, 331, 7, 67, 68, 69, 70	FA**

NFA* = No Further Action (Remediation) Recommended.

FA** = Further Action (Remediation) Recommended.

Exhibit 8.6: Potential Release Sites Recommended for Administration by Mound Operations and Maintenance. September, 1994

Release Blocks	PRS	Status
A through S	29, 61, 83, 85, 87, 161, 162, 163, 164, 165, 166, 167, 168, 169	Inactive*
	31, 32, 33, 34, 35, 36, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 60, 62, 82, 89, 101, 102, 104, 120, 121, 125, 127, 128, 134, 135, 136, 137, 140, 141, 142, 143, 144, 145, 152, 160, 172, 174, 179, 180, 183, 184, 185, 186, 187, 188, 189, 190, 192, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 209, 210, 211, 212, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 248, 249, 250, 251, 253, 254, 255, 256, 257, 258, 259, 262, 264, 268, 270, 271, 278, 296, 297, 298, 299, 315, 316, 317, 318, 319, 326, 329, 333, 334, 335, 336, 337, 341, 342, 343, 344	In Service**
	88	Historical***
	181, 182, 191, 193, 194, 263	Unknown****

Inactive* = PRSs were no longer in service as of September, 1994. Remediation activities will be undertaken, where applicable, with the removal/recycling of the associated facility.

In Service** = PRSs were still in service as of September, 1994. Remediation activities will be undertaken, where applicable, with the removal/recycling of the associated facility.

Historical*** = Remediation undertaken prior to 1989.

Unknown****= Insufficient data on Status of PRS.

Exhibit 8.7: Potential Release Sites Currently in the D&D Program and Sites Recommended for Inclusion in D&D Program. September, 1994

Release Blocks	PRS	Status
A through S	40, 75, 78, 124, 132, 133, 139, 146, 150, 151, 208, 225, 226, 227, 228, 229, 230, 231, 232, 233, 252, 327, 328, 339, 340	D&D*
	86, 90, 122, 123, 138, 153, 154, 155, 156, 157, 158, 159, 175, 176, 177, 178, 205, 206, 207, 235, 237, 238, 240, 266, 267, 272, 273, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 300, 302, 305, 307, 308, 309, 310, 313	FA**

D&D* = Decontamination and Decommissioning activities recommended.

FA** = Further Action Recommended.

Exhibit 8.8: PPE Selection Criteria at the Mound Facility as of August 1997

Level	Equipment Recommended:	Equipment Optional:	Protection Provided:	Should Be Used When:	Limiting Criteria
A	<ul style="list-style-type: none"> - Self-contained breathing apparatus (SCBA). - Chemical suit. - Chem-resistant gloves. - Chem-resistant boots. 	<ul style="list-style-type: none"> - Cooling Unit. - Coveralls. - Long cotton underwear. - Disposable gloves and boot covers. 	-Highest available level of protection.	<ul style="list-style-type: none"> In presence of - Chemicals - Atmospheric vapors, gases, or particulates. - Poorly ventilated areas. 	-Suit materials must be compatible to substances involved.
B	<ul style="list-style-type: none"> - SCBA. - Chemical resistant clothing (coveralls, jacket). - Chem-resistant gloves. - Chem-resistant boots. - Hard hat. - Two-way radio. 	<ul style="list-style-type: none"> - Coveralls. - Disposable gloves and boots. - Face shield. - Long-cotton underwear. 	- Same as A, but with less skin protection. It is the minimum level recommended for initial entries until hazards have been further identified.	<ul style="list-style-type: none"> - In atmospheres identified requiring high respiratory protection, but less skin protection. 	<ul style="list-style-type: none"> - Use only when atmosphere is not suspected of containing high concentrations of vapors or gases. - Not to be used where contact with gases or particulates may affect the skin, or where chemical splashes may occur.
C	<ul style="list-style-type: none"> - Full face mask with air-purifying canister. - Chemical resistant clothing (coveralls, jacket). - Chem-resistant gloves. - Chem-resistant boots. - Hard hat. - Two-way radio. 	<ul style="list-style-type: none"> - Coveralls. - Disposable gloves and boots. - Face shield. - Long-cotton underwear. - Escape mask. 	-The same skin protection as B, but less respiratory protection.	<ul style="list-style-type: none"> - In atmospheres where air contaminants have been identified, concentrations measured, and a canister is capable of removing the contaminant. - Also, that air contaminants or splashes will not adversely affect exposed skin. 	<ul style="list-style-type: none"> -Atmospheric chemicals must not exceed IDLH levels. - The atmosphere must contain at least 19.5% oxygen.
D	<ul style="list-style-type: none"> - Coveralls. - Safety boots and shoes. - Safety glasses, or chemical splash goggles. - Hard hat. 	<ul style="list-style-type: none"> - Gloves. - Escape mask. - Face shield. 	<ul style="list-style-type: none"> - No respiratory protection. - Minimal skin protection. 	<ul style="list-style-type: none"> - The atmosphere contains no known hazards. - Work functions preclude splashes, immersions, and potential for unsuspected inhalation or contact with hazardous chemicals. 	<ul style="list-style-type: none"> - This level should not be worn in the Exclusion Zone. - The atmosphere must contain at least 19.5% oxygen.

Exhibit 8.9: Mound OCAW Members Breakdown by Job Title and Gender as of August 1997

Union Job Title	Total # of Workers	# of Female Workers	# of Male Workers
Construction Crafts	8	1	7
Decontamination	30	16	14
RadCon Crafts	24	0	24
RadCon Fabrication/Mechanical	15	1	14
Repair & Operations Heavy Duty Mechanic II	5	0	5
Repair & Operations Heavy Duty Mechanic II	9	0	9
Hazmat. Laborers	12	2	10
Welders/Pipefitters	14	0	14
EG&G Totals	117	20	97

Per Conversation Report w/Tom Braun. Attachment 8-18-97

Exhibit 8.10: Mound Site Historic Employee Numbers Breakdown by Calendar Year

Calendar Year①	Total Site Employees	Total Site Male	Total Site Female	OCAW Members
1989	2168	1568	600	398
1990	2045	1474	571	332
1991	2079	1493	586	333
1992	1640	1177	463	267
1993	1625	1134	491	259
1994	1281	932	349	193②
1995	1090	776	314	180③
1996	935	672	263	182④

①: As reported on December 31, 1989-96.

②: OCAW Attrition rate of 7.0 %for FY 94.

③: OCAW Attrition rate of 2.1%for FY 95.

④: OCAW members include administrative support personnel such as custodians, cooks and other service workers which are excluded from the study. The study population consists of 117 workers of the 182 members listed. Per fax from Barbara Bonelli, Human Resources Dept, Mound Applied Technologies, Inc., Dated 8/25/97, 11 pages.

Exhibit 8.11: Projected Mound Site Employee Numbers by Calendar Year*

Calendar Year	Total Site Employees
1998	806
1999	865
2000	934
2001	816
2002	733
2003	700
2004	574
2005	662

* figures include DOE, prime contractor and subcontractors at the Mound.

Exhibit 8.12: Reported TEDE* at the Mound Site. 1989 through 1996

Monitoring Year	Labor Category	Occupation Description	Occupation Code	Total Monitored	Number with Measurable TEDE	Collective TEDE (person-mrem)
1989	Unknown	Unknown	0001	2,766	779	25,083
1990	Unknown	Unknown	0001	2,677	398	4,970
1991	Unknown	Unknown	0001	2,244	325	7,856
1992	Unknown	Unknown	0001	2,887	219	7,193
1993	Unknown	Unknown	0001	2,196	258	6,613
1994	Unknown	Unknown	0001	2,827	299	9,065
1995	Unknown	Unknown	0001	2,336	175	6,365
1996	Unknown	Unknown	0001	1,415	405	20,087

* Total Effective Dose Equivalent

Per fax from Derek A. Hagemeyer, SAIC. 9-3-97

Table 9.1: Demographic Description of Remediation Workers at the Mound Facility as of August, 1997

