FINDING OF NO SIGNIFICANT IMPACT

DECONTAMINATION AND DECOMMISSIONING PROJECTS

MOUND PLANT

MIAMISBURG, OHIO

AGENCY: U. S. Department of Energy, Ohio Field Office

ACTION: Finding of No Significant Impact for Mound Plant Decontamination and Decommissioning Projects

SUMMARY:

The U.S. Department of Energy (DOE) has prepared an Environmental Assessment (EA) for seven decontamination and decommissioning (D&D) projects at the Mound Plant in Miamisburg, Ohio, that have not been previously addressed in the *Final Environmental Impact Statement for the Mound Facility* (June 1979). Based on the information presented in the EA, the DOE has determined that the proposed action is not a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act (NEPA) of 1969. Therefore, the preparation of an Environmental Impact Statement (EIS) is not required and the Department is issuing this Finding of No Significant Impact (FONSI).

BACKGROUND:

The Mound Plant is a federal facility operated by EG&G Mound Applied Technologies, Inc., located in Miamisburg, Ohio, which is approximately 16 km (10 miles) southwest of Dayton, Ohio. The 305 acre Mound Plant is comprised of approximately 100 buildings whose previous and current missions include: research, development, engineering, production and surveillance of components for DOE weapons programs; separation, purification and sale of stable isotopes; and conduct of DOE programs in nuclear safeguards and waste management, heat source testing and fusion fuel systems.

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The location of the projects in the EA include rooms in three buildings and several soil locations. They are described as follows: Research (R) Building - R-140 Laboratory; Semi-Works (SW) Building - five surplus rooms and support areas; Waste Disposal Annex (WDA) Building - seven surplus rooms; Sanitary Disposal (SD) Plant - entire 500 square foot plant; Building 21 - entire 5,000 square foot building; Underground Liquid Waste Transfer Lines to the Waste Disposal Building - approximately 4,000 linear feet of piping and soil; and former Office of Military Applications Contaminated Soils area located throughout the site.

PROPOSED ACTION:

The proposed decontamination and decommissioning actions at these locations within the Mound Plant involve remediation of contaminated buildings or specific rooms within buildings and excavation and disposal of contaminated soil and other materials. Specifically, the remediation involves demolition of reinforced concrete structures, cleaning and removal of equipment and piping, structural decontamination, soil excavation, waste packaging, and disposal of wastes. A sampling program will be used to verify the success of the remediation activities. The contamination present at most D&D projects is thought to be entirely radioactive, with one exception, because no traceable paths for nonradioactive hazardous materials are known, except for asbestos which will be removed. Approximately two liters of tritiated mercury, a radioactive mixed waste, is present in the SW building.

The major radioisotopes included in this action are plutonium-238, thorium-232 and tritium. Minimal trace amounts of protactinium-231, thorium-230, thorium-229, uranium-233, americium, cobalt-60, radium, cesium, polonium-210 daughter products, and isotopes of bismuth may also be encountered. Existing monitoring data and historical information indicate an estimated 316 Curies (Ci) of plutonium-238 contamination, 31 Ci of tritium contamination, and 6 Ci of thorium contamination present in the projects.

ENVIRONMENTAL IMPACTS:

The potential environmental consequences of the proposed action were analyzed for two categories of activities: (1) decontamination and decommissioning and (2) transportation impacts. No significant impacts were determined in any category under routine or accident conditions. The results are summarized below.

Decontamination and Decommissioning

Personnel dose equivalent expected to result from the proposed projects will remain well below the limits established by DOE Order 5480.11. Neither internal dose equivalent (primarily from alpha/beta contamination) nor external dose equivalent (primarily from gamma radiation) for the maximally exposed worker is expected to exceed 0.5 rem/year.

The D&D activities will be conducted in such manner as to minimize emissions. Examples of minimization include: dust control through the use of water mist, utilization of paint to temporarily trap contamination during size reduction, utilization of High Efficiency Particulate Air (HEPA) filtered vacuum cleaners, and use of retention ponds, settling basins, and silt fences for water runoff. Based on these practices and past D&D activities, any releases resulting from the proposed action are expected to remain below 1% of the DOE Derived Concentration Guide (DCG).

No Species on Federal or State of Ohio lists of endangered and threatened species have been found on the Mound Plantsite. The habitats present are not generally supportive of the species on these lists with the exception of the shagbark hickory which may host the Indiana bat. No shagbark hickories were found at any locations relative to this action. There are no hydric soils within the site boundaries or off-site down gradient, thus no wetlands are anticipated to be involved in this action.

Transportation

Potential exposure to transportation personnel as a result of transporting waste will remain well within the limits established by DOE Order 5480.11. There is a certain potential for non-radiological injury or death as a result of a truck accident during the transportation of wastes. It is estimated that waste shipments may lead to .73 accidents in rural areas, 4.34 accidents in suburban, and 1.55 accidents in urban areas during a four year period. An estimated total of 2,141 shipments will be made from Mound Facility.

ALTERNATIVES CONSIDERED:

In the EA, the Department considered three alternatives to this action: (1) No Action, (2) Deferred Action, (3) Complete Demolition. If no action is taken, the radioactively contaminated soil, equipment, and structures will remain in place leading to radiological risks to personnel at the Mound Plant. In addition, contaminates will continue to disperse into soil and groundwater, and emissions due to an accidental release are possible. This action was not selected in compliance with DOE initiatives for radiation protection of the public and the environment and also to meet the requirements within the Federal Facilities Agreement (FFA) among the U. S. Environmental Protection Agency (EPA), Ohio Environmental Protection Agency, and DOE signed in 1993. Deferred action has the same effects as no action until D&D is undertaken and was not selected for the reasons stated above. Complete demolition of SW Building, WD Building, and R Building would require temporary but extended shutdown of all Mound operations based in those buildings. The existing operations could be relocated to new or possibly existing facilities. Complete demolition would remove the existing functional facilities before their useful life. As the operations to be maintained would cause the new facilities to become radioactively contaminated, this would generate new contaminated facilities for future D&D. Thus the complete demolition alternative was not selected.

FOR FURTHER INFORMATION, CONTACT:

For further information on the proposed action (including a copy of the Environmental Assessment), please contact:

Sue Smiley, NEPA Compliance Officer
DOE Ohio Field Office
P.O. Box 3020
Miamisburg, OH 45343-3020
(513) 865-3987

For general information on the DOE's National Environmental Policy Act process, please contact:

Carol Borgstrom, Director
DOE Office of NEPA Policy and Assistance
1000 Independence Avenue, SW
Washington, DC 20585
(202) 586-4600 **or** (800) 472-2756

FINDING:

The D&D actions described in the EA will take place over the next sixteen years and will result in minimal radiological exposure to D&D workers as well as the general public. Any exposure will be well within DOE established limits. All wastes generated will be shipped for burial (LLW) or stored (Mixed and TRU) until it can be disposed.

A long term beneficial environmental effect from this action is the elimination of some sources of radioactive emissions and reductions in the cost of continuing environmental surveillance in some areas at the Mound Plant.

Declaration of Finding

The DOE has determined that the proposed action is not a major Federal action significantly affecting the quality of the human environment, within the meaning of the NEPA of 1969. Therefore, the preparation of an Environmental Impact Statement (EIS) is not required and the Department is issuing a Finding of No Significant Impact (FONSI).

Signed in Miamisburg, Ohio, on May 16, 1995.

J. Phil Hamric
Manager

DOE/EA - 0683

ENVIRONMENTAL ASSESSMENT FOR MOUND PLANT DECONTAMINATION AND DECOMMISSIONING PROJECTS

May 1995

UNITED STATES DEPARTMENT OF ENERGY

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DISCLAIMER

LIST OF ACRONYMS AND ABBREVIATIONS

AEA	Atomic Energy Act
ALARAAs	Low As Reasonably Achievable
ANSPD	Advanced Nuclear Systems and Products Division
APE	Annual probability of exceedance
BVA	Buried Valley Aquifer
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CH	Contact Handled
Ci	Curie
CWA	Clean Water Act
D&D	Decontamination and Decommissioning
DCG	Derived Concentration Guide
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
dpm	Disintegrations per minute
EA	Environmental Assessment
EDE	Effective Dose Equivalent
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
FFA	Federal Facilities Agreement
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FONSI	Finding of No Significant Impact
FSAR	Final Safety Analysis Report
FY	Fiscal Year
H	Hot Laundry (Building)
HEPA	High Efficiency Particulate Air
HH	Stable Isotope (Building)
HSWA	Hazardous and Solid Waste Amendments
kg	kilogram
l	liter
μCi	microcurie
MCL	Maximum Contaminant Level
m	meter

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

mrem	millirem
MSL	Mean Sea Level
N.A.	Not Applicable
nCi	nanocurie
NE	DOE's Nuclear Energy Program
NEPA	National Environmental Policy Act
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
NTS	Nevada Test Site
OMA	Office of Military Applications
OSHA	Occupational Safety and Health Act
pCi	picocurie
ppm	parts per million
R	Research (Building)
RAPCA	Regional Air Pollution Control Agency
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
SD	Sanitary Disposal
SM/PP	Special Metallurgical and Plutonium Processing Buildings
SW	Semi-Works (Building)
T	Technical (Building)
TRU	Transuranic
TSCA	Toxic Substances Control Act
UGL	Underground Liquid Waste Transfer Lines
USC	United States Code
USDA	U.S. Department of Agriculture
VOC	Volatile Organic Compound
WD	Waste Disposal (Building)
WIPP	Waste Isolation Pilot Plant
WTS	Waste Transfer System

1.0 INTRODUCTION

1.1 OVERVIEW

This Environmental Assessment (EA) was prepared to meet the requirements of the National Environmental Policy Act (NEPA) of 1969 (42 USC 4321 *et seq.*) and covers seven decontamination and decommissioning (D&D) projects at Mound Plant in Miamisburg, Ohio, that have not been addressed in the *Final Environmental Impact Statement for Mound Facility* [U.S. Department of Energy (DOE), 1979]. The proposed action involves the D&D of radioactively contaminated surplus rooms in three buildings, the decontamination and demolition of two surplus buildings and associated radioactively contaminated soil, and the decontamination of other radioactively contaminated soil areas. Room decontamination will allow restricted use of the rooms. Soil decontamination will reduce contamination to levels suitable for unconditional release.

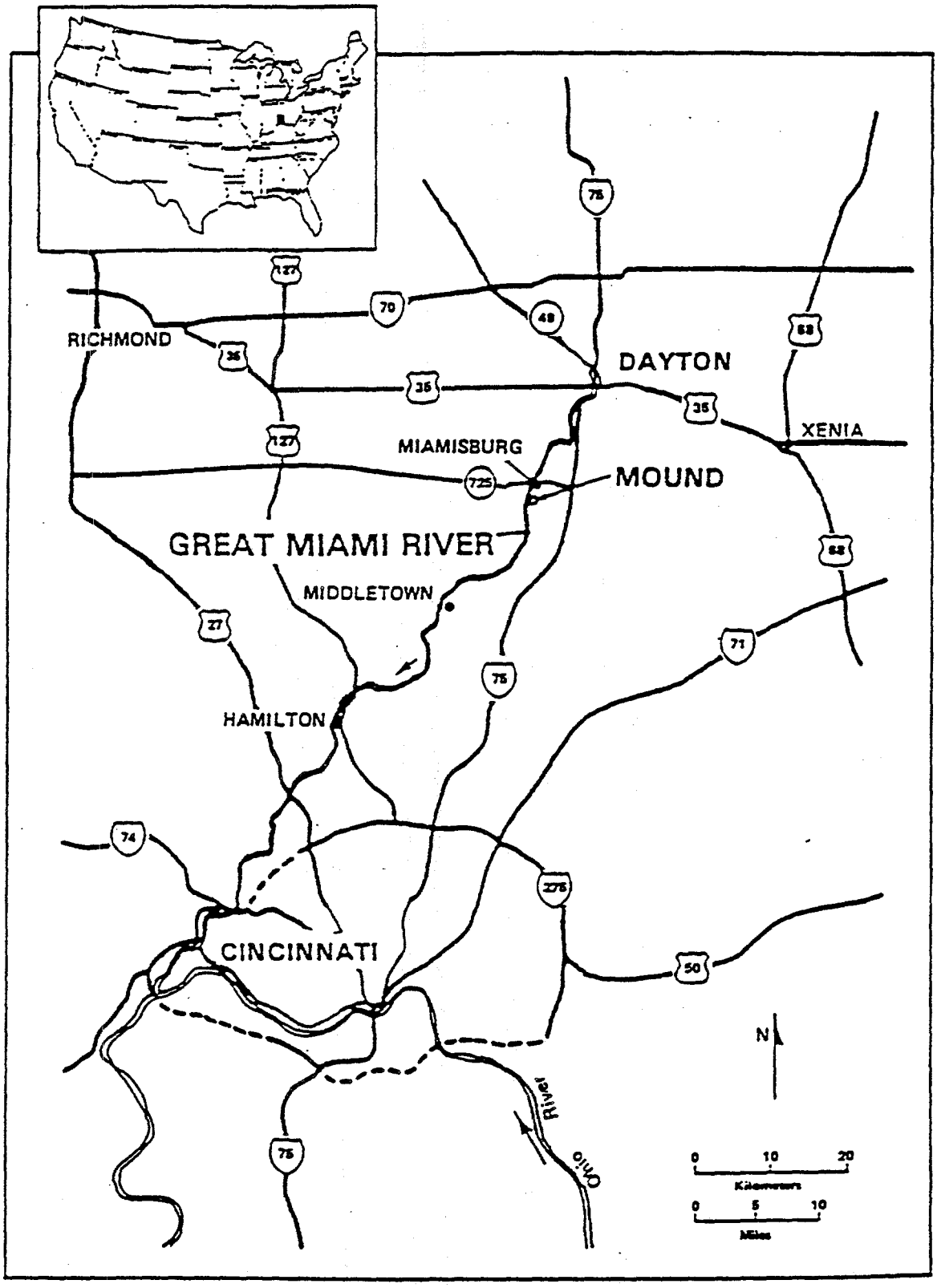
Mound has an ongoing D&D Program in support of its mission and DOE requirements. This program requires that all D&D proposed actions have the appropriate NEPA review and determination. This EA covers the currently planned projects not covered by the FEIS, 1979. As future projects are proposed under the D&D program, they will receive the appropriate NEPA review and determinations.

