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RECORD OF DECISION FOR REMEDIAL ACTIONS AT OPERABLE UNIT 5

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

JANUARY 1996

U.S. DEPARTMENT OF ENERGY
FERNALD AREA OFFICE

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ALARA	as low as reasonably achievable
ARAR	applicable or relevant and appropriate requirement
CAMU	corrective action management unit
CAWQC	chronic ambient water quality criteria
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
COC	constituent of concern
CPC	constituent of potential concern
CRARE	comprehensive response action risk evaluation
CSF	cancer slope factor
CT	central tendency
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FS	feasibility study
HI	hazard index
HQ	hazard quotient
ILCR	incremental lifetime cancer risk
LDR	land disposal restriction
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MTR	minimum technology requirements
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NRC	U.S. Nuclear Regulatory Commission
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
ORC	Ohio Revised Code
PAH	polycyclic aromatic hydrocarbons
PRL	preliminary remediation level
RCRA	Resource Conservation and Recovery Act
RfD	reference dose
RI/FS	remedial investigation/feasibility study
RME	reasonable maximum exposure
ROD	record of decision
SSOD	storm sewer outfall ditch
TBC	to be considered
TCLP	toxicity characteristic leaching procedure
TU	temporary unit
UMTRCA	Uranium Mill Tailings Radiation Control Act

DECLARATION STATEMENT

SITE NAME AND LOCATION

Fernald Environmental Management Project (FEMP), formerly the Feed Materials Production Center (FMPC) - Operable Unit 5 Hamilton and Butler Counties, Ohio

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Operable Unit 5 of the FEMP site in Hamilton and Butler Counties, Ohio. Operable Unit 5 consists of impacted environmental media including groundwater in the underlying Great Miami Aquifer, perched groundwater, surface water, soil, sediment, flora, and fauna.

This remedial action was selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act of 1986 (hereinafter jointly referred to as CERCLA), and to the extent practicable, the National Contingency Plan, 40 CFR Part 300. The decision is based on the information available in the administrative record for this site.

The State of Ohio concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from Operable Unit 5, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy for Operable Unit 5 involves the excavation of contaminated soil and placement in an on-property disposal facility and the restoration of the Great Miami Aquifer to its full beneficial use. The selected remedy is comprised of the following major components:

- Excavation, using conventional construction equipment, of contaminated soil and sediment to the extent necessary to establish statistically, with reasonable certainty, that the concentrations of contaminants at the entire site are below final remediation levels.

- Excavation, using conventional construction equipment, of contaminated soil containing perched water that presents an unacceptable threat, through contaminant migration, to the underlying aquifer.

- Placement of contaminated soil and sediment, which attain concentration-based waste acceptance criteria, in an on-property disposal facility. Soil exhibiting contaminant concentrations exceeding the waste acceptance criteria (e.g., soil contaminated with organic constituents) will be treated before placement in the on-property facility or shipped off site for disposal at an appropriate commercial or federal disposal facility. Soil from six designated areas where a reasonable potential exists for the presence of characteristic waste (as defined by the Resource Conservation and Recovery Act) will be treated, as needed, before disposition. No off-site waste will be disposed of in the on-property disposal facility. Emergent technologies are being retained as potential

options for treating soil to meet the on-property waste acceptance criteria. Retaining emergent technologies is appropriate due to the uncertainty of the long-term availability of off-site disposal capacity.

- Extraction of contaminated groundwater from the Great Miami Aquifer to the extent necessary to provide reasonable certainty that final remediation levels have been attained at all affected areas of the aquifer.

- Treatment of contaminated groundwater, storm water and wastewater to the extent necessary to attain performance-based concentration discharge limits, mass-based discharge limits, and final remediation levels, in the Great Miami River.

- Application of institutional controls, such as access controls, deed restrictions, and alternate water supplies, during and after remedial activities to minimize the potential for human exposure to site-introduced contaminants and ensure the continued protection of human health.

- Implementation of a long-term environmental monitoring program and a maintenance program to ensure the continued protectiveness of the remedy, including the integrity of the on-property disposal facility.

Operable Unit 5 is one of five operable units at the FEMP. Operable Unit 5 addresses the environmental media at the site and beyond the property line contaminated by releases from the four source operable units at the facility. The source operable units contain the principal threat at the site; Operable Unit 5 is comprised of a large volume of contaminated soil and groundwater exhibiting relatively low concentrations of contaminants.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action (or justifies a CERCLA waiver), and is cost effective. The selected remedy uses permanent solutions and alternative treatment technologies to the maximum extent practicable. A U.S. Environmental Protection Agency waiver is required from Ohio solid waste disposal regulations to allow waste disposal over a high-yield sole-source aquifer. The waiver is granted pursuant to CERCLA 121(d)(4)(D) which allows a waiver of an applicable or relevant and appropriate requirement if "the remedial action selected will attain a standard of performance that is equivalent to that requited under the otherwise applicable standard, requirement, criteria, or limitation, through the use of another method or approach." The justification for this waiver is provided in the Decision Summary of this record of decision and is supported by the administrative record for Operable Unit 5.

When coupled with the selected remedies for the other four FEMP operable units, the site-wide remedy satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted no less often than each five years after the commencement of remedial actions to ensure that the remedy continues to provide adequate protection of human health and the environment.

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1.0 SITE LOCATION AND DESCRIPTION

This Record of Decision (ROD) documents the plans for remediating Operable Unit 5 at the Fernald Environmental Management Project (FEMP) site. The site, formerly known as the Feed Materials Production Center, is owned by the U.S. Department of Energy (DOE) and processed high-purity uranium metal products between 1951 and 1989. Operable Unit 5 addresses the environmental media (soil, surface water and sediment, groundwater and perched water, flora and fauna) contaminated by production activities and waste management practices.

1.1 LOCATION

The FEMP site is a 1050-acre facility located in southwestern Ohio, about 18 miles northwest of downtown Cincinnati. The facility is located just north of the small rural community of Fernald and lies on the boundary between Hamilton and Butler counties (Figure 1-1). The address is 7400 Willey Road, Fernald, Ohio.

1.2 SURFACE AND SUBSURFACE FEATURES

Site surface and subsurface features that are a result of human activity are shown in Figures 1-2 and 1-3 and described in the following operable unit definitions. Operable units are logical groupings of facilities or environmental media at a cleanup site.

- Operable Unit 1 addresses the Clearwell, burn pit, and six waste pits plus their berms, liners, and the soil (approximately 3 feet deep) beneath the waste pits.

- Operable Unit 2 addresses the solid waste landfill, lime sludge ponds, flyash piles and other South Field disposal areas, and the berms, liners, and soil within the unit's boundary

- Operable Unit 3 addresses the former production area and associated facilities and equipment, such as all structures, equipment, utilities, drums, tanks, effluent lines, wastewater treatment facilities, scrap metal piles, feedstocks, and the coal pile (see Figure 1-3).

- Operable Unit 4 addresses Silos 1, 2, 3 and 4, their berms and underlying soil and decant sump tank system.

On-property roads and fences are clearly visible in Figure 1-2; buried utility lines, storm sewer lines, etc., are located beneath the former production area. Various other subsurface structures such as the effluent line and monitoring wells are present.

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Natural site surface features include Paddys Run, a 7-mile long intermittent stream that begins northwest of the FEMP, runs along the western boundary of the site and empties into the Great Miami River about 1.5 miles south of the property, and other small streams and drainageways.

The major subsurface feature underlying the FEMP is the Great Miami Aquifer, a widely distributed buried valley aquifer. This important resource is discussed below and in Section 1.6.

1.3 DEMOGRAPHICS AND LAND AND WATER USE

On the basis of the 1990 census, the 5-mile radius around the FEMP site contains an estimated 22,900 people while the eight-county Cincinnati consolidated metropolitan statistical area has a population of more than 1.7 million and a labor force of more than 920,000. Unemployment in late 1994 was 5.2 and 4.9 percent, respectively, in Hamilton and Butler counties. Scattered residences and several villages are located near the FEMP property. Residential units are concentrated in Ross to the northeast, in a trailer park to the east, and in New Baltimore to the southeast.

No sensitive subpopulations occur within 1 mile of the FEMP except for 29 children who live in the area. Within 5 miles there are six schools that enroll 3316 students, two day care centers that enroll about 160 children, and residences that house about 8140 children.

The area around the FEMP remains predominantly open and agricultural and the site itself was farmed before construction of production facilities in 1951. Residences, many of them farmsteads, are scattered around the area and a dairy farm is located just outside the southeast corner of the FEMP boundary. Due to a long history of intensive agriculture, there is no nearby land where a natural environment remains intact.

Recreational facilities are centered in the Miami Whitewater Forest to the south; two youth camps operated in the area but were recently closed.

Commercial activity is generally restricted to the village of Ross, approximately 3 miles to the northeast. Industrial use is concentrated along State Route 128, in a small industrial park south of the FEMP property, in the village of Fernald, and along the site's western boundary.

The Great Miami Aquifer is designated as the sole drinking water source (under Section 1424(e) of the Safe Drinking Water Act) for over 600,000 people in Southwestern Ohio, providing 100 and 48 percent of the potable water for Hamilton and Butler counties, respectively. Some residents within a 5-mile radius of the FEMP rely on private wells, cisterns or bottled water for potable water.

A FEMP area farms use wells to irrigate their fields and farmers along the Great Miami River irrigate with river water.

1.4 TOPOGRAPHY AND SURFACE WATER HYDROLOGY

The topography in the area of the FEMP includes gently rolling uplands with steep hillsides along the major streams such as the Great Miami River and Paddys Run (Figure 1-4). Natural surface drainage on the FEMP property is from east to west and south into Paddys Run, except for 23 acres in the northeast corner that drain east toward the Great Miami River. Construction activities since 1951 have significantly altered the topography of the FEMP site.

The FEMP is located within the Great Miami River Basin; the river represents the vicinity's main surface water feature and is the receiving stream for the FEMP wastewater effluent discharge. The average flow of the river adjacent to the FEMP is estimated to be 3460 ft3/s while estimates of the 100-year flood discharge and the 7-day, 10-year low flow value (Q7-10) are 81,455 ft3/s and 267 ft3/s, respectively. Paddys Run is an ungauged, intermittent stream that flows primarily between January and May with an estimated discharge of .2 to 4 ft3/s. Paddys Run has eroded through the clay-rich glacial overburden and for much of its length is now in direct contact with the underlying sand and gravel deposits of the Great Miami Aquifer. Both Paddys Run and the storm sewer outfall ditch (SSOD) (an on-property drainageway) lose water to the underlying aquifer, making them pathways by which contaminants can reach the aquifer. Surface water drainage from the FEMP's waste storage area (Operable Units 1 and 4) and the former production area (Operable Unit 3) is presently controlled. These controls were emplaced through removal

actions and/or contaminant abatement actions implemented from 1986 through 1993.

1.5 SOIL

During the last glaciation period, the clay-rich overburden was deposited on top of the valley fill outwash deposits at the FEMP. The physical, chemical, and engineering properties of FEMP soil affect the suitability of the site for construction and other activities, the likelihood of erosion, and the kinds of habitats (such as wetlands) that can develop. The types of soil identified at the FEMP are moderately high in productivity and are frequently used for growing cash crops and raising livestock.

1.6 GEOLOGY AND HYDROGEOLOGY

A comprehensive geologic history has been developed for the FEMP and surrounding area based on published studies and from data collected during the remedial investigation (RI) at the site. The FEMP overlies a classic example of a regional, unconfined, buried valley glacial outwash aquifer system (the Great Miami Aquifer) covered by younger glacial overburden (Figure 1-5). The glacial overburden has been incised by drainages on the FEMP and has been completely removed by the erosive forces of the Great Miami River to the east and south of the FEMP.

The glacial overburden is composed principally of clay-rich till and contains a perched groundwater system. Sustainable yield from wells completed in the glacial overburden is on the order of 1 gallon per minute. Horizontal flow rates within the glacial overburden have a calculated range from 1 to 58 feet per year. Vertical flow rates have been calculated to be on the order of 0.85 to 2.15 feet per year. Groundwater flow in the glacial overburden beneath the FEMP generally follows topography and moves from the northeast toward the southwest.

The Great Miami Aquifer consists primarily of well-sorted sand and gravel material. Sustainable yields from wells completed in the aquifer are on the order of hundreds of gallons per minute. Horizontal flow rates have been calculated to be in the range of 400 to 1000 feet per year. Groundwater flow in the Great Miami Aquifer beneath the FEMP is generally from west to east with a component of the flow directed toward the south (see arrows in Figure 1-4).

1.7 ECOLOGY

Most of the FEMP site is maintained in early stages of succession by current land management practices (mowing, grazing, bush hogging and bulldozing), causing habitat fragmentation and heterogeneity. Relatively undisturbed habitats are restricted to the narrow riparian community along Paddys Run and several small woodlots.

The fishery of the Great Miami River remains stable with no indication that the FEMP has had any discernible effects on the abundance, condition, or species richness of the fish communities. Species diversity in Paddys Run also remains stable.

Surveys for seven threatened and endangered species have identified two species of concern at the FEMP site. The Paddys Run corridor represents excellent habitat for the federally endangered Indiana bat and the state threatened Sloan's crayfish inhabits portions of the creek. In order to protect all species, appropriate management practices and follow-up surveys will be implemented throughout site remediation.

Wetlands on the FEMP cover 35.9 acres, mostly in the forested north-central sector, with much smaller acreages in drainage ditches. The wetlands delineation was approved in 1993 by the Army Corps of Engineers.

1.8 CULTURAL RESOURCES

The area surrounding the FEMP site has a large and diverse archaeological and historical resource base. Archaeological sites include three Indian mounds, Adena Circle and Demoret Mound

in Ross Township and Hogen-Borger Mound to the northeast; and the Colerain Works and Dunlap Archaeological District along the Great Miami River. All are on the National Register of Historic Places. These are the known significant archaeological sites; additional studies have been carried out that indicate there may be more potentially significant sites that remain undiscovered.

Archaeological surveys have been conducted in certain areas of the FEMP. Preliminary results indicate the presence of several sites that may be eligible for listing on the National Register of Historic Places. At this time, mitigation of adverse effects to historic places is conducted on a case-by-case basis pursuant to 36 CFR 800.4-6. DOE is in preliminary discussion with the Ohio Historic Preservation Office and the Advisory Council on Historic Preservation to develop a programmatic agreement that will address the mitigation of adverse effects to historic properties on a site-wide basis pursuant to 36 CFR 800.13.

Many of the area's early farmsteads and l9th-century buildings are well preserved and historically important, with three listed and 12 eligible for listing on the National Register of Historic Places.

2.0 SITE HISTORY AND CERCLA ENFORCEMENT ACTIVITIES

2.1 SITE HISTORY

DOE constructed the FEMP in 1951 to produce high-purity uranium metal in support of national defense programs. This was accomplished by chemically and physically purifying a variety of feed materials, converting uranium compounds into uranium metal, casting the metal into various shapes, and machining the castings to specified dimensions. Some of these materials contained trace quantities of fission products (e.g., technetium-99) and transuranics (e.g., plutonium-239).

The site consists of three primary areas: the former production area, the waste. storage area, and adjacent forest/pasture land. The production area is a 136-acre tract at the center of the site. The waste storage area is located west of the production area and is where virtually all processing wastes were deposited. Contaminants from material processing and related activities were released into the environment through air emissions, wastewater discharge, storm water runoff, and leaks and spills.

Production at the FEMP ceased in 1989 and the plant focused on environmental restoration and waste management activities; the 1991 name change from Feed Materials Production Center to Fernald Environmental Management Project emphasized the new focus. One of these activities, the remedial investigation/feasibility study (RI/FS), is being conducted pursuant to the terms of a 1986, Federal Facility Compliance Agreement and a 1990 Consent Agreement (as amended) between DOE and the U.S. Environmental Protection Agency (EPA). The purpose of the RI/FS is to identify effective cleanup actions for the FEMP that satisfactorily address environmental concerns. The Ohio EPA (OEPA) is participating in the RI/FS process through direct involvement in information exchange meetings and technical review of project documents. Additionally, in 1988, DOE entered into a Consent Decree with the State of Ohio that provided for the management of water pollution and hazardous wastes. This agreement was modified in 1993 by the Stipulated Amendment to the Consent Decree.

Before the 1988 Consent Decree between the State of Ohio and DOE, the state filed a lawsuit against the FEMP that included a claim for natural resource damages (State of Ohio v. DOE 1986).

This claim was addressed in the Consent Decree where the parties agreed to stay the claim until completion of the RI/FS (Consent Decree 1988). At the time the Consent Decree was signed, the site had not been divided into the five operable units, so there was to be only one RI/FS document for the site.

Natural resource issues are part of the site's environmental media and DOE believes that the State of Ohio will continue to stay its claim for injury to those resources at least until the issuance of the Operable Unit 5 ROD.

The Comprehensive Environmental Response, Compensation and Liability Act as amended by the Superfund Amendments and Reauthorization Act of 1996 (hereinafter jointly referred to as CERCLA), the Clean Water Act, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) designate DOE as a Trustee for natural resources at DOE facilities. These same authorities also appoint other departments, such as the U.S. Department of Interior and state representatives, as natural resource Trustees. The State of Ohio has appointed OEPA to act as its Trustee representative. The Trustees' role is to act as guardian for natural resources at or near the site. The FEMP site natural resource Trustee representatives are currently negotiating avenues to compensate for potential impacts to natural resources and to settle the 1986 State of Ohio lawsuit.

To promote a more structured and expeditious cleanup of the FEMP site, the facility's waste storage areas and the associated environmental media were segmented into five operable units (described in Section 1.2), each with its own documentation. Operable Unit 5 is the fourth to issue RI and FS reports, a Proposed Plan, and a ROD. An interim ROD was signed in July 1994 for Operable Unit 3. The ROD for Operable Unit 4 was signed in December 1994; the Operable Unit 1 ROD was signed in January 1995; and the Operable Unit 2 ROD was signed in June 1995.

2.2 OPERABLE UNIT 5 HISTORY

Operable Unit 5 encompasses all environmental media, both on and off the FEMP property, affected by contaminants released from the FEMP site. It has no operating history of its own, but reflects the impacts of the "source" operable units (1, 2, 3, and 4) on the soil, surface water and sediment, groundwater, plants and animals in the affected area.

2.3 ENFORCEMENT ACTIVITIES

On March 9, 1995, EPA issued a Notice of Noncompliance to the DOE, identifying concerns about environmental impacts associated with the FEMP's past and ongoing operations. On July 18, 1986, a Federal Facility Compliance Agreement was signed, detailing the actions DOE was to take to assess and investigate environmental impacts of FEMP operations. This Agreement initiated the RI/FS to meet the requirements of CERCLA and the NCP, 40 CFR Part 300. In November 1989, the EPA placed the FEMP site on the National Priorities List.

2.4 OPERABLE UNIT 5 REMOVAL ACTIONS

Removal actions, pursuant to 40 CFR Part 300.415, are intended to abate, minimize, stabilize, mitigate or eliminate a release of hazardous substances, pollutants, or contaminants before a final remedial action. The 31 removal actions underway at the FEMP are being conducted pursuant to the terms of the Amended Consent Agreement and in accordance with authorities granted to DOE under Section 104 of CERCLA by Executive Order 12580. The five removal actions discussed below are wholly or in part the responsibility of Operable Unit 5.

Removal Action No. 1 - Contaminated Water Beneath FMPC Buildings. Perched water zones beneath some former production buildings are of concern due to significant concentrations of uranium and volatile organic compounds. To minimize the potential for the movement of contaminated water to the underlying Great Miami Aquifer, a series of wells were installed to extract the perched groundwater for treatment.

Removal Action No. 3 - South Groundwater Contamination Plume. The five parts of this action are intended to prevent or minimize the further migration of a plume of contamination within the Great Miami Aquifer (the South Plume) off of the FEMP property and to mitigate the effects of the contamination on local users:

- Part 1 - An alternative source of potable and process water was provided to affected industries.

- Part 2 - A groundwater recovery well system to extract and pump groundwater from the South Plume back to the FEMP for monitoring and discharge to the Great Miami River was completed in August 1993, including the installation of a new effluent outfall line.

- Part 3 - An interim treatment system was constructed to remove additional uranium from site wastewater streams to reduce the amount of uranium discharged to the Great Miami River in order to compensate for the additional uranium discharge coming from the South Plume and other removal actions. This system has been operational since July 1992.

- Part 4 - Groundwater monitoring (including private wells located near areas of known contamination) and institutional controls have been ongoing since 1992 to prevent use of contaminated groundwater.

- Part 5 - Additional investigations were completed to identify the leading edge and the extent of the South Plume downgradient (south) of the Part 2 recovery wells.

A related supplemental DOE action is the South Plume Interim Treatment project to reduce site uranium discharges to the Great Miami River. The project's components include successful efforts to:

- Reduce uranium by approximately 105 pounds per year by March 1994 by installing an additional unit to treat South Plume groundwater.

- Reduce uranium by approximately 211 pounds per year by January 1995 by converting a unit treating storm water to treating South Plume water.

- Reduce uranium by approximately 194 pounds per year by January 1995 by using off-peak capacity in another treatment facility.

- Reduce uranium by approximately 105 pounds per year by March 1995 by eliminating treatment of low-uranium streams and using the capacity to treat South Plume water.

Removal Action No. 16 - Collect Uncontrolled Production Area Runoff. Regrading and the installation of drainage controls were completed in August 1993 to control storm water runoff from the perimeter of the production area and redirect it to the existing storm water system.

Removal Action No. 17 - Improved Storage of Soil and Debris. An interim program to store and manage contaminated soil and debris generated by FEMP cleanup activities.

Removal Action No. 30 - KC-2 Warehouse/Well 67. This well, located inside the warehouse, is sampled twice a year for uranium and other metals to monitor the potential for contaminants to migrate to the Great Miami Aquifer.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

After operating under a veil of secrecy for over 30 years, DOE began a community relations program in 1985 to provide information about the site to interested members of the public and to correct the misconceptions and allay the fears of residents living near the site. This program reached out to the public through newsletters and fact sheets, regular community meetings, availability sessions, site tours and open houses, and a speakers bureau. DOE made information available and accessible by opening several reading rooms that were essentially small libraries containing information about all aspects of the RI/FS. In 1990, DOE established an administrative record at the Public Environmental Information Center, located about a mile from the FEMP site. The reading rooms were consolidated and moved to this location as well.

In November 1993, DOE implemented a public participation program at Fernald to involve community members and other interested parties in the decision-making process at the site. These efforts, along with the community relations activities required by CERCLA, reflect DOE's intent to fully involve the community in decision making.

The public is provided with numerous opportunities for learning about and commenting on proposed cleanup alternatives relating to the remediation of environmental media on and off site. These include fact sheets, reports, news releases, and monthly updates for Fernald Residents for the Environment, Safety and Health meetings. Status updates on projects of interest to the public - such as the advanced wastewater treatment facility and the public water supply - are provided at trimesterly community meetings and featured in monthly external publications. Presentations are regularly given at public workshops and range from providing information on the latest project designed to significantly reduce contamination to discussing the Operable Units 1 through 5 RI/FS reports.

For example, Operable Unit 2 introduced its Proposed Plan and preferred remedial alternative, which included an on-property disposal facility, at a public workshop on June 28, 1994. The issue of the disposal facility generated a lot of attention that in turn generated several special availability sessions; OEPA sponsored one on September 13 followed by DOE on October 25. In all, OEPA, DOE and the Fernald Citizens Task Force provided seven opportunities in 1994 and 10 in 1995 for the public to participate in the decision-making process around this issue. DOE held its first Operable Unit 5 workshop on June 1, 1993, to discuss the initial screening of alternatives process. On November 23, 1993, a second workshop was conducted to increase stakeholder understanding of groundwater issues so they could make informed comments on the upcoming RI and FS reports and the preferred cleanup alternative. This workshop focused on the regional geologic setting of the FEMP and the Fernald area, the occurrence and movement of groundwater, and on contaminated groundwater and where it can spread.

As work moved beyond sampling and analysis and the draft Operable Unit 5 RI Report was prepared, a third workshop was conducted to explain the nature and extent of contamination at the site. The November 15, 1994 meeting focused on the uranium concentrations in soil and the Great Miami Aquifer, the other contaminants in soil and groundwater, and the cleanup options under consideration.

A fourth workshop was held on March 28, 1995, soon after submitting the draft final Feasibility Study and Proposed Plan for Operable Unit 5 to EPA and OEPA. This workshop provided the public with a chance to ask questions and get information on these documents before the formal public comment period. This workshop focused on DOE's proposed remedy and how DOE arrived at this recommendation to clean up the soil, sediment, and groundwater, the risks of this proposed action, and what DOE plans to do with contaminated soil.

Operable Unit 5 launched an aggressive community outreach program during the March-May 1995 time frame with the objective of resolving confusion about the preferred remedy. Operable Unit 5 management personnel attended meetings of the Ross Merchants Association, Ross Lions Club, and

Morgan, Crosby and Ross Township trustees. The purpose of these meetings was to explain how DOE arrived at its decision to have an on-property disposal facility and respond to questions about the facility.

The notice of availability for public inspection of the draft RI Report for Operable Unit 5 was published June 22, 1994 in the Cincinnati Enquirer, the Hamilton Journal-News, and the Harrison Press. The notice of availability for the draft FS and Proposed Plan was published November 16, 1994, in the same papers. The Proposed Plan was finalized at the end of April and the Notice of Availability was published on May 1, 1995, in the Enquirer, the Journal-News, and the Press. Approximately 650 area residents received the Proposed Plan by mail; another 200 copies were given to the Ross Area Merchants Association who provided further distribution of the document. All RI/FS documents are available at the Public Environmental Information Center on Hamilton-Cleves Highway, Harrison, Ohio.

A public comment period on the Proposed Plan was announced for May 1 to May 31, 1995. On May 15 OEPA held an availability session in Ross for citizens who wanted to discuss Operable Unit 5's preferred alternative with representatives of the state. A public meeting was held on May 23 where representatives from EPA, OEPA and DOE made brief presentations and answered questions about the Operable Unit 5 alternatives. Reminder postcards were sent to the entire mailing list about two weeks before the meeting, display ads were placed in the above-mentioned newspapers, and a billboard containing meeting information was erected in Ross.

During the meeting a commentor requested an extension to the public comment period. The agencies and DOE agreed to a 30-day extension, making June 30, 1995, the final date for receipt of public comments. A notice to this effect appeared in the above-mentioned newspapers on or before May 31 and postcards were mailed to key stakeholders (approximately 300). When the comment period closed, postcards were sent to all commentors who included names and addresses, acknowledging receipt of their comment, thanking them for their input, and informing them of the availability of the Responsiveness Summary.

The Proposed Plan was submitted to the Toole County, Utah commissioners and to the Utah Department of Environmental Quality. The DOE Nevada Operations Office distributed the Proposed Plan to the Nevada public, the State of Nevada and the Nevada Test Site Community Advisory Board. Utah and Nevada public officials and citizen groups have been requesting more information on proposed destinations for FEMP waste because their states are identified as representative licensed disposal facilities. Stakeholder groups in Kansas also received copies of the Proposed Plan.

Responses to all comments received during the 60-day comment period are included in the Responsiveness Summary, Appendix A of this ROD. This decision document presents the selected remedial action for Operable Unit 5 of the Fernald Environmental Management Project, chosen in accordance with CERCLA and, to the extent practicable, the NCP. The decision for Operable Unit 5 is based on the administrative record.

Another initiative to foster community input into the FEMP's decision-making process is the Fernald Citizens Task Force, chartered by DOE in 1993. Much of the information the Task Force has needed in order to make recommendations on the future use of the site has come from Operable Unit 5 sources. Operable Unit 5 staff have researched, compiled, summarized, and communicated information to the Task Force on the human health risk assessment, waste volume issues as they relate to the disposal facility, the status of ecological habitats on FEMP property, and detailed information on groundwater contamination and modeling. Additionally, Operable Unit 5 management has made presentations at Task Force special sessions and attended their monthly meetings to help answer questions. The Task Force's final report was available at the end of July, 1995.

4.0 SCOPE AND ROLE OF THE OPERABLE UNIT 5 REMEDIAL ACTION

The broad scope of the remedial action for Operable Unit 5 addresses the principal threats represented by contaminated soil and groundwater at the FEMP site. The four source operable units discharged contaminants to environmental media over the 38-year operating history of the FEMP and these contaminants have moved to environmental media both on and off property and have impacted groundwater, surface water and sediment, soil, flora and fauna; human receptors are also at risk from contamination in the environmental media.

Although Operable Units 1, 2 and 4 are addressing contaminated soil within their specific boundaries to the degree specified in their respective RODs, Operable Unit 5 is addressing the soil under the production area structures and the remaining site acreage, as well as approximately 11 square miles of off-property surface soil. Cleanup measures taken will prevent direct contact with contaminated soil and migration of contaminants to groundwater. Soil remediation is estimated to take between 20 and 22 years.

For the groundwater media, Operable Unit 5 is addressing interim control and cleanup issues in addition to long-term monitoring, pumping and treating of the South Plume contamination. These measures will prevent access to and use of potentially contaminated groundwater. Remediation of the Great Miami Aquifer is estimated to take up to 27 years.

Operable Unit 5's remedial action provides a permanent solution for remediating the contaminated environmental media and includes these parameters:

- Establishment of final cleanup levels for soil, sediment and groundwater
- Use of treatment to the extent practical to address the principal threats posed by the contaminated media
- Removal and permanent disposition of contaminated materials to an appropriate on- or off-property disposal facility
- Application of appropriate institutional controls to complement engineering measures taken to address site contaminants
- Return of the Great Miami Aquifer and other useable groundwater to full beneficial use in a reasonable time
- Protection, both short and long term, of the public and sensitive environmental receptors
- Accommodation of cost effectiveness, implementability, uncertainties, and emerging technologies.

The cost of remedial actions, volumes of contaminated materials requiring action, and range of available remedial alternatives for Operable Unit 5 are sensitive factors in determining the final cleanup levels for the affected environmental media. These final cleanup levels are the concentration of a given contaminant which would be permitted to remain in site soil, sediment and groundwater following the implementation of remedial actions. The final cleanup levels also consider factors such as technical limitations on attaining the cleanup level (for example, attaining levels below natural background or analytical detection limits), cross-media impacts, and potential impacts to sensitive ecological receptors. While the Operable Unit 5 ROD does not establish future land use for the FEMP, the possible future uses of the property and the costs of remedial actions necessary to accommodate those uses must be taken into consideration when

determining the final cleanup levels for the operable unit. Projected future land uses which envision more extensive and continued exposure to site contaminants remaining after remedial actions, such as the creation of a family farm on the existing government property, would require lower cleanup levels to ensure the long-term protection of such a future land user. Lower cleanup levels typically would require the removal, containment or treatment of larger quantities of contaminated site media, both on- and off-property, resulting in increased costs for a given remedial alternative.

EPA has already selected remedies that address principal site threats for Operable Units 4, 1 and 2 and Operable Unit 3 is proceeding with dismantling the former production area in accordance with its interim ROD. Before the placement of bentonite caps, the silos of Operable Unit 4 released radon to the atmosphere and the structures themselves had reached the end of their design life. The Operable Unit 1 waste pits have released contaminants to soil, groundwater and air as have the various disposal areas of Operable Unit 2. The former production area (Operable Unit 3) will remain a source of contamination to soil and groundwater until decontamination and deconstruction are complete.

Integration of the five remedial actions is recognized as an ongoing process; the three completed RODs defer final disposition of their contaminated soil and perched groundwater to Operable Unit 5's remedy decisions. The sequencing of disposal facility preparation, facilities decontamination and dismantlement, and final soil and groundwater remediation will be closely coordinated among all operable units through the remedial design and remedial action phases of site cleanup.

The DOE, in cooperation with the EPA, OEPA and local citizenry is actively pursuing budgeting support for an accelerated cleanup program for the FEMP. Under this accelerated program, remedial actions to address the contaminated soil at the FEMP could be completed within 10 years instead of 20-22; no change is anticipated in the time required for groundwater remediation.

5.0 SUMMARY OF OPERABLE UNIT 5 CHARACTERISTICS

5.1 EXTENT OF CONTAMINATION AND AFFECTED MEDIA

This section discusses, by media type, the nature and extent of contamination and the affected area. The information contained in this section was gleaned from the Operable Unit 5 RI and FS Reports (DOE 1995d; 1995a). Sources of media contamination are discussed in Section 2.0 of this report.

5.1.1 Soil

Nature and Extent of Contamination

Extensive soil sampling was conducted during the RI and other programs in order to characterize the nature and extent of contamination resulting from past FEMP operations. Data from these investigations clearly show that uranium is widespread on the FEMP property. Radium-226 and total thorium are also predominant contaminants in soil. Furthermore, the extent or boundaries of uranium contamination generally include the extent of all other contaminants-including inorganic and organic contaminants. Table 5-1 (surface soil, 0 to 1.5-foot depth) and Table 5-2 (subsurface soil, depth greater than 1.5 feet) list summary statistics for the predominant contaminants in soil at the FEMP. Predominant contaminants are defined based on frequency and magnitude of detections above background.

Total uranium concentrations in surface soil within the FEMP boundary typically range from 10 to 100 mg/kg (Figure 5-1). Above-background concentrations of total uranium (background is

3.7 mg/kg) in subsurface soil are found at depths up to 20 feet or more in the former production area.

Radium-226 contamination is limited to the former process areas and waste storage areas. The only significant area of subsurface radium-226 contamination is west of the K-65 silos.

Like the radium-226 contamination, total thorium contamination is generally found in process and waste storage areas. All thorium detections were within the bounds of uranium contamination, and were generally in surface soil. Subsurface contamination was limited to a depth of 10 feet.

The predominant inorganic contaminants are cadmium and beryllium. Except for isolated locations near the K-65 silos, all above-background concentrations of cadmium are located within the

TABLE 5-1

SUMMARY STATISTICS FOR PREDOMINANT CONTAMINANTS IN FEMP SURFACE SOIL
(0 - 1.5 FOOT DEPTH)

Parameter	Units a	Summary of Detections: Frequency of Detection	Frequency of Detection Above Background	Range of Detection b	Average of Detections	95th Percentile of Background
Radionuclides						
Radium-226	pCi/g	1104/1256	345/1256	0.300-2950	10.8	1.42
Thorium-228	pCi/g	889/943	307/943	0.200-315	3.52	1.43
Thorium-232	pCi/g	1223/1435	404/1435	0.190-283	3.28	1.36
Uranium-234	pCi/g	1093/1107	950/1107	0.200-18100	98.6	1.24
Uranium-235/236	pCi/g	774/1123	652/1123	0.0180-1020	7.97	0.156
Uranium-238	pCi/g	1411/1588	1279/1588	0.300-19100	91.2	1.24
Uranium, total	mg/kg	2235/2583	1956/2583	1.00-90400	244	3.73
Inorganics						
Beryllium	mg/kg	245/420	195/420	0.280-5.70	0.980	0.600
Cadmium	mg/kg	158/432	153/432	0.490-12.4	3.70	0.870

a Unit equivalents: mg/kg = ppm; :g/kg = ppb
b Based on total number of samples collected

TABLE 5-2
SUMMARY STATISTICS FOR PREDOMINANT CONTAMINANTS IN FEMP SUBSURFACE SOIL
(GREATER THAN 1.5 FEET IN DEPTH)

Parameter	Units a	Summary of Detections Frequency of Detection	Frequency of Detection Above Background	Range of Detection b	Average of Detections	95th Percentile of Background
Radionuclides						
Radium-226	pCi/g	415/482	36/482	0.300-137	1.25	1.47
Thorium-228	pCi/g	391/530	53/530	0.200-19.5	1.12	1.38
Thorium-232	pCi/g	343/541	31/541	0.200-8.07	0.920	1.26
Uranium-234	pCi/g	422/496	235/496	0.200-319	9.99	1.04
Uranium-235/236	pCi/g	106/500	104/500	0.0480-36.2	2.86	0.150
Uranium-238	pCi/g	440/512	237/512	0.200-317	9.88	1.12
Uranium, total	mg/kg	1084/1644	813/1644	0.500-69300	202	3.69
Inorganics						
Beryllium	mg/kg	228/326	183/326	0.290-5.20	1.03	0.620
Cadmium	mg/kg	168/317	168/317	0.920-8.00	3.77	0.910

a Unit equivalents: mg/kg = ppm; :g/kg = ppb
b Based on total number of samples collected

boundaries of uranium contamination. Cadmium is a trace element in the earth's crust and is a true constituent in the uranium ores processed at the FEMP.

Beryllium contamination is also primarily within the boundaries of uranium contamination, the exceptions being an area northeast of the former production area as well as near the active flyash pile. Beryllium is a trace element in the earth's crust and is a trace constituent in coal and the resulting flyash when burned. Low-level beryllium contamination is widespread at the FEMP, probably due to emissions from the boiler plant as well as dispersion from the coal and flyash piles.

Volatile organic and semivolatile organic compounds and PCBs were detected in select samples in the vicinity of all major processing and supporting facilities. Generally, all detections of organic contaminants are within the boundary of uranium contamination.

Uranium is the predominant contaminant in off-property soil and is mainly in the areas east, northeast, and southwest of the FEMP property boundary. There were also isolated areas of significant uranium contamination located along the FEMP outfall line and along the eastern boundary adjacent to the sewage treatment plant. Isotopic thorium and radium were detected at concentrations slightly above background in off-property surface soil. For nearly all off-property soil samples, inorganic constituents were either detected at insignificant levels or analyzed for and not detected.

In general, off-property total uranium concentrations were in the 5 to 6 mg/kg range, which is slightly above the background concentration. Figure 5-2 depicts off-property areas where soil is potentially impacted by FEMP historical operations. Concentrations of approximately 20 mg/kg of uranium (approximately five times background) were identified in surface soil samples collected off property immediately adjacent to the eastern and northeastern boundary of the FEMP. The source of the uranium contamination is emissions of dust particles to the atmosphere from plant stacks during FEMP operations.

Area and Volume of Affected Soil

The estimated affected area of soil (both on- and off-property) with uranium concentrations above background is approximately 7907 acres or 12.4 square miles. The estimated volume of soil requiring remediation ranges from 1,750,000 cubic yards to more than 9,350,000 cubic yards. These volumes are dependent upon the various alternatives and their associated cleanup levels.

5.1.2 Groundwater

To measure the flow and contaminants in groundwater, monitoring wells were installed to four different depths; Figure 5-3 shows well types and installation depths. Wells completed in the glacial overburden (Type 1) are screened in the material most likely to be contaminated by direct contact with wastes and by surface water infiltrating through waste areas and adjacent contaminated soil. Wells with a screen that straddles the water table in the Great Miami Aquifer (Type 2) monitor general groundwater quality at the top of the aquifer, the first zone to be impacted by vertically infiltrating contaminants.

Wells with a screen set within the 10-foot interval above the discontinuous clay layer sometimes present near the middle of the Great Miami Aquifer (or at the equivalent elevation if the clay was not encountered; Type 3) were- installed to better define the extent of the clay unit and to determine if the clay layer influenced the migration of contaminants or groundwater flow. Wells with a screen set 10 feet above bedrock at the bottom of the aquifer (Type 4) were advanced until bedrock was encountered.

Contamination of the Great Miami Aquifer is largely confined to the uppermost portion. In general, the plume is most laterally extensive at the top of the aquifer (Type 2 wells), less laterally extensive with lower concentrations at the middle (Type 3 wells), and essentially nonexistent at the bottom (Type 4 wells).

5.1.2.1 Perched Groundwater

Nature and Extent of Contamination

Extensive sampling of perched groundwater on the FEMP property identified the presence of site-related contaminants across much of the former production area, adjacent to the storage pits and silos, and in several other locations (see Figure 5-4). Concentrations of contaminants are greatest underlying several of the former production buildings but diminish to near natural background levels at the perimeter of the FEMP property. Table 5-3 summarizes the constituents in perched groundwater (Type 1 wells) which have concentrations above background and are, discernable, as areas of contamination on isoconcentration contour maps of groundwater results.

<NMG S.C. 0596312A8>
<NMG S.C. 0596312A9>

TABLE 5-3
SUMMARY STATISTICS FOR PREDOMINANT CONTAMINANTS
IN FEMP TYPE 1 WELLS (PERCHED WATER) a

Parameter	Filter Flag b	Unit c	Frequency of Detection d	Frequency of Detection Above Background	Range of Detections	95th Percentile of Background
Technetium-99	FIL	pCi/L	56/138	45/138	15.1-2670	30.0
Technetium-99	UNF	pCi/L	64/170	55/170	15.8-6130	30.0
Uranium-234	FIL	pCi/L	129/147	124/147	0.300-42800	0.600
Uranium-234	UNF	pCi/L	186/206	175/206	0.00100-25000	0.900
Uranium-235/236	FIL	pCi/L	78/148	78/148	0.236-2170	--- e
Uranium-235/236	UNF	pCi/L	100/189	100/189	0.208-2490	--- e
Uranium-238	FIL	pCi/L	126/148	--- e	0.400-44100	--- e
Uranium-238	UNF	pCi/L	191/211	185/211	0.300-39000	0.800
Uranium, total	FIL	:g/L	174/181	169/181	0.290-1290000	1.40
Uranium, total	UNF	:g/L	273/275	268/275	0.400-4360000	1.30
Calcium	FIL	mg/L	203/204	95/204	4.65-1800	131
Iron	FIL	mg/L	98/203	11/203	0.0104-21.3	3.58
Magnesium	FIL	mg/L	203/204	97/204	1.55-690	47.8
Manganese	FIL	mg/L	175/202	95/202	0.00250-35.0	0.180
Sodium	FIL	mg/L	203/203	35/203	2.35-1300	56.3
Vanadium	FIL	mg/L	36/195	23/195	0.00290-0.299	0.0195
Zinc	FIL	mg/L	72/195	13/195	0.00200-1.78	0.0443
Chloride	UNF	mg/L	169/173	54/173	0.0320-6300	45.0
Nitrate	UNF	mg/L	153/253	105/253	0.0120-2670	0.290
Sulfate	UNF	mg/L	168/171	56/171	0.170-6200	136

a See Section 5.1.2 for well type depth description; sources are Tables 4-44 and 4-45 in the Operable Unit 5 RI Report.
b Indicates analysis was performed on filtered or unfiltered samples
c Unit equivalents: mg/L = ppm; :g/L = ppb
d Frequency of detection is defined as the number of detectable results divided by number of wells tested and is based on one sample from each well sampled.
E Data not sufficient to determine background value; see Table 4-7 in the Operable Unit 5 RI Report.

Area of Affected Perched Water

The estimated area of affected perched water is 96 acres. This is based on the areas where the uranium concentrations in perched water are greater than or equal to 20 :g/L.

5.1.2.2 Great Miami Aquifer

Nature and Extent of Contamination

Uranium, the principal site-related contaminant in the Great Miami Aquifer, is primarily found in the uppermost portion of the aquifer. Figure 5-5 shows impacted areas of the Great Miami Aquifer. Significant levels of contamination exist in several areas, including:

- A localized area beneath the former production area (up to 50 :g/L of uranium)
- Beneath the waste storage area (up to 70 :g/L of uranium)
- Along the length of Paddies Run from the waste storage area to approximately one mile south of the FEMP property (up to 350 :g/L of uranium)
- Beneath a solid waste disposal area, termed the South Field, located on the southern portion of the FEMP property (up to 2100 :g/L of uranium).

Above-background concentrations of uranium also exist in the groundwater beneath the west bank of the Great Miami River south of the confluence with Paddys Run. Concentrations of uranium in this area are typically less than 10 :g/L. Table 5-4 summarizes the constituents in the uppermost Great Miami Aquifer (Type 2 wells) which have concentrations above background and are discernable as areas of contamination on isoconcentration contour maps of groundwater results.

Several other site-related contaminants are also present in the aquifer, occurring as localized areas within the plume of uranium contamination.

Area of Affected

The estimated area of affected groundwater in the Great Miami Aquifer at a concentration of greater than or equal to 20 :g/L uranium is 172 acres.

TABLE 5-4

SUMMARY STATISTICS FOR PREDOMINANT CONTAMINANTS
IN FEMP TYPE 2 WELLS (UPPER PORTION OF THE GREAT MIAMI AQUIFER)a

Parameter	Filter Flag b	Unit c	Frequency of Detection d	Frequency of Detection Above Background	Range of Detections	95th Percentile of Background
Technetium-99	FIL	pCi/L	7/70	7/70	19.2-204	--- e
Technetium-99	UNF	pCi/L	12/140	9/140	17.8-211	22
Uranium-234	FIL	pCi/L	105/128	79/128	0.270-358	0.900
Uranium-234	UNF	pCi/L	121/156	93/156	0.268-662	0.800
Uranium-235/236	FIL	pCi/L	25/128	25/128	0.240-15.7	--- e
Uranium-235/236	UNF	pCi/L	31/156	31/156	0.220-31.7	0.094
Uranium-238	FIL	pCi/L	106/129	77/129	0.240-381	0.900
Uranium-238	UNF	pCi/L	114/156	96/156	0.300-707	0.640
Uranium, total	FIL	:g/L	127/135	108/135	0.200-1130	0.800
Uranium, total	UNF	:g/L	159/171	129/171	0.200-207	1.20
Cadmium	UNF	mg/L	18/134	5/134	0.00220-0.0459	0.0135
Calcium	UNF	mg/L	134/134	25/134	1.63-411	159
Chromium	UNF	mg/L	32/135	9/135	0.00360-1.11	0.0211
Cobalt	UNF	mg/L	13/133	6/133	0.00500-0.168	0.00860
Iron	UNF	mg/L	115/134	22/134	0.0329-913	5.72
Magnesium	UNF	mg/L	134/134	29/134	0.285-507	38.5
Potassium	UNF	mg/L	115/134	99/134	0.724-182	1.96
Sodium	UNF	mg/L	133/134	11/134	3.76-130	47.1
Ammonia	UNF	mg/L	61/154	4/154	0.0200-17.0	4.20
Chloride	UNF	mg/L	149/156	12/156	3.00-340	73.0
Nitrate	UNF	mg/L	100/139	7/139	0.0160-79.4	11.4
Sulfate	UNF	mg/L	149/155	22/155	0.0620-740	197

a See Section 5.1.2 for well type and depth description; sources are Tables 4-54 and 4-55 in the Operable Unit 5 RI Report
b Indicates analysis was performed on filtered or unfiltered samples
c Unit equivalents: mg/L = ppm; :g/L = ppb
d Frequency of detection is defined as number of detectable results divided by number of wells tested and is based on one sample from each well tested
e Data not sufficient to determine background value; see Table 4-8 in the Operable Unit 5 RI Report.

5.1.3 Surface Water and Sediment

Nature and Extent of Contamination

Surface Water. The FEMP's primary drainageways are the storm sewer outfall ditch (SSOD) and Paddys Run. Because the composition and spatial boundaries of surface water rapidly change, the concentrations discussed here reflect the most recent sampling results (1993). Surface water samples collected from the SSOD indicated elevated concentrations of total uranium (up to 64 :g/L) and thorium-230 (up to 6.4 pCi/L).

Surface water samples collected from both the off- and on-property portion of Paddys Run exhibited above-background concentrations for total uranium and total thorium. Samples collected from the Great Miami River immediately downstream from the FEMP wastewater discharge outfall line indicated concentrations of uranium ranging up to 2.8 :g/L (background concentrations range from 0.52 to 1.1 :g/L). Concentrations of uranium in the Great Miami River were found to quickly diminish downstream of the outfall line, nearing background levels within one mile. Volatiles, semivolatiles, and inorganics were also detected and are listed in detail in Appendix C of the Operable Unit 5 RI Report.

Sediment. Sediment samples were collected from the SSOD, Paddys Run, and the Great Miami River (downstream of the FEMP outfall line as well as downstream of the river's confluence with Paddys Run). Because the composition and spatial boundaries of sediment change rapidly, the concentrations discussed here reflect the 1993 sampling results. In sediment samples collected from the SSOD, total uranium was the most frequently detected radionuclide with concentrations ranging up to 3.3 mg/kg (background concentrations range from 1.0 to 3.0 mg/kg). Inorganic contaminants were also detected at above-background concentrations.

Radium-226 (1.4 pCi/g) and total uranium (22.8 mg/kg) were detected in sediment from the on-Property Portion of Paddys Run in above-background concentrations. Volatile organics, semivolatile organics and inorganics were also detected in select samples of on-property sediment; the concentration of semivolatile organics ranged up to 350 mg/kg. Off-property sediment sampling detected only total uranium (11 mg/kg) and zinc (50 mg/kg) concentrations exceeding background.

Sediment samples from the Great Miami River indicated concentrations of total uranium, radium-226, and total thorium at or slightly above background.

Volatiles, semivolatiles, and inorganics were also detected in sediment from just below the FEMP outfall line; Appendix C of the Operable Unit 5 RI Report includes a detailed list of contaminants in sediment.

Area of Affected Surface Water and Sediment

Because of the dynamic nature of surface water (constantly moving) and sediment (agitated and redistributed), it is difficult to quantify the affected areas. Site characterization data indicate that certain locations are affected, including the area immediately downstream of the FEMP wastewater discharge outfall line (surface water) and the uncontrolled drainages that flow to Paddys Run and the Great Miami River (surface water and sediment).

5.2 CONCEPTUAL MODEL OF CONTAMINANT MIGRATION

Operable Unit 5 includes all of the FEMP environmental media. The Great Miami Aquifer and the perched groundwater zone in the glacial overburden are both part of the groundwater media. Surface soil and the underlying glacial deposits make up the soil media. The Great Miami River, Paddys Run, and the SSOD are examples of the surface water media. Sediment within these surface water bodies includes material carried in storm water runoff or site effluent discharged to surface water or drainage ditches. All of the air in the vicinity of the FEMP makes up the air

media. Contaminant migration and further human exposures through flora and fauna are considered in the baseline risk assessment and the FS, based on the modeled and measured contaminant concentrations in air, water, and soil.

Residual contaminants can migrate through multiple media, pathways and impact potential receptors, as shown in Figure 5-6. Understanding the physical and chemical processes that control contaminant migration in these pathways was the basis for determining acceptable remedial alternatives in the FS. The Operable Unit 5 FS focused on the effects that remedial actions have on contaminant migration in each of the pathways, and factored pathway-specific protective requirements into the remedial components.

5.2.1 Air Pathway

Before production activities ended, air emissions from the former production area were the most significant source of contamination to the environment. Residual contaminants in uncovered surface soil can impact potential receptors through the air pathway. Therefore, remedial alternatives need to be protective of the air pathway. Air emissions associated with Operable Unit 5 residual source areas may involve different types of release mechanisms. If organic compounds are present in the soil, volatilization of these compounds may occur. Radon gas, generated as a result of radioactive decay of radium-226, may be released. During periods of turbulent wind conditions, particles of contaminated surface soil can become suspended in the air and possibly inhaled by on- or off-property human receptors. In the event that previously covered subsurface contaminant sources become uncovered during remediation, the possible transport of this material by wind erosion could become a concern. The amount of material that may be suspended depends on the wind speed and other site conditions such as soil moisture, particle size, and vegetative cover.

5.2.2 Soil and Sediment Pathway

Contaminated soil and sediment serve as source material for the air and various water pathways at the
FEMP. Contaminants in soil can be mobilized into the air pathway via resuspension and volatilization. Erosion and dissolution of contaminated soil/sediment by surface water mobilizes contaminant. Surface water infiltrates contaminated soil and sediment, mobilizing contaminants into the perched groundwater system and to the Great Miami Aquifer. Contaminated soil/sediment can also be mobilized via plant uptake and ingestion by animals.

5.2.3 Surface Water Pathway

Surface water runoff is a viable transport pathway for all contaminated surface soil at the FEMP. During a rainfall event, soil particles are dislodged by the impact of raindrops and by the flow of runoff across the soil surface. 1he dislodged soil particles travel overland in the runoff and eventually become sediment in the receiving water courses. Contaminants in the soil particles are also dissolved and transported into the runoff and the receiving surface water. Some of the contaminated surface water infiltrates through the upper portions of the glacial overburden to the perched water. Infiltration to the Great Miami Aquifer through portions of the streambeds of Paddys Run and the SSOD where the streams have cut through the glacial overburden also occurs. The South Plume in the Great Miami Aquifer is an example of the impact caused by contaminant migration in the surface water pathway and subsequently the groundwater pathway. Although it is not known to occur at the FEMP site, the potential exists for contaminated surface water to affect area crops if it is used for irrigation. The potential for direct human exposure to contaminated surface water exists along site drainages, Paddys; Run and the Great Miami River.

5.2.4 Perched Groundwater Pathway

Once contaminants reach the perched water beneath the FEMP they have the potential to migrate laterally to various site drainages where they may reenter the surface water pathway via

seepage. Vertical seepage of contaminated perched water through the glacial overburden to the Great Miami Aquifer is also a recognized pathway. Site characterization data indicate that these two pathways are not presently contributing significant contamination to site surface water drainages or to the Great Miami Aquifer; however, fate and transport modeling indicates that these two pathways will become significant in the future if remedial action does not occur.

5.2.5 Groundwater Pathway

Rainfall, surface water runoff and perched water can infiltrate through the surface soil/sediment and percolate down to the Great Miami Aquifer. The three major controlling mechanisms for the groundwater migration pathway are:

- The leaching of contaminants from the soil matrix into the dissolved phase
- The percolation of the contaminated leachate or perched water through the overburden to the underlying aquifer
- The movement of groundwater in the Great Miami Aquifer.

The groundwater pathway of migration has canned contaminants outside the FEMP property boundary to the south and east of the FEMP. This contaminated groundwater has the potential to re-emerge as surface water in Paddys Run where the Great Miami Aquifer water table intercepts the streambed south of the FEMP. Fate and transport modeling indicates the Great Miami River to the east and south of the FEMP could be impacted by this pathway in the distant future if remediation does not occur.

Contaminated groundwater could affect crops and livestock by irrigation with or consumption of water from wells in the affected area(s). Although presently not occurring, the potential for human exposure to contaminants in groundwater exists in the affected areas.

5.3 MOBILITY OF CONTAMINANTS

Detailed discussions of contaminant mobility are provided in the Operable Unit 5 RI and FS reports (DOE 1995d; 1995a) and in a site-specific contaminant mobility study entitled the Operable Unit 5 K, Sampling and Analysis Results (Draft) (DOE 1995b). K1 is the source leaching coefficient used to define the initial aqueous loading of uranium (for a full discussion see Section F.2.4 in the Operable Unit 5 FS Report). Ile mobility of uranium, the predominant site contaminant, is discussed below.

Site investigations documented in the above-referenced reports show that outside the former production area the majority of remaining uranium contamination has relatively low solubility and is contained in the top 2 inches of surface soil. Aqueous spills and leaks occurred from production activities and placed a large source of soluble uranium in local areas in the glacial overburden in both the former production area and waste storage area. Historic air emissions also deposited uranium in the form of uranium fluoride and oxide particles both inside and outside the production area (see Figures 5-1 and 5-2).

After deposition, rainwater rapidly dissolved the soluble uranium fluoride particles and the resulting plume quickly reached its maximum uranium concentration. Outside the former production area the maximum uranium concentration in the perched groundwater occurred many years ago. However, in the former production and waste storage areas, the soluble uranium has not been depleted and the uranium concentration in the migrating plume continues to increase.

In general, most soluble uranium forms at the FEMP have been removed by leaching, leaving the less soluble forms. The leachability, and hence mobility, of the remaining uranium in surface soil and the percent of extractable uranium mass decreases with distance from the former

production area.

6.0 SUMMARY OF OPERABLE UNIT 5 RISK

DOE conducted a Baseline Risk Assessment for human health and a Site-Wide Ecological Risk Assessment to evaluate and document potential threats to human health and ecological receptors, respectively. The baseline risk assessment for human health evaluates risk under various hypothetical scenarios to hypothetical receptors exposed to contaminants within Operable Unit 5 if remedial actions are not taken. Baseline risk provides a measure against which the reduced risk associated with various remedial action alternatives may be compared, as well as a measure of their relative effectiveness. The ecological risk assessment determines if radiological and nonradiological contaminants associated with the FEMP represent a current or future risk to ecological receptors inhabiting the facility and nearby off-property areas if remedial actions are not taken. These receptors include all organisms, exclusive of humans and domestic animals, potentially exposed to contamination originating from the FEMP.

The baseline risk assessment (Appendix A of the Operable Unit 5 RI Report, DOE 1995d) was conducted according to EPA guidance (EPA 1991a), the Risk Assessment Work Plan Addendum (DOE 1992), and supplemental guidance to the Risk Assessment Work Plan Addendum. The media of interest for the Operable Unit 5 baseline risk assessment are perched groundwater, groundwater in the Great Miami Aquifer, surface water and sediment, surface and subsurface soils, flora and fauna (including cattle grazing on the FEMP property), and crops and produce potentially affected by contamination originating from the FEMP.

The site-wide ecological risk assessment (Appendix B of the Operable Unit 5 RI Report, 1995d) was conducted following guidelines prepared by EPA Region 5 (EPA 1992). Both risk assessments are briefly summarized in the Operable Unit 5 FS Report and the Proposed Plan (DOE 1995a and 1995c).

The baseline risk assessment for human health shows that, for all sources and pathways, every receptor for each of the land use scenarios evaluated had a maximum calculated incremental lifetime cancer risk (ILCR) greater than 1 x 10-5. In addition, the maximum calculated noncarcinogenic risk, known as the hazard index (HI), was greater than 1 with two exceptions. The results of the site-wide ecological risk assessment indicate that a number of constituents are present in soil, surface water and sediment in concentrations that may pose a risk to ecological receptors. The results of both the baseline and the ecological risk assessments support the decision to take remedial action.

Sections 6.1 and 6.2 provide a summary of the baseline risk assessment for human health and the site-wide ecological risk assessment, respectively.

6.1 HUMAN HEALTH RISK

The baseline risk assessment for human health determines whether adverse human health effects are possible assuming an individual is exposed to the environmental media which define Operable Unit 5. The baseline risk assessment is organized according to the four primary components listed below:

- Identification of constituents of potential concern
- Exposure assessment
- Toxicity assessment
- Risk characterization.

The following discussion follows the same organization and explains how Operable Unit 5 arrived

at the estimates of carcinogenic and noncarcinogenic risk. The results of the baseline risk assessment support the FS by identifying constituents of potential concern (CPCs) and by providing risk estimates for various human receptors under several plausible current and future land use scenarios.

6.1.1 Contaminant Identification

The identification of the major contaminants that are the primary contributors to risk begins with identification of CPCs in the RI. Constituents of concern (COCs) are identified in the FS, and the COCs that contribute 99 percent or more of the total estimated carcinogenic and noncarcinogenic risk are identified in the Comprehensive Response Action Risk Evaluation (CRARE) in Appendix H of the FS. The identification process is described in the following paragraphs.

Constituents of Potential Concern

CPCs are those chemicals and radionuclides in environmental media that are retained for quantitative evaluation in the baseline risk assessment. To select CPCs, a comprehensive review of analytical data was conducted, focusing on the chemicals and radionuclides that, based on their prevalence, concentration and toxicity, are considered to be of concern to human health. Organic constituents detected in a given environmental medium were selected as CPCs based on toxicity screening and frequency of detection. (A conservative toxicity screening value was used as a benchmark for CPC selection.) Radiological constituents and metals (and other inorganic chemicals) were selected as CPCs by comparing measured, on-property concentrations of a constituent to background concentrations of that constituent in the same environmental media. Laboratory contaminants (identified during data validation), essential macronutrients and micronutrients (calcium, etc.), or ubiquitous minerals (silica, etc.) were screened out as CPCs in the selection process. Table 6-1 identifies CPCs by media.

The methods and results of the CPC screening process are described in Sections A.2.3 and A.2.4 of Appendix A of the Operable Unit 5 RI Report; the CPCs and their concentrations are presented in Tables A.2-1 through A.2-12 (DOE 1995d). Due to the very large number of CPCs and their associated data, these tables are not repeated in the ROD.

Constituents of Concern

Not all CPCs identified in the Operable Unit 5 baseline risk assessment pose significant health risks and many need not be considered in future remedial activities. The ones that remain are called COCs. The purpose of restricting the number of COCs in the remedial alternative evaluations during the FS is to focus on the contaminants that require the implementation of remedial actions to ensure the protection of human health and the environment.

This screening of CPCs to COCs is accomplished by following NCP guidelines, which establish a general point of departure for acceptable risk as one in a million (10-6) for carcinogenic compounds including radionuclides. The acceptable limit for noncarcinogenic effects is a HI of 1.0; an HI greater than 1.0 indicates a potential toxic effect. However, because multiple contaminants are considered, and to ensure no significant COCs are ignored, the screening point for selection of COCs for the Operable Unit 5 FS is set at an ILCR of 10-7 and an individual HI of 0.1 to the hypothetical on-property farmer. Any constituent with a risk level or HI less than these FS screening criteria is not considered further. Details of the COC selection process can be found in Section 2.3 of the Operable Unit 5 FS Report (DOE 1995a).

