3001-0102050005

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a McDermott company

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ESC-187/00
November 29, 2000

00-TC/11-29

Mr. Richard B. Provencher, Director
Miamisburg Environmental Management Project
U.S. Department of Energy
P.O. Box 66
Miamisburg, OH 45343-0066

ATTENTION: Dewain Eckman

SUBJECT: Contract No. DE-AC24-97OH20044
BUILDINGS R, SW, 58 AND 68 SLAB - PUBLIC REVIEW DRAFT

REFERENCE: Statement of Work Requirement C 7.1d -- Regulator Data Requests

Dear Mr. Provencher:

The attached Action Memorandum for Buildings R, SW, 58 and 68 Slab has been authorized for release to USEPA, OEPA, and ODH by Sam Cheng of MEMP. This document will go into public review for the period of November 29, 2000 through December 30, 2000. Attached is the ad that will be placed in the *Miamisburg News*.

Please advise if additional copies are required for distribution with DOE. If you require further information, please contact Dave Rakel at extension 4203.

Sincerely,

JSStapleton

Jeffrey S. Stapleton
Manager, Environmental Safeguards & Compliance

JSS/nmg

Enclosures as stated

cc: Tim Fischer, USEPA, (1) w/attachments
Brian Nickel, OEPA, (2) w/attachments
Ruth Vandegrift, ODH, (1) w/attachments
Rob Rothman, MEMP, (2) w/attachments
Tim Heath, BWXT of Ohio, (2) w/attachments
Dann Bird (2), w/attachments
Public Reading Room (5), w/attachments
DCC

MOUND

Environmental Restoration Program

MOUND PLANT ACTION MEMORANDUM

Notice of Public Review Period

The Action Memorandum for R/SW/58 & 68 Slab is available for public review in the CERCLA Public Reading Room, 305 E. Central Ave., Miamisburg, Ohio. The Memorandum public review period will be November 29, 2000 through December 30, 2000.

R/SW/58 & 68 Slab:
Laboratories (Research and Semi-Works)

Questions can be referred to Paul Lucas at (937) 865-4578.

ACTION MEMORANDUM
ENGINEERING EVALUATION/COST ANALYSIS

BUILDINGS R, SW, 58, AND 68 SLAB REMOVAL ACTION

MOUND PLANT
MIAMISBURG, OHIO

NOVEMBER 2000

Public Review Draft

(Revision 0)

Department of Energy

BWXT of Ohio

ACTION MEMORANDUM

BUILDING R, SW & 58 AND 68 SLAB REMOVAL ACTION

MOUND PLANT
MIAMISBURG, OHIO

NOVEMBER 2000

PREPARED BY:

BWXT OF OHIO, INC.
P.O. BOX 3030
MIAMISBURG, OHIO 45343-3000

FOR THE

U.S. DEPARTMENT OF ENERGY

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ACRONYMS

AEC	Atomic Energy Commission
AM	Action Memorandum
AM/EE/CA	Action Memorandum/Engineering Evaluation/Cost Analysis
ARARs	Applicable or Relevant and Appropriate Requirements
BGS	Below Ground Surface
BVA	Buried Valley Aquifer
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
D&D	Decontamination and Decommissioning
DOE	Department of Energy
EE/CA	Engineering Evaluation/Cost Analysis
EG	Emergency Generator
EPA	Environmental Protection Agency
ER	Environmental Restoration
FFA	Federal Facilities Agreement
FSP	Field Sampling Plan
HEPA	High Efficiency Particulate
ID	Identification
LSA	Low Specific Activity
mrem	millirem
MSL	Mean Sea Level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NTS	Nevada Test Site

ACRONYMS (cont.)

OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
OU	Operable Unit
OSC	On-Scene Coordinator
OSHA	Occupational Safety and Health Administration
pCi/g	picoCuries per gram
PRS	Potential Release Site
RCRA	Resource Conservation and Recovery Act
RESRAD	Residual Radioactive Material Program (Software)
RI/FS	Remedial Investigation/Feasibility Study
RREM	Residual Risk Evaluation Methodology
RSE	Removal Site Evaluation
SARA	Superfund Amendments and Reauthorization Act
SW	Semi-Works
TRU	Transuranic
USEPA	United States Environmental Protection Agency

1. PURPOSE

The U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (USEPA) have agreed on an approach for decommissioning surplus DOE facilities consistent with the ***Policy on Decommissioning of Department of Energy Facilities under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)*** dated May 22, 1995. According to this approach, decommissioning activities will be conducted as CERCLA removal actions, unless the circumstances at the facility make it inappropriate (DOE 1995). The DOE is the designated lead agency under CERCLA and removal actions at the Mound Plant are implemented as federal-lead actions with DOE funds instead of the funds available to the EPA under CERCLA (i.e., non-Superfund). DOE provides the On-Scene Coordinator (OSC). Non-Superfund, federal-lead removal actions are not subject to United States Environmental Protection Agency (USEPA) limitations on the OSC ($50,000 authority) and are not subject to National Oil and Hazardous Substances Pollution Contingency Plan (NCP) limitations on removal actions (i.e., $2,000,000 in cost and 12 months in duration).

This Action Memorandum (AM) has been completed to document the evaluation of site conditions, to propose the action described herein, and to allow public input.

2. SITE CONDITIONS AND BACKGROUND

2.1 SITE DESCRIPTION

This section describes the physical location, characteristics, release of contaminants into the environment and the National Priorities List (NPL) status of the site of the proposed removal action.

2.1.1 Physical Location

The Mound Plant is a 306-acre facility on the southern border of the city of Miamisburg in Montgomery County, Ohio. The Mound Plant is approximately 10 miles south-southwest of Dayton and 45 miles north of Cincinnati. This removal action is proposed for Buildings R, SW, 58, the Building 68 slab, and contaminated soils in the vicinity of these buildings. The letter R stands for Research, the letter SW stands for Semi-works. Buildings R, SW, 58, and the Building 68 slab are physically connected. The locations of Buildings R, SW, 58, and the Building 68 slab are shown in Figure 2.1. The R Building and the Building 68 slab are bordered by Building H to the north, Building SW to the west, and DS Building to the south. Buildings adjacent to Building SW and 58 are B Building to the north, Building I to the west, Building R to the east, and Building 48 to the south.

2.1.2 Site Characteristics

2.1.2.1 Building R and Building 68 Slab

Building R is a single-story structure, with a penthouse, constructed of concrete block with brick facing. The roof is metal with a built-up membrane of coal tar. Building R, one of the original buildings constructed in 1948, is located on the main hill. The total area of Building R is 55,006 square feet. The R Building penthouse contains a HEPA filter bank and associated ductwork connecting it to the T-West stack. The building has central steam for heat, chilled water, and electrical service of 480V. The building was divided into two areas: the cold side and the hot side.

The hot side is associated with radiological areas, in particular, areas used for tritium recovery, rooms in which plutonium work was conducted and discontinued and rooms used for various analytical support activities. The cold side of the building contained research and development laboratories, analytical laboratories, a respirator fitting facility, offices, and the library.