Facility	Contractors	No. of Workers	Industry Profile	Primary Job Task or Category	Top 5 Job Titles	No. of Workers
Mound	Name: E.G.&G, Mound Applied Technologies Address: P.O. Box 3000, (Mound Road) Miamisburg, Ohio 45343-3000 Demographics (POC): Tom Braun - E.G.&G Industrial Relations Phone: (937) 865-4698	398 in FY 89 117 in FY 96 ②	1. Construction 2. Demolition 3. Asbestos and Lead Abatement 4. Nuclear Power Plant Maintenance 5. Solid, Hazardous and Mixed Waste, TSDF Workers	HW/MW/LLRW Treatment, Storage, Disposal, Transportation. Systems Maintenance, Deactivation, Dismantlement of buildings and equipment	1. Decontamination Worker 2. RadCon Crafts 3. RadCon Fabrication/Mechanical Workers 4. Non-Radcon Welders/Pipefitters 5. Hazmat. Laborers	1. 30 2. 24 3. 15 4. 14 5. 12
	Name: ICF-Kaiser, International Address: Gatewayview Plaza, 1600 West Carson Street, Pittsburgh, PA 15219 Demographics (POC): Douglas Malik Phone: (412) 497-2366	③	1. Environmental RI/FS sampling technician 2. Groundwater well driller	N/A	1. Env. Sampling Technician 2. Driller	1. N/A 2. N/A
	Name: (SAIC) Science Applications International Corporation. Address: 4031 Cornell Glenn Highway. Beavercreek, Ohio 45431 POC: Mike Giodano Phone: (937) 431-2220	④	1. Environmental RI/FS sampling technician 2. Groundwater well driller 3. Nuclear Power Plant Maintenance	N/A	1. Env. Sampling Technician 2. Driller 3. Spill response Technician 4. Decontamination Worker	1. N/A 2. N/A 3. N/A 4. N/A

① Roy F. Weston , Inc. 11840 Kempersprings Dr., Cincinnati, OH 45240, Phone:(513)825-3440, (POC): Doug Arthur, this contractor was excluded for the study due to the short term nature of their project support (2-3 weeks on a PCB spill response) and the limited number of workers involved (<10).

② See Exhibit 8.10, "Mound Site Historic Employee Numbers Breakdown by Calendar Year."

③ Mr. Malik was told not to release this information per conversation with James Sechler, IFC Kaiser Federal Contracts Manager (703) 934-3214

④ SAICS' Mr. Giodano was unable to locate this information and felt his workers did not apply to a study of this nature.

Table 9.2: Mound Remediation Worker Contacts, Activity Descriptions and Exposure Types As Reported November, 1997

Facility	Task Type	Contact(s)	Activities Title and Brief Description	Exposure Type	Driver	Time line	Duration	Workers per Activity
Mound	HW	Information gathered from reference material	<p>Activity 1: PRS 111, Oil Contamination, Monitoring Well 0034. Release Block Q</p> <p>Activities associated with this Removal Action were containerization, transportation, storage, and disposal of hazardous waste. Contaminants of concern include petroleum hydrocarbon contaminated water.</p>	Hazardous	CERCLA	10/95 - 3/97	1.5 years	Med: 11 - 75 (estimated)
			<p>Activity 2: PRS 408, Prism System. Lubricating Oil Contamination, Release Block R</p> <p>Activities associated with this Removal Action included excavation, transportation, and treatment of hazardous waste. Contaminants of concern included petroleum hydrocarbon contaminated soil.</p>	Hazardous	CERCLA	12/96 - 4/97	4 months.	Med: 11 - 75 (estimated)

Table 9.2 (Continued): Mound Remediation Worker Contacts, Activity Descriptions and Exposure Types As Reported 11/97.

Facility	Task Type	Contact(s)	Activities Title and Brief Description	Exposure Type	Driver	Time line	Duration	Workers per Activity
Mound	HW	Information gathered from reference material	<p>Activity 3: PRS 114-117, Fuel Oil Storage Removal Action (FOSRA), Release Block O</p> <p>Activities associated with this Removal Action included excavation, transportation, treatment, storage, and disposal of hazardous waste. Contaminants of concern associated with this activity were petroleum hydrocarbons.</p>	Hazardous	CERCLA	2/96 - 1/97	11 months	Med: 11 - 75 (estimated)
			<p>Activity 4: PRS 18, Fire Fighting Training Area (FFTA) Response Action, Release Block J</p> <p>Activities associated with this Removal Action included excavation, transportation, treatment, storage, and disposal of hazardous waste. Contaminants of concern associated with this activity were petroleum hydrocarbons.</p>	Hazardous	CERCLA	7/27/1994 thru 1/18/1995	5.5 mos	Med: 11 - 75 (estimated)

Table 9.2 (Continued): Mound Remediation Worker Contacts, Activity Descriptions and Exposure Types As Reported 11/97.

Facility	Task Type	Contact(s)	Activities Title and Brief Description	Exposure Type	Driver	Time line	Duration	Workers per Activity
Mound	HW	Information gathered from reference material	<p>Activity 5: West Powerhouse Polychlorinated Biphenyl (PCB) Site, Release Block O</p> <p>Activities associated with this Removal Action included excavation, containerization, storage, and disposal of contaminated soils and water. Contaminants of concern associated with this activity were PCBs.</p>	PCBs	TSCA/ CERCLA	03/13/1991 thru 03/27/1991	2 weeks	Med: 11 - 75 (estimated)
			<p>Activity 6: Operable Unit 1 Remedial Action. Release Block I</p> <p>Activities associated with this Remedial Action include collection and treatment of contaminated groundwater and disposal of treated water. Contaminants of concern include 1,2-Dichloroethane; 1,2-cis-DCE; vinyl chloride; and tetrachloromethane.</p>	Hazardous	CERCLA	Unknown	Unknown	Med: 11 - 75 (estimated)

Table 9.2 (Continued): Mound Remediation Worker Contacts, Activity Descriptions and Exposure Types As Reported 11/97.

Facility	Task Type	Contact(s)	Activities Title and Brief Description	Exposure Type	Driver	Time line	Duration	Workers per Activity
Mound	HW	Information gathered from reference material	<p>Activity 7: PRS 17, Oil Burn Structure</p> <p>Activities associated with this proposed action include the identification and removal of chemically contaminated soils and materials for offsite transportation, storage, and disposal.</p> <p>Contaminants of concern are aviation fuel, benzene, toluene, ethyl benzene, xylenes.</p>	Hazardous	AEA	12/95 - 6/98	2.5 years	Med: 11 - 75 (estimated)
			<p>Activity 8: PRS 153, Radioactive Waste Line Break</p> <p>Activities associated with this proposed action include the identification and removal of mixed, chemically and radiologically contaminated soils and materials for offsite transportation, storage, and disposal.</p> <p>Contaminants of concern are Sodium Nitrate, Pu - 238, Cs - 137, Th, Cs - 60.</p>	Mixed	AEA/RCRA	2/96 - 7/97	1.5 years	Med: 11 - 75 (estimated)

Table 9.2 (Continued): Mound Remediation Worker Contacts, Activity Descriptions and Exposure Types As Reported 11/97.

Facility	Task Type	Contact(s)	Activities Title and Brief Description	Exposure Type	Driver	Time line	Duration	Workers per Activity
Mound	De	Information gathered from reference material	<p>Activity 9: Semi-Works (SW) Building Areas Decontamination and Decommissioning Project</p> <p>Activities associated with these projects will include, but are not limited to: cleaning and removal of radioactively contaminated equipment, fumehoods, gloveboxes, and the associated piping and equipment; structural decontamination; and disposal of the wastes generated by the operations. Contaminants of concern include protactinium-231, thorium-230, thorium-229, uranium-233, tritium, tritiated mercury, and asbestos associated with piping and equipment.</p>	Radioactive	AEA	Upon completion of NEPA review - 3/2010	Unknown	Med: 11 - 75 (estimated)

Table 9.2 (Continued): Mound Remediation Worker Contacts, Activity Descriptions and Exposure Types As Reported 11/97.

Facility	Task Type	Contact(s)	Activities Title and Brief Description	Exposure Type	Driver	Time line	Duration	Workers per Activity
Mound	De	Information gathered from reference material	<p>Activity 10: Waste Disposal (WD) Annex Building Decontamination and Decommissioning Project</p> <p>Activities associated with this project will include, but are not limited to: cleaning and removal of radioactively contaminated equipment, gloveboxes, structural decontamination, and disposal of the wastes generated by the operations. Contaminants of concern include tritium, plutonium, americium, cobalt, thorium, and cesium, may be present. Asbestos is also present on piping and equipment.</p>	Radioactive	AEA	Upon completion of NEPA review - 1/99	Unknown	Med: 11 - 75 (estimated)

Table 9.2 (Continued): Mound Remediation Worker Contacts, Activity Descriptions and Exposure Types As Reported 11/97.