Identifying Contaminants Driving Risk

The CRARE estimates the human-health risks associated with the FEMP after all remedial actions have been completed. To ensure that the risk evaluated in this CRARE is focused on the most significant constituents, risk assessors evaluated the COCs identified in the Operable Unit 5 FS

TABLE 6-1
CONSTITUENTS OF POTENTIAL CONCERN IN EACH MEDIUM FOR OPERABLE UNIT 5 a

Constituent	Medium b	Constituent	Medium b
Radionuclide		Chemical (Continued)	
Cesium-137	Soil	Bis(2-ethylhexyl)phthalate	Soil, Per, SW, GW
Neptunium-237	Soil, GW, SW, Per	Boron	Soil, GW, Per
Protactinium-231	NA	Bromodichloromethane	Soil, GW, SW
Lead-210	Soil, Per, SW, Sed	Bromomethane	GW, SW, Soil
Plutonium-238	Soil, SW, Per	2-Butanone	Soil
Plutonium-239	Soil, SW, Per	Butylbenzyl phthalate	NA
Plutonium-240	Soil, SW, Per	Cadmium	Soil, Per, SW, GW
Radium-226	Soil, GW, Per, SW, Sed	Carbazole	Soil, GW, Per
Radium-228	Soil, GW, SW, Sed	Carbon disulfide	Per, GW
Radon-222 c	Air	Carbon tetrachloride	Per
Ruthenium-106	Soil	4-Chloro-3-methylphenol	NA
Strontium-90	Soil, GW, SW, Per	Chlorobenzene	NA
Technetium-99	Soil, GW, Per, SW	Chloroethane	GW
Thorium-228	Soil, Per, SW, Sed, GW	Chloroform	GW, SW, Per
Thorium-230	Soil, Per, SW, GW	Chromium VI	Soil, GW, SW
Thorium-232	Soil, Per, SW, Sed, GW	Chrysene	Soil
Uranium-234	Soil, GW, Per, SW	Cobalt	GW
Uranium-235	Soil, GW, Per, SW, Sed	Copper	Soil, Per, SW, GW
Uranium-236	Soil, GW, Per, SW, Sed	Cyanide	SW, GW, Soil
Uranium-238	Soil, GW, Per, SW, Sed	4,4-DDE	NA
		Dibenzo(a,h)anthracene	Soil, SW
Chemical		3,3-Dichlorobenzidine	SW, Soil
Acenaphthene	NA	1,1-Dichloroethane	Soil, GW
Acetone	Soil	1,2-Dichloroethane	GW, Per
Alpha-chlordane	GW, SW	1,1-Dichloroethene	Soil, SW, Per, GW
Anthracene	NA	1,1-Dichloroethylene	NA
Antimony	Soil, GW, SW, Per	1,2-Dichloroethylene	Per
Aroclor-1221	NA	Dieldrin	SW
Aroclor-1248	NA	Diethyl phthalate	NA
Aroclor-1254	Soil, SW, Sed, GW	Di-n-butyl phthalate	SW
Aroclor-1260	Soil, SW, Sed, GW	Di-n-octyl phthalate	Soil, SW
Arsenic	Soil, SW, Sed, Per, GW	Endrin	NA
Barium	Soil, SW, Per, GW	Ethylbenzene	NA
Benzene	GW, SW, Per	Ethylether	NA
Benzoic acid	NA		

TABLE 6-1
(Continued)

Constituent	Medium b	Constituent	Medium b
Chemicals (Continued)		Chemicals (Continued)	
Benzo(a)anthracene	Soil, SW	Fluoranthene	NA
Benzo(a)pyrene	Soil, SW	Fluorene	NA
Benzo(b)fluoranthene	Soil	Fluoride	Soil, GW, Per, SW
Benzo(g,h,i)perylene	NA	Heptachlorodibenzo-p-dioxin	Soil
Benzo(k)fluoranthene	Soil	Heptachlorodibenzofuran	Soil
Beryllium	Soil, GW, SW, Per	2-Hexanone	NA
Beta-BHC	Soil	Indeno(1,2,3-cd)pyrene	Soil
Bis(2-chloroisopropyl)ether	Soil, GW, SW	Lead	Soil, SW, Sed
Manganese	Soil, GW, Per, SW, Sed	Pyrene	NA
Mercury	Soil, GW, SW	Selenium	Soil, GW
Methanol	NA	Silver	Soil, Per, GW
Methylene chloride	Soil, GW, Per, SW	Styrene	NA
2-Methylnaphthalene	NA	1,1,2,2-Tetrachloroethane	Soil, Per
4-Methyl-2-pentanone	NA	1,1,1-Trichloroethane	SW
4-Methylphenol	SW, Soil, GW	1,1,2-Trichloroetbiane	SW, Per
Molybdenum	Soil, Per, GW	Tetrachlorodibenzo-p-dioxin	NA
Naphthalene	NA	Tetrachlorodibenzofuran	NA
Nickel	Soil, SW, GW	Tetrachloroethene	Soil, SW, Per
Nitrate	Soil, GW, Per, SW	Thallium	Soil, Per
4-Nitrophenol	Soil, GW, SW	Toluene	NA
N-Nitroso-di-n-propylamine	Soil, Per	Tributyl phosphate	Per
N-Nitrosodiphenylamine	Soil, Sed	Trichloroethene	Soil, GW, Per
Octachlorodibenzo-p-dioxin	Soil	Vanadium	Soil, Per, SW, GW
Octachlorodibenzofuran	Soil	Vinyl chloride	Soil, GW, Per
Pentachlorophenol	Per	Xylenes (Total)	NA
Phenanthrene	NA	Zinc	Soil, SW, GW
Phenol	NA		

a CPCs for Operable Unit 5 were taken from the RI Report.
B Abbreviations used in this table:
GW = Groundwater
Sed = Sediment
Per = Perched groundwater
SW = Surface water
HWMU = Hazardous waste management unit
c Radon was the only CPC detected in on-site air samples. However, all surface soil CPC exposures through particulate
inhalation are evaluated quantitatively in the CRARE.
NA - Not a CPC for OU5 but a COC for one or more other OUs as noted in the OU5 FS Report, Table 2-3.

Report. This process is detailed in Appendix H, Section H.2.3 of the FS. The CRARE COC selection process determines the total risk to the target receptors (undeveloped park-user and off-property adult farmer and child) as calculated in the Operable Unit 5 baseline risk assessment. Beginning with the constituents which contributed greatest to carcinogenic and noncarcinogenic risk, the fractions of risk for each CPC (the CPCs as determined in the RI) were added until the constituents which contributed 99 percent of the total risk were determined. Those CPCs contributing to the remaining 1 percent were not included in the list because their contribution becomes insignificant under postremedial conditions.

Table 6-2 presents the COCs that contribute 99 percent or more of the total carcinogenic and noncarcinogenic risks and potential health effects as evaluated in the Operable Unit 5 CRARE.

6.1.2 Exposure Assessment

The second primary component of the baseline risk assessment is the exposure assessment. Exposure is defined as contact between a person and a chemical or physical (e.g., radiological) agent. The magnitude of the exposure resulting from such contact is determined by measuring or estimating (through modeling) the amount of an agent available to the lungs, gastrointestinal system, or skin during a specific period. Human activity patterns are a key determinant in predicting the nature and magnitude of potential exposures. Exposure assessment is the determination or estimation of the magnitude, frequency, duration, and route of exposures to plausible hypothetical receptors under current and future land use scenarios. Quantitative exposure assessment is the estimation of an intake by a receptor. The intake quantified during the exposure assessment is evaluated during the risk characterization to estimate potential health risks to receptor populations.

The exposure assessment is conducted in three stages, and each stage is discussed in the following paragraphs:

- Characterizing the exposure setting
- Identifying contaminant migration and exposure pathways (development of the conceptual model for the site)
- Quantifying exposure.

Details are provided in Appendix A, Section A.3 of the Operable Unit 5 RI Report.

TABLE 6-2

MAJOR CONSTITUENTS OF CONCERN FOR OPERABLE UN1T 5
AS DEFINED IN THE CRARE a

Radionuclides	Inorganics	Organics
Cesium-137	Antimony	Aroclor-1254
Radium-226	Arsenic	Aroclor-1260
Radon-222	Beryllium	Benzo(a)pyrene b
Strontium-90	Cadmium	1,2-Dichloroethane
Technetium-99	Copper	
Thorium-228	Cyanide	
Thorium-232	Manganese	
Uranium-234	Mercury	
Uranium-235/236	Molybdenum	
Uranium-238	Silver	
	Uranium-total	
	Zinc	

a This table includes those COCs that contribute 99 percent or more of the total ILCR and HI.
b Concentrations of these compounds were determined from relative potency factors of other carcinogenic polycyclic aromatic hydrocarbons identified on site.

Characterizing the Exposure Setting

An important component of characterizing the operable unit setting is identifying potentially exposed populations. Demographic information is used, in part, to select receptors for the exposure assessments. As presented in Section 1.3, the 1990 census estimates 22,900 people live within a 5-mile radius of the FEMP in scattered residences and several villages.

Some of the nearest residences are along the western side of Paddys Run Road, a road that closely parallels the western property boundary. A dairy farm is located on Willey Road just outside the southeast corner of the boundary; leased grazing areas include acres inside the FEMP boundary. Several residences located south of the FEMP property boundary are located over the South Plume, that portion of the Great Miami Aquifer along Paddys Run contaminated by uranium that extends approximately one-half mile south of the FEMP boundary. Several industries are located south of the FEMP, and Miami Whitewater Forest (a county park) is located within 5 miles of the FEMP.

Future land use scenarios are difficult to develop at government facilities. A reasonable scenario is that the government retains control of and restricts access to the property. However, because the possibility exists that the government will not control the site, the future land use includes a second scenario which considers unrestricted use of the property including farming in the baseline risk assessment for both current and future land use scenarios. Table 6-3 describes receptors, exposure locations, media to which receptors are exposed, and exposure routes evaluated.

Identifying Contaminant Migration and Exposure Pathways

In many cases, the size or area of a site or operable unit is small enough so that the risk assessor can evaluate all data as one group or set. However, the large area of Operable Unit 5, and the uneven distribution of contaminants present in the environmental media made it necessary to divide the site into 10 areas. An evaluation of the site as one area would underestimate total risk because several areas have constituents present in relatively low concentrations. By evaluating separate areas, the results clearly identify those areas with the highest risk.

Each of the 10 areas was examined much the same as if each area were the site. A conceptual model was developed to provide the basis for identifying and evaluating the potential risks to human health in the baseline risk assessment assuming current and hypothetical future contaminant sources in environmental media (referred to as source terms) and land use conditions (Figures 6-1 and 6-2). As outlined in the following paragraphs, the model considers four scenarios and is used to evaluate

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TABLE 6-3

SUMMARY OF LAND USE SCENARIOS AND RECEPTORS a

Receptor	Description	Exposure Locations	Media to which Exposed	Exposure Routes
Current Site Conditions and Land Use With Access Controls				
Off-Property resident Farmer/Child	Farm family fives adjacent to the FEMP property boundary.	Rural/agricultural area along eastern, southern, northern, and western fencelines of site. Rural/agricultural area at the northeast corner of site. Rural/agricultural area at the southeast corner of site.	Air, groundwater, and soil	Inhalation of fugitive dust, volatiles, and gases; consumption of farm-produced foodstuffs; dermal contact and inhalation while using groundwater in the home; incidental ingestion of, direct radiation exposure from, and dermal contact with soil.
Consumer of Meat and Milk Products	User of animal products produced by cattle grazing on FEMP Property.	Grazing areas exist within the FEMP property boundary to the northwest, northeast, south and west of the production area.	Cattle exposed to soil and surface water.	Ingestion of meat; ingestion of milk
Groundskeeper	Full-time employee who does routine maintenance and security work.	All on-property areas	Soil and air	Inhalation of fugitive dust, volatiles, and radon; incidental ingestion of soil; dermal contact; external radiation exposure.
Visitor	A regular visitor to the FEMP who is not covered by a health and safety or radiation protection program. An example is a delivery person.	The administration area only.	Soil and air	Inhalation of fugitive dust, volatiles, and gases; external radiation exposure from soil.
Trespassing Youth	Youth on-property without permission.	All areas except the production area.	Soil, air, surface water, and sediment	Inhalation of fugitive dust, volatiles, and gases; incidental ingestion of, external radiation exposure from, and dermal contact with contaminated soil and sediment; incidental ingestion of and dermal contact with surface water.
Critical Subpopulations	Local school children and youths (grades K through 8 for elementary students and grades 9 through 12 for high school students).	Schools located 5 miles NW, 2 miles SW, 4 miles SE, 4 miles NE of site, and 3 miles NE of the FEMP site.	Air	Inhalation of fugitive dust, volatiles, and gases.
Great Miami River	Individual who obtains water from the river for either domestic, agricultural, or recreational uses, or any combination of the three.	This receptor was evaluated at the outfall effluent line and the Great Miami River confluence with Paddys Run	Surface water and sediment	Incidental ingestion of surface water; inhalation of VOCs from use of water in the home; dermal contact with surface water; ingestion of farm-produced foodstuffs and fish caught in the river; ingestion of drinking water.

TABLE 6-3
(Continued)

Receptor	Description	Exposure Locations	Media to which Exposed	Exposure Routes
Current Site Conditions and Land Use Without Access Controls				
Off-Property Farmer/Child	Same as for case with access controls except the family has unrestricted use of groundwater and access to potential on-property grazing areas.	Same as for case with access controls	Same as for case with access controls	Same as for case with access controls except includes ingestion of groundwater
Consumer of Meat and Milk Products	Same as for case with access controls	Same as for case with access controls	Same as for case with access controls	Same as for case with access controls
Groundskeeper	Same as for case with access controls	Same as for case with access controls	Same as for case with access controls	Same as for case with access controls
Visitor	Same as for case with controls	Administration and production areas.	Same as for case with access controls	Same as for case with access controls
Exploring Youth	A child playing at the FEMP particularly along Paddys Run.	All on-property areas.	Same as for case with access controls	Same as for case with access controls
Critical Subpopulations	Same as for case with access controls	Same as for case with access controls	Same as for case with access controls	Same as for case with access controls
Great Miami River User	Same as for case with access controls	Same as for case with access controls	Same as for case with access controls	Same as for case with access controls
Future Land Use with Continued Federal Ownership				
Off-Property Farmer/Child	A farm family living adjacent to the FEMP fenceline or at a location nearby. Assumes an 85 percent vegetative covering of the FEMP property	Rural/agricultural area along eastern, southern, northern, and western fencelines of site. Rural/agricultural area at the northeast Corner of the site. Rural/agricultural area at the southeast corner of site. Three off-site locations.	Air, groundwater, and Soil. The farm family would have unrestricted use of groundwater	Ingestion of groundwater; inhalation of fugitive dust, volatiles, and gases; consumption of farm-produced foodstuffs; dermal contact and inhalation while using groundwater in the home; incidental ingestion of, direct radiation exposure from, and dermal contact with soil.
Recreational Receptors - Wildlife Reserve - Undeveloped Park - Developed Park	FEMP is accessible to the public as a park. Use may vary depending on the type of park; a wildlife reserve; an undeveloped park with limited recreation; or a developed park with playgrounds and ball fields.	Seven on-property areas selected based on the results of air and groundwater modeling results and a review of measured soil concentrations.	Surface water, sediment, air, soil	Inhalation of fugitive dusts, volatiles, and gases; incidental ingestion of, external radiation exposure from, and dermal contact with soil and sediment; incidental ingestion of and dermal contact with surface water.

TABLE 6-3
(Continued)

Receptor	Description	Exposure Locations	Media to which Exposed	Exposure Routes
Future Land Use with Continued Federal Ownership (Continued)				
Groundskeeper	Full-time employee who does routine maintenance and security work.	Same seven locations specified for the recreational receptors.	Soil and air	Inhalation of fugitive dust, volatiles, and radon; incidental ingestion of soil; dermal contact; external radiation exposure.
Great Miami River User	Individual who obtains water from the river for either domestic, agricultural, or recreational uses, or any combination of the three.	This receptor was evaluated at the outfall effluent line and the Great Miami River confluence with Paddys Run.	Surface water and sediment	Incidental ingestion of surface water; inhalation of VOCs from use of water in the home; dermal contact with surface water; ingestion of farm-produced foodstuffs and fish caught in the river; ingestion of drinking water.
Future Land Use Without Federal Ownership				
Off-Property Farmer/Child	Same as for case with access controls except for assuming 50 percent vegetative cover of the FEMP.	Same as for case with access controls	Same as for case with access controls	Same as for case with access controls
Great Miami River User	Same as for case with access controls	Same as for case with access controls	Same as for case with access controls	Same as for case with access controls
On-Property (central tendency) Farmer/Child	A farmer resides on the property and conducts agricultural activities. The exposure of the child is similar to the adult with modifications of exposure parameters to reflect those typical of a child.	Same seven locations specified for the recreational receptors identified under future land use with federal ownership.	Air, soil, perched groundwater, and radon	Inhalation of fugitive dust, volatiles, and gases; ingestion of groundwater (separate evaluations for perched and aquifer water); dermal contact and inhalation while using groundwater in the home; consumption of foodstuffs grown on the property; incidental ingestion of, external radiation from, and dermal contact with soil.
Homebuilder	This exposure evaluates a construction worker (or a farmer building her/his own house) constructing a house.	Same seven RME locations specified for the on-property resident farmer/child.	Soil and air	Inhalation of particulates, volatiles, and gases; incidental ingestion of, dermal contact with, or external radiation from soil.

contaminant concentrations measured or estimated for several on-property and off-property areas or receptor locations. Risk evaluation areas and receptor locations were determined based on an understanding of historical and current land use, the plausible future land use, and the location of sensitive human receptors. The four scenarios are:

- Current land use with access controls: the FEMP is defined as a facility operated by the DOE. Further, it is assumed that members of the public do not establish residence on the Operable Unit 5 study area. However, farmers do use on-property areas for pasture land.

- Current land use without access controls: access restrictions at the FEMP site historically provided by DOE are assumed to be discontinued, and the FEMP site is operated by an industrial concern other than DOE. This scenario assumes that members of the public do not establish residence on the Operable Unit 5 study area.

- Future land use with federal ownership or institutional controls (government reserve): assumes that the federal government continues to maintain control over the land use at the FEMP. An industrial or recreational land use scenario is plausible.

- Future land use without federal ownership of institutional controls (agricultural): assumes that no access/institutional controls are in place and includes exposure routes that require development time, such as establishing a home and farm operations on property.

Quantifying Exposure

The final component of the exposure assessment is the determination of the exposure point-concentration (i.e., the concentration to which a receptor is exposed and the quantification of the intake resulting from exposure). For the Operable Unit 5 baseline risk assessment, exposure-point concentrations for environmental media are mainly based on analytical data resulting from the RI sampling and analytical programs. However, for certain scenarios, the exposure-point concentrations must be based on environmental transport modeling. Section 5.0 and Appendix F of the Operable Unit 5 RI Report address the modeling results in detail. Appendix A.3 of the RI Report specifies the assumptions regarding source terms and potential release mechanisms on which the transport modeling is based; estimated exposure-point concentrations used in exposure calculations are tabulated in baseline risk assessment Tables A.3-3 through A.3-19. Ranges of exposure-point concentrations are shown in Table 6-4.

Section A.3.4 describes how the exposure-point concentrations are used with scenario-specific assumptions and intake parameters to arrive at exposure values. The models and equations used to quantify intakes are described in the Risk Assessment Work Plan Addendum (DOE 1992). EPA guidance (EPA 1989a) was considered in determining appropriate intake equations. In cases where

TABLE 6-4

RANGE OF EXPOSURE POINT CONCENTRATIONS
FOR CONTAMINANTS CONTRIBUTING 99 PERCENT OR MORE OF TOTAL RISK

Constituent	Surface Soil a	Subsurface Soil	Air b	Sediment c	Groundwater (includes Perched)	Surface Water d
On-Property, Current Land Use						
Radionuclides	(pCi/g)	(pCi/g)	(pCi/m3)	(pCi/g)	(pCi/L)	(pCi/L)
Cesium-137+1d	0.64-1.4	NA	2.3E-08 - 1.8E-07	NA	NA	NA
Radium-226+5d	0.94-35	NA	4.5E-06 - 2.0E-04	0.69 - 1.1	NA	ND - 1.7
Radon-222+4d	NA	NA	2.0 - 49	NA	NA	NA
Strontium-90+1d	1.0-5.0	NA	3.7E-08 - 5.7E-07	ND - 0.99	NA	NA
Technetium-99	ND-230	NA	3.0E-07 - 6.6E-O6	NA	NA	ND - 89
Thorium-228+7d	0.98-31	NA	4.7E-07 - 4.7E-06	0.70 - 0.73	NA	ND
Thorium-232	0.87-36	NA	9.2E-07 - 1.1E-05	0.57 - 0.80	NA	ND - 0.40
Uranium-234	4.0-740	NA	1.4E-05 - 3.1E-04	3.7 - 3.8	NA	11 - 1200
Uranium-235/236	0.70-63	NA	1.3E-06 - 2.8E-05	0.025 - 0.90	NA	1.7 - 42
Uranium-238+2d	2.9-780	NA	1.8E-05 - 3.6E-04	3.1 - 46	NA	1.4 - 1200
Organic Chemicals	(mg/kg)	(mg/kg)	(mg/m3)	(mg/kg)	(mg/L)	(mg/L)
1,2-dichloroethane	ND-O.O020	NA	NA	NA	NA	NA
Aroclor-1254	0.014-4.0	NA	2.3E-12 - 3.9E-11	NA	NA	NA
Aroclor-1260	ND-2.8	NA	6.0E-14 - 1.4E-12	NA	NA	NA
Benzo(a)pyrene	ND-11	NA	2.3E-12 - 6.0E-11	0.13 - 0.55	NA	NA
Inorganics						
Antimony	ND-30	NA	1.5E-09 - 8.6E-09	NA	NA	ND - 2.5E-03
Arsenic	4.5-23	NA	7.0E-10 - 2.9E-09	ND - 10	NA	ND - 5.4E-03
Beryllium	0.53-1.7	NA	7.4E-11 - 3.2E-10	ND - 3.5	NA	ND - 1.5E-03
Cadmium	ND-7.6	NA	4.1E-10 - 1.5E-O9	ND - 5.5	NA	ND - 6.3E-03
Copper	11-91	NA	1.9E-09 - 1.0E-08	ND - 19	NA	ND - 0.020
Cyanide	0.24-1.7	NA	2.9E-11 - 1.5E-10	ND - 0.49	NA	2.4E-03 - 7.7E-03
Manganese	670-2000	NA	6.7E-08 - 2.7E-07	ND - 1600	NA	0.041 - 0.83
Mercury	ND-17	NA	1.3E-11 - 1.9E-10	NA	NA	ND - 6.OE-04
Molybdenum	4.2-12	NA	5.8E-10 - 2.5E-09	ND - 6.6	NA	ND - 0.023
Silver	0.48-9.7	NA	6.6E-10 - 2.8E-09	ND - 6.8	NA	ND - 4.0E-03
Uranium-total	12-1700	NA	5.2E-08 - 9.5E-07	23 - 31	NA	0.035 - 2900
Zinc	47-2200	NA	1.3E-08 - 6.9E-08	ND - 81	NA	0.015 - 0.073

TABLE 6-4
(Continued)

Constituent	Surface Soil e	Subsurface Soil	Air f	Sediment g	Groundwater h	Surface Water i
Off-Property, Current Land Use						
Radionuclides	(pCi/g)	(pCi/g)	(pCi/m3)	(pCi/g)	(pCi/L)	(pCi/L)
Cesium-137+1d	0.60 - 0.87	NA	2.5E-09 - 5.1E-08	NA	NA	NA
Radium-226+5d	0.90 - 1.2	NA	4.4E-08 - 1.6E-03	1.1	1.2 - 3.2	2.0 - 2.8
Radon-222+4d	NA	NA	0.079 - 4.9	NA	NA	NA
Strontium-90+1d	1.0-5.2	NA	2.6E-10 - 2.2E-07	NA	ND - 5.7	NA
Technetium-99	ND - 3.5	NA	2.6E-08 - 3.7E-06	NA	ND - 24	ND
Thorium-228+7d	1.2-1.7	NA	5.4E-08 - 1.5E-06	0.40	0.30-5.9	ND - 3.2
Thorium-232	1.0 - 1.6	NA	6.1E-08 - 3.9E-06	0.80	ND - 2.7	ND
Uranium-234	2.6 - 14	NA	2.9E-07 - 8.2E-05	0.80	0.60 -100	0.80 - 7.0
Uranium-235/236	ND - 3.6	NA	4.6E-08 - 5.3E-06	ND	ND - 3.6	ND - 2.0
Uranium-238+2d	2.7 -21	NA	1.0E-06 - 7.0E-05	0.70	0.70 - 3.8	0.60 - 3.9
Organic Chemicals	(mg/kg)	(mg/kg)	(mg/m3)	(mg/kg)	(mg/L)	(mg/L)
1,2-dichloroethane	ND	NA	NA	NA	ND - 0.31	NA
Aroclor-1254	ND	NA	1.0E-17 - 9.5E-12	NA	NA	NA
Aroclor-1260	ND	NA	1.0E-17 - 1.9E-13	NA	NA	NA
Benzo(a)pyrene	ND - 0.11	NA	1.0E-17 - 6.6E-12	NA	NA	NA
Inorganics						
Antimony	ND - 2.9	NA	4.7E-12 - 1.7E-09	NA	ND - 0.031	ND - 0.015
Arsenic	4.3 - 7.0	NA	2.7E-12 - 1.1E-09	4.8	ND - 0.31	2.9E-03 - 6.0E-03
Beryllium	0.74 - 1.4	NA	2.4E-13 - 1.2E-10	1.8	ND - 0.0020	ND - 7.7E-03
Cadmium	ND - 1.9	NA	1.1E-12 - 4.9E-10	ND	0.0022 - 0.029	ND - 0.018
Copper	1.2 -2.1	NA	7.3E-12 - 4.6E-09	7.6	0.0063 - 0.060	ND - 0.031
Cyanide	0.42 - 0.43	NA	1.1E-13 - 7.3E-11	ND	ND - 0.055	ND - 0.021
Manganese	1200 - 4400	NA	2.3E-10 - 1.1E-07	500	0.13 - 6.1	0.056 - 0.56
Mercury	ND	NA	8.2E-14 - 4.3E-11	NA	ND - O.O015	ND
Molybdenum	ND - 1.2	NA	1.7E-12 - 8.8E-10	ND	ND - 0.045	ND
Silver	ND - 1.8	NA	1.9E-12 - 7.5E-10	0.25	ND - 0.029	ND
Uranium-total	8.3 - 68	NA	3.0E-09 - 1.9E-07	11	9.0E-04 - 6.6E-03	2.5E-03 - 8.8E-03
Zinc	8.0 - 430	NA	3.4E-11 - 1.8E-08	50	ND - 0.28	ND - 0.11

TABLE 6-4
(Continued)

Constituent	Surface Soil j	Subsurface Soil k	Air l	Sediment m	Ground Water n	Surface Water o
On-Property, Future Land Use						
Radionuclides	(pCi/g)	(pCi/g)	(pCi/m3)	(pCi/g)	(pCi/L)	(pCi/L)
Cesium-137+1d	0.51 - 1.1	0.25 - 0.49	5.7E-07 - 5.0E-06	NA	NA	NA
Radium-226+5d	ND - 35	ND - 4.6	1.2E-04 - 1.6E-03	7.9 - 95	2.1 - 16	ND - 4.7
Radon-222+4d	ND	NA	1.1 - 20	NA	NA	NA
Strontium-90+1d	1.4 - 2.1	1.8 - 10	1.0E-06 - 1.1E-05	0.18 - 0.34	1.4E-04 - 14	ND - 1.2
Technetium-99	ND - 23	3.6 - 20	7.5E-06 - 5.9E-05	3.0 - 5.0	120 - 6800	ND - 1500
Thorium-228+7d	NA	NA	NA	NA	NA	NA
Thorium-232	ND - 27	ND - 3.2	1.4E-05 - 2.1E-04	3.8 - 11	4.0	ND - 0.064
Uranium-234	3.6 - 440	1.9 - 96	3.7E-04 - 7.2E-03	31 - 580	2.2 - 11000	1.5 - 1200
Uranium-235/236	0.70 - 37	0.50 -8	3.3E-05 - 5.9E-04	4.0 - 38	0.099 - 1300	ND - 51
Uranium-238+2d	2.7 - 560	7.8 - 89	4.5E-04 - 7.9E-03	190 - 670	2.1 - 13000	1.7- 1200
Organic Chemicals	(mg/kg)	(mg/kg)	(mg/m3)	(mg/kg)	(mg/L)	(mg/L)
1,2-dichloroethane	ND - 0.00010	ND - 0.0011	NA	NA	0.015	NA
Aroclor-1254	ND - 2.3	ND - 0.22	6.2E-11 - 8.8E-10	0.074 - 0.99	NA	ND - 5.8E-06
Aroclor-1260	ND - 0.54	ND - 2.7	1.3E-12 - 1.3E-11	3.3E-03 - 0.37	NA	ND - 1.8E-06
Benzo(a)pyrene	ND - 1.1	0.12 - 8.6	6.3E-11 - 4.7E-10	NA	NA	NA
Inorganics						
Antimony	ND - 30	ND - 22	3.1E-08 - 1.6E-07	4.6 - 11	2.2E-04 - 0.084	ND - 1.5E-03
Arsenic	ND - 13	9.1 - 34	1.9E-08 - 7.2E-08	9.2 - 17	1.7E-03 - 0.14	2.9E-03 - 5.4E-03
Beryllium	0.73 - 1.7	1.1 - 1.9	2.0E-09 - 8.0E-09	1.2 - 1.4	3.9E-19 - 8.6E-03	ND - 3.8E-05
Cadmium	0.50 - 5.8	3.7 - 5.6	7.7E-09 - 3.0E-08	NA	0.014	NA
Copper	14 - 43	22 - 44	5.2E-08 - 2.5E-07	NA	0.095	ND - 0.020
Cyanide	ND - 2.0	0.35 - 1.5	9.6E-10 - 3.9E-09	0.029 - 0.048	0.014	2.8E-03 - 0.14
Manganese	ND - 1200	9O0 - 2200	1.8E-06 - 6.9E-06	750 - 1400	0.43 - 2.6	0.041 - 0.83
Mercury	ND - 6.3	ND - 0.13	3.4E-10 - 4.4E-09	0.23 - 0.45	2.0E-04	ND - 1.6E03
Molybdenum	ND - 12	ND - 11	1.4E-06 - 6.3E-08	NA	0.040	NA
Silver	ND - 8.7	5.6 - 10	1.5E-08 - 6.5E-08	NA	0.062	NA
Uranium-total	14 - 920	54 - 340	1.4E-06 - 2.1E-05	400 - 1600	6.4E-03 - 130	0.035 - 2900
Zinc	62 - 300	90 - 180	2.3E-07 - 1.0E-06	NA	0.28	9.0-03 - 0.073

TABLE 6-4
(Continued)

Constituent	Surface Soil p	Subsurface Soil	Air q	Sediment	Groundwater r	Surface Water s
Off Property, Future Land Use						
Radionuclides	(pCi/g)	(pCi/g)	(pCi/m 3)	(pCi/g)	(pCi/L)	(pCi/L)
Cesium-137+1d	0.60 - 0.87	NA	1.4E-08 - 1.4E-06	NA	NA	NA
Radium-226+5d	0.90 - 1.2	NA	7.2E-06 - 8.1E-04	NA	8.8E-16 - 1.3	0.41
Radon-222+4d	NA	NA	0.64 - 4.9	NA	NA	NA
Strontium-90+1d	1.0 - 5.2	NA	4.4E-08 - 6.0E-06	NA	9.5E-11 - 0.59	0.11
Technetium-99	ND - 3.5	NA	5.3E-07 - 1.0E-04	NA	5.9E-03 - 1500	130
Thorium-228+7d	NA	NA	NA	NA	NA	NA
Thorium-232	1.0 - 1.6	NA	7.7E-07 - 1.1E-04	NA	NA	5.6E-03
Uranium-234	2.6 - 14	NA	1.8E-05 - 2.2E-03	NA	0.013 - 600	73
Uranium-235/236	ND - 3.6	NA	1.3E-06 - 1.4E-04	NA	5.8E-04 - 27	4.5
Uranium-238+2d	2.7 - 21	NA	1.8E-05 - 1.9E-03	NA	0.012 - 590	96
Organic Chemicals	(mg/kg)	(mg/kg)	(mg/m3)	(mg/kg)	(mg/L)	(mg/L)
1,2-dichloroethane	ND	NA	NA	NA	NA	NA
Aroclor-1254	ND	NA	2.2E-12 - 2.6E-10	NA	NA	5.1E-07
Aroclor-1260	ND	NA	4.5E-14 - 5.3E-12	NA	NA	1.6E-07
Benzo(a)pyrene	ND - 0.11	NA	1.6E-12 - 1.8E-10	NA	NA	NA
Inorganics						
Antimony	ND - 2.9	NA	4.7E-10 - 4.5E-08	NA		1.3E-04
Arsenic	4.3 - 7.0	NA	2.8E-10 - 2.9E-09	NA	1.3E-16 - 1.6E-03	2.5E-04
Beryllium	ND - 1.4	NA	3.0E-11 - 3.3E-09	NA	1.9E-20 - 54E-06	3.3E-06
Cadmium	ND - 1.9	NA	1.2E-10 - 1.3E-08	NA	NA	NA
Copper	12 - 21	NA	1.0E-09 - 1.2E-07	NA	NA	NA
Cyanide	0.42 - 0.43	NA	1.6E-11 - 2.0E-09	NA	0.27 - 0.97	0.012
Manganese	1200 - 4400	NA	2.7E-08 - 3.1E-06	NA	3.8E-19 - 0.44	0.025
Mercury	ND	NA	1.1E-11 - 1.2E-09	NA	4.3E-13 - 5.8E-10	1.4E-04
Molybdenum	ND - 12	NA	2.2E-10 - 2.4E-08	NA	NA	NA
Silver	ND - 1.8	NA	2.0E-10 - 2.0E-08	NA	NA	NA
Uranium-total	11 - 68	NA	4.8E-08 - 5.1E-06	NA	3.7E-05 - 1.8	0.17
Zinc	80 - 430	NA	4.5E-09 - 4.9E-07	NA	NA	NA

TABLE 6-4
(Continued)

Source of all Table 6-4 data for comparison to obtain greatest range is the Final OU5 RI Report, Appendix A (DOE 1995d):

a Table A.3-3 and Table A.3-4.
b Table A.3-9; these are modeled values.
c Table A.3-17
d Table A.3-16
e Table A.3-5
f Table A.3-10 and Table A.3-11b; they are modeled values.
9 Table A.3-16
h Table A.3-13
i Table A.3-16
j Table A.3-6
k Table A.3-8
l Table A.3-11
m Table A.3-19; modeling was used to obtain representative concentrations for the waste pit area, the southwest area, and the southeast area.
n Table A.3-14; they are modeled values.
o Table A.3-18
p Table A.3-7
q Table A.3-12; these are modeled values.
r Table A.3-15; these are modeled values.
s Table A.3-18; modeling was used to obtain concentrations for surface water at the southwest area and the Great Miami River at confluence with Paddys Run.
ND - Contaminant is not a CPC for this scenario. For radiological chemicals, there is a difference in the CPC list for current versus future land use scenarios. This difference is a function of the assumptions made regarding the equilibrium and the properties of the radiologicals. See Section A.3.3. In accordance with EPA Risk Assessment Guidance, nondetected values were estimated at one-half the sample quantitation limit for calculations involving nondetects.
NA - Contaminant was not evaluated.

models were not available from EPA, models developed by the U.S. Nuclear Regulatory Commission (NRC) Regulatory Guide 1.109 (NRC 1977) were used.

The method used to quantify chronic exposures at the FEMP employs the concept of reasonable maximum exposure (RME) for each of the four land use/source-term scenario combinations. If the RME is determined to be acceptable, then it is likely that all other lesser exposures represented by other hypothetical receptors at the site will also be acceptable. Exposures for the on-property resident are also evaluated using the central tendency (CT) analysis. The CT analysis represents exposures under more typical situations and exposure parameters are selected accordingly.

The initial step of a quantitative exposure assessment is determining the exposure routes for each environmental media. For example, exposure routes for soil include incidental ingestion, skin (dermal) contact, and direct external radiation. The equations used with each exposure route to estimate dose include a set of exposure parameters. For the incidental ingestion exposure route, some of the parameters included in the calculations are exposure-point concentration, ingestion rate (grams/day), exposure duration in years, exposure frequency in days per year, and body weight.

The equations and exposure parameters are unique to each exposure pathway. Exposure model equations and parameters used in the baseline risk assessment are presented in Tables A.3-20, A.3-21a, and A.3-21b in Appendix A of the RI Report. They are summarized in Table 6-5.

Because exposures depend on measured or predicted concentrations of chemicals in environmental media and local land use practices, they are subject to change over time. Ibis produces a large number of possible combinations of media, receptors, exposure pathways, and constituent concentrations. The exposure pathways selected for this baseline risk assessment are reasonable in light of the current and anticipated future land use scenarios and with regard to the contamination detected in the environmental media.

TABLE 6-5

EXPOSURE PARAMETERS IN THE OPERABLE UNIT 5 BASELINE RISK ASSESSMENT

Receptor	Exposure Duration (year)	Exposure Frequency (day/year)	Exposure Time (hour/day)
Current Land Use Receptors			
Off-property RME adult farmer	70 a	350 a	5.7 b
Off-property RME child	6 a	350 a	2 b
User of meat and milk grown within OU5	70 a	350 a	NA
On-property groundskeeper	25 a	250/39 c	8 d
On-property visitor	25 a	250 a	2 e
Trespassing/Exploring youth	12 f	52 f	4 f
Critical subpopulations			
Grades K-8	9	180 g	2 h
Grades 9-12	4	180 g	2 h
Great Miami River user	70 a	350 a	NA
Future Land Use Receptors			
Off-property adult farmer	70 a	350 a	5.7 b
Off-property RME child	6 a	350 a	2 b
User of Great Miami River water	70 a	350 a	NA
On-property CT adult farmer	70 a	350 a	4.9 i
On property RME child	6 a	350 a	2 j
On-property home builder	1 k	175 a	8 k
On-property groundskeeper	25 d	250/39 c	8 d
Future Land Use Recreational Receptors l			
Wildlife reserve			
Child	6	26	1
Youth	12	39	2
Adult	38	52	2
Senior	14	26	1
Undeveloped park			
Child	6	40	1
Youth	12	104	2
Adult	38	40	2
Senior	14	26	1
Developed park			
Child	6	64	4
Youth	12	104	4
Adult	38	40	4
Senior	14	40	2

TABLE 6-5
(Continued)

a DOE 1992a
b Assumes the reasonable maximum exposure farmer works outdoors 2000 hours/year, (5.7 hrs/day), and a resident child spends 700 hrs/yr outdoors, (2 hrs/day).
c Assumes a groundskeeper spends 250 days/yr in the production area and 39 days/year in peripheral areas while the groundskeeper is assumed to spend 6.4 hrs/day indoors and 1.6 hrs/day outdoors. The groundskeeper in peripheral areas spends 9 hrs/day outdoors during 39 days/yr.
d EPA 1991b
e Assumes a visitor (delivery person) who comes on property 250 days/year for 2 hour/day.
f DOE 1993d, Comment Responses - Site-Wide Characterization Report: assumes a youth trespasses on site 3 days/week for the mouths of June, July and August (36 days while the youth is not in school) plus 1 day/week for the months of April, May, September and October (16 days) for a total of 52 days, 4 hrs/day. The trespassing youth trespasses on peripheral areas due to access controls. The exploring youth can gain access to all areas.
g According to the State of Ohio, school year is 180 days.
h Assumes elementary and high school students spend ½ hr walking to school, ½ hr walking home from school, and approximately 1 hour in recess or outdoor activities, for a total of 2 hrs/day outdoors.
i EPA 1991b; assumes the central tendency farmer spends 1155 cumulative hours farming. Therefore 115 hrs/234 days = 4.9 hr/day spent outdoors. Indoor duration is the remaining time in a day = 19.1 hrs/day.
j Assumes a resident small child spends 700 hours/yr outdoors (2 hrs/day x 350 days/yr).
k Assumes a home builder spends 175 eight-hour days building a home, spending 50 percent of her/his time working on the exterior of the house, and 50 percent of her/his time working on the interior of the house.
l See section A-3.4.6.2 of the Operable Unit 5 RI Report for an explanation of these terms.
NA - Not applicable

6.1.3 Toxicity Assessment

The toxicity assessment, the third primary component of the baseline risk assessment, addresses two primary human health hazards - cancer induction and chemical toxicity. Cancer is a genotoxic effect and may be induced by exposure to a chemical carcinogen or ionizing radiation from a radionuclide undergoing decay. Chemical noncarcinogenic toxicity refers to general toxicity that does not affect the genetic material. It includes organ tissue effects, which are numerous and range from systemic effects such as kidney or liver damage to localized effects such as skin or eye irritation. Dose-response data from human and animal studies are used by the EPA to develop cancer slope factors and reference doses which allow an estimation of cancer and noncancer risk, respectively.

Cancer slope factors (CSFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals and numerous radionuclides. CSFs, which are expressed in units of (mg/kg-day)-1, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper-bound" reflects the conservative estimate of the risks calculated from the CSF. This approach makes it highly unlikely the actual cancer risk will be underestimated. CSFs are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RM is expressed in units of mg/kg-day. An RfD is defined as an estimate of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious effects. Estimated intakes, of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcenogenic effects to occur.

Cancer risks (the ILCRs) from exposure to chemical carcinogens and ionizing radiation are expressed as a unitless probability, and are calculated as follows:

- For internal radiation exposures, ILCR = intake of radionuclide times its CSF

- For external radiation exposures, ILCR = the dose from exposure intake of the radionuclide times its CSF

- For chemical carcinogenic risk, ILCR = intake of a chemical times its CSF.

Quantitative toxicity factors (i.e., CSFs and RfDs) for radionuclides and chemical constituents are presented in Appendix A of the RI Report and in Tables 6-6 and 6-7.

6.1.4 Risk Characterization

The fourth primary component of the baseline risk assessment is risk characterization. In this component, risk assessors combine the results of the exposure assessment and the toxicity assessment to quantitatively estimate the degree of hazard associated with exposure to CPCs. The results are characterized based on ranges of generally acceptable risk under CERCLA, an ILCR of 10-4 to 10-6 or a HI equal to or less than 1 (EPA 1990).

For cancer induction, it is assumed that no dose threshold exists, so for any dose of a carcinogen there exists a possibility of developing cancer. ILCRs are expressed in terms of the

probability that a given person (receptor) will develop cancer as a result of estimated exposures. For example, an excess lifetime cancer risk of 1 x 10-6 indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of exposure to a carcinogen under the conditions specified in the exposure assessment. Risks below 1 x 10-6 (a risk less than 1 in 1 million) are generally considered to be acceptable by the EPA, and risks greater than 1 x 10-5 (1 in 10,000) are generally considered to be unacceptable by the agency (EPA 1989).

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ), which is the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose. By adding the HQs for all contaminants within a medium or across all media to which a receptor may reasonably be exposed, the HI can be generated. The HI provides a useful reference point for gauging the potential

TABLE 6-6

CANCER SLOPE FACTORS FOR FEMP RADIOLOGICAL CONTAMINANTS CONTRIBUTING MORE THAN 99 PERCENT OF TOTAL INCREMENTAL LIFETIME CANCER RISK AND HAZARD INDEX

Radionuclide	SFo a (Risk/pCi)	SFi a (Risk/pCi)	SFe a,b (Risk-g/yr-pCi)
Cesium-137	2.8 x 10-11	1.9 x 10-11	0.0 x 10+00
Cesium-137 + 1d c	2.8 x 10-11	1.9 x 10-11	2.0 x 10-06
Radium-226	1.2 x 10-10	3.0 x 10-09	1.2 x 10-08
Radium-226 + 5d c	1.2 x 10-10	3.0 x 10-09	6.0 x 10-06
Radium-226 + 8d c,d	7.8 x 10-10	7.0 x 10-09	6.0 x 10-06
Radon-222	1.4 x 10-12	7.3 x 10-13	1.2 x 10-09
Radon-222 + 4d c	1.7 x l0-12	7.7 x 10-12	5.9 x 10-06
Strontium-90	3.3 x 10-11	5.6 x 10-11	0.0 x 10+00
Strontium-90 + 1d c	3.6 x 10-11	6.2 x 10-11	0.0 x 10+00
Technetium-99	1.3 x 10-12	8.3 x 10-12	6.0 x 10-13
Thorium-228	1.1 x 10-11	7.7 x 10-08	5.5 x 10-10
Thorium-228 + 7d c	5.5 x 10-11	7.8 x 10-08	5.6 x 10-06
Thorium-232	1.2 x 10-11	2.8 x 10-08	2.6 x 10-11
Thorium-232 + 10d c,d	1.7 x 10-10	1.1 x 10-07	8.5 x 10-06
Uranium-234	1.6 x 10-11	2.6 x 10-08	3.0 x 10-11
Uranium-235	1.6 x 10-11	2.5 x 10-08	2.4 x 10-07
Uranium-235 + 1d c,e	1.6 x 10-11	2.5 x 10-08	2.4 x 10-07
Uranium-236	1.5 x 10-11	2.5 x 10-08	2.4 x 10-11
Uranium-238	1.6 x 10-11	2.4 x 10-08	2.1 x 10-11
Uranium-239 + 2d c	2.0 x 10-11	2.4 x 10-08	5.1 x 10-08

a SFo = Oral cancer slope factor; SFi = Inhalation cancer slope factor; SFc External radiation cancer slope factor. SFo, SFi, and SFc acquired from U.S. EPA, Health Effects Assessment Summary Tables, March 1994.

b SFc incorporates a soil depth and density of 0.1 m and 1430 kg/m3, respectively.

c +d" Indicates that the slope factors (SFs) presented incorporate SFs that are available for the individual primary decay chain products, from U.S. EPA, Health Effects Assessment Summary Tables, March 1994. (EPA 1994b)

d Slope factors to be used to evaluate future exposure scenarios involving parent radionuclide in equilibrium with progeny Slope factors for U-235+1d were used to evaluate exposure to U-235/236.

TABLE 6-7

ORAL AND INHALATION SLOPE FACTORS AND REFERENCE DOSES
FOR INORGANIC AND ORGANIC CHEMICAL CONTAMINANTS

Chemical	Reference Dose Oral Route of Exposure (mg/kg/day)	Reference Dose Inhalation Route of Exposure (mg/kg/day)	Cancer Slope Factor Oral Route of Exposure (mg/kg/day)-1	Cancer Slope Factor Inhalation Route of Exposure (mg/kg/day)-1	U.S. EPA Weight of Evidence a
Inorganics					
Antimony	4.0x10-04 b	NA	NA	NA	D
Arsenic	3.0x10-04 b	NA	1.75x10+00	1.5X10+01 b,c	A (lung cancer, skin cancer)
Beryllium	5.0x10-03 b	NA	4.3x10+00 b	8.4X10+00 b,c	B2 (lung cancer in rats, monkeys; tumors of the bone in rabbits)
Cadmium	5.0x10-04 (water)c 1.0x10-03 (food)c	NA	NA	6.3x10+00 b,c	B1 (respiratory system tumors in humans; inhalation/ occupational)
Copper	3.71X10-02 d	NA	NA	NA	D
Cyanide	2.0x10-02 c	NA	NA	NA	D
Manganese	1.4x10-01 (water)e 1.4x10-01 (food) e	1.4x10-05 b	NA	NA	D
Mercury	3.0x10-04 c	8.6x10-05 e,f	NA	NA	D
Molybdenum	5.0x10-03 b	NA	NA	NA	D
Silver	5.0x10-03 b	NA	NA	NA	D
Zinc	3.0x10-01 b	NA	NA	NA	D
Uranium	3.0x10-03	NA	NA	NA	D
Organics					
Aroclor-1254	NA	NA	7.7x10+00 g	NA	B2 g (liver tumors in rats; suggestive evidence of liver cancer in humans)

TABLE 6-7
(Continued)

Aroclor-1260	NA	NA	7.7x10+00 g	NA	B2 g (liver tumors in rats; suggestive evidence of liver cancer in humans)
Benzo(a)pyrene	NA	NA	7.3x10+00 b	6.1x10+00 h (forestomach tumors in rats, mice; respiratory tract tumors in hamsters)	B2
1,2-Dichloroethane	NA	2.9x10-03 i	9.1x10-02 b	9.1x10-02 b,c	B2 (lung tumors in mice)

a U.S. EPA carcinogen Classification:
Group A: Human Carcinogen (sufficient evidence of carcinogenicity in humans).
Group B: Probable Human Carcinogen (B1-limited evidence of carcinogenicity in humans; B2-sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans).
Group C: Possible Human Carcinogen (limited evidence of carcinogenicity in animals and inadequate or lack of human data).
Group D: Not Classifiable as to Human Carcinogenicity (inadequate or no evidence).
Group E: Evidence of Noncarcinogenicity for Humans (no evidence of carcinogenicity in adequate studies).

b Dose-response parameter obtained from the U.S. EPA Integrated Risk Information System (IRIS). September 1994.

c Dose-response, parameter calculated from a unit risk value.

d Reference dose derived from action level of 1.3 mg/L, which represents the maximum contaminant level goal (MCLG).

e Dose-response parameter obtained from the U.S. EPA Health Effects Assessment Summary Tables (HEAST), Annual FY 1994 (EPA 1994b)

f Dose-response parameter calculated from a reference concentration.

g Cancer slope factor for polychlorinated biphenyls in general.

h Cancer dope factor derived by application of EPA toxicity equivalency factors (TEFs) to benzo(a)pyrene CSF (7.3/mg/kg-day). See Table A.4-5 of the OU5 RI Report for TEFs.

i EPA 1994d

NA - Information not available.

significance of multiple contaminant exposures within a single medium or across media. An HQ or HI equal to or less than 1 indicates that adverse noncarcinogenic health effects are not anticipated.

Due to the large quantity of information regarding each exposure medium and pathway, not all risk characterization results are provided in the ROD. A comprehensive risk characterization for the baseline risk assessment is provided in Appendix A of the RI Report. Estimated carcinogenic and noncarcinogenic risks and HIs are presented by receptor and land use scenario in Tables 6-8 through 6-11. Descriptions for the maximum, exposures for current and future land use scenarios follow the tables.

Risk Estimate for RME - Current Land Use Scenario

The maximally exposed receptor for current land use scenarios (without access controls) is the off-property farmer for whom total carcinogenic risk (the sum of radiological and chemical risks) is estimated to be between 6.8 x 10-4 (at the west property boundary) and 2.9 x 10-2 (at the south property boundary). Over 60 percent of carcinogenic risk in the east, north, and south areas of the FEMP is due to CPCs in groundwater, primarily through ingestion of drinking water. Over 90 percent of carcinogenic risk in the west, northeast, and southeast areas is due to CPCs in soil, primarily through ingestion of meat, milk, vegetables and fruit, incidental ingestion of soil, and external radiation. The main carcinogenic drivers are isotopes of uranium, radium, and thorium; strontium-90; technetium-99; and arsenic, beryllium, 1,1-dichloroethene, and 1,2-dichloroethane. Noncarcinogenic risk (HIs) ranges from 3.0 for the receptor at the southeast comer of the FEMP to 77 on the southern boundary of the site. Uranium, antimony, arsenic, and cadmium are the dominant chemicals contributing to noncarcinogenic health effects.

Risk Estimate for RME - Future Land Use Scenario

The maximally exposed receptor for future land use scenarios (without access controls) is the on-property farmer living in the former production area using perched groundwater (agricultural use). The total estimated carcinogenic risk to this receptor is 5.2 x 10-2. The dominant carcinogenic constituents are the isotopes of uranium. CPCs in the groundwater contribute approximately 60 percent of this risk. The HI developed for the hypothetical exposures incurred by this receptor was 1500, with uranium being the primary chemical toxicant. These risk results must be evaluated in light of the fact that although the perched water zone could be a potential (but limited) drinking water source, it would not support continuous domestic use by a family over a prolonged period of time.

TABLE 6-8

ESTIMATED CARCINOGENIC RISKS AND POTENTIAL
NONCARCINOGENIC EFFECTS FOR CURRENT LAND USE WITH ACCESS CONTROLS

Receptor	Range of Estimated Carcinogenic Risks		Primary Source of Estimated Risk	Range in Estimated Hazard Indicies	Primary Source of Estimated Noncarcinogenic Effects
	Radiological	Chemical			
On-Property Receptors a					
Groundskeeper	9.3E-06 to 1.3E-03	3.7E-07 to 1.7E-04	External exposure to radionuclides in soil	4.3E-02 to 5.4E+00	Dermal contact with and incidental ingestion of soil
Visitor	2.7E-05	1.1E-09	Same as above	9.9E-04	Inhalation of CPCs in air
Trespassing youth	2.4E-06 to 5.9E-05	1.6E-07 to 6.4E-06	Same as above	6.8E-02 to 1.8E+00	Dermal contact with soil
Off-Property Receptors b					
Consumer of meat and milk products	9.0E-05 to 2.1 E-04	7.6E-06 to 1.1E-04	Ingestion of meat and milk	7.0E+00 to 9.9E+00	Ingestion of meat and milk
Off-property farmer	5.1E-04 to 9.0E-04	1.1E-08 to 1.1E-02	Ingestion of drinking water; ingestion of meat, milk, vegetables and fruit; incidental ingestion of soil; external radiation from CPCs in soil	2.3E+00 to 5.0E+01	Ingestion of drinking water, meat, milk, vegetables and fruit; incidental ingestion of and dermal contact with soil
Off-property child	5.2E-O5 to 1.0E-04	3.6E-09 to 3.8E-03	Ingestion of milk (soil); ingestion of drinking water, vegetables and fruit	1.4E+01 to 2.6E+02	Ingestion of meat, milk, vegetables and fruit; ingestion of drinking water

TABLE 6-8
(Continued)

Receptor	Range of Estimated Carcinogenic Risks: Radiological	Range of Estimated Carcinogenic Risks: Chemical	Primary Source of Estimated Risk	Range in Estimated Hazard Indicies	Primary Source of Estimated Noncarcinogenic Effects
Off-Property Receptors b (Continued)					
Great Miami River User - household	3.8E-05 to 3.9E-05	5.2E-04 to 1.0E-03	Ingestion of drinking water, vegetables and fruit, fish; dermal contact when bathing	10E+00 to 8.6E+00	Ingestion of drinking water, vegetables and fruit, meat, milk, and fish; dermal contact when bathing
Great Miami River User - agricultural	7.9E-06	10E-04 to 2.5E-04	Same as above	2.5E+00 to 1.7E+01	Same as above
Great Miami River User - recreational	2.1E-05 to 2.2E-05	2.7E-04 to 4.5E-03	Same as above	4.2E-01 to 2.0E+02	Same as above

a Source is Table A.7-1, final OU5 RI Report.
b Source is Table A.7-3, final OU5 RI Report. Critical subpopulations were evaluated only under current land use conditions. Air was the only medium evaluated for these receptors. Cancer risk estimates fell between 1.0 x 10-09 and 2.0 x 10-08, which are well below the acceptable risk level of 10-6. HIs were under 1.0 for all locations evaluated. Therefore, it can be concluded that health impacts to children at local schools are minimal and insignificant under the current land use scenario. Tables A.5-19 and A.5-20 present the risk summaries for critical subpopulations.

TABLE 6-9

ESTIMATED CARCINOGENIC RISKS AND POTENTIAL
NONCARCINOGENIC EFFECTS FOR CURRENT LAND USE WITHOUT ACCESS CONTROLS

Receptor	Range of Estimated Carcinogenic Risks		Primary Source of Estimated Risk	Range in Estimated Hazard Indicies	Primary Source of Estimated Noncarcinogenic Effects
	Radiological	Chemical			
On-Property Receptors a					
Groundskeeper	9.3E-O6 to 1.1E-03	3.7E-07 to 1.7E-04	External exposure to radionuclides in soil	4.3E-02 to 5.4E+00	Dermal contact with and incidental ingestion of soil
Visitor	2.7E-05 to 4.6E-04	1.1 E-09 to 1.9E-09	Same as above	9.9E-04 to 1.2E-03	Inhalation of CPCs in air
Exploring youth	7.8E-07 to 7.7E-05	1.6E-07 to 1.1E-05	Same as above	6.8R-02 to 2.6E+01	Dermal contact with surface water and soil
Off-property receptors b					
Consumer of meat and milk products	9.0E-05 to 6.3E-04	7.6E-06 to 9.9E-03	Ingestion of meat and milk	7.0E+00 to 2.3E+01	Ingestion of meat and milk
Off-property RME farmer	5.1E-04 to 9.7E-04	1.1E-08 to 2.8E-02	Ingestion of drinking water; ingestion of meat, milk, vegetables and fruit; incidental ingestion of soil; external radiation from CPCs in soil	3.OE+00 to 7.7E+01	Ingestion of drinking water, meat, milk, vegetables and fruit; incidental ingestion of and dermal contact with soil
Off-property child	5.2E-05 to 1.0E-04	3.6E-09 to 7.3E-03	Ingestion of milk (soil); ingestion of drinking water, vegetables and fruit	1.6E+01 to 2.9E+02	Ingestion of meat, milk, vegetables and fruit; ingestion of drinking water

TABLE 6-9
(Continued)

Receptor	Range of Estimated Carcinogenic Risks: Radiological	Range of Estimated Carcinogenic Risks: Chemical	Primary Source of Estimated Risk	Range in Estimated Hazard Indicies	Primary Source of Estimated Noncarcinogenic Effects
Off-property receptors b (Continued)					
Great Miami River user - household	3.8E-05 to 3.9E-05	5.2E-04 to 1.0E-03	Ingestion of drinking water, vegetables and fruit, fish; dermal . contact when bathing	1.0E+00 to 1.1E+01	Ingestion of drinking water, vegetables and fruit, meat, milk, and fish; dermal contact when bathing
Great Miami River user - agricultural	7.9E-06	1.0E-04 to 2.5E-04	Same as above	2.5E+00 to 1.8E+01	Same as above
Great Miami River user - recreational	2.1E-05 to 2.2E-05	2.7E-04 to 4.5E-03	Same as above	4.2E-01 to 2.9E+02	Same as above

a Source is Table A.7-2, final OU5 RI Report.
b Source is Table A.7-4, final OU5 RI Report.

TABLE 6-10

ESTIMATED CARCINOGENIC RISKS AND POTENTIAL
NONCARCINOGENIC EFFECTS FOR FUTURE LAND USE WITH ACCESS CONTROLS

Receptor	Range of Estimated Carcinogenic Risks		Primary Source of Estimated Risk	Range in Estimated Hazard Indicies	Primary Source of Estimated Noncarcinogenic Effects
	Radiological	Chemical			
On-Property Receptors a					
Groundskeeper	1.5E-05 to 1.1E-03	3.4E-06 to 6.3E-05	External exposure to radionuclides in soil; inhalation	3.4E-01 to 4.5E+00	Dermal contact with soil
Recreational - developed park	2.3E-06 to 4.5E-04	1.7E-06 to 3.3E-05	External exposure to soil and sediment	7.0E-02 to 1.7E+00	Dermal contact with soil and sediment
Recreational - undeveloped park	1.0E-06 to 2.0E-04	1.1E-06 to 2.5E-05	External exposure to radionuclides in soil and sediment	5.9E-02 to 1.7E+00	Same as above
Recreational - wildlife reserve	9.1E-07 to 1.8E-04	8.8E-07 to 2.1E-05	External exposure to radionuclides in soil	4.9E-02 to 1.6E+00	Same as above
Off-Property Receptors b					
Off-property farmer	1.6E-05 to 2.2E-03	1.1E-08 to 9.5E-05	Ingestion of milk, meat, and vegetables; external exposure to soil; ingestion of drinking water	3.1E-02 to 3.7E+01	Ingestion of milk and meat, drinking water, and vegetables and fruit

TABLE 6-10
(Continued)

Receptor	Range of Estimated Carcinogenic Risks: Radiological	Range of Estimated Carcinogenic Risks: Chemical	Primary Source of Estimated Risk	Range in Estimated Hazard Indicies	Primary Source of Estimated Noncarcinogenic Effects
Off-Property Receptors b (with and without access controls)					
Off-property child	4.2E-07 to 1.8E-04	3.9E-09 to 5.3E-05	Ingestion of drinking water; ingestion of milk and meat; ingestion of vegetables and fruit	7.9E-02 to 1.5E+02	Ingestion of drinking water; ingestion of milk, meat, vegetables, and fruit
Great Miami River user - household	1.7E-04	2.2E-05	Ingestion of drinking water	1.8E+00	Ingestion of drinking water
Great Miami River user - agricultural	4.0E-05	4.8E-06	Same as above	5.3E-01	Same as above
Great Miami River user - recreational	1.4E-05	9.7E-05	Same as above	8.5E-01	Same as above

a Source is Table A.7-5, final OU5 RI Report.
b Source is Table A.7-7, final OU5 RI Report.

TABLE 6-11

ESTIMATED CARCINOGENIC RISKS AND POTENTIAL
NONCARCINOGENIC EFFECTS FOR FUTURE RE LAND USE WITHOUT ACCESS CONTROLS

Receptor	Range of Estimated Carcinogenic Risks		Primary Source of Estimated Risk	Range in Estimated Hazard Indicies	Primary Source of Estimated Noncarcinogenic Effects
	Radiological	Chemical			
On-Property Receptors a					
RME farmer	4.7E-04 to 1.5E-02	4.1EE-04 to 8.7E-03	External exposure and ingestion of milk; ingestion of drinking water	2.3E+01 to 3.7E+02	Ingestion of milk and meat; dermal contact; ingestion of vegetables, fruit, and drinking water
CT farmer	2.8E-05 to 1.2E-03	2.4E-05 to 3.3E-04	Same as above; ingestion of meat	1.2E+01 to 1.5E+02	Ingestion of drinking water; ingestion of milk and meat
RME child	4.9E-05 to 1.1E-03	9.5E-05 to 3.4E-03	Ingestion of drinking water; external exposure to soil and ingestion of milk	1.1E+02 to 8.4E+02	Ingestion of milk and meat
RME farmer using perched groundwater	3.6E-02	1.7E-02	Ingestion of drinking water and external exposure to soil	1.5E+03	Ingestion of drinking water
Home builder	5.0E-07 to 3.8E-05	3.2E-07 to 1.2E-05	External exposure to soil	8.2E-01 to 3.5E+00	Dermal contact with soil
Off-Property Receptors b					

a Source is Table A.7-6, Final OU5 RI Report.
b See Table 6- 10; off-property receptors are the same as those listed under future land use with access controls. Source is Table A.7-7, final OU5 RI Report.

A more representative hypothetical receptor for this scenario is the on-property RME farmer who uses water from the Great Miami Aquifer rather than perched water. In addition, the risk assessment assumes the receptor has access to all areas of the FEMP, not just the former production area. This receptor had total estimated carcinogenic risks ranging from 6.0 x 10-3 to 2.2 x 10-2. The predominant carcinogenic contaminants are isotopes of uranium, radium, thorium, beryllium, as well as arsenic, the carcinogenic polycyclic aromatic hydrocarbons (PAHs), and Aroclor-1254 and -1260. Noncarcinogenic risk for this receptor ranged from 23 to 37. Uranium, magnesium, antimony, mercury, silver, arsenic, and zinc are the dominant chemical toxicants. It should be noted that the majority of estimated risk to this receptor is through the food pathways, which have the greatest range of uncertainty among all exposure pathways due to the conservative assumptions used to develop exposure parameters.

The tables in Attachment A.VII in the RI Report contain the quantified carcinogenic risks and hazard quotients of each CPC in each exposure medium for each exposure pathway according to current and future land use scenarios.

Background Risks

Risks and hazard quotients are calculated for background concentrations of CPCs (taken from Attachment A.I of the OU5 RI Report) in soil, groundwater, surface water, and sediment and then compared with risks and HQs calculated for areas of high concentrations. The baseline risk assessment calculates all site-related risks without separating the contribution from natural background when, in fact, the contribution from background concentrations for certain CPCs may yield an ILCR greater than 10-4 or an HI exceeding 1.0. Although the CPC selection includes a statistical comparison to background, in many cases the concentrations of CPCs in the environmental media of Operable Unit 5 are at or only slightly above natural background concentrations. Some CPCs are retained because the statistical procedures used to identify CPCs tend to select a CPC if there is any question that it may be above background. Therefore, background contributions provide a useful point of comparison for site-related risk estimates.