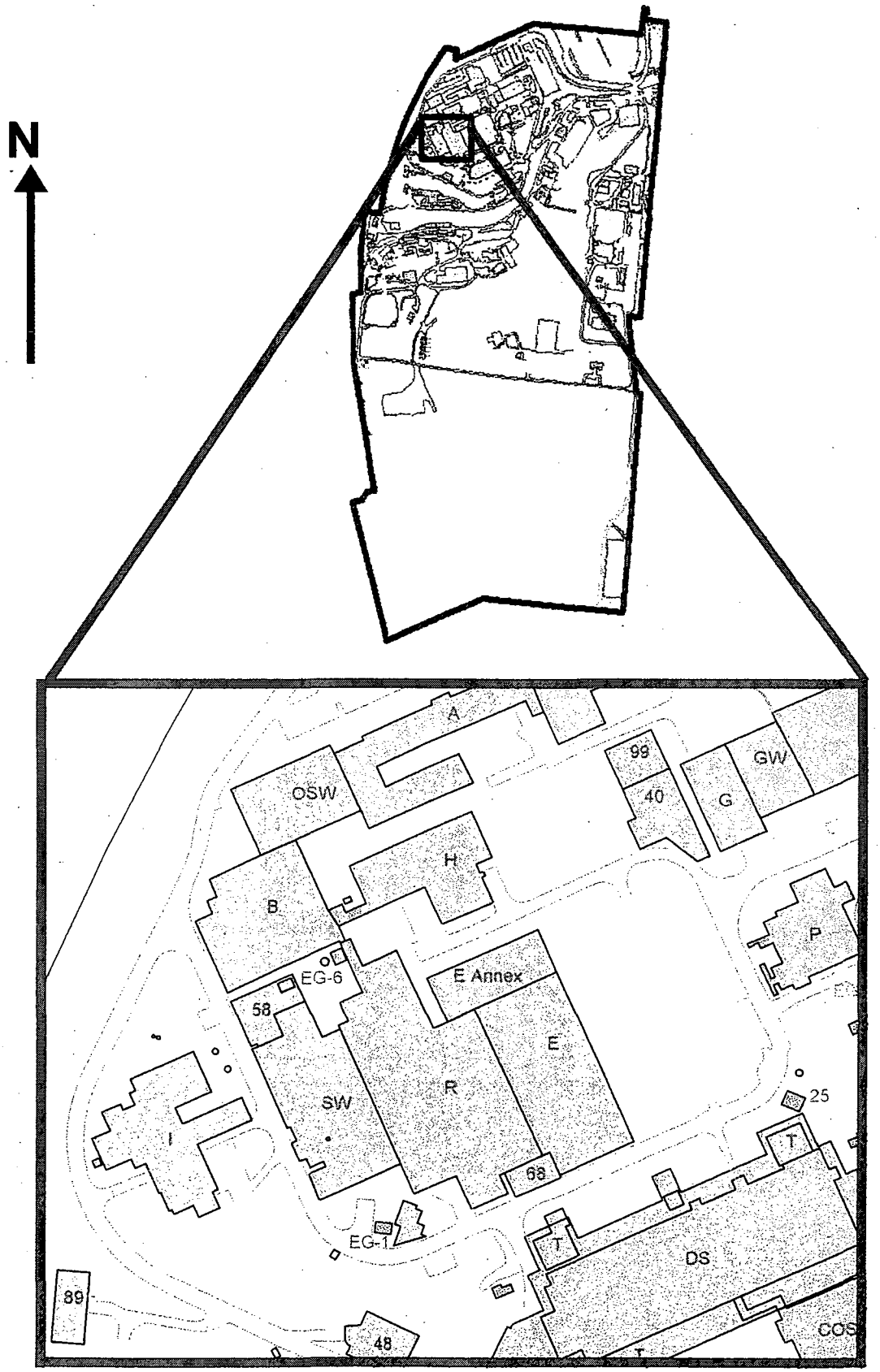


Figure 2.1 Location of Buildings R, SW, 58 and Formerly 68

Seven Potential Release Sites (PRSs) (PRS 142, 143, 144, 145, 146, 327, and 328) are associated with Building R. The PRSs and a brief description are listed in Table 2.1. These PRSs are included in the removal action.

Figure 2.2 is a photograph of Building R.

Table 2.1 PRSs Associated with Building R

PRS	Description	Comments
142	Building SW/R Solid Radioactive Waste Compactor	
143	Building SW/R/T Stack Diesel Fuel Storage Tank (Tank 117)	
144	R Building Sanitary Waste Collection Tank (Tank 120)	
145	Room R-128 Alpha Waste Water Tank (Tank 19)	
146	R Building Rooms 121, 144, 146, and 148 entombed drains	Sealed in concrete in building floor drains.
327	R-111 Calorimetry Bath (Tank 255)	
328	R-111 Calorimetry Bath (Tank 256)	

Building 68 was a one-story structure constructed in 1979 of pre-fabricated metal with a metal roof. The Building 68 structure was demolished as part of the E Building demolition project in May, 2000. (See E Building Action Memo, Final, April 2000.) Following the demolition of the Building 68 structure, the slab was left to be used as an equipment staging area for the Buildings R/SW demolition project. The total area of the Building 68 slab is approximately 1,990 square feet. Following completion of the R/SW demolition, the Building 68 slab will be removed along with the R and SW building slabs.

Figure 2.3 is a photograph of the former location of Building 68 (slab).

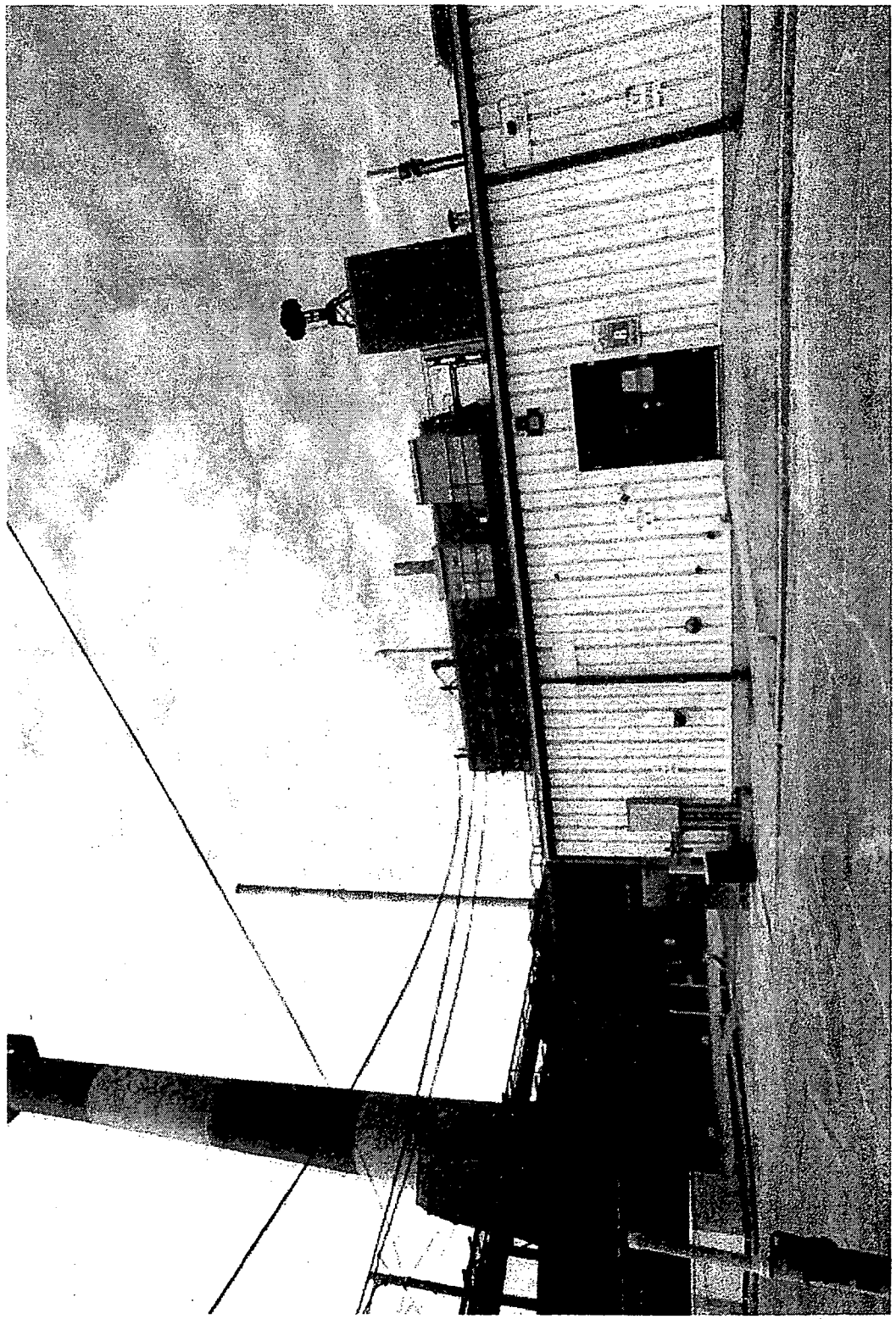


Figure 2.2 R Building (Pictured from the South.)

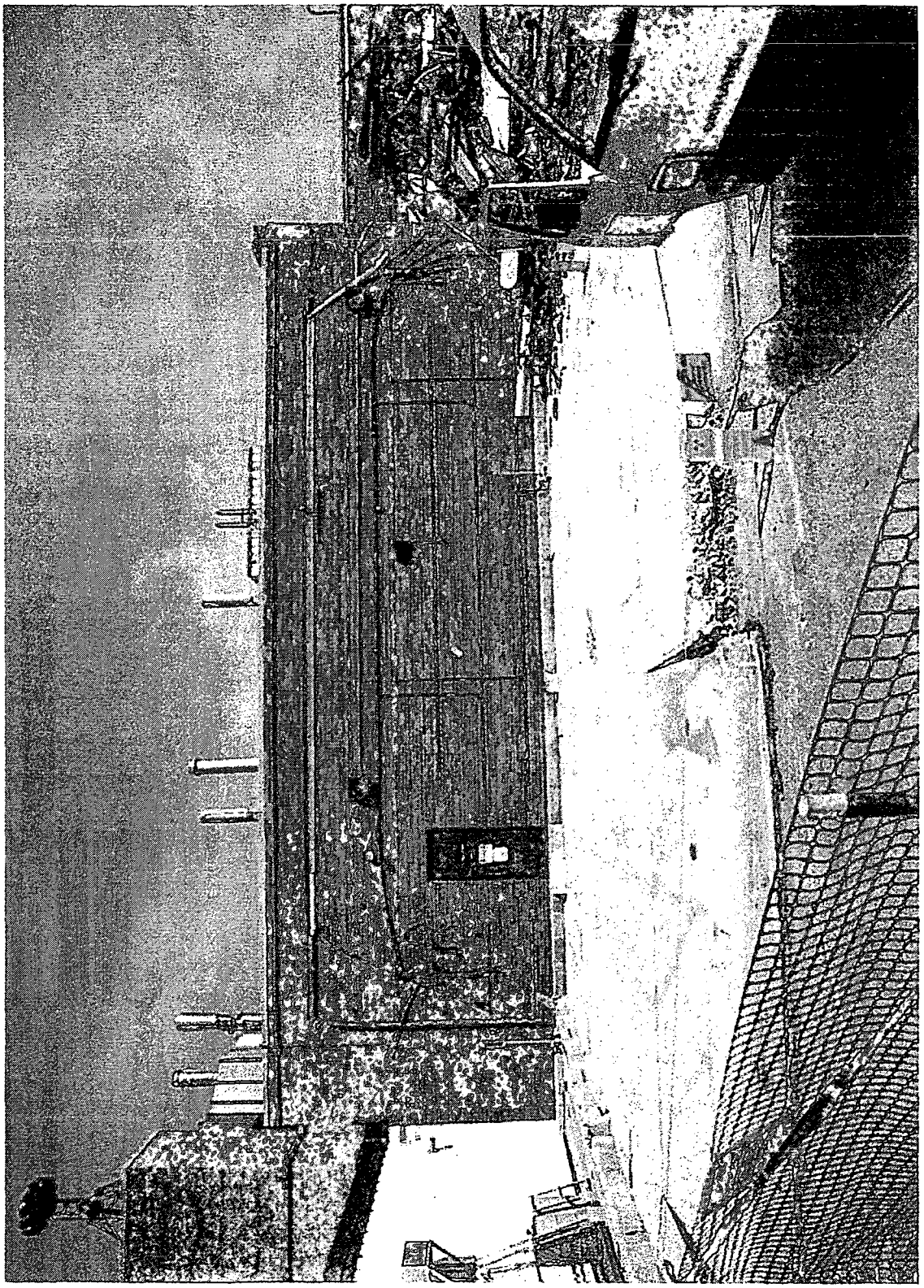


Figure 2.3 Building 68 (Slab)

Building 68 was used as a storage area for Decontamination and Decommissioning operations. Containers of radioactive waste, primarily of low-specific activity (LSA) from Buildings R and SW were staged for shipping. The other portion of Building 68 was used to store parts and materials for maintenance operations. No research, development, or production activities using radiation or energetic materials have occurred in the building.