Facility	Task Type	Contact(s)	Activities Title and Brief Description	Exposure Type	Driver	Time line	Duration	Workers per Activity
Mound	De	Information gathered from reference material	<p>Activity 11: Sanitary Disposal (SD) Plant Decontamination and Decommissioning Project</p> <p>Activities associated with this project will include, but are not limited to: decontamination and small-scale demolition of the pumping building, enclosed equipment, underground tanks, contaminated sanitary lines, excavation of drying beds and associated soil, and disposal of the wastes generated by the operations. Contaminants of concern include plutonium-238, polonium-210 daughter products, cobalt-60, and isotopes of bismuth.</p>	Radioactive	AEA	Upon completion of NEPA review - 12/99	Unknown	Med: 11 - 75 (estimated)
			<p>Activity 12: Building 21 Decontamination and Decommissioning Project</p> <p>Activities associated with this project will include, but are not limited to: decontamination and decommissioning of a reinforced concrete building and the removal of adjacent radioactively contaminated soil. Contaminants of concern include thorium-232 and plutonium-238.</p>	Radioactive	AEA	9/97 - 5/2005	8 years	Med: 11 - 75 (estimated)

Table 9.2 (Continued): Mound Remediation Worker Contacts, Activity Descriptions and Exposure Types As Reported 11/97.

Facility	Task Type	Contact(s)	Activities Title and Brief Description	Exposure Type	Driver	Time line	Duration	Workers per Activity
Mound	De/CW	Information gathered from reference material	<p>Activity 13: R-Building Decontamination and Decommissioning Project</p> <p>Activities associated with the decommissioning of laboratories 120, 127, 130, 131, 143, and 147 included, but were not limited to: cleaning and removal of radioactively contaminated equipment, structural decontamination, asbestos removal, and disposal of the wastes generated by the D&D operations. Plutonium-238 was the contaminant of concern associated with these D&D actions.</p>	Radioactive	AEA	1978 - 1990	12 years	Med: 11 - 75 (estimated)
	Di/HW		<p>Activity 14: PRS 129/130, B-Building Solvent Storage Shed Demolition, Release Block R</p> <p>Activities associated with this demolition were excavation, transportation, storage, and disposal of hazardous waste. Contaminants of concern associated with this demolition were Freon 113; trans-1,2 dichloroethene; 1,1,1-trichloroethane; trichloroethane; and toluene.</p>	Hazardous	CERCLA	1994	1 years	Med: 11 - 75 (estimated)

Table 9.2 (Continued): Mound Remediation Worker Contacts, Activity Descriptions and Exposure Types As Reported 11/97.

Facility	Task Type	Contact(s)	Activities Title and Brief Description	Exposure Type	Driver	Time line	Duration	Workers per Activity
Mound	Di/CW	Information gathered from reference material	<p>Activity 15: Special Metallurgical (SM) Building Dismantlement Project.</p> <p>Activities associated with this dismantlement were excavation, transportation, storage, and disposal of radioactive waste. Contaminant of concern was Pu - 238.</p>	Radioactive	AEA	1993 - 1995	2 years	Med: 11 - 75 (estimated)
	CW		<p>Activity 16: PRS 86, Removal of Septic Tank and Associated Soils, Release Block F</p> <p>Activities associated with this Removal Action included the excavation, removal, transportation, storage, and disposal of a radiologically contaminated septic tank and associated radiologically contaminated soils. The contaminants of concern were actinium-227 and thorium-232.</p>	Radioactive	AEA	3/96 - 7/97	16 mos	Med: 11 - 75 (estimated)

Table 9.2 (Continued): Mound Remediation Worker Contacts, Activity Descriptions and Exposure Types As Reported 11/97.

Facility	Task Type	Contact(s)	Activities Title and Brief Description	Exposure Type	Driver	Time line	Duration	Workers per Activity
Mound	CW	Information gathered from reference material	<p>Activity 17: PRS 266, Thorium Contaminated Soil Release Block F</p> <p>Activities associated with this Removal Action included excavation of soils, interim storage, shipment of Low Specific Activity (LSA) containers, and off-site disposal of the contaminated soil. The contaminant of concern was thorium -232.</p>	Radioactive	AEA	8/95 - 5/97	21 mos	Med: 11 - 75 (estimated)
			<p>Activity 18: OU 4, Miami-Erie Canal Removal Action (Includes PRSs 1 - 6)</p> <p>Activities associated with this Removal Action will include excavation of contaminated soils and transportation of contaminated soil to an off-site disposal facility. The contaminants of concern are plutonium-238 and tritium.</p>	Radioactive	CERCLA	1996 -1998	2 years	Med: 11 - 75 (estimated)

Table 9.2 (Continued): Mound Remediation Worker Contacts, Activity Descriptions and Exposure Types As Reported 11/97.

Facility	Task Type	Contact(s)	Activities Title and Brief Description	Exposure Type	Driver	Time line	Duration	Workers per Activity
Mound	CW	Information gathered from reference material	<p>Activity 19: Drainage Control Interim Response Action, Release Blocks K and E</p> <p>Activities associated with this Removal Action included excavation, transportation, and disposal of radioactive waste. Contaminants of concern associated with this activity were plutonium-238, thorium-232, and asbestos-containing concrete pipe.</p>	Radioactive	CERCLA	6/95 -10/95	4 mos.	Med: 11 - 75 (estimated)
			<p>Activity 20: Waste Transfer System (WTS) Decommissioning Project.</p> <p>Project involved the removal and disposal of contaminated soil, equipment and materials associated with underground lines used to transfer liquid wastes. Activities associated with this project included excavation, transportation, and disposal of radioactive waste. Contaminant of concern associated with this activity was plutonium-238.</p>	Radioactive	CERCLA	Equipment and materials removal and disposal-1882 thru 1987. Removal of radiologically contaminated soils continued until early 1991.	9 years	Med: 11 - 75 (estimated)

Table 9.2 (Continued): Mound Remediation Worker Contacts, Activity Descriptions and Exposure Types As Reported 11/97.

Facility	Task Type	Contact(s)	Activities Title and Brief Description	Exposure Type	Driver	Time line	Duration	Workers per Activity
Mound	CW	Information gathered from reference material	<p>Activity 21: OMA Soils D&D Project</p> <p>Activities will consist of the removal of radioactively contaminated soil. Contaminants of concern are plutonium, thorium, cesium, cobalt, actinium, and radium. Some asbestos contaminated soil may be present.</p>	Radioactive	AEA	Upon completion of NEPA review - 1/2005	Unknown	Med: 11 - 75 (estimated)
			<p>Activity 22: PRS 75, Railroad Siding</p> <p>Activities associated with this proposed action include the identification and removal of radiologically contaminated soils and materials for offsite transportation, storage, and disposal. Contaminants of concern are Thorium and daughters.</p>	Radioactive	AEA	3/96 - 9/2005	9 years	Med: 11 - 75 (estimated)

Table 9.2 (Continued): Mound Remediation Worker Contacts, Activity Descriptions and Exposure Types As Reported 11/97.

Facility	Task Type	Contact(s)	Activities Title and Brief Description	Exposure Type	Driver	Time line	Duration	Workers per Activity
Mound	CW	Information gathered from reference material	Activity 23: PRS 76, Warehouse 9 Activities associated with this proposed action include the identification and removal of radiologically contaminated soils and materials for offsite transportation, storage, and disposal. Contaminant of concern is Th - 232.	Radioactive	AEA	8/95 - 6/97	2 years	Med: 11 - 75 (estimated)
			Activity 24: PRS 40, Building 66 Parking lot. Activities associated with this proposed action include the identification and removal of radiologically contaminated soils and materials for offsite transportation, storage, and disposal. Contaminant of concern is Pu - 238.	Radioactive	AEA	3/96 - 7/97	1.5 years	Med: 11 - 75 (estimated)

Table 9.2 (Continued): Mound Remediation Worker Contacts, Activity Descriptions and Exposure Types As Reported 11/97.