Carcinogenic and noncarcinogenic risks and HQs have been calculated for background concentrations of CPCs in Operable Unit 5 environmental media and are presented in Tables A.7-8 through A.7-19 in Appendix A of the RI Report. The 11LCRs and HQs for the major contaminants are summarized inTable 6-12. Exposure assumptions and models used for background calculations are the same as

TABLE 6-12

INCREMENTAL LIFETIME CANCER RISKS (ILCRs) AND HAZARD QUOTIENTS (HQs) FROM EXPOSURE TO BACKGROUND CONCENTRATIONS OF MAJOR CONTAMINANTS DETECTED IN ENVIRONMENTAL MEDIA ACCORDING TO CRITICAL RECEPTOR

Background Exposure and Critical Receptor

	On-Property RME Farmer		Off-Property RME Farmer		On-Property RME Farmer		Exploring Youth		Exploring Youth		Great Miami River User	
Constituent	Surface Soil a (ILCR)	Surface Soil a (HQ)	Groundwater b (ILCR)	Groundwater b (HQ)	Perched Groundwater c (ILCR)	Perched Groundwater c (HQ)	Surface Water d (ILCR)	Surface Water d (HQ)	Surface Sediment e ([ILCR)	Surface Sediment e (HQ)	GMR Surface Water f (ILCR)	GMR Surface Water f (HQ)
Radionuclides												
Cesium-137+1d	4.2E-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Radium-226+4d	3.1E-04	NA	1.1E-05	NA	1.9E-05	NA	9.1E-10	NA	2.3E-06	NA	4.5E-06	NA
Radon-222	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Strontium-90+d	1.8-05	NA	2.1E-06	NA	3.6E-06	NA	7.6E-10	NA	ND	NA	NA	NA
Technetium-99	ND	NA	3.1E-05	NA	1.9E-06	NA	ND	NA	ND	NA	NA	NA
Thorium-228+7d	NA	NA	6.2E-07	NA	NA	NA	ND	NA	ND	NA	1.9E-06	NA
Thorium-232+10d	3.8E-04	NA	6.7E-08	NA	1.7E-06	NA	ND	NA	3.9E-11	NA	NA	NA
Uranium-234	1.9E-07	NA	6.1E-07	NA	4.7E-07	NA	2.5E-10	NA	5.7E-10	NA	1.0E-06	NA
Uranium-235/236+d	9.1E-07	NA	8.6E-08	NA	ND	NA	ND	NA	ND	NA	2.3E-07	NA
Uranium-238+2d	2.6E-06	NA	7.7E-07	NA	5.1E-07	NA	3.2E-10	NA	3.7E-09	NA	6.7E-07	NA
Inorganics												
Antimony	NA	ND	NA	ND	NA	4.2E-01	NA	NA	NA	NA	NA	ND
Arsenic	1.0E-04	2.0E-01	5.7E-04	1.1E+00	9.1E-04	1.7E+00	ND	ND	7.0E-08	8.2E-04	3.2E-04	6.1E-05
Beryllium	1.7E-05	9.9E-03	8.30-03	8.3E-03	2.7E-04	1.3E-02	ND	ND	1.5E-08	1.6E-05	ND	ND
Cadmium	NA	1.1E-01	NA	9.7E-01	NA	1.7E-01	NA	ND	NA	1.0E-02	NA	2.6E+00
Copper	NA	1.0E-01	NA	5.7E-02	NA	2.1E-02	NA	ND	NA	3.3E-06	NA	8.0E-02
Cyanide	NA	6.4E-01	NA	ND	NA	ND	NA	4.8E-03	NA	ND	NA	1.2E-06
Manganese	NA	4.1E-01	NA	1.7E+00	NA	2.8E-01	NA	4.8E-03	NA	1.4E-02	NA	3.4E-02
Mercury	NA	1.2E-01	NA	2.5E-01	NA	3.7E-02	NA	ND	NA	NA	NA	NA
Molybdenum	NA	ND	NA	5.9E-02	NA	9.4E-02	NA	ND	NA	NA	NA	NA
Silver	NA	ND	NA	5.5E-01	NA	6.0E-02	NA	ND	NA	ND	NA	NA
Uranium-total	NA	2.4E-06	NA	6.8E-03	NA	1.4E+01	NA	1.7E-01	NA	1.3E-02	NA	1.1E-02
Zinc	NA	1.6E+00	NA	4.0E+00	NA	2.9E-02	NA	ND	NA	2.8E-05	NA	2.4E-06

TABLE 6-12
(Continued)

Background Exposure and Critical Receptor

	On-Property RME Farmer			Off-Property RME Farmer			On-Property RME Farmer		Exploring Youth		Exploring Youth		Great Miami River User
Organics													
Aroclor-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Aroclor-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
1,2-Dichloroethane	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	

a Background risk and HQ calculations are based on exposure to surface soil to the on-property RME farmer (critical receptor for surface soil). The source tables for this information are Table A.7-8 and Table A.7-9 in the final OU5 RI Report.
b Background risk and HQ calculations are based on the off-property RME farmer (critical receptor for groundwater). The source tables for this information are Table A.7-10 and Table A.7-11 in the final OU5 RI Report.
c Background risk and HQ calculations are based on exposure to perched groundwater to the on-property RME former (critical receptor for perched groundwater). The source tables are Table A.7-12 and Table A.7-13 in the final OU5 Rl Report.
d Background risk and HQ calculations are based on exposure to surface water to the exploring youth (critical receptor for perched groundwater). The source tables are Table A.7-14 and Table A.7-15 in the final OU5 Rl Report.
e Background risk and HQ calculations are based on exposure to sediment by the exploring youth (critical receptor for sediment). The source tables are Table A.7-16 and Table A.7-17 in the final OU5 Rl Report.
f Background risk and HQ calculations are based on exposure to surface water to the Great Miami River user (critical receptor for Great Miami River surface water). The source tables are Table A.7-18 and Table A-7-19 in the final OU5 RI Report.
NA - not analyzed/not applicable
ND - not detected

those used for evaluating site-related risks to a critical receptor of that media. Soil concentrations used for background risk calculations are the upper confidence limit values determined for the site-specific background soil sample analytical results.

External radiation - specifically from radium-226, thorium-228, and radium-228 - is the primary pathway for background cancer risks from radionuclides and their short-lived progeny present in soil. Generally, the concentrations of these constituents on site present a risk level which is approximately one order of magnitude greater than that of background concentrations. A greater difference can be noted between background risk and on-site risk from uranium-234, uranium-235/236, and uranium-238 (approximately two orders of magnitude). Risks from arsenic in soil at background concentrations exceed 1 x 10-4. Background concentrations of beryllium in soil present a potential risk level of 1.7 x 10-5. It should be noted that the highest representative concentrations of beryllium and arsenic on site demonstrate risks nearly equivalent to the risks demonstrated from background concentrations of these constituents.

HQs were calculated for naturally occurring concentrations of inorganic chemicals in soil based on representative concentrations calculated from site-specific background soil sample analytical results. The HQs for mercury and zinc exceed 0.1 while the HQ for cadmium exceeds 1.0.

Calculated background risks appear to be a very significant factor to consider when determining risk levels to receptors from soil and sediment in the Operable Unit 5 study area because background risks for many CPCs are close to site risks. However, naturally occurring background concentrations of
surface water and groundwater, including perched groundwater, generally present acceptable risk levels. In contrast, on-site groundwater and surface water risk are considerably greater than background; they are not likely to be naturally occurring. Based on these results, background risks from surface water and groundwater are, for the most part, less significant than for the other media. On-site perched water and groundwater, as expected, had a generally higher level of constituents thanbackground groundwater.

6.1.5 Uncertainty Analysis

It is generally recognized that uncertainty is inherent in quantitative risk assessment and is a factor in each stage of the risk assessment process. The cumulative impacts of uncertainties on the results of the exposure and risk assessments are judged to be minor because the majority of the risk for most receptors (particularly the on-property receptors) is attributable to exposures to uranium, thorium, and radium and their progeny in the surface soil and groundwater. (The majority of risk for most off-property receptors is attributable to exposure to the radionuclides and metals in groundwater.) The relative contribution from this group of radionuclides to the total risk is so great, in most instances, that the total risk would not change significantly if most of the other constituents were added or deleted from the list of constituents selected for evaluation in the baseline risk assessment.

Section A.6.0 in the RI Report discusses Operable Unit 5-specific uncertainties in detail. The following paragraphs summarize uncertainty for the various stages of the baseline risk assessment.

6.1.5.1 Uncertainty in the Selection of CPCs

Constituents to be quantitatively addressed in the risk assessment are selected using an iterative process. The resulting CPCs are those constituents representing the greatest potential significance in the overall risk assessment based on toxicity, concentration, and frequency of detection. CPCs were screened out only if the maximum concentration for a media was less than a toxicity screening value. Therefore, toxicity screening is intended to retain all constituents that have potential for risk. The resulting probability of underestimating risk, based on CPC selection, is assumed low.

6.1.5.2 Uncertainty Exposure Assessment

The primary sources of uncertainty associated with scenario development are the definition of current and future land uses within the boundaries of Operable Unit 5 and the receptor source-term configuration selected as a basis for the risk assessment evaluation. The exposure scenarios and receptors evaluated in the risk assessment are conservative and are expected to result in significant overestimation of potential health risk.

As described in Appendix A, Section A.3.0 of the RI Report, the future site configuration for Operable Unit 5 assumes that engineering controls in the area will not be maintained. In addition, the surface water runoff control system is assumed to have become nonfunctional, resulting in increased contaminant loading to Paddys Run. This particular combination of site, conditions was selected as feasible and representative of reasonable, maximum, source-term conditions. It is important to note, however, that there are a wide variety of potential future site configurations that could have been applied in the risk assessment, and a degree of uncertainty is introduced by the selection of this particular configuration over another. Nevertheless, confidence is high that the major sources, exposure pathways, and important constituents have been identified using this configuration.

The inherent uncertainty associated with future land use and site configuration is addressed in the Operable Unit 5 risk assessment by using a wide range of potential receptors and exposure conditions. The receptors evaluated represent exposure conditions considered as both reasonable maximum and average cases. Based on this conservatism and the diversity inherent in the evaluated scenarios, the resulting risk estimates are unlikely to underestimate potential health risks associated with exposure to site-related constituents.

Each exposure factor selected for use in this risk assessment has uncertainties associated with it. Standard assumptions regarding exposure frequency, duration, population characteristics, and activities may not be representative of exposure conditions for all receptors. To avoid underestimation of exposure, the Operable Unit 5 risk assessment follows EPA's recommendation and uses RME assumptions that correspond to the 95th percentile for most of the exposure factors. In other words, the values used generally target the habits of a small percentage of the population representing the upper-bound exposure conditions.

The availability of site characterization data (i.e., contaminant types, levels, and distribution) has a direct impact on the estimation of exposure concentrations. Specific and potentially significant sources of uncertainty with relevance to the calculation of exposure-point concentrations are the adequacy of characterization data on an area as large as Operable Unit 5; assignment of validation qualifiers on data which indicate their usability for quantitative risk assessment; lack of data characterizing some environmental media that represent source terms for exposure; and the positive bias associated with some of the radiological sampling locations.

The analytical data for many chemical constituents varied among the sampled areas. This demonstrates the difficulty in obtaining accurate information-based data acquired from separate sampling episodes across a large operable unit.

There is less analytical data for concentrations of organic parameters (versus analytical data available for radiological parameters) measured across the entire FEMP site. This is due in part to the difficulties encountered while conducting organic sampling and analysis (i.e., reduced holding times, volatilization and biodegradation in environmental media), and historical emphasis of the site sampling programs on radiological constituents. This limitation introduces some degree of uncertainty into the selection of CPCs and the calculation of exposure-point concentrations for organics in the environmental media, particularly in surface soil. In instances where data sets were limited, the maximum detected concentrations were used as the

exposure-point concentrations. These specific data limitations are of low to moderate significance in comparison with other sources of uncertainty, such as those associated with the toxicity assessment and the fate and transport modeling in the risk analysis.

Estimation of exposure-point concentrations using environmental fate and transport modeling introduces a number of potentially significant uncertainties into the risk assessment results. This uncertainty results from the use of general assumptions regarding contaminant distribution and intermediate transfer processes, as well as from intrinsic uncertainties in the models applied to estimate environmental concentrations. Section 5.0 and Appendix F of the Operable Unit 5 RI Report provide detailed discussions of the inputs and uncertainties associated with the modeling process.

The partitioning of contaminants between soil and vegetation (crops for human consumption and food for livestock) is not well characterized for most compounds. Available data are used to make order-of-magnitude estimates of plant/soil partitioning relationships. The biotransfer factors that express contaminant partitioning between animal intake and animal-based food products (such as meat and dairy products) can only be estimated to within about 2 orders of magnitude (McKone and Ryan 1989). These limitations have important implications for Operable Unit 5, where food-related pathways are significant for some receptors.

6.1.5.3 Uncertainty in Toxicity Assessment

Considerable uncertainty is associated with the qualitative (hazard assessment) and quantitative (dose response) toxicity assessment process. The uncertainty associated with the toxicity assessment is chemical specific because it depends on the existing information used to derive the dose-response factor. In general, this uncertainty tends to be high (overestimates risks by 2 or more orders of magnitude) for the chemical risk assessment, but tends to be lower (overestimates risks by one order of magnitude or less) for radionuclides. This difference is the result of animal versus human data used for chemical and radiological compounds, respectively.

6.1.5.4 Uncertainty in Risk Characterization

High uncertainty exists in risk characterization results when summing ILCRs or HIs for several constituents across different exposure pathways. This assumes that each substance has a similar effect and/or mode of action. Often dissimilar compounds affect different target organs, have different mechanisms of action, and differ in their ultimate fate and clearance in the body. Because the types of interaction (additive, synergistic, or antagonistic) between different chemicals have generally not been quantified, risk characterization does not consider antagonistic or synergistic effects and assumes additivity. The summing of contaminant-specific ILCRs and HIs to produce total carcinogenic and noncarcinogenic risk estimates, respectively, has the potential to either overestimate or underestimate potential human health risks.

In summary, the receptors in the current land use scenarios with the highest uncertainty are the off-property resident farmer and off-property user of meat/milk from livestock grazed on site. The off-property resident farmer was evaluated based on modeled concentrations for the air pathway which results in high uncertainty. For the second receptor, the bioaccumulation of CPCs into meat and milk was modeled and results in high uncertainty. The receptors in the future land use scenarios with the highest uncertainty include the on-property RME resident farmer, the Great Miami River user, and the off-property user of meat and milk. The highest uncertainty for the farmer and the off-property user of milk and meat products is associated with the potential exposure pathways from farming on the FEMP property as well as from the modeled concentrations of contaminants in food. Uncertainty associated with the other two receptors is primarily the result of surface water, groundwater, and air modeling used to support those scenarios. The modeling assumptions were conservative, and this resulted in conservative estimates for the exposure-point concentrations.

The cumulative uncertainties identified with site data, exposure parameters, fate and transport modeling, toxicity assessment, and risk characterization are judged to be moderate and may potentially result in an overestimation of Operable Unit 5 risk by 2 or more orders of magnitude.

6.2 SITE-WIDE ECOLOGICAL RISK ASSESS

Following guidance provided by Region 5 of the EPA, Operable Unit 5 prepared a Site-Wide Ecological Risk Assessment as part of its RI Report (found in Appendix B) to determine if radiological and nonradiological constituents associated with actions at the FEMP represent a current or future risk to ecological receptors inhabiting this facility and nearby off-property areas. These receptors include all organisms, exclusive of humans and domestic animals, that may be potentially exposed to FEMP contaminants. EPA's guidelines emphasize that the development of the ecological risk assessment considers factors such as the nature and extent of contamination, the physical and toxicological properties of contaminants, and the quantity and quality of ecological resources.

In order to evaluate potential exposure of ecological receptors to CPCs, habitat (e.g., grassland) and the size of the home range of receptor species (those modeled to quantify total radiation doses) were used to subdivide on-property portions of the FEMP into seven study areas (see Figure 6-3). This approach provided for a more meaningful evaluation of potential risks to ecological receptors than examining the risks associated with the entire 1050-acre site, because media-specific contaminant concentrations within a given habitat were quantified, allowing a separate evaluation of those study areas that may have received greater amounts than other study areas.

For the ecological risk assessment, contaminants of greatest concern were those present in surface water and sediment in Paddys Run and the Great Miami River as well as in surface soil. Contaminants are likely to have entered Paddys Run through uncontrolled contaminated runoff, the Great Miami River by the permitted discharge through the outfall line and from Paddys Run, and were deposited in soil through airborne emissions.

This discussion of the ecological risk assessment begins with a description of the ecological setting of the FEMP followed by the summary of the exposure assessment. Next, the process of identifying nonradiological CPCs, and risk characterization are discussed. Because radiological constituents were evaluated through modeling, they are discussed separately.

6.2.1 Ecological Setting

As noted in Appendix B of the Operable Unit 5 RI Report, a number of studies have been conducted to characterize the biota both on and off FEMP property. Biological surveys and studies designed and conducted in 1986 and 1997 by Miami University and summarized by Facemire et al. (1990) remain the broadest in scope. They identify habitats and biota, determine species abundance and distribution, and noted apparent stress-induced differences between on-property and off-property biota.

Vegetation on the site is typical of the Western Mesophytic forest region, and biological communities on the site appear similar to those found in southwestern Ohio where similar land use practices occur. No species or group is conspicuously low or absent in any available habitat niches; the ecological communities on the FEMP are typical of those found in the region.

The Facemire et al. (1990) survey indicated possible stress on ecological receptors, including suppressed growth in FEMP American robin nestlings. However, recent studies suggested that this observed suppression may have been a result of land management practices and not related to the presence of contaminants in food items collected near nesting sites (Osborne et al. 1992). Facemire et al. (1990) attributed apparent stress on macroinvertebrate communities and other

ecological receptors in Paddys Run to the prolonged dry periods that are typical during the summer months.

Facemire et al. (1990) also characterized the fish community in Paddys Run, and indicated that both the number of taxa and the species composition were comparable to the results of studies performed on other small streams in southwestern Ohio.

Avifauna inhabiting the FEMP have been surveyed several times. Pomeroy (1977) conducted a survey in June 1977, while Facemire et al. (1990) conducted three separate surveys during 1986 and 1987. The data indicated that many of the species observed by Pomeroy in 1977 were also observed almost 10 years later during the surveys conducted by Miami University. These data indicate that the avian species composition at the FEMP appeared stable during this period.

Based on the review of these studies, there is apparent stability in species composition at the FEMP. These studies do not, however, permit an evaluation of changes in abundance and dominance of species.

6.2.2 Exposure Assessment for Ecological Receptors

As described in the EPA Region 5 guidelines, the major objective of the exposure assessment is to estimate, as accurately as possible, the media-specific chemical concentrations to which ecological receptors in each study area might be exposed (EPA 1992). Estimated environmental concentrations were based on measured site-specific data. The representative concentrations of media-specific nonradiological contaminants were compared to concentration-based benchmark toxicity values (e.g., water quality criteria) that protect ecological receptors. Contaminants exceeding these values were regarded as final CPCs and their relative risks to FEMP ecological receptors were evaluated. This risk assessment did not calculate the total dose of nonradiological constituents which individual ecological receptors might receive; therefore, dose estimates due to nonradiological contaminants were not made for specific ecological receptors.

The ecological risk assessment evaluated the potential impact of contaminants in surface water to both freshwater biota and terrestrial receptors that may inhabit these various bodies of water or use them as sources of drinking water. Exposures to contaminants in sediment were evaluated by examining sediment contaminant concentrations or by employing partitioning coefficients to determine the concentrations of CPCs present in the interstitial water. Only limited data were available for evaluating the bioavailability of surface soil CPCs. Therefore, the concentrations of CPCs in surface soil used in this assessment were based on individual contaminant concentrations per unit of soil without adjustment for bioavailability.

Ecological receptors may come in contact with contaminants by a number of pathways. Terrestrial receptors may be exposed to direct radiation from contaminated soil, ingestion of radionuclides and other contaminants contained in water and various food items, or incidental ingestion of contaminated soil during grooming or burrowing. Aquatic receptors may come in contact with contaminants that are dissolved in solution, adsorbed to sediment particles, or through consumption of contaminated prey.

6.2.3 Determining Nonradiological CPCs

Determination of nonradiological CPCs for ecological receptors relied on the supporting information and environmental data used to determine nature and extent of contamination as presented in the Operable Unit 5 RI Report. Media-specific contaminant concentrations were compared to media-specific benchmark values that are protective of ecological receptors. Concentrations of constituents exceeding these values were regarded as final CPCs and their toxicological properties summarized. Finally, the relative risks that each of these final CPCs might pose to FEMP ecological receptors were evaluated. The CPCs for the ecological receptors

were determined for surface water, drinking water, sediment, and soil.

Identifying Final CPCs in Surface Water

The process began by considering all inorganic contaminants present in concentrations statistically greater than background concentrations to be CPCs. All organic chemicals detected in surface water samples were also considered CPCs. The representative concentrations of these constituents (the process to determine representative concentrations is described in Appendix A of the Operable Unit 5 RI Report) were then compared to benchmark values that are protective of aquatic biota.

The primary benchmark values used to identify final CPCs in surface water were chronic ambient water quality criteria (CAWQC), which are developed to protect sensitive aquatic species from exposures to chronic, sublethal contaminant concentrations. Actual exposures of FEMP aquatic receptors to CPCs are assumed to be primarily chronic (long-term) exposures, usually at sublethal concentrations. These CAWQCs were selected as conservative and appropriate screening criteria. Where chronic toxicity data were not available, surrogate chronic benchmark values were estimated from acute toxicity data. Complete details of the process can be found in Appendix B, Section B.2.2 of the Operable Unit 5 RI Report (DOE 1995d).

Even though mercury's concentration in the Great Miami River is below its background value, it is retained as a CPC because of its well-documented propensity to bioaccumulate and biomagnify. The following constituents are the final ecological CPCs in surface water in Paddys Run and the Great Miami River, with respect to aquatic biota:

- Paddys Run - on-property are aluminum, cadmium, lead, manganese, silver, bis(2-ethylhexyl)phthalate, di-n-octyl phthalate; off-property are lead, bis(2-ethylhexyl)phthalate and di-n-octyl phthalate

- Great Miami River - above the effluent line are ammonia and mercury; between the effluent line and Paddys Run are aluminum, cadmium and cyanide; below Paddys Run are aluminum, barium, cadmium, cyanide, lead, manganese, and bis(2-ethylhexyl)phthalate.

Complete tables are found in Attachment B.II of Appendix B of the RI Report.

Identifying CPCs in Drinking Water

Exposure of terrestrial mammalian and avian receptors to surface water is primarily through ingestion of water. Currently, surface water criteria for the protection of terrestrial species are not available. Therefore, the potential hazards for terrestrial species ingesting contaminants in surface water are evaluated by comparing surface water contaminant concentrations measured in filtered and unfiltered samples to various benchmarks selected from the following:

- Available drinking water toxicity data for avian and mammalian species
- EPA Region 3 Risk-Based Contaminant Tables, Second Quarter (EPA 1994c)
- OEPA's (1993) or EPA's (1994a) criteria for public water supplies
- Benchmarks selected for assessment of risk to aquatic life.

Toxicity data for avian and terrestrial ecological receptors generated as a result of ingestion of contaminants in drinking water are summarized in Table B.III-1 of the RI Report.

As a screening method for identifying CPCs in drinking water for ecological receptors, the most conservative hum2n health criterion was selected as a drinking water benchmark. Human health criteria such as the OEPA's criteria for public water supplies were considered when selecting drinking water benchmarks because human health criteria are typically based on laboratory

studies using animals (usually rodents). These standards for drinking water are more protective than those used to assess risk to aquatic life.

In the Operable Unit 5 RI Report Appendix B, Tables B.III-3 to B.III-10 summarize representative surface water contaminant concentrations for each study area and compare these concentrations to the drinking water benchmarks selected for each contaminant. It was conservatively assumed that terrestrial ecological receptors relied exclusively on individual bodies of water (for example, drainage ditches, Paddys Run, the Great Miami River) for sources of drinking water. This screening process identified the following constituents as final CPCs in drinking water for terrestrial ecological receptors:

- On-property drainage ditches - aluminum, cadmium, mercury, uranium, 1,2-Dichloroethene, and trichloroethylene

- Paddys Run - aluminum, cadmium, lead, bis(2-ethylhexyl)phthalate and di-n-octyl phthalate

- Great Miami River - aluminum, beryllium, cadmium, mercury and bis(2-ethylhexyl)phthalate.

Identifying Final CPCs in Sediment

The limited nature of the background database precluded the performance of statistical comparisons of constituents present in sediment collected from various study areas to background concentrations. Therefore, unlike the other media, all inorganic and organic constituents were considered CPCs and compared directly to appropriate benchmark values and final CPCs in sediment were identified (Table B.2-2 of Appendix B of the RI Report).

Unlike surface water, national criteria have yet to be established for contaminants in sediment largely because of the difficulties associated with identifying biologically available concentrations. Models have been developed to predict the concentration of nonpolar organic contaminants that may be dissolved into interstitial water and therefore become biologically available. However, no equivalent, widely accepted models exist for predicting the partitioning of metals or polar organics between water and sediment particles. As a result, separate approaches were used to identify sediment benchmarks in the Site-Wide Ecological Risk Assessment.

Although calcium, magnesium, potassium, and sodium were detected in sediment samples in concentrations exceeding background concentrations, they are considered to be nontoxic and were eliminated from further consideration. The remaining inorganic chemicals were then compared to benchmark values developed by Long and Morgan (1991). Long and Morgan developed apparent effects data sets for various toxicants in sediment by compiling biological effects data (e.g., reductions in benthic populations associated with the presence of a contaminant) for a specific toxicant.

Long and Morgan have not developed benchmark values for all of the inorganic chemicals considered in this assessment. Therefore, surrogate values were selected, including sediment quality criteria established by various government agencies. If sediment-specific criteria could not be identified, these inorganic contaminants in sediment were retained as CPCs (e.g., aluminum and uranium) or compared to published soil concentrations, that are indicative of (e.g., cobalt). For nonpolar organic CPCs, equilibrium partitioning was used to extrapolate from contaminant concentrations in sediment to concentrations present in interstitial water.

Chemicals measured in sediment at concentrations greater than the Long and Morgan benchmark (or surrogate) values were considered to be inorganic CPCs. Uranium was retained for consideration

as a CPC because toxicity-based benchmark values were not available. The results of this screening process are summarized in Appendix B, Attachment B.IV of the RI Report. The final inorganic CPCs in sediment for Paddys Run and the Great Miami River are barium, cadmium, cyanide, iron, lead, manganese, uranium, phenanthrene and zinc.

Since no widely recognized models have been developed to predict the concentration of polar organic contaminants present in interstitial water it was assumed that these contaminants were completely dissolved in the interstitial water (e.g., :g/kg = :g/L) and, like nonpolar organics, were then compared to CAWQC (or surrogate values). Ibis screening process is summarized in Appendix B, Attachment B.IV of the RI Report.

Phenanthrene was the only organic contaminant present in sediment collected from the Great Miami River (downstream of the effluent outfall) identified as a final CPC; no organic CPCs were identified in Paddys Run.

Identifying Final CPCs in Soil

Inorganic chemicals that exceeded background concentrations in soil were compared to benchmark toxicity values; those constituents exceeding benchmark values were considered final CPCs in soil. All organic chemicals detected in soil were automatically considered CPCs.

Inorganic chemicals whose concentrations were statistically greater than background concentrations and all organic chemicals detected in soil were compared to concentrations considered to be protective of receptors. These contaminant threshold values were obtained from a number of sources, including:

- Quebec Ministry of the Environment for soil (Direction des Substances Dangereuses 1988)
- Maximum allowable concentrations established by various regulatory agencies for amending farm soil with sewage sludge
- Proposed action levels for contaminated soil at Resource Conservation and Recovery Act sites (EPA 1990)
- EPA Region 3 Risk-Based Contamination Tables, Second Quarter (EPA 1994c).

Whenever possible, the ecological risk assessment preferentially selected benchmark values that considered impacts to ecological receptors. In many instances, surface soil benchmarks developed to protect human health had to be employed. To the extent possible, these values were checked against ecological toxicity data published in the literature to ensure that they also protected ecological receptors.

Calcium, iron, magnesium, potassium, sodium, and vanadium were eliminated from further consideration as CPCs because they are considered nontoxic in soil. Although generally considered nontoxic, benchmark criteria were available for aluminum, barium, cobalt and manganese and these four contaminants were therefore retained for further assessment.

Summary tables identifying CPCs in soil that were significantly greater than background concentrations and were greater than benchmark values appear in Appendix B, Attachment B.V of the RI Report. The final CPCs in surface soil for on-property locations are aluminum, antimony, cadmium, lead, manganese, molybdenum, silver, thorium, uranium, zinc and several organics. Only manganese and lead present in samples collected off property exceeded soil benchmark values.

Although detected in soil collected from other study areas, only soil collected from Study Areas A, C, and E contained organic chemicals with concentrations that exceeded benchmark criteria.

PAHs identified as final CPCs are summarized in Attachment B.V of the RI Report.

6.2.4 Risk Characterization of Final CPCs

Risk characterization relates exposure concentrations of final CPCs to concentrations of CPCs that are known to cause adverse effects; it is essentially the integration of exposure and toxicity. The toxicity quotient method was selected to characterize risks associated with the final CPCs. Toxicity quotient values are derived by dividing the representative concentration for each final CPC for each media by the same benchmark toxicity values used to identify media-specific CPCs. A toxicity quotient value of less than 1.0 is considered to be associated with insignificant risk. The resulting toxicity quotients for media- and study area-specific final CPCs are listed in Appendix B, Attachments B.II - B.V and all quotient values > 1.0 are summarized in Tables B.2-4 to B.2-6 of the RI Report.

The toxicity quotient method is commonly used in risk characterization for ecological risk assessments because it is relatively easy to implement, is generally accepted, and can be applied to any data. In addition, it is useful when a large number of chemicals must be screened (Barnthouse et al. 1986).

Cumulative toxicity can be evaluated by summing the individual representative concentration/toxicity value quotients for various CPCs (Barnthouse et al. 1986). Those contaminants with quotient values > 0. 3 were included in the assessment of cumulative risk because they may contribute to chronic effects resulting from additivity or synergism (Cardwell et al. 1993). Estimates of cumulative toxicity were confined to surface water; it was assumed that contaminants present in these water bodies were thoroughly mixed and equally available to aquatic receptors. Similar assumptions were not applied to contaminants present in sediment and soil. The cumulative risk values calculated for surface water examined in this study are summarized in Table B.2-4 of the RI Report.

It should be emphasized that the individual toxicity quotient values presented do not represent the absolute probability of risk in themselves, but are representative of the relative probability of risk; that is, the greater the toxicity quotient value the greater the likelihood that ecological receptors coming in contact with a given contaminant may be adversely affected.

Risk Associated with Final CPCs in Surface Water

The highest cumulative risk values for Paddys Run were calculated for on-property locations. Lead accounted for the single largest source of risk associated with Paddys Run on property, followed by bis(2-ethylhexyl)phthalate. Cumulative risks determined for off-property sections of Paddys Run were also largely associated with lead and bis(2-ethylhexyl)phthalate.

Although the representative quotient values determined for total lead measured in samples from on-property and off-property locations in Paddys Run and the Great Miami River below its confluence with Paddys Run exceeded 1.0, filtered concentrations of this metal were relatively low. These data suggest that the concentration of lead that is biologically available to aquatic biota in these two bodies of water is less than indicated by the concentration measured in the unfiltered sample, effectively lowering the risk indicated by the toxicity quotient values.

For the Great Miami River, the greatest calculated cumulative risk value was for that portion of the river downstream from its confluence with Paddys Run. Aluminum accounted for almost all of the risk posed to aquatic biota inhabiting this section of the river, followed by bis(2-ethylhexyl)phthalate.

The assessment of potential risk posed to ecological receptors by ingesting surface water is very conservative in that it is assumed that a given body of water represents the only drinking water source available. In addition, the risk assessment assumes that ecological receptors had

year-round access to these various water bodies. However, with the exception of the Great Miami River and the upper sections of Paddys Run, the other on-property water bodies contain water intermittently, thereby limiting potential exposure (and risk) to ecological receptors.

The concentrations of aluminum and uranium exceeded the aquatic biota benchmark values; however, toxicity information indicates that neither metal is readily absorbed from the gastrointestinal tract and the small quantities absorbed are rapidly excreted (Venugopal and Luckey 1978). Studies performed on movement of uranium through terrestrial foodchains (Mahon 1992) reported that this heavy metal exhibited no sign of biomagnification. This information, coupled with the representative concentrations of aluminum and uranium reported for Study Area A (232 and 930 :g/L, respectively) indicate that these two heavy metals do not represent a risk to terrestrial ecological receptors.

Risk Associated with Final CPCs in Sediment

Although uranium was retained for consideration as a final CPC in sediment, studies conducted on various uranium-contaminated aquatic systems suggest that this metal does not biomagnify and that it is not generally bioavailable. It is probable that the risk posed to benthic organisms is limited as a result of the low bioavailability associated with this metal.

Risk Associated with Final CPCs in Soil

Toxicity quotient values derived from the surface soil concentration/Quebec threshold values (or other soil threshold values) for surface soil can only be applied in a broad sense (i.e., potentially hazardous or nonhazardous) because information on the effects of contaminated soil on ecological receptors is limited.

Uranium is not generally biologically available; transfer coefficients through various food chains indicate an order of magnitude decline at every trophic, level. Based on the results of several recent studies, concentrations of uranium present in all surface soil samples except those collected from Study Area C are well below concentrations associated with adverse biological effects (e.g., phytotoxicity, decreased earthworm survival). This information indicates that concentrations of uranium outside of Study Area C, although greater than the background soil concentrations, are less than values reported to adversely impact terrestrial ecological receptors. Therefore, with the exception of Study Area C, it is not likely that uranium is adversely impacting organisms inhabiting the remainder of the FEMP.

6.2.5 Assessing Radiological Constituents

The Site-Wide Ecological Risk Assessment evaluates potential risks to ecological receptors due to chronic exposure to low-levels of radiological contaminants present in the FEMP study areas. To calculate the internal and external doses, media- and site-specific data are evaluated in a model and the results are compared to a target-level dose published in 1992 by the International Atomic Energy Agency (IAEA). The basis for the target-level dose is presented in the publication, Effects of Ionizing Radiation on Plants and Animals at Levels Implied by Current Radiation Protection Standards. Among the conclusions reached in the report is that there is no convincing evidence from the scientific literature that chronic radiation dose rates below 1 mGy/day (36.5 rad/year) will harm animal or plant populations.

The methods and assumptions used to model the available RI/FS data indicate that the absorbed doses to ecological receptors fall below the target level dose (36.5 rad/year). It can be concluded that, based on the measured levels of radioactivity on and around the FEMP site, there is no threat of radiation effects to populations of terrestrial or aquatic biota. The methods, assumptions, and calculations used in this determination are presented in the following sections.

6.2.5.1 Selection of Receptor Organisms

White-footed deer mice (Peromyscus leucopus noveborensis) and meadow voles (Microtus pennsylvanicus) were selected as the reference mammals for several reasons. First, they are known to occur on the FEMP, and the small size of their home ranges makes it likely that individuals would spend their entire life on the site. These mammals live in direct contact with the soil, increasing the probability that they will come in contact with contaminants in this particular medium. In addition, mice and meadow voles are potential prey for a number of species that feed at the FEMP. Finally, studies have documented that they are sensitive to radioactivity (IAEA 1992). A generic pine was selected as the indicator plant for two reasons. First, studies of terrestrial vegetation have shown that pine trees are among the plant species most sensitive to radiation and, secondly, because of the large number of white pines (Pima strobus) and Austrian pines (Pinus nigra) on the FEMP. Some Norway spruce (Picea excelsa) also occur on site.

Shiners (Notropis sp.) were selected as the indicator fish species because the genus is common in the Great Miami River and comprises more than 50 percent of the fish community in Paddys Run. In addition, there is adequate information in the literature to characterize their sensitivity to radiation.

6.2.5.2 Selection of Pathways

Selected pathways include the internal pathways described in the Risk Assessment Work Plan Addendum (DOE 1992), as supplemented, as well as additional external pathways to ensure that the actual dose received by the organisms would not exceed the calculated values. Mathematical equations used to calculate absorbed dose through each of these pathways are provided in Appendix B, Attachment B.VI of the RI Report.

For mammals inhabiting each of the terrestrial study areas, including the two off-property locations, the exposure pathways are:

- Direct irradiation from soil
- Inhalation of resuspended soil
- Ingestion of insects
- Incidental ingestion of soil (e.g., through grooming)
- Ingestion of vegetation
- Ingestion of water (only for study areas where water monitoring results were available).

For aquatic animals in Paddys Run and the Great Miami River, the exposure pathways are:

- Direct irradiation from sediment
- Uptake of contaminants from water (all pathways)
- Direct irradiation from submersion in water
- Ingestion of benthic macroinvertebrates.

For pine trees in all study areas, the exposure pathways are direct irradiation from soil and uptake of contaminants from soil.

6.2.5.3 Selection of Calculation Parameters

Parameters used in the calculations and their source(s) include ingestion and inhalation rates, receptor mass, plant-to-soil concentration ratios, bioconcentration factors, and soil density. The complete lists are found in Appendix B, Tables B.3-1 through B.3-3 of the RI Report.

6.2.5.4 Calculation of Absorbed Dose Due to External Exposure

The representative concentration values for each radionuclide and medium in each study area were derived from the RI/FS database and are presented in Attachment VII of Appendix B. The calculations for absorbed dose to the white-footed deer mouse, the meadow vole, pine trees, and shiners were performed using the computer program MicroShieldTM (Grove Engineering 1988). While

this program is designed primarily for use as a shielding calculational tool, it provides estimates for external exposure scenarios where attenuating media are involved. Following the entry of data regarding source and shield materials and geometry, the program determines the exposure rate in milliroentgen per hour, which is converted to milliroentgen per year.

6.2.5.5 Calculation of Absorbed Dose Due to Internal Exposure

To calculate absorbed dose due to ingested or inhaled radioactive contaminants, dose conversion factors were derived using methods similar to that in Sections 7.4.2 and 7.4.3 of the Risk Assessment Work Plan Addendum (DOE 1992). Doses were calculated for representative environmental concentrations as representative doses to individual organisms in each study area. Data used in the calculation of dose conversion factors are listed in Tables B.3-5 through B.3-7 of the RI Report.

6.2.5.6 Analysis of Results

Calculated absorbed (internal and external) doses to the receptor organisms in each on- and off-property study area, the Great Miami River, and Paddys. Run are provided in Table B.3-9 of the RI Report; the summation of absorbed dose by area and pathway based on representative concentrations are presented in Attachment IX of Appendix B. The final calculated absorbed doses to the receptor organisms were compared to the target-level dose of 36.5 rad/year (IAEA 1992). All calculated doses are below the target-level dose of 36.5 rad per year. It can be concluded that, based on the measured levels of radioactivity on the FEMP site, there is no threat of radiation effects to populations of terrestrial plants or terrestrial or aquatic animals.

6.2.6 Uncertainty in the Ecological Risk Assessment

Uncertainties in the exposure assessment include the limited number of nonradiological samples, which may increase or decrease risk estimation. Concentrations of uranium, thorium, and radiological isotopes were based on RI samples collected at depths up to 2 feet. These data were compared to background samples collected at 0-6 inch depths; impact of this comparison on assessment is unknown. Appendix Table B.2-1 of the RI Report presents exposure assessment uncertainty.

Because complete toxicological databases do not exist for most chemicals, there are many opportunities for uncertainty to impact the toxicological screening process. In addition, due to the limited number of surface water samples collected for the RI, contaminants present in both filtered and unfiltered samples were compared to benchmark values. However, these benchmark values are expressed in terms of concentration of contaminant present in unfiltered samples. Comparing contaminant concentrations detected in filtered samples to benchmark values based on analyses of unfiltered water adds uncertainty to the interpretation of these results. It was also noted that a number of chemicals were detected in surface water, sediment, and soil samples in concentrations greater than concentrations reported for background samples but were eliminated from further consideration because they are generally regarded as nontoxic macronutrients (e.g., calcium and potassium). Benchmark toxicity values could not be identified for these macronutrients. Elimination of these chemicals present in concentrations greater than background values without considering their possible toxicity adds uncertainty to this assessment. Specific areas of concern, and methods used to reduce uncertainty are summarized in Appendix Table B.2-3 of the RI Report.

Because risk characterization is essentially the integration of the exposure assessment and toxicity screening, sources of uncertainty associated with either of these two processes contribute to uncertainty in the risk characterization. Uncertainty associated with the bioavailability of contaminants, including uranium, also influences the risk characterization process. In addition, elements of the risk characterization procedure itself should contribute to overall uncertainty. The toxicity quotient method, which was selected to characterize risk, does not directly account for incremental or cumulative toxicity. Areas of uncertainty

associated with this risk characterization and efforts to reduce uncertainty are summarized in Appendix Table B.2-7 of the RI Report.

6.2.7 Significant Habitat

About 10 acres of wetlands will likely be impacted by remedial actions. These wetlands are drainage ditches in and near the former production area. Mitigation measures are being negotiated with appropriate regulatory agencies. Habitat for threatened and endangered species is not directly impacted by contamination; however, the habitat must be protected during remediation to control surface water runoff and associated siltation into Paddys Run and to protect appropriate riparian habitat along Paddys Run.

6.3 CONCLUSION

Estimates of risk presented in the comprehensive baseline risk assessment for human health and ecological risk assessment indicate that actual or threatened releases of hazardous substances from the FEMP, if not addressed by implementing the response action selected in the ROD, may present an imminent and substantial to public health, welfare, or the environment. The results support the decision to take remedial action.

7.0 DESCRIPTION OF REMEDIAL ALTERNATIVES

From the many remedial technologies and process options considered for the cleanup of the affected media at the FEMP, 10 alternatives were identified as suitable for the initial screening step of the FS. These alternatives were compared against one another and then evaluated with respect to their effectiveness, implementability and cost. Ibis screening process resulted in the selection of seven viable remedial alternatives which are discussed in Section 7.2.

7.1 FEATURES COMMON TO ALL ACTION ALTERNATIVES

There are five features that are common to all the action alternatives considered for the Operable Unit 5 remedy; these are discussed below.

7.1.1 Remedial Action Objectives

Remedial action objectives are developed during the RI/FS process to set goals that ensure the protection of human health and the environment. Goals were developed for Operable Unit 5 that would mitigate the potential adverse effects of site contaminants present in environmental media, which led to setting acceptable chemical-specific: remediation levels (10-6, 10-5, etc.) for a range of human and ecological receptors under differing land uses. A remediation level of 10-6 represents the concentration of contaminants in media that would yield a calculated increase in the chance of acquiring cancer in a 70-year lifetime of 1 in 1,000,000, incremental to the current 1-in-4 chance of acquiring cancer for U.S. residents. Operable Unit 5's objectives include reducing or eliminating the potential for human or ecological receptors to come in contact with contaminated environmental media and preventing contaminants from migrating off site. Operable Unit 5 remedial action objectives are defined in Section 2.12 of the FS Report.

All of the alternatives considered in the FS were designed to achieve target land use objectives that bracketed potentially viable future uses of FEMP property which, in turn, provided the framework for identifying risk-based exposure scenarios and land-use specific remediation levels.

Land Use Objective 1 returns the entire on-property area to full unrestricted use following cleanup; i.e., establishes a hypothetical family farm anywhere on the FEMP property.

Land Use Objective 2 places contaminated material in a consolidated, managed area and establishes a hypothetical family farm on any of the remaining FEMP property.

Land Use Objective 3 places contaminated material in a consolidated, managed area but restricts the potential uses (e.g., recreational, industrial, undeveloped park) of the rest of the property through institutional controls.

Land Use Objective 4 minimally consolidates contaminated material and restricts access and future use of the FEMP property.

These objectives were developed within the context of the existing land use of the local area, residential farming, and in conjunction with the deliberations and resolutions of the Fernald Citizens Task Force.

7.1.2 Target Risk Cases

To support calculation of volume estimates for affected soil, nine target risk cases were developed in the FS Report (Section 2.13). Each risk case specified, for each medium, an associated land use, a target receptor, a target risk range, and the resultant uranium preliminary remediation level (PRL). The receptors considered represented the most restrictive

credible receptor for each medium consistent with the projected land use for a particular risk case. Table 7-1 displays the full range of the evaluations.

7.1.3 Removal Actions

The Operable Unit 5 removal actions are described in Section 2.4. These interim response actions will be integrated with the selected remedy as follows:

No. 1 - Contaminated Water Beneath FEMP Buildings. Analysis of the hydrogeology of the contaminated areas beneath the FEMP buildings, as well as contaminant fate and transport modeling performed as part of the Operable Unit 5 RI/FS since the implementation of this removal action, indicate it is not cost-effective to remediate the contaminated portions of the perched water system through pump and treat methods. Additionally, all the remedial alternatives considered include the excavation of affected perched water zones. Therefore, the wells pumping contaminated perched groundwater for treatment will be retired from operation following final issuance of this ROD.

TABLE 7-1

TARGET RISK CASES EVALUATED IN FEASIBILITY STUDY

Preliminary Remediation Levels (PRLs)
Soil PRLs

	On-Property - Central Area (K 1 = 15 L/kg a) Target Risk Range				On-Property - Border Area (K 1 = 325 L/kg a) Target Risk Range				Off-Property Risk Target			
Case(s)	Lower Limit	Upper Limit	Target Receptor b	PRLs Total U (ppm)	Lower Limit	Upper Limit	Target Receptor b	PRLs Total U (ppm)	Lower Limit	Upper Limit	Target Receptor b	PRLs Total U (ppm)
						Land Use Objectives 1 and 2						
1	1 x 10-6	1 x 10-5	Resident	5	1 x 10-6	1 x 10-5	Resident	5	1 x 10-6	1 x 10-5	Resident	5
2	1 x 10-5	1 x 10-4	Resident	15	1 x 10-5	1 x 10-4	Resident	15	1 x 10-5	1 x 10-4	Resident	15
						Land Use Objective 3						
3	1 x 10-6	1 x 10-5	Industrial	15	1 x 10-6	1 x 10-5	Industrial	15	1 x 10-5	1 x 10-4	Resident	15
4	1 x 10-6	1 x 10-5	Dev. Park	20	1 x l0-6	1 x 10-5	Dev. Park	40	1 x 10-5	1 x 10-4	Resident	15
5	1 x 10-6	1 x 10-5	Undev. Park	20	1 x 10-6	1 x 10-5	Undev. Park	80	1 x 10-5	1 x 10-4	Resident	15
6	1 x 10-6	1 x 10-5	Undev. Park	20	1 x 10-6	1 x 10-5	Undev. Park	80	1 x 10-5	1 x 10-4	Resident	50 c
7	1 x 10-6	1 x 10-5	Undev. Park	20	1 x 10-6	1 x 10-5	Undev. Park	50 d	1 x 10-5	1 x 10-4	Resident	50 c
						Land Use Objective 4						
8	1 x 10-6	1 x 10-5	Trespasser	20	1 x 10-6	1 x 10-5	Trespasser	100	1 x 10-5	1 x 10-4	Resident	15
9	1 x 10-6	1 x 10-5	Trespasser	20	1 x 10-6	1 x 10-5	Trespasser	100	1 x 10-5	1 x 10-4	Resident	50 c

TABLE 7-1
(Continued)

Surface Water and Sediment PRLs

Case(s)	Sediment Target Risk Range: Lower Limit	Sediment Target Risk Range: Upper Limit	Sediment Target Risk Range: Target Receptor	PRLs Total (ppm)	Surface Water Target Risk Range: Lower Limit	Surface Water Target Risk Range: Upper Limit	Surface Water Target Risk Range: Target Receptor	PRLs Total U (ppb)
Land Use Objectives 1 and 2								
1-2	1 x 10-6	1 x 10-5	Youth/Rec. User	2.1×10^2	1 x 10-6	1 x 10-5	Resident	5.4×10^2
Land Use Objective 3								
3	1 x 10-6	1 x 10-5	Youth/Rec. User	2.1×10^2	1 x 10-6	1 x 10-5	Industrial	5.4×10^2
4	1 x 10-6	1 x 10-5	Youth/Rec. User	2.1×10^2	1 x 10-6	1 x 10-5	Dev. Park	5.4×10^2
5-7	1 x 10-6	1 x 10-5	Youth/Rec. User	2.1×10^2	1 X 10-6	1 x 10-5	Undev. Park	5.4×10^2
Land Use Objective 4								
8-9	1 x 10-6	1 x 10-5	Youth/Rec. User	2.1×10^2	1 x 10-6	1 x 10-5	Trespasser	5.4×10^2

TABLE 7-1
(Continued)

Groundwater PRLs

	Perched Groundwater Target Risk Range				Great Miami Aquifer Groundwater Target Risk Range			
Case(s)	Lower Limit	Upper Limit	Target Receptor	PRLs Total U (ppb)	Lower Limit	Upper Limit	Target Receptor	PRLs Total U (ppb)
				Land Use Objectives 1 and 2				
1	1 x 10-6	1 x 10-5	Resident	5	1 x 10-6	1 x 10-5	Resident	5
2	1 x 10-5	1 x 10-4	Resident	20	PMCL e	PMCL	ARAR f	20
				Land Use Objective 3				
3-7	NA	NA	NA	NA	PMCL	PMCL	ARAR	20
				Land Use Objective 4				
8-9	NA	NA	NA	NA	PMCL	PMCL	ARAR	20

a K1 = leachability coefficient
b Resident is resident farmer
c Corresponds to an ILCR in the range of 1 x 10-5 to 1 x 10-4 with HQ of 1.0
d Uses the principle of as low as reasonably achievable (ALARA) to reduce on-property residual contamination
e Proposed maximum contaminant level
f Applicable or relevant and appropriate requirement; at residual risk level of 10-5 to the resident farmer, PMCLs are more restrictive and are therefore used in lieu of the risk-based limits.

No. 3 - South Groundwater Contamination Plume. The five parts of this removal action were designed and implemented to minimize public risk of exposure to uranium-contaminated groundwater south of the FEMP. This action will be integrated into the final remedy as follows:

Part 1 - no integration required; this completed part of the removal action involved providing an alternate water supply to industries south of the FEMP.

Part 2 - the groundwater recovery well system will continue until it is integrated into the larger pump and treat activities planned under the selected remedy.

Part 3 - the interim treatment system for site wastewater streams will continue to operate, as necessary, as part of the Operable Unit 5 final remedy.

Part 4 - monitoring to prevent use of contaminated groundwater will continue through the time frame of the groundwater remediation component of the remedy.

Part 5 - no integration required; investigations to identify the leading edge of the South Plume are complete.

South Plume Interim Treatment project - these systems to reduce uranium discharges to the Great Miami River will continue to operate, as necessary, as part of the final remedy.

No. 16 - Collect Uncontrolled Production Area Runoff. This completed action will be maintained as part of the final remedy for as long as needed to control contaminated storm water runoff from the former production area.

No. 17 - Improved Storage of Soil and Debris. This interim action provides guidelines for management of soil and debris generated at the FEMP. Operable Unit 5 soil/sediment excavation and interim storage will be conducted consistent with this removal action (including revisions) until such time as the appropriate Operable Unit 5 remedial design/remedial action documentation is approved by EPA.

No. 30 - KC-2 Warehouse/Well 67. Sampling and monitoring of Well 67 will continue until Operable Unit 3 demolishes the structure and the well is plugged and abandoned.

7.1.4 Institutional Controls

During implementation of the Operable Unit 5 remedial action the appropriate protective strategies will be built into the remedial design/remedial action work plans and implemented as part of the selected remedy to ensure worker and site neighbor health and safety.

Institutional measures including the following would be applied as part of each remedial alternative during remedy implementation:

- Access controls, through the use of fencing and guards, to the more heavily contaminated areas on the FEMP property
- Continued federal ownership of the FEMP property
- Alternate water will be supplied to potential users of groundwater within the areas of the aquifer exhibiting contaminant concentrations exceeding final remediation levels.

Following remedy implementation and attainment of remedial objectives, institutional controls, including continued federal ownership of all or portions of the FEMP property, would continue as part of remedies contemplating on-property disposal of contaminated material.

7.1.5 Five-Year CERCLA Reviews

As mandated by CERCLA, if contaminated materials remain at a site as envisioned for the Operable Unit 5 action alternatives involving on-property disposal, EPA will conduct reviews of the performance of the selected remedy at least once every five years from the date the remedial action is initiated, to ensure the continued protection of human health and the environment.

7.2 REMEDIAL ALTERNATIVES

The Proposed Plan for Operable Unit 5 discussed seven alternatives that met the initial screening criteria. Along with the no-action alternative, each of these and the associated land use objectives are summarized below. Table 7-2 provides a summary of the various components of the alternatives for ease of comparison.

The following statutes and regulations define the primary applicable or relevant and appropriate requirements (ARARs) and to be considered (TBC) criteria for each of the Operable Unit 5

TABLE 7-2

SUMMARY OF ALTERNATIVES

Land Use Objective	Alternative a		Risk Case b	On-Site Soil Excavation (million yd 3)	Off-site Excavation (million yd 3)	Soil Shipped Off-Site (million yd 3)	On-Property Backfill c (million yd 3)	Disposal Facility (million yd 3)	Consolidation Area (million yd 3)	Present Worth (million $)	Total Cost (Escalated) (million $)	Time to Implement (yrs) Aquifer	Time to Implement (yrs) Soil
None	No action	None	0	0	0	0	0	0	0	0			
Full unrestricted use	1 Excavation and off-property disposal of soil	1	4.45	5.20	9.35	0.30	0	0	4330	13,900	75	22	
		2	2.34	0.40	2.40	0.34	0	0	1240	3020	27	22	
Establishment of a consolidated waste management area with unrestricted use of the remaining areas of the property	2A Excavation and on-property disposal of soil in cell; off-site disposal of soil not meeting cell waste acceptance criteria (WAC)	1	4.45	5.20	0.05	0.30	9.30	0	2290	12,000	75	22	
		2	2.34	0.40	0.03	0.340	2.37	0	720	2580	27	22	
	2C Excavation, off-site disposal of heavily contaminated soil, consolidation of slightly contaminated soil	1	4.45	5.20	9.35	0.30	0	0	4330	13,900	27	22	
		2	2.34	0.40	1.16	0.34	0	1.24	910	2780	27	22	
Establishment of a consolidated waste management area with restricted use of the remaining areas of the property	3A Excavation, on-property disposal in cell; off-site disposal of soil not meeting WAC	3	1.99	0.40	0.03	0.03	2.34	0	690	2510	27	22	
		4	1.80	0.40	0.03	0.43	1.75	0	630	2220	27	22	
		5	1.79	0.40	0.03	0.42	1.75	0	610	2180	27	22	
		6	1.79	0.001	0.03	0.02	1.75	0	580	2110	27	22	
		7	1.80	0.001	0.03	0.03	1.75	0	580	2110	27	22	

TABLE 7-2
(Continued)

Land Use Objective	Alternative a		Risk Case b	On-Site Soil Excavation (million yd 3)	Off-site Excavation (million yd 3)	Soil Shipped Off-Site (million yd 3)	On-Property Backfill c (million yd 3)	Disposal Facility (million yd 3)	Consolidation Area (million yd 3)	Present Worth (million $)	Total Cost (Escalated) (million $)	Time to Implement (yrs) Aquifer
Soil												
	3C Excavation, off-property disposal of heavily contaminated soil; consolidation of slightly contaminated soil	3	1.99	0.40	1.15	0.02	0	1.22	880	2690	27	22
		4	1.80	0.40	1.13	0.42	0	0.65	820	2290	27	22
		5	1.79	0.40	1.12	0.42	0	0.65	800	2210	27	22
		6	1.80	0.001	1.12	0.02	0	0.65	770	2170	27	22
		7	1.80	0.001	1.12	0.03	0	0.65	770	2170	27	22
Restricted use of entire on-property area	4A Excavation, on-property disposal of soil in cell	8	1.79	0.40	0.03	0.42	1.75	0	610	2190	27	22
		9	1.80	0.001	0.03	0.02	1.75	0	580	2110	27	22
	4C Excavation, off-property disposal of soil	8	1.79	0.40	1.12	0.42	0	0.65	800	2240	27	22
		9	1.80	0.001	1.12	0.02	0	0.65	780	2170	27	22

a All action alternatives include extraction, treatment, and discharge of groundwater.
b For a complete discussion of risk cases see Section 7.1.2, Table 7-1, and the Feasibility Study Report for Operable Unit 5, Section 2.0.
c This is the estimated volume of clean soil to be excavated to reach contaminated soil at depth (e.g., under pipelines).

alternatives; a summary of the pertinent ARARs/TBCs is included with the descriptions of the alternatives:

- Safe Drinking Water Act national primary drinking water regulations
- Ohio Water Quality Standards for surface water
- Ohio general radiation protection standards
- Clean Water Act
- National Emission Standards for Hazardous Air Pollutants
- Resource Conservation and Recovery Act (RCRA) hazardous waste management regulations
- Uranium Mill Tailings Radiation Control Act (UMTRCA)
- Protection of wetlands, flood plains, and threatened and endangered species under the National Environmental Policy Act
- Department of Transportation requirements for transport of hazardous materials.

ARARs for the selected remedy are cited in Appendix B, Tables B.1 through B.3. The methods of compliance with ARARs for the selected remedy are described in Tables B.4.A through B.4.C of Appendix B. Detailed descriptions of ARARs for each alternative can be found in the Operable Unit 5 FS Report, Section 4.0.

7.2.1 No-Action Alternative

In order to adequately compare the final alternatives and select an appropriate remedy, the NCP requires that a no-action alternative be developed and used as a baseline against which other alternatives are evaluated. Under this alternative, no remedial actions would be taken for Operable Unit 5 contaminated media. The no-action alternative would not decrease the toxicity, mobility, or volume of hazardous substances through treatment or reduce public health or environmental risks.

Compliance with Primary ARARs

Remedial actions pursuant to Sections 104 or 106 of CERCLA must meet the cleanup standards of Section 121 of CERCLA, including attainment of (or justification of a waiver from) ARARs.

A no-action decision can only be made when no remedial action is necessary to reduce, control, or mitigate exposure because the site is already protective of human health and the environment.

The no-action alternative is not protective of human health and the environment and also does not comply with ARARs for Operable Unit 5. With no further action (according to the Operable Unit 5 Baseline Risk Assessment), the continued release of contaminants could result in exceeding limits for airborne emissions of radionuclides under 40 CFR 61, Subparts H and I, and exposure limits to the public established under DOE Order 5400.5. Releases of radionuclides and organic and inorganic contaminants would violate State of Ohio water quality standards (Ohio Administrative Code [OAC] 3745-1) for receiving surface waters. Drinking water maximum contaminant levels (MCLs) and maximum contaminant level goals (MCLGs) under the Safe Drinking Water Act would also be exceeded in the long term if the released material were to continue to migrate into the Great Miami Aquifer.

7.2.2 Alternative 1 - Excavation and Off-Site Shipment

Land Use Objective 1: Full Unrestricted Use

Contaminated soil and sediment exceeding remediation levels would be excavated and shipped by rail to an off-site licensed disposal facility. Contaminated perched groundwater zones that represent unacceptable risks to potential human receptors or to the Great Miami Aquifer would also be excavated and disposed of off site. Water collected from the perched water zones during excavation would be treated at the FEMP's wastewater treatment facility before discharge to the Great Miami River. Remediation levels for two case were examined; Case 1 would protect the projected future receptors at an ILCR level of 10-6 and Case 2 would protect at a 10-5 level.

Equivalent restoration of the Great Miami Aquifer would occur. For Case 1, contamination residing in the aquifer would be remediated to a level of 3 ppb (i.e., 10-6 ILCR level) of uranium and for Case 2, to 20 ppb (the proposed federal drinking water standard). These cleanup levels would be attained by the installation and pumping of groundwater extraction wells to pull the contaminated water from the aquifer. Modeling of pumping rates and time frames produced estimates for the two cases of 7500 gpm and 75 years for the 10-6 level and 4000 gpm and 27 years for the 20 ppb level.

The FEMP's advanced wastewater treatment facility would reduce the uranium concentration in the extracted groundwater before discharging it to the Great Miami River.

Compliance with Primary ARARs
The following subsections summarize the manner by which Alternative 1 will comply with the primary ARARs, according to chemical-, location-, or action-specific requirements.

Chemical-Specific ARARs - Alternative 1 would comply with the chemical-specific ARARs/TBCs. ARARs associated with penetrating radiation and potential releases of contaminants to air, surface water, and groundwater would be met through the removal of all contaminated material from the site. The material would be disposed of at a permitted, off-site commercial disposal facility. Water encountered during pumping and excavation would be treated to meet the Ohio Water Quality Standards (OAC 3745-1) before off-site discharge. Contaminated portions of the Great Miami Aquifer would be restored to meet proposed and final MCLs promulgated under the Safe Drinking Water Act.

Location-Specific ARARs/TBCs - Location-specific requirements associated with this alternative relate to the protection of four principal natural features or resources: floodplains, wetlands, endangered species, and the sole-source aquifer underlying the FEMP site.

Restrictions on activities conducted in wetlands and floodplains are specified in 40 CFR 6.302, 10 CFR 1022 and Executive Orders 11990 and 11998. Compliance with these requirements would be met through the prior assessment of potential impacts associated with activities conducted in these locations and the implementation of mitigative measures. This assessment would result in appropriate planning, siting, design, and operational procedures. The methods for handling dredged and excavated material would comply with the provisions of 33 CFR 323 and 40 CFR 230, which state that dredged or excavated material will not be discharged into waters of the United States.

Protection of threatened and endangered species is mandated by 16 U.S. Code 1531, 50 CFR 17 and 402, and Ohio Revised Code (ORC) 1531.25, 1518.02 and OAC 1501:18-1. Studies have been conducted to determine if these species are present and/or if suitable habitat for the threatened and endangered species exists at the FEMP. If the habitat of any endangered species is disturbed, appropriate mitigative measures will be taken.

The provisions of 16 U.S. Code 469, 36 CFR 800, 40 CFR 6.301; 42 U.S. Code 1996 and

43 CFR 7 require federal agencies undertaking an action to implement measures to avoid adverse impacts to historic and cultural properties. Alternative 1 would comply with these provisions because any cultural resources identified would be either avoided or managed appropriately.

Action-Specific ARARs - Alternative 1 would comply with all pertinent action-specific ARARs for waste removal, treatment and off-site disposal.

The specific implementation measures and engineered controls incorporated into Alternative 1 would need to meet all action-specific ARARs regarding air quality from 40 CFR 50.6 and OAC 3745-17-08. These ARARs would be pertinent during remedial actions and the postclosure care period.

Waste removal actions would be conducted in compliance with 40 CFR 192.02(b) and 192.12 under UMTRCA to provide reasonable assurance that residual radioactive materials do not exceed the specified concentrations above proposed final remediation levels. During implementation of the remedial action (including waste removal, facility construction and waste treatment), appropriate engineered features and procedures would be implemented to comply with the requirements of the Clean Air Act, 40 CFR 50.6, and Ohio's requirements for fugitive dust control, OAC 3745-17-08. Off-site disposal of Operable Unit 5 media containing greater than 50 ppm of polychlorinated biphenyls would require management, in accordance with 40 CFR 761, Subpart G.

Any listed or characteristic hazardous wastes to be disposed of off site would have to meet the waste acceptance criteria for off-site disposal, including the treatment standards appropriate for the land disposal restrictions (LDRs) under RCRA (40 CFR 268.40 through 269.44). All storage, containment, management, and manifesting requirements for listed and characteristic hazardous waste would be performed in accordance with 40 CFR 261, 262, and 265.

7.2.3 Alternative 2A - Engineered Disposal Facility

Land Use Objective 2: Establishment of a Consolidated Waste Management Area with Unrestricted Use of the Remaining Areas of the Property

Contaminated soil exceeding remediation levels would be excavated and placed in an engineered above-grade disposal facility. This facility would be placed on the location with the best available geologic conditions and be designed with a multilayered lining and capping system. The fenced disposal facility would remain under the continued ownership of the federal government and other measures taken to prevent human intrusion. The performance of the facility would be monitored on a long-term basis.

The design and construction of the site-wide engineered disposal facility is the province of Operable Unit 2 and is discussed in the Operable Unit 5 FS in general terms. The Operable Unit 5 Proposed Plan described the proposed site-wide facility in more detail, giving approximate dimensions of 2400 x 1300 feet x 62 feet high (about 71 acres). The size is based upon the consolidation of soil and debris from Operable Units 1-4 in addition to the soil from Operable Unit 5 and would accommodate 2.4 million cubic yards of material. A disposal facility with the dimensions of approximately 1610 x 1610 feet x 37 feet high (about 60 acres) would accommodate Operable Unit 5 material (about 1.8 million cubic yards).