1.2 MOUND PLANT

The Mound Plant is a federal facility operated by EG&G Mound Applied Technologies, Inc., for the DOE in Miamisburg, Ohio, which is approximately 16 km (10 miles) southwest of Dayton (***Figure 1.1***). Mound originated as a technical organization in 1943 as part of the Manhattan Engineering District. Construction of a permanent physical facility in Miamisburg began in 1947 and operations began in 1949. Mound's current mission includes conduct of DOE programs in environmental restoration, safe shutdown, waste management, heat-source testing, and fusion fuel systems.

The radionuclides of primary environmental concern at Mound from either current or past operations are plutonium-238 and tritium. The local environment is monitored primarily for these compounds (Farmer, et al., 1991). In addition, thorium-232 was stockpiled at Mound and other heavy radionuclides were involved in several operations. The only known nonradiological hazardous materials are asbestos,mercury, and volatile organic compounds (VOC). The contamination addressed by the D&D projects includes all these materials except the volatile organic compounds (VOC).

Figure 1.1. Southwestern Ohio and location of Mound Plant (DOE, 1979).



2.0 PURPOSE AND NEED FOR AGENCY ACTION

2.1 PURPOSE AND NEED FOR AGENCY ACTION

Agency action is needed to eliminate sources of radioactive emissions and reduce the costs of continuing radiological surveillance at Mound. DOE is involved in a continuing effort to keep Mound in compliance with DOE Orders 5400.5, *Radiation Protection of the Public and the Environment*; 5480.11, *Radiation Protection for Occupational Workers*; and 5820.2A, *Radioactive Waste Management*; and to meet requirements within the Federal Facilities Agreement (FFA) between the U.S. Environmental Protection Agency (EPA) and DOE signed in 1990. This agreement was superseded in 1993 by the three-party Federal Facilities Agreement (FFA) that added the Ohio Environmental Protection Agency (EPA) to the agreement. The Sanitary Disposal (SD) Plant, Building 21, Office of Military Applications (OMA) Underground Lines (UGL), and Office of Military Applications (OMA) Soils Areas projects are in the agreed clean-up schedule contained in the FFA. Failure to comply with this schedule could result in fines and/or legal action against the DOE. The DOE Orders guide Mound's stated policy and the goals of the agency with regard to the decontamination of inactive buildings for eventual release with radiological restrictions and the removal of contaminated soils to levels suitable for release without radiological restrictions. High levels of tritium within deteriorating gloveboxes present a growing radiological threat that should be addressed through decontamination. In addition to addressing legal, policy, and safety issues, agency action is needed to eliminate many small sources of potential radioactive emissions from the Mound site.

3.0 PROPOSED ACTION AND ALTERNATIVES

3.1 INTRODUCTION

Several D&D projects have been proposed at Mound to address radioactively contaminated soil and facilities for the protection of workers, the public, and the environment. The action at Mound described in this EA includes seven D&D projects covered in Section 3.2. The locations of these projects are shown in ***Figure 3.1***. The D&D involves remediation of contaminated buildings or other structures or specific rooms within buildings (Section 3.3) and excavation and disposal of contaminated soil and other materials (Section 3.4). The remediation involves demolition of reinforced concrete structures, cleaning and removal of equipment and piping, structural decontamination, soil excavation, waste packaging, and disposal of waste. A sampling program would be used to verify the success of the remediation activities. The contamination present at most D&D projects (except as noted in Section 3.2) is thought to be entirely radioactive, because no traceable paths for nonradioactive hazardous materials are known, except for asbestos which is present at many of the projects. Removal and disposal of asbestos are included in the D&D actions.

The overall D&D program at Mound includes other projects already underway that have previously received NEPA review. These include the Waste Transfer System, the SM Building Leach Field and the soils surrounding the WD Building. The first two were covered under the site-wide FEIS and the third project under a categorical exclusion. Characteriztion activities for all of these projects as well as the HH-WD line remedial activities have also been covered under a categorical exclusion. The proposed action described in this EA would not prejudice the selection of any future proposed D&D projects or alternatives.

The decontamination and release criteria necessary to meet the cleanup standards and disposal requirements established for the D&D activities are described in Section 3.6. Section 3.7 summarizes the amounts and types of waste expected to be generated. Section 3.8 covers packaging and transportation requirements. Emissions expected from the proposed action are covered in Section 3.9. Alternatives to the proposed action are covered in Section 3.10.

3.2 PROPOSED ACTION SUMMARY

3.2.1 General

The proposed action consists of seven D&D projects at Mound. The action would remove potential sources of minor chronic radioactive emissions to the environment. Although only minor renovation activities would take place for reuse of the facilities, the D&D actions would reduce radioactive contamination to a level that would permit reuse with radiological restrictions of buildings and release without radiological restrictions of soil areas (see Section 3.6 for explanation of release criteria). Both low-level and transuranic (TRU) waste would result from the D&D actions. Low-level waste is defined in DOE Order 5820.2A as waste that contains radioactivity and is not high-level or TRU waste. TRU waste is defined in DOE Order 5820.2A as a waste contaminated with alpha-emitting transuranium radionuclides with half-lives greater than 20 years and concentrations greater than 100 nCi/g at the time of assay. Following are brief descriptions of the D&D actions proposed for each project.

The current estimated timetable and costs for these projects are listed in ***Table 3.1***. Emissions from the proposed action are expected to be minimal, as has been the experience during past similar operations (see Section 3.9 for emissions information). The expected levels of radioactive contamination for each project are listed in ***Table 3.2***.

Figure 3.1. Site map showing locations of D&D projects.

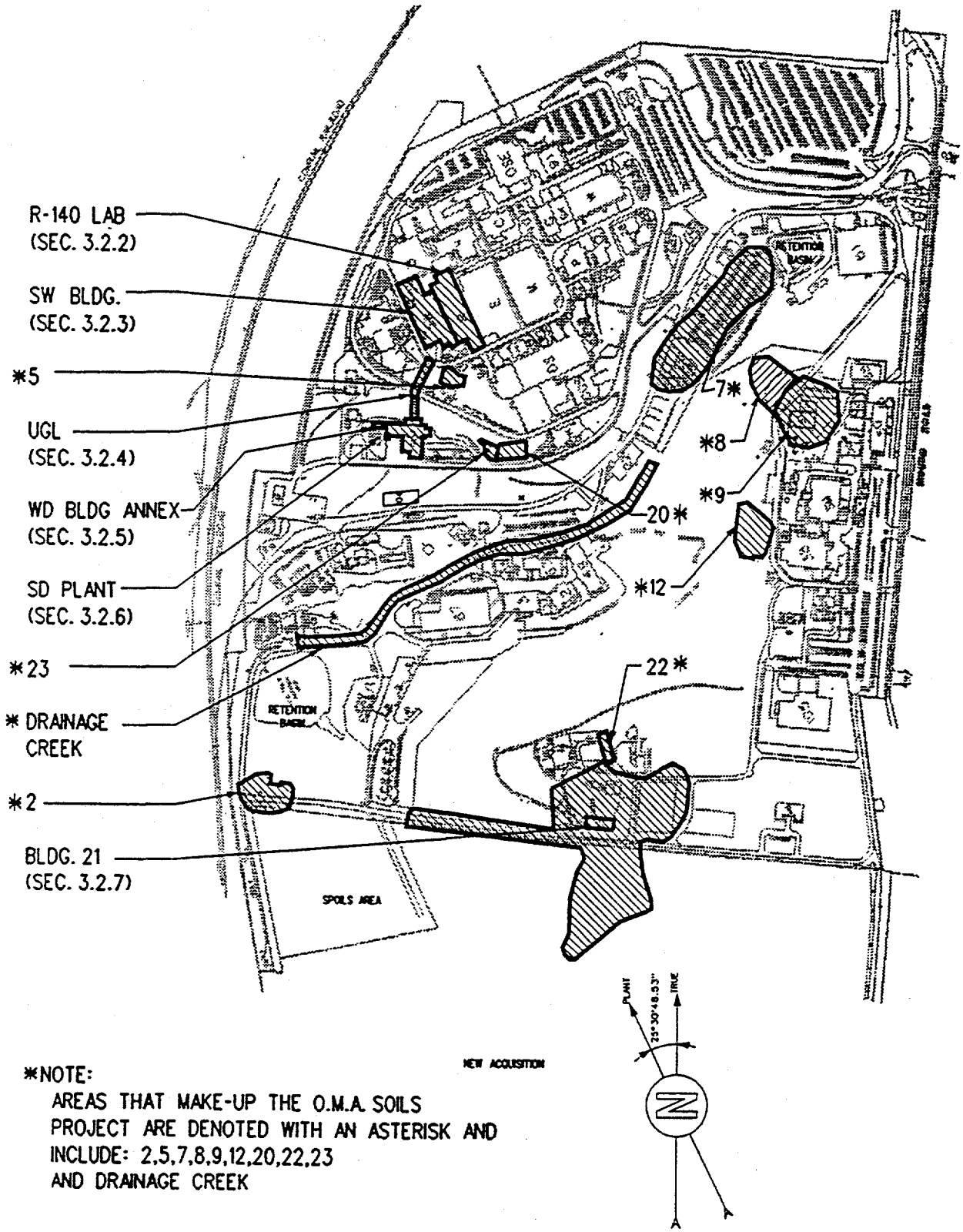


Table 3.1. Schedule and cost for the proposed action

Project	Start Date	Completion Date	Cost in thousands
R-140 Laboratory	a	03/13/03	$4,139
SW Building Areas, SW Cave	a	03/25/10	$26,505
OMA Underground Lines[b]	08/11/97	12/19/02	$37,043
WD Building Annex	a	01/12/99	$3,441
SD Plant	a	12/30/99	$10,355
Building 21	09/01/97	05/11/05	$41,945
OMA Soils Areas	a	01/17/05	$64,890
Total	a	03/25/10	$185,318

[a] Upon completion of NEPA review.
[b] Excludes HH-WD project completed in FY94 (Cat-x, B6.1 in FR 57 15156, NEPA I.D. No. MDP-93-008)

Table 3.2. Expected levels of radioactive contamination

Building Projects
(estimated maximum values)

	Plutonium-238			Tritium	
Project	Direct (dpm/100cm^2)	Alpha Wipe (dpm/100cm^2)	Total (curies)	Beta Wipe (dpm/100cm^2)	Total (curies)
WD Building Annex	400,000	1,000	0.04	700	0.010
SW Building	40,000[a]	300	0.01	10,000[b]	30.400
R-140	2,600,000[c]	135,000	0.90	700	0.001
SD Plant	100,000	300	0.004	N/A	N/A
Totals			0.954		30.411

Notes: [a] Floor slab and gloveboxes contain higher levels.
[b] 10,000,000 dpm/100 cm^2 expected inside gloveboxes.
[c] TRU levels are expected inside gloveboxes.