Facility	Task Type	Contact(s)	Activities Title and Brief Description	Exposure Type	Driver	Time line	Duration	Workers per Activity
Mound	CW	Information gathered from reference material	Activity 25: PRS 273, Thorium contaminated soils Activities associated with this proposed action include the identification and removal of radiologically contaminated soils and materials for offsite transportation, storage, and disposal. Contaminants of concern are thorium and Pu - 238.	Radioactive	AEA	11/96 - 11/97	1 year	Med: 11 - 75 (estimated)

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Table 9.3: Past, Present, and Proposed Future Technologies for Remediation Workers at the Mound Site as of Aug. 1997

Facility	Task and Time Period	Task Title	Technology and Brief Description	# Workers per Technology	Descriptive Exposure Potential	Advantages	Disadvantages
Mound	HW Task Past: 1989-1997 Present: 8/97 Proposed: 1997-2001	Preparation of mixed wastes for treatment	Technology 1: Bulking Shipment for Incineration Bulking, containerizing, sampling and shipping of mixed waste to be incinerated at an offsite TSDF.	LOW: 1-10	Labor intensive setup, sampling and pumping utilizing a closed loop system. Shipping of containerized waste.	1. Limited contact utilizing PPE 2. Reduced exposure potential by eliminating the waste from the site. 3. Closed loop pumping system	1. Outdoors workers subject to weather conditions
	HW Task Past: 95-97 Proposed: 1997-2015	Treatment of ground water and soil	Technology 2: Air Sparging and Vapor Extraction Treatment technologies Air sparging wells pump air into the groundwater thereby flushing dissolved VOC's out of the groundwater. The installation of vapor extraction wells above the groundwater source allows the VOC's to be extracted from the soil, treated, and then released into the atmosphere.	LOW: 1-10	Once installed very limited contact is anticipated.	1. Closed loop system which reduces personnel exposure potential.	1. Long duration technology requiring several years of operation
	HW Task Past: 1995-1997	Treatment of mixed/hazardous wastes	Technology 3: Amalgamation Technology This mixed / hazardous waste technology was used at the site to treat radiologically contaminated mercury to meet standards for land disposal.	LOW: 1-10	Operation was small-scale and performed in an engineering controlled environment (i.e., lab hood)	1. Engineering controlled system to reduce personnel exposure.	1. None noted

Table 9.3 (Continued): Past, Present and Proposed Future Technologies for Remediation Workers at the Mound Site as of Aug. 1997

Facility	Task and Time Period	Task Title	Technology and Brief Description	# Workers per Technology	Descriptive Exposure Potential	Advantages	Disadvantages
Mound	HW Task Past: 95-97 Present: 8/97 Proposed: 1997-2001	Transportation and Storage of HW and MW	Technology 4: Transportation and Storage of Mixed and Hazardous wastes These past and present technologies are utilized during interim storage and disposal of mixed and hazardous wastes within RCRA warehouse type facilities	MED: 11-75	Involves contact, PPE requirements, potential airborne radiological and/or hazardous waste components and indoor/outdoor work activities	1. None Noted	1. Potential for incidental exposure due to accident 2. Continuous surveillance and maintenance are required 3. The technology is labor intensive
	HW Task Past: 96-97 (pilot) Proposed: 1997-2001 (full scale)	Treatment of HW and MW soil	Technology 5: Soil Separation/Treatment This technology involves the removal of organic, inorganic and radiologically contaminated soil by physical means (mass action) or chemically by complexing, chelating, reducing, oxidizing or ion-exchange.	LOW: 1-10 pilot program. MED: 11-75 full scale	Involves limited contact due to a closed loop system. Work is performed indoors using facility HEPA ventilation and off-gas scrubbers. "Level B" PPE is worn	1. Reduced potential for skin contact with hazardous or mixed waste in this closed loop treatment system	1. Utilization of phosphates and sulfates as additives. 2. Radon control issues.
	HW Task Past: 1975-97 Proposed: 1997-99	Treatment of HW and MW soil	Technology 6: Bio-remediation of Petroleum Contaminated Soil Soil is trucked to a covered handling area where bacteria are used to naturally breakdown organic (carbon-containing) materials. Oxygen is added to the soil through bi-weekly tilling.	LOW: 1-10 pilot program.	Once trucked to handling area limited contact with soil occurs, tilling is performed using a tractor in an open air environment	1. Allows end product soils to be utilized as backfill onsite, eliminating disposal costs.	1. None noted

Table 9.3 (Continued): Past, Present and Proposed Future Technologies for Remediation Workers at the Mound Site as of Aug. 1997

Facility	Task and Time Period	Task Title	Technology and Brief Description	# Workers per Technology	Descriptive Exposure Potential	Advantages	Disadvantages
Mound	HW Task Past: 1973-97 Proposed: 1997-99	Treatment of radiological waste	Technology 7: Beta Wastewater Solidification Facility This facility solidifies wastewater hardness using a cement-like compound (Aqaset®) which is containerized and shipped offsite for disposal.	LOW: 1-10	Once solidified, limited contact with contaminants occurs	1. Contaminant immobility factors	1. None noted
	HW/De Tasks Past: 94 (pilot) Proposed: (full scale) 1997-2002	Characterization of waste	Technology 8: Pipe Crawler Technology The Pipe Crawler system traverses the inside of a pipe with a variety of radiation and other detectors and provides a survey of the pipes' contents.	LOW: 1-10 pilot program and full scale	Controlled remotely to reduce exposure by removing the worker from the contamination zone and eliminating the need for PPE while characterizing.	1. Controlled remotely 2. Aids in determining PPE levels, reduces worker stay times and containment measures.	1. None noted
	HW/De/CW Tasks Past: 1989-97 Present: 8/97 Proposed: 1997-2001	Treatment of radioactive, chemical or mixed material	Technology 9: Baseline Decontamination Technologies Designed to decontaminate radioactive, hazardous and/or mixed materials throughout the site. They include using chemical, electro-chemical, thermal and/or mechanical cleaning techniques.	MED: 11-75	Potential generation of airborne radiological or mixed waste, high worker risk due to labor intensive nature of the work, requires extensive use of PPE.	1. Best available technology to date. 2. Levels of PPE dependant upon area contamination conditions	1. Creation of secondary wastes 2. Inability to efficiently decontaminate components having complex geometries or surface irregularities. 3. Levels of PPE dependant upon area contamination conditions.

Table 9.3 (Continued): Past, Present and Proposed Future Technologies for Remediation Workers at the Mound Site as of Aug. 1997

Facility	Task and Time Period	Task Title	Technology and Brief Description	# Workers per Technology	Descriptive Exposure Potential	Advantages	Disadvantages
Mound	HW/CW Tasks Past: 1989-97 Present: 8/97 Proposed: 1997-2001	Treatment/dsposal of radioactive, chemical or mixed waste soil	Technology 10: Standard Excavation Technology Remediates radiological, hazardous and/or mixed wastes by excavation, removal and containerization of these waste solids.	LOW: 1-10	Potential generation of airborne radiological or mixed waste, high worker risk due to labor intensive nature of the work, and requires extensive use of PPE	1. Limited contact 2. Outdoors workers subject to weather conditions 3. Levels of PPE dependant upon area of contamination conditions	1. Outdoors workers subject to weather conditions
	HW/CW Tasks Past: 1995-97 Proposed: 1997-2001	Treatment of radioactive/mixed chemically contaminate d soils	Technology 11: Dig Face System/Warthog® This technology is an ex-situ waste site characterization tool which will greatly reduce exposures to workers by eliminating the standard practice of excavation with continued monitoring and sampling (chemical and radiological) to determine the concentration and extent of contamination.	LOW: 1-10	Operation is performed remotely, allows appropriate PPE selection prior to start of work.	1. No contact with unknown environment. 2. Remotely operated to reduce personnel exposure. 3. Appropriate PPE selection prior to start of work.	1. None noted
	Di Task Past: 89-97 Present: 8/97 Proposed: 1997-2001	Treatment of radioactive waste	Technology 12: Standard Application of Latex Paint to Contaminated Surfaces (Fixed Radiological). This technology involves the application of latex paint to encapsulate fixed radiological contamination.	LOW: 1-10	Limited contact and is performed indoors while using "Level B" PPE.	1. Reduced worker exposure to airborne chemical or radiological contaminants	1. None Noted (Use of PPE could cause potential heat stress issues

Table 9.3 (Continued): Past, Present and Proposed Future Technologies for Remediation Workers at the Mound Site as of Aug. 1997

Facility	Task and Time Period	Task Title	Technology and Brief Description	# Workers per Technology	Descriptive Exposure Potential	Advantages	Disadvantages
Mound	<p>Di Task</p> <p>Past: 89-97</p> <p>Present: 8/97</p> <p>Proposed: 1997-2001</p>	Treatment of radiological wastes	<p>Technology 13: Baseline Technologies for Dismantlement</p> <p>This technology utilizes manual and hydraulic tools to cut, shear, lift, and move structural materials and process equipment. These tools include overhead cranes, high-pressure water jets, saws, laser cutters, and plasma and acetylene torches.</p>	LOW: 1-10	Limited contact and is performed outdoors while using "Level B" PPE.	<p>1. Include versatility and ease of control.</p> <p>2. Worker somewhat removed from the work.</p>	<p>1. Generate secondary wastes which must be handled, require manual intervention/operation</p> <p>2. Exposes workers to industrial and radiological safety hazards</p> <p>3. Use of PPE could cause potential heat stress issues</p>
	<p>CW Task</p> <p>Past: 1995-1997</p>	Treatment of radioactive waste	<p>Technology 14: ISOTRON® Electrokinetics</p> <p>Designed to decontaminate radioactive contaminated materials using electrolytes so that these materials can be released for handling outside a controlled environment.</p>	LOW: 1-10	Potential generation of airborne radiological waste.	<p>1. Automated to reduce personnel exposure.</p> <p>2. Minimization of secondary wastes</p>	<p>1. Met expectations only on perfect (no dents, scratches etc.) matrixes. This technology will not be utilized at the site in the future.</p>