Contaminated soil exceeding the waste acceptance criteria for the disposal facility would be shipped to an off-site disposal facility unless a cost/effective technology emerged that could treat the soil and reach concentrations below the criteria. The same remediation levels used in Alternative 1 were considered, 10-6 and 10-5 ILCR levels.

Extraction and treatment of contaminated perched water and the Great Miami Aquifer are the same

as under Alternative 1.

Compliance with Primary ARARs
Alternative 2A would comply with all the primary ARARs as described for Alternative 1. Alternative 2A, however, also requires on-property disposal of excavated soil, triggering the Ohio Solid Waste Disposal Regulations as an additional primary ARAR. In order to site a disposal facility over the Great Miami Aquifer, a waiver would be required to carry out this alternative, as described below under location-specific ARARs. Other action- and chemical-specific requirements would be identical to those described in Alternative 1, except those pertinent to on-property disposal.

Chemical-Specific ARARs
Alternative 2A would comply with the chemical-specific ARARs/TBCs. ARARs associated with penetrating radiation and potential releases of contaminants to air, surface water and groundwater would be met through the excavation and placement of contaminated material in an on-property disposal facility, provided the contaminants in the material meet the facility's waste acceptance criteria. Material, exceeding the waste acceptance criteria would be disposed of off site. The prescribed engineering controls for the on-property disposal facility would ensure that Safe Drinking Water Act proposed and final MCLs in the Great Miami Aquifer, air emission standards, and radon protection standards would be met.

Extraction and treatment of contaminated perched water and the Great Miami Aquifer are the same as under Alternative 1.

Location-Specific ARARs
Alternative 2A would meet the primary location-specific ARARs with the exception that a CERCLA waiver would be required for two State of Ohio solid waste disposal siting restrictions. These restrictions prohibit the siting of disposal facilities over 1) sole-source aquifers designated under the Safe Drinking Water Act and 2) aquifers capable of providing 100 gpm or more of sustained yield for consumptive use.

The on-property disposal of soil containing RCRA hazardous wastes would be performed in accordance with the provisions of the RCRA Subtitle C corrective action management unit (CAMU) regulations for management of environmental media containing listed or characteristic hazardous waste. Excavated soil would be considered "remediation waste" for management within the CAMU, as defined in 40 CFR 260.10. The use of the CAMU would not trigger LDR treatment standards or minimum technology requirements (MTRs).

Compliance with location-specific ARARs for floodplains, wetlands, dredging, endangered species, and historical preservation would be met as described for Alternative 1.

Action-Specific ARARs
Alternative 2A would meet the primary action-specific ARARs discussed for Alternative 1. Because the FEMP contains low-level radioactive waste/residual radioactive material, solid waste, and hazardous waste, the engineering design of the on-property disposal facility would meet the more stringent requirements for disposal of low-level radioactive waste/residual radioactive material. EPA states in 40 CFR 192(a) for uranium mill tailings that the disposal facility must be designed to be effective for up to 1000 years, to the extent reasonably achievable, and in any case, for at least 200 years, and provide protection of groundwater. This disposal facility would also exceed the engineering design criteria for the less-stringent OEPA and RCRA technical requirements for the disposal of solid and hazardous waste, respectively.

7.2.4 Alternative 2C - Consolidation with Off-Site Shipment
Land Use Objective 2: Establishment of a Consolidated Waste Management Area with Unrestricted

Use of the Remaining Areas of the Property

Contaminated soil exceeding remediation levels would be excavated and, depending on contaminant concentration levels, dispositioned either in an on-property earthen-covered consolidation area or at an off-site licensed disposal facility. The consolidation area, would remain under the continued ownership of the federal government with measures taken to prevent human intrusion. Waste acceptance criteria for the consolidation area would be set at levels protective of the Great Miami Aquifer.

The perched groundwater and Great Miami Aquifer remedial actions would be identical to those described for Alternative 1.

Compliance with Primary ARARs
The ARARs for Alternative 2C are identical to those for 2A, and a waiver from the Ohio Solid Waste Disposal restrictions would be necessary to site the consolidation area over the Great Miami Aquifer. Alternative 2C would comply with all remaining primary ARARs in a manner identical to Alternative 2A.

7.2.5 Alternative 3A - Engineered Disposal Facility
Land Use Objective 3: Establishment of a Consolidated Waste Management Area with Restricted Use of the Remaining Areas of the Property

Under Alternative 3A, contaminated soil exceeding final remediation levels would be excavated and placed in an on-property engineered disposal facility; excavated soil or sediment not meeting the waste acceptance criteria would be shipped to an off-site licensed disposal facility. Perched water zones exhibiting concentrations of contaminants that threaten the water quality of the underlying Great Miami Aquifer to a level above proposed or final Safe Drinking Water Act MCLS would also be excavated. Groundwater restoration of the Great Miami Aquifer would be accomplished as in Alternative 1.

The disposal facility would remain under the continued ownership of the federal government with measures taken to prevent human intrusion. The remaining areas made available for use would have institutional controls applied to ensure that the restricted (nonfarming) land use was maintained. An on-going environmental monitoring program would be put in place.

Compliance with Primary ARARs
The remedial action components of Alternative 3A are identical to Alternative 2A, and compliance with primary ARARs for this alternative would be identical to those described for Alternative 2A.

7.2.6 Alternative 3C - Off-Site Disposal
Land Use Objective 3: Land Use Objective 3: Establishment of a Consolidated Waste Management Area with Restricted Use of the Remaining Areas of the Property

Contaminated soil exceeding remediation levels (the same as for Alternative 3A) would be excavated, with the soil exhibiting contaminant levels greater than the consolidation area waste acceptance criteria shipped by rail to a licensed off-site disposal facility. The remedial strategy for soil, perched groundwater, and the Great Miami Aq&er is consistent with Alternative 2C.

Compliance with Primary ARARs
The remedial action components of Alternative 3C are identical to Alternative 2C; thus compliance with primary ARARs for Alternative 3C would be the same as previously described for Alternative 2C.

7.2.7 Alternative 4A - Engineered Disposal Facility
Land Use Objective 4: Restricted Use of the Entire On-Property Area

Contaminated soil exceeding remediation levels would be excavated, consolidated, and placed in an engineered disposal facility; excavated soil or sediment not meeting the waste acceptance criteria would be shipped to an off-site licensed disposal facility. This alternative is similar to Alternatives 2A and 3A in that it specifies the construction of an on-property engineered disposal facility. Restricting access to the entire FEMP property is the primary difference between Alternative 4A and Alternatives 2A and 3A, where portions of the FEMP outside the disposal facility buffer area could be used.

Compliance with Primary ARARs
The remedial action components of Alternative 4A are identical to Alternatives 2A and 3A; thus compliance with primary ARARs for Alternative 4A would be the same as previously described for Alternatives 2A and 3A.

7.2.8 Alternative 4C - Consolidation with Off-Site Disposal
Land Use Objective 4: Restricted Use of the Entire On-Property Area

Contaminated soil exceeding remediation levels would be excavated and dispositioned either on property in an earthen-covered consolidation area or off site at a licensed disposal facility depending on contaminant concentration levels. This alternative is similar to Alternatives 2C and 3C in that it specifies the construction of an on-property earthen-covered consolidation area. Restricting access to the entire FEMP property is the primary difference between Alternative 4A and Alternatives 2C and 3C, where portions of the FEMP outside the consolidation area buffer zone could be used.

Compliance with Primary ARARs
The remedial action components of Alternative 4C are identical to Alternatives 2C and 3C; thus compliance with primary ARARs for Alternative 4C would be the same as previously described for Alternatives 2C and 3C.

8.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

The NCP identifies nine evaluation criteria against which final remedial alternatives must be evaluated. The NCP also requires a comparative analysis that focuses upon the relative performance of each alternative against the criteria. The nine criteria are:

1. Overall protection of human health and the environment - Addresses protection achieved, in both the short and long term, from unacceptable risks posed by contaminants at the site by eliminating or controlling exposures.

2. Compliance with ARARs - Addresses compliance with federal environmental laws and state environmental or facility-siting laws.

3. Long-term effectiveness and permanence - Addresses the magnitude of residual risk associated with untreated waste or treatment residuals remaining at the conclusion of remedial activities; also addresses the adequacy and reliability of controls that are necessary to manage treatment residuals and untreated wastes.

4. Reduction of toxicity, mobility, or volume through treatment - Addresses the degree to which treatment reduces the hazards posed by the principal threats at the site, the

amount of material treated, the expected reduction in toxicity, mobility, or volume, the degree to which the treatment is irreversible, and the type and quantity of treatment residuals.

5. Short-term effectiveness - Addresses short-term risks to the public during remedial action, potential impacts on workers during remedial action and the effectiveness and reliability of protective measures for workers, and potential environmental impacts of the remedial action and the effectiveness and reliability of mitigative measures; also addresses the time until protection is achieved.

6. Implementability - Addresses the technical and administrative feasibility of implementing an alternative and the availability of needed services and materials, including adequate off-site disposal capacity.

7. Cost - Addresses capital and operation and maintenance costs and their net present value.

8. State acceptance - Addresses state concerns, including concerns related to the preferred alternative and other alternatives as well as ARARs and any proposed use of waivers.

9. Community acceptance - Addresses concerns of the community relative to alternatives under consideration.

The first two are threshold criteria that must be met by an alternative in order to be eligible for selection as the remedy for a site (unless a waiver condition applies to the second criterion). The next five are primary balancing criteria that are used to identify relative advantages and disadvantages among the alternatives. The last two are modifying criteria that must be considered in remedy selection.

The following sections provide a comparative analysis of the alternatives using the nine evaluation criteria. The comparative analysis of the alternatives using the threshold and balancing criteria is summarized in Table 8-1.

8.1 THRESHOLD CRITERIA

8.1.1 Overall Protection of Human Health and the Environment

All of the action alternatives provide for overall protection of human health and the environment. It cannot, however, be ensured that the no-action alternative would be protective of human health and the environment in the long term. For each of the action alternatives, the potential for human and environmental exposures to contaminants would be reduced in several ways. The major sources of contamination would be removed: contaminated groundwater would be removed and treated; contaminated soil would be placed in a consolidation area with an earthen cover ("C" alternatives) or in an engineered, on-property disposal facility ("A" alternatives) that would prevent the release of contaminants into the environment for at least 200 to 1000 years or they would be removed to an off-site, licensed disposal facility (Alternative 1). All action alternatives would be implemented in such a manner as to protect human health and the environment in the short term.

8.1.2 Compliance with ARARs

Alternative 1 and Risk Case 1 of Alternative 2C would comply with all federal and state ARARs. All other action alternatives would meet all ARARs except for State of Ohio siting requirements for solid waste disposal facilities. Implementing any of these action alternatives would require a waiver from the state siting requirements.

The no-action alternative would not comply with all federal and state ARARs. With no action,

continued release of contaminants could result in exceeding limits for airborne emissions of radionuclides, exceeding radiological exposure limits for the public, violation of water quality standards, and exceeding MCLs in the Great Miami Aquifer.

TABLE 8-1

COMPARATIVE ANALYSIS OF OPERABLE UNIT 5 REMEDIAL ALTERNATIVES

Alternative a	Overall Protection of Human Health and Environment	Compliance with ARARs b	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility or Volume Through Treatment	Short-Term Effectiveness	Implementability	Estimated Present-Worth Cost/Risk Case c (Millions of Dollars)
1. Excavate and dispose of soil/sediment off property.	Protective of human health and the environment.	Complies with all ARARs.	Effective and permanent; provides the lowest residual risk of all alternatives.	Groundwater is treated following extraction; no treatment of soil/sediment.	Risks to public higher than for Alt. 2A because transportation of all waste off-site required. Otherwise similar to Alt. 2A.	Technically implementable; however, uncertainties associated with off-site disposal capacity make this alternative the most difficult to implement. Possible difficulty with access to off-property soil.	$4330/Case 1 1240/Case 2
2A. Excavate and dispose of soil/sediment in an on-property disposal facility; off-property disposal of material not meeting WAC d for disposal facility.	Same as Alt. 1.	Requires waiver of requirements related to on-property disposal.	Effective and permanent; however, residual risk higher than for Alt. 1 because contaminated soil would remain in an on-property disposal facility.	Same as Alt. 1	Acceptable risks to workers and public; acceptable environmental impacts.	Technically implementable. Possible difficulty with access to off-property soil; otherwise, low administrative difficulty.	$2290/Case 1 720/Case 2

TABLE 8-1
(Continued)

Alternative a	Overall Protection of Human Health and Environment	Compliance with ARARs b	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility or Volume Through Treatment	Short-Term Effectiveness	Implementability	Estimated Present-Worth Cost/Risk Case c (Millions of Dollars)
2C. Excavate and dispose of soil/sediment not meeting WAC for an on-property consolidation area off property. On-property disposal of material meeting WAC for unit.	Same as Alt. 1.	For Risk Case 1, same as Alt. 1. For Risk Case 2, same as Alt. 2A.	Effective and permanent. For Risk Case 1, residual risk same as for Alt. 1. For Risk Case 2, residual risk is between that provided by Alt. 1 and 2A.	Same as Alt. 1.	Similar to Alt. 1.	Similar to Alt. 1; however, ARAR waiver may not be available for the consolidation area for Risk Case 2.	$4330/Case 1 91O/Case 2
3A. Excavate and dispose of soil/sediment in an on-property disposal facility; off. property disposal of material not meeting WAC for disposal facility.	Same as Alt. 1.	Same as Alt. 2A.	Similar to Alt. 2A.	Same as Alt. 1.	Similar to Alt. 2A.	Similar to Alt. 2A, except that Risk Cases 6 and 7 have no difficulty related to access to off-property soil.	$630/Case 3 630/Case 4 610/Case 5 580/Case 6 580/Case 7
3C. Excavate and dispose of soil/sediment not meeting WAC for an on-property consolidation area off property. On-property disposal of material meting WAC for unit.	Same as Alt. 1.	Same as Alt. 2A.	Effective and permanent. Provides residual risk between that provided by Alt. 1 and 2A.	Same as Alt. 1.	Similar to Alt.	Similar to Alt. 1, although less off-site disposal capacity is needed, except that Risk Cases 6 and 7 have no difficulty related to access to off-property soil.	$820/Case 3 800/Case 4 770/Case 5 830/Case 6 770/Case 7

TABLE 8-1
(Continued)

Alternative a	Overall Protection of Human Health and Environment	Compliance with ARARs b	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility or Volume Through Treatment	Short-Term Effectiveness	Implementability	Estimated Present-Worth Cost/Risk Case c (Millions of Dollars)
4A. Excavate and dispose of soil/sediment in an on-property disposal facility; off-property disposal of material not meeting WAC for disposal facility.	Same as Alt. 1.	Same as Alt. 2A.	Similar to Alt. 2A.	Same as Alt. 1.	Similar to Alt. 2A.	Same as Alt. 3A, Risk Cases 6 and 7.	$610/Case 8 580/Case 9
4C. Excavate and dispose of soil/sediment not meeting WAC for an on-property consolidation area off property. On-property disposal of material meeting WAC for unit.	Same as Alt. 1.	Same as Alt. 2A.	Similar to Alt. 3C.	Same as Alt. 1.	Similar to Alt. 1.	Similar to Alt. 3C, Risk Cases 6 and 7.	$800/Case 8 780/Case 9
No action	Cannot ensure that alternative would be protective of human health and the environment in the long term.	Does not meet all ARARs.	Provides unacceptable residual risk; not effective over the long term.	No treatment.	No short-term risks to workers or the public; no short-term environmental impacts.	Easiest to implement because no action is required.	$0

a More detail on alternatives is given in Section 7.2. Differences between similar alternatives.(e.g., 2A, 3A, 4A) relate to different land-use objectives and associated risk scenarios. For all action alternatives, groundwater would be extracted, treated, and discharged.
b Applicable or relevant and appropriate requirements,
c Risk cases are defined in Section 7.1.2 and Table 7-1.
d Waste acceptance criteria.

8.2 PRIMARY BALANCING CRITERIA

8.2.1 Long-Term Effectiveness and Permanence

All of the action alternatives would reduce the residual risks associated with contaminated soil or treatment residuals to an acceptable level. Remedial alternatives employing off-site disposal would leave the least amount of contaminated materials at the FEMP. Alternatives 1 and 2C (Risk Case 1) would be most effective because they would leave no contaminated material above remediation levels on site. Alternatives 2C (Risk Case 2), 3C and 4C would remove less contaminated soil from the site than Alternatives 1 and 2C (Risk Case 1) but more than Alternatives 2A, 3A and 4A, which rely primarily on on-property disposal. All action alternatives would include pumping and treating contaminated groundwater from the Great Miami Aquifer and removing contaminated perched water zones that threaten the Great Miami Aquifer through cross-media pathways. For all action alternatives, verification and certification sampling would ensure remediation of contaminated soil to appropriate levels.

The residual risk for Alternatives 2A, 3A and 4A would be the highest for the action alternatives. Because the no-action alternative would remove no contaminated soil or groundwater, it would have the highest residual risk of all the alternatives.

Each of the alternatives employing a disposal facility or consolidation area relies on engineering measures or institutional controls to ensure the long-term performance of the remedy and maintain the protection of human health and the environment over time. These measures and controls are adequate to provide reliable, long-term protection for up to 1000 years. For Alternative 1 and Risk Case 1 of Alternative 2C, no long-term management of the site would be necessary because of the removal and off-site shipment of all materials above remediation levels.

8.2.2 Reduction of Toxicity, Mobility, or Volume Through Treatment

All of the action alternatives rely on treatment to address contaminated storm water and recovered groundwater before discharge to the Great Miami River. Treatment options were studied for application to contaminated soil but were not adopted as a main component of any of the remedial alternatives due to lack of cost effectiveness. During the remedial action, DOE will continue to evaluate emerging technologies for potential application to the selected remedy to promote cost effectiveness, waste minimization, and successful on- and off-property disposal of wastes.

The no-action alternative provides no treatment.

8.2.3 Short-Term Effectiveness

Because no remedial activity would be taken, the no-action alternative would cause the least short-term impact. Each of the other alternatives involves earth moving and other construction activity, operation of treatment facilities, and material transport. Thus, all action alternatives would pose some risk to the environment, workers, and the public. However, these impacts can be effectively controlled through the application of mitigative measures such as the suppression of dust, restoration of wetland areas, rigorous worker health and safety programs, and monitoring.

The lowest short-term risks for the action alternatives are associated with those alternatives (2A, 3A, and 4A) relying on disposal in an engineered on-property facility. Those remedial alternatives (1, 2C, 3C, and 4C) relying on off-site disposal as a major means for material disposition present the highest overall short-term risks due to the added potential for injuries and fatalities associated with transporting large quantities of material to an off-site disposal location.

All action alternatives except Risk Case 1 of Alternatives 1, 2A, and 2C would require 27 years to implement. Risk Case 1 would require 75 years to implement because of the additional time required to achieve groundwater remediation levels.

8.2.4 Implementability

The no-action alternative would be the most readily implemented because it requires no remedial activity.

The soil remediation component of all the action alternatives is generally technically feasible and implementable using existing technologies and construction methods. In particular, on- and off-property disposal of soil and sediment is considered readily implementable. However, excavating soil to achieve a 10-6 residual risk level for residential farming (Risk Case 1 for Alternatives 1, 2A and 2C) may prove difficult because it would be hard to distinguish cleanup levels from natural background concentrations. Excavation boundaries could not be delineated using real-time field monitoring due to the insensitivity of available techniques at the required detection levels. At the 10-6 residual risk level, all analysis would need to be conducted using a conventional analytical laboratory.

The typical turnaround times for such a facility would interfere with the continuity of field activities, including excavation and backfilling.

The groundwater restoration component of all the action alternatives is considered implementable using available technology. There is considerable uncertainty in the amount of time required to attain groundwater remediation levels for uranium and several other contaminants; however, 27 years is estimated for all action alternatives except Risk Case 1 of Alternatives 1, 2A, and 2C, which is estimated to require 75 years. This uncertainty is due to difficulty predicting the rate at which contaminants will be released to groundwater from the silt, sand, and gravel that make up the aquifer. DOE will continue to investigate technologies, such as water reinjection, to enhance contaminant recovery and reduce the time required to attain groundwater remediation levels. Reinjection would potentially involve the pumping of treated groundwater back into the aquifer to increase the rate of flow and create a flushing effect that would speed contaminant release.

The administrative feasibility of alternatives relying primarily on an on-property engineered disposal facility is higher than that of other action alternatives. Administratively, alternatives involving off-site disposal of a major portion of the contaminated material (1, 2C, 3C, and 4C) may be less readily implementable than those involving primarily on-property disposal in an engineered disposal (2A, 3A, and 4A) because the availability of disposal capacity at an off-site location is unclear, with the uncertainty compounded by the potential 22-year duration of soil remediation. In addition, obtaining a waiver from the State of Ohio's solid waste disposal siting requirements is unlikely for alternatives that rely on a consolidation area (2C, 3C, and 4C).

At the 10-6, and to a lesser extent at the 10-5 residual risk level, access to off-property locations to conduct remedial activities would be required. Gaining such access may prove difficult and cause delays. In the event voluntary access could not be acquired, access to the private properties would need to be sought through legal action, a time-consuming and relatively unpredictable process. Administrative feasibility would be higher for those risk cases that involve less stringent cleanup levels for off-property soil; i.e., Alternatives 3A (Risk Case 6), 3C (Risk Case 7), and 4A and 4C (Risk Cases 8 and 9).

8.2.5 Cost

No costs are associated with the no-action alternative.

The lowest estimated costs for the action alternatives are for Alternatives 3A and 4A, which involve on-property disposal of virtually all contaminated material and which generally have the highest cleanup levels for soil. The highest estimated costs are associated with Risk Case 1 of Alternatives 1, 2A, and 2C, which involve off-property disposal and/or the lowest cleanup levels for soil. intermediate in terms of estimated costs are Alternatives 3C, 4C, and Risk Case 2 of Alternatives 1, 2A, and 2C, which have higher cleanup levels for soil than does Risk Case 1.

Total estimated present-worth costs for all alternatives are given in Table 8-1.

8.3 MODIFYING CRITERIA

8.3.1 State Acceptance

As discussed in detail in Section 9.0, DOE has selected Alternative 3A as the most appropriate remedy for Operable Unit 5 at the FEMP. Alternative 3A provides the best balance among the remedy selection criteria provided by the CERCLA NCP. The State of Ohio supports DOE's selected alternative and has issued a letter documenting this support (provided in Appendix A). In their letter, the State of Ohio has requested that DOE agree to certain stipulations for obtaining state concurrence on the selected remedy. The principal stipulations are:

- No disposal or long-term storage of off-site waste in the proposed engineered disposal facility or any other facility on the FEMP site

- The disposal facility waste acceptance criteria should be set at a maximum of 1030 parts per million total uranium with the flexibility to be lowered based upon other operable unit decisions and volumes

- The waste acceptance criteria must represent an upper limit and not be used as an average limit.

- No characteristic hazardous waste should be disposed of in the facility

- DOE must not use dilution to meet waste acceptance criteria or remediation levels

- DOE should commit to being open to consider new technologies which may reduce the volume, toxicity, or mobility of waste being disposed of on site.

DOE has responded to the issues raised by the State of Ohio in the Responsiveness Summary. In Section 9.0 and the Responsiveness Summary, DOE has incorporated an implementation approach to satisfy each of the stipulations requested by the State of Ohio.

The State of Nevada and the State of Utah concur with the balanced approach to site remediation (shipping the higher-level contaminated material off site combined with management of lower-level contaminated material on site) adopted for Operable Unit 5. Both states conveyed that by taking a balanced approach, their support for the receipt of out-of-state wastes would continue. Letters of support from both the State of Nevada and the State of Utah are provided in the Responsiveness Summary.

8.3.2 Community Acceptance

Community input on the alternatives for remedial action for Operable Unit 5 was solicited during the public comment period from May 1 to June 30, 1995. Many members of the local community are

personally opposed to on-property disposal and expressed their preference for off-site disposal of all of Operable Unit 5's soil, regardless of cost and implementability considerations. Other members of the community (including the Fernald Citizens Task Force) expressed an understanding of the necessity of taking a balanced approach to site cleanup. In general, all commentors; were in agreement to restore the Great Miami Aquifer to full beneficial use. While expressing reservations about on-property disposal, the comments received did not identify any technical omissions or errors in the development of the alternatives for Operable Unit 5 or the technical basis for the selection of the preferred alternative. Responses to community comments are found in the Responsiveness Summary.

9.0 SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the results of the detailed analysis of alternatives using the nine criteria, and public comments, DOE and EPA have determined that Alternative 3A is the most appropriate remedy for Operable Unit 5 at the FEMP.

Alternative 3A provides for the protection of existing and projected future human and environmental receptors through the implementation of remedial actions involving: the excavation of soil, sediment and perched water zones containing concentrations of COCs above the final remediation levels (presented in Section 9.2); on-property disposal of the excavated materials in an engineered disposal facility; restoration of the Great Miami Aquifer through pump and treat technologies to attain the final remediation levels; collection of contaminated storm water; treatment of collected storm water and process wastewater generated through remedial activities and recovered contaminated groundwater to the extent necessary to ensure that discharge limits are attained and final remediation levels for the receiving surface water streams are not exceeded; long-term groundwater monitoring; and continued federal ownership of the FEMP, or portions thereof, to the extent necessary to ensure the continued protection of human health and the environment.

During the remedial design and remedial action processes new information may be developed that supports enhancing or making a change to the remedy selected in this ROD. This information could be a result of additional investigations at the site or the processes of design or value engineering following issuance of the ROD. If a nonsignificant or minor change to the ROD is deemed necessary, it will be recorded in a postdecision document file; nonsignificant changes are those that do not significantly affect the scope, performance or cost of a remedy. If a significant change to a component of the remedy in the ROD is warranted, it will be documented in an Explanation of Significant Differences. If a fundamental change to the overall remedy is deemed appropriate, it will be made through issuance of a ROD amendment. A fundamental change to a remedy typically involves a reconsideration of the overall management approach for addressing the hazardous substances in the environment. Any changes deemed necessary to the remedy selected in this ROD will be implemented in a manner consistent with applicable EPA guidance, and the technical and public participation requirements of the NCP.

This ROD provides for the on-property disposal of contaminated materials originating on-site. Contaminated materials to be placed into the on-property disposal facility (following any necessary demonstration of the attainment of waste acceptance criteria) include: contaminated soil and sediment; water and wastewater treatment sludges, spent resins and filter media; miscellaneous rubble from the construction, demolition and maintenance of water, wastewater and storm water conveyance, equalization, and treatment systems; investigation-derived waste from Operable Unit 5 investigation, sampling and analysis efforts; miscellaneous waste (i.e., respirators, protective clothing, etc.,) generated consequentially to the planning and implementation of remedial actions; and sludges and other wastes derived during the conduct of engineering studies (i.e., treatability, proof-of-process, etc.,) on Operable Unit 5 materials.

This ROD provides an explicit prohibition to the placement of any waste generated off of the FEMP in the on-property disposal facility. Specifically excluded from this prohibition are laboratory wastes generated at off-site facilities resulting directly from the chemical, radiological and engineering analysis of FEMP waste materials/contaminated media or wastes generated at off-site facilities during the conduct of treatability or demonstration type studies on FEMP material.

9.1 KEY COMPONENTS

The selected remedy consists of 10 key components: soil and sediment; perched water; regional groundwater aquifer; storm water/wastewater; treatment of discharges; measures to minimize environmental impacts; institutional controls/monitoring; the corrective action management unit (CAMU) rule; cost; and community involvement. Each is discussed below.

9.1.1 Soil and Sediment

Soil and sediment exceeding final remediation levels (discussed in Section 9.2) will be excavated with conventional construction equipment. Figure 9-1 provides a planning-level estimate of the projected footprint of soil and sediment requiring excavation as part of the selected remedy. The exact boundary of required excavation will be established through the completion of a verification sampling program before field activities begin. Excavation is projected to generally proceed from the northeastern portion of the facility toward the southwest to take maximum advantage of natural drainage patterns to minimize the potential for the recontamination of previously excavated areas resulting from contact with contaminated runoff. Appropriate mitigative measures will be used during excavation activities to minimize the resuspension of dust particles. Excavation will continue until a
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certification sampling program indicates with reasonable confidence that the concentrations of contaminants at the entire site are statistically less than the final remediation levels. Excavated areas will be regraded, backfilled (as necessary) and a vegetative cover reestablished. Environmental and worker health and safety monitoring will be provided during excavation activities.

Figure 9-1 indicates the need for substantial excavation activities in the former production area. Consequently, a necessary integration of remedial activities must take place between Operable Units 3 and 5. The excavation of soil within this area must be properly sequenced with building demolition activities. It is envisioned that the excavation of contaminated soil will take place coincidental with building foundation and subsurface utility removals. The specific sequencing of remedial activities will be developed during the remedial action phase of the project.

Excavated soil will be placed into an on-property engineered disposal facility using conventional construction equipment. The facility will be situated at a location on the FEMP property which exhibits the best available geology. A field investigation is currently underway to establish the best location for the disposal facility. The disposal facility will be designed such that the contents are placed at or above grade with minimal potential for human or biotic intrusion. The disposal facility design will include an engineered lining and capping system to minimize water infiltration and provide for the long-term protection of the Great Miami Aquifer. Contaminant-specific waste acceptance criteria have been established for the disposal facility (see Section 9.2). Soil exhibiting contaminant concentrations that exceed these waste acceptance criteria will be shipped off site for disposal. Off-site disposal will be conducted consistent with the terms of the Amended Consent Agreement and EPA's Off-Site Rule (see Appendix B.5.1 of the Operable Unit 5 FS Report (DOE 1995a). In the event off-site disposal capacity becomes

unavailable or cost prohibitive, physical or chemical techniques will be examined to treat the soil to attain the waste acceptance criteria. Approval will be sought from EPA before the application of any soil treatment technology.

The selected remedy consists of the following key components for soil and sediment:

- Performance of a verification sampling program to establish the specific horizontal and vertical boundaries of required excavation to attain the final remediation levels.

- Excavation of site soil and sediment to the extent necessary to attain the final remediation levels. Excavation will be performed in such a manner as to minimize the potential short-term impacts to human health and the environment through the implementation of mitigative measures such as dust suppression and storm water run-on/runoff control.

- Performance of a certification sampling program following excavation activities to demonstrate that the final remediation levels have been attained.

- Application of DOE's as low as reasonably achievable (ALARA) principles through the use of hand-held instruments to support the verification sampling and excavation processes. To the extent economically practical, detection limits achievable with hand-held instruments will be used to reduce the final remediation level for on-property soil containing relatively nonleachable forms of uranium from 80 ppm to 50 ppm.

- Establishment of waste acceptance criteria for the on-property disposal facility (see Section 9.2) for Operable Unit 5 materials. These criteria include a maximum waste acceptance criteria of 1030 ppm of total uranium for the on-property disposal facility.

- Transportation and on-property disposal of excavated material attaining the waste acceptance criteria.

- Transportation and off-site disposal of excavated material exceeding the waste acceptance criteria. For soil that exceeds the waste acceptance criteria due to the presence of nonradiological constituents, cost-effective treatment (e.g., thermal desorption) will be applied in order for the soil to meet the criteria. If deemed necessary for excavated materials or water treatment residuals that exceed the waste acceptance criteria for radiological constituents, treatment will be applied in order for the material to meet the criteria.

- Continuation of efforts to examine and apply, where practical, emerging technologies pertaining to treatment of soil and sediment. These technologies will include potential methods to reduce the quantity of material requiring disposal in the on-property facility provided they are demonstrated to be cost effective and implementable. Engineering studies will be performed on two emerging technologies to assess their viability for application to the Operable Unit 5 remedy: soil amendment with phosphate additives and physical separation techniques.

- Continuation of efforts to examine and apply, where practical, throughout the duration of remedial activities, new methods or technologies to mitigate environmental releases occurring as a result of the implementation of remedial actions.

- Site-wide restoration of impacted areas following excavation and certification sampling. Restoration will include regrading to blend with the surrounding topography and to promote positive drainage, seeding, fencing, and reestablishment of wetlands, as

required.

- Operable Unit 5 soil and sediment excavation and interim storage will be conducted consistent with the requirements of the EPA-approved Removal Action 17 Work Plan (Improved Storage of Soil and Debris) until such time as the appropriate Operable Unit 5 remedial design is approved by EPA. The Operable Unit 5 remedial design deliverable addressing soil management practices during remedial action will contain the final strategy for excavation and interim storage/staging of contaminated materials originating from Operable Unit 5. At that point, Removal Action 17 will be terminated and soil and sediment excavation activities will be conducted in accordance with the approved remedial design plan.

- Based on historical process knowledge and soil contaminant concentration levels identified through the Operable Unit 5 remedial investigation, six geographic areas of the FEMP have been identified where a reasonable potential exists for the presence of soil that qualifies as RCRA characteristic waste (see Table 9-1) and provides a reasonable opportunity for treatment. Within these six geographic areas, additional efforts will be made to identify and segregate for treatment (as needed) the soil that qualifies as RCRA characteristic waste. As soil is excavated from within these areas based upon exceedences of final remediation levels, follow-up analytical testing will be performed to determine if the soil demonstrates a RCRA characteristic. If the soil does not demonstrate a RCRA characteristic and it satisfies the on-property numerical waste acceptance criteria it will be placed in the disposal facility. If a representative volume of the soil in question demonstrates a characteristic it will be preferentially segregated for treatment (to remove the characteristic property) before disposition either on or off site. DOE, EPA, and OEPA agree that sufficient existing data and historical process knowledge are available to identify the boundaries of the six geographic areas as those that represent a reasonable opportunity for cost-effective soil treatment. Outside of these geographic areas, DOE, EPA, and OEPA all concur that there is no reasonable basis to conclude that an increased potential for the presence of RCRA characteristic waste exists that would provide additional opportunity for cost-effective soil treatment. Therefore, outside the boundaries of the six geographic areas, no additional analytical data will be required to screen for the presence of characteristic waste before placement in the disposal facility. Treatment is expected to involve EPA-approved stabilization technologies (for inorganic constituents) or low temperature thermal destruction techniques (for organic constituents), as necessary. The EPA's toxicity characteristic leaching procedure (TCLP) will be used to guide the identification of material requiring treatment from within the boundaries of the six geographic areas. The remedial design effort will provide the details of 1) the statistical and testing protocols necessary to establish representative soil volumes requiring treatment; 2) the treatment processes to be employed; and 3) the procedures for verifying the treatment's effectiveness.

- A best management approach will also be applied during all excavation activities to identify, segregate (and treat as necessary) soil containing concentrations of organic compounds at levels that potentially could jeopardize the integrity of the earthen liners that are built into the on-property disposal facility. To accomplish this objective, DOE will employ hand-held organic vapor analyzers during the excavation process to identify material exhibiting elevated concentrations of organic compounds. The materials so identified will be preferentially segregated and treated before on-property disposal. Treatment is expected to involve EPA-approved low temperature thermal destruction

TABLE 9-1

RCRA CHARACTERISTIC SOIL AREAS DESIGNATED FOR IDENTIFICATION, SEGREGATION, AND TREATMENT*

Area Description	Justification
Inactive HWMUs to be Closed Under CERCLA:	
Abandoned sump west of pilot plant	Sump contents failed TCLP for metals. Barium exceeded the 20 times Rule a at a soil sample depth of 10-10.5 ft.
Non-HWMU Areas:	
Area between KC-2 warehouse and railroad tracks	Several samples showed surficial contamination for lead exceeding the 20 times rule.
Trap range	RI data showed that lead contamination from lead shot exceeds the 20 times rule.
Paddys Run streambank: fill material west of silos	RI data indicated that concentrations of the following constituents may exceed the 20 times rule: lead, nitrobenzene, hexachloroethane, hexachlorobutadiene, hexachlorobenzene, heptachlor, and heptachlor epoxide.
Scrap metal pile area	Surficial soil samples exceeded the 20 times rule for toxaphene, heptachlor, methoxychlor, heptachlor epoxide, endrin and lead.
Area north of maintenance budding	Subsurface samples exceeded the 20 times rule for vinyl chloride, endrin, heptachlor, heptachlor epoxide, endrin, and lead.

* Areas for which RCRA characteristic testing and soil treatment (if needed) will be implemented to satisfy the regulatory preference for treatment contained in Section 264.552 of the CAMU Rule. These area were identified based on process knowledge and existing data obtained through the Operable Unit 5 remedial investigation, and represent locations where sufficient quantities of material may be present to consider cost-effective treatment.

a The "20 times rule" is a conservative suggestion in EPA guidance whereby soil with contaminant concentrations numerically exceeding 20 times the TCLP limit is considered to have increased potential to demonstrate a RCRA characteristic.

techniques and the EPA's TCLP will be used as the benchmark for determining the extent of treatment necessary before disposal. The remedial design effort will outline the specific testing protocols for employing the hand-held organic vapor analyzers and verifying the effectiveness of treatment.

- In the event the Site Treatment Plan developed under the Federal Facilities Compliance Act identifies treatment technologies other than low temperature thermal destruction that may be appropriate for the treatment of organic compounds in soil, such alternate technologies will be considered and evaluated during remedial design.

9.1.2 Perched Water

Perched water zones presenting an unacceptable threat (i.e., having a cross-media impact to the Great Miami Aquifer that would produce concentrations in groundwater exceeding the existing or proposed MCLs) to the underlying aquifer will be excavated with the contaminated soil. Excavation will take place using conventional excavation equipment. Perched water zones requiring excavation as part of the selected remedy are included in Figure 9-1 which delineates the projected footprint of excavations for soil and sediment. Considerations associated with the excavation, staging and soil transportation process are as discussed above for soil and sediment. Excavated subsurface soil removed to address perched water may, if necessary, be temporarily staged at an appropriate location to permit excess liquids to drain. Such drainage and water collected during perched water zone removal will be transferred to the advanced wastewater treatment facility for treatment before discharge. Collected perched water containing volatile organic compounds will be directed through a carbon absorption treatment system (or equivalent) located at the advanced wastewater treatment facility. Perched water collected during excavation at the fire training area and the sludge drying beds at the sewage treatment plant will be segregated and pretreated, if necessary, to address any listed hazardous wastes before joining the remaining FEMP wastewater streams. The perched water collected during excavation from the vicinity of the fire training area and the sludge drying beds (both facilities are designated RCRA-listed waste management units) will be pretreated to avoid introducing RCRA-listed hazardous wastes into the main water treatment processes at the FEMP's advanced wastewater treatment facility. The residuals resulting from this pretreatment step will be managed as RCRA-listed hazardous waste.

Excavated subsurface soil will be placed into an on-property disposal facility. Subsurface soil exhibiting contaminant concentrations which exceed the waste acceptance criteria for the disposal facility will shipped off site for disposal. Considerations for the on-property disposal of contaminated material are as previously discussed for soil and sediment.

In the event field conditions preclude the ability to effectively implement the excavation option to address a given perched water zone, limited application of pumping or trenching may be used to attain necessary remediation levels.

The selected remedy consists of the following key components for perched water:

- Excavation of perched water zones necessary to ensure the continued protection of the regional groundwater aquifer.

- Disposition of the excavated soil generated during the removal of the impacted perched zones in a manner consistent with the methods defined for soil.

- Treatment, as required, of contaminated perched water and storm water collected during excavation operations.

9.1.3 Regional Groundwater Aquifer

Areas of the Great Miami Aquifer exceeding final remediation levels (see Section 9.2) will be restored through extraction methods. The areas of the aquifer requiring remediation are identified in Figure 9-2. Modeling conducted to support the FS identified the need for 28 extraction wells distributed across the affected areas of the aquifer. These 28 wells are divided into four extraction well systems and are identified in Figure 9-3. The final number and configuration of these extraction wells will be established during remedial design.

The FEMP presently has an extraction well network located at the leading edge of the South Plume, installed as part of a removal action. These wells are an integral part of the required recovery well system for the selected remedy. The FEMP is in the process of installing additional extraction wells in the South Field that are part of the system contemplated by the selected remedy.

Modeling conducted to date suggests that a combined maximum pumping rate of 4000 gpm from the extraction well system will be required for up to 27 years to fully attain the final remediation levels throughout all portions of the aquifer. The DOE has committed, as part of the selected remedy, to examine enhancement technologies to improve the extraction well system described in the FS. One such technique is reinjection of treated or clean water into the aquifer to enhance the flushing effect. Such a technique may reduce the projected time period to achieve full aquifer restoration. Enhancement techniques will be examined during remedial design and will be applied only with the specific approval of EPA.

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The selected remedy consists of the following key components for regional groundwater:

- Extraction of contaminated groundwater until such time as final remediation levels are attained at all points in the impacted areas of the Great Miami Aquifer.

- Performance of an engineering study to examine the viability of applying reinjection techniques to enhance contaminant recovery from the aquifer system; application of reinjection to groundwater restoration activities where established to be economically and technically viable.

- Collection of recovered groundwater for treatment and/or discharge to the Great Miami River or reinjection (if deemed appropriate).

9.1.4 Storm Water/Wastewater

The FEMP maintain a storm water collection system which includes conveyance systems and retention basins. This system is designed to prevent contaminated storm water from entering the SSOD and Paddys Run. As part of the selected remedy, the FEMP will continue to operate this system until such time as soil final remediation levels are attained on a site-wide basis or until jointly deemed unnecessary by DOE and EPA.

Sanitary and process wastewater continue to be generated at the FEMP as a result of the occupancy of the site by the work force and due to ongoing cleanup initiatives such as building decontamination. Additionally, process wastewater is expected to be generated as a consequence of the implementation of remedial actions for Operable Unit 5 and the other four operable units. The FEMP will continue to collect and direct this wastewater for treatment, as necessary, as part of the selected remedy.

The selected remedy includes the following key components for storm water and wastewater:

- Collection of contaminated storm water, using the existing FEMP retention basin, as necessary during the implementation of site-wide remedial actions to minimize discharges of contaminants to Paddys Run and the resultant impacts to the regional aquifer. Sedimentation sludges from the basin will be dewatered to the extent necessary and placed into the on-property disposal facility. In the event a portion or all of these sludges exceed the waste acceptance criteria for the disposal facility they will be transported off the site for disposal at an appropriate facility. Sludge treatment will be applied only with the approval of EPA.

- Collection and treatment, as required, of wastewater generated during the conduct of remedial actions at all FEMP operable units.

9.1.5 Treatment of Discharges

The FEMP will construct and operate the treatment facilities necessary to attain mass-based discharge limits to the Great Miami River. Storm water, wastewater and groundwater will be treated in existing and expanded facilities such that the monthly average concentration in the combined discharges to the river does not exceed the final remediation. levels for surface water in Paddys Run or the Great Miami River (see Section 9.2). Additionally, treatment will be applied such that the total mass and blended effluent concentration of uranium discharged to the Great Miami River does not exceed 600 pounds per year or 20 ppb, as further defined below. Available wastewater treatment capacity will be applied first to highest concentration streams to effectively minimi e the concentration and mass of uranium present in the blended effluent discharged to the Great Miami River.

Treatment will be applied to storm water, wastewater and recovered groundwater to the extent necessary to limit the total m s of uranium discharged through the FEMP outfall to the Great Miami River to 600 pounds per year and to ensure that the levels necessary to ensure the protection of human health (i.e., 530 ppb total uranium outside the mixing zone) for concentrations of uranium and other COCs in the Great Miami River are not exceeded. This mass-based discharge limit will become effective upon issuance of the ROD. Additionally, the necessary treatment will be applied to these streams to limit the concentration of total uranium in the blended effluent to the Great Miami River to 20 ppb. The 20 ppb discharge limit has been adopted as a performance-based requirement of the selected remedy as it is considered reasonably attainable with the application of a sensible and cost-effective level of treatment. The 20 ppb discharge limit for uranium will be based on a monthly average and will become effective January 1, 1998.

The FEMP will be allowed to by-pass storm water directly from the site's storm water retention basin to the river for up to 10 days per year to accommodate periods of significant precipitation. The intent of allowing the by-pass of these flows is to provide the relief needed during periods of excessive precipitation when the quantities of storm water exceed retention and treatment capacities. The uranium concentration in the blended discharge during these 10 days will be considered in the 600 pound per year mass-based limit, but will not be included in the monthly average for purposes of demonstrating compliance with the 20 ppb performance-based concentration limit. Uranium concentrations in the effluent discharged to the river for these 10 days will not permit an exceedance of the final remediation level (530 ppb total uranium outside the mixing zone) for the river.

Notification will be provided to EPA and OEPA within seven days of the implementation of such a direct by-pass.

Additionally, needed relief from the discharge limits will be provided to the FEMP to accommodate scheduled treatment plant maintenance activities. The uranium concentration in the blended discharge during these periods will be considered in the 600 pound per year mass-based limit. EPA approval will be obtained in advance when notification of these planned maintenance periods is accompanied by a request that the uranium concentrations in the discharge not be considered in the monthly averaging performed to demonstrate compliance with the 20 ppb limit.

To attain these mass-based and concentration-based discharge limits, DOE has committed to expanding the design capacity of the existing advanced wastewater treatment facility by a minimum of an additional 1800 gpm. Schedules for designing and constructing this additional treatment capacity will be defined as part of the RD/RA process. The process for reporting and instituting corrective measures for the groundwater extraction and treatment systems, in the event discharge limits are exceeded, will be established as part of remedial design.

Treatment sludges will be placed into the on-property disposal facility to the extent they attain the waste acceptance criteria for the facility. Sludges not attaining the waste acceptance criteria will be transported off site for disposal. Off-site disposal will be conducted consistent with the terms of the Amended Consent Agreement and EPA's Off-Site Rule. In the event off-site disposal capacity becomes unavailable or cost prohibitive, physical or chemical techniques will be examined to treat the sludges to attain the waste acceptance criteria. Approval will be sought from EPA before the application of any sludge treatment technology.

The selected remedy includes the following key components for treatment of discharges:

- Treatment of collected storm water, wastewater, and recovered groundwater before discharge to the Great Miami River to the extent necessary so as not to exceed final remediation levels for surface water in the Great Miami River.

- Treatment of the necessary wastewater, storm water and groundwater to ensure that the maximum annual mass discharge of uranium to the Great Miami River from the FEMP effluent does not exceed 600 pounds. The 600 pound per year discharge limit for uranium will become effective upon issuance of the ROD.

- Treatment of the necessary wastewater, storm water and groundwater to ensure that the maximum concentration of total uranium in the blended effluent discharged to the Great Miami River does not exceed 20 ppb based upon a monthly average concentration. This limit will become effective January 1, 1998.

- Expansion of the advanced wastewater treatment facility within the confines of existing Building 51. This expansion will have a minimum additional design capacity of 1800 gpm. Utilization of this treatment capacity to first address the highest concentration wastewater stream to effectively minimize the concentration and mass of uranium present in the blended effluent discharged to the river.

- Disposal of treatment sludges generated from site wastewater, storm water and groundwater treatment activities which meet the waste acceptance criteria in the on-property disposal facility. Conventional sludge thickening and dewatering techniques will be applied to the sludges to the extent necessary to facilitate placement in the on-property disposal facility.

- Disposal of treatment sludges which do not attain the waste acceptance criteria for the on-property disposal facility at an appropriate off-site disposal facility.

9.1.6 Measures to Minimize Environmental Impacts

All practical measures will be employed to minimize environmental impacts during implementation of the Operable Unit 5 remedial action. DOE has factored environmental impacts into the decision-making process for the remedial action as discussed below.

Measures to minimize environmental impacts to on-property national resources (e.g., wildlife and wildlife habitat, wetlands, floodplains, surface water, groundwater) have been identified in the final Operable Unit 5 FS Report and Proposed Plan. Remedial activities are not expected to alter flow patterns or uses of the 100- and 500-year floodplain of Paddys Run at the FEMP. The implementation of engineering and/or natural controls (e.g., silt fences and hay bales) will minimize indirect impacts such as runoff and sediment deposition to the floodplain.

Impacts to on-property vegetation and wildlife habitat will result from the removal of contaminated soil and sediment and construction of support facilities. Approximately 115 acres of on-property grassland will be impacted and later restored by revegetation.

Approximately 7.5 acres of early to mid-successional woodlands, 16.5 acres of riparian habitat along 1375 feet of Paddys Run, and 50 acres of pine plantation will be impacted. These impacts will be offset by implementing mitigative measures such as revegetation with native tree species in consultation with appropriate federal and state agencies.

Because habitat of the Sloan's crayfish, listed as threatened in Ohio, could be impacted from increased sediment load into Paddys Run, control measures will be used to minimize the impact of sediment deposition to Sloan's crayfish habitat. If necessary, Sloan's crayfish will be relocated upstream of remedial activities in pooled sections of Paddys Run.

A total of approximately 10 acres of wetlands will be impacted as a result of the implementation of the Operable Unit 5 remedial, action. Mitigation for wetland impacts will be determined using the Section 404 (b)(1) guidelines of the Clean Water Act. The need for compensatory mitigation will be determined after all practicable steps to avoid and minimize adverse impacts to wetlands have been applied.

To avoid impacts to cultural resources, Phase 1 and 2 archaeological surveys will be performed to determine the presence of historic and prehistoric (archaeological) sites eligible for the National Register of Historic Places. If a remedial action is found to have an adverse impact, consultation with the Advisory Council on Historic Preservation and the State Historic Preservation Office would be required under the National Historic Preservation Act, Section 106, process. If an adverse impact to a cultural resource cannot be avoided, a memorandum of agreement or programmatic agreement would be negotiated among the Advisory Council, the State Historic Preservation Office, and DOE which will identify mitigative measures.

The natural resource Trustees for the FEMP site include the Department of the Interior, DOE, and OEPA. The Trustees' role is to act as guardian for natural resources at or near the FEMP site that may have been injured as a result of a release of a hazardous substance or an oil spill. Negotiations with the Trustees are ongoing. Input from the Trustees is anticipated to be factored into the natural resource mitigation activities contemplated by the Operable Unit 5 selected remedy.

9.1.7 Institutional Controls/Monitoring

One element of the selected remedy that will be used to ensure protectiveness is institutional controls, including continued access controls at the site during the remediation period, alternate water supplies to affected residential and industrial wells, continued federal

ownership of the disposal facility and necessary buffer zones, and deed restrictions to preclude residential and agricultural uses of the remaining regions of the FEMP property. Additionally, proper notifications, as mandated by CERCLA, will be provided before the transfer of any federal real property which is known to contain or have been used in the processing of hazardous substances. These measures will minimize the potential for human exposure to contaminated soil and groundwater during the implementation of site-wide remedial actions, and to the contaminated material contained in the on-property disposal facility following completion of remedial activities at the site. Specific institutional control measures to be implemented at the site will be established during the remedial design and remedial action processes.

The Fernald Citizens Task Force issued recommendations regarding future use of the FEMP property in May of 1995. The Task Force recommended that the area of the FEMP containing the disposal facility and associated buffer zone remain under the continued ownership of the federal government. Additionally, the Task Force recommended that the remaining portions of the FEMP property be made available for the uses that are deemed most beneficial to the surrounding communities. The Task Force encouraged DOE to consult with the local communities to establish their preferences for future use and ownership of these areas of the site. Consistent with this recommendation, the DOE will work with the local communities during remedial design on establishing a final land use and ownership plan for the FEMP property. An institutional control plan, focused on specifying the short-term (i.e., during remedy implementation) and long-term institutional control measures to be applied at the site, will be developed during remedial design to complement this final land use plan.

Long-term environmental monitoring will also be conducted as part of the selected remedy. This monitoring will be designed to detect and quantify, to the extent practical, releases from the site attributable to the implementation of remedial actions and will include monitoring of the air, surface water and groundwater pathways. Monitoring devices providing real-time or near real-time data will be evaluated and applied, if practical. Monitoring will also be conducted following the completion of remedial actions to assess the continued performance of the remedy; groundwater monitoring will be continued for, at a minimum, the area of the disposal facility. The type ad frequency of monitoring activities will be established during remedial design, with necessary modifications to the program applied during or following remedy implementation.

Long-term maintenance will be provided as part of the selected remedy for the on-property disposal facility to ensure the continued protectiveness of the remedy. Additionally, reviews will be conducted every five years by EPA to evaluate the effectiveness of the remedy and the continued attainment of the media-specific final remediation levels (see Section 9.2). If, upon such review, it is the judgment of EPA that additional action or modification of remedial actions is appropriate in accordance with Section 104 or 106 of CERCLA, DOE may be required to implement additional actions or modify the existing action.

The selected remedy includes the following key components for institutional controls and monitoring:

- Continuation of access controls at the FEMP, as necessary, during the conduct of remedial actions. Property ownership will be maintained by the federal government of the area comprising the disposal facility and associated buffer areas.

- Maintenance of remaining portions of the FEMP property (outside the disposal facility area) under federal ownership or control (e.g., dead restrictions) to the extent necessary to ensure the continued protection of human health commensurate with the cleanup levels, established by the remedy. If portions of the FEMP property are transferred or sold at any future time, restrictions will be included in the deed, as necessary, and proper notifications will be provided as required by CERCLA.

- Maintenance of the on-property disposal facility will be performed to ensure its long-term performance and the continued protection of human health and the environment.

- Conduct an environmental monitoring program during and following remedy implementation to assess the short- and long-term effectiveness of remedial actions.

- Provision of an alternate water supply to domestic, agricultural and industrial users relying upon groundwater from the area of the aquifer exhibiting concentrations of contaminants exceeding the final remediation levels. The alternate water supply will be provided until such time as the area of the aquifer impacting the user is certified to have attained the final remediation levels.

9.1.8 Corrective Action Management Unit Rule

The CAMUs and Temporary Units (TUs) Final Rule (59 FR 8658 et seq., Vol. 58, No. 29, February 16, 1993, codified at 40 CFR §260.10 and 40 CFR §264.552) was promulgated to meet the objectives of a cleanup program under RCRA, as amended. Management of remediation (and investigation) waste within a CAMU is not subject to the strict RCRA Subtitle C requirements. Specifically, waste management activities within a CAMU are not subject to LDRs and MTRs. As defined at 40 CFR §260.10, remediation waste includes "all solid and hazardous wastes, and all media (including groundwater, surface water, soil, and sediment) and debris, which contain listed hazardous wastes, or which themselves exhibit a hazardous waste characteristic that are managed for the purpose of implementing corrective action requirements ... under RCRA." Remediation waste "may originate only from within the facility boundary, but may include waste ... [from] releases beyond the facility boundary" (i.e., on site under CERCLA).

The CAMU rule is identified as an applicable requirement for Operable Unit 5 (Appendix B, Table B.3). The seven criteria stated at 40 CFR §264.552(c) were used to designate the CAMU for the selected remedy (see Appendix B, Section B.1 of the Operable Unit 5 FS Report.) The boundaries of the CAMU are designated to be coincident with the FEMP property boundaries and encompass the on-property engineered disposal facility. Consolidation or management of on-site remediation wastes into or within the CAMU will not constitute the creation of a unit subject to MTRs [OAC 3745-68-011 and 265.301(a)] and will not invoke LDRs (OAC 3745-59 and 40 CFR §268.40 through .44).

Site-specific risk-based concentration standards have been employed to establish 1) final remediation levels to determine the extent of remediation, and 2) waste acceptance criteria of the on-property engineered disposal facility for consolidation of those remediation wastes which are to be managed on property. These site-specific remedial action objectives and cleanup levels are defined for the selected remedy in Section 9.2. The design, groundwater detection and closure requirements for the engineered on-property disposal facility will be finalized through the Operable Unit 2 remedial design process.

DOE, EPA, and OEPA reviewed remedial investigation data and site process knowledge to determine if areas of soil exhibiting a RCRA characteristic could be identified which offered a reasonable opportunity for the application of a cost-effective level of treatment before disposal. This review was conducted to further satisfy the regulatory preference for treatment contained in Section 264.552 of the CAMU rule. The review identified six geographic areas of the FEMP where a reasonable potential exists for the presence of RCRA characteristic waste in soil. These areas are summarized in the remedy description for soil provided in Section 9.1.1. Recognizing that a protective remedy has been selected for Operable Unit 5 soil, coupled with the desire on the part of DOE, EPA and OEPA to satisfy the regulatory preference for treatment, consensus has been reached by DOE, EPA, and OEPA that these six geographic areas represent the locations where a reasonable opportunity exists for cost-effective treatment of RCRA characteristic soil. DOE is

committed to identifying, segregating and treating, as necessary, contaminated soil from within the six geographic areas that exhibits one or more RCRA characteristics. Additional details of this commitment and the procedures for its implementation are provided in Section 9.1.1. As a result of the commitment to identify and treat RCRA characteristic soil from the six designated geographic areas, no significant quantities of RCRA characteristic wastes from Operable Unit 5 are envisioned to be disposed of in the on-property disposal facility.

The Operable Unit 5 remediation waste that is destined for on-property disposal may contain these listed RCRA constituents (shown with their waste codes): methylene chloride (F002), tetrachloroethylene (F002), toluene (F005), trichloroethylene (F002), 1,1,1-trichloroethane (F002), and xylene (F003). Under the provisions of the CAMU rule, these constituents will not be placed in the on-property disposal facility at concentration levels that exceed the health-protective waste acceptance criteria levels established for each constituent. Materials that are contaminated above the waste acceptance criteria for the listed constituents will either be 1) treated to meet the criteria or 2) shipped off site for disposal.

9.1.9 Cost

Table 9-2 presents the estimated costs for the selected remedy. The construction costs include: verification surveys to establish the boundaries of excavation; the excavation of contaminated soil and sediment; storm water controls; installation of the groundwater extraction system; expansion of the FEMP wastewater treatment facility; construction of the on-property disposal facility; and backfilling/regrading following attainment of final remediation levels. Operations and maintenance costs include: the labor, materials, fuel, utilities, chemicals and parts required to operate and maintain remedial systems; and transportation and disposal of contaminated materials. Postremediation costs include: the decontamination and demolition of remediation facilities; decontamination and free-release of equipment; and long-term monitoring.

TABLE 9-2
ESTIMATED COSTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Construction	$430,000,000
Operation & maintenance	$340,000,000
Postremediation	$ 70,000,000
Total cost (in constant 1995 dollars)	$840,000,000
Present-worth cost	$580,000,000
Total cost with escalation	$2,110,000,000

Table 9-2 presents the estimated cost of the selected remedy in three different manners; total cost, present worth cost, and total cost with escalation. The total cost of the remedy ($840,000,000) represents the total amount, in constant 1995 dollars, necessary to implement the selected remedy assuming no escalation or inflation occurs over the life of the remedy. The present worth cost ($580,000,000) represents the total estimated present worth cost of the remedy assuming a discount rate of 2.8 percent. The present worth cost represents the sum of money which must be placed into a bank at the onset of remedial activities at an interest rate of 2.8 percent to progressively pay for the entire scope and duration of remedial actions. The total cost with escalation ($2,110,000,000) represents the total estimated cost of remedial actions assuming that funding is provided on an annual basis and an annual escalation rate of 3.7 percent prevails throughout the duration of the remedy.

9.1.10 Community Involvement

The DOE and EPA are committed to continuing the active community involvement program currently in place at the FEMP throughout the duration of remedial activities at the site. This program will include: public meetings; public comment periods (as needed); newsletters; tours; and small focused group sessions assessing specific cleanup issues.

9.2 REMEDIAL ACTION OBJECTIVES AND CLEANUP LEVELS

Remedial action objectives were developed in accordance with the NCP and EPA guidance with the intention of setting goals to ensure the protection of human health and the environment. The objectives are designed to mitigate the potential adverse effects of site contaminants present in environmental media.

The remedial action objectives for Operable Unit 5 include eliminating, or reducing to acceptable levels, the potential for human or ecological receptors to come into contact with contaminated environmental media and prevention of off-property migration of contaminants in excess of the contaminant-specific final remediation levels. From these objectives, final remediation levels were developed for each of the environmental media to ensure that remedial actions reduce the projected risk to human and ecological receptors to protective levels consistent with anticipated future uses of the land or water.

While it is not the intent of this decision document to establish a future land use for the FEMP property, final remediation levels have been defined as part of the selected remedy for each of the environmental media. These final remediation levels establish the permissible concentration of contaminants which could remain at the site following the completion of remedial actions. The remaining (or residual) concentrations of these contaminants will present a potential for exposure and risk to future users of the FEMP. The degree of exposure and risk associated with these remaining concentrations would be directly linked to the type and duration of future land use of the facility. Future land uses contemplating more direct contact for longer intervals, such as residential farming, would be expected to yield a higher calculated exposure and risk than would future uses which involve less opportunities for long-term exposure, such as recreational use of the FEMP.

The Fernald Citizens Task Force has made the following recommendations for consideration by the DOE regarding the future use of the FEMP property:

- The area of the FEMP containing the disposal facility and associated buffer zone remain under the continued ownership of the federal government

- The remaining portions of the FEMP property be made available for uses that are the most beneficial to the surrounding communities

- Any agricultural or residential uses of the FEMP property be prohibited.