2.1.2.2 Buildings SW and 58

Building SW is a two-story structure, with a penthouse, constructed of concrete block with brick facing. The roof is metal with built-up membrane of carboline, asphalt, and coal tar. Building SW is located on the main hill. Originally constructed in 1950, Building SW has undergone 13 major additions. One addition originally named Building 62 is now considered part of SW Building. The total area of Building SW is 43,066 square-feet. The building has central steam for heat, chilled water, and electrical service of 480V.

Building SW was used for tritium recovery and purifications, tritium component development, component evaluation, and analysis of materials. The past operations included research projects on plutonium, actinium, radium, uranium, thorium, and protactinium. The building is contaminated with radiological materials. The building contains high-efficiency particulate air (HEPA) filters and alpha and beta hot drains.

Building 58 is an elevated one-story, steel-frame building with brick face exterior. The roof is a metal built-up membrane with asphalt. This building, which was erected in 1974, contains 6,100 square-feet. Access to the building is from the roof of Building SW or by a staircase from the roof of Building B. The building has central steam for heat, chilled water, and electrical service of 480V. Electrical service of 12,470V is provided to the SW Substation, which is part of Building 58.

Building 58 contains the alpha and beta filter banks and plenum exhaust for Building SW. A High Efficiency Particulate (HEPA) filtration system is used to filter out alpha and beta particulate from the exhaust of several rooms in Building SW. The building has been used for the same purpose since construction. The building contains equipment possibly contaminated with radioactive materials.

Seventeen (17) Potential Release Sites (PRSs) (PRS 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 209, 234, 249, 250, 251, and 329) are associated with Buildings SW and 58. The PRSs and a brief description are listed in Table 2.2. These PRSs are included in the removal action. Figure 2.4 is a photograph of Buildings SW and 58.

Table 2.2 PRSs Associated With Buildings SW and 58

PRS	Description	Comments
131	SW Building Soils	Tritium and other radioisotopes beneath the building.
132	Area 15 Entombed SW Cave (Room SW-1A)	Radon-222, Actinium-227, and Thorium Isotopes
133	SW Building Room 1B	Radioisotopes sealed in concrete in building floor.
134	Building SW Drum Storage (Staging) Area	
135	Room SW-8, Beta Wastewater Tank (Tank 20)	
136	Room SW-125, Beta Wastewater Tank (Tank 21)	Suspected historical leaks. Tank lined.
137	Room SW-143, Beta Wastewater Tank (Tank 22)	Suspected historical leaks. Tank lined.
138	Room SW 137 Alpha Wastewater Sump (Tank 23)	Possible Uranium-233
139	Room SW-10, Beta Wastewater Sump (Tank 226)	Suspected historical leaks. Tank lined.
140	Beta Waste Solidification Facility, Building SW	Waste oils
141	Tritium Effluent Recovery System (ERS)	Pump oils and organic solvents
209	Building 62 Stack Deluge Tank	
234	Building 58 Diesel Fuel Storage Tank (Tank 222)	Tank removed December 1989. Binned No Further Assessment (NFA) 8/20/96. See Appendix B.
249	SW Building NCPDF Stack	
250	SW Building SW1C Stack	
251	SW Building HEFS Stack	
329	Building 62 Hot Waste Sump (Tank 258)	Sanitary waste water with potential alpha contamination.

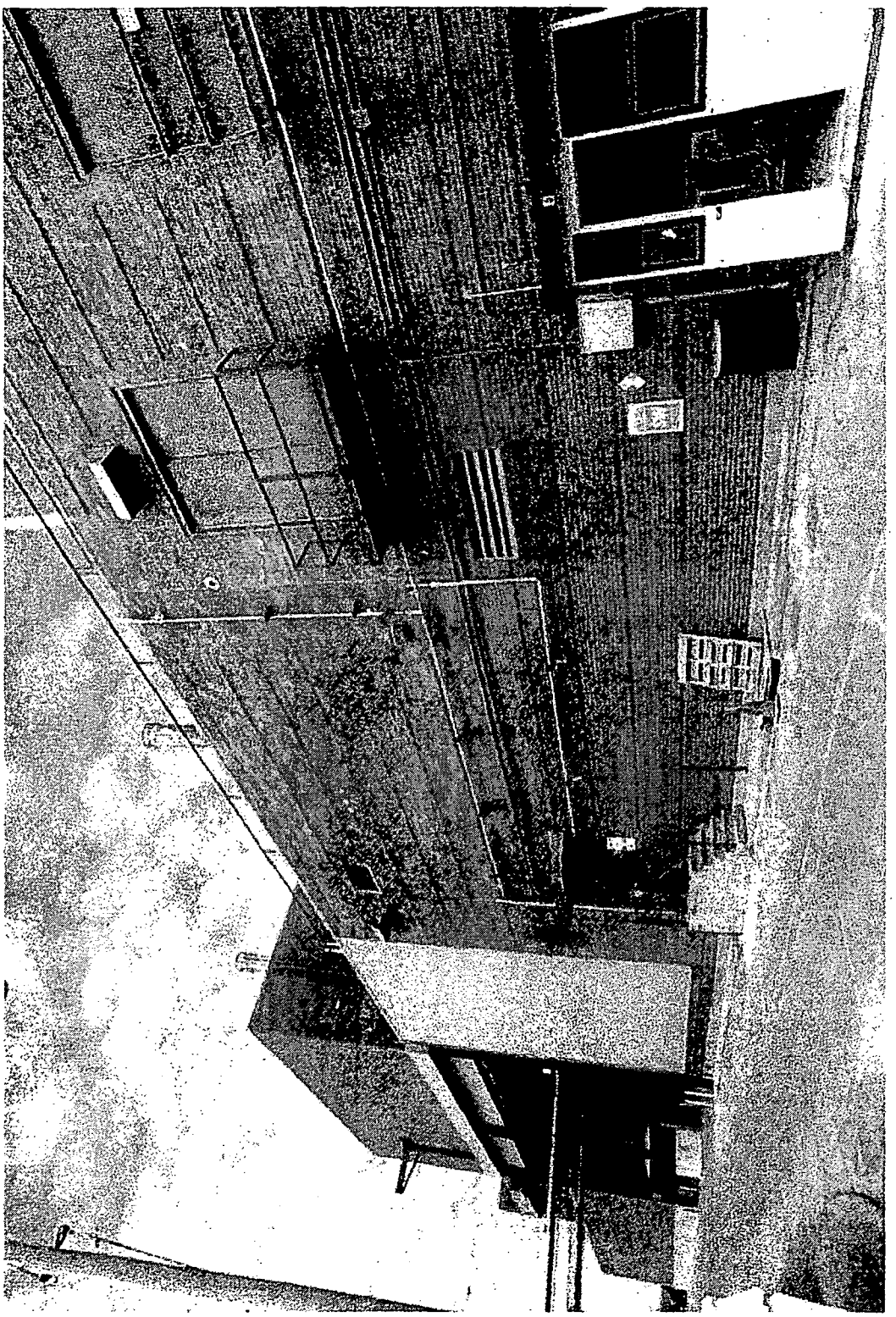


Figure 2.4 Buildings SW and 58 (Viewed from West)

2.1.3 Release or Threatened Release into the Environment

The potential release of radionuclides prompted this removal action.

2.1.4 National Priorities List Status

The USEPA placed the Mound Plant in Miamisburg, Ohio on the NPL by publication in the Federal Register on November 21, 1989.

2.2 OTHER ACTIONS TO DATE

The Mound Plant initiated a CERCLA program in 1989, now guided by the agreement between the DOE, Ohio Environmental Protection Agency (OEPA), and USEPA. A Federal Facilities Agreement (FFA) under CERCLA Section 120 was executed between DOE and US EPA Region V on October 12, 1990. It was revised on July 15, 1993 (EPA Administrative Docket No. OH 890-008984) to include OEPA as a signatory. The general purposes of this agreement are to:

- Ensure that the environmental impacts associated with past and present activities at the site are thoroughly investigated and appropriate remedial action taken as necessary to protect the public health, welfare, and the environment.

- Establish a procedural framework and schedule for developing, implementing, maintaining, and monitoring appropriate response actions at the site in accordance with CERCLA, Superfund Amendments and Reauthorization Act (SARA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Superfund guidance and policy, and Resource Conservation and Recovery Act (RCRA) guidance and policy.