Table 9.3 (Continued): Past, Present and Proposed Future Technologies for Remediation Workers at the Mound Site as of Aug. 1997

Facility	Task and Time Period	Task Title	Technology and Brief Description	# Workers per Technology	Descriptive Exposure Potential	Advantages	Disadvantages
Mound	CW Task Past: 1995-1997	Treatment of radioactive wastes soils	Technology 15: Brickmaker® Technology This device was used to reduce the volume of soil that was shipped to an offsite TSDF. The technology produces extruded clay columns, called bricks, that are 8 inches by 8 inches by five feet long, and weigh 300 pounds	LOW: 1-10	Potential generation of airborne radiological waste, high worker risk due to labor intensive nature of the work, and requires extensive use of PPE	1. Cost effectiveness	1. Potential generation of airborne radiological waste, high worker risk due to labor intensive nature of the work, and requires extensive use of PPE
	CW Task Past: 95-97 Present: 8/97 Proposed: 1997-2001	Treatment of radioactive/mixed chemically contaminated materials	Technology 16: Seamist® Method for Stabilization of Hazardous and LLRW in Piping, Ducts and Vent Lines. This technology utilizes an adhesive fabric liner which is placed on the equipment, trapping the hazardous and LLRW in-place.	LOW: 1-10	Limited contact with the waste, indoor work and "Level B" PPE	1. This technology is versatile and easy to control	1. This technology cannot be utilized in ducts and pipes that step down or contain baffles 2. Use of PPE causing potential heat stress issues
	CW Task Past: 96-97	Treatment of radiological wastes	Technology 17: Chemical Extraction Techniques This technology removes radiological contamination from the grout between floor tiles.	LOW: 1-10 pilot program.	Limited contact and is performed indoors while using "Level B" PPE.	1. None Noted	1. Not effective on non-porous surfaces

Table 9.3 (Continued): Past, Present and Proposed Future Technologies for Remediation Workers at the Mound Site as of Aug. 1997

Facility	Task and Time Period	Task Title	Technology and Brief Description	# Workers/Technology	Descriptive Exposure Potential	Advantages	Disadvantages
Mound	CW Task Past: 94 (pilot program) Proposed: (full scale) 1997-2002	Treatment of radiological wastes	Technology 18: CO ₂ Blasting Technology This technology is an innovation which was used in the SW Cave pilot project to reduce the amount of blasting media and the substrate generated. The next phase will incorporate a robotics unit that is controlled remotely and utilizes a vacuum/filtration/containment subsystem.	LOW: 1-10 (Both pilot program and full scale)	Full scale: Controlled remotely to reduce exposure by removing the worker from the contamination zone and eliminating the need for PPE ⁶	Full scale: 1. Controlled remotely 2. No PPE required 3. Less secondary waste than conventional methods	Full scale: 1. None noted
	CW Task Past: 1965-97 Proposed: 1997-1999	Treatment of radiological wastes	Technology 19: Tritium Treatment Technology This technology is still in the development stages for most waste streams, however tritium effluent removal system is an ongoing wastewater treatment process.	LOW: 1-10	Removing worker from the contamination zone there by eliminating the need for PPE	1. Controlled remotely 2. No PPE required	1. None noted
	CW Task Past: 1970-97 Proposed: 1997-2002	Treatment of radiological waste	Technology 20: Alpha Wastewater Treatment System This widely used clarifier/flocculation- based wastewater treatment technology treats alpha- bearing radioactively contaminated wastewater and allows the final effluent to be safely discharged into the Great Miami river.	LOW: 1-10	Primarily a closed loop waste water treatment system some exposure potential exists during filtration and filter press operations	1. Closed loop system	1. None noted

⁶Qualitative indicator of the number of workers per task of technology (LOW: < 10; MED: 11 - 75; HIGH: > 75)

SECTION 10.0 - WORKS CITED/REFERENCES

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DOE [1997]. Environmental, safety and health website U.S. Department of Energy. World Wide Web [URL=http://tis-hq.ehdoe.gov/others/ird/perf_doe_ih_html]. ES & H TIS Internet Resource Directory. Performance Data-DOE-Industrial Hygiene.

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SECTION 11.0 - POINTS OF CONTACT

Name/Title/Employer Phone Number	Mound Address, E-mail, Fax	Job/Area of Expertise
Contacts		
Gerald Peterson - DOE (301) 903-2340		DOE Headquarters
Bill McArthur - DOE (301) 903-9674		DOE Headquarters
Randy Jencks - Contractor to DOE (937) 865-4599	Building W., Mound. http://www.eh.doe.gov/wpphm/ewp/ewp2.html Fernald: (513) 648-3129 Fernald fax: (513) 648-3079	HQ Site Leader Worker Protection and Hazards Mgmt
Geoffrey Gorsuch - DOE Ohio Field Office (937) 865-4459	fax: (937) 865-4402 P.O. Box3020 Miamisburg, OH 45343-3020	Industrial Hygienist
Jane Greenwalt - DOE Public Affairs Officer (937) 865-3116		Privacy Act Officer Public Affairs Officer
Bill Taylor - ATSDR (404) 639-6035		Public Health Assessment - Mound
Brian Nickel - Ohio EPA (937) 285-6468	Dayton Office	Contact and signator for PRS reports
EG&G Contacts		
Mark Becker - EG&G Public Affairs Officer (937) 865-4450	Mound (937) 865-4450	General information
Marian Schomaker - DOE (937) 865-468	Mound Fax: (937) 865-5087	General information

POINTS OF CONTACT (Continued):

Name/Title/Employer Phone Number	Mound Address, E-mail, Fax	Job/Area of Expertise
CERCLA/ER/D&D Contacts		
Steve Nowka - EG&G Mound ER/CERCLA Community Relations (937) 865- 4140	Mound Pager: 628-9095	General information
Douglas M. Maynor - DOE Technology Transfer Engineer (937) 865-3986	Fax: (937) 865-4402	Mound privatization and technology
James Johnson - DOE Technology information (937) 847-5234	Mound Fax: (937) 865-4489	Technology Expert
Mike Reeker - Team Leader (937) 865-3254	Mound	Team Leader - CERCLA
Rob Rothman - DOE Hazardous Waste Workers (937) 865-3823	Miamisburg Area Office 1 Mound Road, P.O. Box 66 Miamisburg, OH 45343-0066	Hazardous Waste Workers Manager
Frank Schmaltz - DOE Hazardous Waste Workers (937) 865-3620	Miamisburg Area Office 1 Mound Road, P.O. Box 66 Miamisburg, OH 45343-0066	Hazardous Waste Workers
Sam Cheng - DOE Decontamination & Decommissioning Team Leader (937) 865-4778	Fax: (937) 865-4489 Miamisburg Area Office 1 Mound Road, P.O. Box 66 Miamisburg, OH 45343-0066	DFR Team Leader - D&D expert
Art Kleinrath - DOE Cleanup Workers (937) 865-3597	Fax: (937) 865-4219 Miamisburg Area Office 1 Mound Road, P.O. Box 66 Miamisburg, OH 45343-0066 arthur.kleinrath%em@em. doe.gov	Environmental Restoration/D&D Author of "Mound 2000"

POINTS OF CONTACT (Continued):

Name/Title/Employer Phone Number	Mound Address, E-mail, Fax	Job/Area of Expertise
Jim Zahora - EG&G VP of Waste Management (937) 865-4032	Fax: (937) 865-3725 Mound	Waste Management Technologies
Monte Williams - EG&G VP of Environmental Management (937) 865-4543	Fax: (937) 865-3835 Mound, OSW 436	Environmental Restoration Manager
Linda Laidley - Secretary to Monte Williams (937) 865-5175	Mound, OSW 413D	ER Newsletter/PRS Status Map
John Nichols - EG&G D&D Project Manager (937) 865-3706	Mound, E-239 nichjw@doe-md.gov	D&D Project Manager
Norm Burdick - EG&G D&D Project Manager (937) 865-3814	Mound, E-235-D burdnc@doe-md.gov	D&D Project Manager
Gerald Maul - EG&G D&D Project Manager (937) 865-4285	Mound, E-327 maulgf@doe-md.gov	D&D Project Manager
Richard Bauer - EG&G D&D Project Manager (937) 865-3738	Mound, E-240 bauerl@doe-md.gov	D&D Project Manager
Timothy Ellers - Jr. Industrial Hygiene (937) 865-5592	Mound P.O. Box 3000; MS B-157 Miamisburg, OH 45343	Industrial Hygiene
Ray Weaver - EG&G Team Leader Rad Health (937) 865-3320	Mound P.O. Box 3000, MS R-40 Miamisburg, OH 45343	Team Leader - Rad Health