Consistent with these recommendations, the final remediation levels presented in Tables 9-3 through 9-6 have been designed to attain the following postremediation risk levels:

- A carcinogenic risk level of 10-5 and a HI of 1 to an off-property farmer

TABLE 9-3

FINAL REMEDIATION LEVEL FOR SOIL

Constituent	On-Property Final Remediation Levels	Off-Property Final Remediation Levels
Radionuclides (pCi/g)		
Cesium-137+1d	1.4 x 10 0	8.2 x 10-1
Neptunium-237+1d	3.2 x 10 0	4.9 x 10-1
Lead-210+2d	3.8 x 10 1	2.2 x 10 0
Plutonium-238	7.8 x 10 1	9.3 x 10 0
Plutonium-239/240	7.7 x 10 1	9.0 x 10 0
Radium-226+8d	1.7 x 10 0	1.5 x 10 0
Radium-228+1d	1.8 x 10 0	1.4 x 10 0
Strontium-90+1d	1.4 x 10 1	6.1 x 10-1
Technetium-99	3.0 x 10 1	1.0 x 10 0
Thorium-228+7d	1.7 x 10 0	1.5 x 10 0
Thorium-230	2.8 x 10 2	8.0 x 10 1
Thorium-232+10d	1.5 x 10 0	1.4 x 10 0
Uranium, total (K 1=325 L/kg a) (ppm)	8.2 x 10 1	5.0 x 10 1
Uranium, total (K 1=15 L/kg a) (ppm)	2.0 x 10 1	NA
Chemicals (mg/kg)		
Acetone	4.3 x 10 4	4.3 x 10-1
Antimony	9.6 x 10 1	6.1 x 10-1
Aroclor-1254	1.3 x 10-1	4.0 x 10-2
Aroclor-1260	1.3 x 10-1	4.0 x 10-2
Arsenic	1.2 x 10 1	9.6 x 10 0
Barium	6.8 x 10 4	1.2 x 10 2
Benzene	8.5 x 10 2	4.3 x 10-1
Benzo(a)anthracene	2.0 x 10 1	1.6 x 10-1
Benzo(a)pyrene	2.0 x 10 0	9.0 x 10-2
Benzo(b)fluoranthene	2.0 x 10 1	1.6 x 10-1
Benzo(k)fluoranthene	2.0 x 10 2	9.0 x 10-2
Beryllium	1.5 x 10 0	6.2 x 10-1
Bis(2-chloroisopropyl)ether	4.2 x 10 2	2.0 x 10-1
Bis(2-ethylhexyl)phthalate	8.2 x 10 2	2.6 x 10 1
Boron	7.4 x 10 3	4.0 x 10 0
Bromodichloromethane	4.0 x 10 0	1.8 x 10-1
Bromoform	3.1 x 10 1	1.6 x 10 0
Bromomethane	8.2 x 10 3	2.4 x 10-2
Cadmium	8.2 x 10 1	9.1 x 10-1
Carbazole	1.2 x 10 1	3.1 x 10 0
Carbon disulfide	5.0 x 10 3	6.2 x 10 0
Carbon tetrachloride	2.1 x 10 0	9.1 x 10-2

TABLE 9-3
(Continued)

Constituent	On-Property Final Remediation Levels	Off-Property Final Remediation Levels
Chemicals (Cont.) (mg/kg)		
Chlordane	1.9 x 10-1	3.8 x 10-2
Chlorobenzene	3.4 x 10 2	1.9 x 10 0
Chloroform	4.5 x 10 1	5.0 x 10-1
Chromium VI	3.0 x 10 2	1.1 x 10 1
Chrysene	2.0 x 10 3	1.6 x 10 1
Cobalt	7.4 x 10 2	2.6 x 10 1
Copper	2.2 x 10 5	2.0 x 10 1
Cyanide	1.2 x 10 5	8.0 x 10-1
Dibenzo(a,h)anthracene	2.0 x 10 0	1.6 x 10-3
3,3'-Dichlorobenzidine	5.5 x 10-1	2.0 x 10-1
1,2-Dichloroethane	1.6 x 10-1	1.3 x 10-1
1,1-Dichloroethene	4.1 x 10-1	5.9 x 10-2
Dieldrin	1.5 x 10-2	8.8 X 10-3
Di-n-octylphthalate	1.1 x 10 3	2.0 x 10-1
Ethylbenzene	5.1 x 10 3	1.0 x 10-3
Fluoride	7.8 x 10 4	8.5 X 10 2
Heptach1orodibenzofuran	8.8 x 10-4	5.0 x 10-5
Heptachlorodibenzo-p-dioxin	8.8 x 10-4	5.0 x 10-5
Indeno(1,2,3-cd)pyrene	2.0 x 10 1	1.6 x 10-2
Lead	4.0 x 10 2	4.0 x 10 2
Manganese	4.6 x 10 3	1.4 x 10 3
Mercury	7.5 x 10 0	3.0 x 10-1
Methyl-2-pentanone	2.5 x 10 3	9.4 x 10-1
Methylene chloride	3.7 x 10 1	6.3 x 10-1
4-Methy1phenol	2.5 x 10 2	2.7 x 10-1
Molybdenum	2.9 x 10 3	1.3 x 10 1 a
Nickel	1.5 x 10 4	3.4 x 10 1
4-Nitroanaline	1.5 x 10 2	8.0 x 10-1
N-nitrosodiphenylamine	5.1 x 10 1	1.3 x 10 1
N-nitrosodipropylamine	2.0 x 10-1	2.0 x 10-1
Octachlorodibenzofuran	8.8 x 10-3	1.0 x 10-5
Octachlorodibenzo-p-dioxin	8.8 x 10-3	1.0 x 10-5
Pentachlorophenol	2.3 x 10 0	9.7 x 10-1
Selenium	5.4 x 10 3	2.5 x 10 0
Silver	2.9 x 10 4	1.0 x 10 0
Tetrachloroethene	3.6 x 10 0	1.0 x 10 0
Thallium	9.1 x 10 1	1.0 x 10 0

TABLE 9-3
(Continued)

Constituent	On-Property Final Remediation Levels	Off-Property Final Remediation Levels
Chemicals (Cont.) (mg/kg)		
Toluene	1.0 x 10 5	2.7 x 10 1
Tributyl phosphate	2.5 x 10 2	2.9 x 10 0
1,1,2-Trichloroethane	4.3 x 10 0	1.9 x 10-1
Trichloroethene	2.5 x 10 1	1.5 x 10 0
Vanadium	5.1 x 10 3	5.8 x 10 1
Vinyl chloride	1.3 x 10-1	2.3 x 10-3
Xylenes, total	9.2 x 10 5	4.0 x 10 2
Zinc	1.2 x 10 5	8.2 x 10 1

a K 1 = leaching coefficient

TABLE 9-4

FINAL REMEDIATION LEVELS FOR GREAT MIAMI AQUIFER GROUNDWATER

Constituent	Final Remediation Levels
Radionuclides (pCi/L)	
Neptunium-237(+1d)	1.0 x 10 0
Radium-226(+8d)	2.0 x 10 1
Radium-228(+1d)	2.0 x 10 1
Strontium-90(+ld)	8.0 x 10 0
Technetium-99	9.4 x 10 1
Thorium-228(+7d)	4.0 x 10 0
Thorium-230	1.5 x 10 1
Thorium-232+(10d)	1.2 x 10 0
Uranium, total (mg/L)	2.0 x 10-2
Chemicals (mg/L)	
Alpha-chlordane	2.0 x 10-3
Antimony	6.0 x 10-3
Aroclor-1254	2.0 x 10-4
Arsenic	5.0 x 10-2
Barium	2.0 x 10 0
Benzene	5.0 x 10-3
Beryllium	4.0 x 10-3
Bis(2-chloroisopropyl)ether	5.0 x 10-3
Bis(2-ethylhexyl)phthalate	6.0 x 10-3
Boron	3.3 x 10-1
Bromodichloromethane	1.0 x 10-1
Bromomethane	2.1 x 10-3
Cadmium	1.4 x 10-2
Carbazole	1.1 x 10-2
Carbon disulfide	5.5 x 10-3
Chloroethane	1.0 x 10-3
Chloroform	1.0 x 10-1
Chromium VI	2.2 x 10-2
Cobalt	1.7 x 10-1

TABLE 9-4
(Continued)

Constituent	Final Remediation Levels
Chemicals (Cont.) (mg/L)	
Copper	1.3 x 10 0
1,1 -Dichloroethane	2.8 x 10-1
1,1-Dichloroethene	7.0 x 10-3
1,2-Dichloroethane	5.0 x 10-3
Fluoride	8.9 x 10-1
Lead	2.0 x 10-3
Manganese	9.0 x 10-1
Mercury	2.0 x 10-3
Methylene chloride	5.0 x 10-3
4-Methylphenol	2.9 x 10-2
Molybdenum	1.0 x 10-1
Nickel	1.0 x 10-1
Nitrate	1.1 x 10 1
4-Nitrophenol	3.2 x 10-1
Octachlorodibenzo-p-dioxin	1.0 x 10-7
Selenium	5.0 x 10-2
Silver	5.0 x 10-2
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1.0 x 10-5
Trichloroethene	5.0 x 10-3
Vanadium	3.8 x 10-2
Vinyl chloride	2.0 x 10-3
Zinc	2.1 x 10-2

TABLE 9-5

FINAL REMEDIATION LEVELS FOR SURFACE WATER IN PADDYS RUN AND THE GREAT MIAMI RIVER*

Constituent	Final Remediation Levels
Radionuclides (pCi/L)	
Cesium-137+1d	1.0 x 10 1
Neptunium-237+1d	2.1 x 10 2
Lead-210+2d	1.1 x 10 1
Plutonium-238	2.1 x 10 2
Plutonium-239/240	2.0 x 10 2
Radium-226+8d	3.8 x 10 1
Radium-228+1d	4.7 x 10 1
Strontium-90+1d	4.1 x 10 1
Technetium-99	1.5 x 10 2
Thorium-228+7d	8.3 x 10 2
Thorium-230	3.5 x 10 3
Thorium-232+10d	2.7 x 10 2
Uranium, total (mg/L)	5.3 x 10-1
Chemicals (mg/L)	
Alpha-chlordane	3.1 x 10-4
Antimony	1.9 x 10-1
Aroclor-1254	2.0 x 10-4
Aroclor-1260	2.0 x 10-4
Arsenic	4.9 x 10-2
Barium	1.0 x 10-2
Benzene	2.8 x 10-1
Benzo(a)anthracene	1.0 X 10-3
Benzo(a)pyrene	1.0 x 10-3
Beryllium	1.2 x 10-3
Bis(2-chloroisopropyl)ether	2.8 x 10-1
Bis(2-ethylhexyl)phthalate	8.4 x 10-3
Bromodichloromethane	2.4 x 10-1
Bromomethane	1.3 x 10 0
Cadmium	9.8 x 10-3
Chloroform	7.9 X 10-2

TABLE 9-5
(Continued)

Constituent	Final Remediation Levels
Chemicals (Cont.) (mg/L)	
Chromium VI	1.0 x 10-2
Copper	1.2 x 10-2
Cyanide	1.2 x 10-2
Dibenzo(a,h)anthracene	1.0 x 10-3
3,3-Dichlorobenzidene	7.7 x 10-3
Di-n-butylphthalate	6.0 x 10 0
1,1-Dichloroethene	1.5 x 10-2
Dieldrin	2.0 x 10-5
Di-n-octylphthalate	5.0 x 10-3
Fluoride	2.0 x 10 0
Lead	1.0 X 10-2
Manganese	1.5 x 10 0
Mercury	2.0 x 10-4
Methylene chloride	4.3 x 10-1
4-Methylphenol	2.2 x 10 0
Molybdenum	1.5 x 10 0
Nickel	1.7 x 10-1
Nitrate	2.4 x 10 3
4-Nitrophenol	7.4 x 10 3
Selenium	5.0 x 10-3
Silver	5.0 X 10-3
Tetrachloroethene	4.5 x 10-2
1,1,1-Trichloroethane	1.0 X 10-3
1,1,2-Tricholoroethane	2.3 x 10-1
Vanadium	3.1 x 10 0
Zinc	1.1 X 10-1

* The point of compliance is outside the mixing zone.

TABLE 9-6

FINAL REMEDIATION LEVELS FOR SEDIMENT

Constituent	Final Remediation Levels
Radionuclides (pCi/g)	
Cesium-137(+ld)	7.0 x 10 0
Neptunium-237(+ld)	3.2 x 10 1
Lead-210(+2d)	3.9 x 10 2
Plutonium-239	1.2 x 10 3
Plutonium-239/240	1.1 x 10 3
Radium-226(+8d)	2.9 x 10 0
Radium-228(+ld)	4.8 x 10 0
Strontium-90(+ld)	7.1 x 10 3
Technetium-99	2.0 x 10 5
Thorium-228(+7d)	3.2 x 10 0
Thorium-230	1.8 x 10 4
Thorium-232(+10d)	1.6 x 10 0
Uranium, total (mg/kg)	2.1 x 10 2
Chemicals (mg/kg)	
Aroclor-1254	6.7 x 10-1
Aroclor-1260	6.7 x 10-1
Arsenic	9.4 x 10 1
Benzo(a)anthracene	1.9 x 10 2
Benzo(a)pyrene	1.9 x 10 1
Benzo(b)fluoranthene	1.9 x 10 2
Benzo(k)fluoranthene	1.9 x 10 3
Beryllium	3.3 x 10 1
Bis(2-ethylhexyl)phthalate	5.0 x 10 3
Bromoform.	1.6 x 10 2
Cadmium	7.1 x 10 1
Carbazole	6.3 x 10 1
Chromium VI	3.0 x 10 3
Chrysene	1.9 x 10 4
Cobalt	3.6 x 10 4
Indeno(1,1,2-cd)-pyrene	1.9 x 10 2

TABLE 9-6
(Continued)

Constituent	Final Remediation Levels
Chemicals (Cont.) (mg/kg)	
Manganese	4.1 x 10 2
4-Methyl-2-pentanone	2.1 x 10 3
N-Nitrosodiphenylamine	2.6 x 10 2
Phenanthrene	3.0 x 10-3
Thallium	8.8 x 10 1

- A carcinogenic risk level of 10-6 and a HI of 1 for recreational users of the FEMP property

- A carcinogenic risk level of 10-6 and a HI of 1 for trespassers in the disposal facility area.

The final remediation levels for the individual carcinogenic contaminants presented in Table 9-3 for on-property soil represent the 1 x 10-6 ILCR level to a hypothetical undeveloped park user. For the noncarcinogenic constituents, the final remediation levels for each constituent present in on-property soil represent a concentration equivalent to a HQ of 0.2 to a hypothetical undeveloped park user. As identified in Table 9-3, final remediation levels are presented for on-property soil for uranium present in both leachable and relatively nonleachable forms. Soil exhibiting relatively leachable forms of uranium have been detected within the former production area beneath the retired processing buildings. For on-property soil exhibiting less leachable forms of uranium, the final remediation level is 82 ppm of uranium. For soil exhibiting these less leachable forms of uranium, the selected remedy has adopted an ALARA goal of 50 ppm of uranium in soil. The FEMP will apply available hand-held instruments to help guide excavation and assist in identifying any isolated areas of higher contamination to help attain this ALARA goal.

The final remediation levels for off-property soil represent the 1 x 10-5 ILCR level (3.5 x 10-5 for uranium) to the resident farmer receptor for individual carcinogenic constituents. The final remediation levels for noncarcinogenic constituents potentially present in off-property soil represent the concentration equivalent to a HQ of 0.2 to a resident farmer receptor.

It should be noted that the constituents identified in Table 9-3 for on and off-property soil are not uniformly distributed across the site. Available data indicate that many of these constituents are exclusively located in soil within the former production area close to the generating source. Verification and certification sampling programs conducted as part of remediation will be designed to accommodate the relative spatial distribution of each of these site-introduced contaminants.

Operable Unit 5 is the fourth of the five FEMP operable units to proceed through the remedy selection process. The three FEMP operable units (i.e., 1, 2 and 4) preceding Operable Unit 5 similarly established soil remediation levels in their RODs for the constituents of concern occurring within the respective boundaries of these source operable units. The final remediation levels in these RODs were derived on the basis of operable unit-specific information regarding the physical, chemical, radiological and geochemical characteristics of the contaminants and the environmental setting in which they reside. Where the final soil remediation level for a specific constituent established through the Operable Unit 5 remedy decision process is more restrictive (i.e., lower) than that defined in an individual ROD for Operable Units 1, 2 or 4, the final Operable Unit 5 remediation level will serve as the soil cleanup criteria within the boundary of the source operable unit.

The final remediation levels for the Great Miami Aquifer (Table 9-4) represent the Safe Drinking Water Act MCLs or, in the absence of MCLs, the 1 x 10-5 ILCR or HQ of 0.2 values for individual constituents through the drinking water pathway. The final remediation levels for surface water and sediment (Tables 9-5 and 9-6) represent the 1 x 10-6 ILCR or HQ of 0.2 values for individual constituents to recreational users of surface water resources or consumers of meat and milk irrigated/watered with flows from the Great Miami River and/or Paddys Run.

Additionally, a key component of the remedy is the establishment of waste acceptance criteria for the on-property disposal facility. These criteria are defined in Table 9-7. The waste acceptance criteria were derived to establish mass-based or activity-based operational limits

for soil or sludge contaminant concentrations to ensure the long-term protection of the Great Miami Aquifer underlying and downgradient of the on-property disposal facility. The waste acceptance criteria were derived to ensure that the water quality in those portions of the aquifer potentially impacted by the on-property disposal facility do not exceed the groundwater final remediation levels over the long term.

Several of the RCRA constituents shown in Table 9-7, including a number of the RCRA organic solvents, do not have a calculated waste acceptance criteria value (i.e., indicated as solubility or pure product in the tables) because the modeling simulations show that these constituents do not have the capability to exceed designated Great Miami Aquifer action levels within the 1000-year simulation period, regardless of the starting concentrations for these constituents in the disposal facility.

It is recognized that for the organic solvents shown in the tables, the mass balance approach applied in the modeling for determining the waste acceptance criteria does not consider the potential deleterious effects that full-strength solvents can have on the earthen material comprising the disposal facility liners or the underlying native clays. Full strength solvents have been proven to cause shrinking of clays with a resulting potential for increases in clay liner permeability. As a best management practice for these compounds, the FEMP acknowledges that it cannot place any RCRA

TABLE 9-7

OPERABLE UNIT 5 ON-PROPERTY DISPOSAL FACILITY
WASTE ACCEPTANCE CRITERIA

Constituent of Concern	Maximum Concentration
Radionuclides: (pCi/g)	
Neptunium-237	3.12 x 10 9
Strontium-90	5.67 x 10 10
Technetium-99	2.91 x 10 1
Total uranium - (mg/kg)	1.03 x 10 3
Organics (mg/kg):	
1,2-Dichloroethane	*
Carbazole	7.27 x 10 4
Bis(2-chlorisopropyl)ether	2.44 x 10-2
Alpha-chlordane	2.89 x 10 0
Bromodichloromethane	9.03 x 10-1
4-Nitroaniline	4.42 x 10-2
Chloroethane a	3.92 x 10 5
1,1,1-Trichloroethane a	*
1,1-Dichloroethane a	*
Carbon tetrachloride a	*
Chloroform a	*
Methylene chloride a	*
Chloromethane a	*
Vinyl chloride a	1.51 x 10 0
Tetrachloroethene a	1.28 x 10 2
Trichloroethene a	1.28 x 10 2
1,1 -Dichloroethene a	1.14 x 10 1
1,2-Dichloroethene a	1.14 x 10 1
Acetone a	*
Benzene a	*
Endrin a	*
Ethylbenzene a	*
Heptachlor a	*

Constituent of Concern	Maximum Concentration
Organics (Cont.) (mg/kg):	
Heptachlor epoxide a	*
Hexachlorobutadiene a	*
Methoxychlor a	*
Methyl ethyl ketone a	*
Methyl isobutyl ketone a	*
Toluene a	*
Toxaphene a	1.06 x 10 5
Xylenes a	*
Inorganics (mg/kg):	
Boron	1.04 x 10 3
Mercury a	5.66 x 10 4
Chromium VI a	*

Barium a	*
Lead a	*
Silver a	*

a RCRA-based constituent of concern
* Denotes compounds that will not exceed designated Great Miami Aquifer action level within 1000-year performance period, regardless of starting concentration in the disposal facility.

COCs into the disposal facility at concentrations that are incompatible with the clay liners or the underlying native clays beneath the liners. To track these concentrations during the excavation control surveys, the FEMP will rely on field screening methods to identify the soil that is contaminated with RCRA organics. This soil will be segregated for treatment before placement in the on-property disposal facility or shipped for off-site disposal.

10.0 STATUTORY DETERMINATIONS

In accordance with the statutory requirements of Section 121 of CERCLA, remedial actions taken at a CERCLA site pursuant to Sections 104 and 106 must:

- Protect human health and the environment
- Comply with all ARARs established under federal and state environmental laws (or justify a waiver)
- Be cost-effective
- Use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable
- Satisfy the statutory preference for treatment as a principal element to permanently and significantly reduce the toxicity, mobility, and volume of hazardous wastes (or explain why this preference cannot be satisfied).

CERCLA Section 121(c) also requires the use of five-year reviews to determine if adequate protection of human health and the environment is being maintained in those instances where remedial actions result in hazardous substances remaining on site above health-based levels.

The subsections below summarize the basis for determining that the selected remedy for Operable Unit 5 achieves the CERCLA Section 121 statutory requirements listed above.

10.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected site remedy is designed to achieve target land use objectives upon completion of the cleanup. The target land use objectives provide the basis for establishing receptor-specific, health-protective remediation levels for each environmental media pathway comprising Operable Unit 5. These objectives also provide the basis for determining the institutional controls necessary to maintain the intended land use following completion of the cleanup. For the off-property area, full unrestricted use represented by residential farming (the predominant land use of the surrounding area) was selected as the target land use objective. On property, a restricted use represented by an undeveloped park was selected as the target land use objective.

The following subsections describe how the risks posed through each environmental media pathway (soil and sediment, perched groundwater, Great Miami Aquifer groundwater, and surface water) will be eliminated, reduced, or controlled by the components of the selected site remedy and

thereby protect human health consistent with the target land use objectives.

In addition to human health requirements, the selected remedy is protective of the environment because it addresses all concerns identified by the ecological risk assessment and will achieve all ecological benchmark toxicity values for all media upon completion of the remedy. A certification sampling program will be conducted to ensure that the benchmark toxicity values are met following completion of the remedy and achievement of human-health-protective goals.

10.1.1 Soil and Sediment

The selected site remedy protects human health through excavation of soil and sediment contaminated above established final remediation levels that are protective of the undeveloped park user (on property) and the residential farmer (off property). Following excavation, the soil and sediment will be placed in an on-property disposal facility that will remain under institutional control by the federal government. Soil and sediment that are contaminated above waste acceptance criteria for the disposal facility will be shipped off site. For the on-property area (land use represented by the undeveloped park), the selected remedy protects human health by reducing ILCR levels for individual contaminants to 1 x 10-6, and cumulative risk for all contaminants to between 1 x 10-4 to 1 x 10-6. Similarly, a cumulative HI of less than 1 will be achieved for all contaminants that present a noncarcinogenic health threat. These risk levels are within the health-protective range specified by the NCP.

For the off-property area (land use represented by residential farming), the selected remedy protects human health by reducing ILCR levels for uranium to 3.5 x 10-5 and the HQ for uranium to less than 1. Based on the findings of the RI/FS, site-introduced contaminants other than uranium are not present in off-property soil and sediment at concentrations requiring remedial action. (Therefore, the selected remedy reduces the HI to less than 1 as well). Verification sampling will be conducted as part of the selected remedy to confirm this finding and certify that additional off-property excavation is not required. In the event that additional contaminants are detected, risk levels consistent with those established for uranium (HQ less than 1 and an ILCR in the range of 1 x 10-4 to 1 x 10-5) will be applied to each individual contaminant to determine the extent of additional excavation necessary.

Institutional controls will be employed as part of the remedy to maintain the on-property area for appropriate postremediation uses. Consistent with the recommendations of the Fernald Citizens Task Force, the actual designated land use for the on-property area outside of the disposal facility (if different from the representative scenario used to guide the development of remediation levels) will be decided following completion of the remedy, achievement of on-property remediation goals, and planning input from the local citizenry. Upon completion of the remedy and determination of appropriate land use, any deed restrictions will be assigned. The disposal facility area will remain under federal ownership with access restrictions.

The final remediation levels for soil and sediment are also protective of human health through cross-media pathways of exposure and will protect the Great Miami Aquifer over the long term at levels consistent with Safe Drinking Water Act MCLs or, in the absence of MCLs, 1 x 10-5 ILCR and HI = 0.2 levels for individual contaminants.

10.1.2 Perched Groundwater

Perched groundwater zones that are contaminated above levels protective of the underlying Great Miami Aquifer will be excavated concurrently with contaminated soil. The health-protective levels and resultant excavation limits established for the perched groundwater zones are intended to prevent cross-media impacts to the underlying Great Miami Aquifer at levels consistent with Safe Drinking Water Act MCLs or, in the absence of MCLs, 1 x 10-5 ILCR and HQ=0.2 levels for individual contaminants. All of the contaminated perched groundwater zones requiring action reside on property and are accounted for in the excavation footprints for soil.

The cleanup levels established for soil take into account cross-media pathways of exposure through the perched groundwater system and will be used to ensure that the perched groundwater zones that pose an unacceptable risk to the Great Miami Aquifer are successfully remediated.

10.1.3 Great Miami Aquifer

The selected remedy is designed to reduce existing contaminants in the Great Miami Aquifer to levels below the MCLs (including the proposed MCL for uranium) stipulated in the Safe Drinking Water Act, or, in the absence of MCLs, to levels providing an ILCR of 1 x 10-5 and a HQ = 0.2 for individual contaminants.

As discussed above, soil and perched groundwater zone excavation will address cross-media impacts to the Great Miami Aquifer and eliminate the potential for future recontamination of the aquifer.

During the time that active restoration of the aquifer takes place, alternate water supplies will continue to be provided to affected water users (i.e., those users whose supplies are contaminated with uranium above the proposed 20 ppb MCL).

Following certification that cleanup goals are met, all areas of the aquifer will have been restored to levels that potentially allow unrestricted use. However, consistent with the target land use objective for the on-property area (restricted use as an undeveloped park), institutional control measures will be implemented, as necessary, to prevent the use of the aquifer as an on-property drinking water supply. At all off-property locations the aquifer will be available for full beneficial use, including use as a drinking water supply, following completion of the remedy.

The performance standards for the on-site disposal facility also have a direct bearing on the long-term protection of the aquifer. The waste acceptance criteria established for the facility are formulated to be protective of the aquifer over a targeted 1000-year performance period. Consistent with the cross-media-based remediation levels established for soil, the waste acceptance criteria for the disposal facility will protect the aquifer by not allowing the introduction of contaminants into the aquifer at levels above Safe Drinking Water Act MCLs or, in the absence of MCLs, 1 x 10-5 ILCR and HQ =0.2 levels for individual contaminants.

10.1.4 Surface Water

Surface water resources of the site (Paddys Run and the Great Miami River) will not require direct remediation as a consequence of the selected remedy. Paddys Run is a pathway for contaminant migration and the Great Miami River a receiving body for treated water discharges from the FEMP's water treatment operations. Final remediation levels are established for surface water to delineate protective requirements for the discharge of treated storm water, groundwater, and remediation wastewater to the Great Miami River and to control runoff to Paddys Run. These final remediation levels are protective of surface water receptors (represented by recreational users of the river and consumers of meat and milk products derived from cattle that directly consume surface water) at a cumulative ILCR of between 1 x 10-4 and 1 x 10-6 and a HI of less than 1.

Storm water runoff control will continue throughout the site remediation time period. Collected storm water, wastewater generated during remediation, and extracted groundwater will be treated in the advanced wastewater treatment facility before discharge to the Great Miami River. As a result of treatment, the total uranium mass loading to the river will not exceed 600 pounds per year, and a monthly average discharge limit of 20 ppb (as stipulated in Section 9.1.5) and in-stream final remediation levels of 530 ppb will not be exceeded. Although a health-protective limit (530 ppb total uranium measured outside the mixing zone) was established, the total uranium discharge limit (20 ppb measured at the outfall to the Great Miami River) has been

adopted as a performance-based requirement because it is considered attainable with the existing and planned modifications to the FEMP's advanced wastewater treatment facility.

10.1.5 Cumulative Risks from all Media Pathways

A comprehensive site-wide risk assessment was conducted to verify that the Operable Unit 5 remedy, in conjunction with the selected or leading alternatives from the other four operable units, will provide for the protection of human health over the long term, considering the collective contributions of residual risks from all environmental media pathways. The assessment demonstrated that the site-wide remedy for the FEMP will result in a total residual ILCR of 2.1 x 10-5 and a total HI of 0.05 for the undeveloped park user from all pathways of exposure.

10.1.6 Risks During Remedy Implementation

There will be no unacceptable short-term risks during remedy implementation. Appropriate controls for air emissions and surface water runoff will be incorporated into the design of the remedy to minimize short-term impacts and the potential for contaminant release during construction. Health and safety measures will be employed as appropriate to minimize risk to workers during implementation. Site monitoring will track the effectiveness of remedy implementation control measures.

10.2 COMPLIANCE WITH ARARs

Under Section 121 (d)(1) of CERCLA, remedial actions must attain standards, requirements, or criteria that are "applicable or relevant and appropriate" (i.e., ARARs) under the circumstances of the release at a site. All ARARs will be met upon completion of the selected remedy, with the exception of two OEPA solid waste disposal facility siting criteria (contained in OAC 3745-27-07 and -20) that restrict the siting of a disposal facility over a high yield and/or a sole-source aquifer regulated under the Safe Drinking Water Act. A waiver to the OAC 3745-27-07 and -20 requirements is necessary in order to locate the on-property disposal facility over the Great Miami Aquifer.

A definitive list of the ARARs and TBC criteria that will be attained by the selected remedy is provided in Appendix B, organized by chemical-specific, location-specific, and action-specific requirements. The justification supporting issuance of an ARAR waiver to the OAC 3745-27-07 and -20 solid waste disposal facility siting restrictions is provided below. EPA grants the waiver and concurs with DOE that the selected remedy will attain a standard of performance equivalent to that required by the ARAR being waived, in accordance with the ARAR waiver provisions provided by the NCP (40 CFR 300.430).

10.2.1 Solid Waste Disposal Facility Siting Requirements

The contaminated soil to be excavated and placed in the on-property disposal facility as part of the selected remedy is considered by OEPA to be solid waste. The OEPA disposal facility siting criteria from 0hio solid waste disposal regulations are pertinent ARARs for on-property disposal. OAC 3745-27-07 and -20 list the following areas where a solid waste disposal facility may not be located:

- In surface and subsurface areas surrounding a public water supply well through which contaminants may move toward and may reach the public water supply well within a period of five years

- Above an aquifer declared by the federal government under the Safe Drinking Water Act to be a sole-source aquifer

- Above an unconsolidated aquifer capable of sustaining a yield of 100 gallons per minute for a 24-hour period to an existing or future water supply well located within 1000 feet of the limits of solid waste placement

- In a regulatory floodplain
- Within 1000 feet of an existing water supply well or developed spring
- Within 300 feet of the facility's property line
- Within 1000 feet of an existing residence whose owner has not consented in writing to the location of the facility
- Within 200 feet of a stream, lake, or wetland
- The isolation distance between the uppermost aquifer system and the bottom of the recompacted soil liner of the disposal facility cannot be less than 15 feet of in situ or added geologic material.

The proposed feasible location of the on-property disposal facility is on the eastern side of the FEMP which is not: in a floodplain; near a stream, lake, or wetland; within 1000 feet of an existing water supply well or developed spring; near enough to an existing public water supply well so that contaminants may reach the well within a period of 5 years. The facility will not be placed within 300 feet of the FEMP property line or within 1000 feet of an existing residential house. The isolation distance between the uppermost aquifer system and the bottom of the recompacted soil liner will be greater than 15 feet.

The remaining two siting criteria (bullets two and three) cannot be met because of the FEMP's location over a sole-source aquifer that is capable of sustaining a yield of 100 gallons per minute for a 24-hour period. OEPA has established two specific policies (GD202.101 and GD202.102) that identify conditions that would be acceptable to allow an exemption to the siting criteria. While these policies state that several factors will be considered in evaluating an exemption, the specific factors identified indicate that the protection of human health and the environment should be provided solely by the existing hydrogeologic conditions. This has been reaffirmed by OEPA in several meetings.

The primary hydrogeologic standards established by these policies are:

- Significant thickness of low permeable material between the disposal facility and the aquifer
- Lack of inter-connection between the sole-source aquifer and any significant zones of saturation
- Significant amount of sediment [soil] between the disposal facility and the high-yield aquifer to prevent leachate from migrating to the high-yield aquifer during the life of the landfill and the post-closure care period. The post-closure care period for a solid waste landfill is a minimum of 30 years [OAC 3745-17-14(A)].

It has been determined, based on existing hydrogeologic information, that the existing hydrogeologic conditions at the FEMP do not fully meet these conditions. This is based on the possibility that some granular soils are interbedded in the till and the need to protect the aquifer for significantly longer than 30 years (at least for 200 years; an ARAR under 40 CFR 192).

Because the aquifer underlies the entire site, a waiver was requested to locate an on-property disposal facility on the FEMP. The waiver request was based on the ability of the selected remedial action, through the use of another method or approach, to attain a standard of

performance that is equivalent to that required by the ARARs. The criteria in determining a CERCLA ARAR waiver based on an equivalent standard of performance [40 CFR 300.430 (f)(1)(ii)(C)(4)] are: degree of protection, level of performance, reliability into the future, and time required for results.

10.2.2 Equivalent Standard of Performance

The preamble to the NCP states that the purpose of this waiver is for the use of alternative but equivalent technologies and comparison based on risk is only permitted where the original standard is risk-based. The Ohio exemption guidance, with its focus on geological conditions, is for the most part analogous to a technology standard but also appears to be, with respect to level of performance, risk and technology based. Therefore the following analysis of the CERCLA waiver criteria uses a technology-based comparison, except for level of performance, which is a risk-based comparison. The circumstances of the selected alternative are considered equivalent to the OEPA requirements and thereby warrant the granting of a CERCLA ARAR waiver. The basis for equivalency is identified for each of the identified criteria:

Degree of protection:

- OEPA standard

  The justification to allow a solid waste landfill over a high-yield sole-source aquifer is that the existing hydrogeology will provide adequate protection to the high-yield sole-source aquifer from the effects of a release of leachate and thereby protect the aquifer from contamination. The approach spelled out by the pertinent policies is to prevent leachate from reaching the aquifer during the active life of the landfill and the postclosure period of 30 years. The active life of the disposal facility for Operable Unit 5 wastes is estimated to be 22 years.

- Equivalent standard

  The combination of engineering controls and existing hydrogeology proposed in this alternative will provide the same degree of protection to the aquifer as the hydrogeologic conditions described in the OEPA policy alone. Modeling with the combined controls shows that the leachate will not reach the aquifer during the active life of the landfill and a postclosure period of 30 years.

  It should be noted that the modeling performed in the Operable Unit 5 FS Report (Appendix F) was performed for 1000 years and assumed that the liner system and man-made materials (e.g., leachate collection, leak detection, and synthetic liners) of the disposal facility would fail. This modeling showed that with the enhanced cap to reduce infiltration and the existing hydrogeology, leachate that may eventually reach the aquifer will not cause the constituent concentrations in the aquifer to exceed the promulgated and proposed MCLs.

Level of performance (method based):

- OEPA standard

  Significant thickness of low permeable material between the disposal facility and the aquifer

- Equivalent standard

  Modeling has shown that the combination of 20 feet of gray clay with a minimum K d of

3.1 L/kg and a maximum waste acceptance criteria of 346 pCi/g of uranium-238 or 1030 ppm total uranium will not exceed the proposed MCL for total uranium at the boundary of the disposal facility or a concentration level based on the 10-6 ILCR at the boundary of the FEMP. Only the layers in the engineered cap and the gray clay and unsaturated Great Miami Aquifer hydrogeologic layers were used in this modeling. The liner system and brown clay will increase the protection of the aquifer.

- OEPA standard

  Lack of interconnection between the sole-source aquifer and any significant zones of saturation

- Equivalent standard

  Any interconnections will be minimized by:

  1) Locating the disposal facility in an area with the greatest thickness of gray clay and the least occurrence of interbedded granular material; and

  2) Providing an increase in the engineered controls to compensate for any reduction of protection due to interbedded granular material; and/or

  3) Providing engineering control of lateral movement of water in an area of interbedded granular material by removing the granular material affecting the geologic protection of the aquifer or by preventing the movement of water from these areas to the aquifer.

- OEPA standard

  Significant amount of sediment (soil) must exist between the disposal facility and the high-yield aquifer to prevent leachate from migrating to the high-yield aquifer during the life of the landfill and the postclosure cue period. The postclosure care period for a solid waste landfill is a minimum of 30 years [OAC 3745-27-14(A)].

- Equivalent standard

  At a minimum, a total of four additional layers will be added to the standard solid waste cap and liner [OAC 3745-27-08(C)]. These layers are a sand filter, biotic barrier and bentonite composite layers in the cap to reduce infiltration and to protect the integrity of the cap. A leak-detection layer will be provided in the liner to monitor the integrity of the containment system and to provide early warning to allow corrective action prior to any adverse impact to the aquifer. These additional engineering controls together with the natural hydrogeology will prevent leachate from reaching the aquifer during the postclosure care period.

Level of performance (risk based):

- OEPA standard

  ORC 3734.01(G) allows exemptions of OEPA regulations if an alternative is unlikely to adversely affect the public health or safety or the environment. The pertinent policies mirror this requirement using an approach which requires existing hydrogeologic conditions to provide this protection.

OEPA does not propose a specific definition for the protection of human health and the environment. However, OAC 3745-27-10(F)(7)(a)-(d), which specifies solid waste landfill operating requirements, sets forth concentration levels for constituents detected in the groundwater for which a corrective action is required. This standard provides an appropriate framework for risk analysis in this case because the waiver concerns the establishment of a solid waste disposal unit. These levels are concentrations that are at a statistically significant level to be:

- Protective of human health and the environment; and

- The promulgated MCL; or

- Background concentrations for constituents that do not have a promulgated MCL; or

- The alternative groundwater protection standard for a known or suspected carcinogen, concentration levels that represent a cumulative excess upper-bound lifetime cancer risk to an individual within the 1 x 10-4 to 1 x 10-6 range.

A Equivalent standard

This same definition has been used as a threshold criteria in evaluating alternatives in the CERCLA decision-making process at the FEMP and specifically in the Operable Unit 5 FS with the addition that constituents in groundwater should not be higher than the proposed MCLs. The selected remedy meets this threshold criteria.

Protection of human health has been determined through the risk assessment process based on contaminant transport modeling and the NCP-acceptable ILCR range of 1 x 10-4 to 1 x 10-6 and in compliance with promulgated and proposed MCLs.

Reliability in the future:

The combination of hydrogeologic and engineering controls (including additional controls beyond the requirements for a solid waste disposal facility) provides increased reliability into the future because of the following:

A The biotic barrier in the cap will prevent burrowing animals or vegetative roots from compromising the integrity of the cap and thereby increasing the infiltration

A Leak-detection monitoring will provide an early warning of any problem in leachate containment and allow corrective measures to be undertaken prior to adverse impact to the aquifer.

Time required for results:

Construction of a disposal facility with additional engineering controls will not take significantly longer than the time required for a disposal facility which strictly meets the Ohio Solid Waste Disposal Regulations.

A CERCLA ARAR waiver of the OEPA prohibition of siting a disposal facility over a high-yield sole-source aquifer is justified based on an equivalent standard of performance [4O CFR 300.430(f)(1)(ii)(C)(4)] to the OEPA policies allowing an exemption to the siting requirements. This waiver is applicable only to Operable Unit 5 on-site remediation wastes. If on-property disposal is chosen as the selected remedy for other FEMP operable units, separate waivers from this Ohio requirement would be necessary.

The disposal facility location and design will be subject to review and approval during the remedial design phase. DOE intends to construct only one disposal facility at the FEMP. Therefore, should on-property disposal be selected for additional FEMP operable units, the disposal facility capacity and location will be adjusted accordingly during the remedial design process.

10.3 COST EFFECTIVENESS

The selected remedy (Alternative 3A) is cost-effective because it has been determined to provide overall effectiveness proportional to its costs, the net present-worth value being $580 million. Overall the selected remedy achieves the remedial action objectives established for Operable Unit 5 for the least cost. The selected remedy represents less than one-third the cost of meeting the cleanup levels associated with full unrestricted use (Alternative 1).

Alternative 2A proposes the same major elements of remediation as the selected remedy, but is applied to the resident farmer. The net present-worth cost of this scenario was estimated at $720 million. Alternative 2A is not considered proportionally cost-effective relative to the difference in protectiveness of the selected remedy.

Alternative 3C has a projected cost, of $770 million and uses an on-property earthen cover for some of the contaminated soil, with the contaminated soil that exceeds the on-property waste acceptance criteria being shipped off site for disposal. The cost for Alternative 3C would be higher than for 3A and Alternative 3C would be potentially less implementable considering the uncertainty of future off-site disposal capacity. The engineered disposal facility in Alternative 3A will provide greater long-term protectiveness and permanence than consolidation with an earthen cover (Alternative 3C). Alternative 2C shares the same drawbacks as 3C at even greater expense ($910 million).

Alternatives 4A ($580 million) and 4C ($780 million) are nearly identical in present-worth costs to Alternatives 3A ($580 million) and 3C ($770 million), but provide less opportunity for productive use of the on-property area following remediation. Alternatives 4A and 4C result in the dedication of the entire 1050-acre on-property area of the FEMP as an access-controlled waste management area, whereas Alternatives 3A and 3C provide opportunities to make over 90 percent of the on-property area available for productive use. Alternatives 3A and 3C are therefore more cost-effective comparedto 4A and 4C.

EPA and DOE have determined that the selected remedy (Alternative 3A) will provide the best overall effectiveness proportional to its costs and therefore is cost-effective in accordance with Sections 300.430(f)(1)(i)(B) and (D) of the NCP.

10.4 USE OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

EPA has determined that the selected remedy for Operable Unit 5 uses permanent solutions and alternative treatment technologies, or resource recovery technologies, to the maximum extent practicable because it 1) uses state-of-the-art treatment technologies for groundwater, storm water and wastewater treatment, and 2) incorporates an ongoing commitment on the part of DOE to evaluate and employ, where cost-effective, emergent technologies for the treatment of soil over the life of the remedial action. Although the selected remedy for soil is in large part a containment remedy, the remedy offers the best mix of tradeoffs among the five balancing criteria and further use of existing treatment technologies (as evaluated in the RI/FS) is not practicable as an alternative to the on-property containment facility for the soil.

While the selected site remedy for soil does not offer as high a degree of long-term effectiveness and permanence as the off-site disposal alternative, it will significantly reduce the risks from the contaminated material through excavation and placement in an engineered

on-property disposal facility. By combining all of the remediation waste into one disposal location, it can be managed more effectively over the long term.

The selected remedy provides for a reduction of toxicity, mobility, and volume through treatment for the soil contaminated with RCRA-regulated substances. RCRA-regulated contaminants present in the soil will be treated as necessary to meet LDR treatment levels before shipment to an off-site disposal facility (for the soil destined for off-property disposal) or to meet on-property waste acceptance criteria, including the criterion to treat soil containing RCRA characteristic waste from six designated geographic areas (for the soil destined for on-property disposal).

The selected remedy will also provide substantial reduction of toxicity, mobility, and volume through treatment by extracting and selectively treating contaminated groundwater from the Great Miami Aquifer before discharge to the Great Miami River. In addition, the selected remedy will provide for the treatment of perched groundwater collected during the excavation of contaminated surface and subsurface soils, and storm water and remediation wastewater collected as part of the site-wide remedial program for the FEMP.

The selected remedy provides adequate short-term effectiveness and is administratively and technically implementable. The services and materials required to implement this remedy are readily available and use current technologies. Because the majority of the contaminated soil to be excavated is present on property within an area under DOE access control, there is little opportunity for public exposure to the contaminants during the remedial activity. The exposure potential to remediation workers will be managed in accordance with a health and safety plan and is, therefore, considered acceptable. The on-property disposal alternative provides more short-term effectiveness and is more implementable than off-site disposal.

The major tradeoffs that provide the basis for the selection of on-property disposal (with off-site disposal of the soil fraction exceeding waste acceptance criteria) are short-term effectiveness, implementability, and cost. The selected remedy provides the most reliable method of managing and monitoring the disposal of Operable Unit 5 soil and permanently restoring the affected portions of the Great Miami Aquifer for the least cost. For this reason, the selected remedy (Alternative 3A) is determined to be the most appropriate remedy for the contaminated environmental media that comprise Operable Unit 5.

DOE has considered state and community input in the selection of Alternative 3A as the remedy for Operable Unit 5. The selected remedy mirrors the recommendations of the Fernald Citizens Task Force and has received State of Ohio concurrence. As part of their concurrence in the selected remedy, the State of Ohio has requested that DOE agree to certain stipulations for implementation of the selected remedy (see the OEPA letter in Appendix A). DOE has incorporated implementation strategies to address all of the state's stipulations into the remedy description provided in Section 9.0. Responses to the state's letter are documented in the Responsiveness Summary.

Many members of the local community are personally opposed to on-property disposal and expressed their preference for off-site disposal of all of Operable Unit 5's soil, regardless of cost and implementability considerations. Other members of the community (including the Fernald Citizens Task Force) expressed an understanding of the prudence of taking a balanced approach to site cleanup, noting the disproportionate costs, implementability concerns, and transportation safety concerns associated with full off-site disposal. In general, all commentors were in agreement to restore the Great Miami Aquifer to full beneficial use. While many members of the community expressed reservations about on-property disposal, the comments received did not identify any specific technical omissions or errors in the development of the alternatives for Operable Unit 5 or the basis for selection of the remedy. Therefore, in light of the remedy selection factors

provided by the NCP, DOE believes the selected remedy, Alternative 3A, is the most appropriate remedy for Operable Unit 5. Responses to community comments are found in the Responsiveness Summary to this ROD.

10.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The NCP states in 40 CFR 300.430 (a)(iii)(A) and (B) that "EPA expects to use treatment to address the principal threats posed by a site" and "to use engineering controls, such as containment, for waste that poses a relatively low long-term threat." From a site-wide perspective, Operable Unit 5 soil is considered to pose a relatively low long-term threat and will not undergo treatment. The lower volume, higher toxicity materials from the site's other operable units (e.g., the Operable Unit 4 K-65 silo contents, the Operable Unit 1 waste pit materials, and the Operable Unit 3 nuclear product andprocess waste inventories) constitute the principal threat materials at the site, and the majority of these materials will undergo treatment to meet off-site waste acceptance criteria before being sent for disposal. EPA has determined that this balanced site-wide approach, wherein the principal threat materials are sent off site for disposal following necessary treatment to achieve off-site waste acceptance criteria, meets the statutory preference for remedies that employ treatment as a principal element.

DOE is entering into a commitment through this ROD to evaluate emerging technologies for the treatment of soil before placement in the on-property engineered disposal facility. This commitment extends over the life of the remedy and is focused on identifying cost-effective technologies, should they become available in the future, that can further enhance the long-term permanence of the on-property engineered disposal facility. Two technologies (physical separation and phosphate treatment) have been identified by EPA for initial evaluation by DOE as part of the remedial design process for the Operable Unit 5 remedy. DOE is committing to an engineering evaluation of these two technologies for applicability to the Operable Unit 5 remedy before placement of Operable Unit 5 soil in the engineered disposal facility.

The Operable Unit 5 remedy includes:

- Treatment of contaminated groundwater collected from the Great Miami Aquifer to health-protective levels before discharge to the Great Miami River

- Treatment of perched groundwater, intercepted during the excavation of contaminated surface and subsurface soils, to health-protective levels before discharge to the Great Miami River

- Treatment of contaminated storm water and remediation wastewater collected from the other operable units to health-protective levels before discharge to the Great Miami River

- Treatment of soil contaminated with RCRA-regulated substances as necessary for off-site disposal (soil that exceeds the on-property waste acceptance criteria for radiological constituents). Additionally, RCRA characteristic wastes located within six geographic areas designated in Section 9.0 of this ROD will be treated to the extent necessary to remove the characteristics that cause them to be regulated before on-property disposal.

Because this remedy will result in CERCLA hazardous substances remaining on the FEMP site above health-based levels established for unrestricted use, a review will be conducted at least every five years after commencement of remedial actions to ensure that the remedy continues to provide adequate protection of human health and the environment.

10.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Natural resources and associated services will be permanently committed as a result of implementing the selected remedy for Operable Unit 5. These not only include the land and resources, but the services they provide as well.

Based on the estimated volumes and contaminant concentration levels of soil requiring action, implementing the selected remedy will permanently commit 137.6 acres of land at the FEMP for on-property disposal along with 0.5 acre of land at the Clive, Utah Envirocare facility for off-property disposal.

Approximately 7.5 acres of early to mid-successional woodlands and 50 acres of pine plantation will be permanently disturbed during soil excavation activities. An example of mitigation activities that could restore these terrestrial habitats includes the planting of native tree species upon completion of remedial activities and installation of wildlife boxes to reestablish mammal and bird populations.

Based on the estimated areas requiring action, remedial activities will impact 9 acres of wetlands including isolated scrub-shrub/persistent emergent and drainage ditch/swale wetlands. Mitigation for wetland impacts will be determined using the 404 (b)(1) guidelines of the Clean Water Act. The need for compensatory mitigation will be determined after all practicable steps to avoid and minimize adverse impacts to wetlands have been applied. No wetlands or floodplains are present at the off-property disposal site.

Consumptive use of geological resources (e.g., quarried rock, sand, and gravel) and petroleum products (e.g., diesel fuel and gasoline) will be required for removal, construction, and disposal activities. Additional fuel use will result from off-site transport of materials. However, adequate supplies are available without affecting local requirements for these products.

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APPENDIX A

OPERABLE UNIT 5 RESPONSIVENESS SUMMARY

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Attachment A. Transcript of the Operable Unit 5 Public Meeting

A.1.0 OVERVIEW

This responsiveness summary, the third component of the Record of Decision (ROD) for Operable Unit 5, provides the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE) with information about community preferences regarding both remedial alternatives and general concerns about the Fernald Environmental Management Project (FEMP). It demonstrates how public comments were integrated into the decision-making process and provides a record of EPA's responses to the comments. The responsiveness summary has been prepared pursuant to the terms of the 1991 Amended Consent Agreement between EPA and DOE as well as the following guidance:

- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act, 42 U.S. Code, Section 9601, et seq.
- National Oil and Hazardous Substances Pollution Contingency Plan, 40 Code of Federal Regulations Part 300
- Guidance on Preparing Superfund Decision Documents
- Community Relations in Superfund: A Handbook.

A.1.1 Description of Selected Remedy

The agencies have selected Alternative 3A for the remediation of environmental media at the FEMP as summarized below; see Section 9.0 for full details:

- Excavation of contaminated soil and sediment
- Excavation of contaminated perched water zones
- Placement of contaminated soil and sediment that attain concentration-based waste acceptance criteria in an on-property disposal facility; contaminated material that exceeds the criteria will be treated before placement or shipped off site for disposal
- Extraction of contaminated groundwater from the Great Miami Aquifer
- Treatment of contaminated groundwater, storm water and wastewater
- Application of institutional controls during and after remedial activities
- Implementation of long-term environmental monitoring and maintenance programs.

A.1.2 Community Response to the Selected Remedy

Fifty-two separate comments were received from 49 commentors; three people made formal comments at the public meeting in addition to submitting written comments. One local group (the Ross Area Merchants Association) and two state agencies (the Ohio EPA [OEPA] and the Ohio Department of Health) submitted comments. The Utah Department of Environmental Quality and the Nevada Test Site Community Advisory Board wrote to express approval of the selected remedy and the Nevada State Clearinghouse said they had reviewed the Operable Unit 5 Proposed Plan and had no comments.

Twenty-nine commentors expressed varying levels of opposition to the construction of an on-property disposal facility while 11 commentors expressed acceptance of such a facility; seven of the 11 supported this aspect of the remedy as truly the best solution for dealing with

contaminated soil and sediment. For the groundwater component of the remedy, several commentors questioned the selected cleanup and/or treatment levels, seeing them as too stringent and hence unnecessarily expensive. Other commentors stated that the cleanup levels were appropriate and at least one commentor suggested that the groundwater cleanup should be taken as far below proposed or final drinking water standards as is reasonably achievable.

It is clear from the comments that the community is having trouble accepting the construction of a disposal facility on the FEMP property. This facility was proposed and selected as the preferred remedy for Operable Unit 2 waste material (at a size of approximately 14 acres) and then expanded four-fold to accommodate contaminated soil and sediment from Operable Unit 5 (to approximately 60 acres) plus the residual soil and construction debris from Operable Units 1, 3 and 4 (for a total of approximately 71 acres). There is strong "not in my backyard" sentiment. A segment of the community believes that placing the disposal facility (often referred to as a "dump") in their midst will be very detrimental for reasons of health, safety, property values, and aesthetics. There is doubt that any such facility can truly protect the Great Miami Aquifer from further contamination for the very long term (i.e., 1000 years). However, from among the 11 supportive comments came acceptance (somewhat reluctant) of the scientific merit and reasonableness of the 'balanced approach' to solving the FEMP's problems that the disposal facility represents.

A.2.0 BACKGROUND ON COMMUNITY INVOLVEMENT

A.2.1 History of Community Interest in the FEMP

Community involvement at DOE's FEMP site has developed remarkably over the last decade. Environmental issues became the center of public controversy in late 1984 when it was reported that nearly 300 pounds of enriched uranium oxide had been released to the atmosphere from the Plant 9 dust collector system. It was also disclosed that three off-property wells south of the site were found (in 1981) to be contaminated with uranium. By early 1985 DOE had publicly confirmed that the FEMP was responsible for the contamination in the wells.

A local citizens group, Fernald Residents for Environmental Safety and Health (FRESH), formed in 1984 to monitor FEMP activities. That same year area residents filed a class action lawsuit seeking damages for emotional distress and decreased property values.

In 1985, in response to growing public interest in the FEMP, DOE opened reading rooms at the site and at Lane Public Library in Hamilton to enable the public to better understand FEMP operations. In early 1986, two signal events - unauthorized venting of the K-65 Silos 1 and 2 and a crack in a pilot plant reactor vessel - brought more public scrutiny. Then, in July, EPA and DOE signed the Federal Facility Compliance Agreement which initiated the remedial investigation/feasibility study (RI/FS) at the FEMP.

The FEMP came under increasingly heavy scrutiny in 1987 by various federal and state entities as environmental and safety problems throughout DOE's nuclear weapons complex were regularly covered by the news media. Over one 10-day period in 1988, 150 reporters came to the FEMP site.

The class action lawsuit was settled in 1989 after a summary trial; DOE agreed to pay $73 million for emotional distress, medical monitoring, residential real property diminution, and legal and administrative costs and an additional $5 million for commercial and industrial real property diminution claims. Regular public meetings began that year to update the community on the progress of the RI/FS and related topics and, to encourage dialogue between area residents and FEMP personnel, community roundtables were initiated.

In 1993 the Fernald Citizens Task Force was chartered to provide DOE, EPA and OEPA with recommendations about cleanup solutions and future courses of action at the FEMP. The Task Force

provided recommendations on future use of the site, waste disposal options, and cleanup objectives and priorities.

Throughout the decade, DOE has responded to demands for varying levels of public involvement with focused agendas and innovative meeting formats, notification agreements, person-to-person communication, the envoy program to area groups, and has committed to providing continued public participation opportunities beyond the RI/FS phase, into the remedial design and remedial action process.

A.2.2 Operable Unit 5's Public Affairs Efforts

DOE's public affairs efforts for the RI/FS in general and Operable Unit 5 in particular are detailed in Section 3.0 and summarized below:

- Held workshops in June and November, 1993 on the initial screening of alternatives process and groundwater issues

- Held workshops in November 1994 (on the RI Report) and March 1995 (on the FS Report and Proposed Plan)

- Met with local groups and township trustees both before and during the public comment period on the Proposed Plan; made an extra effort to widely distribute the Proposed Plan (more than 850 copies of the Proposed Plan were circulated for comment)

- Held a public meeting in May 1995 on the Proposed Plan.

A.2.3 Key Issues Identified by the Public

Those members of the public who offered comments identified the following issues as being of major importance to them:

- The on-property disposal facility is generally undesirable but, if it must be part of the remedy for Operable Units 2 and 5, the public advocates these conditions:

  - No additional waste can be brought from off site for disposal at the FEMP
  - Buffer zone and fencing must be as protective as possible
  - DOE remains responsible for the disposal facility and environs far, far into the future
  - The best possible protective measures must be used during facility construction and movement of material for placement

- DOE's commitment to a complete and safe cleanup of the FEMP site is not trusted and this sentiment runs deep, particularly as it applies to long-term funding for implementation and monitoring of the remedy

- Protection of the Great Miami Aquifer is a prime concern

- Several comments were received that indicated the discharge requirements for the release of treated groundwater and wastewater to the Great Miami River may be overly stringent; the commentors questioned the rationale and cost-effectiveness of treating wastewater streams to drinking water quality before release to the river.

- Several commentors indicated that the cost estimates for the remedial alternatives provided in the Proposed Plan did not allow for a fair comparison between off-site and on-site disposal options or cannot be trusted for decision making

- Several commentors, wanted a restriction placed on the disposal of characteristic waste regulated by the Resource Conservation and Recovery Act (RCRA) in the disposal facility; others recognized that the waste acceptance criteria developed for these constituents provide a suitable level of protection to the Great Miami Aquifer and offer an acceptable threshold for managing the. disposal of RCRA-regulated substances in the on-property disposal facility

- DOE received several comments on the need to maintain the active public involvement process throughout the remedial design and remedial action phases of the Operable Unit 5 remedy

- Several members of the public expressed an interest in reviewing site closeout information in the future to confirm that cleanup levels bad been attained following completion of the Operable Unit 5 remedy.

Responses to each comment received during the public comment period are provided in Section 3.0 of this Responsiveness Summary.

A.2.4 State and Community Input to the Operable Unit 5 Remedy

DOE has considered state and community input in the selection of Alternative 3A as the remedy for Operable Unit 5. The selected remedy mirrors the recommendations of the Fernald Citizens Task Force and has received State of Ohio concurrence.

Many members of the local community are personally opposed to on-property disposal and expressed their preference for off-site disposal of all of Operable Unit 5's soil, regardless of cost and implementability considerations. Other members of the community (including the Fernald Citizens Task Force) expressed an understanding of the prudence of taking a balanced approach to site cleanup, noting the disproportionate costs, implementability concerns, and transportation safety concerns associated with full off-site disposal. In general, all commentors were in agreement to restore the Great Miami Aquifer to full beneficial use.

While expressing reservations about on-property disposal, the comments received did not identify any technical omissions or errors in the development of the alternatives for Operable Unit 5 or the technical basis for the selection of the preferred alternative.

No significant changes were made to the selected remedy described in the Proposed Plan as a result of public comments.

A.3.0 SUMMARY OF COMMENTS RECEIVED AND RESPONSES

This section contains EPA's and DOE's responses to all comments received from the public regarding the Operable Unit 5 Proposed Plan and selected remedy. The comments are sorted alphabetically by the last name of the commentor with the anonymous comments (1 through 22) at the beginning. A copy of the actual comment is followed by the response to the various issues raised in the comment. For those who made their comments at the public meeting on May 23, the applicable page of the meeting transcript is used. For ease of reading, the part of the comment being answered is typed almost verbatim and a number assigned to it; this number appears in the margin on the copy of the actual comment outside a bracket that encompasses the portion of the comment being answered.

For example, if Anonymous 3 commented on three distinct issues, the copy of the comment would have three sequentially numbered brackets down the right margin. The next page would repeat the bracketed text and the number, followed by the response. Pagination throughout this section is continuous and the Table of Contents for Appendix A, the Responsiveness Summary, lists the name

of each identified commentor and the page number where her/his comment can be found. Those who commented anonymously will need to look among the first 22 comments in order to find their response.

Only the FEMP acronyms listed below are used in the responses to comments to provide easier reading
and understanding:

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FRESH	Fernald Residents for Environment, Safety and Health
FS	feasibility study
OEPA	Ohio Environmental Protection Agency
RCRA	Resource Conservation and Recovery Act
ROD	record of decision.

SECTION A.3

Anon. 1
1 At the meeting with OEPA on May 15 they suggested that members of the public should be aware of several issues surrounding the disposal cell. One of these issues is the disposal of hazardous waste in the cell. At the public meeting on May 23, a member of FRESH spoke out against allowing hazardous waste in the cell. FRESH made it clear that their concern... was not limited to flammable, corrosive and ignitable waste, which clearly should not be placed in the cell, but included toxic hazardous waste. Toxic hazardous wastes include relatively low concentrations of some metals (low relative to the uranium WAC). Uranium, also a metal, has similar properties (including mobility) as some of these metals. It is inconsistent to believe that the cell can safely contain radioactive waste if it cannot safely contain hazardous waste. The disposal cell is either protective or it is not! How can OEPA endorse this alternative after implying that the cell is not safe for the disposal of similar type waste?

Response:

DOE agrees with the technical issues raised by this comment concerning the disposal of RCRA hazardous waste (in particular, the disposal of RCRA characteristic waste that was raised by OEPA) in the on-property disposal facility. The Operable Unit 5 remedy proposed by DOE is fully protective of human health and the environment for all contaminants of concern that are present in the soil, including those contaminants that qualify (and require management) as regulated hazardous waste under RCRA. Specific waste acceptance criteria have been developed for the on-property disposal facility to ensure that all of the materials placed in the facility will be consistent with the need for a fully protective remedy. In particular, the waste acceptance criteria are intended to limit the placement in the facility of RCRA contaminants exhibiting toxicity to levels that are protective of the Great Miami Aquifer. (Along with the waste acceptance criteria developed for the materials exhibiting toxicity, DOE proposes to prohibit the placement of materials which qualify as ignitable, corrosive, or reactive characteristic waste under RCRA.) The approach used to develop limits for the placement of these RCRA contaminants in the facility is the same as that used to establish limits on radiological contaminants, such as uranium. The waste acceptance criteria developed for the RCRA contaminants satisfy the regulatory requirements of EPA's RCRA corrective action management unit rule, which has been adopted as an applicable or relevant and appropriate requirement for Operable Unit 5.

Anon. 1 In addition to the requirement that a health-protective remedy be adopted for a site
1(Contd.) undergoing cleanup for RCRA-regulated substances (which is satisfied by the health-protective waste acceptance criteria and final remediation levels adopted for the Operable Unit 5 contaminated media), the corrective action management unit rule requires that the remedy satisfy a regulatory preference for methods that enhance the long-term effectiveness of the remedy through the application, as appropriate, of treatment technologies that reduce toxicity, mobility, or volume of wastes that will remain in place after site closure. In their comments on the Operable Unit 5 Proposed Plan, OEPA raised a stipulation requiring treatment of the Operable Unit 5 soil materials that qualify as RCRA characteristic hazardous waste (i.e., to remove the characteristic property associated with the material) before placement in the disposal facility. Recognizing that DOE has developed health-protective final remediation levels and waste acceptance criteria for all of the Operable Unit 5 contaminants of concern, OEPA's additional stipulation concerning the on-property disposal of characteristic waste has its origin in the need to satisfy, on a site-specific basis, the regulatory preference for remedies that employ treatment. As stated in the corrective action management unit rule, the decision to apply cost-effective treatment is a case-by-case decision that must consider waste- and site-specific factors. OEPA has designated the Operable Unit 5 soil that qualifies as RCRA characteristic waste as a site-specific quantity of material that offers a reasonable opportunity to apply additional treatment measures. Upon review of the site characterization data from the Operable Unit 5 remedial investigation coupled with historical process knowledge, six geographic areas of the FEMP have been identified where a reasonable potential exists for the presence of soil that qualifies as containing RCRA characteristic waste. DOE agrees that these six areas offer a reasonable, site-specific, and cost-effective opportunity to treat additional materials before on-properly disposal, in the interest of enhancing the long-term effectiveness of the remedy through treatment techniques. The remedy described in Section 9.0 of the ROD includes a commitment by DOE to search for and employ treatment as necessary for characteristic hazardous waste in soil that originates from within the six geographic areas.

Anon. 2 I'm totally against this plan. Its not fair to our family. We're homeowners in the
1 Ross area. My children have to go to school right down the road from Fernald. I think my family has the right to clean dirt, water, etc. Your plan win devastate my family, our health the value of our property.

Response:

The proposed cleanup plan will correct an existing contamination problem and reduce levels of contamination within the environmental media at the site to levels deemed to be health-protective by federal environmental regulation. It cleans up the FEMP by getting the material with higher levels, of contamination away from the site, and provides a strategy for permanently protecting human health and the underlying Great Miami Aquifer by isolating the remaining less contaminated material in an engineered disposal facility at the site.

Anon. 2 I think Fernald should go to another state because it has devastated the whole area
2 around it people has died due to this Fernald plant. I think that people have the right to say yes or no to this news about Fernald. We want it out of our community it has damaged our (sic.) enough.

Response:

DOE understands that a segment of the community near the FEMP site wants all contamination removed from the site and shipped to an off-site location. DOE realizes that some

members of the public will think that it is unfair to propose that some contaminated FEMP material remain in an engineered on-property disposal facility. But a is equally unfair to expect other communities located in other areas of the country to accept large quantities of contaminated material from the FEMP site. The current site-wide remedial approach, of which Operable Unit 5 is a component, involves balancing the off-site disposal of the FEMP's inventory of highly contaminated wastes with on-property disposal of less contaminated soil and rubble.

Plans are to remove the materials that constitute about 97 percent of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

What will remain for disposal at the FEMP in the engineered disposal facility will be about 3 percent of the current quantity of radioactivity present at the site. This 3 percent is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials, specifically Operable Unit 5 soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from this operable unit is also being considered for on-site disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-site disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

Anon. 3 1 Please do not build a building to store contaminants in or haul contaminants here to be cleaned. We have the largest aquifer in the nation and would like to keep it safe for everyone. Why would anybody want a building full of contaminants close to their house or any where else for that fact.