- Facilitate cooperation, exchange of information, and participation of the parties in such actions.

2.2.1 Previous Removal Actions

No previous CERCLA Removal Actions were conducted at Buildings R, SW, 58, and the building 68 slab. As described earlier, the Building 68 structure was demolished during the E Building demolition project conducted as a CERCLA removal action. Removal and administrative closure of the PRSs is included in this removal action.

2.2.2 Current Actions

2.2.2.1 Building R and Building 68 Slab

Research (R) Building (55,003 square feet) is a one-story concrete block and brick building constructed in 1948. The building contains laboratories for both radioactive and non-radioactive work, offices and service rooms. Radioactive material present in Building R include uranium, plutonium, americium, protactinium, radium, radon, actinium, and tritium.

Current actions pertinent to Building R include a tritium removal project, work planning for D&D, safe shutdown, and characterization. Work planning consists of the up-front work required to execute building disposition activities in accordance with Environmental Safety & Health requirements, DOE orders, and best management practices. Safe shutdown includes building surveillance (weekly and monthly contamination surveys), and disposition of equipment and waste.

There are two safe shutdown activities for Building R. The first is the safe shutdown of radiologically contaminated areas (Area A).

Area A consists of the areas in the building in which active radioactive material work is underway; this is primarily tritium removal work. The majority of the remaining rooms are ones in which plutonium work was conducted and discontinued. The radiological control counting lab and the penthouse which includes the facility HEPA filter bank are also included, and the sumps and crawlspaces above the room ceilings.

The second safe shutdown activity involves the safe shutdown of non-contaminated areas (Area B). Area B consists mainly of the rooms presently being used as offices and storage areas with the building. The restrooms and the old plant library are included. There are some laboratories included in which non-radioactive development work was performed as well as laboratories which have been previously decommissioned.

The Building 68 slab (1,990 square feet) was left following demolition of the Building 68 structure during the E Building demolition project in May, 2000. The Building 68 pad will be used as an equipment staging area for the Buildings R and SW demolition project. Following completion of the R and SW structures demolition, the Building 68 slab will be removed along with the slabs of Buildings R and SW.

2.2.2.2 Buildings SW and 58

The Semi-Works (SW) Building (43,066 square feet) is a two-story building with a penthouse, constructed of concrete block with brick facing and is used primarily for handling tritium. Originally constructed in 1950, Building SW has undergone 13 major additions, including the Building 58 erected in 1974.

Current actions pertinent to Buildings SW and 58 include tritium removal, work planning for D&D, safe shutdown, and characterization. Work planning consists of the up-front work required to execute building disposition activities in accordance with Environmental Safety & Health requirements, DOE orders, and best management practices. Safe shutdown includes building surveillance (routine contamination surveys), and disposition of equipment and waste.

There are eight safe shutdown activities for Building SW. The first of the safe shutdown activities involves Area A, Accountable Tritium Area/Component Evaluation Organization.

Area A includes a component evaluation and testing area. The first floor rooms are minimally contaminated as is the second floor, which is used for component evaluation. The testing areas have some of the most heavily contaminated gloveboxes in the facility; however, most of the rooms including the testing console areas are only slightly contaminated. The old testing area (SW-210) is heavily contaminated. The area also includes an old mass spectroscopy lab that has heavily contaminated equipment in fumehoods and behind wall enclosures. Room 208 work is scheduled up front to support critical path activities in Area F, Room SW-19.

The second safe shutdown activity involves the safe shutdown of Area B, Building Systems/Effluent Recovery System.

Area B contains primarily the equipment associated with the Effluent Recovery System (ERS) which was installed in a number of phases beginning in the late 1960s. The primary ERS area is in the two-story SW-8 area with the associated tritiated water collection and solidification systems in SW-149 & 149B and a freon refrigeration system in SW-205P. SW-8 also includes an old, solids recovery boxline (discontinued in 1970s) as well as large fumehoods which contain an abandoned thermal diffusion (TD) system used originally for tritium enrichment. The TD system is heavily contaminated with mercury and the ground area under SW-8 is contaminated with a variety of radioactive materials (mainly tritium) and potentially hazardous chemicals.

The third safe shutdown activity involves the safe shutdown of Area C, Nuclear Component Development and Pre-production Facility (NCDPF).

Area C contains primarily the tritium development and environmental testing facility originally constructed in the mid-1970s. The systems in this area include offices and storage vaults, laboratories containing gloveboxes and fumehoods for components, tritium processing areas, environmental storage areas, welding development, calorimetry and decontamination as well as inert atmosphere re-circulation system equipment and a central vacuum system. Whereas the office and storage areas are minimally contaminated, the majority of the equipment in the lab areas is heavily tritium contaminated.

The fourth safe shutdown activity involves the safe shutdown of Area D, Non-Rad Areas.

Area D contains the primary change rooms and restrooms for the SW Building. The first floor section also contains two heavy electrical switch gear areas, most of the tritium component environmental temperature and shock testing laboratories, as well as a laboratory that contains non-radioactive equipment. The second floor section includes offices and a building-wide utility services area, such as cooling water and electrical. A central readout area for tritium stack monitors is also included.

The fifth safe shutdown activity involves the safe shutdown of Area E, Metallography Area.

Area E contains gloveboxes and equipment used most recently for metallographic support of tritium operations at Mound. The support equipment for these operations is also included. The only operable scanning electron microscope (capable of radioactive sample analysis) is in this area. Because of prior uses, this area represents a significant removal hazard and will require extensive characterization. There is uncertainty associated with the extent of contamination in/under the SW-13 floor and the effort required for its removal.

The sixth safe shutdown activity involves the safe shutdown of Area F, Tritium Operations.

Area F consists of a mass spectroscopy lab and a heavily contaminated area used for processing and disassembling components. This area also contains the inert re-circulation system equipment for the extensive gloveboxes. The equipment and gloveboxes are heavily contaminated with a variety of radioactive materials, and a significant amount of mercury.

SW-19 needs to be completed in a timely manner before work on the "Old Cave" can begin. The "Old Cave" or entombment lies under SW-19. SW-19 work activities include the removal of a contaminated vertical lathe and the enclosure which surrounds it. The lathe and enclosure protrude into SW-208, the room above SW-19.

The seventh safe shutdown activity involves the safe shutdown of Area G, Old Cave.

The Old Cave, which was used to process actinium, is under the floor of SW-18, SW-19 and SW-13. The knowledge of what is specifically entombed is not complete at this time. Area G contains the HEPA filter bank which supports the alpha areas in the building. The filter bank will need to be left in place until alpha contamination is at an acceptable level following remediation of the New Cave area and the Old Cave.

The eighth safe shutdown activity involves the safe shutdown of New Cave Area.

The New Cave Area was used most recently for repackaging of U-233 for removal from the site. The original transuranic processing operations in this area were terminated more than 10 years ago. Since then, the area has been used minimally except for storage. Some initial decontamination and decommissioning activities were performed in the area in 1996-1997, but most of the equipment remains in the area. The filter bank and stack can be removed only after sufficient remediation of the area precludes release of alpha materials from this area and the area under rooms 17, 18, and 19 (Old Cave) in Area G. The New Cave work will utilize the 1C-North HEPA filter bank and the 1C-North stack.

Safe shutdown activities for Building 58 and the HEFS stack will be addressed after SW Building site shutdown activities are completed.

2.3 STATE AND LOCAL AUTHORITIES' ROLES

2.3.1 State and Local Action to Date

In 1990, as a result of Mound Plant's placement onto the NPL, DOE and USEPA entered into a Federal Facilities Agreement (FFA) which specified the manner in which the CERCLA program was to be implemented at Mound. In 1993, the FFA was amended to include the OEPA. DOE remains the lead agency.

2.3.2 Potential for Continued State and Local Response

OEPA will continue its oversight role until all the terms of the FFA have been completed.

3. THREAT TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT

3.1 THREATS TO PUBLIC HEALTH OR WELFARE

The potential release of radionuclides may create a potential threat to the public health or welfare.

3.2 THREATS TO THE ENVIRONMENT

The potential release of radionuclides may create a potential threat to the environment.

3.2.1 Removal Site Evaluation

The Removal Site Evaluation (RSE) requirements, as outlined under EPA's NCP regulations in 40 CFR 300.415, are presented throughout this AM. An evaluation by public health agencies has not been performed for this area, and, therefore, is not included in this AM.

The NCP identifies eight factors that must be considered in determining the appropriateness of a removal action [40 CFR 300.415(b)(2)]. These criteria are evaluated in Table 3.1.

Table 3.1 Evaluation of Removal Action Appropriateness Criteria
[40 CFR 300.415(b)(2)]

Criteria		Evaluation
(I)	"...potential exposure to nearby human populations, animals, or the food chain..."	There is potential exposure to nearby human populations, animals, or the food chain from radionuclides when present institutional controls are relaxed.
(ii)	"Actual or potential contamination of drinking water supplies..."	There is potential contamination of on-site drinking water supplies from the radionuclides. The contaminants could migrate to the ground water that is the source for the plant drinking water and is part of the buried aquifer.
(iii)	"Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release;"	Not applicable. This removal action does not address hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage.
(iv)	"High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate;"	There are high levels of radioactive contaminants in soils largely at or near the surface that are migrating.
(v)	"Weather conditions that may cause hazardous substances to migrate or be released;"	This site is exposed to weather conditions. Rain might cause radioactive contaminants near the surface to migrate.
(vi)	"Threat of fire or explosion;"	Not applicable.
(vii)	"The availability of other appropriate federal or state response mechanisms to respond to the release;" and	There are no other appropriate federal or state mechanisms to respond. The Federal Facilities Agreement (FFA) established a combined state and federal mechanism to respond under CERCLA. DOE is the designated lead agency at Mound under CERCLA
(viii)	"Other situations or factors that may pose threats to public health or welfare or the environment."	Not applicable.