POINTS OF CONTACT (Continued):

Name/Title/Employer Phone Number	Mound Address, E-mail, Fax	Job/Area of Expertise
Barbara Bonelli - DOE H.R. Coordinator (937) 865-3004	Mound P.O. Box 3000 Miamisburg, OH 45343-3000	HR Coordinator
Kim Torrey - Industrial Hygiene (937) 865-3686	Mound P.O. Box 66 Miamisburg, OH 45343-0066	Contact for building numbers
Randy Wood - EG&G Industrial Hygiene Coordinator (937) 865-3686	Mound P.O. Box 3000, MS B-157 Miamisburg, OH 45343-0066	Industrial Hygiene records
Steve Rohrig - EG&G Environmental Restoration (937) 865-4167	Mound Fax: (937) 847-5297 or 865-3835	Supplied names of subcontractors involved with ER
Jered Wills - Hazwoper Training Coordinator (937) 865-4096	Mound Fax: (937) 865-3832	Training
Library Information Resources		
Cindy Franklin (937) 865-4078 or 3174	Mound Library	Information Resources
Kathy Stine	Mound CERCLA	Information Resources
Marian Taylor	CERCLA Reading Room	Information Resources
Bob Garbe - EG&G Engineer (937) 865-4556	Mound, Bldg.: OSW-140B e-mail: garbrl@doe-md.gov or garbrk@doe-md.gov@wins Also: GARBRL%A1%MR	Building status

POINTS OF CONTACT (Continued):

Name/Title/Employer Phone Number	Mound Address, E-mail, Fax	Job/Area of Expertise
Unions		
Gary Nolley - OCAW Local 74200 (937) 865-3389	EG&G Mound	Union information
Chuck Williams United Plant Guard Workers (937) 865- 4493	EG&G Mound	Union information
Security		
Dan Baker - Security Manager (937) 865-4282		Security Manager
Health Physics		
Karen Kent (937) 865-3429		Radcon
Dave Kent (937) 865-4679		Radcon
Ted Quale (937) 865-4256		Radcon
Records Managers/Holders		
Al Ogurek - EG&G (937) 865-3978	Mound, E-Annex, R-40 Miamisburg, OH 45343 Fax: (937) 865-4751	Radiological Health Personnel Records Center
Kay Miller - Internal dosimetry	Mound E-Annex (part-time)	Internal dosimetry
Cheryl Kirkwood - EG&G Records Manager	Mound, Records Bldg 40, Technical Communications Office, Old Medical record and x-rays in bldg G.W., second floor).	Medical records

POINTS OF CONTACT (Continued):

Name/Title/Employer Phone Number	Mound Address, E-mail, Fax	Job/Area of Expertise
Terry L. Vaughn - EG&G Radiological Control Manager (937) 865-3437	Mound Fax: (937) 865-4239	Radiological Records
Kathy Hall - DOE Mound	Records	Records
Medical		
Dr. Edgar J. Reagan - EG&G At facility since 1948. (937) 865-3414		Current medical records/Medical files
Jeanette Feilback - EG&G Registered Nurse		RN

SECTION 12.0 - ACRONYMS AND GLOSSARY OF TERMS

ACM	Asbestos Containing Material
AEA	Atomic Energy Act
AEC	U.S. Atomic Energy Commission
AIMS	Advanced Intermediate Management Services
ALARA	As Low As Reasonably Achievable
ATMX	Atomic Materials Rail Transport
ATSDR	Agency for Toxic Substances and Disease Registry
AUST	Active Underground Storage Tank
B&W	Babcock and Wilcox
CAA	Clean Air Act
CAB	Citizens Advisory Board
CAIRS	Computerized Accident/Incident Reporting System
CAO	Carlsbad Administrative Office
CC&AT	Cross Cutting and Advanced Technology development
CCO	Catalytic Chemical Oxidation
CEDE	Committed Effective Dose Equivalent
CEDR	Comprehensive Epidemiologic Data Resource
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFC	Chlorofluorocarbon
CFR	Code of Federal Regulations
CFX	Californium Multiplier
CHWA	Colorado Hazardous Waste Act
CDPHE	Colorado Department of Public Health and Environment
COC	Continuity of Combustibility
CRP	Comprehensive Reuse Plan
CW	Clean-up Workers
CWA	Clean Water Act
DCE	Dicloroethylene
De	Deactivation Task
DF&O	Director's Findings and Orders
Di	Dismantlement Task
D&D	Decontamination and Decommissioning
DHHS	Department of Health and Human Services of the Centers for Disease Control and Pervation
DNFSB	Defense Nuclear Facilities Safety Board
DOE	Department of Energy
DOT	Department of Transportation
DS	Development Operations and Standards
EG&G	Ederton, Germeshausen & Grier (DOE/RFO Contractor)
EIS	Environmental Impact Statement
EM	U.S. Department of Energy Office of Environmental Management
EPA	Environmental Protection Agency

LIST OF ACRONYMS (Continued)

ER	Environmental Restoration
ER&WM	Environmental Restoration and Waste Management
ERIMS	Employee Records Information Management System
ES&H	Environmental Safety & Health
ESA	Endangered Species Act
FEMP	Fernald Environmental Management Program
FPIMS	Facility Profile Information Management System
FFA	Federal Facility Agreement
FFCA	Federal Facilities Compliance Act
FFTA	Fire Fighting Training Area
FPIMS	Facility Profile Information Management System
FS	Feasibility Study
FSAR	Final Safety Analysis Report
FOIA	Freedom of Information Act
FOSRA	Fuel Oil Storage Removal Action
FWPCA	Federal Water Pollution Control Act
FY	Fiscal Year
GOCO	Government Owned/Contractor Operated
GPHS	General Purpose Heat Sources
H & S	Safety and Hygiene (Manual)
HASP	Health and Safety Plan
HazMat	Hazardous Material
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEPA	High Efficiency Particulate Air (Filtration)
HGMS	High-Gradient Magnetic Separation
HISS	Hydrogen Isotope Separations System
HVAC	Heating Ventilation and Air Conditioning
HLW	High Level Waste
HW	Hazardous Waste
HWSA	Hazardous and Solid Waste Amendments
HW	Hazardous Waste Workers
HWMU	Hazardous Waste Management Unit
IEMP	Integrated Environmental Management Program
IH	Industrial Hygiene
IHSS	Individual Hazardous Substance Site
IMAC	Integrated Management Contract
INEL	Idaho National Engineering Laboratory
LLMW	Low-Level Mixed Waste
LLRW	Low-Level Radioactive Waste
LLW	Low-Level Waste
LSA	Low Specific Activity

LIST OF ACRONYMS (Continued)

LTDD	Low Temperature Thermal Desorption
M&O	Maintenance and Operation
MCL	Maximum Contaminant Levels
MCLG	Maximum Contaminant Levels Goals
MEMP	Mound Environmental Management Program
MEO	Mediated Electrochemical Oxidation
MESH	Mound Environmental Safety and Health
METC	Morgantown Energy Technology Center
MICROSPI	Multisensor Inspection and Characterization Robot for Small Pipes
MRC	Monsanto Research Corporation
MMCIC	Miamisburg Mound Community Improvement Corporation
NAAQS	National Ambient Air Quality Standards
NAREL	National Air and Radiation Environmental Laboratory
NA	No Action
NARA	National Archives Record Administration
NE	Nuclear Energy (Program)
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFA	No Further Action
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NSPS	New Source Performance Standards
NTS	Nevada Test Site
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
OFFO	Office of Federal Facilities Oversight out of the Ohio EPA
OMA	Office of Military Applications
ORPS	Occurrence Reporting and Processing System
OS & A	Occupational Safety & Health
OSC	On Scene Coordinator
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PC	Performance Category
PCB	Polychlorinated Biphenyls
PCE	Perchloroethylene
PEIS	Programmatic Environmental Impact Statement
POC	Point of Contact
POTW	Publicly Owned Treatment Works
PP	Plutonium Processing
PPE	Personal Protective Equipment

LIST OF ACRONYMS (Continued)