Response:

DOE acknowledges that no one wants contamination near where they live but contaminated material already exists at the FEMP. The cleanup plan proposed for the FEMP will address this existing contamination and reduce the levels in the soil and groundwater to concentrations deemed to be health-protective by federal environmental regulation.

DOE has no plans to bring contaminants to the FEMP site to be cleaned and then placed in the on-site disposal facility. However, DOE is evaluating the potential cost savings of treating some materials from other DOE sites at the FEMP and then shipping them back to the originating facility for final disposal. There is much public concern regarding placement of off-site waste in the site engineered disposal facility. The facility is being designed to correct a problem that already exists at the FEMP. No consideration is being given to placing waste from other sites in the FEMP engineered disposal facility.

The selected cleanup remedy at the FEMP has three objectives related to the Great Miami Aquifer; stop existing sources of contamination to the aquifer, restore the aquifer to maximum beneficial use in a reasonable time frame, and protect the aquifer from future contamination originating from the FEMP property. DOE recognizes that the aquifer is an important national and local resource and that the FEMP site has adversely impacted an approximate 200-acre area of the aquifer system. DOE also recognizes that if the FEMP is not cleaned up it poses continued contamination risk to the public and to the aquifer. DOE intends to eliminate this unacceptable risk by moving forward with a balanced remediation approach. This approach gets the most contaminated materials away from the aquifer (by shipping them off-site), restores the aquifer, and limits the quantity and disposal configuration of the contaminated material remaining at the site. Completion of the selected remedy will also provide for more

beneficial use of the FEMP property outside the disposal facility area.

Plans are to remove the materials that constitute about 97 percent of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

What will remain for disposal at the FEMP in the engineered disposal facility will be about 3 percent of the current quantity of radioactivity present at the site. This 3 percent is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials; specifically Operable Unit 5 soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from this operable unit is also being considered for on-property disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-property disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

Anon. 3 Several different options were considered for the less contaminated material before the
1 (Contd.)Excavation and on-property disposal option was selected. Use of caps, in-place containment, off-site disposal, and soil washing were all considered but the risks and costs were judged to be unacceptable. The decision as to what less contaminated m material would remain on site was developed with input from the Fernald Citizens Task Force and the public through numerous round tables and open forums. Waste acceptance criteria for the less contaminated material were developed for the engineered disposal facility to help ensure protection of the aquifer. Only material that falls below the contamination level of the waste acceptance criteria will be disposed of in the engineered disposal facility. Material that does not meet the criteria will have to be either treated or shipped off site.

The waste acceptance criteria considers the hydrogeologic environment of the site and the protective properties of the engineered disposal facility. Soil, for instance, would be excavated down to the proposed cleanup level of 80 parts per million total uranium outside the former production area of the FEMP and 20 parts per million within the former production area. Current estimates indicate that placing all of the lightly contaminated soil together in the disposal facility will produce an average concentration of about 100 parts per million of uranium in the facility. This average concentration is one-tenth of the waste acceptance criteria for disposal in the on-property disposal facility, a tenfold safety factor. It should be noted that sophisticated computer model simulations used to derive the waste acceptance criteria were completed assuming that there was no active maintenance of the facility and that the synthetic barriers present in the facility (e.g., high-density polyethylene membranes) were not functioning. These simulations indicate that even under these extreme conditions, the facility would still be protective of the aquifer over the full 200- to 1000-year performance period envisioned by federal regulations.

ANONYMOUS #4

I formally submit the following comment:

At a recent Fernald Citizens Task Force Meeting, Mr. Willeke brought up the issue that Operable Unit 5 was using a proposed drinking water standard for uranium. Mr. Willeke further noted that the standard is expected to be finalized in the next year and is anticipated to increase from the current 20 parts per billion.

I concur with Mr. Willeke's position that the Operable Unit 5 decision should permit the adoption of the final uranium drinking water standard when available.

This approach is consistent with the recommendations of the task force and with the spirit and intent of federal environmental regulations. Such an approach provides adequate protection to the aquifer and the public, and would save the government in excess of $150 million. Such a savings must be taken seriously in these times of financial crisis at the federal level.

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Anon. 4 At a recent Fernald Citizens Task Force Meeting, Mr. Willeke brought up the issue
1 that OU5 was using a proposed drinking water standard for uranium. Mr. Willeke further noted that the standard is expected to be finalized in the next year and is anticipated to increase from the current 20 ppb. I concur with Mr. Willeke's position that the OU5 decision should permit the adoption of the final uranium drinking water standard when available.

This approach is consistent with the recommendations of the task force and with the spirit and intent of federal environmental regulations. Such an approach provides adequate protection to the aquifer and the public, and would save the government in excess of $150 million. Such a savings must be taken seriously in these times of financial crisis at the federal level.

Response:

Consistent with Section 300.430(e)(2)(i)(C) of the National Contingency Plan, the DOE has adopted the maximum contaminant levels under the Safe Drinking Water Act as relevant and appropriate requirements to the restoration of the Great Miami Aquifer. Lacking a final promulgated maximum contaminant level for uranium, DOE adopted, as part of the selected remedy, the maximum contaminant level proposed by EPA in July 1991 under the Safe Drinking Water Act of 20 parts per billion as the final remediation level for restoration of the aquifer. This proposed standard was adopted as a "To Be Considered" requirement to the selected remedy.

The estimated costs for the restoration of the Great Miami Aquifer are, as would be expected, very sensitive to the established final groundwater cleanup limits (final remediation levels). While DOE is committed to fully restoring the aquifer to health-protective levels, DOE must do so in full recognition of its role as a steward of public funds. Within its stewardship role, the DOE must ensure that public funds are committed only to remedial activities which yield a commensurate environmental or human health-related benefit. As such, the DOE must evaluate the technical and economic implications of pursuing adoption of the final maximum contaminant level for uranium, once promulgated by EPA. Such a technical and economic evaluation will be warranted regardless of whether the final maximum contaminant level for uranium represents a higher or lower concentration-based limitation than the proposed 20 parts per billion standard. In the event DOE considers it appropriate to pursue a change to the final remediation level for uranium in groundwater identified in this decision document, DOE will initiate such a change in a manner consistent with CERCLA, the National Contingency Plan and the terms of the Amended Consent Agreement. As done throughout the remedial investigation/feasibility study decision-making process, the DOE will involve the public in any attempt to modify the final remedial level for uranium in the Great Miami Aquifer from the 20 parts per billion value identified in Section 9 of this ROD.

ANONYMOUS #5

I formally submit the following comment:

During the Operable Unit 2 Public Meeting a representative of Ohio EPA noted that the disposal facility would not receive hazardous waste. Of issue was soil containing lead from a firing range.

At the October 15 Ohio EPA meeting representatives of the agency again recommended that the public submit comments requesting a prohibition of hazardous waste in the disposal facility. For Operable Unit 5, again this appears focused on lead contaminated soil from a trap range and possibly some other soils containing metals.

I question the sensibility of the Ohio EPA position. It is inconceivable that a disposal facility designed to contain uranium for a 1000 years cannot be designed to address spent lead bullets and other metals. The Ohio EPA position presents a inconsistent message to the public. It cuts at the foundation of the disposal facility concept; that of long term performance.

At a recent Fernald Citizens Task Force Meeting, waste acceptance criteria for the disposal facility were discussed. At this session it was noted that criteria were being developed for uranium and a series of other contaminants. It would seem appropriate that these criteria address lead and other metals.

In summary, I request that DOE develop waste acceptance criteria for all contaminants found in soil at the site. I further request that soil received at the facility be measured against these criteria, regardless of a regulatory label (i.e., hazardous waste). This will provide a consistent message to the public on the disposal facility.

<IMG SRC 0596312C4>

Anon. 5 During the Operable Unit 2 Public Meeting a representative of Ohio EPA noted that
1 the disposal facility would not receive hazardous waste. Of issue was soil containing lead from a firing range. At the October 15 Ohio EPA meeting representatives of the agency again recommended that the public submit comments requesting a prohibition of hazardous waste in the disposal facility. For Operable Unit 5, again this appears focused on lead contaminated soil from a trap range and possibly some other soils containing metals. I question the sensibility of the Ohio EPA position. It is inconceivable that a disposal facility designed to contain uranium for a 1000 years cannot be designed to address spent lead bullets and other metals. The Ohio EPA position presents a inconsistent message to the public. It cuts at the foundation of the disposal facility concept; that of long term performance. At a recent Fernald Citizens Task Force Meeting, waste acceptance criteria for the disposal facility were discussed. At this session it was noted that criteria were being developed for uranium and a series of other contaminants. It would seem appropriate that these criteria address lead and other metals. In summary, I request that DOE develop waste acceptance criteria for all contaminants found in soil at the site. I further request that soil received at the facility be measured against these criteria, regardless of a regulatory label (i.e., hazardous waste). This will provide a consistent message to the public on the disposal facility.

Response:
DOE agrees with the technical issues raised by this comment concerning the

disposal of RCRA hazardous waste (in particular, the disposal of RCRA characteristic waste that was raised by OEPA) in the on-property disposal facility. The Operable Unit 5 remedy proposed by DOE is fully protective of human health and the environment for all contaminants of concern that are present in the soil, including those contaminants that qualify (and require management) as regulated hazardous waste under RCRA. Specific waste acceptance criteria have been developed for the on-property disposal facility to ensure that all of the materials placed in the facility will be consistent with the need for a fully protective remedy. In particular, the waste acceptance criteria are intended to limit the placement in the facility of RCRA contaminants exhibiting toxicity to levels that are protective of the Great Miami Aquifer. (Along with the waste acceptance criteria developed for the materials exhibiting toxicity, DOE proposes to prohibit the placement of materials which qualify as ignitable, corrosive, or reactive characteristic waste under RCRA.) The approach used to develop limits for the placement of these RCRA contaminants in the facility is the same as that used to establish limits on radiological contaminants, such as uranium. The waste acceptance criteria developed for the RCRA contaminants satisfy the regulatory requirements of EPA's RCRA corrective action management unit rule, which has been adopted as an applicable or relevant and appropriate requirement for Operable Unit 5.

Anon. 5 In addition to the requirement that a health-protective remedy be adopted for a site
1 (Contd.)undergoing cleanup for RCRA-regulated substances (which is satisfied by the health-protective waste acceptance criteria and final remediation levels adopted for the Operable Unit 5 contaminated media), the corrective action management unit rule requires that the remedy satisfy a regulatory preference for methods that enhance the long-term effectiveness of the remedy through the application, as appropriate, of treatment technologies that reduce toxicity, mobility, or volume of wastes that will remain in place after site closure. In their comments on the Operable Unit 5 Proposed Plan, OEPA raised a stipulation requiring treatment of the Operable Unit 5 soil materials that qualify as RCRA characteristic hazardous waste (i.e., to remove the characteristic property associated with the material) before placement in the disposal facility. Recognizing that DOE has developed health protective final remediation levels and waste acceptance criteria for all of the Operable Unit 5 contaminants of concern, OEPA's additional stipulation concerning the on-property disposal of characteristic waste has its origin in the need to satisfy, on a site-specific basis, the regulatory preference for remedies that employ treatment. As stated in the corrective action management unit rule, the decision to apply cost-effective treatment is a case-by-case decision that must consider waste- and site-specific factors. OEPA has designated the Operable Unit 5 soil that qualifies as RCRA characteristic waste as a site-specific quantity of material that offers a reasonable opportunity to apply additional treatment measures. Upon review of the site characterization data from the Operable Unit 5 remedial investigation coupled with historical process knowledge, six geographic areas of the FEMP have been identified where a reasonable potential exists for the presence of soil that qualifies as containing RCRA characteristic waste. DOE agrees that these six areas offer a reasonable, site-specific, and cost-effective opportunity to treat additional materials before on-property disposal, in the interest of enhancing the long-term effectiveness of the remedy through treatment techniques. The remedy described in Section 9. 0 of the ROD includes a commitment by DOE to search for and employ treatment as necessary for characteristic hazardous waste in soil that originates from within the six geographic areas.

ANONYMOUS #6

I formally submit the following comment:

The Operable Unit 5 Proposed Plan notes that treatment will be applied to wastewater and groundwater streams such that the "blended" concentration is less

than the Federal drinking water standards. DOE needs to revise this position.

Why does DOE feel it necessary to spend hard earned taxpayer money to treat water for drinking and then dump it to the river. This is inconceivable in this time of shrinking budgets. We all need to tighten our belts. Here we need to simply abandon such an idea and treat only as necessary to protect the river (fish, etc.) and recreational users of the river. Anybody using the river for drinking (NOTE: I don't know of any) would be required to treat the water anyway.

Anon. 6 1 The OU5 Proposed Plan notes that treatment will be applied to wastewater and groundwater streams such that the "blended" concentration is less than the Federal drinking water standards. DOE needs to revise this position. Why does DOE feel it necessary to spend hard earned taxpayer money to treat water for drinking and then dump it to the river. This is inconceivable in this time of shrinking budgets. We all need to tighten our belts. Here we need to simply abandon such an idea and treat only as necessary to protect the river (fish etc.) and recreational users of the river. Anybody using the river for drinking (NOTE: I don't know of any) would be required to treat the water anyway.

Anon. 6 1 (Contd.) Response:

DOE, EPA and OEPA consider it prudent to continue to strive for reduction of uranium discharges to the Great Miami River. In 1989, the year production ceased at the FEMP, uranium discharges to the Great Miami River were approximately 1800 pounds per year. Through the construction of the storm water retention basin, the installation and operation of two temporary treatment units, and the construction and operation of the advanced wastewater treatment system, uranium discharges to the river have gradually decreased. The current year's projected discharge is anticipated to be less than 600 pounds. As full-scale aquifer restoration begins, it would be reasonably expected that the quantity of water and the mass of uranium being discharged to the river will increase. Meetings were held with the EPA and the OEPA regarding the need and advisability of imposing a performance-based concentration discharge limit as part of the ROD. A performance-based concentration limit that could be reasonably attained with a cost-effective level of treatment was considered necessary by EPA to supplement the human health-based final remediation level of 530 ppb established for concentrations of total uranium in the Great Miami River.

Modeling was performed by DOE to assess the cost and technical implications of adopting a 20 ppb total uranium discharge limit. This modeling led to the conclusion that, for the groundwater extraction/reinjection scenarios presently under consideration for the Great Miami Aquifer, the 20 ppb discharge limit could be attained under average operating conditions with the use of existing or proposed site treatment capacity. The modeling identified that the actual application of such a limit would need to accommodate unusual operating conditions.

It was agreed, as identified in Section 9.1.5, that 20 ppb total uranium would be adopted as a reasonable, performance-based concentration discharge limit with the incorporation of provisions to accommodate unusual operating conditions.

Anon. 7 I know you help the Township out a lot and do other things but when I herd (sic) that you wanted to bring toxic waste into our little township I was shocked! Did our government actulley (sic.) lie to us and tell us that the place was getting cleaned up then just do the opposite. I can't believe it. I know you must be busy cantamuates (sic., contaminating) our beatiful farm ground....

Response:

The proposed cleanup plan will correct an existing contamination problem and reduce the levels of contamination within the environmental media at the site to levels deemed to be health protective by federal environmental regulation. It cleans up the FEMP by getting the material with higher levels of contamination away from the site, and provides a strategy for permanently protecting human health and the underlying Great Miami Aquifer by isolating the remaining less contaminated material in an engineered disposal facility at the site.

DOE has no plans to bring contaminated materials from other sites to the FEMP to be treated and then placed in the on-site disposal facility. However, DOE is evaluating the potential cost savings of treating some materials from other DOE sites at the FEMP and then shipping them back to the originating facility for final disposal. There is much public concern regarding placement of off-site waste in the site engineered disposal facility, and no consideration is being given to placing waste from other sites in the FEMP engineered disposal facility.

Anon. 8 1 The aquifer must be protected above all. After all cost of building the cell and (if) the cell would fail who would pay to fix or remove the material; move it now and save money in the long run.

Response:

The selected cleanup remedy at the FEMP has three objectives related to the Great Miami Aquifer; stop existing sources of contamination to the aquifer, restore the aquifer to maximum beneficial use in a reasonable time frame, and protect the aquifer from future contamination originating from the FEMP property. DOE recognizes that the aquifer is an important national and local resource and that the FEMP site has adversely impacted an approximate 200-acre area of the aquifer system DOE also recognizes that if the FEMP is not cleaned up it poses continued contamination risk to the public and to the aquifer. DOE intends to eliminate this unacceptable risk by moving forward with a balanced remediation approach. This approach gets the most contaminated materials away from the aquifer (by shipping them off-site), restores the aquifer, and limits the quantity and disposal configuration of the contaminated material remaining at the site. Completion of the selected remedy will also provide for more beneficial use of the FEMP property outside the disposal facility area.

Plans are to remove the materials that constitute about 97 percent of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

What will remain for disposal at the FEMP in the engineered disposal facility will be about 3 percent of the current quantity of radioactivity present at the site. This 3 percent is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials; specifically Operable Unit 5 soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from this operable unit is also being considered for on-property disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-property disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

The long-term cost effectiveness of the selected Operable Unit 5 remedy was evaluated against other alternatives in the feasibility study's detailed evaluation of alternatives. Comprehensive cost estimating in this evaluation indicated that even with the inclusion of conservative long-term monitoring and maintenance costs of the on-property disposal

facility, it was still much more cost effective to dispose of some material on site rather than ship all the material off site. The DOE (i.e., U.S. government) will have responsibility for the long-term performance and maintenance of the on-property disposal facility.

Anon. 8 2 The Ross area has received enough bad press over the years and has had its problems with growth; leave us alone and do what is right, protect land, water and the children from future problems.

Response:
The DOE is committed to cleaning up the FEMP site in the most reasonable time period possible. The proposed cleanup plan is designed to protect the land, water, and the children from future problems involved with the FEMP.

Anon. 8 3 The tax base in the area and property values will be affected by the cell and the schools with loose money to operate as well as they are now.

Response:
Although the Proposed Plan includes an on-property disposal facility, it is DOE's intention to clean the remaining portions of the facility in order to accommodate some beneficial reuse. It is not however, within the scope of the Proposed Plan/Record of Decision to identify the specific future use of the facility. The community will be involved in future use determinations. Although the DOE cannot speculate on whether future use of the facility will expand the tax base, at a minimum the facility will be restored to be aesthetically appealing and will encourage rather than deter development in this area.

Anon. 9 1 People with off-site contamination above background should be asked if they want it removed from their property.

Response:
The Proposed Plan supporting the Operable Unit 5 remedy decision process identified the extent of uranium contamination in surface soil both on and adjacent to the FEMP. The opening of the public comment period and notification of the availability of the Proposed Plan was announced in local newspapers. The Proposed Plan was widely distributed during the public comment period in an attempt to gain input from the public on the remedial alternatives considered in the feasibility study and the proposed remedy for Operable Unit 5. Additionally, both formal and informal public meetings were held during the public comment period by FEMP representatives to help increase awareness in the community of the pending decision and to solicit comment on proposed remedial actions.

The Fernald Citizens Task Force similarly deliberated on the proposed cleanup levels for contaminated surface soil and recommended that the off-FEMP-property cleanup levels be commensurate with an incremental lifetime cancer risk of 10-4 and not exceed a hazard index of 1. The selected remedy for Operable Unit 5, documented in Section 9.0 of this ROD, includes soil cleanup levels which are consistent with the recommendations of the Task Force and fully accommodate pertinent public comments on the issue.

<IMG SRC 0596312C9>

Anon. 10 1 Has your cost estimate been validated by any outside agency?

Response:

Both EPA and OEPA independently reviewed the adequacy and worthiness of DOE's cost estimates. As part of their approval process, both agencies agreed with the representativeness of the estimates for decision making and concluded that the cost implications of the off-site and on-site alternatives could be fairly compared. DOE also obtained an independent review of the Operable Unit 5 feasibility study cost estimates from Argonne National Laboratory that substantiated the adequacy of DOE's estimates.

<IMG SRC 0596312D1>

Anon. 11 No dump
1

Response:

DOE's plans for remediation of the site as a whole include a conservative approach regarding on-site and off-site disposal of contaminated material. It is important to distinguish that this approach includes off-site disposal of all of the more highly contaminated material found at the FEMP in all operable units.

Plans are to remove the materials that constitute about 97 percent of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This wi11 be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

What will remain for disposal at the FEMP in the engineered disposal facility will be about 3 percent of the current quantity of radioactivity present at the site. This 3 percent is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials; specifically Operable Unit 5 soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from this operable unit is also being considered for on-property disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-property disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

Several different options were considered for the less contaminated material before the excavation and on-property disposal option was selected. Use of caps, in-place containment, off-site disposal, and soil washing were all considered but the risks and costs were judged to be unacceptable. The decision as to what less contaminated material would remain on site was developed with input from the Fernald Citizens Task Force and the public through numerous round tables and open forums. Waste acceptance criteria for the less contaminated material were developed for the engineered disposal facility to help ensure protection of the aquifer. Only material that falls below the contamination level of the waste acceptance criteria-will be disposed of in the engineered disposal facility. Material that does not meet the criteria will have to be either treated or shipped off site.

The waste acceptance criteria considers the hydrogeologic environment of the site and the protective properties of the engineered disposal facility. Soil, for instance, would be excavated down to the proposed cleanup level of 80 parts per million total uranium outside the former production area of the FEMP and 20 parts per million within the former production area. Current estimates indicate that placing all of the lightly contaminated soil together in the disposal facility will produce an average concentration of about 100 parts per million of uranium in the facility. This average concentration is one-tenth of the waste acceptance criteria for disposal in the on-property disposal facility, a tenfold safety factor. It should be noted that sophisticated computer model simulations used to derive the waste acceptance criteria were completed assuming that there was no active maintenance of the facility and that

the synthetic barriers present in the facility (e.g., high-density polyethylene membranes) were not functioning. These simulations indicate that even under these extreme conditions, the facility would still be protective of the aquifer over the full 200- to 1000-year performance period envisioned by federal regulations.

Anon. 11 (Cont'd)

1 (Cont'd)The on-property disposal facility will not be an open dump, but a state-of-the-art engineered facility consisting off a multiple layer liner, cap and leak detection system Movement of material to the facility will be managed to minimize dust. There will be no odor from the disposal facility.

Anon. 12 Where is the clean up?

Response:

DOE cleanup plans are to remove the materials that constitute about 97 percent of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

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Anon. 12 The dump is a cover up?
2

Response:
The DOE is very committed to cleaning up the FEMP and protecting the public from any future FEMP-related contamination. The DOE has no hidden agenda concerning the cleanup of the FEMP. The cleanup plans presented to the public and the agencies are what would be followed when approved, provided sufficient funding is made available to the site.

Anon. 13 Did anyone contact local Business, churches, schools, governments, citizens and ask
1 their opinion. Don't talk about meeting the local people ... Ask straight up about the dump.

Response:
As part of the overall site program for community involvement at Fernald, numerous opportunities were provided to the public during the past few years for commenting on proposed cleanup alternatives relating to the remediation of environmental media on and off site. The public involvement strategy consisted of a combination of written information, support of the Fernald Citizens Task Force, meetings with local trustees and activist groups, and public workshops to solicit public input. Fernald management has consistently sought more effective ways to involve the public. One example is the envoy program.

Local governmental, business, and activist group meetings attended by FEMP management during the March-May time frame included:

March 22 -- Ross Merchants Meeting
April 17 -- Morgan Township Trustee Meeting
April 18 -- Ross Township Trustee Meeting
April 24 -- Crosby Township Trustee Meeting
April 25 -- Ross Lions Club Meeting
May 17 -- Cooperative Planning & Training Committee.

DOE will continue to seek effective ways to involve the public.

Dialogue about the on-property disposal option has been ongoing for several months, and discussions will continue. Several members of the local community and a majority of the Fernald Citizens Task Force, an independent site-specific advisory board, have expressed their acceptance of the on-property disposal facility with the view that waste disposal is a global issue (technological, political, and practical considerations need to be factored into decision-making) and members of the community in other states do not want Fernald wastes in their backyards either. Community members felt DOE should adopt a practical long-term solution and get the worst materials off site and take responsibility for the rest of the waste that can be safety kept on site. However, these same commentors also stated that certain conditions must be met (e.g., buffer zone, geologic support). Some of these commentors, including OEPA, discussed specific requirements that they felt should be committed to before on-property disposal is implemented.

<IMG SCR 0596312D4>

Anon. 14 Who's idea was/is the dump? Do they live here? Hell no they don't. Put in someone
1 back yard and move on.

Response:
The idea to construct an on-property disposal facility for some of the less

contaminated FEMP waste resulted from over seven years of study and was developed by DOE, EPA, and OEPA, with input by the Fernald Citizens Task Force and the public through numerous round tables and open forums. Several members of the Fernald Citizens Task Force do live near the FEMP site and are long-term members of the community.

DOE understands that a segment of the community near the FEMP site wants all contamination removed and shipped to an off-site location. DOE realizes that some members of the public will think that it is unfair to propose that some contaminated FEMP material remain in an engineered on-property disposal facility. But it is equally unfair to expect other communities located in other areas of the country to accept large quantities of contaminated material from the FEMP site. The current site-wide remedial approach, of which Operable Unit 5 is a component, involves balancing the off-site disposal of the FEMP's inventory of highly contaminated wastes with on-property disposal of less contaminated soil and rubble.

Plans are to remove the materials that constitute about 97 percent of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

What will remain for disposal at the FEMP in the engineered disposal facility will be about 3 percent of the current quantity of radioactivity present at the site. This 3 percent is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials; specifically Operable Unit 5 soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from this operable unit is also being considered for on-property disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-property disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

<IMG SRC 0596312D5>

Anon. 15 1 FRESH has sold out. This is a done deal, why waste our time and money. Ohio EPA has been bought. U.S. EPA has been bought. No one thinks long term. The Citizen Task Force did not decide anything. It gave DOE what it wanted. Local citizen input was not wanted/not asked. Get outsiders to dump it here.

Response:

Dialogue about the on-property disposal option has been ongoing for several months, and discussions will continue. Several members of the local community and a majority of the Fernald Citizens Task Force, an independent site-specific advisory board, have expressed their acceptance of the on-property disposal facility with the view that waste disposal is global issue (technological, political, and practical considerations need to be factored into decision-making) and members of the community in other states do not want Fernald wastes in their backyards either. Community members felt DOE should adopt a practical long-term solution and get the worst materials off site and take responsibility for the rest of the waste that can be safety kept on site. However, these same commentors also stated that certain conditions must be met (e.g., buffer zone, geologic support). Some of these commentors, including OEPA, discussed specific requirements that they felt should be committed to before on-property disposal is implemented.

<IMG SRC 0596312D6>

Anon. 16 How do we know no outside waste will come in. At some point in the past didn't all
1 (material) waste past thru Fernald so therefore it can be brought back.

Response:

The DOE concurs with the comment, and has no intention of using the disposal facility associated with the Operable Unit 5 remedy to address wastes generated at off-site locations. Additionally, the DOE has no intention of using existing or newly constructed storage facilities located at the FEMP for the long-term storage of wastes generated at off-site locations. Specifically excluded from this prohibition are laboratory wastes generated at off-site facilities resulting directly from the chemical, radiological or engineering analysis of FEMP waste materials or generated during the conduct of treatability or demonstration type studies on FEMP waste materials. Such analyses and studies are typically performed as an integral part of implementing a selected remedy at a cleanup site.

Language has been added to Section 10.0 of this ROD to specifically identify that the FEMP storage and future disposal facilities shall not be used for the long-term storage or disposal of wastes generated at off-site locations.

<IMG SRC 0596312D7>

Anon. 17 It is bad policy to put a nuclear dump over a water supply. The dump cost are low
1 balled and the off site cost are esculated. True real GOA cost accountants need to
look at this rust before we waste more dollars.

Response:

The cost estimates for the remedial alternatives were prepared using EPA's approved CERCLA remedial investigation/feasibility study cost estimating method and used, as required, a present-worth approach to allow fair comparison of the costs of different alternatives that may involve different time frames for completion. As part of their oversight responsibility, both EPA and OEPA conducted independent reviews of the adequacy and worthiness of DOE's cost estimates and agreed that the estimates provide for a fair comparison between the off-site and on-site remedial alternatives. DOE also obtained an independent review of the Operable Unit 5 cost estimates from Argonne National Laboratory that substantiated the adequacy of DOE's estimates.

<IMG SRC 0596312D8>

Anon. 18 Lisa Crawford ... and FRESHS' opinion do not represent Ross.
1

Response:

Stakeholder input is absolutely critical to DOE's present and future mission. DOE actively solicits and considers the views of people and groups from different backgrounds representing a wide variety of interests. DOE cannot be successful at the FEMP -- or anywhere else for that matter -- without continuing dialogue among various stakeholder groups.

The interests and opinions of all stakeholder groups are viewed with equal importance. DOE does not assume that one group's opinions are shared by others. DOE realizes that each group has their own opinions and concerns about the FEMP site.

<IMG SRC 0596312D9>

Anon. 19 What will the site look like when dean up is done?

1

Response:

The commentor is referred to the Proposed Plan for Operable Unit 5, dated April 1995. On page 42 there is an artist's rendition of the FEMP skyline with the proposed on-property disposal facility drawn in at its approximate location. Standing on Willey Road looking north, the outline of the facility, which could cover up to 71 acres, is barely visible.

Various renditions of how the FEMP might look following cleanup from other viewpoints in the area were presented at the May 1995 Operable Unit 5 public meeting and are available for public inspection if desired.

<IMG SRC 0596312E1>

Anon. 20
1

The process wears citizens down and the results are not important to DOE. Just work the process. The Citizens Task Force was not citizen. It was outsider. 7,000 cubic yards and 3,800 barrels or 1,000 cubic yards get the same attention and process. No one ask the local people do you want a dump.

Response:

The Department of Energy has made every effort to solicit the concerns and preferences of a wide range of stakeholders during the two public comment periods and in subsequent meetings and discussions with others. The DOE carefully considered the public's comments as it developed its proposals for final remediation of the Fernald site.

As part of the overall site program for community involvement at Fernald, numerous opportunities were provided to the public during the past few years for commenting on proposed cleanup alternatives relating to the remediation of environmental media on and off site. The public involvement strategy consisted of a combination of written information, meetings with local trustees and activist groups, workshops to solicit public input, and support of the Fernald Citizens Task Force. Several nearby residents are members of the Task Force, including a township trustee and a Ross school teacher. Fernald management has consistently sought more effective ways to involve the public. One example is the envoy program.

DOE will continue to seek effective ways to involve the public. Local governmental, business, and activist group meetings attended by FEMP management during the March-May time frame included:

March 22 - Ross Merchants Meeting
April 17 - Morgan Township Trustee Meeting
April 18 - Ross Township Trustee Meeting
April 24 - Crosby Township Trustee Meeting
April 25 -- Ross Lions Club Meeting
May 17 -- Cooperative Planning & Training Committee.

Many factors such as availability of waste storage space, transportation issues, political climate, and cost affect the final decision. CERCLA, which governs the FEMP site, requires that cleanup alternatives be compared against nine criteria. A cleanup alternative must first meet two "threshold criteria" -- overall protection of human health and the environment, and compliance with applicable or relevant and appropriate requirements (or justification of a waiver from any of these requirements), before being evaluated against the next five "primary balancing criteria." These primary balancing criteria include long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment,

short-term effectiveness; implementability, and cost. The last two criteria, state acceptance and community acceptance, are the "modifying criteria" and are evaluated after the public comment period. The on-property disposal option meets the two threshold criteria; it will protect human health and the environment.

<IMG SRC 0596312E2>

Anon. 21 Is this the only site in the U.S. considering a local dump?
1

Response:
A number of sites across the United States have selected on-property disposal for materials, similar to those proposed for dispositioning at the FEMP. As examples, the Weldon Spring site in St. Louis has adopted on-property disposal as its preferred remedy, as has the Cannonsburg site in Pennsylvania. The FEMP is not the first nor the only radiologically contaminated site that has selected on-property disposal as part of a balanced approach to site remediation. A number of nonradiological CERCLA sites also employ on-property disposal as part of their preferred remedy.

<IMG SRC 0596312E3>

Anon. 22 How can you guarantee that there will be money to pay for the upkeep and repair of
1 the disposal cell? Will a trust fund be established or some other funding mechanism?

Response:
As part of its review of DOE's preferred remedy, EPA has determined that the selected remedy for Operable Unit 5 will be protective of human health and the environment, and EPA will use the 5-year review process under Section 121 (c) of CERCLA to ensure that the selected remedy remains so. If the agency determines during a 5-year review that the remedy is no longer protective, it may review additional contingency actions and evaluate whether they are appropriate for implementation at the site.

Funding to address upkeep and repair of the disposal facility, or to address any health-protective concerns raised by EPA during the ongoing 5-year review process, will be secured on an annual basis through the annual federal budgeting and appropriation process. A trust fund to secure funds in advance of need is not envisioned at this time. Under Section 107 of CERCLA, the federal government remains liable for all response costs associated with the site (including the costs associated with long-term care), regardless of when incurred. The guarantee that the commentor is seeking is best embodied in the likelihood that the federal government will exist indefinitely as a viable entity to honor its obligations in the future.

<IMG SRC 0596312E4>

Beckner, M. There is no guarantee that the liner in the disposal facility will last 500 years.
Please remove all contaminated material as promised and quit wasting time and money.

Response:
The primary concern to DOE that is embodied in the commentor's question would be the long-term protection of the Great Miami Aquifer if the disposal facility no longer received long-term care. As part of the feasibility study, DOE conducted a number of disposal facility performance analyses to determine health- and environment-protective waste acceptance criteria for the facility. As a fundamental basis of these analyses, no credit was taken for active maintenance measures in the development of the waste acceptance criteria. In effect, the waste acceptance criteria conservatively assume that active maintenance measures and long-term care activities have ceased and that the facility rests in a passive (i.e., abandoned) mode with no

human attention provided. For the analyses, effectiveness was defined as ensuring that protective standards (drinking water maximum contaminant levels) were not exceeded in the Great Miami Aquifer at any point beneath the disposal facility footprint. It was assumed in the analyses that the synthetic liner materials in the disposal facility cap and base had failed, the leachate collection systems were no longer functioning, and the natural earthen materials in the cap began to degrade over time, allowing infiltration into the facility to steadily increase. Even under the hypothetical failure modes evaluated through the analyses, the disposal facility was found to be reliable and effective over the full 200- to 1000-year performance period envisioned by federal regulations. The performance assessment provides a reasonable level of assurance that the on-property disposal facility will provide negligible impacts to the Great Miami Aquifer even in the absence of funding to conduct operation and maintenance activities, as the commentor asks.

The most heavily contaminated material (25,000 cubic yards) will be shipped off site for disposal. It is not feasible or cost effective to ship the rest (1,750,000 cubic yards), as demonstrated by the feasibility study process and report. On-property disposal can and will be made effective and protective.

Beckner, M. 2 I feel this situation since 1994 has caused me and my family enough stress.

Response:

EPA and DOE recognize that neighbors of the FEMP have experienced considerable impacts from both the operation of the plant and the proposed cleanup. In 1989 DOE sealed the class action lawsuit brought by area residents and agreed to pay $73 million for emotional distress, medical monitoring, and residential real property diminution. DOE is also partially funding the new public water supply being installed by the Hamilton County Department of Public Works. DOE is committed to maintaining public involvement during the implementation of the selected remedy and the ongoing long-term monitoring of the site.

<IMG SRC 0596312E5>

Beddow/ Walden, J. 1 *I do not think that any on-site disposal should even be considered. Level Fernald's remaining buildings and get that crap away from here.

*Excavate the contaminated soil and sediment - do not leave it on the property.

*The bedrock will have to be escavated also. Make a 17 mile deep gravel pit, fence it off with trees and electric fence and burry Fernald's reputation somewhere else.

Response:

DOE acknowledges that no one wants contamination near where they live but contaminated material already exists at the FEMP. The cleanup plan proposed for the FEMP will address this existing contamination and reduce the levels in the soil and groundwater to concentrations deemed to be health-protective by federal environmental regulation. Plans are to remove the materials that constitute about 97 percent of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

What will remain for disposal at the FEMP in the engineered disposal facility will be about 3 percent of the current quantity of radioactivity present at the site. This 3 percent is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials; specifically Operable Unit 5 soil,

Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from this operable unit is also being considered for on-property disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-property disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

Several different options were considered for the less contaminated material before the excavation and on-property disposal option was selected. Use of caps, in-place containment, off-site disposal, and soil washing were all considered but the risks and costs were judged to be unacceptable. The decision as to what less contaminated material would remain on site was developed with input from the Fernald Citizens Task Force and the public through numerous round tables and open forums. Waste acceptance criteria for the less contaminated material were developed for the engineered disposal facility to help ensure protection of the aquifer. Only material that falls below the contamination level of the waste acceptance criteria will be disposed of in the engineered disposal facility. Material that does not meet the criteria will have to be either treated or shipped off site. As noted above, the remedy for Operable Unit 3 has not been finalized. However, as currently envisioned the Operable Unit 3 remedy would include removing all of the buildings at the site. There is no reason to excavate the bedrock beneath the FEMP which lies approximately 200 feet below the ground surface. Over six years of study indicate that the bedrock is not contaminated.

Beddow/ Walden, J. 2 The aquifer will flush itself out if left alone. Set up a treatment facility down stream instead of trying to pump it backwards. That’s kind of stupid.

Response:

The DOE has studied, as part of the remedial investigation/feasibility study process, what would happen if the aquifer were left alone and permitted to flush itself out. Conditions in the Great Miami Aquifer would not improve greatly in the foreseeable future if left alone. Existing federal environmental regulations do not permit, except under select site-specific conditions, waste sites being addressed under CERCLA to adopt remedies which include the use of natural attenuation to achieve health-protective levels in aquifer systems presently supplying potable drinking water to domestic wells. The National Contingency Plan defines that it is the expectation of EPA that usable groundwater will be restored to their full beneficial use within a reasonable time frame. In situations where this objective cannot be practically attained, the National Contingency Plan establishes that actions will be undertaken to prevent the further migration of the contaminant phone. The results of the modeling performed to evaluate natural attenuation of the contaminant plumes at the FEMP are reported in the Operable Unit 5 Remedial Investigation Report. This modeling indicates that the levels of uranium in the affected portions of the Great Miami Aquifer will not attain the proposed drinking water maximum contaminant level (i.e., 20 parts per billion) within 1000 years. It is anticipated that the proposed remediation pumping system will clean up the aquifer to 20 parts per billion in approximately 27 years.

The DOE recently installed a series of groundwater extraction wells in the Great Miami Aquifer south of the FEMP. These wells are presently withdrawing contaminated groundwater at a rate of approximately 1400 gallons per minute. As part of this removal action a 20-inch polyethylene force main pipeline was installed to convey the extracted groundwater to the newly constructed advanced wastewater treatment facility. The advanced wastewater treatment facility was situated on-property at the FEMP to use available utilities and federal land. It should be recognized that the selected remedy will require the extraction of groundwater from several locations on the FEMP property, in addition to a continuation of pumping operations in the South Plume area. These additional extraction well locations are both north and south of the new treatment facility. Thus, the new advanced wastewater treatment facility is centrally

located to planned groundwater pumping activities associated with the selected remedy for Operable Unit 5.

Beddow/ Walden, J. 3 NO one should be allowed to go on the property after the demolition. Keep it restricted.

Response:

It is not the intent of DOE to attempt to establish a final future land use for the FEMP through this decision document. DOE does recognize that the final remediation levels identified in Section 9.0 of this ROD do establish the permissible concentrations of contaminants which could remain at the site following completion of remedial actions. These remaining concentrations of contaminants will present a potential for exposure to future users of the FEMP.

The Fernald Citizens Task Force issued recommendations regarding future use of the Fernald property in May of 1995. In these recommendations, the Task Force recommended that the area of the FEMP containing the disposal facility and associated buffer zone remain under the continued ownership of the federal government. Additionally, the Task Force recommended that the remaining portions of the FEMP property be made available for the uses that are the most beneficial to the surrounding communities. While the Task Force recommended prohibiting any sort of agricultural or residential uses of the remaining portions of the FEMP property (outside the disposal facility area), the Task Force encouraged DOE to consult with local communities to establish their preferences for future use and ownership of these areas of the site. Consistent with this recommendation, DOE does not consider it prudent to insert enforceable provisions within this ROD to provide for the continued federal ownership of the entire FEMP property.

Additionally, DOE considers that final, enforceable institutional control measures for postremedial conditions at the FEMP should be established based upon an analysis of the actual residual concentrations as measured in site soil and groundwater following the completion of remedial actions; the measured concentrations and spatial distribution may differ from feasibility study projections. This difference in estimated versus measured concentrations could have a significant impact on the required institutional controls necessary to maintain continued protectiveness. In this ROD, DOE has elected to define that institutional controls are a necessary component of the remedy to ensure continued protectiveness, but that the specific institutional control provisions necessary to be applied to postremedial site conditions will be defined during remedial design. The institutional control provisions defined during remedial design may be modified during the remedial action phase to accommodate the progressive findings of the field certification efforts. As with all remedial design and remedial action documentation, the plan for institutional controls at the FEMP, and any necessary modifications to it, will be subject to approval by EPA and review by OEPA.

Beddow/ Walden, J. 4 My family and I have decided to move because of Fernald Uranium Processing Plant. Allius: Fernald Environmental Protection. (Beddow/Walden, J.)

Response:

Comment acknowledged.

Blake, J. 1 This community has had enough! We do not want the storage cell! We will be lied to again and Fernald will start to take contaminated materials from other places. It will get out of control and we will become one big toxic-contamin. community. The people of this town have been contaminated enough. We've had our share!!!. No more!

Response:

DOE acknowledges that no one wants contamination near where they live but

contaminated material already exists at the FEMP. The cleanup plan proposed for the FEMP will address this existing contamination and reduce the levels in the soil and groundwater to concentrations deemed to be health protective by federal environmental regulation.

DOE has no plans to bring contaminants to the FEMP site to be cleaned and then placed in the on-property disposal facility. However, DOE is evaluating the potential cost savings of treating some materials from other DOE sites at the FEMP and then shipping them back to the originating facility for final disposal. There is much public concern regarding placement of off-site waste in the site engineered disposal facility. The facility is being designed to correct a problem that already exists at the FEMP. No consideration is being given to placing waste from other sites in the FEMP engineered disposal facility.

Plans are to remove the materials that constitute about 97 percent of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

What will remain for disposal at the FEMP in the engineered disposal facility will be about 3 percent of the current quantity of radioactivity present at the site. This 3 percent is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials; specifically Operable Unit 5 soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from this operable unit is also being considered for on-property disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-property disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

Several different options were considered for the less contaminated material before the excavation and on-property disposal option was selected. Use of caps, in-place containment, off-site disposal, and soil washing were all considered but the risks and costs were judged to be unacceptable. The decision as to what less contaminated material would remain on site was developed with input from the Fernald Citizens Task Force and the public through numerous round tables and open forums. Waste acceptance criteria for the less contaminated material were developed for the engineered disposal facility to help ensure protection of the aquifer. Only material that falls below the contamination level of the waste acceptance criteria will be disposed of in the engineered disposal facility. Material that does not meet the criteria will have to be either treated or shipped off site.

Blake, J.

1 (Contd.) The waste acceptance criteria considers the hydrogeologic environment of the site and the protective properties of the engineered disposal facility. Soil, for instance, would be excavated down to the proposed cleanup level of 80 parts per million total uranium outside the former production area of the FEMP and 20 parts per million within the former production area. Current estimates indicate that placing all of the lightly contaminated soil together in the disposal facility will produce an average concentration of about 100 parts per million of uranium in the facility. This average concentration is one-tenth of the waste acceptance criteria for disposal in the on-property disposal facility, a tenfold safety factor. It should he noted that sophisticated computer model simulations used to derive the waste acceptance criteria were completed assuming that there was no active maintenance of the facility and that

the synthetic barriers present in the facility (e.g. , high-density polyethylene membranes) were not functioning. These simulations indicate that even under these extreme conditions, the facility would still be protective of the aquifer over the full 200- to 1000-year performance period envisioned by federal regulations.

<IMG SRC 0596312E7>

Bommer,_ I am opposed for several reason, 1st this is a farm community. Can you be 100% sure this will not seep into our food and water.

Response:

The proposed cleanup plan will correct an existing contamination problem and reduce the levels of contamination within the environmental media at the site to levels deemed to be health protective by federal environmental regulation. It cleans up the FEMP by getting the material with higher levels of contamination away from the site, and provides a strategy for permanently protecting human health and the underlying Great Miami Aquifer by isolating the remaining less contaminated material in an engineered disposal facility at the site.

Plans are to remove the materials that constitute about 97 percent of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

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Bommer,_ (Contd.)

1 (Contd.)

The waste acceptance criteria considers the hydrogeologic environment of the site and the protective properties of the engineered disposal facility. Soil, for instance, would be excavated down to the proposed cleanup level of 80 parts per million total uranium outside the former production area of the FEMP and 20 parts per million within the former production area. Current estimates indicate that placing all of the lightly contaminated soil together in the disposal facility will produce an average concentration of about 100 parts per million of uranium in the facility. This average concentration is one-tenth of the waste acceptance

criteria for disposal in the on-property disposal facility, a tenfold safety factor. It should be noted that sophisticated computer model simulations used to derive the waste acceptance criteria were completed assuming that there was no active maintenance of the facility and that the synthetic barriers present in the facility (e.g., high-density polyethylene membranes) were not functioning. These simulations indicate that even under these extreme conditions, the facility would still be protective of the aquifer over the full 200- to 1000-year performance period envisioned by federal regulations.

Bommer,_ We live in a flood zone, what about earthquake, tornadoes, or someone just blowing it up for a personal reason.

Response:

DOE shares the public concern in ensuring that the final remedy at the FEMP is protective of the Great Miami Aquifer and the public in general. Regarding the potential implications of a flood on the integrity of the disposal facility, current design requirements require the facility to be situated above the 500-year Great Miami River flood plain. Being a land mass structure, tornadoes should have little or no impact on the integrity of the facility. The Cincinnati area is in a moderate risk earthquake zone. The potential impacts of an earthquake will be considered during the design phase for the disposal facility. The DOE cannot guarantee that the disposal facility would not ever be the target of a bomb; however, it should be noted that the materials within the disposal facility do not possess any apparent quality or value which would potentially render it the subject of terrorist type activities. Additionally, it should be noted that the materials planned to be placed within the on-property disposal facility do not pose an acute threat to human health upon direct contact or exposure. The materials are being placed into the disposal facility to preclude long-term chronic exposure to the contaminated soil and ensure the permanent protection of the water quality in the underlying Great Miami Aquifer.

Bommer,_ ... not to mention trying to sell our property with a waste plant so close.
3

Response:

The evaluation of the implications of the remedy on local property values is outside the technical criteria defined by environmental regulation and guidance for consideration in the development and detailed analysis of remedial alternatives. At several public meetings regarding other FEMP relate issues, members of the local community have provided commentary on the potential beneficial impact the final completion of cleanup at the Fernald site will have on local property values.

Bommer,_ I would like to see my kids grow up in a safe and healthy place.
4

Response:

Comment Acknowledged. The DOE is committed to implementing the selected remedy in a expedient manner based upon the availability of funding. The selected remedy will remove media containing site-introduced contaminants to the extent necessary to achieve levels deemed health protective by federal environmental regulation. The excavated materials will be permanently isolated in an on-property disposal facility specifically designed to ensure long-term protectiveness.

Land Use Objective 1: Full Unrestrictive Use

This is the only means of insuring environmental stability and protecting the Great Miami Aquifer. The soil is contaminated with uranium at 100 times background levels to a depth of 20 feet. The highest level, 8000 ppm, is 1600 times background level. Contamination near processing facilities of acidic uranium solutions is 400 ppm, which is 80 times background level. Another

11 square miles which is approximately 2 times background levels has all contributed to contamination of the Great Miami Aquifer. The radioactive half life of the uranium isotopes 234 to 238 is 2.45 x 10 5 to 4.46 x 10 9 years respectively (this is almost a million to many, many millions of years). The contamination of groundwater in the Great Miami Aquifer ranges from 50 ppb at the former production area to 2100 ppb at South Field, a solid waste disposal area. The highest projected contamination levels in the aquifer will occur within 1000 years.

Consideration of Alternative 3A: Engineered Disposal Facility (on-site) will place the Great Miami Aquifer at an unacceptable risk to introduction of additional radioactive material contamination over time.

Denis Boudreau
55A Jacob Drive
Harrison, OH 45030
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<IMG SRC 0596312E8>

Boudreau, D.
1

Alternative 1: Excavation and Off-Site Shipment
Land Use Objective 1: Full Unrestrictive Use

This is the only means of insuring environmental stability and protecting the Great Miami Aquifer.

Consideration of Alt. 3A ... will place the Great Miami Aquifer at an unacceptable risk to introduction of additional radioactive material contamination over time.

Response:

Alternative 1 is not the only means of ensuring environmental stability and protecting the Great Miami Aquifer. The uranium concentrations listed in the commentor's letter exist now in soil and groundwater. The proposed cleanup plan will correct an existing contamination problem and reduce the levels of contamination within the environmental media at the site to levels deemed to be health protective by federal environmental regulation. It cleans up the FEMP by getting the material with higher levels of contamination away from the site, and provides a strategy for permanently protecting human health and the underlying Great Miami Aquifer by isolating the remaining less contaminated material in an engineered disposal facility at the site.

The selected cleanup remedy at the FEMP has three objectives related to the Great Miami Aquifer; stop existing sources of contamination to the aquifer, restore the aquifer to maximum beneficial use in a reasonable time frame, and protect the aquifer from future contamination originating from the FEMP property. DOE recognizes that the aquifer is an important national and local resource and that the FEMP site has adversely impacted an approximate 200-acre area of the aquifer system. DOE also recognizes that if the FEMP is not cleaned up it poses continued contamination risk to the public and to the aquifer. DOE intends to eliminate this unacceptable risk by moving forward with a balanced remediation approach. This approach gets the most contaminated materials away from the aquifer (by shipping them off-site), restores the aquifer, and limits the quantity and disposal configuration of the contaminated material remaining at the site. Completion of the selected remedy will also provide for more beneficial use of the FEMP property outside the disposal facility area.

Plans are to remove the materials that constitute about 97 percent of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be

accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

What will remain for disposal at the FEMP in the engineered disposal facility will be about 3 percent of the current quantity of radioactivity present at the site. This 3 percent is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials; specifically Operable Unit 5 soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from this operable unit is also being considered for on-property disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-property disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

Boudreau, D. 1 (Contd.) (Contd.)

Several different options were considered for the less contaminated material before the excavation and on-properly disposal option was selected. Use of caps, in-place containment, off-site disposal, and soil washing were all considered but the risks and costs were judged to be unacceptable. The decision as to what less contaminated material would remain on site was developed with input from the Fernald Citizens Task Force and the public through numerous round tables and open forums. Waste acceptance criteria for the less contaminated material were developed for the engineered disposal facility to help ensure protection of the aquifer. Only material that falls below the contamination level of the waste acceptance criteria will be disposed of in the engineered disposal facility. Material that does not meet the criteria will have to be either treated or shipped off site.

The waste acceptance criteria considers the hydrogeologic environment of the site and the protective properties of the engineered disposal facility. Soil, for instance, would be excavated down to the proposed cleanup level of 80 parts per million total uranium outside the former production area of the FEMP and 20 parts per million within the former production area. Current estimates indicate that placing all of the lightly contaminated soil together in the disposal facility will produce an average concentration of about 100 parts per million of uranium in the facility. This average concentration is one-tenth of the waste acceptance criteria for disposal in the on-properly disposal facility, a tenfold safely factor. It should be noted that sophisticated computer model simulations used to derive the waste acceptance criteria were completed assuming that there was no active maintenance of the facility and that the synthetic barriers present in the facility (e.g., high-density polyethylene membranes) were not functioning. These simulations indicate that even under these extreme conditions, the facility would still be protective of the aquifer over the full 200- to 1000-year performance period envisioned by federal regulations.

Boudreau, D. 2

The highest projected contamination levels in the aquifer will occur within 1000 years.

Response:

This commentor is correct, assuming that no remediation of the site occurs. As noted above, plans are to remediate the site and to provide long-term protection to the Great Miami Aquifer by shipping the more highly contaminated material off site and containing the lower concentration material on site in an engineered disposal facility.

Brown, J. 1

To put this site over our aquifer is insane. You cannot possibly protect our water from contamination. You must not be thinking this situation over very carefully.

Response:

The proposal to put an engineered disposal facility over the Great Miami Aquifer was very carefully thought out. This proposal is the culmination of over seven years of study. The proposed cleanup plan will correct an existing contamination problem and reduce the levels of contamination within the environmental media at the site to levels deemed to be health protective by federal environmental regulation. It cleans up the FEMP by getting the material with higher levels of contamination away from the site, and provides a strategy for permanently protecting human health and the underlying Great Miami Aquifer by isolating the remaining less contaminated material in an engineered disposal facility at the site.

The selected cleanup remedy at the FEMP has three objectives related to the Great Miami Aquifer; stop existing sources of contamination to the aquifer, restore the aquifer to maximum beneficial use in a reasonable time frame, and protect the aquifer from future contamination originating from the FEMP property. DOE recognizes that the aquifer is an important national and local resource and that the FEMP site has adversely impacted an approximate 200-acre area of the aquifer system DOE also recognizes that if the FEMP is not cleaned up it poses continued contamination risk to the public and to the aquifer. DOE intends to eliminate this unacceptable risk by moving forward with a balanced remediation approach. This approach gets the most contaminated materials away from the aquifer (by shipping them off-site), restores the aquifer, and limits the quantity and disposal configuration of the contaminated material remaining at the site. Completion of the selected remedy will also provide for more beneficial use of the FEMP property outside the disposal facility area.

Plans are to remove the materials that constitute about 97 percent of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

What will remain for disposal at the FEMP in the engineered disposal facility will be about 3 percent of the current quantity of radioactivity present at the site. This 3 percent is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials, specifically Operable Unit 5 soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from this operable unit is also being considered for on-property disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-property disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

Brown, J. (Contd.)
1 (Cont'd)

Several different options were considered for the less contaminated material before the excavation and on-property disposal option was selected. Use of caps, in-place containment, off-site disposal, and soil washing were all considered but the risks and costs were judged to be unacceptable. The decision as to what less contaminated material would remain on site was developed with input from the Fernald Citizens Task Force and the public through numerous round tables and open forums. Waste acceptance criteria for the less contaminated material were developed for the engineered disposal facility to help ensure protection of the aquifer. Only material that falls below the contamination level of the waste acceptance criteria will be disposed of in the engineered disposal facility. Material that does not meet the criteria will have to be either treated or shipped off site.

The waste acceptance criteria considers the hydrogeologic environment of the site and the protective properties of the engineered disposal facility. Soil, for instance, would be

excavated down to the proposed cleanup level of 80 parts per million total uranium outside the former production area of the FEMP and 20 parts per million within the former production area. Current estimates indicate that placing all of the lightly contaminated soil together in the disposal facility will produce an average concentration of about 100 parts per million of uranium in the facility. This average concentration is one-tenth of the waste acceptance criteria for disposal in the on-property disposal facility, a tenfold safety factor. It should be noted that sophisticated computer model simulations used to derive the waste acceptance criteria were completed assuming that there was no active maintenance of the facility and that the synthetic barriers present in the facility (e.g., high-density polyethylene membranes) were not functioning. These simulations indicate that even under these extreme conditions, the facility would still be protective of the aquifer over the full 200- to 1000-year performance period envisioned by federal regulations.

Brown, J. 2 Remove the Contamination! Do not have anyone elses in to cleanup. (Brown, J.)

Response:

As stated above, plans are to remove the materials that constitute about 97 percent of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

DOE has no plans to bring contaminants to the FEMP site to be cleaned and then placed in the on-site disposal facility. However, DOE is evaluating the potential cost savings of treating some materials from other DOE sites at the FEMP and then shipping them back to the originating facility for final disposal. There is much public concern regarding placement of off-site waste in the site engineered disposal facility. The facility is being designed to correct a problem that already exists at the FEMP. No consideration is being given to placing waste from other sites in the FEMP engineered disposal facility.

Clawson, M. 1 I agree with remedial action for OU5 is Alternative 3A. My concern is the 300 ft. area around disposal cell should be planted in trees and fence on outside of 300 ft area so it would make it difficult for a trespasser to enter area.

Response:

The actual dimensions of the buffer area and access controls will be determined during the remedial design/remedial action phase and will be designed to protect the disposal facility from the trespasser and the trespasser from the facility.

Clawson, M. 2 DOE should monitor area and be responsible for upkeep of disposal cell forever.

Response:

The remedy for Operable Unit 5 includes continued federal government ownership for the portion of the site used for the disposal facility and the buffer area. Additionally, the selected remedy provides for long-term monitoring and maintenance of the on-property disposal facility.

<IMG SRC 0596312F2>
<IMG SRC 0596312F3>

Crawford, L. I believe the alternative selected in the Proposed Plan is protective of human health and the environment. I believe the preferred alternative is the appropriate one when considered in the context of the overall site cleanup. I personally support the concept of a

balanced approach where the low volume high concentration wastes go off site for disposal and high volume lower concentration waste are disposed of in an engineered facility on-site. I believe this approach provides the most protective for remediation of the FEMP site.

Response:

Statement acknowledged. The selected remedy for Operable Unit 5 is consistent with the "balanced approach" whereby more heavily contaminated materials will be shipped for off-site disposal, while the large volume of materials exhibiting low concentrations of contaminants will remain in an engineered disposal facility at the site.

Crawford, L. a) No hazardous waste can be disposed of in the facility.
2

Response:

To properly respond to this comment it is first important to highlight some pertinent background regulatory considerations related to the term "hazardous waste" in context with the types of contaminated materials present in Operable Unit 5. Under the terms of both the federal (RCRA) and state regulations, a waste is considered hazardous, in general, through one of two ways; by listing or by exhibiting a characteristic. Simply put, a waste would be considered a hazardous waste if it appears on a series of specific lists identified in the federal and state hazardous waste regulations. Waste appearing on these lists is typically referred to as listed hazardous waste; examples include spent industrial solvents, dry cleaning fluids and types of unused pesticides and herbicides.

For a waste to be hazardous by characteristic it must exhibit at least one of four characteristics. The regulations define these characteristics and the testing protocols by which a material is judged to establish its compliance position. The characteristics evaluated to establish whether a waste is hazardous under RCRA are ignitability, reactivity, corrosivity and toxicity. An ignitable waste is one which will combust upon the application of a defined ignition source, e.g., xylene. A reactive waste is typically a waste which will readily react in a violent manner when contacting water or air, e.g., unused sodium. A corrosive waste is one that is very acidic or basic and could corrode its container, e.g., spent acidic solutions.

To protect the integrity of the disposal facility liners the waste acceptance criteria prohibits disposal of corrosive, reactive, and ignitable materials.

The characteristic of toxicity is measured by the tendency of the waste to leach a given constituent that is regulated under RCRA. This characteristic examines a list of inorganics, organics, pesticides and polychlorinated biphenyls. The regulation establishes a standardized testing protocol to be applied and individual concentration-based limits for each constituent. In effect, the toxicity of the waste is inferred indirectly by measuring the leachability of the components comprising the waste.

Operable Unit 5 addresses environmental media which have become contaminated through releases from production and waste management facilities located at the site. The scope of Operable Unit 5 does not include the examination of high concentration residues generated from production processing. The releases that contaminated environmental media originated as process losses during normal production operations and spills which occurred over the 37-year history of uranium production. It is speculated that some limited portion of the media became contaminated as a direct result of releases from designated hazardous waste management units at the facility; the media so contaminated would be categorized as hazardous waste. These media are typically regulated as hazardous waste in that they contain a listed hazardous waste which was released from a designated unit. The regulations currently set no lower concentration limit

below which the media would be considered not to represent a listed hazardous waste. Sampling conducted as part of Operable Unit 5 has identified a quantity of soil which is presumed to contain low concentrations of listed hazardous waste constituents in addition to uranium and other radionuclides. This volume of soil would be labeled as listed hazardous waste regardless of the measured concentration of the listed hazardous waste contained in the soil. The adoption of a position that hazardous waste could not be received at the on-property disposal facility would require off-site disposal of this contaminated soil.

Crawford, L. (Contd.)
2 (Contd.)

Additionally, a limited quantity of Operable Unit 5 soil is expected to exhibit the characteristic of toxicity for one or more inorganic or organic constituents. The most significant volume of this category of contaminated soil would be associated with the former trap range at the site. The current test method for determining if the characteristic of toxicity is present would require that the spent lead bullets/shot in the soil be ground and then subjected to an acidic leach process. This test method would render the soil characteristically hazardous due to the presence of the spent lead bullets/shot in the soil. Again, adoption of a prohibition of hazardous waste in the disposal facility would require this soil to be treated to remove the hazard or sent off site for disposal.

In February 1993 EPA promulgated a federal regulation pertaining to the management of remediation waste within what they termed "corrective action management units." Remediation waste is defined as all solid and hazardous wastes, and all media (including groundwater, surface water, soil, and sediments) and debris, which contain listed hazardous wastes or which themselves exhibit a hazardous waste characteristic, that are managed for the purpose of implementing corrective action requirements. The EPA clearly indicated in the preamble to this final rule that the substantive requirements of the regulations for corrective action management units are expected to be applicable or relevant and appropriate requirements for the remediation of CERCLA sites, including federal facilities, involving remediation of hazardous wastes. In essence, the adoption of this promulgated EPA regulation would permit placement in the on-property disposal facility of contaminated soil containing listed hazardous wastes or soil exhibiting a characteristic of a hazardous waste.

EPA established this regulatory framework for the use of corrective action management units because remediation of existing contamination problems is inherently different from the management of as-generated industrial hazardous waste (58 Fed. Reg. 8658). The original hazardous waste management program under the RCRA was designed to prevent new releases. EPA noted a number of differences between as-generated hazardous wastes resulting from operating processes and remediation wastes. One significant difference was that remediation often involves management of large volumes of contaminated media, such as soil and groundwater, with physical and chemical characteristics that can be quite different from those of as-generated wastes. EPA has found that applying the stringent requirements for as-generated hazardous wastes to remediation wastes can act as a disincentive to more protective remedies and limit flexibility in choosing the most practical remedy at a particular site. The agency noted in the preamble to the corrective action management unit rulemaking that "application of regulatory requirements designed for as-generated wastes to remediation wastes has proven problematic. In essence, standards designed to prevent releases from occurring and to force hazardous waste generators to internalize the costs posed by hazardous waste management can be highly counterproductive when applied to wastes generated during remediation, where the release has already occurred and the desired incentive is to increase, rather than decrease, waste production." EPA therefore developed regulations "for management of remediation wastes that are better tailored to the realities of remediation actions." The agency notes that the goal related to corrective action decisions is to select a remedy that is fully protective, yet reflects the technical and practical realities of the site.

Crawford, L. (Contd.)
2 (Contd.)