Soils Projects
(estimated maximum values)[a]

	Plutonium-238		Thorium	
Project	Concentration (pCi/gram)	Total (curies)	Concentration (pCi/gram)	Total (curies)
Building 21	34,000	296.0	60	0.4
Soil Areas	1,000	16.7	300	4.2
Underground Lines	1,000	3.1	300	0.9
Totals		315.8		5.5

Note: [a] Total Tritium in the Soils Projects is negligible.

3.2.2 R-140 Laboratory D&D

The R-140 Laboratory in the Research (R) Building at Mound Plant is a 400-ft^2, plutonium-contaminated, inactive, surplus laboratory containing contaminated gloveboxes and associated piping and equipment. A 10,000-ft^2 return-air plenum/crawl space and plutonium filter system serving the laboratory and other rooms contain large amounts of asbestos and some plutonium. Additional asbestos insulation is present on piping and equipment. The project includes cleaning and removal of radioactively contaminated equipment, structural decontamination, asbestos removal, and disposal of the wastes generated by the D&D operations.

3.2.3 Semi-Works Building Areas D&D

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 ft^2 of SW Building would undergo D&D. Approximately 2 liters of containerized tritiated mercury, a radioactive mixed waste, is present. Asbestos is also present on piping and equipment.

The project includes cleaning and removal of radioactively contaminated gloveboxes, fumehoods, a large manipulator box, and the associated piping and equipment; structural decontamination; and disposal of the wastes generated by the D&D operations.

3.2.4 D&D of Office of Military Applications (OMA) Underground Liquid Waste Transfer Lines to the Waste Disposal (WD) Building

The OMA Underground Liquid Waste Transfer Lines (UGL) D&D Project consists of the characterization and removal of approximately 3,400 linear feet of radioactively contaminated liquid waste transfer lines (mostly vitrified clay pipe) and associated contaminated (primarily > 100 pCi/g plutonium) soils. The lines, constructed to carry radioactively contaminated liquid waste from buildings R (Research), SW, H (Hot Laundry), HH (Stable Isotope), and T (Technical) to the WD Building, leaked or were suspected of leaking and were removed from service. Some lines have been capped. Contamination remains in and around the lines. The D&D project would include excavation of reasonably accessible lines, removal of surrounding contaminated soil, and plugging inaccessible lines that run beneath buildings. Sampling has shown no evidence of nonradioactive hazardous material. Should nonradioactive hazardous materials be found, they would be turned over to Mound's Waste Management Group for disposal with Mound's hazardous operating wastes. Additional sampling would verify the absence of hazardous constituents following D&D. For the purpose of estimating waste volumes, the depth range of contamination was assumed to be from 2 feet below the surface to 6 feet below the surface. The depth range was chosen in order to adequately quantify the potential contamination from the typical underground waste line which is at 4 feet below the surface.

3.2.5 Waste Disposal Building Annex D&D

The WD Building Annex D&D project is designed to decontaminate seven radioactively contaminated, inactive, surplus rooms, occupying approximately 4,290 ft^2 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. The D&D project would include cleaning and removal of radioactively contaminated equipment, structural decontamination, and disposal of the wastes generated by the D&D operations.

3.2.6 Sanitary Disposal Plant D&D

The SD Plant is a 500-ft^2, 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. The D&D project includes decontamination and demolition of the pumping building, enclosed equipment, underground tanks, and contaminated sanitary lines, as required; excavation of drying beds and associated soil; disposal of the wastes generated by the D&D operations; and sampling for hazardous and radioactive constituents to confirm the effectiveness of the D&D operations. For the purposes of estimating wastes, the depth range of soil contamination was assumed to be 0 to 20 feet. These depths were chosen for estimating wastes in order to cover the range of assumed contamination from the drying beds (surface), underground waste lines (4 to 6 feet below grade), and the digester (approximately 15 feet below grade).

3.2.7 Building 21 D&D

The Building 21 D&D project consists of the decontamination and demolition of a reinforced concrete building and the removal of adjacent radioactively contaminated soil. Building 21 has approximately 5,000 ft^2 of floor space. The surrounding area of contaminated soil covers approximately four acres. The building was constructed in 1966 to contain approximately 5,000 tons of bulk thorium-232 sludge, which was sold in 1975. After cleanup, the building was used to store Cotter concentrate in drums until 1987. 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 material. For the purposes of estimating waste volume, the contaminated soil was assumed to range from 1 foot (due to airborne deposition of bulk thorium sludge during its placement within the building) to 3 feet (due to the leakage of Plutonium-238 waste containers).

3.2.8 OMA Contaminated Soils Areas D&D

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 principal contaminants are plutonium and thorium, with some minor amounts of cesium, cobalt, actinium, and radium. Some asbestos-contaminated soil may be present. 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. For the purposes of estimating the amount of waste generated, the depth range of soil contamination was assumed to be from 0 to 20 feet. This depth range was chosen to include surface contamination caused by former site operations and contamination at approximately 20 feet below grade caused by the burial of drums contaminated with thorium.

3.3 BUILDING DECONTAMINATION AND DECOMMISSIONING

D&D of the contaminated areas in buildings would be performed in three general phases: (1) glovebox, equipment, and piping removal; (2) structural decontamination; and (3) structural demolition.

Equipment, benches, and piping would be removed from the room, cut up to reduce volume, and disposed of as radioactive waste (Sections 3.6 and 3.7). It is assumed that all equipment, benches and piping are contaminated to the degree that decontamination for reuse is not feasible. These items are marked as contaminated waste. Suspect material would be sampled prior to disposal to determine if it is radioactive waste or uncontaminated material. Gloveboxes that were used for handling radioactive materials would undergo a more extensive D&D process. The interior of the box would be cleaned to remove loose contamination, then painted to fix any residual contamination in place. Then the box would be disassembled or cut up and the pieces placed in standard radioactive waste disposal containers.

Structural decontamination addresses contamination with alpha emitters and involves the removal of any contaminated room surfaces. Removal of the floor covering and sandblasting paint off the walls and ceiling will often remove most contamination. If contamination above release criteria remains, then a powered vacuum scabbler would be used to chip away quarter-inch layers of concrete from the walls, ceilings, or floors as required. In extreme cases, or where contaminants have penetrated beneath floor slabs along cracks, the floor may be carefully disassembled by hand to avoid spreading contamination. Alternatively, concrete may be sawed and removed as slabs to allow removal of contaminated materials.

Most alpha-emitting contamination is spread by dust. To control dust, a water mist would be sprayed on the surfaces as they are being chipped away. Paint would be used as necessary to hold the contamination temporarily, and a large, High Efficiency Particulate Air (HEPA) filtered vacuum cleaner would be used as necessary to remove surface dust. Long-handled tools and a remote-controlled jackhammer/shovel may be used to keep workers away from contaminated dust. Respiratory protection and protective clothing for dermal protection which includes gloves, boots, and other clothing as required per the work permit would be used.

Contamination from tritium, a radioactive gas and beta emitter, is usually contained in fumehoods and gloveboxes. The stacks are constantly monitored and set to alarm at a fraction of the allowable limit. Decontamination of tritium oxide-contaminated equipment and room surfaces is accomplished by applying cleaning liquids and wiping the liquids up with rags or a mop. If contamination occurs under tile cracks, the tile would be removed, the area cleaned, and new tile installed.

The final element of structural decontamination is verification that the remaining contamination in the rooms is at or below the release criteria (Section 3.6), after which surfaces would be sealed and monitors installed. After further testing by Mound and an independent verification contractor, the areas would be returned to use with the radiological restriction that any future penetration or modification would require monitoring and approval by Mound Health Physics Operations.

Because most buildings already have appropriate ventilation systems, much of the D&D work can be safely performed in the rooms without airborne spread of contaminated material. In other instances, temporary enclosures or airlocks around the entrances to rooms would be erected. These temporary enclosures would be connected to the building's main ventilation system via HEPA filters or portable HEPA-filtration units.

All materials and wastes would be surveyed and certified by Mound health physics personnel. All air emissions would be filtered by HEPA filter systems to maintain levels below the allowable limits specified in Section 3.5. Contaminated waste water would be either routed through the plant's water treatment facility, WD Building, (which has the capacity to properly treat the water) or solidified and packaged as radioactive waste. The contaminated solid wastes (metal, filters, rags, mops, and residues from the cleaning operations) would be

appropriately packaged and shipped to the Nevada Test Site (NTS) as part of Mound's plant operations waste stream. Decontaminated and uncontaminated materials may be reused or disposed of as ordinary nonhazardous wastes as part of Mound's nonhazardous plant operations waste stream. The impacts of waste disposal are discussed in Section 5.6.5.

Structural demolition, where required, would proceed using a combination of the environmental protection features described above and in Section 3.4. Personnel safety methodology follows the *Mound Safety and Hygiene Manual* (MD-10286), which sets forth policies, establishes programs, and addresses all industrial and explosive safety and industrial hygiene issues and concerns. The manual is based upon many sources, including 29 CFR 1910 and DOE Order 5480.11.

3.4 SOIL DECONTAMINATION AND DECOMMISSIONING

The soil D&D process includes verification of soil contamination, removal of contaminated soil, and disposal of the wastes generated. Certification after removal of the contaminated soil would ensure that cleanup standards described in Section 3.6 are met. Appropriate disposal methods would be selected as described in Sections 3.6 and 3.7.

The depth to ground water on the main hill area varies over a range of 18 to 33 feet. Ground water is not expected to be encountered during any of the D&D projects.

Underbrush and trees would be cleared prior to soil characterization and excavation and would be monitored for radioactive contamination. Very few trees would be removed. Usually, the vegetation is shredded and used for plant mulch. If any vegetation is radioactively contaminated, it would be shipped to a licensed, authorized facility for disposal. In the excavation process, approximately the top six inches of soil and all underlying soil that is contaminated above release criteria would be removed, and disposed of at Nevada Test Site. UGL would be exposed and surveyed as excavation proceeds. Surplus lines would be checked for water and, if necessary, the water would be removed and the lines capped. The contaminated lines and soil around them would be excavated and the pipes and lines cut up and boxed. All excavation would be sloped, shored, or shielded per Occupational Safety and Health Act (OSHA) standards (29 CFR 1926). Off-site soil would be used to backfill the excavation, if necessary. Disturbed areas would be re-vegetated or otherwise stabilized following excavation.

Release of radioactivity to the air in the form of fugitive dust particles would be minimized through monitoring and mitigation controls such as water misting. The wind velocity would be measured and recorded each working hour and disturbance of the soil would be suspended whenever the average wind velocity exceeds 25 mph. A dust control agent would be sprayed on all freshly exposed soil at the end of the work day and during the excavation as needed.

The spread of radioactively contaminated soil from water runoff would be controlled at the excavation sites by use of existing retention ponds, settling basins, filtering systems, new silt fences and retention ponds. Work would stop if rainfall exceeds 0.1 inches per hour or wind speeds greater than an average of 25 mph are experienced, and the work area would possibly be covered with a tarp. At night and on weekends the work area would be stabilized by covering and ensuring that erosion controls are in place. In addition, before water and sediment are released, they would be monitored and then released to one of two plant retention basins or processed and packaged as radioactive waste if required.

All personnel within the work area would wear respirators and protective clothing approved by the National Institute for Occupational Safety and Health (NIOSH) when required. Attending health physics personnel would monitor the workers, ensure that proper procedures and equipment are used, and ensure that contamination is

not released to the environment or other work areas. In addition, asbestos removal would be supervised by a State of Ohio Certified Asbestos Hazard Evaluation/Abatement Specialist.

3.5 RADIATION PROTECTION

In 1973, Mound developed and implemented a Radiation Protection program with measurable goals for all operations utilizing radiation producing machines or radioactive materials to ensure that occupational exposures were maintained at the lowest possible level. Since 1973, Mound has consistently reduced and lowered its annual occupational and radiation worker exposure each year. Tracking doses to workers is possible since all plant personnel working in radiation areas are provided with and are required to wear a dosimeter. For example, the Mound as low as reasonably achievable (ALARA) goal for 1990 was 25.0 person-rem collective effective dose equivalent and at the end of 1990, the total exposure for the Mound Plant was less than 5.0 person-rem. The D&D Program occupational and radiation worker person-rem was the lowest of the major operating groups within the plant, with a total of 0.07 person-rem. The standards and requirements adopted by Mound to meet DOE on-site requirements (primarily DOE Order 5480.11) are documented in MD-10019, *Nuclear Radiation Safety*, which addresses administration, dose limits, radiation survey requirements, monitoring, the ALARA program, contamination control, instrumentation, and handling.