PPHF	Plutonium Processing and Handling Facility
PRS	Potential Release Site
PSD	Prevention of Significant Deterioration
PU&DU	Plutonium, Uranium, and Depleted Uranium
R	Research
RA	Removal Action
RD&T	Research Development and Testing
RadCon	Radiological Control
RAPCA	Regional Air Pollution Control Agency
RAPIC	Remedial Action Program Information Center
RCM	Radiological Control Manual
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RFA	Rocky Flats Authorization to Ship
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
FFO	Rocky Flats Field Office
RFLII	RFETS Local Impacts Initiative
RHS	Radiological Health System
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RMDB	Record Management Data Base
RMMA	Radioactive Material Management Area
ROD	Record of Decision
RSE	Removal Site Evaluation
RTDP	Robotics Technology Development Program
RTG	Radio Isotope Thermogenerator
RWP	Radiation Work Permit
S&M	Surveillance and Maintenance
SAIC	Science Applications International Corporation
SARA	Superfund Amendments and Authorizations Act
SCDE	Supercritical Carbon Dioxide Extraction
SD	Sanitary Disposal
SDWA	Safe Drinking Water Act
SM	Special Metallurgical
SM/PP	Special Metallurgical/Plutonium Processing
SMCLS	Secondary Maximum Contaminant Levels
SNM	Special Nuclear Materials
SOP	Standard Operating Procedures
SRS	Savannah River Site
STP	Site Treatment Plan

LIST OF ACRONYMS (Continued)

SVE	Soil Vapor Extraction
SW	Semi-Works
SWMU	Solid Waste Management Units
SW/R	Semi-Works Tritium Complex
T	Tritium
T	Technical
TCE	Trichloroethylene
TERF	Tritium Emissions Recovery Facility
TIRS	Transient Infrared Spectroscopy
TIS	Technical Information Service
TRAIN	Training Records and Information Network
TRU	Transuranic Waste
TRUPACT II	Transuranic Package Transporter
TSCA	Toxic Substances Control Act
TSR	Training, Scheduling, and Records
T/YR	Tons or more Per Year
UIC	Underground Injection Control Program
USC	United States Code
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tanks
UV	Ultraviolet
VOC	Volatile Organic Compounds
WAC	Waste Acceptance Criteria
WD	Waste Disposal
WHP	Well Head Program
WIPP	Waste Isolation Pilot Plant
WM	Waste Management
WM/PP	Waste Minimization/Pollution Prevention
WSF	Waste Staging Facility
WTS	Waste Transfer System

GLOSSARY AND ACRONYMS

- ACM** **Asbestos Containing Material.** Asbestos fibers that are a portion of the overall site waste stream generated by construction, maintenance and building decommissioning activities.
- AEA** **Atomic Energy Act.** The Act of 1946 gave responsibility for production and control of nuclear materials with the Atomic Energy Commission. The Act of 1954 allowed the Atomic Energy Commission to license private companies to use nuclear materials, construct and operate nuclear plants.
- AEC** **Atomic Energy Commission.** The AEC was created by the U.S. Congress in 1946 as the civilian agency responsible for the production of nuclear weapons. The AEC also researched and regulated atomic energy. It's weapons production and research activities were given to the *Energy Research and Development Administration* in 1975, while its regulatory responsibility was given to the new Nuclear Regulatory Commission.
- AHERA** **Asbestos Hazard Emergency Response Act**
- AHF** **Anhydrous Hydrogen Fluoride**
- ALARA** **As Low As Reasonably Achievable.** A phrase and acronym (As Low As Reasonably Achievable) used to describe an approach to radiation exposure and emissions control or management whereby the exposures and resulting doses to the public are maintained as far below the specified limits as economic, technical and practical considerations will permit.
- ARAR** **Applicable or Relevant and Appropriate Requirement.** Standards, criteria, or limitations established under federal and state environmental regulations. These standards are used in determining treatment of mixed waste that can not be decontaminated under the project.
- ASER** **Annual Site Environmental Report.** The site specific report identifies mission statements, site background information, radiological health hazards, compliance summaries, air pathway monitoring, effluent and surface water monitoring, groundwater monitoring, estimated radiation doses for the year, quality assurance procedures and current programs applicable to that year. Its purpose is to show the comparisons between the results of the site's monitoring program to specific standards for various pollutants.

GLOSSARY AND ACRONYMS (CONTINUED)

- ATSDR** **Agency for Toxic Substances and Disease Registry.** The federal agency responsible for reporting and documenting toxic substance information and disease outbreak. Work related exposures must also be reported to ATSDR.
- CAA** **Clean Air Act.** This Act protects and enhances the quality of air resources. Its primary application is through Prevention of Significant Deterioration (PSD) permits to regulate new potentially polluting facilities. The CAA was passed in 1970 as an amendment to 42 USC 7401. It was also amended in 1977, 1990 and 1992.
- CERCLA** **Comprehensive Environmental Response, Compensation and Liability Act.** A Federal law, enacted in 1980, that governs the cleanup of hazardous, toxic and radioactive substances. The Act and its amendments created a trust fund, commonly known as Superfund, to finance the investigation and cleanup of abandoned and uncontrolled hazardous waste sites.
- CFR** **Code of Federal Regulations.** The index containing United States law.
- Ci** **Curie.** The unit of quantity of radioactivity. It requires that in the given sample of any material, 37 billion disintegrations occur each second.
- COC** **Contaminants of Concern**
- CSOU** **Comprehensive Sitewide Operable Unit.** An Operable Unit (OU) containing many Hazardous Waste Management Units (HWMU's) and many complex remediation strategies.
- CW** **Clean Up Worker.** A worker involved with the treatment, transportation, storage and disposal of Low Level Radioactive Waste (LLRW).
- CWA** **Clean Water Act.** This act amended the Federal Water Pollution Control Act first passed in 1956. Its objective is to restore and maintain the chemical, physical and biological integrity of the nation's waters, including surface waters and navigable streams. It regulates discharges to or dredging of wetlands. Its major enforcement tool is the National Pollutant Discharge Elimination System (NPDES) permit.
- DAC** **Derived Air Concentration**

GLOSSARY AND ACRONYMS (CONTINUED)

- D&D** **Decontamination and Decommissioning Program.** A program involved with the decontamination and decommissioning of structures and associated equipment.
- De** **Deactivation:** The process/task of placing a facility in a safe and stable condition to minimize the long-term cost of a surveillance and maintenance program that is protective of workers, the public and the environment until decommissioning is complete. Actions include the removal of fuel, draining and/or de-energizing of non-essential systems, removal of stored radioactive and hazardous materials and related actions. As a bridge between operations and decommissioning, based on facility-specific conditions and final disposition plans, deactivation can accomplish operations such as final process runs, and decontamination activities aimed at placing the facility in a safe and stable condition.
- Decom** **Decommissioning:** Takes place after deactivation and includes surveillance and maintenance, decontamination, and/or dismantlement. These actions are taken at the end of the life of the facility to retire it from service with adequate regard for the health and safety of the workers, the public and protection of the environment. The ultimate goal of decommissioning is the unrestricted release or restricted use of the site.
- Decon** **Decontamination:** The removal or reduction of radioactive or hazardous contamination from facilities, equipment, or environmental media by washing, heating, chemical or electrochemical action, mechanical cleaning, or other techniques to achieve a stated objective or end condition.
- Di** **Dismantlement:** The task involving disassembly or demolition and removal of any structure, system, or component during decommissioning and satisfactory interim or long-term disposal of the residue from all portions of the facility.
- DE** **Drum Equivalent.** The number of 55-gallon drums that it would take to contain a given volume of waste.
- DHHS** **Department of Health and Human Services** The United States Government's principal agency for protecting the health of all Americans and providing essential human services, especially for those who are least able to help themselves
- DOD** **Department of Defense.** The federal agency in charge of defense tactics and protective strategies for the nation.

GLOSSARY AND ACRONYMS (CONTINUED)

- DOE** **Department of Energy.** Created from the Energy Research and Development Administration in 1977, the cabinet-level US Government agency is responsible for nuclear weapons production, energy research and the cleanup of hazardous and radioactive waste at its sites.
- DOT** **Department of Transportation.** The federal agency in charge of national transportation regulations.
- DP** **Defense Program.** The program dedicated to National weapons, protection and military tactics headed by the Department of Energy. The DP came to an abrupt weapons production halt in 1989 following the end of the cold war.
- EDE** **Effective Dose Equivalent.** The sum of the weighted dose equivalents for all irradiated tissues, using the weighting factors in ICRP Publication 26.
- EM** **Environmental Monitoring.** Periodic or continuous measuring of the quantity and type of discharges or migration of radioactive or hazardous waste from a management facility to determine the level of compliance with regulatory requirements and/or pollutant levels in various media.
- Environmental Media** Consists of groundwater (perched and regional aquifer, surface water), surface soils and sediments, subsurface soils and flora and fauna
- EPCRA** **Emergency Planning & Community Right-to-Know Act.**
- ERIMS** **Employee Records Information Management System.** An individual record system in database format maintained by the FEMP.
- FEMP** **Fernald Environmental Management Program**
- Fixed Radiological Contamination** Any radioactive material that cannot be removed by light to moderate swiping techniques using paper or cloth smears.
- FS** **Feasibility Study.** An analysis of the practicability of a proposal. The feasibility study emphasizes data analysis and usually recommends selection of a cost effective alternative. Usually performed with data within a remedial investigation and is collectively termed RI/FS.
- FFTA** **Fire Fighting Training Area** The area historically used to train emergency responders in site-specific response drills.