To ensure the long-term protection of human health and the environment, Section 9 of this ROD defines a series of waste acceptance criteria for the on-property disposal facility. The criteria establish the maximum concentration of a given constituent which can be present in the contaminated media for receipt in the on-property disposal facility to ensure the long-term protection of the underlying aquifer. The criteria, including those for uranium and the other constituents present on the list, were developed in an equivalent manner employing a consistent set of technical input parameters. To compile the list of waste acceptance criteria, each of the contaminants found to occur in the Operable Unit 5 media were individually evaluated. This list of contaminants included those that would be labeled as hazardous waste under the current regulatory framework. Concentration-based waste acceptance criteria were derived for those constituents which had a potential to leach to the underlying aquifer within the 1000-year time frame in a concentration which would exceed existing or proposed federal drinking waste standards (or a risk level of 10 -5 where a drinking water standard was not available for a given constituent). In essence, the selected remedy does not necessarily consider the regulatory definition of whether the soil would be labeled as hazardous waste, but focuses on the individual concentration of all contaminants that are present to determine the viability for the soil to be placed in the on-property disposal facility. The soil which exhibits a concentration of a contaminant that exceeds the waste acceptance criteria would not be considered for on-property disposal unless subjected to some form of treatment to render the soil suitable for placement in the facility. Additionally, the concentration-based waste acceptance criteria has been extended to preclude the acceptance in the on-property disposal facility of any material that exhibits the characteristics of reactivity, ignitability, or corrosivity. These additional restrictions were added as a best management practice to ensure worker safety and the integrity of the disposal facility lining and capping systems. Through the application of these waste acceptance criteria, the selected remedy provides for the long-term protection of human health, while at the same time providing an implementable and cost-effective strategy for addressing the permanent disposal of the contaminated environmental media at the FEMP.

Crawford, L. (Contd.)
2 (Contd.)

In addition to the requirement that a health-protective remedy be adopted for a site undergoing cleanup for RCRA-regulated substances (which is satisfied by the health-protective waste acceptance criteria and final remediation levels adopted for the Operable Unit 5 contaminated media), the corrective action management unit rule requires that the remedy satisfy a regulatory preference for methods that enhance the long-term effectiveness of the remedy through the application, as appropriate, of treatment technologies that reduce toxicity, mobility, or volume of wastes that will remain in place after site closure. In their comments on the Operable Unit 5 Proposed Plan, OEPA raised a stipulation requiring treatment of the Operable Unit 5 soil materials that qualify as RCRA characteristic hazardous waste (i.e., to remove the characteristic property associated with the material) before placement in the disposal facility. Recognizing that DOE has developed health-protective final remediation levels and waste acceptance criteria for all of the Operable Unit 5 contaminants of concern, OEPA's additional stipulation concerning the on-property disposal of characteristic waste has its origin in the need to satisfy, on a site-specific basis, the regulatory preference for remedies that employ treatment. As stated in the corrective action management unit rule, the decision to apply cost-effective treatment is a case-by-case decision that must consider waste- and site-specific factors. OEPA has designated the Operable Unit 5 soil that qualifies as RCRA characteristic waste as a site-specific quantity of material that offers a reasonable opportunity to apply additional treatment measures. Upon review of the site characterization data from the Operable Unit 5 remedial investigation coupled with historical process knowledge, six geographic areas of the FEMP have been identified where a reasonable potential exists for the presence of soil that

qualifies as containing RCRA characteristic waste. DOE agrees that these six areas offer a reasonable, site-specific, and cost-effective opportunity to treat additional materials before on-property disposal, in the interest of enhancing the long-term effectiveness of the remedy through treatment techniques. The remedy described in Section 9.0 of the ROD includes a commitment by DOE to search for and employ treatment as necessary for characteristic hazardous waste in soil that originates from within the six geographic areas.

Crawford, L. The disposal facility WAC for Uranium-232 must be set at a maximum of 346 pCi/g or 1030 ppm for total uranium. The WAC must be an upper limit of concentration acceptable into the disposal facility and may not be used as an average limit.

Response:

The waste acceptance criteria for the engineered disposal facility defined in the Feasibility Study and Proposed Plan have been adopted as part of the selected remedy for Operable Unit 5. These criteria, as defined in Section 9 of this ROD, include the establishment of a concentration-based waste acceptance criteria for total uranium of 1030 parts per million. Assuming a natural distribution of the major isotopes of uranium (i.e., uranium-238, -235, and -234), the 1030 parts per million waste acceptance criteria would convert to 346 picocuries per gram of uranium-238. This limit has been set as an upper permissible concentration level for contaminated soil to be received into the on-property disposal facility, and as such will not be used as an average limit.

The selected remedy provides that soil exceeding this waste acceptance criteria will be shipped for off-site disposal at an appropriate facility. DOE is committed to implementing this remedy as defined in this decision document. However, DOE must also bring to the commentor's attention that the availability of off-site disposal capacity cannot be assured over the 10- to 25-year cleanup program associated with Operable Unit 5. In the event off-site disposal capacity becomes unavailable or cost prohibitive at some point in the future, DOE considers it important that flexibility be maintained and indicated in the ROD so as to permit the application of treatment technologies to soil exceeding these acceptance criteria to convert them to a form suitable for on-property disposal. The application of such technologies would only occur following receipt of approval from EPA and input from OEPA.

Crawford, L. No disposal or long-term storage of off-site waste in the proposed engineered
4 disposal facility or any other facility on the FEW site.

Response:

The DOE concurs with the comment, and has no intention of using the disposal facility associated with the Operable Unit 5 remedy to address wastes generated from off-site locations. Additionally, the DOE has no intention of using existing or newly constructed storage facilities located at the FEMP for the long-term storage of wastes generated from off-site locations. Specifically excluded from this prohibition are laboratory wastes generated at off-site facilities resulting directly from the chemical, radiological or engineering analysis of FEMP waste materials/contaminated media or generated during the conduct of treatability or demonstration type studies on FEMP waste materials/contaminated media. Such analyses and studies are typically performed as an integral part of implementing a selected remedy at a cleanup site.

Crawford, L. While I understand the need for a USEPA waiver and reluctantly support it, it must
5 allow and follow my comments under #2.

Response:

Statement acknowledged. Please see responses to the comments labeled Crawford 2, 3 and 4 above.

Crawford, L. 6 DOE must make a commitment within the OU5 ROD regarding government ownership. DOE must/will provide a commitment to ensure the land-use to develop the clean up standards is maintained into the future. DOE ownership is essential.

Response:

The comment raises the need to properly align the necessary institutional control provisions for the FEMP with the future land use for the facility to ensure the continued protection of human health. DOE agrees with the need for this alignment. It is not the intent of DOE to attempt to establish a final future land use for the FEMP through this decision document. DOE does recognize that the final remediation levels identified in Section 9.0 of this ROD do establish the permissible concentrations of contaminants which could remain at the site following completion of remedial actions. These remaining concentrations of contaminants will present a potential for exposure to future users of the FEMP.

The Fernald Citizens Task Force issued recommendations regarding future use of the Fernald property in May of 1995, recommending that the area of the FEMP containing the disposal facility and associated buffer zone remain under the continued ownership of the federal government. Additionally, the Task Force recommended that the remaining portions of the FEMP property be made available for the uses that are the most beneficial to the surrounding communities. While the Task Force recommended prohibiting any sort of agricultural or residential uses of the remaining portions of the FEMP property (outside the disposal facility area), the Task Force encouraged DOE to consult with local communities to establish their preferences for future use and ownership of these areas of the site. Consistent with this recommendation, DOE does not consider it prudent to insert enforceable provisions within this ROD to provide for the continued federal ownership of the entire FEMP property.

Additionally, DOE considers that final, enforceable institutional control measures for postremedial conditions at the FEMP should be established based upon an analysis of the actual residual concentrations as measured in site soil and groundwater following the completion of remedial actions; the measured concentrations and spatial distribution may differ from feasibility study projections. This difference in estimated versus measured concentrations could have a significant impact on the required institutional controls necessary to maintain continued protectiveness. In this ROD, DOE has elected to define that institutional controls are a necessary component of the remedy to ensure continued protectiveness, but that the specific institutional control provisions necessary to be applied to postremedial site conditions will be defined during remedial design. The institutional control provisions defined during remedial design may be modified during the remedial action phase to accommodate the progressive findings of the field certification efforts. As with all remedial design and remedial action documentation, the plan for institutional controls at the FEMP, and any necessary modifications to it, will be subject to approval by EPA and review by OEPA.

The need for institutional controls during the conduct of remedial actions and the requirement for continued federal ownership of the disposal facility area at the FEMP have been specifically identified in this ROD. More specific detail on the actual implementation of these controls will be defined during remedial design.

Crawford, L. 7 DOE must ensure public participation through the RD/RA. DOE must commit to continuing the public involvement program during this time.

Response:

DOE is committed to continuing the active community involvement program currently in place at the FEMP throughout the duration of remedial activities at the site. This issue has been discussed at public meetings and has been the subject of a more focused roundtable held with interested members of the local community. Language has been added to Section 9 of this ROD to formalize the commitment to continue the ongoing public involvement program during the remedial design/remedial action process.

Crawford, L. DOE should attempt to do pollution prevention as much as possible during OU5 remedial actions. All methods available to reduce or eliminate discharges and releases from the excavation and disposal activities should be considered during the design of the system.

Response:

Pollution prevention will be a key consideration during remedial design for Operable Unit 5. Considerations during remedial design will include minimizing discharges to the Great Miami River to the extent practical, applying appropriate mitigative measures during excavation and soil transport and staging operations to minimize fugitive dust emissions, and ensuring the necessary controls to reduce the migration of contaminated soil and surface water out of controlled areas during rain events. DOE's planned actions will be documented during remedial design and subject to approval by EPA, formal review by OEPA, and will be available for public inspection.

Crawford, L. DOE should commit to using and developing real-time monitoring. Data obtained
9 from the real-time monitoring and any other monitoring will be provided to the public in a timely manner.

Response:

DOE is committed to executing a responsible and technically defensible environmental monitoring program during and following the conduct of remedial actions at the FEMP. Language committing DOE to perform this monitoring has been included in Section 9 of this ROD. Specific details on the type and frequency of monitoring will be defined during the remedial design phase. It is also expected that, as the site moves through the remedial action process, changes will be necessary to this monitoring program to reflect changed conditions at the site (e.g., completion of remedial action for one area of the site) or to address the progressive findings of the program. Recognition of the need to modify the monitoring program during and after remedial actions has also been identified in this ROD.

Commercially available and emerging monitoring techniques that could provide real-time or near real-time data on environmental releases will be considered during the development of this monitoring program during remedial design.

The DOE currently has in place a program for reporting upon environmental monitoring data collected at the FEMP including nonroutine releases (such as spills) and more routine environmental discharges generated by site cleanup activities. As part of the Operable Unit 5 remedial design process, the existing site reporting system will be evaluated and necessary changes effected to ensure the program is properly aligned with proposed remedial activities. One goal of the reporting system will be to continue to report environmental discharges to the local community and involved regulatory agencies in a prompt and responsible manner. The proposed mechanisms and frequency of reporting will be defined in the remedial design documentation for Operable Unit 5 and be subject to EPA approval, formal review by OEPA, and will be made available for public inspection.

Crawford, L. During the implementation of the preferred alternative, DOE must use excavation and
10 waste management techniques which-will prevent the dilution of waste concentrations

to meet the WAC's. DOE will not use dilution to meet the WAC or remediation levels. This is unacceptable and will not be tolerated.

Response:

DOE agrees that an important consideration during the remedy implementation phase is to ensure that proper excavation control and waste management practices are applied to prevent the dilution of contaminated soil and increase the volume of soil requiring disposal. DOE has no intention of using dilution as a mechanism to attain the waste acceptance criteria for the disposal facility. DOE is compiling detailed procedures to guide site-wide excavation operations for contaminated soil. These procedures, which will be developed during the remedial design phase for Operable Unit 5, will clearly define intended excavation methods that will ensure against such dilution taking place.

Crawford, L. 1 DOE should be open in considering new technologies which way reduce the volume, toxicity or mobility of wastes being disposed of on-site. I am personally requesting that DOE remain open minded to the idea of additional technologies which could result in a safer waste for on-site disposal.

Response:

DOE agrees that the FEMP should continue to be open to new technologies that may reduce the volume, toxicity or mobility of wastes being disposed of on site. Language expressing this commitment was provided in the Proposed Plan in the description of the preferred alternative and has been incorporated in Section 9 of this ROD.

Crawford, L. I greatly support DOE's use of the proposed MCL for total uranium of 20 ug/l as the groundwater remediation level. I personally believe that remediation to this standard will ensure the Great Miami Aquifer is restored to it full beneficial use. Any proposed changes to the 20 ug/l total uranium remediation standard would necessitate a ROD amendment including a formal public comment period.

Response:

Consistent with Section 300.430(e)(2)(i)(C)of the National Contingency Plan, the DOE has adopted the maximum contaminant levels under the Safe Drinking Water Act as relevant and appropriate requirements to the restoration of the Great Miami Aquifer. Lacking a final promulgated maximum contaminant level for uranium, DOE adopted, as part of the selected remedy, the maximum contaminant level proposed by EPA in July 1991 under the Safe Drinking Water Act of 20 parts per billion as the final remediation level for restoration of the aquifer. This proposed standard was adopted as a "To Be Considered requirement to the selected remedy.

The estimated costs for the restoration of the Great Miami Aquifer are, as would be expected, very sensitive to the established final groundwater cleanup limits (final remediation levels). While DOE is committed to fully restoring the aquifer to health-protective levels, DOE must do so in full recognition of its role as a steward of public funds. Within its stewardship role, the DOE must ensure that public funds are committed only to remedial activities which yield a commensurate environmental or human health-related benefit. As such, the DOE must evaluate the technical and economic implications of pursuing adoption of the final maximum contaminant level for uranium, once promulgated by EPA. Such a technical and economic evaluation will be warranted regardless of whether the final maximum contaminant level for uranium represents a higher or lower concentration-based limitation than the proposed 20 parts per billion standard. In the event DOE considers it appropriate to pursue a change to the final remediation level for uranium in groundwater identified in this decision document, DOE will initiate such a change in a manner consistent with CERCLA, the National Contingency Plan and the terms of the Amended Consent Agreement. As done throughout the remedial investigation/ feasibility study decision-making process, the DOE will involve the public in any attempt to

modify the final remedial level for uranium in the Great Miami Aquifer from the 20 parts per billion value identified in Section 9 of this ROD.

Once again, being a nearby resident, let me state up front that my preference would be for a total cleanup of the site that would return the site to background levels and leave no waste on site. However, since technological, political, and practical considerations must also come into play, I realize that this is probably not going to happen.

However, before the final ROD is decided upon I would like to see a more realistic evaluation at the costs at the proposed alternative. The costs of O & M were only figured for 30 years. This may be a standard way of estimating costs, but it does not accurately reflect the true costs of operating and monitoring a disposal cell at the FEMP versus disposing at the waste off-site. Because of the extremely long half-life of uranium the O & M costs will continue year after year indefinitely. However, if the waste were disposed of in an arid climate, the O & M costs would be considerably less and would also be just a portion of the costs of monitoring a facility in an arid climate which also accepts other wastes. Also, inevitably the cell will fail, and probably need repairs to prevent further contamination of the Great Miami Aquifer. Were these repair costs included in the cost estimates? For a true picture at costs you must look way beyond a 30 year time frame.

If a cell were built, and Congress cut the O & M funding out, what would be the worst case scenario for the cell, the community and the environment?

The rest of my comments are aimed at bringing up concerns and suggestions relative to the Proposed Plan for OU 5. The ROD for OU 5 should clearly deal with or state the following:

* No off-site waste will be brought onto FEMP property for storage or disposal. (Define off-site waste as anything not currently on the site, except for samples that were sent off-site for characterization or treatability studies)

* No characteristic hazardous waste should be placed in the cell.

* The ROD should state that DOE will follow a sort of ALARA-principle in designing and executing the remediation. The remediation levels should be as close to background as possible given the technological, risk, and cost constraints. If an additional process or activity could get us substantially closer to background at a reasonable cost and risk, this should be pursued. The goal should be background levels, not just staying within a remediation level.

With this in mind, please clarify how an ALARA goal or 50 ppm U for soil was chosen.

<IMG SRC 0596312F4>

* If a disposal cell is built, it will be placed over the best geology an the site.

* If a disposal cell is built, there should be constant oversight by an independent expert as the engineering, construction and filling are performed to insure that they are done properly. Reports from the independent expert

should be part of the public record.

* If a disposal cell is built, it should be built in such a way that the contents can be accessed for future remediation efforts if needed. This does not mean it must be in containers in neat rows, but be stored in a way that heavy machinery could get to it without lofting it in the air or increasing the risks to workers, community or the environment unnecessarily.

* It a cell is built, the cell designers should meet with the stakeholders before they start work and as they progress so that they adequately understand the concerns or the stakeholders and can design the cell to account for them. Also, the designers can snare their concerns with the stakeholders as they do their work. Frequent 2-way communication will save time, money and headaches in the long run.

* In order to minimize the size or the cell, reduction of waste volume technologies should be studied extensively before and during any cell construction and filling.

* If a cell is built, it inevitably will fail to some degree at a future date. Therefore it must be designed to keep any aquifer contamination as far below 20ppb as possible. Treatment technologies that would help achieve this should be studied extensively before and during the cell construction and filling. Consideration or treatment technologies (such as vitrification) should be considered for the portions of the waste that approach the upper WAC limit.

* Groundwater should be remediated to as far below 20 ppb as reasonably achievable. If drinking water standards change over the years, the 20 ppb level should not be raised for remediation purposes at the FEMP.

* Groundwater pumping and remediation should not end without stakeholder input being actively sought.

* The remediation of the FEMP should comply with all laws that exist on the date the RODs are signed and should only be changed to incorporate any future more stringent laws.

* The 5 year reviews of the ROD for effectiveness should include an analysis of the then current technologies ability to pursue further remediation. If at a future time a technology would allow for a way to truly deactivate the radioactivity or hazardous chemicals or for a way to greatly enhance the long-term storage at the material, we would want

to be able to evaluate if it was desirable to pursue further action. This process would also call attention to the technology research needs of the DOE.

* Copies of the annual reports and the 5 year reviews should be mailed to:

1. Ross, Crosby, and Morgan Townships
2. Butler and Hamilton Counties
3. OEPA, USEPA, ODH
4. Congressional and State Reps that have the FEMP in their district
5. Any resident, group or agency that wishes to be on the mailing list

* DOE will be responsible for requesting proper levels of funding for remediation and 0 & M (including future repairs) so that the Consent Agreements will be met. If Congress does not provide adequate funding, letters of inadequate funding should go out to those on the above mailing list. Defining "inadequate funding" should be worked out with the stakeholders. If at some time in the future another agency takes over the remediation and O & M functions of the site, it must accept the responsibilities in the RODs as well. The federal government must retain ownership of the disposal cell and any area necessary for maintaining the cell and controlling access to it. It should retain ownership of any area where the land use must be restricted to provide protectiveness for the public and the environment.

* DOE should commit to detailing the 0 & M process within its Administrative orders so that future DOE decision makers will be clear about the importance of this ongoing task.

* The RODs should be enforceable with fines and lawsuits if necessary.

* A mechanism for the stakeholders to initiate a request for future review and possible amendment of the ROD should be included in the ROD. Perhaps a petition with a certain number of signatures?

* If for some reason, the ROD for OU 5 can't be implemented fully, the ROD should be reopened with full public participation. Also, notice of any "Explanations of Significant Differences" or "Amendments to the ROD" should be mailed to stakeholders on the mailing list in addition to publishing a notice in an area newspaper.

* There needs to be a commitment that all the RODs will be rolled up into one "big picture" ROD that will incorporate any improvements in the wordings in the RODs that have evolved over time. For example, the ROD for OU 3

may have something in it that no one had thought of when they were writing earlier RODs. If appropriate, there should be a mechanism to incorporate it into all of the RODS.

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* Air monitoring data during excavation, drying and transport will be extremely important to the community and workers. The best available devices and techniques should be used to give the workers and community a clear picture of air emissions. Real time monitoring should be done on a routine basis. Action levels should be developed (with the community) so that work can be halted if they occur.

* Excavation techniques should be used that will not "dilute" the waste as it is being dug up for disposal.

* Any waiver given so that a disposal cell can be built, must include wording to keep all off-site waste from entering the FEMP for storage or disposal. It must also be so site-specific that it does not create a precedent for future federal or commercial disposal sites in the vicinity of the FEMP.

* The WAC of 1030ppm U for the waste cell should never be raised, but should be allowed to be lowered to account for other OU decisions and volumes. It should be a maximum number for the waste going into the cell and not an average.

* A commitment to continue the public involvement process that has been developed over the years should be stated clearly in the ROD. This should extend through design, remediation, and out into the 0 & M years.

While the government may feel that the remediation will be protective of human health and the environment, I feel that the public has the right to know whenever materials are above the background levels for their area. That way the public can decide for itself if it wants to be in contact with such materials. Also, it allows the public to have the information needed to determine if any additive or multiplicative risks need to be considered if such materials will be combined with other so-called "clean" materials.

Once cleanup is considered complete, all areas where the public will have access and that are above background (even if they are below the cleanup criteria) should be posted so that the public can make informed choices as to any exposures they might incur.

Submitted by Vicky Dastillung
6/30/95

Dastillung, V. However, before the final ROD is decided upon I would like to see a more
1 realistic evaluation of the costs of the proposed alternative. The costs of 0 & M were only figured for 30 years. This may be a standard way of estimating costs, but it does not accurately reflect the true costs of operating and monitoring a disposal cell at the FEMP versus disposing of the waste offsite. Because of the extremely long half-life of uranium the 0 & M costs will continue year after year indefinitely. However, if the waste were disposed of in an arid climate, the 0 & M costs would be considerably less and would also be just a portion of the costs of monitoring a facility in an arid climate which also accepts other wastes. Also, inevitably the cell will fail, and probably need repairs to prevent further contamination of the Great Miami Aquifer. Were these repair costs included in the cost estimates? For a true picture of costs you must look way beyond a 30 year time frame.

Response:

DOE agrees with the concerns raised by the commentor regarding the need for the long-term care of the disposal facility well into the future, and the need to consider the costs of this care when comparing alternatives. As will be explained below, the cost estimates prepared for Operable Unit 5 alternatives specifically consider the long-term care needs of the on-property disposal options.

The cost estimates used to compare the off-site and on-property options use present-worth methods that are designed specifically to allow for fair comparison of engineering alternatives that extend over different tune periods. The 30-year period provides a basis for comparing remedial alternatives and is not intended to signify the length of the remedial actions or DOE's commitment to their upkeep. The 30-year period of evaluation is specified in EPA remedial investigation/feasibility study cost estimating guidance because it is typically used to evaluate engineering alternatives that have long-term performance periods or which are expected to perform indefinitely. Thirty years is selected by EPA for the analysis because it typically represents the threshold point in a present-worth calculation beyond which additional yearly costs (while still accounted for) do not appreciably affect the magnitude of the present-worth cost estimate. As an example, DOE has estimated that the annual maintenance and monitoring costs for the disposal facility may be on the order of $1.4 million per year, and this figure was furnished to the Fernald Citizens Task Force for inclusion in their Toolbox. To illustrate the concept, if one performs a present-worth cost estimate using this $1.4 million per year annual expenditure, and employs a discount rate of 5 percent and considers expenditure periods of 10, 30, 50, 100, and 500 years, the following present-worth cost estimates result: 10 years -- $10.8 million; 30 years -- $21.5 million; 50 years -- $25.5 million; 100 years -- $27.8 million; and 500 years - $28.0 million. Clearly, as the performance period extends longer into the future the net effect on the present-worth estimate decreases significantly. This is the proper way to compare expenditures of money that have different duration periods over which they are spent, and EPA's remedial investigation/feasibility study cost estimating guidance employs such methods to compare remedial alternatives that contain differing performance periods.

It is also important to note that off-site disposal costs also represent inherent uncertainty over time, in that both prices and availability of capacity may change. DOE attempted to represent the off-site costs fairly by using prices that are representative of today's market, but this market can change over the next 10 to 20 years as competition for off-site capacity increases.

Dastillung, V. (Contd.)
1 (Contd.) DOE recognizes that under Section 107 of CERCLA it is liable for all response costs associated with the remedy, including the costs of long-term care. DOE further recognizes that these costs will extend indefinitely into the future and do not end with a 30-year time frame. DOE believes the long-term care costs associated with on-property disposal were properly considered in the cost comparisons conducted during the feasibility study.

Dastillung, V. If a cell were built, and Congress cut the 0 & M funding out, what would be the worst case scenario for the cell, the community and the environment?

Response:

The primary concern to DOE that is embodied in the commentor's question would be the long-term protection of the Great Miami Aquifer if the disposal facility no longer received long-term care. As part of the feasibility study, DOE conducted a number of disposal facility performance analyses to determine health- and environment-protective waste acceptance criteria for the facility. As a fundamental basis of these analyses, no credit was taken for active maintenance measures in the development of the waste acceptance criteria. In effect, the waste acceptance criteria conservatively assume that active maintenance measures and long-term care activities have ceased and that the facility rests in a passive (i.e., abandoned) mode with no human attention provided. For the analyses, effectiveness was defined as ensuring that protective standards (drinking water maximum contaminant levels) were not exceeded in the Great Miami Aquifer at any point beneath the disposal facility footprint. It was assumed in the analyses that the synthetic liner materials in the disposal facility cap and base had failed, the leachate collection systems were no longer functioning, and the natural earthen materials in the cap began to degrade over time, allowing infiltration into the facility to steadily increase. Even under the hypothetical failure modes evaluated through the analyses, the disposal facility was found to be reliable and effective over the full 200- to 1000-year performance period envisioned by federal regulations. The performance assessment provides a reasonable level of assurance that the on-property disposal facility will provide negligible impacts to the Great Miami Aquifer even in the absence of funding to conduct operation and maintenance activities, as the commentor asks.

With regard to other pathways of exposure that may be of concern -- such as inadvertent access to the contents of the facility -- the design of the facility does not rely on institutional controls or active measures to prevent contact with the contents. While institutional controls provide an additional margin of safety to prevent intruder access (or damage to the facility) and are planned for, sufficient physical barriers are included in the design to prevent intruder access and minimize erosional degradation of the cap over the long term, even if operating in a passive (i.e., "abandoned") mode. Finally, the average soil uranium concentration in the disposal facility following completion of the remedy is estimated to be approximately 100 parts per million (a result of the 1030 parts per million waste acceptance criteria for protecting the aquifer and the volume vs. concentration relationships for the site's contaminated soil). Thus, if an intruder were able to access the materials at some point in the future, he/she would be exposed to concentrations that, on average, are not much greater than the 80 parts per million soil cleanup level for Operable Unit 5 (which, as shown in the Operable Unit 5 Proposed Plan, is protective of the undeveloped park user at a 10 -6 incremental lifetime cancer risk level). By design, the worst case scenario for the disposal facility, the community, and the environment, if the facility were abandoned completely due to a lack of funding, is not much different than the scenario of all active maintenance measures taking place. As a point of interest, the vast-majority of the cost associated with active maintenance lies in the analytical monitoring that is required by federal regulation, rather than the need for intensive or complex maintenance procedures at the disposal facility.

Dastillung, V. No off-site waste will be brought onto FEMP property for storage or disposal. (Define off-site waste as anything not currently on the site, except for samples that were sent offsite for characterization or treatability studies.)

Response:

The DOE concurs with the comment, and has no intent to use the disposal facility associated with the Operable Unit 5 remedy to address wastes generated at off-site locations.

Additionally, the DOE has no intention of using existing or newly constructed storage facilities located at the FEMP for the long-term storage of wastes generated at off-site locations. Specifically excluded from this prohibition are laboratory wastes generated at off-site facilities resulting directly from the chemical, radiological or engineering analysis of FEMP waste materials or generated during the conduct of treatability or demonstration type studies on FEMP waste materials. The FEMP is contractually obligated to accept these lab-generated wastes. Such analyses and studies are typically performed as an integral part of implementing a selected remedy at a cleanup site.

Language has been added to Section 9 of this ROD to specifically identify that the FEMP storage and future disposal facility shall not be used for the long-term storage or disposal of wastes generated at off-site locations. Language regarding the identified exclusion has also been added to Section 9.

Dastillung, V. No characteristic hazardous waste should be placed in the cell.
4

Response:

To property respond to this comment it is first important to highlight some pertinent background regulatory considerations related to the term "hazardous waste" in context with the types of contaminated materials present in Operable Unit 5. Under the terms of both the federal (RCRA) and state regulations, a waste is considered hazardous, in general, through one of two ways; by listing or by exhibiting a characteristic. Simply put, a waste would be considered a hazardous waste if it appears on a series of specific lists identified in the federal and state hazardous waste regulations. Waste appearing on these lists is typically referred to as listed hazardous waste; examples include spent industrial solvents, dry cleaning fluids and types of unused pesticides and herbicides. For a waste to be hazardous by characteristic it must exhibit at least one of four characteristics. The regulations define these characteristics and the testing protocols by which a material is judged to establish its compliance position. The characteristics evaluated to establish whether a waste is hazardous under RCRA are ignitability, reactivity, corrosivity and toxicity. An ignitable waste is one which will combust upon the application of a defined ignition source, e.g., xylene. A reactive waste is typically a waste which will readily react in a violent manner when contacting water or air, e.g., unused sodium. A corrosive waste is one that is very acidic or basic and could corrode its container, e.g., spent acidic solutions.

To protect the integrity of the disposal facility liners the waste acceptance criteria prohibits disposal of corrosive, reactive, and ignitable materials.

The characteristic of toxicity is measured by the tendency of the waste to leach a given constituent that is regulated under RCRA. This characteristic examines a list of inorganics, organics, pesticides and polychlorinated biphenyls. The regulation establishes a standardized testing protocol to be applied and individual concentration-based limits for each constituent. In effect, the toxicity of the waste is inferred indirectly by measuring the leachability of the components comprising the waste.

Operable Unit 5 addresses environmental media which have become contaminated through releases from production and waste management facilities located at the site. The scope of Operable Unit 5 does not include the examination of high concentration residues generated from production processing. The releases that contaminated environmental media originated as process losses during normal production operations and spills which occurred over the 37-year history of uranium production. It is speculated that some limited portion of the media became contaminated as a direct result of releases from designated hazardous waste management units at the facility; the media so contaminated would be categorized as hazardous waste. These media are typically regulated as hazardous waste in that they contain a listed hazardous waste which was

released from a designated unit. The regulations currently set no lower concentration limit below which the media would be considered not to represent a listed hazardous waste. Sampling conducted as part of Operable Unit 5 has identified a quantity of soil which is presumed to contain low concentrations of listed hazardous waste constituents in addition to uranium and other radionuclides. This volume of soil would be labeled as listed hazardous waste regardless of the measured concentration of the listed hazardous waste contained in the soil. The adoption of a position that hazardous waste could not be received at the on-property disposal facility would require off-site disposal of this contaminated soil.

Dastillung, V. (Contd.)
4 (Contd.)

Additionally, a limited quantity of Operable Unit 5 soil is expected to exhibit the characteristic of toxicity for one or more inorganic or organic constituents. The most significant volume of this category of contaminated soil would be associated with the former trap range at the site. The current rest method for determining if the characteristic of toxicity is present would require that the spent lead bullets/shot in the soil be ground and then subjected to an acidic leach process. This test method would render the soil characteristically hazardous due to the presence of the spent lead bullets/shot in the soil. Again, adoption of a prohibition of hazardous waste in the disposal facility would require this soil to be treated to remove the hazard or sent off site for disposal.

In February 1993 EPA promulgated a federal regulation pertaining to the management of remediation waste within what they termed "corrective action management units." Remediation waste is defined as all solid and hazardous wastes, and all media (including groundwater, surface water, soil, and sediments) and debris, which contain listed hazardous wastes or which themselves exhibit a hazardous waste characteristic, that are managed for the purpose of implementing corrective action requirements. The EPA clearly indicated in the preamble to this final rule that the substantive requirements of the regulations for corrective action management units are expected to be applicable or relevant and appropriate requirements for the remediation of CERCLA sites, including federal facilities, involving remediation of hazardous wastes. In essence, the adoption of this promulgated EPA regulation would permit placement in the on-property disposal facility of contaminated soil containing listed hazardous wastes or soil exhibiting a characteristic of a hazardous waste.

EPA established this regulatory framework for the use of corrective action management units because remediation of existing contamination problems is inherently different from the management of as-generated industrial hazardous waste (58 Fed. Reg. 8658). The original hazardous waste management program under the RCRA was designed to prevent new releases. EPA noted a number of differences between as-generated hazardous wastes resulting from operating processes and remediation wastes. One significant difference was that remediation often involves management of large volumes of contaminated media, such as soil and groundwater, with physical and chemical characteristics that can be quite different from those of as-generated wastes. EPA has found that applying the stringent requirements for as-generated hazardous wastes to remediation wastes can act as a disincentive to more protective remedies and limit flexibility in choosing the most practical remedy at a particular site. The agency noted in the preamble to the corrective action management unit rulemaking that "application of regulatory requirements designed for as-generated wastes to remediation wastes has proven problematic. In essence, standards designed to prevent releases from, occurring and to force hazardous waste generators to internalize the costs posed by hazardous waste management can be highly counterproductive when applied to wastes generated during remediation, where the release has already occurred and the desired incentive is to increase, rather than decrease, waste production." EPA therefore developed regulations "for management of remediation wastes that are better tailored to the realities of remediation actions." The agency notes that the goal related to corrective action decisions is to select a remedy that is fully protective, yet reflects the technical and

practical realities of the site.

Dastillung, V. (Contd.)
4 (Contd.)

To ensure the long-term protection of human health and the environment, Section 9 of this ROD defines a series of waste acceptance criteria for the on-property disposal facility. The criteria establish the maximum concentration of a given constituent which can be present in the contaminated media for receipt in the on-property disposal facility to ensure the long-term protection of the underlying aquifer. The criteria, including those for uranium, and the other constituents present on the list, were developed in an equivalent manner employing a consistent set of technical input parameters. To compile the list of waste acceptance criteria, each of the contaminants found to occur in the Operable Unit 5 media were individually evaluated. This list of contaminants included those that would be labeled as hazardous waste under the current regulatory framework Concentration-based waste acceptance criteria were derived for those constituents which had a potential to leach to the underlying aquifer within the 1000-year time frame in a concentration which would exceed existing or proposed federal drinking waste standards (or a risk level of 10 -5 where a drinking water standard was not available for a given constituent). In essence, the selected remedy does not necessarily consider the regulatory definition of whether the soil would be labeled as hazardous waste, but focuses on the individual concentration of all contaminants that are present to determine the viability for the soil to be placed in the on-property disposal facility. The soil which exhibits a concentration of a contaminant that exceeds the waste acceptance criteria would not be considered for on-property disposal unless subjected to some form of treatment to render the soil suitable for placement in the facility. Additionally, the concentration-based waste acceptance criteria has been extended to preclude the acceptance in the on-property disposal facility of any material that exhibits the characteristics of reactivity, ignitability, or corrosivity. These additional restrictions were added as a best management practice to ensure worker safety and the integrity of the disposal facility lining and capping systems. Through the application of these waste acceptance criteria, the selected remedy provides for the long-term protection of human health, while at the same time providing an implementable and cost-effective strategy for addressing the permanent disposal of the contaminated environmental media at the FEMP.

Dastillung, V. (Contd.)
4 (Contd.)

In addition to the requirement that a health-protective remedy be adapted for a site undergoing cleanup for RCRA-regulated substances (which is satisfied by the health-protective waste acceptance criteria and final remediation levels adopted for the Operable Unit 5 contaminated media), the corrective action management unit rule requires that the remedy satisfy a regulatory preference for methods that enhance the long-term effectiveness of the remedy through the application, as appropriate, of treatment technologies that reduce toxicity, mobility, or volume of wastes that will remain in place after site closure. In their comments on the Operable Unit 5 Proposed Plan, OEPA raised a stipulation requiring treatment of the Operable Unit 5 soil materials that qualify as RCRA characteristic hazardous waste (i.e., to remove the characteristic property associated with the material) before placement in the disposal facility. Recognizing that DOE has developed health-protective final remediation levels and waste acceptance criteria for all of the Operable Unit 5 contaminants of concern, OEPA's additional stipulation concerning the on-property disposal of characteristic waste has its origin in the need to satisfy, on a site-specific basis, the regulatory preference for remedies that employ treatment. As stated in the corrective action management unit rule, the decision to apply cost-effective treatment is a case-by-case decision that must consider waste- and site-specific factors. OEPA has designated the Operable Unit 5 soil that qualifies as RCRA characteristic waste as a site-specific quantity of material that offers a reasonable opportunity to apply additional treatment measures. Upon review of the site characterization data from the Operable Unit 5 remedial investigation coupled with historical process knowledge, six geographic areas of

the FEMP have been identified where a reasonable potential exists for the presence of soil that qualifies as containing RCRA characteristic waste. DOE agrees that these six areas offer a reasonable, site-specific, and cost-effective opportunity to treat additional materials before on-property disposal, in the interest of enhancing the long-term effectiveness of the remedy through treatment techniques. The remedy described in Section 9.0 of the ROD includes a commitment by DOE to search for and employ treatment as necessary for characteristic hazardous waste in soil that originates from within the six geographic areas.

Dastillung, V. The ROD should state that DOE will follow a sort of ALARA-principle in designing
5 and executing the remediation. The remediation levels should be as close to background as possible given the technological, risk, and cost constraints. If an additional process or activity could get us substantially closer to background at a reasonable cost and risk, this should be pursued. The goal should be background levels, not just staying within a remediation level. Please clarify how an ALARA goal of 50 ppm U for soil was chosen.

Response:

Recognizing that the cleanup levels for Operable Unit 5 soil are set at health-protective levels, DOE concurs with this comment and is committed to applying as low as reasonably achievable principles during remedy implementation. Language has been added to Section 9 of the ROD to provide a commitment on the part of DOE to employ as low as reasonably achievable principles throughout all aspects of the remedy as a means to further enhance the protectiveness of the remedy.

The as low as reasonably achievable goal of 50 parts per million total uranium that was cited in the Proposed Plan was selected because it is coincident with the generally accepted technology-based lower limit for which real-time hand-held characterization equipment can be used to conduct field screening of soil uranium levels. Thus, although the Operable Unit 5 cleanup level is set at 80 parts per million total uranium, the FEMP believes it can effectively screen to 50 parts per million in the field. The incremental cost to excavate to a 50 parts per million level above and beyond the 80 parts per million level is considered by DOE to provide benefits that outweigh the additional cost.

Dastillung, V. If a disposal cell is built, it will be placed over the best geology on the site.

Response:

DOE agrees and language is contained in the ROD signifying this commitment.

Dastillung, V. If a disposal cell is built, there should be constant oversight by an independent expert as the engineering, construction and filling are performed to insure that they are done properly. Reports from the independent expert should be part of the public record.

Response:

DOE expects to follow all CERCLA requirements for implementation of remedial design/remedial action activities for the Operable Unit 5 remedy, including those that pertain to the availability of remedial design/remedial action documents for public inspection. All of these will be conducted under EPA oversight. DOE acknowledges that EPA has oversight authority and will be conducting their oversight activities in accordance with their recent "Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties" (EPA/540/G-90/001 April 1990). This document outlines the information that needs to be furnished by DOE for public inspection and the procedures to be implemented to ensure that quality design and construction practices are used, and that independent construction acceptance testing is conducted. DOE believes that this level of independent oversight is adequate and does not envision that an additional oversight group (in addition to EPA and its technical review contractors) will be necessary.

Dastillung, V. If a disposal cell is built, it should be built in such a way that the contents can be accessed for future remediation efforts if needed. This does not mean it must be in containers in neat rows, but be stored in a way that heavy machinery could get to it without lofting it in the air or increasing the risks to workers, community or the environment unnecessarily.

Response:

While the design of the facility is to function as a permanent (rather than temporary or interim) site and that the need for access to the materials is unlikely, the contents of the disposal facility would be amenable to access if necessary, and conventional measures could be implemented to retrieve the contents if additional remediation were found to be necessary.

Dastillung, V. If a cell is built, the cell designers should meet with the stakeholders before they start work and as they progress so that they adequately understand the concerns of the stakeholders and can design the cell to account for them. Also, the designers can share their concerns with the stakeholders as they do their work. Frequent 2-way communication will save time, money and headaches in the long run.

Response:

DOE concurs with the comment and such stakeholder interactions are planned during the remedial design and implementation phase of the project. DOE is committed to continuing the active community involvement program currently in place at the FEMP throughout the duration of remedial activities. This issue has been discussed at public meetings and has been the subject of a more focused roundtable meeting held with interested members of the local community. Language has been added to Section 9 of this ROD to formalize the commitment to continue the ongoing public involvement program during the remedial design/remedial action process.

Dastillung, V. In order to minimize the size of the cell, reduction or waste volume technologies
10 should be studied extensively before and during any cell construction and filling.

Response:

DOE concurs with the comment that the FEMP should continue to be open to new technologies that may reduce the volume, toxicity or mobility of wastes being disposed of onsite. Language has been included in Section 9 of this ROD documenting DOE's commitment to continue to evaluate new and emerging technologies for application to the contaminated media associated with Operable Unit 5. Included within this language is a commitment by DOE to evaluate two such technologies during remedial design: physical separation (to potentially reduce volume) and a soil amendment process (to potentially reduce contaminant mobility). DOE will conduct engineering studies of these two technologies during remedial design to assess the viability of applying them as part of the Operable Unit 5 remedy.

Analysis of physical separation during the remedial investigation/feasibility study identified significant constraints to applying the technique at the FEMP as a lead component of the remedy. One of the most important constraints identified during the remedial investigation/feasibility study was the determination that the contamination in site soil was distributed across all size fractions making up the soil. This hindered the ability to separate out one specific size fraction by physical methods and release this portion of the soil, without further treatment, for unrestricted use as backfill at the site. Much work is continuing through the DOE complex on soil washing and in particular on physical separation methods. Process improvements may emerge that can improve the viability of this or other techniques for

application at the FEMP. DOE is committed to applying such techniques if they enhance the overall performance and permanence of the selected remedy.

Dastillung, V. If a cell is built, it inevitably will fail to some degree at a future date. Therefore itmust be designed to keep any aquifer contamination as far below 20 ppb as possible. Treatment technologies that would help achieve this should be studied extensively before and during the cell construction and filling. Consideration of treatment technologies (such as vitrification) should be considered for the portions of the waste that approach the upper WAC limit.

Response:
As mentioned in the previous response, DOE concurs that the FEMP should continue to be open to new technologies that may reduce the volume, toxicity or mobility of wastes being disposed of onsite. Language has been included in Section 9 of this ROD documenting DOE's commitment to continue to evaluate new and emerging technologies for application to the contaminated media associated with Operable Unit 5. The soil amendment process is one technology cited in the ROD that DOE will be examining during remedial design to further reduce the leachability of uranium from contaminated soil placed in the disposal facility.

Dastillung, V. Groundwater should be remediated to as far below 20 ppb as reasonably achievable.
12 If drinking water standards change over the years, the 20 ppb level should not be raised for remediation purposes at the FEMP.

Response:
DOE is committed to the application of as low as reasonably achievable principles in the restoration of groundwater. DOE disagrees, however, that if the 20 parts per billion proposed uranium standard for drinking water is raised in the future as part of final standard setting, that consideration should not be given to raising the final remediation level for the Great Miami Aquifer. Consistent with Section 300.430(e)(2)(i)(C)of the National Contingency Plan, the DOE has adopted the maximum contaminant levels under the Safe Drinking Water Act as relevant and appropriate requirements to the restoration of the Great Miami Aquifer. Lacking a final promulgated maximum contaminant level for uranium, DOE adopted, as part of the selected remedy, the maximum contaminant level proposed for uranium by EPA in July 1991 under the Safe Drinking Water Act of 20 parts per billion as the final remediation level for restoration of the aquifer. This proposed standard was adopted as a "To Be Considered" requirement to the selected remedy.

The estimated costs for the restoration of the Great Miami Aquifer are, as would be expected, very sensitive to the established final groundwater cleanup limits (final remediation levels). While DOE is committed to fully restoring the aquifer to health-protective levels, DOE must do so in full recognition of its role as a steward of public funds. Within its stewardship role, the DOE must ensure that public funds are committed only to remedial activities which yield a commensurate environmental or human health-related benefit. As such, the DOE must evaluate the technical and economic implications of pursuing adoption of the final maximum contaminant level for uranium, once it is promulgated by EPA. Such a technical and economic evaluation will be warranted regardless of whether the final maximum contaminant level for uranium represents a higher or lower concentration-based limit than the proposed 20 parts per billion standard. In the event DOE considers it appropriate to pursue a change to the final remediation level for uranium in groundwater identified in this decision document, DOE will initiate such a change in a manner consistent with CERCLA, the National Contingency Plan and the terms of the Amended Consent Agreement.

Dastillung, V. Groundwater pumping and remediation should not end without stakeholder input

13 being actively sought.

Response:

DOE agrees with the comment and acknowledges that the administrative process for final site closeout accommodates public and stakeholder input. At the completion of the remedy, once EPA has concluded that remedial levels have been attained, EPA will initiate the formal process for project closeout. As part of the process, DOE will be required to submit a project closeout report for EPA's review and approval. This report includes documentation that the performance standards have been met. Once EPA approves the report, EPA initiates the site deletion process as described in EPA OSWER Directive 9320.2-3A, "Procedures for Completion and Deletion of National Priority List Sites" (April, 1989). The process is initiated by the EPA regional office and EPA headquarters and the State of Ohio are given the opportunity to review and comment on the delisting decision. A deletion administrative record (known as a "deletion docket")that contains all pertinent information supporting the deletion recommendation is assembled and made available to the public. A national notice of intent to delete the site is published in the Federal Register and a similar notice is published in a local newspaper of general circulation. A 30-day public comment period is required, during which public and stakeholder input on the project closeout report, the deletion decision, and all supporting information is sought.

Dastillung, V. The remediation or the FEMP should comply with all laws that exist on the date
14 the RODs are signed and should only be changed to incorporate any future more stringent laws.

Response:

This comment raises the issue of the "freezing" of legal requirements by the ROD process that are in effect at the time of ROD signature. As required by CERCLA, DOE must comply with all laws identified as applicable or relevant and appropriate requirements for the selected remedy as they exist at the time of ROD signature. These applicable or relevant and appropriate requirements are identified in Appendix B of this Record of Decision, and become binding upon ROD signature. During the 5-year review process, EPA reviews each ongoing or completed remedy to determine if it continues to be health protective. If a determination is made that additional response actions are warranted to ensure protectiveness, EPA can require the ROD to be reopened. A future revision in a law (i.e., an applicable or relevant and appropriate requirement) that results in a more stringent performance standard would need to be evaluated on a site-specific basis by EPA from the perspective of overall protection of human health and the environment. Under EPA policy a revised applicable or relevant and appropriate requirement does not automatically result in a ROD modification, unless EPA decides that the change renders the remedy to be no longer protective. Similarly, if a future revision to an applicable or relevant and appropriate requirement results in a less stringent performance standard than existed at the time of ROD signature, the ROD is not automatically revised downward to account for the change. In this instance, DOE (or other stakeholder) would need to request a revision to the ROD to accommodate the downward change, and EPA would need to examine the request from a perspective of the overall effect on the protectiveness of the remedy. As long as the change still met protectiveness requirements defined in the National Contingency Plan, EPA could potentially accommodate the request for a change through the ROD amendment process (which requires an opportunity for public comment). EPA generally applies the National Contingency Plan risk range as the benchmark for deciding whether an applicable or relevant and appropriate requirement revision occurring after ROD signature requires a modification to the ROD.

Dastillung, V. The 5 year reviews of the ROD for effectiveness should include an analysis of the
15 then current technologies' ability to pursue further remediation. If at a future time a technology would allow for a way to truly deactivate the radioactivity or hazardous chemicals or for a way to greatly enhance the long-term storage of the material, we

would want to be able to evaluate if it was desirable to pursue further action. This process would also call attention to the technology research needs of the DOE.

Response:
Generally, EPA's 5-year review process is focused on protectiveness to ensure that a remedial action remains protective of public health and the environment and is functioning as designed. The scope of the review is statutory in nature and is conducted by EPA, rather than the responsible party. DOE will be conducting an ongoing review of emerging technologies for the treatment of soil before placement in the engineered disposal facility. DOE's commitment to evaluate such technologies extends over the life of the remedy and is focused on identifying cost-effective technologies, should they become available in the future, that can further enhance the long-term permanence of the disposal facility. DOE will identify a schedule for reporting the results of the reviews to EPA as part of the Operable Unit 5 Remedial Design Work Plan.

Dastillung, V. Copies of the annual reports and the 5 year reviews should be mailed to:
16

1. Ross, Crosby and Morgan Townships
2. Butler and Hamilton Counties
3. OEPA, USEPA, ODH
4. Congressional and State Reps that have the FEMP in their district
5. Any resident, group or agency that wishes to be on the mailing list.

Response:
DOE public affairs has been made aware of this request.

Dastillung, V. DOE will be responsible for requesting proper levels of funding for remediation
17 and 0 & M including future repairs) so that the Consent Agreements will be met.
If Congress does not provide adequate funding, letters of inadequate funding should go out to those on the above mailing list. Defining "inadequate funding" should be worked out with the stakeholders. If at some time in the future another agency takes over the remediation and 0 & M functions of the site, it must accept the responsibilities in the RODs as well. The federal government must retain ownership of the disposal cell and any area necessary for maintaining the cell and controlling access to it. It should retain ownership of any area where the land use must be restricted to provide protectiveness for the public and the environment.

Response:
In accordance with Section XX of the Amended Consent Agreement, DOE is required to pursue all necessary steps to obtain timely funding to meet its obligations under the Agreement. Regarding the sending of letters to specific parties defining the adequacy of funds, DOE public affairs has been made aware of this request.

Responsibility for the site and its institutional requirements will be retained by the federal government regardless of what agency serves as the long-term site custodian. The need for institutional controls during the conduct of the remedial actions and the requirement for continued federal ownership of the disposal facility area at the FEMP have been specifically identified in Section 9 of the ROD. The language in Section 9 provides for the following institutional control provisions:

- Continuation of access controls at the FEMP during the period of remediation

- Provision of alternate water supply to residences and industrial users whose

current wells are located within an area of the aquifer exhibiting FEMP contaminant concentrations exceeding final remediation levels for groundwater

- Continued federal ownership of the area comprising the disposal facility and associated buffer zones

- Implementation of deed restrictions or continued federal ownership of the remaining areas of the FEMP, as necessary to ensure continued protection of human health. If ownership of portions of the FEMP is transferred in the future, restrictions will be included in the deed, and proper notifications will be provided as required by CERCLA.

Dastillung, V. 19 DOE should commit to detailing the 0 & M process within its Administrative orders so that future DOE decision makers will be dear about the importance of this ongoing task.

Response:
The operations and management process for soil and groundwater will be defined in future remedial design and implementation documents that are required under CERCLA. Remedy performance monitoring and the verification/certification sampling activities that will be used to certify that remedial goals have been met will be conducted under EPA oversight. DOE recognizes the importance and enforceability of the CERCLA requirements and believes that the CERCLA process adequately stresses the importance of these activities.

Dastillung, V. 19 The RODs should be enforceable with fines and lawsuits if necessary.

Response:
EPA and DOE concur that the RODs are enforceable, legal instruments &hat are binding by law.

Dastillung, V. 20 A mechanism for the stakeholders to initiate a request for future review and possible amendment of the ROD should be included in the ROD. Perhaps a petition with a certain number of signatures?

Response:
As stated in the National Contingency Plan, EPA can consider additional, new information if it comes to light to reopen the ROD in the future. Stakeholders, if they identified new concerns, would need to bring such information to EPA's attention to initiate the process. Generally, the new information would need to demonstrate that the remedy was no longer protective in its current configuration, and that alternate actions were necessary.

Dastillung, V. If for some reason, the ROD for Operable Unit 5 can't be implemented fully, the ROD should be reopened with full public participation. Also, notice of any Explanation of "Significant Differences" or "Amendment to the ROD" should be mailed to stakeholders on the mailing list in addition to publishing a notice in an area newspaper.

Response:
DOE concurs with this process, and the noted actions mirror National Contingency Plan requirements and EPA's recent guidance on technical impracticability decisions (EPA OSWER Directive 9234.2-25, "Guidance for Evaluating the Technical Impracticability of Groundwater Restoration," October, 1993). As stated in this guidance, termination of a CERCLA remedial action for technical impracticability reasons before attainment of remediation levels constitutes a fundamental change in the remedy, requiring a ROD amendment and a full 30-day

public comment period.

Dastillung, V. 22 There needs to be a commitment that all the RODs will be rolled up into one "big picture" ROD that will incorporate any improvements in the wordings in the RODs that have evolved over time. For example, the ROD for Operable Unit 3 may have something in it that no one had thought of when they were writing earlier RODs. If appropriate, there should be a mechanism to incorporate it into all of the RODs.

Response:

Generally, the Operable Unit 5 ROD provides the mechanism that the commentor is seeking. The Operable Unit 5 ROD establishes site-wide cleanup levels that match the representative final land use adopted for the site. Language has been added to the ROD in Section 9 that states that the Operable Unit 5 cleanup levels apply to the footprints of the other operable units. If new issues come to light during the development of the Operable Unit 3 ROD that have site-wide implications, they can also be worded accordingly to apply to the other operable units.

Dastillung, V. 23 Air monitoring data during excavation, drying and transport will be extremely important to the community and workers. The best available devices and techniques should be used to give the workers and community a clear picture of air emissions. Real time monitoring should be done on a routine basis. Action levels should be developed (with the community) so that work can be halted if they occur.

Response:

DOE is committed to executing a responsible and technically defensible environmental monitoring program during and following the remedial actions at the FEMP. Language committing DOE to perform this monitoring has been included in Section 9 of this ROD. Specific details on the type and frequency of monitoring will be defined during the remedial design phase. It is also expected that, as the site moves through the remedial action process, changes will be necessary to this monitoring program to reject changed conditions at the site (e.g. completion of remedial action for one area of the site) or to address the progressive findings of the program. Recognition of the need to modify the monitoring program during and after remedial actions has also been identified in this ROD.

Commercially available and emerging monitoring techniques which could provide real-time or near real-time data on environmental releases will be considered during the development of this monitoring program during remedial design.

The DOE currently has in place a program for reporting upon environmental monitoring data collected at the FEMP, including nonroutine releases (such as spills) and more routine environmental discharges generated by site cleanup activities. As part of the Operable Unit 5 remedial design process, the existing site reporting system will be evaluated and necessary changes effected to ensure the program is properly aligned with proposed remedial activities. One goal of the reporting system will be to continue to report environmental discharges to the local community and involved regulatory agencies in a prompt and responsible manner. The proposed mechanisms and frequency of reporting will be defined in the remedial design documentation for Operable Unit 5 and be subject to EPA approval, formal review by OEPA, and will be made available for public inspection.

Dastillung, V. 24 Excavation techniques should be used that "will not dilute" the waste as it is being dug up for disposal.

Response:

DOE agrees that an important consideration during the remedy implementation phase is to ensure that proper excavation control and waste management practices are applied to prevent the dilution of contaminated soil and increase the volume of soil requiring disposal. DOE has no intention of using dilution as a mechanism to attain the waste acceptance criteria for the disposal facility. DOE is planning to compile detailed procedures to guide site-wide excavation operations for contaminated soil. These procedures, which will be developed during the remedial design phase for Operable Unit 5, will clearly define intended excavation methods that prevent such dilution from taking place. Excavation protocols and procedures developed during remedial design will take into consideration techniques to minimize the potential for dilution of contaminated soil before final disposition.

Dastillung, V. 25 Any waiver given so that a disposal cell can be built, must include wording to keep all off-site waste from entering the FEMP for storage or disposal. It must also be so site-specific that it does not create a precedent for future federal or commercial disposal sites in the vicinity of the FEMP.

Response:
DOE concurs with the concept raised by the comment and notes that this concern mirrors the concerns of OEPA.

The ROD is the mechanism by which EPA grants the waiver to the Ohio solid waste disposal restrictions for siting the disposal facility over a sole-source aquifer. The issues raised by the commentor are addressed in Section 9 of the ROD, and DOE believes that the appropriate language is present that satisfies the commentor's concerns.

Dastillung, V. 26 The WAC of 1030 ppm U for the waste cell should never be raised, but should be allowed to be lowered to account for other Operable Unit decisions and volumes. It should be a maximum number for the waste going into the cell and not an average.

Response:
DOE concurs with the comment. The waste acceptance criteria for the engineered disposal facility, defined in Section 9 of this ROD, include the establishment of a concentration-based waste acceptance criteria for total uranium of 1030 parts per million. This limit has been set as an upper permissible concentration level for contaminated soil to be received into the on-property disposal facility, and as such will not be used as an average limit.

The selected remedy provides that soil exceeding this waste acceptance criteria will be shipped off site for disposal at an appropriate facility. DOE is committed to implementing this remedy as defined in this decision document. DOE must, however, also bring to the commentor's attention that the availability of off-site disposal capacity cannot be assured over the 10- to 25-year cleanup program associated with Operable Unit 5. In the event off-site disposal capacity becomes unavailable or cost prohibitive at some point in the future, DOE considers it important that flexibility be maintained and indicated in the ROD so as to permit the application of treatment technologies to soil exceeding these acceptance criteria to convert them to a form suitable for on-property disposal. The application of such technologies would only occur following receipt of approval of EPA and input from OEPA.

Dastillung, V. 27 A commitment to continue the public involvement proem that has been developed over the years should be stated dearly in the ROD. This should extend through design, remediation, and out into the 0 & M years.

Response:

The DOE would like to thank local members of the public for their continued commitment to providing meaningful input on the cleanup process at the FEMP. This long-term, ongoing input, including the comments received during the formal public review period on the Operable Unit 5 Proposed Plan, has played an important role in the formulation of the remedial strategy embodied in this ROD.

DOE is committed to continuing the active community involvement program currently in place at the FEMP throughout the duration of remedial activities at the site. This issue has been discussed at public meetings and has been the subject of a more focused roundtable meeting held with interested members of the local community. Language has been added to Section 9 of this ROD to formalize the commitment to continue the ongoing public involvement program during the remedial design/remedial action process.

Dastillung, V. While the government may feel that the remediation will be protective of human
28 health and the environment, I feel that the public has the right to know whenever materials are above the background levels for their area. That way the public can decide for itself if it wants to be in contact with such materials. Also, it allows the public to have the information needed to determine if any additive or multiplicative risks need to be considered if such materials will be combined with other so-called clean materials. Once cleanup is considered complete, all areas where the public will have access and that are above background even if they are below the cleanup criteria) should be posted so that the public can make informed choices as to any exposures they might incur.

Response:

DOE concurs that the extent of FEMP-related above-background contamination should be noted in documents that are available for public inspection. The Operable Unit 5 Remedial Investigation and Feasibility Study Reports and the Proposed Plan have depicted areas surrounding the FEMP that have received above-background levels of FEMP constituents. These documents have been made available to the public for inspection and currently reside in the public record. Following completion of the Operable Unit 5 remedy, a Project Completion Report will be prepared that will document all of the new (post remedial investigation/feasibility study) analytical sampling that will be conducted to confirm and certify that cleanup levels have been attained. This information will be made available for public inspection as part of EPA's site closeout process. Before final closeout and deletion of the site from the National Priorities List (an activity performed by EPA), a 30-day public comment period is required, at which time public and stakeholder review and comment of the supporting information regarding the attainment of cleanup levels will be sought. DOE does not agree, however, that areas that exceed background following remediation should be physically posted as such. The cleanup levels that have been selected for the Operable Unit 5 remedy are health protective and have been subject to review by the public and other stakeholders through the public participation process. The information depicting the levels that remain in the environment following remediation will be available for public review through the public participation activities that accompany project closeout.

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Dunn, P. I support the decision to seek a balanced approach in the remediation efforts for
1 Fernald, with higher concentrations of waste shipped off-site and lower concentrations of waste remaining on-site in an engineered disposal facility.

Response:

Statement acknowledged. The selected remedy for Operable Unit 5 is consistent with the "balanced approach" whereby more heavily contaminated materials will be shipped for off-site disposal, while the large volume of materials exhibiting low concentrations of contaminants will remain in an engineered disposal factory at the site.

Dunn. P. 2 Meaningful public involvement beyond the ROD and throughout the RD/RA process. DOE's commitment to this involvement is essential due to the implications of this alternative and must be included in the ROD.

Response:
The DOE would like to thank members of the public for their continued commitment to providing meaningful input on the cleanup process at the FEMP. This long-term, ongoing input, including the comments received during the formal public review period on the Operable Unit 5 Proposed Plan, has played an important role in the formulation of the remedial strategy embodied in this ROD DOE is committed to continuing the active community involvement program currently in place at the FEMP throughout the duration of remedial activities at the site. This issue has been discussed at public meetings and has been the subject of a more focused roundtable held with interested members of the local community. Language has been added to Section 9 of this ROD to formalize the commitment to continue the ongoing public involvement program during the remedial design/remedial action process.

Dunn, P. 3 Continued efforts in technology development should proceed in an attempt to discover more effective methods for treatment and disposal of the waste streams designated for the disposal cell. Efforts should continue to develop technology that may one day have the ability to remove additional contamination from the soils without total destruction of the existing eco-system present on the site.

Response:
DOE agrees that the FEMP should continue to be open to new technologies that may reduce the volume, toxicity or mobility of wastes being disposed of onsite. Language expressing this commitment was provided in the Proposed Plan in the description of the preferred alternative, and has been incorporated in Section 9 of this ROD. In the second sentence, the commentor is considered to be referring to the efforts to investigate the viability of applying soil washing technologies at the FEMP. Attempts to apply this technology led the principal investigators performing these treatability studies to focus on chemical separation. In the performance of laboratory, bench- and pilot-scale studies on chemical separation, the chemical extraction process typically led to the generation of a washed soil that could no longer sustain biological life. The DOE is continuing to examine the soil washing process as a support technology to the selected Operable Unit 5 remedy. In Section 9 of this ROD, the DOE has committed to specifically examine physical separation techniques to apply to contaminated soil. One benefit of physical separation techniques is that the washed soil would retain its potential to support biological activity. Analysis of physical separation during the remedial investigation/feasibility study identified significant constraints to applying the technique at the FEMP as a leading component of the remedy. One of the most important constraints was the determination that the contamination in site soil was distributed across all size fractions making up the soil. This hindered the ability to separate out one specific-size fraction by physical methods and release this portion of the soil, without further treatment, for unrestricted use as backfill at the site. Much work is continuing through the DOE complex on soil washing and in particular on physical separation methods. Process improvements may emerge that improve the viability of this, or other, techniques for application at the FEMP.

Dunn, P. 4 The waste acceptance criteria (WAC) must be established at a maximum of 346 pCi/g with the option to be lowered depending on the decisions yet to be made

regarding the other operable units. The WAC is to be an upper limit maximum, no averaging or dilution of contaminants will be permitted in meeting the WAC.

Response:

The waste acceptance criteria for the engineered disposal facility defined in the Feasibility Study Report and Proposed Plan have been adopted as part of the selected remedy for Operable Unit 5. These criteria, as defined in Section 9 of this ROD, include the establishment of a concentration-based waste acceptance criteria for total uranium of 1030 parts per million. Assuming a natural distribution of the major isotopes of uranium (i.e., uranium-238, -235, and -234), the 1030 parts per million waste acceptance criteria would convert to 346 picocuries per gram of uranium-238. This limit has been set as an upper permissible concentration level for contaminated soil to be received into the on-property disposal facility, and as such will not be used as an average limit.