DOE Order 5480.11 supersedes that part of DOE Order 5480.1A, Chapter XI, "Requirements for Radiation Protection," and became effective January 1, 1989, establishing radiation protection standards and requirements for the DOE and DOE contractor operations with respect to the protection of workers from ionizing radiation. The Order defines the "Occupational Worker" as an individual who is either a DOE or DOE contractor employee; an employee of a subcontractor to a DOE contractor; or an individual who visits to perform work for or in conjunction with DOE or utilizes DOE facilities.

Personnel dose equivalent expected to result from the proposed D&D projects would remain well within the limits established by DOE Order 5480.11. Engineering controls would be used to reduce dose potential (especially airborne) and would be augmented by the use of respirators and other personnel protection equipment. Neither internal dose equivalent (primarily from alpha/beta contamination) nor external dose equivalent (primarily from gamma radiation) for the maximally exposed worker would be expected to exceed 0.5 rem/year. Total exposure would be minimized, and no single individual would be expected to receive a dose equivalent in excess of the ALARA goal of 0.5 rem/year.

Visitors to Mound are provided the same quality radiation protection as any occupational worker who works at the plant. When entering a radiation control area, the visitor receives the same radiation protection as would a Mound radiation worker, to ensure compliance with the DOE Orders.

3.6 DECONTAMINATION AND RELEASE CRITERIA

Release criteria and cleanup standards have been established for D&D activities at Mound as follows: (1) Contaminated soil is normally removed down to levels suitable for release without radiological restrictions consistent with DOE Order 5400.5 and (2) Buildings and structures at Mound are cleaned to levels consistent with reuse with radiological restrictions. These criteria were set forth by the *Coordinated Advanced Nuclear Systems and Products Division (ANSPD), Nuclear Energy (NE) and Office of Military Applications (OMA) Decontamination and Decommissioning (D&D) Program Plan dated March 31, 1978 (DOE,1978)*, and were subsequently approved formally by DOE in the *Memorandum of Understanding between the Office of Military Applications (OMA) and the Office of Terminal Waste Disposal and Remedial Action (NE-20) for the Coordinated Decommissioning of Inactive Advanced Nuclear Systems and Products Division (ANSPD) and OMA Areas at the Mound Facility, (DOE, 1982)*.

Contaminated soil will be removed until contamination levels consistent with unrestricted use are encountered. Excavation areas will be gridded off and surface samples will be taken from each square.

In inactive facilities, contamination will be reduced to an ALARA level and remaining contamination will be permanently sealed using concrete and epoxy paint, as required, so that use is possible with minimal radiological restrictions, as specified in DOE Order 5400.5.

The disposition of radioactive waste from D&D activities depends on its classification as either TRU or low-level waste. TRU waste contains alpha-emitting TRU radionuclides with half-lives greater than 20 years and an activity concentration greater than 100 nCi/g. Low-level waste is defined in DOE Order 5820.2A as waste that contains radioactivity and is not high-level or TRU waste.

Release criteria for airborne emissions are based on DOE Order 5400.5. Continuous air monitoring at D&D sites and site boundary monitoring verify that emissions are properly controlled. Continuous air monitoring assures that no threat to workers is present and that cumulative emissions of radionuclides from excavation areas or from building D&D activities will not result in members of the public receiving in excess of the DOE primary standard, which is an effective dose equivalent (EDE) of 100 mrem/year.

3.7 WASTE GENERATED

Various types of waste would result from the proposed D&D operations. Waste estimates in ***Table 3.3*** are based upon radiological characterization, process knowledge, screening data, and extensive experience in D&D at Mound. Processes are all mechanical in nature: high-pressure water jet, scabbling, sandblasting, and use of jackhammers.

Table 3.3. Estimates of waste to be generated during D&D operations.

	Asbestos	Hazardous	TRU	Low-level waste	Mixed
R-140	200 ft^3	None	550 ft^3	3,000 ft^3	None
SW Building	500 ft^3	None	None	39,000 ft^3	2 liter (Containerized)
OMA UGL	None	None	None	191,000 ft^3	None
WD Annex	50 ft^3	None	110 ft^3	3,000 ft^3	None
SD	5 ft^3	None	None	78,000 ft^3	None
Building 21	None	None	None	241,000 ft^3	None
OMA Soils	None	None	None	388,000 ft^3	None
TOTALS	755 ft^3	None	660 ft^3	943,000 ft^3	2 liter

Past experience with decommissioning of Pu-238- and Th-232-contaminated soils has led to a working knowledge of the expected profile of contamination in soil. Typically, higher concentrations of radioactivity are found in the immediate vicinity of underground process lines or at the location of known spills. When excavating contaminated soil from underneath radioactive process buildings sites, knowledge of the nature and location of operation within the building provides information on the expected distribution of contamination. Natural drainage patterns and soil characteristics are relied upon to determine the probable spread of contamination both downward into the ground and horizontally through the ground. If available, radiological surface and core screening data is used to verify or nullify the initial expected contamination profile. Experience, process knowledge, soil data, and screening data are then used together to approximate the depth

and horizontal spread of radiological contamination. These figures provide an estimate for the volume of soil that requires decommissioning.

Radioactive liquid waste from D&D operations would be handled according to MD-70180, *Mound Radioactive Liquid Waste Disposal*. All low-level alpha-contaminated waste water is routed to WD Building by lines or tanker truck. After various treatments to decontaminate the water to meet specific discharge requirements under the Clean Water Act (CWA), the processed waste is released into the Great Miami River. Low-level tritiated water is solidified in drums and disposed of at Nevada Test Site. Sludge is pumped into sludge storage pits, solidified and emptied into drums. The drums are stored on-site until an approved application is accepted for disposal at NTS.

3.8 PACKAGING, TRANSPORTATION, AND WASTE ACCEPTANCE CRITERIA

D&D operations will generate and require handling, packaging, and shipping of various types of waste. D&D operations follow standard procedures that have been applied effectively in numerous similar operations. Both the EPA and U.S. Department of Transportation (DOT) shipping regulations will be routinely followed to ensure safe packaging, temporary storage, and shipment.

3.8.1 TRU Waste

TRU waste would be considered newly generated and would be packaged, documented, and certified by the generator as being in compliance with *Waste Acceptance Criteria for the Waste Isolation Pilot Plant* (DOE, 1991). At Mound, TRU waste handling and packaging is performed following internal manuals MD-70205, *TRU Waste Management*, and MD-10203, *Mound WIPP Certification Program for Newly Generated Contact Handled (CH) Transuranic Waste*. In accordance with this guidance, TRU waste is packaged in Type A packages designed to comply with 49 CFR 173.411, *General Design Requirements*, and 49 CFR 173.412, *Additional Design Requirements for Type A Packages*. Type A packages must weigh more than 50 kg (110 lbs), be secured during shipping, have removable lifting attachments, have an easily decontaminated outer surface free from contamination-holding or water-trapping features, maintain adequate containment and shielding over a wide range of temperatures, and meet specified testing requirements. TRU waste would be stored at Building 31, an existing TRU-waste holding area, until national decisions about the ultimate disposal site for the waste have been finalized.

3.8.2 Low-Level Waste

Mound packages, handles, and ships low-level waste to the NTS for disposal in accordance with NVO-325 criteria (DOE et al., 1988); MD-81240, *Low-Level Waste Management*; and the packaging requirements of 49 CFR 173.412. NVO-325 criteria must be met before NTS will accept low-level waste. The waste application submitted to NTS provides documentation of procedures demonstrating compliance to NVO-325 characterization requirements and DOE Orders. These procedures are subject to audit and verification by the Nevada Operations Office. MD-81240 outlines the Mound Nuclear Low-Level Waste Management Program and provides specific information on container specifications, waste-generator responsibilities, health physics survey requirements, packaging and transportation procedures, storage, and other germane activities necessary to implement regulations addressing low-level waste. Specific requirements for packaging are consistent with the requirements put forth in 49 CFR 173.412. Packaging requirements for low-level waste are slightly less stringent than for TRU waste, but still ensure safe waste handling. Packages for non-liquid waste are constructed so that they will maintain structural integrity during normal transportation and handling conditions and so that neither equipment nor personnel become contaminated during off-loading. Radioactively contaminated asbestos waste is planned to be disposed of at the NTS. Should NTS be unable to accept radioactively contaminated asbestos waste, an alternative site would be investigated. If an alternative site has not been secured by the time the asbestos is ready for shipment, it will be temporarily stored at Mound.

The NTS was chosen as the disposal site for Mound waste primarily as a result of the decision not to administer two separate waste programs at Mound, one for tritium and one for plutonium. In November of 1979, Mound received guidance for waste shipments from the Office of Nuclear Waste Management which provided Mound with a choice of two sites for disposal, Nevada Test Site or Savannah River. In the guidance, it was requested that no tritium be sent to Savannah River. Because a portion of Mound's waste is contaminated with tritium, the decision was then made to send all of the waste to Nevada Test Site. It was concluded that this would be the most reasonable as well as cost effective disposal option. Mound has and continues to investigate commercial facilities as potential alternatives for waste disposal.

3.8.3 Radioactive Mixed Waste

Tritiated mercury, present in SW Building, is designated as radioactive mixed waste because it is a low level waste containing both radioactive (tritium) and hazardous components (mercury, waste # U151, 40 CFR 261.33; effective August 8, 1990, prohibited for land disposal, 40 CFR 263.35) as defined by DOE Order 5820.2A and the Resource Conservation and Recovery Act (RCRA), respectively. Mound's mixed waste handling system is described in MD-70523, *Nonradioactive Hazardous, Radioactive Mixed, Toxic, and Solid Waste Management.*

The tritiated mercury in the SW Building (Section 3.2.3) would be processed by amalgamation with zinc to stabilize the mercury. The amalgamated mercury would be packaged in accordance with the above criteria and held in Building 23, an existing mixed-waste holding area, pending national decisions on mixed waste disposal.

3.8.4 Solid Waste

Uncontaminated solid waste, after proper monitoring, would be disposed of according to Mound Plant guidelines (MD-70523) in a local landfill along with other solid waste from plant operations. Nonradioactive asbestos waste would be disposed of in accordance with applicable requirements at an approved local waste disposal site.

3.9 EMISSIONS

Routine emission and ambient environmental monitoring is being conducted at Mound and would continue through the D&D operations. Annual monitoring reports describe this activity (e.g., Farmer, et al., 1991). Overall emissions from Mound are summarized in Section 4.7. The proposed D&D actions are representative of the operational tasks that were performed for past D&D activities which were monitored. The values for Pu-238 are listed below in Table 3.4 and are representative of the level of emissions to be expected during the proposed action.

Table 3.4. Pu-238 emissions from past D&D activities given in percent of the DOE Derived Concentration Guide (DCG) (N/D equals non-detectable)

	1985	1986	1987	1988	1989	1990	DCGs
Air	0.6%	0.6%	0.6%	0.3%	0.2%	0.1%	3.E-14
Water	0.3%	0.2%	0.1%	0.1%	0.5%	0.2%	4.E-08
Ground water	N/D	N/D	N/D	N/D	N/D	N/D	4.E-08

DCG values are for inhaled air and ingested water in μCi/ml.

3.10 ALTERNATIVES TO PROPOSED ACTION

3.10.1 No Action

If no action is taken, the radioactively contaminated soil, equipment, and structures would remain in place, leading to increased radiological risks to personnel at Mound Plant. Current emissions into the environment, summarized in ***Table 4.1***, would continue. Although the emissions listed in Table 4.1 would not be expected to decrease significantly due to the proposed action, the threat of an unplanned release of contamination would decrease. In the long term, contaminants would continue to disperse into soil and ground water. Additional deterioration of the buildings or damage due to an accident could release additional amounts of radioactivity to the environment. Risk of release would increase because the only containment for most of the contaminants are the buildings themselves.

3.10.2 Deferred Action

Deferred action has the same effects as no action until D&D is undertaken. In the long term, D&D will be accomplished during the eventual D&D of the entire Mound site. During the interim, radioactive emissions and radiation exposure of on-site workers would continue and probably increase. Environmental risk will also continue, with the overall probability of a release of radiation through natural events growing steadily.