GLOSSARY AND ACRONYMS (CONTINUED)

HAZWOPER	Hazardous Waste Operations and Emergency Response. The activities associated with specific hazardous waste duties and the emergency response actions taken during hazardous waste accidents. HW workers are specifically trained worker groups required to be certified as such.
HEPA	High Efficiency Particulate Air (Filtration) A gas filtration system having a fibrous medium that produces a particle-removal efficiency of at least 99.97% for 0.3-micron-diameter monodisperse dioctylphthalate (DOP).
HERB	Health-Related Energy Research Branch. The division within the National Institute for Occupational Safety and Health conducting health research for energy related studies.
Herculite®	A plastic sheeting material.
HW	Hazardous Waste Worker. A worker involved in sampling, surveying, containerization, treatment, transportation, storage and disposal of hazardous wastes.
HWMU	Hazardous Waste Management Unit. An area or building within an Operable Unit (OU) that is to be decontaminated and decommissioned. There are usually many HWMUs within an OU.
LDR	Land Disposal Restriction Identifies hazardous wastes that are restricted from land disposal and defines those limited circumstances under which an otherwise prohibited waste may continue to be land disposed.
LLRW	Low Level Radioactive Waste. A term for any radioactive waste that is not spent fuel, high-level, or transuranic waste.
MEK	Methyl Ethyl Ketone
uCi	microcurie. The amount of radioactivity in one microgram of the isotope radium 226.

GLOSSARY AND ACRONYMS (CONTINUED)

MOU	Memorandum of Understanding. An agreement between the Department of Energy (DOE) and the Department of Health and Human Services (DHHS) which transfers responsibility for the the management and conduct of energy-related analytic epidemiologic research to HHS. HHS has designated the Centers for Disease Control (CDC) as the lead agency. The MOU established the need for CDC personnel, their contractors and grantees to access DOE facilities, workers and records to conduct community and worker-based health research and related activities.
MESH	Mound Environmental Safety & Health. Personnel medical, occupational exposure records in individual files maintained in a database format.
mrem	millirem. 1/1000th of the unit that expresses the biologically effective dose produced by any type of radiation.
NIOSH	National Institute of Occupational Safety and Health. An federal agency associated with the Centers for Disease Control and the Public Health Service dedicated to research, evaluation and monitoring potential work related hazards.
NPDES	National Pollutant Discharge and Elimination System. Establishes standards under EPA and state regulations for point sources of discharges of pollutants.
NTS	Nevada Test Site. A 1,350-square-mile area of the southern Nevada desert that has been the site of most of the U.S. underground and atmospheric tests since it opened in 1951.
OEPA	Ohio Environmental Protection Agency. The Ohio State regulatory environmental protection agency in charge of enforcing environmental laws such as RCRA, TSCA, CERCLA and the state's more stringent standards.
OSHA	Occupational Safety and Health Administration. The regulatory agency that enforces the law pertaining to employee safety and health.
OSWER	Office of Solid Waste and Emergency Response. The office within the US EPA that provides directives pertaining to solid waste treatment and emergency responses.

GLOSSARY AND ACRONYMS (CONTINUED)

- OU** **Operable Unit.** A discrete action that comprises an incremental step toward comprehensively addressing site problems. Operable Units may address geographical portions of a site, specific site problems, or initial phases of an action performed over time, or any actions that are concurrent but located in different parts of the site.
- PCB** **Polychlorinated Biphenyls.** Commercially produced organic chemicals used in industrial applications throughout the nuclear weapons complex. PCBs are found in many of the gaskets and large electrical transformers and capacitors in the gaseous diffusion plants. PCBs have been proven to be toxic to both humans and laboratory animals.
- pCi** **picocurie.** The picocurie is 3.7×10^{-2} disintegrations per second and is often used to express the very low natural and environmental levels of radiation.
- PEIC** **Public Environmental Information Center.** Implemented by the DOE, the PEIC is an open reading room providing DOE documentation, US EPA regulation, site specific information and other radiation references. PEICs are usually located on or near the DOE site.
- POC** **Point of Contact.** POCs are designated as fundamental sources of information and for this particular study include EG&G Mound Applied Technologies personnel, DOE officials and other experts in their field.
- PPE** **Personal Protective Equipment.** PPEs include any type of equipment used to protect the worker from potentially hazardous substances in the work place. PPEs may range from respiratory devices to protective clothing.
- RA** **Removal Action.** Removal Actions are actions necessary to monitor, assess, or evaluate the threat of concern. They are initiated when there is a need to accelerate cleanup activities involving hazardous wastes and are coordinated with US EPA and OEPA guidelines.
- RCRA** **Resource Conservation and Recovery Act.** An act passed in 1976 as an amendment to the Solid Waste Disposal Act (1965). The primary goals of RCRA are to protect human health and the environment from the potential hazards of waste disposal; to conserve energy and natural resources, to reduce the amount of waste generated, including hazardous waste and to ensure that waste is managed in an environmentally sound manner. RCRA was amended in 1984 by the Hazardous and Solid Waste Amendments, which expanded RCRA's scope.

GLOSSARY AND ACRONYMS (CONTINUED)

- RI** **Remedial Investigation.** As directed by CERCLA, a Remedial Investigation gathers the data to determine the nature and extent of contamination at a CERCLA site, establishes criteria for cleaning up and identifies alternatives for remedial action. The RI is usually done with a Feasibility Study and are referred to as a RI/FS.
- RI/FS** **Remedial Investigation and Feasibility Study.** A formal examination of the nature and extent of contamination, assessment of the risk and selections of the final remedy based on an evaluation of possible alternatives.
- ROD** **Record of Decision.** Under CERCLA remedial response actions, a ROD is a draft or finalized decision pertaining to Operable Unit management.
- SARA** **Superfund Amendment and Reauthorization Act.** The 1986 Act reauthorizing and amending CERCLA and including the Emergency Planning and Community Right to Know Act of 1986 and the Radon Gas and Indoor Air Quality Act of 1986.
- SDWA** **Safe Drinking Water Act.** Enacted in 1975, the primary purpose of this act is to protect drinking water resources. Standards set by SDWA determine ground water protection regulations.
- SOP** **Standard Operating Procedure.** A SOP in any case refers to the guidelines for operation or standards for completing a project. A SOP will include quality assurance guidelines as well as procedures for obtaining a final goal or end point.
- SRPD** **Self Reading Pocket Dosimeter.** An individually worn device that measures gamma particles and gives an immediate reading of exposure.
- STP** **Site Treatment Plan.** The STP documents the methods and actions needed to obtain proper and cost effective cleanup of a specific site.
- SWMU** **Solid Waste Management Unit.** Any facility for the collection, source separation, storage, transportation, transfer, processing, treatment or disposal of solid wastes, including hazardous wastes, whether such facility is associated with facilities generating such wastes or otherwise.
- TCLP** **Toxicity Characteristic Leaching Procedure.** A test method evaluating solid waste, physical/chemical properties per EPA publication SW-846.

GLOSSARY AND ACRONYMS (CONTINUED)

TEDE	Total Effective Dose Equivalent. The total summation of all weighted dose equivalents for all irradiated tissues, using the weighting factors in ICRP Publication 26.
TLD	Thermo Luminescent Dosimeter. A device which is used to monitor the amount of radiation to which it has been exposed.
TRAIN	Training Records and Information Network A database containing personnel training records. Information includes site and job specific training procedures.
TSCA	Toxic Substances Control Act. A Federal law, enacted in 1976 to protect human health and the environment from unreasonable risk caused by exposure to or the manufacturing, distribution, use, or disposal of substances containing toxic chemicals.
TSDF	Treatment Storage and Disposal Facility
USEPA	United States Environmental Protection Agency. A Federal agency established in 1970 responsible for enforcing environmental laws, including RCRA, CERCLA and TSCA.
WAC	Waste Acceptance Criteria. EPA site specific regulatory guidelines governing land disposal restrictions at TSDF sites.