4. ENDANGERMENT DETERMINATION

There is a potential or threat of release of pollutants or contaminants from this site that could pose an endangerment to public health or welfare or to the environment. To eliminate the possibility of endangerment, as the site transfers from DOE ownership and control, DOE has determined that removal of the contaminants is appropriate.

5. PROPOSED ACTION AND ESTIMATED COSTS

5.1 PROPOSED ACTION

The proposed action is the demolition of Buildings R, SW, 58, Building SW exhaust stacks, removal of the Building 68 slab, and removal of contaminated soils in the vicinity of Building SW. Since the proposed action is within the site boundaries, it is not expected to have a disproportionate impact on low income or minority populations.

5.1.1 Proposed Action Description

The proposed action is described as follows:

- Project Planning

  Planning and execution of the proposed action is divided into two phases, Phase I will be accomplished while the integrity of the building's environmental envelope is intact. Phase II will be accomplished after the environmental envelope is breached. The environmental envelope is defined as the building, the ability to maintain a negative pressure to the outside, and the environmental monitoring of discharge air to the outside environment. Due to the complexity of the work, multiple work plans will be generated during each phase. Because the environmental envelope is still intact during Phase I, work plan documents will be reviewed by DOE and made available to the USEPA and OEPA on request. Work plans for Phase II will be reviewed by DOE, USEPA, and OEPA. Project specific safety documentation (HASP/JSHA) is reviewed by DOE.

- Public Participation

  A notice of the availability of this Action Memorandum for 30 day public comment period will be published in a local newspaper.

- Phase I - Establish Work Zones

  This activity establishes the work zones for the facility in preparation for D&D. The efforts include mobilizing equipment and personnel, establishing air monitoring for personnel and work zone perimeters, establishing the personal protective equipment (PPE) requirements, installing temporary facilities and utilities (if required), construction hazard abatement, general housekeeping, soil erosion control, and establishing dust control.

- Phase I - Buildings R, SW, and 58, Decontamination

  Decontamination is the removal of residual radioactive and hazardous materials by mechanical, chemical, or other techniques to achieve a stated objective or end condition. Activities being conducted prior to building demolition include removing excess equipment, remove lighting, remove tritium contaminated equipment (including bubblers, effluent recovery system, tritium transfer lines, gloveboxes, and fumehood), remove ductwork, remove asbestos piping, decontaminate/remove ceiling and overhead utilities, and decontamination of rooms within the building. Some sumps may be potentially decontaminated to facilitate removal. Most sumps will be removed and dispositioned as low level waste.

  Decontamination of Building R includes the removal of contaminants from the solid radioactive waste compactor (PRS 142), contaminated sumps (wastewater tanks) (PRSs 144, 145), the EG-1 diesel fuel storage tank (PRS 143), the R-111 calorimetry baths (PRS 327, 328), the contaminated (entombed) room drains (PRS 146), fixed contamination areas/walls, soil, waste handling, and disposal.

  Decontamination of Building SW and 58 includes the removal of contaminants from the Building 58 (EG-6) diesel fuel storage tank (PRS 234), the contaminated sumps (wastewater tanks) (PRS 135, 136, 137, 138, 139), the drum storage staging area (PRS 134), the beta waste solidification facility (PRS 140), three exhaust stacks (PRS 249, 250, 251), contamination areas/walls, soils (PRS 131), waste handling, and disposal. The "Old Cave" (PRS 132), the floor of SW-1B (PRS 133) and the tritium effluent recovery system (PRS 141) will be removed and not decontaminated.

  Characterization involves mainly supplemental building characterization. The R Building itself and its important components, such as the penthouse, the sumps and drains, and the crawlspaces above the room ceilings will be characterized. The SW building itself and its important components, such as stacks, the penthouse, the old and new caves (entombments), the sumps, and the HEPA filter banks will be characterized.

- Phase II - Demolish Buildings

  This includes demolition of the structures, waste handling and disposal. Demolition will typically be accomplished using heavy duty equipment such as excavator-mounted shear and/or grapple.

- Phase II - Remove Associated Foundations and Soils

  The foundations and soils associated with Buildings R, SW, 58 and 68 will be removed. Some soil remediation will occur prior to the demolition of the building. This includes the area under SW-8 and the "Old Cave" area. One option being considered is to grout the Old Cave in place and remove after the SW Building structure is down.

- Phase II - Verification

  This step includes, among other activities: sampling and analysis of soil at the edges of the excavations to determine the residual contaminant concentration and verifying that the residual contamination concentration is within acceptable limits. The verification sampling and analysis process will be further defined by a Verification Sampling and Analysis Plan. A partial listing of radionuclides processed in Buildings R and SW including the primary contaminants of concern for Buildings R, SW, and 58, is given in Table 5.1, along with the risk-based cleanup objectives.

- Site Restoration

  Equipment, materials, waste containers, and boundaries will be removed. The site will be back-filled and restored to industrial use standards. The grounds will be seeded and mulched.

- Documentation of Completion

  Completion of the removal action will be documented by an On Scene Coordinator (OSC) report.

5.1.1.1 Rationale, Technical Feasibility, and Effectiveness

The removal action chosen is necessary for the removal of known contamination and to ensure that migration of the contamination does not occur.

5.1.1.2 Monitoring

Health and safety monitoring will be performed throughout the removal action according to standard Mound procedures. Sampling and analysis of excavated soil will be described in more detail in the Work Plan for this removal action.

Table 5.1 Clean-Up Objectives

Contaminant	Risk Based Guideline Values (10^{-5})[1]	Background Values[4]	Clean-Up Objective
Actinium-227 + decay products in secular equilibrium to Lead-207	10 pCi/g	NA	10 pCi/g
Americium-241	49.5 pCi/g	ND	49.5 pCi/g
Bismuth-207	1.75 pCi/g	ND	1.75 pCi/g
Cesium-137 + decay products in secular equilibrium to Barium-137	4.6 pCi/g	0.42 pCi/g	4.6 pCi/g
Lead-210 + decay products in secular equilibrium to Lead-206	17 pCi/g	NA	17 pCi/g
Protactinium-231 + decay products in secular equilibrium to Lead-207	6.9 pCi/g[6]	NA	6.9 pCi/g
Plutonium-238	55 pCi/g	0.13 pCi/g	55 pCi/g
Plutonium-239/240	55 pCi/g	0.18 pCi/g	55 pCi/g
Radium-226 + decay products in secular equilibrium to Lead-210	1.4 pCi/g	2.0 pCi/g	3.4 pCi/g
Strontium-90 + decay products in secular equilibrium to Zirconium-90	30 pCi/g	0.72 pCi/g	30 pCi/g
Thorium-228 + decay products in secular equilibrium to Lead 208	1 pCi/g[3]	1.5 pCi/g	3.0 pCi/g[5]
Thorium-230 + decay products in secular equilibrium to Lead-206	1.3 pCi/g[2]	1.9 pCi/g	3.2 pCi/g[2]
Thorium-232 + decay products in secular equilibrium to Lead-208	1 pCi/g[3]	1.4 pCi/g	3.0 pCi/g[5]
Tritium	235,000 pCi/g	1.6 pCi/g	235,000 pCi/g
Uranium-233 + decay products in secular equilibrium to Bismuth-209	9.7 pCi/g[6]	NA	9.7 pCi/g
Uranium-234 + decay products in secular equilibrium to Lead-206	1.3 pCi/g[6]	1.1 pCi/g	2.4 pCi/g
Uranium-238 + decay products in secular equilibrium to Lead-206	1.2 pCi/g[2]	1.2 pCi/g	2.4 pCi/g[7]

(1) Mound Plant Construction Worker, 1 x 10^{-5} Risk Based Guideline Value (RBGV) concentrations for soil and sediment (DOE 1997).
(2) Taken from HH Building Action Memo, Draft, July 2000.
(3) Values are presented in "Technical Position Report in Support of the Release Block H Residual Risk Evaluation," Final, Rev. 0, July 1999.
(4) Mound 2000 RREM, Final (DOE 1997).
(5) Core Team approved As Low As Reasonably Achievable (ALARA) concentration value based on the quantification limitations of the Mound on-site screening lab.
(6) Calculations of 10^{-5} Risk Based Guideline Values are attached in Appendix A.
(7) If Uranium-238 is present in concentrations greater than 2.4 pCi/g, evaluate secular equilibrium with daughters. If secular equilibrium exists, use 2.4 pCi/g as clean up goal. If secular equilibrium does not exist, adjust Uranium-238 clean-up goal upward to account for reduced daughter concentrations.

NA = Not Available; ND = Not Detected

5.1.1.3 Uncertainties

The major uncertainties are the concentration levels of the contaminants and the extent of contamination.

5.1.1.4 Institutional Controls

DOE will remain in control of Buildings R, SW, 58, and 68 slab during the removal action.

5.1.1.5 Post-Removal Site Control

Initially, post removal site control will be provided by DOE/Mound. The Mound Plant is to be sold to Miamisburg Mound Community Improvement Corporation (MMCIC). Currently, the location of Buildings R, SW, and 58 is in Parcel 8. The controls needed at the time of the transfer in order to ensure future protection of human health and the environment will be included in the Record of Decision for Parcel 8.