3.10.3 Complete Demolition

Complete demolition of SW Building, H Building, HH Building, WD Building Annex, and R Building would require relocation of all existing Mound operations based in those buildings. The existing operations could be relocated to new, or possibly existing facilities. As the operations to be maintained would cause the new facilities to become radioactively contaminated, this would generate new contaminated facilities for future D&D. Complete demolition would remove the existing functional facilities before their useful life and safe shutdown operations could be completed. The safe shutdown of SW Building is not scheduled to be complete until 03/20/02 and 08/01/97 for R Building. H, HH and WD Buildings are designated as landlord buildings and are required to remain intact as long as there are tenants at the Mound site (post FY2000). The complete demolition option was selected for the SD Building (Section 3.2.6) and associated structures since the building has been replaced and for Building 21 (Section 3.2.7) which is inactive. Plant operations will not be disrupted by the planned partial demolitions.

3.10.4 In-situ Treatment

In-situ treatment for areas and buildings contaminated with plutonium is not considered a feasible alternative primarily because no proven, effective in-situ treatment for this contaminant currently exists.

3.10.5 On-site Long Term Storage

Consideration of Mound as a long term storage (100 years) facility was not proposed due to space limitations at the Mound plant. Mound's relatively small total site area (306 acres) would not allow for the storage of waste in addition to regular plant operations. Furthermore, Mound's mission will be shifting toward one of economic development, and Mound may potentially be used by non-DOE organizations in the future. These economic development plans could be adversely affected by the storage of waste at the site.

4.0 AFFECTED ENVIRONMENT

This section contains a brief summary of the natural and human environment surrounding the Mound Plant. Most of the information in this chapter originated in the *Final Environmental Impact Statement for Mound Facility* (DOE, 1979); *Comprehensive Environmental Assessment and Response Program, Phase I: Installation Assessment, Mound* (DOE, 1986); and *Environmental Monitoring at Mound: 1990 Report* (Farmer et al., 1991).

4.1 REGIONAL AND LOCAL SETTING

Mound Plant lies on high bedrock bluffs overlooking Miamisburg, Ohio, and the Great Miami River and the river plain one-half mile to the west (***Figure 1.1***). The site incorporates two high hills divided by a minor northeast-to-southwest-trending valley that feeds into the river along the main drainage channel. Most of the buildings comprising the plant occupy the northwest hill crest (Main Hill). A smaller group of buildings lies in the valley and on the valley slopes. Other buildings occupy the southeastern Special Metallurgical/Plutonium Processing (SM/PP) Hill.

Miamisburg is largely residential, with limited commercial and industrial development, and is surrounded by predominantly agricultural land. Mound abuts residential areas on the north, east, and southeast.

The Mound Plant is located within the Dayton metropolitan area. The (1990) population of Miamisburg is 17,770. The Miami Valley Regional Planning Commission estimates the total population within a five-mile radius of Mound to be 76,061 (based on 1988 figures).

4.2 AIR AND CLIMATE

With a continental climate, the Miamisburg area experiences moderate seasonal temperature variations. Severe weather, generally associated with thunderstorms, can occur in any season, and can result in damaging winds and flash flooding. Precipitation is common in all seasons, with an average rainfall equivalent of 40 inches. Surface wind is predominantly from the southwest, with annual average wind speeds ranging from 7 to 10 mph and "fastest mile" wind speed in the Dayton area of 78 mph (DOE, 1979). Tornados may touch down along short and narrow paths, but are infrequent in the region. The tornado windspeed with an annual probability of exceedance (APE) of 10^{-3} is 90 mph, while for an APE of 10^{-6}, the limit of credible cases, it is 227 mph (Kennedy et al., 1990). Ohio is subject to damaging hailstorms, with two or three occurring each year. Once every four or five years a moderate or heavy ice storm occurs, damaging utility lines and trees and interfering with traffic.

4.3 GEOLOGY AND SOIL

The region around Miamisburg is geologically stable. The surface of the Ordovician-age bedrock, which consists of limestones, calcareous shales, dolomite, and thin sandstones, is covered by a thin (less than 20 feet thick) veneer of Pleistocene-age glacial till. The Pleistocene gravel, sand, clay, and silt till deposits thicken towards the Great Miami River and form the Buried Valley Aquifer (BVA) discussed below. No evidence of solution-cavity development, recent faulting or large earthquakes, volcanic activity, or any other geologically unstable situation has been observed in the Miamisburg area. No mineral resources are present at Mound.

Most structures at Mound are either built directly on bedrock or lie on thin (1.5 feet thick), dense, highly compacted glacial till. Radioactive soil contamination has been found, mostly at the surface, in 19 of the 22 areas studied on the original Mound site (***Figure 3.1***) (Stought, et al., 1988).

4.4 HYDROLOGY AND WATER RESOURCES

4.4.1 Surface Water

Mound lies within the Great Miami River drainage basin, with a drainage area above Miamisburg of 2,711 mi^2. The level of the river adjacent to Mound is controlled by the Hutchings Station Dam [680 feet above mean sea level (MSL)], about 1.5 miles downstream from the facility. The 100-year recurrence interval flood event elevation adjacent to Mound is 698.67 feet. The water from the Great Miami River is not used as a public water supply by any municipality below Mound.

On-site surface water consists of two manmade ponds and a stream with a small, steep watershed lying predominantly within Mound's borders. The alluvium beneath the channel is relatively permeable and allows flow in the channel to infiltrate the underlying aquifer.

4.4.2 Ground water

The major aquifer in the area is the BVA (DOE, 1979), which underlies the western edge of the plant and forms the drinking water source for Miamisburg, Dayton, and the greater Dayton area. Normal ground water flow is from the BVA to the Great Miami River, but pumping from Mound's water wells causes a cone of depression in the water table, drawing water from the river into the BVA. This cone also captures any contaminated ground water from the Mound Site, aiding in the prevention of additional off-site ground water contamination.

4.4.3 Water Use

Surface water is not used for drinking from either the area immediately surrounding or downstream of Mound. Ground water in the vicinity of Mound is used for municipal, domestic, and industrial purposes. Of the six municipal water supplies that lie within a 5-mile radius of the plant, the nearest are those of Miamisburg, which are a minimum of 0.8 km (0.5 mi) away. Private wells on the east bank of the river draw water from the BVA immediately adjacent to Mound, with the nearest active well located at 625 Jefferson Street, approximately 2,000 feet from the site boundary.

The only industrial ground water users in the immediate vicinity of Mound are Mound Plant and the Hutchings Power Station, which is 1.5 miles south of the plant on the west bank of the Great Miami River. Mound obtains its water supply from three wells within the boundaries of the plant. Protection of these wells is a major concern at Mound.

4.4.4 Water Quality

Surface water quality in the vicinity of Mound is generally satisfactory. Tritium and plutonium concentrations, which are probably attributable to Mound operations, are extremely low in the surface water at a maximum of .022% of the DOE DCG values (Farmer et al., 1991). The DOE DCG for tritium is $2{,}000 \times 10^{-6}$ μCi/ml, while the DCG for Pu-238 is $40{,}000 \times 10^{-12}$ μCi/ml.

Ground water quality is also very good. Mound has generated minor contamination of the ground water in the immediate vicinity as indicated by the presence of small concentrations of plutonium-238, tritium, and volatile organic compounds (VOCs). Nearby wells and public supplies are monitored monthly. Concentrations are extremely low (Farmer et al., 1991), even less than in surface water.

Tritium is present in the Miamisburg public supply at a level of 2.3% of the EPA standard and in a privately owned monitoring well at 21.5% of the EPA standard. The EPA standard is 20 x 10^{-6} μCi/ml.

Plutonium-238 concentrations in surface water are at .005% of the DOE DCG or less at all sampling points. Ground water concentrations are also very small, reaching a maximum of 16.5% of the EPA standard of 20 x 10^{-6} μCi/ml. Public supplies are essentially free from Pu-238 contamination with a maximum value of 3.13 x 10^{-12} μCi/ml, far below the EPA standard.

Some on-site ground water VOC (trichloroethene, tetrachloroethene, chlorethene) concentrations exceed EPA Maximum Contaminant Levels (MCLs). Concentrations off-site are far lower, with none exceeding the MCLs. Full information is available in the environmental monitoring report (Farmer et al., 1991). This contamination is being handled under the Environmental Restoration (ER) Program at Mound.

4.4.5 Wetlands/Floodplains

A small portion of the south property, falls within the 100 year flood plain of the Great Miami River. The south property is outside the scope of this environmental assessment, therefore, the proposed action will not be impacted. A wetlands investigation was initiated in response to terms set forth in the Federal Facilities Agreement (FFA) with DOE, U.S. EPA and Ohio EPA. The results of the wetlands assessment indicate that the Mound site does contain small areas onsite that meet the Army Corps of Engineers and EPA definition of wetlands.

4.5 BIOLOGICAL RESOURCES

Native flora found in and around the site include small trees and shrubs, scrub growth, and grasses. Small wild animals, including groundhogs, rabbits, raccoons, skunks, mice, rats, and squirrels, are occasionally found on the plant site. There are some deer on recently acquired portions of the site.

4.5.1 Threatened and Endangered Species

According to the Fish and Wildlife Service of the U.S. Department of Interior (Letter, Kroonmeyer 1991; see ***Appendix B***), the Mound Plant lies within the range of the Indiana Bat (*Myotis sodalis*), a federally listed endangered species. The bat has not been seen on-site. Shagbark hickories (common to southwest Ohio) and other live or dead trees with exfoliating bark may host the bat from May 1 through August 31. However, according to the Dayton Museum of Natural History, a field survey in April 1991 did not locate any shagbark hickories on-site (Letter, Hissong 1991; see ***Appendix B***). During the time from May 1 through August 31, preconstruction site inspections are conducted to assess whether any potential host trees are present.

During ecological assessment activities conducted under the CERCLA program at the Mound Plant, a single specimen of Inland Rush (*Juncas interior weig*) was discovered growing on the Mound south property. The Inland Rush has been designated a state "endangered species" by the Ohio Division of Natural Areas and Preserves. Because a single specimen was found, it is not considered a viable breeding population.

According to existing records, no other rare or endangered species have been found at the proposed site or any alternative site (Letters, Hillmer 1992 and Kroonmeyer 1992; see ***Appendix B***).

4.6 HISTORICAL AND CULTURAL RESOURCES

No sites of historical or cultural interest were found on the plant grounds during investigations for the sitewide Environmental Impact Statement (EIS) (DOE, 1979) or during an additional survey in 1987 which included newly acquired areas (Riordan, 1987). The State of Ohio Historic Preservation Office has noted that the Mound Plant does not contain any properties listed or eligible for the National Register of Historic Places (***Appendix B***).

4.7 CURRENT MOUND EMISSIONS

According to the Regional Air Pollution Control Agency (RAPCA), Mound operations are in compliance with state and federal air pollution regulations. RAPCA has authority under the Clean Air Act (CAA) and both state and local regulations. RAPCA's jurisdiction includes six southwestern Ohio counties: Montgomery, Clark, Miamisburg, Darke, Preble, and Greene. Discussions of Mound's atmospheric nonradioactive and radioactive emissions are presented in the annual environmental monitoring reports (e.g., Farmer et al., 1991).

Based on *Environmental Monitoring at Mound: 1990 Report* (Farmer et al., 1991), the concentrations of radionuclides from Mound were within DOE DCGs for the respective radionuclides (DCG for a radionuclide is defined as the concentration of that radionuclide that will give a committed EDE of 100 mrem during continuous exposure for one year). The conditions of the National Pollution Discharge Elimination System (NPDES) permit were met with the exception of four exceedances of biochemical oxygen demand (BOD).

Current emissions into the environment summarized in Table 4.1, would be expected to continue under the proposed action. Although the emissions listed in Table 4.1 would not be expected to decrease significantly due to the proposed action, the threat of an unplanned release of contamination would decrease.

Table 4.1. Emission figures of certain radioactive and non radioactive materials discharged in different environmental media
(Source: Table E.1, Table 5.1, and Table 5.4 of *Environmental Monitoring at Mound: 1990 Report*)

Material released	Total amount released in air during the year 1990	Total amount released in water during the year 1990[1]	Concentration
Plutonium-238	1.8 X 10^{-5} Ci	6.7 X 10^{-4}Ci	N.A.
Plutonium-239	1.5 X 10^{-7} Ci	3.5 X 10^{-6}Ci	N.A.
Tritium	1823 Ci	4.9 Ci	N.A.
Uranium-233, -234	2.9 X 10^{-8} Ci	4.5 X 10^{-4}Ci	N.A.
Uranium-238	8.6 X 10^{-8} Ci	Not available	N.A.
Sulfur oxides	0.001 lbs/10^6 BTU input[2]	N.A.	N.A.
Organics	803 lbs[2]	N.A.	N.A.
Particulates	0.005 lbs/10^6 BTU input[2]	N.A.	N.A.
Oil and grease	N.A.	<1.2 kg[3]	<1 mg/L
Ammonia as N	N.A.	1.3 kg[3]	1.14 mg/L
Cadmium	N.A.	1.28 g[3]	11 μg/L
Chromium	N.A	58 g[3]	<50 μg/L
Copper	N.A	109 g[3]	94 μg/L
Nickel	N.A	1.28 g[3]	50 μg/L
Zinc	N.A.	63.83 g[3]	55 μg/L
Lead	N.A.	58 g[3]	50 μg/L
Mercury	N.A.	2.3 g[3]	<2 μg/L

Notes:

1 Mound discharged approximately 307 million gallons of water in 1990 to the Great Miami River. (The average monthly discharge is approximately 26 million gallons of water to the Great Miami River. Data from the U.S. Geological Survey show that flow in the Great Miami River at Miamisburg in 1990 averaged 65.340 billion gallons per month.

2 Within standards set by Ohio EPA Air Pollution Regulations 3745-17-10, 3745-18-06, and 3745-21-07.

3 The total amount released is calculated using the concentration of release of material per month and the volume of water discharged from Mound in 1990 to the Great Miami River.

5.0 ENVIRONMENTAL IMPACTS

5.1 IMPACT ASSESSMENT APPROACH

Mound conducts D&D work to minimize emissions, as described in Sections 3.3 and 3.4. Thus, no exact amount of expected release can be specified, only that any release would remain within certain upper-bound concentrations determined by monitoring. In many cases emissions remain too low to measure. The low value of total releases due to D&D activities, reported in ***Table 3.4***, are attributable to these practices. The environmental impact discussions below are based upon the upper-bound approach and backed up by the releases from D&D activities in the past, which remained below 1% of the DOE DCG. Impacts are summarized in Section 5.11.

5.2 AIR QUALITY AND NOISE

The only impacts of the proposed action on air quality would be the minor dispersal of radioactive and nonradioactive particulates, and the emission of hydrocarbons and carbon monoxide from the combustion of gasoline and diesel fuel. Emissions are expected to be small based upon past experience (summarized in ***Table 3.4***). Although the quantities of airborne contamination cannot be estimated, standardized monitoring and mitigation controls as described in Sections 3.3 and 3.4 would be used to prevent any airborne releases greater than the allowable limits specified in DOE Order 5400.5. Radioactivity releases to air would be controlled to ALARA.

5.2.1 Soil Excavations

During excavation of contaminated soils, all personnel within the work area would be protected from airborne emissions by use of full-face respirators and other protective clothing or equipment where required by Mound Health Physics Operations. Constant air monitoring would provide a warning of release and help ensure that excavation activities do not cause releases in excess of DOE Order 5400.5 guidelines from the construction site or the Mound Plant boundary.

Some exhaust from the burning of vehicle and equipment fuel would be released. Emissions containing unburned hydrocarbons and carbon monoxide, both considered pollutants, would be minimized by keeping all equipment maintained to manufacturer's specifications. Small numbers of vehicles and equipment would be used.

5.2.2 Building Decontamination

Releases of airborne contamination to the environment during building D&D would be prevented through the use of at least two levels of HEPA filtration (see Section 3.4). Personnel would be protected through use of appropriate construction techniques, and protective equipment and clothing, as described in Sections 3.3 and 3.4 and as required by Mound Health Physics Operations.

5.2.3 Noise

Noise would be limited to that produced by the routine use of earthmoving or metal-cutting equipment. EPA and OSHA limits will be observed. The loudest D&D operation that would be undertaken for any length of time is the excavation of contaminated soil with a track hoe. This operation generates 94.4 dB, 20 feet away from the track hoe. The day-long average noise exposure level is approximately 80 dB, meeting OSHA requirements.

Based upon the maximum sound level during excavation, the loudest noise at the Mound fence line would be 14.3 dB during operations at Building 21.

5.3 WATER QUALITY

The overall impact of the proposed action on surface and ground waters would be positive through the removal of contaminated soil. Fewer radioactive and nonradioactive suspended particles would be eroded from the Mound Site. This would result in less contamination of the BVA from stormwater runoff and incident precipitation infiltration.

Possible negative impacts from the proposed action are temporary and would occur only during D&D operations. Radioactive and nonradioactive suspended solids in stormwater runoff may rise briefly during excavation. This possibility is mitigated by routine stabilization techniques and sediment-control systems. The amount of increase, if any, would be minor, and normal plant sediment-control systems are capable of handling the resulting sediment along with normal sediment load. Stormwater runoff would comply with the existing NPDES Permit No. 1IO00005*ED.

If no action is taken, minor emissions of radioactive contaminants to surface and ground waters would continue and the long-term spread of contamination from contaminated soil areas may occur.

5.4 WORKER AND PUBLIC HEALTH IMPACTS

Based on the procedures described in Sections 3.3 through 3.6, and Mound's experience with similar decontamination projects, worker and public health exposures would be well within DOE limits and health effects would be expected to be very small.

5.5 IMPACTS FROM ROUTINE TRANSPORTATION

Because of the nature of the waste being transported, and because of the protection provided by the waste packaging and truck shielding, external radiation fields would be low, and therefore, exposure of the public and workers (e.g. drivers) to radiation under incident-free conditions and health impacts from such exposure would be very small.

5.6 LAND

5.6.1 Topography and Wetlands

The proposed actions involve some land disturbance but the proposed actions are not located in floodplains or wetlands. No permanent negative impacts on the topography or physiography of Mound or vicinity are expected, although temporary disturbances are required by the proposed action. No part of the proposed action would impact wetlands or floodplains. The no-action alternative would have no impact.

5.6.2 Soils

There are no significant soil or mineral resources at Mound or in the immediate vicinity. However, the contaminated soils at Mound generate continuing emissions of radioactive particles from the site, as previously described. The proposed action is in part directed at greatly reducing the chance of contamination spreading to additional soil, a positive impact. The no-action alternative would result in gradually increasing areas of soil contamination. In addition, the proposed action would aid in compliance with environmental regulations on erosion and sediment control. Temporary impacts on soils would be controlled by erosion-control and re-vegetation measures described in Section 3.4.

5.6.3 Archaeological, Historical, and Cultural Resources

Because no sites of historical or cultural significance exist anywhere on the Mound Plant property, neither the proposed action nor the alternatives pose a threat to any archaeological, historical, or cultural resources (see ***Appendix B***).

5.6.4 Land Use Patterns

The proposed action and alternatives take place entirely on the Mound site and would not change any local land-use patterns or affect any recreational resources. Ultimately, land now occupied by Mound must be decontaminated prior to release.

5.6.5 Waste Disposal

The wastes of concern are low-level radioactive wastes, TRU wastes, and mixed radioactive and hazardous wastes that may be generated. It is estimated that 943,000 ft^3 of low-level waste would have to be disposed of in land committed to this general purpose as a result of the proposed action.

Approximately 660 ft^3 of TRU waste would be packaged and held at the site. Also held at the plant would be 2 liters of liquid mixed waste (tritiated mercury). Uncontaminated solid and asbestos waste, after proper monitoring, would be disposed of according to Mound Plant guidelines. This presents no more hazard than routine disposal of municipal waste and construction debris. Further details are provided in Sections 3.7 and 3.8. The amounts of waste generated are summarized in ***Table 3.3***.

If no action is taken, contaminants would continue to slowly spread, steadily increasing the amount of contaminated material eventually requiring disposal. Contaminated soil is expensive to remediate and remaining contaminated soil limits the use of the land, a potentially significant impact in a growing urban area.

5.7 ECOLOGY

5.7.1 Wildlife and Threatened and Endangered Species

The proposed action would disturb only non-unique and largely disturbed habitats. The Proposed Action and Alternatives would not be expected to have any affect on threatened or endangered species in the area of the Mound Plant. Such species, other than the single specimen of Inland Rush, (*Juncas interior weig*) are not observed on the plant site, nor are they likely to be be dependent on the site for food and habitat due to the commercial and residential development surrounding the plant. A foreseeable impact to wildlife from the proposed action would be positive, in that radioactive emissions would be reduced. The no-action or deferred-action alternatives would not disturb any habitat, but would allow current emissions to continue.

5.7.2 Vegetation

The proposed actions would not disturb any unique areas of natural vegetation or impact any field crops. Pesticides and herbicides would be used as required to control weeds and insects during decontamination activities. None of the pesticides and herbicides to be used are regulated under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). None are expected to have any significant impact upon the environment, the public, or D&D workers.

5.7.3 Aquatic Resources

The potential short-term impacts of the proposed action would be mitigated through the use of contamination-control techniques within buildings (Section 3.3) and through particulate and sediment control techniques during building demolition and soil excavation (Section 3.4). The conditions of the current NPDES permit would be met. The long-term impact would be to reduce the amount of radioactive sediment released into the aquatic environment. Fish, shellfish, waterfowl, and aquatic plants would be protected by the proposed actions through source reduction, a positive impact.

5.8 HUMAN AND ECONOMIC ASPECTS

The Mound Plant is one of the main employers in Miamisburg. The proposed action will provide employment for those workers engaged in the D&D activities.

There would be a small temporary increase in truck traffic from Mound to the major highways serving Miamisburg. Only a few additional trucks would leave the site each day. The plant site is bound by Mound Road on the east and Benner Road on the south. The Mound Road traffic flow totals approximately 4,000 vehicles per day and the Benner Road traffic flow totals approximately 3,000 vehicles per day. The total number of shipments anticipated is extremely low compared to this traffic volume.

5.9 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The proposed projects would require the use of natural resources such as vehicle fuel and electric power, but the quantities involved are small. The land involved in the action is already in use by Mound. Radioactive waste that may be generated during excavation would be disposed of in land dedicated to that general purpose at the NTS. Nonradioactive waste would be disposed of in local municipal landfills dedicated to waste disposal. No other irreversible or irretrievable commitments exist as a result of the proposed actions.

5.10 ACCIDENT RISKS

5.10.1 Impacts from Potential Accidents

The impacts of potential accidents during D&D projects are limited to standard industrial hazards and the possibility of the release of and exposure to radioactive materials. The radiological hazards associated with these projects are bounded by the accidental releases and subsequent exposures analyzed in existing documents, including the EIS (DOE, 1979) and a variety of safety analysis reports and safety assessment documents [e.g., for the SW Building (Mound, 1992) and WD Building (Mound, 1978)]. These documents describe "maximum credible" (i.e. reasonably foreseeable) accident scenarios that could involve far greater operational amounts of radioactive materials than are expected to be present during the proposed D&D activities, providing a conservative bounding case. For example, the EIS postulated a fire in a plutonium facility, which released 16 Ci of Pu-238, giving a 15-rem total lifetime lung commitment, and a tritium release giving a dose of less than 0.1 rem to the maximally exposed individual. Based on the risk conversion factor of 4×10^{-4} latent cancer fatalities per rem of effective dose equivalent (Nuclear Regulatory Commission, Preamble to Standards for Protection Against Radiation, 56 FR 23363, May 21, 1991) which presents an overly cautious view of the risk from an exposure to only the lung, these exposures would be highly unlikely to result in any adverse health effects.

The maximum release of tritium and Pu-238 during an accident related to the D&D Project is expected to be substantially less than the quantities released during the above postulated accidents, as discussed below:

A. Soil D&D:

The greatest reasonably foreseeable accident that could occur in a D&D Soils project is the falling of an unsealed waste container from a forklift. This accident would result in the release of radioactive contaminants to the environment and is described below:

After a waste container has been filled with contaminated soil, the lid is placed on the container without the sealing (locking) mechanisms in place. The container is picked up by forklift and moved to an area, still within the Radiation Control Zone, for weighing and sampling. During the move, it is postulated that a set of conditions could exist that would cause the waste container to fall from the grasp of the forklift to the ground, with most of (if not all) its contents leaving the confines of the container. The accident would generate an airborne release of radioactively contaminated soil particulates.