5.1.1.6 Cross-Media Relationships and Potential Adverse Impacts

The potential cross-media impact associated with the removal action is the potential for unintended release of contaminated materials into the atmosphere. Careful monitoring and control will be implemented during the removal action.

No potential significant adverse impacts of the removal action have been identified.

5.1.2 Contribution to Future Remedial Actions

To facilitate further assessments and removal actions in or near the location of this removal action, the exact dimensions of the excavation and the levels of contamination identified and removed will be documented. The On-Scene Coordinator Report will document the removal action with photographs, drawings, and other information collected during the field work.

The information obtained, as a result of this removal, will be used in determining the availability of the Mound Plant for final disposition and will be subject to review in the subsequent residual risk evaluation.

5.1.3 Description of Alternative Technologies

Alternative technologies frequently evaluated for CERCLA remediation include institutional controls, containment, collection, treatment, and disposal. Based on the prevailing conditions, the following alternatives (in addition to the proposed alternative of dismantlement) were developed.

1. No Action
2. Institutional Controls

The performance capabilities of each alternative with respect to the specific criteria is discussed below.

5.1.3.1 No Action

The levels of radioactive contamination in Buildings R, SW, and 58, and associated soils are unacceptable. The "No Action" option was eliminated from further consideration.

5.1.3.2 Institutional Controls

Existing Mound Plant institutional controls effectively minimize the potential for contact of the subject contamination with the general public. However, after ownership is transferred, these same institutional controls will be difficult to monitor and enforce. Also, the radioactivity can migrate and be transported beyond the site boundaries. Thus, institutional controls were eliminated from further consideration. A Removal Action is warranted.

5.1.4 Engineering Evaluation/Cost Analysis (EE/CA)

This document serves as the Action Memorandum and EE/CA.

5.1.5 Applicable, or Relevant and Appropriate Requirements (ARARs)

Mound ARARs for the ER Program have been identified (DOE 1998). CERCLA regulations require that removal actions comply with ARARs.

The following have been identified as applicable, or relevant and appropriate to this removal action:

- 49 CFR 172, 173: DOT hazardous material transportation and employee training requirements.

5.1.5.1 Air Quality

- 40 CFR Part 61 Subpart H: National Emissions Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities.
- 40 CFR Part 61 Subpart M: National Emission Standards for Asbestos.
- Ohio Administrative Code (OAC) 3745-15-07(A): Air Pollution Nuisances Prohibited.
- OAC 3745-17-02 (A,B,C): Particulate Ambient Air Quality Standards.
- OAC 3745-17-05: Particulate Non-Degradation Policy.
- OAC 3745-17-08: (A1), (A2), (B),(D): Emission Restrictions for Fugitive Dust.
- OAC 3745-20: Asbestos Emission Control.

5.1.5.2 To Be Considered

- EPA/230/02-89/042: Methods for Evaluating the Attainment of Cleanup Standards.
- DOE Order 5400.5: Radiation Protection of the Public and the Environment

5.1.5.3 Worker Safety

- 29 CFR Part 1910: Occupational Safety and Health Act (OSHA) - General Industry Standards
- 29 CFR Part 1926: Occupational Safety and Health Act (OSHA) - Safety and Health Standards
- 29 CFR Part 1904: Occupational Safety and Health Act (OSHA) - Record keeping, Reporting, and Related Regulations

5.1.6 Other Standards and Requirements

Other standards or requirements related to the actual implementation of the response action may be identified subsequently during the design phase and will be incorporated into the Work Plan for this removal action.

5.1.7 Project Schedule

5.1.7.1 Building R and Building 68 Slab Project Schedule

The schedule established for planning and implementing the removal action is summarized in Table 5.2.

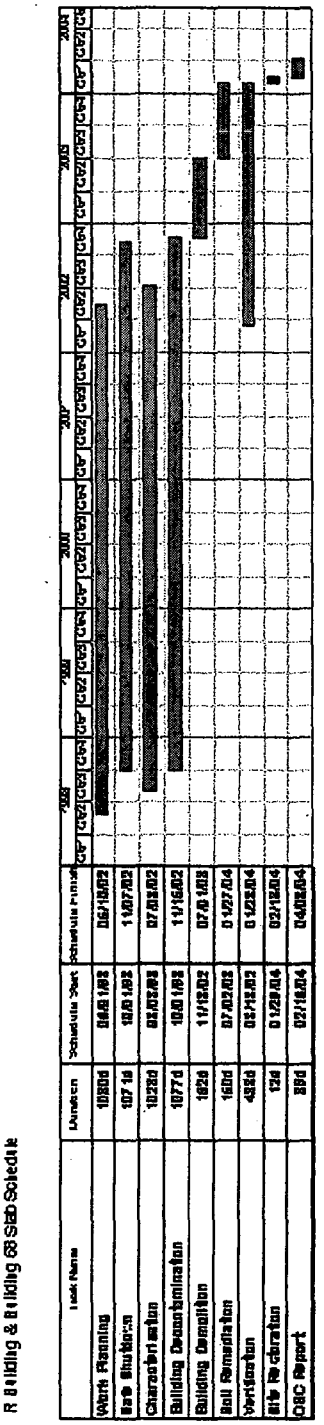
Table 5.2 Schedule Summary for Building R and Building 68 Slab

Activity	Start Date	Completion Date
Phase I		
Work Planning	01 June 1998	23 May 2002
Safe Shutdown	01 October 1998	07 November 2002
Characterization	01 August 1998	03 July 2002
Building Decontamination[A]	01 October 1998	17 November 2002
Phase II		
Building Demolition	18 November 2002	01 July 2003
Soil Remediation	02 July 2003	27 January 2004
Verification	18 March 2002	28 January 2004
Site Restoration	29 January 2004	13 February 2004
OSC Report	16 February 2004	08 April 2004

[A] Building R decontamination schedule includes entire Main Hill tritium project schedule and portion of Main Hill-Rad project schedule prior to demolition.

Note: The schedule is subject to change pending approval of the baseline change proposal.

Figure 5.1 Schedule Summary for R Building and Building 68 Slab



5.1.7.2 Buildings SW and 58 Project Schedule

The schedule established for planning and implementing the removal action is summarized in Table 5.3.

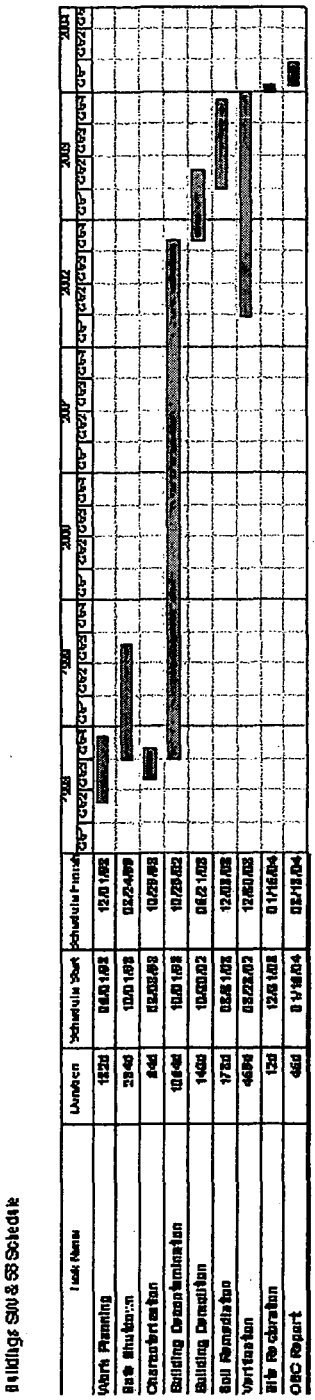
Table 5.3 Schedule Summary for Buildings SW and 58

Activity	Start Date	Completion Date
Phase I		
Work Planning	01 June 1998	07 June 2002
Safe Shutdown	01 October 1998	22 October 2002
Characterization	01 August 1998	29 January 2002
Buildings Decontamination[A]	01 October 1998	29 October 2002
Phase II		
Building Demolition	30 October 2002	21 May 2003
Soil Remediation	31 March 2003	03 December 2003
Verification	28 March 2002	30 December 2003
Site Restoration	31 December 2003	15 January 2004
OSC Report	16 January 2004	18 March 2004

[A] Buildings SW & 58 decontamination schedule includes entire Main Hill tritium project schedule and portion of Main Hill-Rad project schedule prior to demolition.

Note: The schedule is subject to change pending approval of the baseline change proposal.

Figure 5.2 Schedule Summary for Buildings SW and 58



5.2 ESTIMATED COSTS

5.2.1 R Building and Building 68 Slab Estimated Costs

The cost estimate to perform the removal action, based on the Main Hill Rad Project work scope definition sheets for Building R, is shown in Table 5.4. Costs include the construction activities, all engineering and construction management, and site restoration.

Table 5.4 Removal Action Cost Estimate for Building R

COST ESTIMATE	
Activity	Cost
Work Planning	$200,571
Buildings Decontamination[(A)]	$10,580,548
Buildings Demolition	$731,127
Remove Foundations & Soils	$94,343
Verification	$122,470
Site Restoration	$63,439
OSC Report	$19,755
TOTAL	$11,812,253

[(A)] Building R Costs (unburdened) associated with Main Hill Tritium Project.

Note: Costs are subject to change pending approval of the baseline change proposal.

5.2.2 Buildings SW and 58 Estimated Costs

The cost estimate to perform the removal action, based on Main Hill Rad work scope demolition sheets for Buildings SW & 58, is shown in Table 5.5. Costs include the construction activities, all engineering and construction management, and site restoration.