Before mitigating measures (see Section 3.4.1) are applied by the workforce, it is assumed that approximately 1 part in 1,000,000 parts (1 ppm) (*Draft Safety Evaluation, Decontamination, and Decommissioning Activities, Special Metallurgical Building and Soils*, April 23, 1992) of the container's contents becomes airborne and is available for inhalation uptake by workers and members of the public. Since the accident would occur in the Radiation Control Zone, the

workforce would be appropriately protected (see Section 3.5) and therefore would not be exposed. It is assumed for this exercise that the off-site receptor is 200 m downwind from the accident and that it will take 4 hours before emissions are brought under control.

Table 3.2 indicates that the Building 21 Project is made up of soil uniformly contaminated with up to 296 Ci Pu-238. Since the project involves 267,800 ft^3 of waste (***Table 3.3***) approximately 2,678 waste containers will be required, with each containing soil with up to 0.111 Ci Pu-238. Therefore, from wind resuspension (*Draft Safety Evaluation D&D Activities, Special Metallurgical Building and Soils*, April 23, 1992), a dose of 0.03 mrem would be received by an off-site maximally exposed member of the public.

DOE Order 5400.5, *Radiation Protection to the Public and the Environment*, limits public exposure to 100 mrem/year and 40 CFR 61, Subpart H (EPA 1991) limits public exposure to 10 mrem/year.

A Mound project that was started in 1982 and completed in 1991, the Waste Transfer System (WTS) D&D Project, was very similar to the proposed Building 21 project. During the 10 years of the WTS activities, over 5,000 waste containers were involved. No incident occurred that involved an unsealed, filled waste container falling from the grasp of a forklift with the contents leaving the waste container.

B. Building D&D

Tritium

There are many reasonably foreseeable accidents that potentially could occur during the D&D of the tritium areas of the SW Building. The results of these incidents are described below for both a release to the atmosphere that would result in an off-site dose and release within a laboratory occupied by a D&D worker. The frequency of such a release has been determined to be 1×10^{-5} (Mound Facility Risk Review October 1991, JBF Associates, Inc.).

Because of the SW Building exhaust system design, some amount of gaseous tritium or tritium oxide release to a room would be exhausted to the atmosphere. Since tritium is lighter than air, the buoyant plume would not intersect the ground and would rapidly disperse in the atmosphere. The buoyancy of the plume could be increased further if its temperature were greater than the outside air temperature. Conversion of tritium to tritium oxide after release from a stack could result in some fallout of tritium oxide. However, at a conversion rate of 20% per day, the release of tritium would be well dispersed before significant quantities of tritium oxide could be formed. Extreme meteorological conditions, such as a low inversion layer, calm winds, and rain, might increase the conversion of tritium to tritium oxide and increase local fallout of tritium oxide.

From an accident release scenario described in the *Final Safety Analysis Report (FSAR) for the SW/R tritium Complex* (February 4, 1992), the 30 Ci estimated to be in the SW D&D Project (***Table 3.2***) would result in a maximum airborne radionuclide concentration of tritium oxide approximately 0.3 KM (a 0.3KM radius from the stack includes areas both on-site and off-site) from the stack. An individual inhaling this airborne contamination for 2 hours would receive a dose of 0.03 mrem. This exposure is below both DOE Order 5400.5 limit of 0.1 rem/year and 40 CFR 61 limit of 0.01 rem/year for airborne releases. The dose to an individual at any other distance from the stack would be less than 0.03 mrem.

It can also be seen from the FSAR for the SW/R Complex that if the estimated 30 Ci in the SW Building D&D Project were accidentally released into the typical building laboratory, and both the room exhaust system and tritium detection system failed, the dose would be 0.02 mrem for an individual working in the room for 8 hours.

Plutonium

The most severe reasonably foreseeable accident is assumed to occur in the R-140 project, which contains the greatest quantity of Pu-238, due to a breach of a temporary enclosure's containment and area filtration. The building's HEPA filtration system is assumed to continue to function.

The R-140 project contains an inventory of approximately 0.9 Ci Pu-238 (Table 3.2). From the *Safety Assessment Document, WD (Waste Disposal) Building, October 31, 1978, Monsanto Research Corporation, Mound Facility,* it can be shown that the accident scenario described above would result in a dose of less than 0.003 rem to an off-site maximally exposed member of the public.

The scenario for the exposed D&D worker to Pu-238 is that one of the gloveboxes experiences a breach of containment and releases 10% of its activity to the R-140 laboratory. It is assumed that the worker is wearing a supplied air respirator and exits the laboratory in one minute. The worker would receive a 50-year dose commitment to the bone of 6.1 rem. This dose is below the DOE Order 5480.11 limits of 50 rem for occupational workers.

As described in Section 3.3 and 3.6, the D&D work would be performed in rooms, enclosures, etc., that are protected by High Efficiency Particulate Air (HEPA) filtered ventilation systems, maintained under negative pressure. The rooms and enclosures are also maintained under negative pressure precluding the escape of particulates. These protective measures for the D&D workers will be augmented by the use of respirators and other personnel protection equipment.

Failure of a HEPA filter would result in minimal release of contaminants, since the area would still be maintained under negative atmospheric pressure and redundant HEPA filters are arranged in series, providing back-up in the event of filter failure.

Should there be a general power failure the, primary building HEPA filtration systems are connected to an emergency back-up power system.

5.10.2 Transportation of Radioactive Materials

There is a potential for non-radiological injury or death as a result of a truck accident. Possible truck accident scenarios might involve personal injury and property damage from the transport vehicle collision, fire or explosion.

The proposed D&D activities would result in an estimated 2,141 shipments to the NTS, a total of 6,926,135 kilometers of travel during a four year period. To assess accident potential, the most likely transport route was divided into segments which were then assigned one of three population densities; rural, suburban, and urban. The percent of travel, accident rate, and potential accidents for each segment are shown below:

Population Zone	Percent[1] of Travel	Accident[2] Rate/km	Potential[3] Accidents
Rural	77.7%	1.37×10^{-7}	.73
Suburban	20.9%	3.00×10^{-6}	4.34
Urban	1.4%	1.60×10^{-5}	1.55

1. INTERSTAT Analysis, TRANSNET System, Sandia National Laboratories, September 22, 1992.

2. "The Impacts of Transportation Within the United States of Spent Reactor Fuel from Domestic and Foreign Research Reactors", SAND88, TTC-0794, UC-603, J. W. Cashwell, R.E. Luna, K.S. Neuhauser, January, 1990. **NOTE:** THIS REFERENCE WAS USED ONLY FOR ESTABLISHING ACCIDENT RATES.

3. Based on number of kilometers traveled in each zone.

The accident rates shown above only reflect probability; considering Mound's shipping history it is likely there would be no accidents. Mound has previously transported waste over 4,581,547 kilometers (2,847,450 miles) with only two minor incidents. In addition, these potential accidents rates do not consider accident severity. Minor incidents such as tire failure or incidents resulting in no property damage could be considered as accidents.

The greatest credible accident considered with radiological impacts was a semi-trailer truck carrying five boxes of Pu-238 contaminated soil overturning and dumping the contents of the boxes onto the roadway. A fraction of the soil becomes airborne and is inhaled by the driver for two hours before he is removed from the scene. The driver wears no protective equipment and all the suspended dust is inhaled. The maximum committed dose equivalent was determined to be a reasonable estimate for this scenario (Refer to Appendix A) is 9 mrem. This estimate is based on conservative estimates of the soil resuspension factor and the expected levels of soil contamination presented in Table 3.2.

Based on a risk conversion factor of 4×10^{-4} latent cancer fatalities per rem of effective dose equivalent (Nuclear Regulatory Commission, Preamble to Standards for Protection Against Radiation, 56 FR 23363, May 21, 1991) which presents an overly cautious view of the risk from an exposure to only the lung, these exposures would be highly unlikely to result in any adverse health effects.

In the event the accident described above occurs, the general public would receive a committed effective dose equivalent considerably less than the driver due to dispersion by wind, dilution by rain as well as distance from the accident. The health risks would also decrease due to the above factors.

5.10.3 Potential Impacts from Natural Hazards

The potential impacts from natural hazards during D&D projects are limited to the possibility of the release of and exposure to radioactive materials. The radiological hazards associated with these projects are bounded by the accidental releases and subsequent exposures analyzed in the EIS and safety documents cited previously. The EIS analysis addresses both tornado and earthquake impacts. For a moderate tornado and a design basis earthquake, the EIS estimated 0.1 to 10.0 g of plutonium would be released off-site. The analyses of the SW/R

complex concluded that no scenario involving natural phenomena was found to result in a hazardous material release. D&D would act to reduce the risks of the public receiving exposure. The above analyses indicate that a release due to natural events would have only minor effects. The maximum amount of radiological materials available for release through natural hazards in this proposed action is expected to be less than the quantities addressed in the above analyses (because the EIS analysis considered the entire Mound plant); therefore, the impacts would be less. The potential impacts would be the same under all alternatives.

5.10.4 Risk Comparison

The maximum total amount of radioactive and hazardous material that could be released into the environment during D&D operations is identical to the amounts currently in the buildings and soil areas. D&D operations would temporarily make contaminants more available for dispersion by excavation, opening up contaminated equipment, and disaggregation of the surfaces of the floors and walls. During the time that debris and rubble from D&D activities are present before packaging, accidents or natural calamities could disperse these materials. Because D&D would proceed through each project over several years, only a small portion of the total radioactive material would be available for mobilization at any one time. The potential risk from an accident that disperses all radioactive material present is identical for all alternatives, including the no-action alternative. The risk following the proposed action would be reduced proportionally to the amount of radioactive material removed.

5.11 LONG-TERM IMPACTS

The cumulative and long-term impacts of the proposed action include positive effects brought about by the removal, consolidation, and appropriate disposal of radioactively contaminated materials. The primary beneficial impact of the proposed action is the reduction in the amount of radioactively contaminated sediment released off-site through stormwater runoff. While the current releases from the site are within regulatory guidelines, removal of the source of contamination would further reduce both emissions and the chance of an exceptional rainfall event eroding large quantities of contaminated soil.

In the short term, D&D operations could possibly increase the potential release of contaminants to the environment. Specifically, soil removal activities could result in release of contaminants to the air and stormwater runoff. Monitoring and mitigation controls described in Section 3.4 would be in effect throughout the D&D operations to ensure that the short term potential increases in released contaminants would be minimized and kept in compliance with regulatory guidelines.

The no-action and deferred-action alternatives would allow continued low-level releases of contaminated sediment and present the possibility of larger releases through exceptional rainfall events, although such releases would be expected to remain within regulatory and permit guidelines.

6.0 REFERENCES CITED

Mound Technical Manuals:

MD-10019, *Nuclear Radiation Safety,* 1991.

MD-10203, *Mound WIPP Certification, Program for Newly Generated Contact Handled (CH) Transuranic Waste*, 1991.

MD-10246, Issue 2, *On-site Transportation of Hazardous Materials*, 1988.

MD-10286, Issue 9, *Mound Safety and Hygiene Manual*, 1992.

MD-70180, *Mound Radioactive Liquid Waste Disposal*, 1988.

MD-70204, Issue 5, *Low-Level Radioactive Waste Management*, 1989.

MD-70205, *TRU Waste Management System*, 1988.

MD-70523, *Nonradioactive Hazardous, Radioactive Mixed, Toxic, and Solid Waste Management*, 1991.

DOE Orders:

DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, 1990.

DOE Order 5480.11, *Radiation Protection for Occupational Workers*, 1988.

DOE Order 5820.2A, *Radioactive Waste Management*, 1988.

Other References:

Farmer, B. M., et al., *Environmental Monitoring at Mound: 1990 Report*, MLM-3703, 1991.

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U.S. Department of Energy, *Waste Acceptance Criteria for the Waste Isolation Pilot Plant*, DOE/WIPP-069, Revision 4-UC70, 1991.

U.S. Department of Energy, Nevada Operations Office and Reynolds Electrical and Engineering Co., Inc., *Nevada Test Site Defense Waste Acceptance Criteria, Certification, and Transfer Requirement*, NVO-325, 1988.

U.S. Nuclear Regulatory Commission, Preamble to *Standards for Protection Against Radiation*, 56 Federal Register 23363, May 21, 1991.

Operable Unit 9, *Hydrogeologic Investigation: Wetlands Determination Report*, Mound Plant, U.S. Department of Energy, Albuquerque Operations Office, 1/94.

Operable Unit 9, *Ecological Characterization Report*, U.S. Department of Energy, Albuquerque Operations Office, 3/94.