Table 5.5 Removal Action Cost Estimate for Buildings SW and 58

COST ESTIMATE	
Activity	Cost
Work Planning	$215,473
Buildings Decontamination[A]	$23,197,557
Buildings Demolition	$613,995
Remove Foundations & Soils	$753,997
Verification	$103,253
Site Restoration	$62,694
OSC Report	$19,755
TOTAL	$24,966,724

[A] Buildings SW and 58 costs (unburdened) associated with Main Hill Tritium Project.

Note: Costs are subject to change pending approval of the baseline change proposal.

6. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

There is the potential for the contaminants to migrate.

7. OUTSTANDING POLICY ISSUES

There are currently no outstanding policy issues affecting performance of this removal action.

8. ENFORCEMENT

The core team consisting of DOE, USEPA, and OEPA has agreed on the need to perform the removal. The work described in this document does not create a waiver of any rights under the Federal Facility Agreement, nor is it intended to create a waiver of any rights under the Federal Facility Agreement. The DOE is the sole party responsible for implementing this clean-up. Therefore, DOE is undertaking the role of lead agency, per CERCLA and the NCP, for the performance of this removal action. The funding for this removal action will be through DOE budget authorization and no Superfund monies will be required.

9. RECOMMENDATION

This decision document represents the selected removal action for Buildings R, SW, 68 Slab and 58, developed in accordance with CERCLA as amended by SARA, and not inconsistent with the NCP. This decision is based on the administrative record for the site.

Conditions at the site meet the NCP Section 300.415 (b)(2) criteria for a removal and we recommend initiation of the response action.

Approved:

Art Kleinrath, On Scene Coordinator	DOE/MEMP	10/18/2000 Date
Timothy J. Fischer, Remedial Project Manager	USEPA	11/16/00 Date
Brain K. Nickel, Project Manager	OEPA	10/18/00 Date

10. REFERENCES

USEPA 1990. Superfund Removal Procedures Action Memorandum Guidance. Office of Emergency and Remedial Response. U.S. Environmental Protection Agency. December 1990.

DOE 1998. List of Ohio Administrative Code and Ohio Revised Code ARARs, Letter from Nickel to Kleinrath, August 19, 1998.

DOE 1997. Risk Based Guideline Values, Mound Plant, March 1997.

DOE 1997. Mound 2000 Residual Risk Evaluation Methodology.

DOE 2000. Action Memorandum for HH Building, July 2000.

DOE 1994. Operable Unit 9 Site Scoping Report: Volume 12 - Site Summary Report, December 1994.

Appendix A

Construction Worker - Soil/Sediment Exposure Pathway

Variables defined in Table 4.1.3 p93 RBGV Report 3/97
Equations listed in Table 4.1.3 p92 RBGV Report 3/97

Enter the following:

Series U-234 to Pb-206

Target Risk		1.00E-05
Oral Cancer Slope Factor		1.39E-09 risk/pCi
Inhalation Cancer Slope Factor		3.78E-08 risk/pCi
External Cancer Slope Factor		6.74E-06 risk/pCi
Ingestion		
Target Risk	TR	1.00E-05
Exposure Duration 1	ED_1	5 yrs
Exposure Frequency	EF	250 days/yr
Oral Cancer Slope factor	SF_o	1.39E-09 risk/pCi
Conversion Factor 1	CF_1	0.001 g/mg
Ingestion rate - Soil	IR_{soil}	480 mg/day
Radionuclide Concentration in Soil (Ingestion)	CS_{ing}	12.01 pCi/g
Inhalation		
Inhalation Cancer Slope factor	SF_i	3.78E-08 risk/pCi
Conversion Factor 2	CF_2	1000 g/kg
Inhalation Rate	IR_{air}	20 m^3/day
Soil to Air Volatilization Factor	VF	1 m^3/kg
Particulate Emission Factor	PEF	4.28E+09 m^3/kg
Radionuclide Concentration in Soil (Inhalation)	CS_{inh}	4.53E+04 pCi/g
External		
External Cancer Slope Factor	SF_e	6.74E-06 risk/pCi
Exposure Duration 2	ED_2	3.425 yrs
Gamma Shielding Factor	S_e	0.1
Gamma Exposure Time factor	T_e	0.33
Radionuclide Concentration in Soil (External Exposure)		1.45 pCi/g
Total		
	CS_{TOTAL}	1.29E+00 pCi/g

Series Segment		Cancer Slope Factors HEAST Table 4 Ingestion	Inhalation	External Exp
U-234	Th-230	4.44E-11	1.40E-08	2.14E-11
Th-230	Ra-226	3.75E-11	1.72E-08	4.40E-11
Ra-226+D	Pb-210	2.96E-10	2.75E-09	6.74E-06
Pb-210+D	Pb-206	1.01E-09	3.86E-09	1.45E-10
	Total	1.39E-09	3.78E-08	6.74E-06

Construction Worker - Soil/Sediment Exposure Pathway

Variables defined in Table 4.1.3 p93 RBGV Report 3/97
Equations listed in Table 4.1.3 p92 RBGV Report 3/97

Enter the following:

Series U-233 to Bi-209

Target Risk		1.00E-05
Oral Cancer Slope Factor		4.01E-10 risk/pCi
Inhalation Cancer Slope Factor		9.67E-08 risk/pCi
External Cancer Slope Factor		7.72E-07 risk/pCi
Ingestion		
Target Risk	TR	1.00E-05
Exposure Duration 1	ED_1	5 yrs
Exposure Frequency	EF	250 days/yr
Oral Cancer Slope factor	SF_o	4.01E-10 risk/pCi
Conversion Factor 1	CF_1	0.001 g/mg
Ingestion rate - Soil	IR_{soil}	480 mg/day
Radionuclide Concentration in Soil (Ingestion)	CS_{ing}	41.55 pCi/g
Inhalation		
Inhalation Cancer Slope factor	SF_i	9.67E-08 risk/pCi
Conversion Factor 2	CF_2	1000 g/kg
Inhalation Rate	IR_{air}	20 m^3/day
Soil to Air Volatilization Factor	VF	1 m^3/kg
Particulate Emission Factor	PEF	4.28E+09 m^3/kg
Radionuclide Concentration in Soil (Inhalation)	CS_{inh}	1.77E+04 pCi/g
External		
External Cancer Slope Factor	SF_e	7.72E-07 risk/pCi
Exposure Duration 2	ED_2	3.425 yrs
Gamma Shielding Factor	S_e	0.1
Gamma Exposure Time factor	T_e	0.33
Radionuclide Concentration in Soil (External Exposure)		12.63 pCi/g
Total		
	CS_{TOTAL}	9.68E+00 pCi/g

Series Segment		Fraction	Cancer Slope Factors HEAST Table 4 Ingestion	Inhalation	External Exp
U-233	Th-229		4.48E-11	1.41E-08	3.52E-11
Th-229	Ra-225		5.65E-11	7.60E-08	5.94E-08
Ra-225	Ac-225		1.57E-10	2.38E-09	1.71E-09
Ac-225	Fr-221		1.42E-10	4.15E-09	7.81E-09
Fr-221	At-217		1.45E-13	8.02E-12	6.74E-08
At-217	Bi-213		8.99E-18	5.14E-16	8.71E-10
Bi-213			4.40E-13	3.09E-11	4.62E-07
	Tl-209	0.022	3.08E-16	2.46E-16	1.72E-07
	Po-213	0.978	6.55E-22	7.63E-20	1.15E-10
	Pb-209		2.09E-13	6.85E-14	0.00E+00
	Bi-209		2.09E-13	6.85E-14	0.00E+00
	Total		4.01E-10	9.67E-08	7.72E-07

Construction Worker - Soil/Sediment Exposure Pathway

Variables defined in Table 4.1.3 p93 RBGV Report 3/97
Equations listed in Table 4.1.3 p92 RBGV Report 3/97

Enter the following:

Series Pa-231 to Pb-207

Target Risk		1.00E-05
Oral Cancer Slope Factor		7.75E-10 risk/pC
Inhalation Cancer Slope Factor		1.03E-07 risk/pC
External Cancer Slope Factor		9.57E-07 risk/pC

Series Segment		Cancer Slope Factors HEAST Table 4 Ingestion	Inhalation	External Exp
Pa-231	Ac-227	1.49E-10	2.42E-08	2.71E-08
Ac-227	Pb-207	6.28E-10	7.87E-08	9.30E-07
	Total	7.75E-10	1.03E-07	9.57E-07

Ingestion

Target Risk	TR	1.00E-05
Exposure Duration 1	ED_1	5 yrs
Exposure Frequency	EF	250 days/yr
Ora Cancer Slope factor	SF_o	7.75E-10 risk/pCi
Conversion Factor 1	CF_1	0.001 g/mg
Ingestion rate - Soil	IR_{soil}	480 mg/day
Radionuclide Concentration in Soil (Ingestion)	CS_{ing}	21.51 pCi/g

Inhalation

Inhalation Cancer Slope factor	SF_i	1.03E-07 risk/pCi
Conversion Factor 2	CF_2	1000 g/kg
Inhalation Rate	IR_a	20 m^3/day
Soil to Air Volatilization Factor	VF	1 m^3/kg
Particulate Emission Factor	PEF	4.28E+09 m^3/kg
Radionuclide Concentration in Soil (Inhalation)	CS_{inh}	1.66E+04 pCi/g

External

External Cancer Slope Factor	SF_e	9.57E-07 risk/pCi
Exposure Duration 2	ED_2	3.425 yrs
Gamma Shielding Factor	S_e	0.1
Gamma Exposure Time factor	T_e	0.33
Radionuclide Concentration in Soil (External Exposure)		10.18 pCi/g