7.0 LIST OF AGENCIES CONSULTED

DAYTON MUSEUM OF NATURAL HISTORY (endangered species)
Mr. Thomas R. Hissong, Curator of Education
April, 1991

UNITED STATES DEPARTMENT OF THE INTERIOR, FISH & WILDLIFE (endangered species)
Mr. Kent E. Kroonemeyer, Supervisor
April, 1991 and June, 1992

OHIO HISTORIC PRESERVATION OFFICE (historic properties)
Ms. Martha J. Raymond, Department Head
April, 1992

OHIO HISTORIC PRESERVATION OFFICE (archaeological)
Ms. Judith Kitchen, Department Head
March, 1991

OHIO DEPARTMENT OF NATURAL RESOURCES (state scenic rivers)
Mr. Stuart Lewis, Administrator, Ohio Scenic Rivers Program

OHIO DEPARTMENT OF NATURAL RESOURCES
Ms. Jennifer Hillmer, Ecological Analyst
Division of Natural Areas and Preserves

NOTE: See Appendix B for copies of correspondence from the above agencies.

APPENDIX A

RADIOLOGICAL IMPACT OF TRANSPORTATION ACCIDENT INVOLVING SPILL OF PU-238 CONTAMINATED SOIL ONTO THE ROAD

EVALUATION

Four parameters were used to compute a 50 year committed effective dose equivalent as a result of inhalation by the driver. A reasonable range of values was determined for each of the parameters and input into a Latin hypercube program. The output is in the form of a percentile versus the inhalation dose for that percentile.

COMPUTATION

Resuspension Factor (g/m^3): Triangular Distribution with ranges:

Minimum	1.00E-4
Likeliest	2.50E-4
Maximum	1.00E-3

Selected range is from 1.00E-4 to 1.00E-3 with mean value in simulation of 4.50E-4. (A Manual for Implementing Residual Radioactivity Material Guidelines, A supplement to U.S. Department of Energy Guidelines for Residual Radioactive Material at Formerly Utilized Sites Remedial Action Program and Surplus Facilities Management Program Sites), June 1989.

Soil Concentration, pCi/g: Triangular Distribution with ranges:

Minimum	1.00E+3
Likeliest	1.00E+4
Maximum	4.00E+4

Selected range is from 1.00E+3 to 4.00E+4 with a mean value of 1.7E+4. (Table 3.2)

Dose Conversion Factor, mrem/pCi: Normal Distribution with ranges:

Mean	3.00E-1
Stand. Dev.	3.00E-5

Reference: United States Department of Energy, (Internal Dose Conversion Factors for Calculation of Dose to the Public), 7/88.

The formula used in the calculation was:

(Resuspension Factor) X (Soil Concentration) X (Breathing Rate) X (Dose Conversion Factor) = Committed Effective Dose Equivalent
Where: Breathing rate = 0.025 m^3/min.

RESULTS

The entire range of doses calculated was from 0 to 18 mrem. After 1000 trials, the standard error of the mean is 0.08.

Note: Calculated using Crystal Ball Software^R.

Percentiles for entire range (mrem)

PERCENTILE(%)	INHALATION DOSE
0	0
5	1
10	1
15	1
20	2
25	2
30	2
35	2
40	3
45	3
50	3
55	3
60	4
65	4
70	5
75	5
80	6
85	6
90	7
95	9
100	18

To obtain the maximum committed effective dose equivalent the 95% percentile was chosen as a reasonable estimate for this scenario as there is only a small probability of the dose being in 95% to 100% percentile. Therefore, the maximum committed effective dose equivalent due to 2 hours of breathing Pu-238 contaminated dust is 9 mrem.

APPENDIX B

LETTERS OF CORRESPONDENCE
WITH FEDERAL, STATE AND LOCAL AGENCIES

Ohio Historic Preservation Office

Ohio Historical Center
1982 Velma Avenue
Columbus, Ohio 43211-2497
(614) 297-2470

OHIO
HISTORICAL
SOCIETY
SINCE 1885

March 15, 1991

Mark D. Gilliat
EG&G Mound Applied Technologies
P.O. Box 3000
Miamisburg, Ohio 45343-0987

Dear Mr. Gilliat:

Re: Mound Facility, Miamisburg, Ohio

This is in response to your letter dated February 21, 1991 concerning the Miamisburg facility. Based on the field survey and examination of the Mound Facility undertaken by Dr. Robert Riordan, Wright State University, in 1987 it appears that there are no significant archaeological remains on the Mound Facility due to previous disturbance. No archaeological sites eligible for the National Register will be affected. Please note that the buildings comprising the facility have not been evaluated in regard to National Register criteria. In order to do this we must have photographs of the buildings, their ages, and a brief history of the facility.

Any questions concerning this matter should be addressed to Julie Quinlan at (614) 297-2470. Her hours are from 5-11 a.m. Thank you for your cooperation.

Sincerely,

Judith Kitchen

Judith Kitchen, Department Head
Technical and Review Services

JLK/JAQ:jq

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Reynoldsburg Field Office
6950-H Americana Parkway
Reynoldsburg, Ohio 43068-4115
(614) 469-6923

IN REPLY REFER TO:

April 4, 1991

Mr. Mark D. Gilliat
EG&G Mound Applied Technologies
P. O. Box 3000
Miamisburg, OH 45343-0987

Dear Mr. Gilliat:

This responds to your April 4, 1991 telephone conversation with Ken Multerer of my staff regarding the construction of roadways at your facility. As you stated, roadways are being constructed in some new growth wooded areas on your property. This wooded area may contain some trees which may provide potential habitat for the Indiana bat.

These comments are provided under the authority of the Endangered Species Act of 1973, as amended.

ENDANGERED SPECIES COMMENTS: The proposed project lies within the range of the Indiana bat, a Federally listed endangered species. Summer habitat requirements for the species are not well defined but the following are thought to be of importance:

1. Dead trees and snags along riparian corridors especially those with exfoliating bark which may be used as maternity roost areas.

2. Live trees (such as shagbark hickory) which have exfoliating bark.

3. Stream corridors, riparian areas, and nearby woodlots which provide forage sites.

Considering the above items, we recommend that if trees with exfoliating bark (which could be potential roost trees) are encountered along the proposed right-of-way, they not be cut between May 1 and August 31.

If the above recommendations are incorporated into the project, this precludes the need for further action on this project as required by the 1973 Endangered Species Act, as amended. Should the project be modified or new information become available that indicates listed or proposed species may be affected, consultation/conferring, as appropriate, should be initiated.

If the above described time restriction is unacceptable, mist netting will need to be done to determine whether Indiana bats are actually present. If they are found to be present, specific recommendations will need to be made at that time.

Sincerely,

for Kent E. Kroonemeyer
Supervisor

cc: Chief, Ohio Division of Wildlife, Columbus, OH
ODNR, Outdoor Recreation Service, Attn: M. Colvin, Columbus, OH
Ohio EPA, Water Quality Monitoring, (L. Merchant), Columbus, OH
U.S.EPA, Office of Environmental Review, Chicago, IL

A NEW MUSEUM FOR A NEW CENTURY

Dayton Museum of Natural History
2629 Ridge Avenue
Dayton, Ohio 45414
Phone (513) 275-7431

April 25, 1991

Mr. Mark Gilliat
EG&G Mound Applied Technologies
P.O. Box 3000 - Mound Road Bldg. 69
Miamisburg, Ohio 45343 - 3000

Mr. Mark Gilliat:

I hope that my visit to the EG&G Mound Applied Technologies facility on Friday - April 12, 1991 was beneficial to your efforts in identifying and protecting any Shagbark Hickory (Carya ovata) trees on your site that might provide protective cover for the endangered Indiana Myotis (Myotis sodalis) bat. I commend your company for their concerns in the protection of our endangered wildlife.

After walking the EG&G Mound site to examine several woodlots, we found that the vast majority of trees on location are second growth hardwoods including: Eastern Cottonwood - Populus deltoides, Box Elder - Acer negundo, Wild Black Cherry - Prunus serotina, Ash sps., Elm sps. and others. Also various honeysuckle species were found throughout the understory. Shagbark Hickory (Carya ovata) was not found to be present in any of the wooded areas examined on the EG&G Mound site.

I found the morning to be very productive in providing you with an opportunity to better understand the vegetational cover at the EG&G Mound site. It was my pleasure to show you a Shagbark Hickory (Carya ovata) tree growing in a local park so that you could become familiar with the identification of this species. I am sure that you will now be able to identify any Shagbark Hickory (Carya ovata) that you might encounter in the future at the EG&G Mound site.

If I can ever be of further help to you please contact me any time.

Sincerely yours,

Thomas R. Hissong

Thomas R. Hissong
Curator of Education

United States Department of the Interior

Fish and Wildlife Service
Reynoldsburg Field Office
6950-H Americana Parkway
Reynoldsburg, Ohio 43068-4115

(614) 469-6923/FAX (614) 469-6919

TAKE PRIDE IN AMERICA

In Reply Refer to:

June 16, 1992

Mr. Mark Gilliat
EG&G
Mound Applied Technologies
P.O. Box 3000
Miamiesburg, Ohio 45343-3000

Dear Mr. Gilliat:

Per our telephone conversation on June 15,1992, regarding endangered and threatened species, I wish to inform you that the only Federally listed species in Montgomery county is the Indiana bat.

These comments are provided under the authority of the Endangered Species Act of 1973, as amended.

Sincerely,

Ken Kroonemeyer

for Kent Kroonemeyer
Supervisor

Ohio Historic Preservation Office

Ohio Historical Center
1982 Velma Avenue
Columbus, Ohio 43211-2497
614/297-2470
Fax: 614/297-2411

OHIO HISTORICAL SOCIETY
SINCE 1885

April 10, 1992

Mark D. Gilliat
EG&G Mound Applied Technologies
P.O. Box 3000
Miamisburg, Ohio 45343-3000

Dear Mr. Gilliat:

Re: Decontamination/Demolition, Miamisburg, Ohio
Neutron Radiography Facility, Building 21, SD Building

This is in response to your letter dated March 19, 1992 concerning the proposed work. These comments are submitted in accordance to the provisions of the Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800). Based on the information you provided it is my opinion that the project will have no effect upon any properties listed or eligible for the National Register of Historic Places. No further coordination is required unless the scope of the undertaking changes. If historic properties are accidentally discovered this office should be notified.

Please contact Julie Quinlan at the above number if you have any questions. Her hours are from 5-11 a.m. Thank you for your cooperation.

Sincerely,

Martha J. Raymond

Martha J. Raymond, Department Head
Technical and Review Services

MJR/JAQ:jq

OHIO
Department of Natural Resources

George V. Voinovich • *Governor*
Frances S. Buchholzer • *Director*

July 14, 1992

Mr. Mark Gilliat
EG&G M.A.T.
P.O. Box 3000
Miamisburg, OH 45343-3000

Dear Mr. Gilliat:

In response to our recent phone conversation and your follow up letter requesting a statement that the Mound Facility has no impact on a State or National Wild and Scenic River, I can verify that the Great Miami River is not a component of the State or National Wild and Scenic Rivers System.

The Mound Facility is not located near a designated State or National Scenic River. The Stillwater State Scenic River is a tributary to the Great Miami and enters the river at Dayton. Since the Stillwater is upstream of the Mound Facility, no impact would be anticipated.

Thank you for providing me the opportunity to comment.

Sincerely,

Stuart Lewis

Stuart Lewis, Administrator
Ohio Scenic Rivers Program
Division of Natural Areas & Preserves

SL/slc

OHIO
Department of Natural Resources

George V. Voinovich • *Governor*
Frances S. Buchholzer • *Director*

August 4, 1992

Mark Gilliat, Engineer
EG&G Mound Applied Technologies
P.O. Box 3000
Miamisburg, OH 45343-3000

Dear Mr. Gilliat:

After reviewing our maps and files, I find the Division of Natural Areas and Preserves has no records of rare and endangered species in the Department of Energy Mound Facilities project area.

There are no existing or proposed nature preserves or scenic rivers in the project area, and we are unaware of any other unique ecological sites in the vicinity of the Miamisburg, Montgomery County site.

Because our inventory program relies on information supplied by a number of individuals and organizations, a lack of records for any particular area is not a statement that special plant or animal species are absent from a site. Please note that we inventory only high-quality plant communities and do not maintain an inventory of all Ohio wetlands.

I have included a copy of our plant and animal lists for your information. The invoice for this search has been sent separately to Beverly Peters in the EG&G Mound Applied Technologies Library. Please contact me if I can be of further assistance.

Sincerely,

Jennifer A. Hillmer

Jennifer Hillmer, Ecological Analyst
Division of Natural Areas & Preserves

JH/slc