Total

	CS_{TOTAL}	8.91E+00 pCi/g

Uranium Series (4n + 2)*

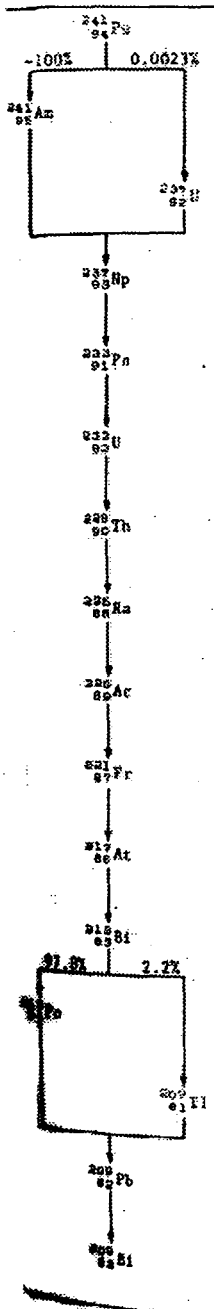
Nuclide	Historical name	Half-life	Major radiation energies (MeV) and intensities† α	β	γ
$^{238}_{92}U$	Uranium I	4.51×10^{9}y	4.15 (25%) 4.20 (75%)	---	---
$^{234}_{90}Th$	Uranium X_1	24.1d	---	0.103 (21%) 0.193 (79%)	0.063e‡ (3.5%) 0.093e (4%)
$^{234}_{91}Pa^{m}$	Uranium X_2	1.17m	---	2.29 (96%)	0.765 (0.30%) 1.001 (0.60%)
99.87% | 0.13%					
$^{234}_{91}Pa$	Uranium Z	6.75h	---	0.53 (66%) 1.13 (13%)	0.100 (50%) 0.70 (24%) 0.90 (70%)
$^{234}_{92}U$	Uranium II	2.47×10^{5}y	4.72 (28%) 4.77 (72%)	---	0.053 (0.2%)
$^{230}_{90}Th$	Ionium	8.0×10^{4}y	4.62 (24%) 4.68 (76%)	---	0.068 (0.6%) 0.142 (0.07%)
$^{226}_{88}Ra$	Radium	1602y	4.60 (6%) 4.78 (95%)	---	0.186 (4%)
$^{222}_{86}Rn$	Emanation Radon (Rn)	3.823d	5.49 (100%)	---	0.510 (0.07%)
$^{218}_{84}Po$	Radium A	3.05m	6.00 (~100%)	0.33 (~0.019%)	---
99.98% | 0.02%					
$^{214}_{82}Pb$	Radium B	26.8m	---	0.65 (50%) 0.71 (40%) 0.98 (6%)	0.295 (19%) 0.352 (36%)
$^{218}_{85}At$	Astatine	~2s	6.65 (6%) 6.70 (94%)	? (~0.1%)	---
$^{214}_{83}Bi$	Radium C	19.7m	5.45 (0.012%) 5.51 (0.008%)	1.0 (23%) 1.51 (40%) 3.26 (19%)	0.609 (47%) 1.120 (17%) 1.764 (17%)
99.98% | 0.02%					
$^{214}_{84}Po$	Radium C'	164μs	7.69 (100%)	---	0.799 (0.014%)
$^{210}_{81}Tl$	Radium C''	1.3m	---	1.3 (25%) 1.8 (36%) 2.3 (19%)	0.296 (80%) 0.795 (100%) 1.31 (21%)
$^{210}_{82}Pb$	Radium D	21y	3.72 (.0000002%)	0.016 (85%) 0.061 (15%)	0.047 (4%)
$^{210}_{83}Bi$	Radium E	5.01d	4.65 (.000007%) 4.69 (.000005%)	1.161 (~100%)	---
~100% | .0001%					
$^{210}_{84}Po$	Radium F	138.4d	5.305 (100%)	---	0.803 (0.0011%)
$^{206}_{81}Tl$	Radium E''	4.19m	---	1.571 (100%)	---
$^{206}_{82}Pb$	Radium G	Stable	---	---	---

*This expression describes the mass number of any member in this series, where n is an integer.
Example: $^{202}_{82}Pb$ (4n + 2).....4(51) + 2 = 206

†Intensities refer to percentage of disintegrations of the nuclide itself, not to original parent of series.

‡Complex energy peak which would be incompletely resolved by instruments of moderately low resolving power such as scintillators.

Neptunium Series (4n + 1)*



Nuclide	Element name	Half-life	Major radiation energies (MeV) and intensities† α	β	γ
$^{241}_{94}Pu$	Plutonium	13.2y	4.85 (0.0003%) 4.90 (0.0019%)	0.021 (~100%)	0.145 (.00016%)
$^{241}_{95}Am$	Americium	458y	5.44 (13%) 5.49 (85%)	---	0.060 (36%) 0.101c‡ (0.04%)
$^{237}_{92}U$	Uranium	6.75d	---	0.248 (96%)	0.060 (36%) 0.208 (23%)
$^{237}_{93}Np$	Neptunium	2.14×10^{6}y	4.65c (12%) 4.78c (75%)	---	0.030 (14%) 0.086 (14%) 0.145 (1%)
$^{233}_{91}Pa$	Protactinium	27.0d	---	0.145 (37%) 0.257 (58%) 0.568 (5%)	0.31c (44%)
$^{233}_{92}U$	Uranium	1.62×10^{5}y	4.78 (15%) 4.82 (83%)	---	0.042 (?) 0.097 (?)
$^{229}_{90}Th$	Thorium	7340y	4.84 (58%) 4.90 (11%) 5.05 (7%)	---	0.137c (~3%) 0.20c (~10%)
$^{225}_{88}Ra$	Radium	14.8d	---	0.32 (100%)	0.040 (33%)
$^{225}_{89}Ac$	Actinium	10.0d	5.73c (10%) 5.79 (28%) 5.83 (54%)	---	0.099 (?) 0.150 (?) 0.187 (?)
$^{221}_{87}Fr$	Francium	4.8m	6.12 (15%) 6.34 (82%)	---	0.218 (14%)
$^{217}_{85}At$	Astatine	0.032s	7.07 (~100%)	---	---
$^{213}_{83}Bi$	Bismuth	47m	5.87 (~2.2%)	1.39 (~97.8%)	0.437 (?)
$^{213}_{84}Po$	Polonium	4.2μs	8.38 (~100%)	---	---
$^{209}_{81}Tl$	Thallium	2.2m	---	1.99 (100%)	0.12 (50%) 0.45 (100%) 1.56 (100%)
$^{209}_{82}Pb$	Lead	3.30h	---	0.637 (100%)	---
$^{209}_{83}Bi$	Bismuth	Stable (>2×10^{16}y)	---	---	---

[illegible] expression describes the mass number of any member in this series, where n is an integer.
Example: $^{229}_{90}Th$ (4n + 1).....4(57) + 1 = 229
[illegible] (4n + 1) series is included here for completion. It is not found as a naturally-occurring series.
[illegible] refer to percentage of disintegrations of the nuclide itself, not to original parent of series.
[illegible] peak which would be incompletely resolved by instruments of moderately low resolving power such as scintillators.

From: Table of Isotopes and USNRDL-TR-802.

Appendix B

No Further Assessment Recommendation for PRS 234

MOUND PLANT
PRS 234
FORMER TANK SITE
BUILDING 58 DIESEL FUEL

RECOMMENDATION:

This Potential Release Site (PRS) is the former location of a 3,000 gallon unlined, steel tank that was used to supply diesel fuel to an emergency generator. The tank was identified as a PRS because of its inclusion in the Mound Plant Underground Storage Tank Program Plan and Regulatory Status Review. Components of diesel fuel are the contaminants of concern associated with this PRS.

The tank was removed in December, 1989. During closure and removal, three soil samples were collected from the base, and the east and west walls of the open excavation. Lab analysis for Total Petroleum Hydrocarbon (TPH) indicated no contamination above the detection limit of 5 ppm as compared to the Bureau of Underground Storage Tank Regulations (BUSTR) guideline criteria of 105 ppm. Soil gas samples in the vicinity of PRS 234 detected trichloroethane (111-TCA), trichloroethene (TCE) and toluene. Calculations converting the 10^{-6} Risk Based Guideline Values for these compounds (given in mg contaminant per kg soil) into a corresponding 10^{-6} Risk Based Guideline Values for soil gas concentrations (parts contaminant per parts soil gas) showed the 111 TCA detection was approximately 60 times less than the guideline criteria, the TCE detection approximately 16 times less than the guideline criteria , and the toluene detection approximately 50,000 times less then guideline criteria. Radiological analysis also indicated Pu-238 and Th-232 below their guideline criteria of 25 pCi/g and 5 pCi/g respectively.

Therefore, since the VOC soil gas detections establishing this soils location as a PRS do not show evidence of contamination above guideline criteria and since there is no additional lab data or history to support evidence of contamination, PRS 234 requires NO FURTHER ASSESSMENT.

CONCURRENCE:

DOE/MB: Arthur W. Kleinrath, Remedial Project Manager — 8/20/96 (date)

USEPA: Timothy J. Fischer, Remedial Project Manager — 8/20/96 (date)

OEPA: Brian K. Nickel, Project Manager — 8/21/96 (date)

SUMMARY OF COMMENTS AND RESPONSES:

Comment period from 9/15/96 9/16/96 to 10/15/96

☒ No comments were received during the comment period.

☐ Comment responses can be found on page _____ of this package.

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