The selected remedy provides that soil exceeding this waste acceptance criteria will be shipped off site for disposal at an appropriate facility. DOE is committed to implementing this remedy as defined in this decision document. However, DOE must also bring to the commentor's attention that the availability of off-site disposal capacity cannot be assured over the 10- to 25-year cleanup program associated with Operable Unit 5. In the event off-site disposal capacity becomes unavailable or cost prohibitive at some point in the future, DOE considers it important that flexibility be maintained and indicated in the ROD so as to permit the application of treatment technologies to soil exceeding these acceptance criteria to convert them to a form suitable for on-property disposal. The application of such technologies would only occurfollowing receipt of approval of EPA and input from OEPA.

Dunn, P. 5

The use of the proposed MCL for Uranium of 20 ppb as the remediation level for groundwater should be maintained and not increased. Any changes to this standard cannot occur without public involvement in the decision making process. This must be included in the OU 5 ROD.

Response:

Consistent with Section 300.430(e)(2)(i)(C) of the National Contingency Plan, the DOE has adopted the maximum contaminant levels under the Safe Drinking Water Act as relevant and appropriate requirements to the restoration of the Great Miami Aquifer. Lacking a final promulgated maximum contaminant level for uranium, DOE adopted, as part of the selected remedy, the maximum contaminant level proposed by EPA in July 1991 under the Safe Drinking Water Act of 20 parts per billion as the final remediation level for restoration of the aquifer. This proposed standard was adopted as a "To Be Considered" requirement to the selected remedy.

The estimated costs for the restoration of the Great Miami Aquifer are, as would be expected, very sensitive to the established final groundwater cleanup limits (final remediation levels). While DOE is committed to fully restoring the aquifer to health-protective levels, DOE must do so in final recognition of its role as a steward of public funds. Within its stewardship role, the DOE must ensure that public funds are committed only to remedial activities which yield a commensurate environmental or human health-related benefit. As such, the DOE must evaluate the technical and economic implications of pursuing adoption of the final maximum contaminant level for uranium, once promulgated by EPA. Such a technical and economic evaluation will be warranted regardless of whether the final maximum contaminant level for uranium, represents a higher or lower concentration-based limitation than the proposed 20 parts per billion standard. In the event DOE considers it appropriate to pursue a change to the final remediation level for uranium in groundwater identified in this decision document, DOE will initiate such a change in a manner consistent with CERCLA the National Contingency Plan and the

terms of the Amended Consent Agreement. As done throughout the remedial investigation/ feasibility study decision-making process, the DOE will involve the public in any attempt to modify the final remedial level for uranium in the Great Miami Aquifer from the 20 parts per billion value identified in Section 9 of this ROD.

Dunn, P. 6 Waste generated from outside the FEMP will not be allowed to be disposed of within the FEMP boundaries under any circumstances. This includes, but is not limited to hazardous, toxic, radioactive, and any and all waste/contaminates which were not a result of on-site activities.

Response:

The DOE concurs with the comment, and has no intention of using the disposal facility associated with the Operable Unit 5 remedy to address wastes generated from off-site locations. Additionally, the DOE has no intention of using existing or newly constructed storage facilities located at the FEMP for the long-term storage of wastes generated from off-site locations. Specifically excluded from this prohibition are laboratory wastes generated at off-site facilities resulting directly from the chemical, radiological or engineering analysis of FEMP waste materials/contaminated media or generated during the conduct of treatability or demonstration type studies on FEMP waste materials/contaminated media. Such analyses and studies are typically performed as an integral part of implementing a selected remedy at a cleanup site.

Language has been added to Section 9 of this ROD to specifically identify that the FEMP storage and future disposal facility shall not be used for the long-term storage or disposal of wastes generated from off-site locations. Language regarding the identified exclusion has similarly been added to Section 9. For the other FEMP operable units, both 4 and 1 are committed to off-site shipment of their waste. The final ROD for Operable Unit 2 contains language clearly prohibiting off-site waste being brought to the FEMP for disposal in their on-property disposal facility. When Operable Unit 3 prepares its ROD next year, similar language will be included. DOE's commitment on this matter covers the entire FEMP site.

Dunn, P. 7 Additional discharges of contaminates during the remediation of OU 5 should be avoided when possible. Methods to achieve minimal releases during remediation should be conducted throughout the RD/RA process.

Response:

The design and implementation of measures to minimize releases during the conduct of remedial action will be a key consideration of DOE during remedial design for Operable Unit 5. Considerations during remedial design will include minimizing discharges to the Great Miami River to the extent practical, applying appropriate mitigative measures during excavation and soil transport and staging operations to minimize fugitive dust emissions, and ensuring the necessary controls to reduce the migration of contaminated soil and surface water out of controlled areas during rain events. DOE's planned actions will be documented during remedial design and subject to approval by EPA, formal review by OEPA, and will be available for public inspection.

In the second sentence, the commentor requests that DOE continue to implement measures throughout remedial design/remedial action to minimize releases. Implicit in this comment is the need for DOE to commit to continue to examine new or emerging technologies during the 10-year or longer remediation time frame to find ways to improve upon the mitigative measures originally laid out during remedial design. DOE agrees that this is a prudent action

which may help reduce overall environmental releases during remedial action.

Language has been added to Section 9 of this ROD to identify a commitment on the part of the DOE to continue to examine, throughout the duration of remedial action, new methods or technologies to improve upon the mitigative measures being used to minimize environmental releases.

Dunn, P. 8 Real time monitoring and other monitoring activities should be implemented during remediation and for the period for which the materials contained within the disposal cell pose a threat and risk to human health and the environment. These monitoring activities should be conducted on a regular and frequent basis with the results provided to the public in a timely manner.

Response:
DOE is committed to executing a responsible and technicality defensible environmental monitoring program during and following the conduct of remedial actions at the FEMP. Language committing DOE to perform this monitoring has been included in Section 9 of this ROD. Specific details on the type and frequency of monitoring will be defined during the remedial design phase. It is also expected that, as the site moves through the remedial action process, changes will be necessary to this monitoring program to reflect changed conditions at the site (e.g., completion of remedial action for one area of the site) or to address the progressive findings of the program. Recognition of the need to modify the monitoring program during and after remedial actions has also been identified in this ROD.

Commercially available and emerging monitoring techniques which could provide real-time or near real-time data on environmental releases will be considered during the development of this monitoring program during remedial design.

The DOE currently has in place a program for reporting upon environmental monitoring data collected at the FEMP, including reporting upon nonroutine releases (such as spills) and more routine environmental discharges generated by site cleanup activities. As part of the Operable Unit 5 remedial design process, the existing site reporting system will be evaluated and necessary changes effected to ensure the program is properly aligned with proposed remedial activities. One goal of the reporting system will be to continue to report environmental discharges to the local community and involved regulatory agencies in a prompt and responsible manner. The proposed mechanisms and frequency of reporting will be defined in the remedial design documentation for Operable Unit 5 and be subject to EPA approval, formal review by OEPA, and will be made available for public inspection.

Dunn, P. 9 The DOE or bow it may evolve in the future under another name and the federal government must retain ownership of the FEMP property. This is necessary to provide adequate institutional controls to protect the site and limit future land use so as to not allow discharges of the contaminants left in the soils. Full disclosure and restrictions of the property must be included in the deed to the land. This must be included in the OU 5 ROD.

Response:
The comment raises the need to property align the necessary institutional control provisions for the FEMP with the future land use for the facility to ensure the continued protection of human health. DOE agrees with the need for this alignment. It is not the intent of DOE to attempt to establish a final future land use for the FEMP through this decision document. DOE does recognize that the final remediation levels identified in Section 9.0 of this ROD do establish the permissible concentrations of contaminants which could remain at the site

following completion of remedial actions. These remaining concentrations of contaminants will present a potential for exposure to future users of the FEMP.

The Fernald Citizens Task Force issued recommendations regarding future use of the Fernald property in May of 1995, recommending that the area of the FEMP containing the disposal facility and associated buffer zone remain under the continued ownership of the federal government. Additionally, the Task Force recommended that the remaining portions of the FEMP property be made available for the uses that are the most beneficial to the surrounding communities. While the Task Force recommended prohibiting any sort of agricultural or residential uses of the remaining portions of the FEMP property (outside the disposal facility area), the Task Force encouraged DOE to consult with the local communities to establish their preferences for future use and ownership of these areas of the site. Consistent with this recommendation, DOE does not consider it prudent to insert enforceable provisions within this ROD to provide for the continued federal ownership of the entire FEMP property.

Additionally, DOE considers that final, enforceable institutional control measures for postremedial conditions at the FEMP should be established based upon an analysis of the actual residual concentrations as measured in site soil and groundwater following the completion of remedial actions, the measured concentrations and spatial distribution may differ from feasibility study projections. This difference in estimated versus measured concentrations could have a significant impact on the required institutional controls necessary to maintain continued protectiveness. In this ROD, DOE has elected to define that institutional controls are a necessary component of the remedy to ensure continued protectiveness, but that the specific institutional control provisions necessary to be applied to postremedial site conditions will be defined during remedial design. The institutional control provisions defined during remedial design may be modified during the remedial action phase to accommodate the progressive findings of the field certification efforts. As with all remedial design and remedial action documentation, the plan for institutional controls at the FEMP, and any necessary modifications to it, will be subject to approval by EPA and review by OEPA.

Dunn, P. (Contd.)
9 (Contd.)

The need for institutional controls during the conduct of remedial actions and the requirement for continued federal ownership of the disposal facility area at the FEMP have been specifically identified in this ROD. More specific detail on the actual implementation of these controls will be defined during remedial design.

Section 9 of this ROD provides a discussion on the role of institutional controls as a necessary component of the Operable Unit 5 remedy. The language of the ROD provides for the following institutional control provisions:

- Continuation of access controls at the FEMP during the period of remediation

- Provision of alternate water throughout the period of remediation to residences and industrial users whose current wells are located within an area of the aquifer which exhibit concentrations exceeding the final remediation levels for groundwater

- Continued federal ownership of the area comprising the disposal facility and associated buffer zones

- Implementation of deed restrictions or continued federal ownership of the remaining areas of the FEMP, as necessary to ensure the continued protection of human health. If ownership of portions of the FEMP is transferred in the future,

restrictions will be included in the deed, and proper notifications will be provided as required by CERCLA.

Dunn, P. 10 ALARA principles must be utilized during the RD process.

Response:

DOE will consider as low as reasonably achievable principles throughout the remedial design process for Operable Unit 5. Additionally, DOE will continue to evaluate the ongoing remedial actions for viable methods to further reduce potential exposures to workers and the public.

Dunn, P. 11 A USEPA waiver of the Ohio solid waste siting criteria should only be granted if the DOE abides by the WAC upper limit stipulations has (sic., as) described in comment #3 [coded at 6] above, the waiver specifically states that there will be no off-site waste disposed of on the FEMP property and no on-site waste will be capped and leftin place.

Response:

Statement acknowledged. Please see responses and resolution to the comments labeled Dunn 4 and 6 above. Regarding the provision that no waste shall be left in place and capped, the selected remedy for Operable Unit 5 provides for the full excavation of all soil and sediment exceeding the final remediation levels. Consistent with this remedy, there is no intention to cap any soil or sediment exceeding the final remediation levels.

Fender, A. 1 I cannot believe the DOE has given its permission so Fernald can put a garbage dump for chemically and radiologically contaminated waste in our back yard. You must be out of your mind to even consider putting something like this in this area. I thought that we had closed it down permanently! Our water supply in this area is one of the cleanest. Why would you even take a chance of polluting it.

Response:

Production of uranium metal at the FEMP is shut down permanently. The proposed cleanup plan will correct an existing contamination problem and reduce the levels of contamination within the environmental media at the site to levels deemed to be health protective by federal environmental regulation. It cleans up the FEMP by getting the material with higher levels of contamination away from the site, and provides a strategy for permanently protecting human health and the underlying Great Miami Aquifer by isolating the remaining less contaminated material in an engineered disposal facility at the site.

The selected cleanup remedy at the FEMP has three objectives related to the Great Miami Aquifer; stop existing sources of contamination to the aquifer, restore the aquifer to maximum beneficial use in a reasonable time frame, and protect the aquifer from future contamination originating from the FEMP property. DOE recognizes that the aquifer is an important national and local resource and that the FEMP site has adversely impacted an approximate 200-acre area of the aquifer system DOE also recognizes that if the FEMP is not cleaned up it poses continued contamination risk to the public and to the aquifer DOE intends to eliminate this unacceptable risk by moving forward with a balanced remediation approach. This approach gets the most contaminated materials away from the aquifer (by shipping them off-site), restores the aquifer, and limits the quantity and disposal configuration of the contaminated material remaining at the site. Completion of the selected remedy will also provide for more beneficial use of the FEMP property outside the disposal facility area.

Plans are to remove the materials that constitute about 97 percent of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be

accomplished by completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy and uranium product.

What will remain for disposal at the FEMP in the engineered disposal facility will be about 3 percent of the current quantity of radioactivity present at the site. This 3 percent is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials, specifically Operable Unit 5 soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from this operable unit is also being considered for on-property disposal All material will have to pass stringent waste acceptance criteria before being placed in the on-property disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

Fender, A. (Contd.)
1 (Contd.) Several different options were considered for the less contaminated material before the excavation and on-property disposal option was selected. Use of caps, in-place containment, off-site disposal, and soil washing were all considered but the risks and costs were judged to be unacceptable. The decision as to what less contaminated material would remain on site was developed with input from the Fernald Citizens Task Force and the public through numerous round tables and open forums. Waste acceptance criteria for the less contaminated material were developed for the engineered disposal facility to help ensure protection of the aquifer. Only material that falls below the contamination level of the waste acceptance criteria will be disposed of in the engineered disposal facility. Material that does not meet the criteria will have to be either treated or shipped off site.

The waste acceptance criteria considers the hydrogeologic environment of the site and the protective properties of the engineered disposal facility. Soil, for instance, would be excavated down to the proposed cleanup level of 80 parts per million total uranium outside the former production area of the FEMP and 20 parts per million within the former production area. Current estimates indicate that placing all of the lightly contaminated soil together in the disposal facility will produce an average concentration of about 100 parts per million of uranium in the facility. This average concentration is one-tenth of the waste acceptance criteria for disposal in the on-property disposal facility, a tenfold security factor. It should be noted that sophisticated computer model simulations used to derive the waste acceptance criteria were completed assuming that there was no active maintenance of the facility and that the synthetic barriers present in the facility (e.g., high-density polyethylene membranes) were not functioning. These simulations indicate that even under these extreme conditions, the facility would still be protective of the aquifer over the final 200- to 1000-year performance period envisioned by federal regulations.

Fender, A. I've lost a father because of Fernald and its radioactive garbage blowing over my
2 father for 31 years before he died! My step-daughter and step-son has low ammunities [sic., immunity) because of Fernald. You must be out of your mind to even consider putting something like this in this area - I thought we had closed it down permanently!

Response:
This comment is outside the scope of the Operable Unit 5 remedy decision. See response to A. Fender 1.

Fender, A. One of our most attractive Girl Scout Council Camps in this area has been closed
3 because of Fernald also - I was a G.S. leader for 9 yrs. and we used to use the Camp Ross Trails at least once a year. Now the girls in this area can't even use it.

Response:
This comment is outside the scope of the Operable Unit 5 remedy decision.

things.

MR. STEGNER: Absolutely, we will let you know.

MR. REISING: We will make a decision within a couple of days.

MR. STEGNER: By your meeting this week you should know.

MR. SARIC: Yeah, you can go ahead and take your 30 days.

MR. STEGNER: Thank you, Jim. That was pretty simple. There's your approval authority right there.

MS. CRAWFORD: So we have until June 30th now?

MR. SARIC: That's right, 30 plus one.

MR. STEGNER: So enjoy your weekend everyone. Do we have anymore individuals wanting to comment? Yes, sir.

MR. KALLILE: My name is Jim Kallile, I'm with the Ohio Department of Health. I would like to say that based upon our point of view, we also endorse the alternative for building an on-site disposal cell, and we believe when you

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consider the risks and costs involved with remediation of the entire site, we believe this is the appropriate remedy.

MR. STEGNER: Thank you. Anyone else right now?

Again, be reminded that now we have until June 30th to get your comments in. And also be reminded that the document, a form for comment is included in the proposed plan summary which are available in the back of the room. I thank you all for coming tonight. We appreciate your input. It is very valuable to us and all your comments will be responded to in the responsiveness summary.

Thank you all very, very much. Be careful going home.

PUBLIC MEETING CONCLUDED

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Kallile, J., ODH - Transcript 1

I would like to say that based upon our point of view, we also endorse the alternative for building an on-site disposal cell, and we believe when you consider the risks and costs involved with remediation of the entire site, we believe this is the appropriate remedy.

Response:
Comment acknowledged. The selected remedy for Operable Unit 5 represents a "balanced approach" whereby more heavily contaminated materials will be shipped for off-site disposal, while the large volume of materials exhibiting low concentrations of contaminants will remain in an engineered disposal facility at the site.

Nevada Div. of Environmental Protection (NDEP) 1

The Nevada Div. of Environmental Protection has reviewed the PP for OU5. The NDEP concurs with the recommended and preferred alternative which proposes to excavate the radioactive contaminated materials and dispose of these materials on site. This proposed remediation activity would not ship wastes to an off-site facility and is consistent with national forum of States encouraging DOE to manage all wastes on-site. Any other alternative would be inconsistent with the national consensus building between the DOE and representatives from States hosting DOE facilities conducted over the past two years.

Response:
Comment acknowledged. While DOE has selected this remedy based on site-specific factors, it is gratifying when the decision-making process validates and supports similar work, such as the national consensus budding done by the National Governors' Association on the issue of waste disposal for all DOE sites.

Nevada State Clearinghouse 1

The State Clearinghouse, as per Executive Order 12372, has processed the proposal and has no comment.

Response:
Thank you for reviewing the Operable Unit 5 Proposed Plan.

Nevada Test Site Community Advisory Board [CAB] 1

As noted in our previous comments, Nevada and Ohio were major participants in developing the United States nuclear deterrent option. The apparent success of this endeavor offers the potential of a safer, more peaceful world. Since many states and communities shared in the development of the nuclear deterrent. NTS CAB members feel that it is also important that we all participate in providing solutions to the onerous waste problems that are present at many DOE sites. We applaud the efforts at Fernald and other sites to consider, where feasible, on-site remediation options. Given the significant amount of waste present at Fernald and other locations throughout the nation, it is important that we remediate, wherever possible, potential health and safety risks to the public. Minimizing the amounts of waste that need to be transported is important in ameliorating some of these risks. The NTS CAB is supportive of the recommendation for on-site remediation of the waste from OU5. Protecting what we understand is an extremely important regional aquifer by removing the waste to a safer controlled site at Fernald would seem to offer many benefits. It is fortunate that an onsite solution is available.

Response:
Agree with commentor about shared responsibilities vis-a-vis providing solutions to the waste disposal problems that are a result of the development of the nation's nuclear deterrent. EPA and DOE believe that a combination of on- and off-site disposal provides the best solution to the problem.

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3. Ohio EPA supports DOE's use of the proposed MCL for total uranium of 20 ug/l as the groundwater remediation level. Ohio EPA believes remediation to this standard will ensure the Great Miami Aquifer is restored to its full beneficial use. Any proposed changes to the 20 ug/l total uranium remediation standard would necessitate a ROD amendment including a formal public comment period.

4 DOE should commit to being open to consider new technologies which may reduce the volume, toxicity or mobility of wastes being disposed of on-site. Ohio EPA is simply requesting that DOE remain open to the idea of additional technologies which may result in a safer waste form for on-site disposal.

5 During implementation of the preferred alternative, DOE must use excavation and waste management techniques which will prevent the dilution of waste concentrations to meet the WACs. DOE must not use dilution to meet the WAC or remediation levels.

6 DOE should commit to including and/or developing real-time monitoring for discharges to the environment resulting from remedial actions. DOE should attempt to incorporate any new developments in real-time monitoring from the DOE Office of Technology Development as well as the private sector. Data obtained from real-time monitors and any additional monitoring activities should be provided to the Ohio EPA and public in a timely manner.

7 DOE should attempt to incorporate pollution prevention activities whenever possible during the design and operation of the OU5 remedial action systems. All available methods to reduce or eliminate discharges and releases from the excavation and disposal activities should be considered during the design of the system.

8 DOE must ensure the public that their involvement will not be diminished during Remedial Design and Remedial Action (RD/RA). DOE should commit within the Record of Decision for OU5 to maintaining the exceptional on-going public involvement program during RD/RA.

9 DOE should make commitments within the OU5 ROD concerning perpetual government ownership of properties associated with the OU5 ROD. DOE must provide commitments to ensure the land-use employed to develop the cleanup standards is maintained into the future, DOE ownership is essential to maintaining institutional controls and limiting land-use to ensure protectiveness of the site.

<IMG SRC 0596312G8>
<IMG SRC 0596312G9>

10 With regard to the request for a USEPA waiver of the Ohio solid waste siting criteria,

OEPA 1 The Operable Unit 5 Proposed Plan is the culmination of efforts by U.S. DOE, Ohio EPA, and U.S. EPA to understand and develop a plan for mitigating releases to the environment from OU5. Ohio believes the preferred alternative is the appropriate one, when

considered in the context of overall site cleanup. OEPA supports the concept of a balanced approach where the low volume high concentration wastes go off-site for disposal and high volume lower concentration wastes are disposed of in an engineered facility on-site. We believe that this approach provides the most implementable and protective strategy for remediation of the FEMP site.

Response:
Comment acknowledged. The preferred remedial alternative as identified in the Proposed Plan for Operable Unit 5, with modification to accommodate public comments, is the selected remedy. The selected remedy is documented in Section 9.0 of this ROD.

OEPA 2 The OU5 Record of Decision (ROD) should clearly place restrictions on the use of the engineered on-site disposal facility. Ohio EPA understands the need to allow flexibility for incorporation of other operable units but also feels the following restrictions must be made in the ROD:

a) No disposal or long-term storage of off-site waste in the proposed engineered disposal facility or any other facility on the FEMP site.
b) The disposal facility WAC for uranium-238 should be set at a maximum of 346 pCi/g or 1030 ppm for total uranium with the flexibility to be lowered based upon other operable unit decisions and volumes. The WAC must be an upper limit of concentration acceptable into the disposal facility and may not be used as an average limit.
c) No characteristic hazardous waste should be disposed of in the facility.

Response:
a) The DOE concurs with the comment and has no intention of using the disposal facility associated with the Operable Unit 5 remedy to address wastes generated from off-site locations. Additionally, the DOE has no intention of using existing or newly constructed storage facilities located at the FEMP for the long-term storage of wastes generated from off-site locations. Specifically excluded from this prohibition are laboratory wastes generated at off-site facilities resulting directly from the chemical, radiological or engineering analysis of FEMP waste materials or generated during the conduct of treatability or demonstration type studies on FEMP waste materials. Such analyses and studies are typically performed as an integral part of implementing a selected remedy at a cleanup site.

Language has been added to Section 10 of this ROD to specifically identify that the FEMP storage and future disposal facilities shall not be used for the long-term storage or disposal of wastes generated from off-site locations.

b) The waste acceptance criteria for the engineered disposal facility defined in the Feasibility Study and proposed plan have been adopted as part of the selected remedy for Operable Unit 5. These criteria, as defined in Section 9 of this ROD, include the establishment of a concentration-based waste acceptance criteria for total uranium of 1030 parts per million. This limit has been set as an upper permissible concentration level for contaminated soil to be received into the on-property disposal facility, and as such will not be used as an average limit.

The selected remedy provides that soil exceeding this waste acceptance criteria will be shipped off site for disposal at an appropriate facility. DOE is committed to implementing this remedy as defined in this decision document. However, DOE must also bring to the commentor's attention that the availability of off-site disposal capacity cannot be assured over the 10- to 25- year cleanup program associated with Operable Unit 5. In the event off-site disposal capacity becomes unavailable or cost prohibitive at some point in the future, DOE considers it important that flexibility be maintained and indicated in the ROD so as to permit

the application of treatment technologies to soil exceeding these acceptance criteria to convert them to a form suitable for on-property disposal. The application of such technologies would only occur following receipt of approval of EPA and input from OEPA.

Section 9 of the ROD adopts the 1010 parts per million waste acceptance criteria for total uranium as a maximum concentration-based limit for contaminated soil to be suitable for on-property disposal at the FEMP. Section 9 also adopts off-site disposal as the selected remedy for soil found to exceed the waste acceptance criteria for total uranium Language was added to Section 9 to permit the DOE to solicit the approval of EPA and input from OEPA to apply treatment technologies to soil exceeding the waste acceptance criteria to convert these materials to a form suitable for on-property disposal. Such a request would only be made in the event off-site disposal capacity becomes unavailable or cost prohibitive.

OEPA 2 (Contd.)

OEPA's comment concerning the disposal of characteristic waste relates to the component of Operable Unit 5 soil that is potentially contaminated with RCRA-regulated constituents at levels sufficient to classify the soil as RCRA characteristic waste. OEPA's comment imposes a requirement to treat the RCRA characteristic soil (in essence, to remove the characteristic property) before disposal in the on-property disposal facility or, alternatively, to dispose of the RCRA characteristic soil off site.

In response to OEPA's concern, DOE acknowledges that EPA's corrective action management unit rule is an applicable or relevant and appropriate requirement for the Operable Unit 5 remedy that provides the regulatory framework for determining treatment and on-property disposal requirements for RCRA-regulated constituents in soil. DOE also acknowledges that the corrective action management unit rule requires several decision steps to ensure that a protective remedy is identified and can be reliably implemented. These decision steps - contained in Section 264.552 of the corrective action management unit rule - can be summarized as follows: 1) the remedy must be protective of human health and the environment - accomplished for Operable Unit 5 through the establishment of health-protective final remediation levels and numerical waste acceptance criteria for all constituents of concern, including the RCRA-regulated constituents; 2) the remedy must minimize the potential for figure release - also accomplished through the setting of health-protective final remediation levels and waste acceptance criteria that typically consider the potential for cross-media impacts, and 3) the remedy must enhance long-term effectiveness through the application, as appropriate, of treatment technologies that reduce toxicity, mobility, or volume of wastes that will remain in place after closure of the corrective action management unit; as cited in the preamble for the corrective action management unit rule, this decision step is analogous to the preference under CERCLA for treatment-based remedies.

Meetings were held on September 5 and October 26, 1995 with EPA and OEPA to identify an implementation strategy to resolve OEPA's concern regarding the need to restrict the on-property disposal of soil that is RCRA characteristic. Recognizing that EPA and DOE have developed health-protective final remediation levels and numerical waste acceptance criteria for all of the Operable Unu 5 constituents of concern (including the RCRA-regulated constituents), OEPA indicated that the decision to require further treatment of RCRA characteristic soil has its origin in the need to satisfy, on a site-specific basis, the regulatory preference for treatment that is contained in decision step 3 above. As stated in the preamble to the corrective action management unit rule, the decision to apply cost-effective treatment at a site is a case-by-case decision that must consider waste- and site-specific factors. Based on a review of site characterization data from the Operable Unit 5 remedial investigation as well as historical process knowledge, six geographic areas of the FEMP have been identified where RCRA characteristic soil may be present in quantities that offer reasonable opportunities for cost-effective treatment. These six areas are:

OEPA 2 (Contd.)

- Abandoned sump west of pilot plant
- Area between KC-2 warehouse and railroad tracks
- Trap range
- Fill material west of Operable Unit 4 silos along Paddys Run streambank
- Scrap metal pile area
- Area north of maintenance building.

The six areas were identified by reviewing a combination of existing analytical data and process knowledge concerning the activities that took place in each area. Conversely, other areas wthin Operable Unit 5 were eliminated from further consideration using the same process. Specifically, DOE evaluated the Operable Unit 5 remedial investigation database to identify instances where soil total contaminant concentration levels for toxicity characteristic RCRA constituents were numerically more than 20 times the associated toxicity characteristic leaching procedure leachate standard. The "20 times rule" (as this effort is customarily called) is a conservative suggestion in EPA guidance to identify waste streams with an increased potential to demonstrate a RCRA characteristic. In those instances where multiple "20 times" exceedances were noted in a localized geographic area, process knowledge information was reviewed to ascertain if any activities were conducted at that location which could have been the source of elevated contaminant concentrations. The locations of the analytical samples and the process knowledge information were then used in combination to bound the suspect areas. Application of this process led to identification of the six areas denoted above.

An identical process was used to screen out the remaining geographic areas within Operable Unit 5. The remedial investigation database contains an extensive volume of analytical data encompassing the entire anticipated remediation area. EPA guidance regarding procedures for RCRA waste characterization (OSWER Directive 9938.4-03) sixes that waste sampling should "reflect the average properties of the universe from which the samples were obtained." The waste universe in question here is the Operable Unit 5 soil. An examination of the remedial investigation database in light of the "20 times rule" strongly demonstrates that the average characteristics of Operable Unit 5 soil are not indicative of an enhanced potential for characteristic waste. Except for specific areas noted above, where analytical data and process knowledge indicate a potential for a volume of readily segregated soil that could demonstrate a RCRA characteristic, this logic was used to screen out Operable Unit 5 soil from further concern. In the very limited instances where a single sample in an area exceeded the "20 times rule," the presence of other data points in the immediate vicinity below the "20 times rule" and lack of process knowledge were used to screen the area out, the logic being that the individual exceedance was not representative of the soil volume in question.

OEPA 2 (Contd.)

In completing its review, DOE also evaluated information specific to the FEMP's designated hazardous waste management units. Under the conditions of an anticipated OEPA Director's Findings & Orders for RCRA/CERCLA integration, hazardous waste management units at the FEMP will be closed either under the jurisdiction of RCRA or through the CERCLA process. For those units anticipated to be clean closed under RCRA, applicable regulations require specific evaluation of the presence of hazardous waste. Any such hazardous waste generated during clean closures will be managed in full compliance with all applicable requirements of RCRA (and DOE is not seeking to apply relief through the corrective action management unit rule for any of these closures). For those hazardous waste management units being closed under the CERCLA process, most of the units were screened out based on two considerations. First, for most of the units, the RCRA hazardous waste historically present was managed within containers, such as drums, in addition to placement within structurally sound secondary containment that would minimize the potential for significant releases to surrounding soil. For these units there was no evidence of releases of hazardous constituents to the surrounding soil. The second consideration was the completion of removal actions at several of the units. These removal actions resulted in the removal of the majority of the affected soil

and thus there is no evidence that a significant quantity of RCRA characteristic soil remains "in place" at the respective locations. The soil volumes that were removed as part of these actions, if still stored on site, will be evaluated for disposal requirements (including an evaluation of RCRA properties as needed) as part of the remedial design for Operable Unit 5.

The other general area of concern evaluated by DOE was the area under the process area buildings. DOE used analytical data from remedial investigation borings completed beneath building floors in areas where process knowledge indicated a significant concern (sumps, processing areas, etc.,) as well as from randomly selected areas, for evaluating the potential presence of quantities of RCRA characteristic soil that could provide additional opportunities for cost-effective treatment. The data considered were principally total contaminant concentrations evaluated in light of the "20 times rule." In addition to these data, however, there were a number of samples of investigation-derived waste (primarily drill cuttings) generated from beneath buildings that had been subjected to the toxicity characteristic leaching procedure. These data, reviewed as a group, strongly suggest that the representative characteristics of soil beneath process area buildings do not indicate an enhanced potential for characteristic waste beneath the buildings. Further information which qualitatively supports this conclusion relates to the probable sources of contamination beneath the buildings; i.e., contaminant migration through cracks in floors or from leaks from process piping beneath the floors. These contaminant migration pathways would serve to limit the overall areal impact to Operable Unit 5 soil. This, in turn, supports the position that contamination associated with these releases would nor be representative of the average characteristics of the soil beneath the buildings.

OEPA 2 (Contd.)

DOE, EPA, and OEPA all desire to satisfy the regulatory preference for treatment within the context of the Operable Unit 5 remedy. At the October 26, 1995 meeting, consensus was reached that the six geographic areas identified above define the boundaries within which additional efforts will be made to identify and segregate for treatment (if needed) the soil that is RCRA characteristic. Within these geographic areas, as soil is excavated based on exceedances of final remediation levels, follow-up analytical testing will be performed to determine if the soil demonstrates a RCRA characteristic. If the soil does not demonstrate a RCRA characteristic and it meets the on-property numerical waste acceptance criteria it will be placed in the disposal facility. If the representative volume of the soil in question demonstrates a RCRA characteristic it will be preferentially segregated for treatment before disposition either on or off site.

As part of the consensus DOE, EPA, and OEPA have agreed that sufficient existing data and historical process knowledge are available to identify the boundaries of the six geographic arms as those that represent a reasonable opportunity for cost-effective soil treatment. Outside of these geographic areas, DOE, EPA, and OEPA concur that there is no reasonable basis to conclude that an increased potential for RCRA characteristic soil exists that would provide additional opportunity for cost-effective soil treatment. Therefore, outside the boundaries of the six geographic areas, no additional analytical data will be required to screen for the presence of characteristic waste before placement in the disposal facility.

To accommodate OEPA's concern initiated by this comment and discussed at the October 26 meeting, the remedy description provided in Section 9.0 of the ROD incorporates a commitment by DOE to address the potential RCRA characteristic concern originating from within the six identified geographic areas. The revised description identifies the overall approach, the treatment technique to be applied to the segregated material, and the use of the toxicity characteristic leaching procedure to guide the identification of the material requiring preferential treatment. The responses to comments from other members of the public (who voiced similar concerns on this issue) will also acknowledge DOE's commitment and adoption of

the implementation strategy.

OEPA 3 OEPA supports DOE's use of the proposed maximum contaminant level for total uranium of 20 ug/l as the groundwater remediation level. OEPA believes remediation to this standard will ensure the Great Miami Aquifer is restored to its full beneficial use. Any proposed changes to the 20 ug/1 total uranium remediation standard would necessitate a ROD amendment including a formal public comment period.

Response:

Consistent with Section 300.430(e)(2)(i)(C) of the National Contingency Plan, the DOE has adopted the maximum, contaminant levels under the Safe Drinking Water Act as relevant and appropriate requirements to the restoration of the Great Miami Aquifer. Lacking a final promulgated maximum contaminant level for uranium, DOE adopted, as part of the selected remedy, the maximum contaminant level proposed by EPA in July 1991 under the Safe Drinking Water Act of 20 parts per billion as the final remediation level for restoration of the aquifer. This proposed standard was adopted as a "To Be Considered" requirement to the selected remedy.

The estimated costs for the restoration of the Great Miami Aquifer are, as would be expected, very sensitive to the established final groundwater cleanup limits (final remediation levels). While DOE is committed to fully restoring the aquifer to health-protective levels, DOE must do so in full recognition of its role as a steward of public funds. Within its stewardship role, the DOE must ensure that public funds are committed only to remedial activities which yield a commensurate environmental or human health-related benefit. As such, the DOE must evaluate the technical and economic implications of pursuing adoption of the final maximum contaminant level for uranium, once promulgated by EPA. Such a technical and economic evaluation will be warranted regardless of whether the final maximum contaminant level for uranium represents a higher or lower concentration-based limitation than the proposed 20 parts per billion standard. In the event DOE considers it appropriate to pursue a change to the final remediation level for uranium, in groundwater identified in this decision document, DOE will initiate such a change in a manner consistent with CERCLA, the National Contingency Plan and the terms of the Amended Consent Agreement. Section 9 of this ROD adopts the proposed maximum contaminant level of 20 parts per billion for total uranium as the final remedial on level for affected regions of the Great Miami Aquifer.

OEPA 4 DOE should commit to being open to consider new technologies which may reduce the volume, toxicity or mobility of wastes being disposed of on-site. OEPA is simply requesting that DOE remain open to the idea of additional technologies which may result in a safer waste form for on-site disposal.

Response:

DOE concurs with the comment that the FEMP should continue to be open to new technologies that may reduce the volume, toxicity or mobility of wastes being disposed of onsite. Language expressing this commitment was provided in the Proposed Plan in the description of the preferred alter native, and has been incorporated in Section 9 of this ROD. Included within this language is a commitment by DOE to evaluate two such technologies during remedial design, physical separation and a soil amendment process. DOE will conduct engineering studies of these two technologies to assess the viability of applying them as part of the Operable Unit 5 remedy.

OEPA 5 During implementation of the preferred alternative, DOE must use excavation and waste management techniques which win prevent the dilution of waste concentrations to meet the WACs. DOE must not use dilution to meet the WAC or remediation levels.

Response:

DOE agrees that an important consideration during the remedy implementation phase is to ensure that proper excavation control and waste management practices are applied to prevent the dilution of contaminated soil and increase the volume of soil requiring disposal. DOE has no intention of using dilution as a mechanism to attain the waste acceptance criteria for the disposal facility. DOE is compiling detailed procedures to guide site-wide excavation operations for contaminated soil. These procedures, which will be developed during the remedial design phase for Operable Unit 5, will clearly define intended excavation methods which will ensure against such dilution from taking place.

OEPA 6 DOE should commit to including and/or developing real-time monitoring for discharges to the environment resulting from remedial actions. DOE should attempt to incorporate any new developments in real-time monitoring from the DOE Office of Technology Development as well as the private sector. Data obtained from real-time monitors and any additional monitoring activities should be provided to the OEPA and public in a timely manner.

Response:

DOE is committed to executing a responsible and technically defensible environmental monitoring program during the conduct of remedial actions at the FEMP. The specifics of this program will be defined during the remedial design phase. DOE will take into consideration commercially available and emerging monitoring techniques which could provide real-time or near real-time data on environmental releases. As part of this planning, DOE will evaluate technologies under consideration by the DOE Office of Technology Development.

The DOE currently has in place a program for reporting upon environmental monitoring data collected at the FEMP including nonroutine releases (such as spills) and more routine environmental discharges generated by site cleanup activities. As part of the Operable Unit 5 remedial design process, the existing site reporting system will be evaluated and necessary changes effected to ensure the program is properly aligned with proposed remedial activities. One goal of the reporting system will be to continue to report environmental discharges to the OEPA and the local community in a prompt and responsible manner. The proposed mechanisms and frequency of reporting will be defined in the remedial design documentation for Operable Unit 5 and be subject to EPA approval, formal review by OEPA, and will be made available for public inspection.

OEPA 7 DOE should attempt to incorporate pollution prevention activities whenever possible during the design and operation of the OU5 remedial action systems. All available methods to reduce or eliminate discharges and releases from the excavation and disposal activities should be considered during the design of the system.

Response:

Pollution prevention will be a key consideration during remedial design for Operable Unit 5. Considerations during remedial design will include minimizing discharges to the Great Miami River to the extent practical, applying appropriate mitigative measures during excavation and soil transport and staging operations to minimize fugitive dust emissions, and ensuring the necessary controls to reduce the migration of contaminated soil and surface water out of controlled areas during rain events. DOE's planned actions will be documented during remedial design and subject to approval by EPA, formal review by OEPA, and will be available for public inspection.

OEPA 8 DOE must ensure the public that their involvement will not be diminished during RD/RA. DOE should commit within the ROD for OU5 to maintaining the exceptional ongoing public involvement program during RD/RA.

Response:

DOE is committed to continuing the active community involvement program currently in place at the FEMP throughout the duration of remedial activities at the site. This issue has been discussed at public meetings and has been the subject of a more focused roundtable held with interested members of the local community. Language has been added to Section 9 of this ROD to formalize the commitment to continue the on-going public involvement program during the remedial design/remedial action process.

OEPA 9 DOE should make commitments within the OU5 ROD concerning perpetual government ownership of properties associated with the OU5 ROD. DOE must provide commitments to ensure the land-use employed to develop the cleanup standards is maintained into the future. DOE ownership is essential to maintaining institutional controls and limiting land-use to ensure protectiveness of the site.

Response:

The comment raises the need to properly align the necessary institutional control provisions for the FEMP with the future land use for the facility to ensure the continued protection of human health. DOE agrees with the need for this alignment. It is not the intent of DOE to attempt to establish a final future land use for the FEMP through this decision document. DOE does recognize that the final remediation levels identified in Section 9.0 of this ROD do establish the permissible concentrations of contaminants which could remain at the site following completion of remedial actions. These remaining concentrations of contaminants will present a potential for exposure to future users of the FEMP.

The Fernald Citizens Task Force issued recommendations regarding future use of the Fernald property in May of 1995. In these recommendations, the Task Force recommended that the area of the FEMP containing the disposal facility and associated buffer zone remain under the continued ownership of the federal government. Additionally, the Task Force recommended that the remaining portions of the FEMP property be made available for the uses that are the most beneficial to the surrounding communities. While the Task Force recommended prohibiting any sort of agricultural or residential uses of the remaining portions of the FEMP property (outside the disposal facility area), the Task Force encouraged DOE to consult with local communities to establish their preferences for future use and ownership of these areas of the site. Consistent with this recommendation, DOE does not consider it prudent to insert enforceable provisions within this ROD to provide for the continued federal ownership of the entire FEMP property.

OEPA 9 (Contd.) Additionally, DOE considers that final, enforceable institutional control measures for postremedial conditions at the FEMP should be established based upon an analysis of the actual residual concentrations as measured in site soil and groundwater following the completion of remedial actions; the measured concentrations and spatial distribution may differ from FS projections. This difference in estimated versus measured concentrations could have a significant impact on the required institutional controls necessary to maintain continued protectiveness. In this ROD, DOE has elected to define that institutional controls are a necessary component of the remedy to ensure continued protectiveness, but that the specific institutional control provisions necessary to be applied to postremedial site conditions will be defined during remedial design. The institutional control provisions defined during remedial design may be modified during the remedial action phase to accommodate the progressive findings of the field certification efforts. As with all remedial design and remedial action documentation, the plan for institutional controls at the FEMP, and any necessary modifications to it, will be subject to approval by EPA and review by OEPA.

The need for institutional controls during the conduct of remedial actions and the requirement for continued federal ownership of the disposal facility area on the FEMP

have been specifically identified in this ROD. More specific detail on the actual implementation of these controls will be defined during remedial design.

Section 9 of this ROD provides a discussion on the role of institutional controls as a necessary component of the Operable Unit 5 remedy. The language of the ROD provides for the following institutional control provisions:

- Continuation of access controls at the FEMP during the period of remediation
- Provision of alternate water throughout the period of remediation to residences and industrial users whose current wells are located within an area of the aquifer which exhibit concentrations exceeding the final remediation levels for groundwater
- Continued federal ownership of the area comprising the disposal facility and associated buffer zones
- Implementation of deed restrictions or continued federal ownership of the remaining areas of the FEMP, as necessary to ensure the continued protection of human health. If ownership of portions of the FEMP is transferred in the future, restrictions still be included in the deed, and proper notifications will be provided as required by CERCLA.

OEPA 10 With regard to the request for a USEPA waiver of the Ohio solid waste siting criteria, OEPA supports this waiver only in that it allows for a remedy more protective than capping in place and more implementable than off-site shipment. Since the DOE FEMP is a CERCLA site and its location would not allow issuance of an OEPA exemption of the criteria, OEPA believes a waiver is the appropriate mechanism to support the preferred alternative. Ohio EPA's support of the waiver is inherently tied to the restrictions described in comment #2 above.

Response:
Comment acknowledged. This ROD provides a discussion in Section 10 on the required waiver of State of Ohio siting requirements needed to implement the selected remedy.

Renck, D. 1 As a young adult I feel as if leaving this nuclear material here as being not the answer. It will contaminate one of the worlds largest aquifers. My family and I will be living here for many, many more years, do not leave this deadly material to contaminate our water, and thousands of other peoples water.

Response:
DOE acknowledges that no one wants contamination near where they live but contaminated material already exists at the FEMP. The cleanup plan proposed for the FEMP will address this existing contamination and reduce the levels in the soil and groundwater to concentrations deemed to be health-protective by federal environmental regulation.

The selected cleanup remedy at the FEMP has three objectives related to the Great Miami Aquifer; stop existing sources of contamination to the aquifer, restore the aquifer to maximum beneficial use in a reasonable time frame, and protect the aquifer from future contamination originating from the FEMP property. DOE recognizes that the aquifer is an important national and local resource and that the FEMP site has adversely impacted an approximate 200-acre area of the aquifer system DOE also recognizes that if the FEMP is not cleaned up it poses continued contamination risk to the public and to the aquifer. DOE intends to eliminate this unacceptable risk by moving forward with a balanced remediation approach. This

approach gets the most contaminated materials away from the aquifer (by shipping them off site), restores the aquifer, and limits the quantity and disposal configuration of the contaminated material remaining at the site. Completion of the selected remedy will also provide for more beneficial use of the FEMP property outside the disposal facility area.

Plans are to remove the materials that constitute about 97% of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

What will remain for disposal at the FEMP in the engineered disposal facility will be about 3% of the current quantity of radioactivity present at the site. This 3% is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials; specifically Operable Unit 5 soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble front this operable unit is also being considered for on-property disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-property disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

Renck, D. (Contd.)
1 (Contd.) The waste acceptance criteria considers the hydrogeologic environment of the site and the protective properties of the engineered disposal facility. Soil, for instance, would be excavated down to the proposed cleanup level of 80 parts per million total uranium outside the former production area of the FEMP and 20 parts per million within the former production area. Current estimates indicate that placing all of the lightly contaminated soil together in the disposal facility will produce an average concentration of about 100 parts per million of uranium in the facility. This average concentration is one-tenth of the waste acceptance criteria for disposal in the on-property disposal facility, a tenfold safety factor. It should be noted that sophisticated computer model simulations used to derive the waste acceptance criteria were completed assuming that there was no active maintenance of the facility and that the synthetic barriers present in the facility (e.g., high-density polyethylene membranes) were not functioning. These simulations indicate that even under these extreme conditions, the facility would still be protective of the aquifer over the full 200- to 1000-year performance period envisioned by federal regulations.

Renck, D. This is a very quick and unsafe way of dealing with this huge problem.
2

Response:

The proposed cleanup approach was not thought of overnight, rather a has been developed after several years of careful study of the site and the various options available to address the contamination. The proposed cleanup plan will correct an existing contamination problem and reduce the levels of contamination within the environmental media at the site to levels deemed to be health-protective by federal environmental regulation. It cleans up the FEMP by getting the material with higher levels of contamination away from the site, and provides a strategy for permanently protecting human health and the underlying Great Miami Aquifer by isolating the remaining less contaminated material in an engineered disposal facility at the site.

Renck, D. Shipping the nuclear material to a safe place is the only answer.
3

Response:

Several different options were considered for the less contaminated material

before the excavation and on-property disposal option was selected. Use of caps, in-place containment, off-site disposal, and soil washing were all considered but the risks and costs were judged to be unacceptable. The decision as to what less contaminated material would remain on site was developed with input from the Fernald Citizens Task Force and the public through numerous round tables and open forums. Waste acceptance criteria for the less contaminated material were developed for the engineered disposal facility to help ensure protection of the aquifer. Only material that falls below the contamination level of the waste acceptance criteria will be disposed of in the engineered disposal facility. Material that does not meet the criteria will have to be either treated or shipped off site.

Renck, J. M. I am opposed to the waste storage dump proposed for the FEMP. The
1 contamination to the aquifer is my primary concern. The aquifer needs to be protected as a source for drinking water for the thousands of people who use it. This method of containment doe not convince me that not further contamination will occur. If this method were safe. NO water should leak into the groundwater. This is not a good enough solution. The second concern is the ground covering the dump and the contaminants left in the area. The area will not be cleaned up to a point that a good use can be made of it.

Response:

The proposed cleanup plan will correct an existing contamination problem and reduce the levels of contamination within the environmental media at the site to levels deemed to be health-protective by federal environmental regulation. It cleans up the FEMP by getting the material with higher levels of contamination away from the site, and provides a strategy for permanently protecting human health and the underlying Great Miami Aquifer by isolating the remaining less contaminated material in an engineered disposal facility at the site.

The selected cleanup remedy at the FEMP has three objectives related to the Great Miami Aquifer; stop existing sources of contamination to the aquifer, restore the aquifer to maximum beneficial use in a reasonable time frame, and protect the aquifer from future contamination originating from the FEMP property. DOE recognizes that the aquifer is an important national and local resource and that the FEMP site has adversely impacted an approximate 200-acre area of the aquifer system DOE also recognizes that if the FEMP is not cleaned up it poses continued contamination risk to the public and to the aquifer. DOE intends to eliminate this unacceptable risk by moving forward with a balanced remediation approach. Ais approach gets the most contaminated materials away from the aquifer (by shipping them off site), restores the aquifer, and limits the quantity and disposal configuration of the contaminated material remaining at the site. Completion of the selected remedy will also provide for more beneficial use of the FEMP property outside the disposal facility area.

DOE's plans for remediation of the site as a whole include a conservative approach regarding on-site and off-site disposal of contaminated material. It is important to distinguish that this approach includes off-site disposal of all of the more highly contaminated material found at the FEMP in all operable units.

Plans are to remove the materials that constitute about 97% of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium, product.

Renck, J. M. (Contd.)
1 (Contd.)

What will remain for disposal at the FEMP in the engineered disposal facility

will be about 3% of the current quantity of radioactivity present at the site. This 3% is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials; specifically Operable Unit 5 soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from this operable unit is also being considered for on-site disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-site disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

Several different options were considered for the less contaminated material before the excavation and on-property disposal option was selected. Use of caps, in-place containment, off-site disposal, and soil washing were all considered but the risks and costs were judged to be unacceptable. The decision as to what less contaminated material would remain on site was developed with input from the Fernald Citizens Task Force and the public through numerous round tables and open forums. Waste acceptance criteria for the less contaminated material were developed for the engineered disposal facility to help ensure protection of the aquifer. Only material that falls below the contamination level of the waste acceptance criteria will be disposed of in the engineered disposal facility. Material that does not meet the criteria will have to be either treated or shipped off site.

The waste acceptance criteria considers the hydrogeologic environment of the site and the protective properties of the engineered disposal facility. Soil, for instance, would be excavated down to the proposed cleanup level of 80 parts per million total uranium outside the former production area of the FEMP and 20 parts per million within the former production area. Current estimates indicate that placing all of the lightly contaminated soil together in the disposal facility will produce an average concentration of about 100 parts per million of uranium in the facility. This average concentration is one-tenth of the waste acceptance criteria for disposal in the on-property disposal facility, a tenfold safety factor. It should be noted that sophisticated computer model simulations used to derive the waste acceptance criteria were completed assuming that there was no active maintenance of the facility and that the synthetic barriers present in the facility (e.g., high-density polyethylene membranes) were not functioning. These simulations indicate that even under these extreme conditions, the facility would still be protective of the aquifer over the full 200- to 1000-year performance period envisioned by federal regulations.

Renck, J. M. 2 How can you say that only 9 inches of rain water per year will find it's way into the aquifer.

Response:

The predicted infiltration rate through the proposed disposal facility and into the aquifer is estimated to be 0.89 inch per year. This amount of infiltration is much lower than estimated infiltration rates through the surrounding soil (which average about 6 inches per year). The reason for the difference is that the impermeable cap on the disposal facility is designed to carry precipitation away from the facility, not through it. Most of the precipitation will travel horizontally away from the facility, and very little will be left to travel vertically through the facility. This design infiltration rare for the disposal facility does not take any credit for the use of synthetic layers because there is no evidence that synthetic material will perform satisfactorily for 1000 years. The 0.89 inch per year estimate also assumes that the leachate collection system is not functioning.

<IMG SRC 0596312H2>

Don't trust D0E or EPA

Poor past record - whatever they say I believe opposite.

Those who ignore past mistakes are doomed to repeat them.

If the law can be changed to allow siteing of waste over the aquifer it can be changed to allow outside waste into Ross.

If the west does not want the waste why do we want it?

Cost estimates at +50 to -30% are more like wags than true cost estimates. (Wild as guess)

No one knows the storage pit will not leak.
What about perche water under pit
Tornados
Earthquakes

DOE promised a clean up not a cover up.

The citizens task force did not contain local citizen, only 1 so their concern about the local area is minimal.

If the site once it is cleaned up is safe why doesn't DOE put its new office building on site? They own the land.

Can the removal and cell be designed so that radioactive waste goes off site until all is gone or the west refuses to take it any more?

When the dump leaks in the future what will be the cost to fix it then?

Once the most hazardous materials are gone the materials remaining become the most hazardous. Clean it up don't pile it up and categorize it as clean and safe.

Does the Citizen Task Force want this dump in their backyard?

<IMG SRC 0596312H3>
The number of transport worker accidents involved in moving this is irrevelant to the decision. Any, all and no actions involve risk. The question is it a good long term idea to site nuclear waste over an aquifer? The answer is NO.

Now figure out the cost effective way to remove the material safely.

Perch water areas may be under the proposed cell site which may make the cell leak into the aquifer.

Why would Ohio EPA allow a nuclear dump to be established over on aquifer?

Creating the dump (cell) destroys more of the site than just shipping it out.

The current projections go 1000 years into the future but just 20-30 years ago DOE thought nothing about working people without protection. The more we know about nuclear/radioactive material the worse it appears to get. The more that is moved now the better our community will be.

No one knows what the future land use will be. The Citizen Task Force did not recommend a use. Someone needs to decide a real practical use, if any, before the dump (cell)/ clean up is finalized.

Why build one cell, why not turn this into a nuclear dump for all of the U.S.? If it is safe lets take it all if it is not - Then lets get rid of it. Is a little cancer OK?

Is Fernald the only site in the US considering on site waste disposal? Where else and why?

Who is to blame for this mess?

Who is held responsible when this cell leaks? What are the guarantees?

<IMG SRC 0596312H4>
This proposal on page 32 states NO Significant long term impact.
On Water Quality
Hydrology
Air Quality
Socioeconomic
Or cultural resources will be caused by the dump.
I want to know how these conclusions were reached.
To state that a cuclear dump would have no significant impact without detailed plans for future use seems unreasonable.

You seem to say different things to different groups.

It, is safe to move nuclear material? We have never had a serious accident when moving it.

Page 33 - Don't move it some one will have a train wreck.
What is it - should we all stay home from work because someone might / will die in a traffic accident if we go to work? Lets get on with the job.

Some dump somewhere out west will be glad to take our nuclear crap. Quit using this as an excuse.

The dump grew from 1610 x 1610 x 40 feet 60 acres to
2400 x 1300 x 62 feet 71 acres

Why? Woops a math error.

Maybe thats only 10 years protection on the aquifer instead of 1000.

Damn those decimal points!

<IMG SRC 0596312H5>
<IMG SRC 0596312H6>

spend hard earned taxpayer money to treat water for drinking and then dump it to the river. This is inconceivable in this time of shrinking budgets. We all need to tighten our belts. Here we need to simply abandon such an idea and treat only as necessary to protect the river (fish, et cetera) and recreational users of the river. Anybody using the river for drinking (Note: I don't know of any) would be required to treat the water anyway.

Those were submitted into the record this evening.

Now I have a request by Tom Renck to speak with Ross Area Merchants. Tom. You can use this microphone here or that one there, either one.

MR. RENCK: I'm Tom Renck, I'm representing the Ross Area Merchants. I have seven points to make, and I am going to start off I think with my conclusion, which I think this needs to be taken as we're taking this whole thing, which is as citizens we trusted this group to clean it up and did not become actively involved until March 17th. We now at that point found out that there was a cover-up, and we've wrote a letter and the

<IMG SRC 0596312H7>

merchants, which represents about 60 businesses in the local area, are opposed to this cell. We don't feel it's a good long-term solution.

You folks have been studying this for two years. We're given 30 days to comment on this, we don't feel that's long enough. This is one of our busiest times in the year in this farming community. Everybody is out in the fields tonight, that's why there aren't people here that should have been here. So we would like to have another 30 days to comment on this process.

We feel that the Citizens Task Force is not representative of the local citizens. We don't know where these folks came from. We understood that a lot of the people tried to get on here locally. We didn't have a lot of involvement because we thought it was going to be cleaned up, so we feel that the Citizens Task Force does not represent us fairly.

Seems to be an awful lot of jargon used in this, operable Unit Number 5, on-site engineered disposal facility. We call this a dump, and I think when all this information is being given out to people, they're getting very, very

<IMG SRC 0596312H8>

1 confused. I've involved about two months, and this
2 is the amount of material that I've received to
3 study, read, revise, look at. I mean this is not
4 my job, and I'm overwhelmed. I have another
5 cardboard box at home that I throw all this Fernald
6 information in, and it's about two or three foot
7 high of stuff that I can glean at and get rid up,
8 but we're just overwhelmed, we're wore out, and I
9 think that's part of the process, we get worn down
10 trying to understand what's going on in our
11 community.
12 Last week I attended a meeting that I
13 thought was important, same notification. Operable
14 Unit No. 5 deals with 9,800,000 cubic yards of
15 material. This thing dealt with 3,400 barrels of
16 material. It's just a drop in the bucket, but the
17 same process goes on, and the average citizen that
18 gets involved just gets overwhelmed, and we've run
19 out of time, we've run out of energy.
20 I have another document that has 30
21 comments about the document Operable Unit 5, so I'm
22 submitting the letter from the Ross Area Merchants
23 in opposition to this and my 30 comments in
24 writing, and I will hand this to Gary when I get

<IMG SRC 0596312H9>

Renck, T. E. 1 Don't trust DOE or EPA

Poor past record - whatever they say I believe opposite.

Those who ignore past mistakes are doomed to repeat them.

Response:
Comments acknowledged.

Renck, T. E. 2 If the law can be changed to allow siteing of wage over the aquifer it can be changed to allow outside waste into Ross.

Response:
The granting of the waiver to the State of Ohio facility siting requirements does not require a change to federal or state law or regulations. CERCLA and the National Contingency Plan both contain specific language regarding the issuance of a waiver to federal or state environmental or siting requirements to facilitate the implementation of response actions at cleanup sites.

Specific language has been added to Section 9 of this ROD to identify that the on-property disposal facility may only accept waste from on-site sources. Waste generated from off-site facilities are specifically precluded from acceptance at the on-property disposal facility. Changes to federal or state law or regulation and amendments to Records of Decision are subjected to public reviews and comment before enactment.

Renck, T. E. 3 If the west does not want the waste why do we want it?

Response:
The selected alternative for Operable Unit 5 is one part of an overall site strategy which applies a balanced approach to remediation of the FEMP site as a whole. This approach includes off-site disposal of all of the more highly contaminated materials found at the FEMP in all operable units.

Plans are to remove the materials that constitute about 97% of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

What will remain for disposal at the FEMP in the engineered disposal facility will be about 3% of the current quantity of radioactivity present at the site. This 3% is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials; specifically Operable Unit 5 soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from this operable unit is also being considered for on-property disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-property disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

Several different options were considered for the less contaminated material before the excavation and on-property disposal option was selected. Use of caps, in-place containment, off-site disposal, and soil washing were all considered but the risks and costs were judged to be unacceptable. The decision as to what less contaminated material would remain on site was developed with input from the Fernald Citizens Task Force and the public through

numerous round tables and open forums. Waste acceptance criteria for the less contaminated material were developed for the engineered disposal facility to help ensure protection of the aquifer. Only material that falls below the contamination level of the waste acceptance criteria will be disposed of in the engineered disposal facility. Material that does not meet the criteria will have to be either treated or shipped off site.

Renck. T. E. 4 — Cost estimates at +50 to -30% are more like wags than true cost estimates. (Wild as guess)

Response:

EPA guidance on the completion of cost estimates to support feasibility studies under CERCLA defines that conceptual engineering estimates with a precision range of +50% to -30% be used to support the remedy decision process. Of significance is that a consistent precision range and consistent assumptions (to the went practical) are employed during the FS to ensure a fair comparison of alternatives. The selected alternative is subjected to more detailed cost estimating during the remedial design process.

Renck, T. E. 5 — No one knows the storage pit will not leak. What about perche water under pit. Tornados Earthquakes

Response:

The multi-layered lining and capping system associated with the engineered disposal facility are designed to minimize the infiltration and vertical migration of surface water through the stored waste and into the underlying soil and groundwater aquifer. It is recognized that complete elimination of infiltration through the disposal facility is unlikely. Approximately 6 inches of rainfall per year naturally infiltrate through the soil and clay in the FEMP area into the underlying groundwater aquifer. The lining and capping system associated with the engineered disposal facility will significantly reduce this infiltration race. Engineering calculations indicate that the infiltration rate through the cap, liner and underlying soil would be less than 0.1 inch per year. To help ensure long-term protectiveness, the waste acceptance criteria for the on-property disposal facility were derived assuming that the infiltration rate through the cap, lining system and underlying soil would be approximately 0.9 inches per year.

Regarding the potential occurrence of perched water under the on-property disposal facility, the on-going siting investigation is examining the hydrogeologic and geologic conditions in, the northeastern portion of the site. The investigation is designed to identify the best available geology at the FEMP site for purposes of siting the on-property disposal facility. A few of the considerations in establishing the best available geology are the thickness and relative impermeability of the existing clays and the characteristics of any perched water zones encountered within the clays. The perched water zones found at the FEMP are typically silty clay formations with increased permeability. The intent of the siting investigation is to locate the facility in an area with the thickest layer of protective clays coupled with the fewest number of significant perched water zones. The occurrence of perched water zones within the clays were considered in the derivation of the waste acceptance criteria for the various contaminants of concern within the Operable Unit 5 media.

The probability and potential implications of tornados and earthquakes will be considerations within the remedial design process for the disposal facility. A cursory analysis of the impacts of tornados on the completed disposal facility indicates that such an event would have minimal or no impact on the integrity of the disposal facility. A cursory analysis indicated that the probability of a significant earthquake in the FEMP area was inconsequential. More detailed analyses will be conducted during remedial design.

Renck, T. E. 6 DOE promised a cleanup not a cover up.

Response:

The FEMP held routine public meetings throughout the remedial investigation/ feasibility study process. At each of these meetings, discussions were held or information was distributed that discussed the remedial investigation/feasibility study decision process, and DOE's and EPA's role in this process. At a number of these meetings the range of options under consideration within the feasibility study process were discussed. Additionally, the Cleanup Updates and fact sheets issued throughout the process similarly discussed the options under consideration and the remedy selection process being followed at the FEMP.

DOE and EPA consider the selected remedy to be the best available option considering the tradeoffs between the technical and economic criteria evaluated. The selected remedy restores the groundwater and soil at the site to levels considered health-protective by federal environmental regulation, and permanently isolates the removed contamination. The selected remedy provides for the fill restoration and permanent protection of the Great Miami Aquifer and returns over 900 acres of land at the site for alternate future uses.

Renck, T. E. 7 The citizens task force did not contain local citizen, only 1 so their concern about the local area is minimal.

Response:

The Fernald Citizens Task Force contained eight of fourteen members who live and work in the direct vicinity of the site. Additionally, each of the Task Force meetings were announced in the local papers and were open to the public. At each meeting the Task Force requested public input into their ongoing deliberations and resolutions. A formal public meeting was held by the Task Force to discuss some of their final resolutions on cleanup levels, on-property disposal and future land use.

Renck, T. E. 8 If the site once it is clean up is safe why doesn't DOE put its new office building on site? They own the land.

Response:

The decision process establishing the location of any new office building to house site personnel is not relevant to the Operable Unit 5 remedy. It should be noted, however, that FERMCO/DOE are currently soliciting interest from private businesses for the construction of an office building or the use of an existing building. FERMCO/DOE are currently exploring the relative economic benefits of securing a long-term lease arrangement with the owner of such a facility. DOE is not presently considering the construction of such a facility using federal funding, and as such no consideration is being given to using federal land to site the privately owned structure.

Renck, T. E. 9 Can the removal and cell be designed so that radioactive waste goes off site until all is gone or the west refuses to take it any more?

Response:

The balanced approach allows 97% of the radioactivity at the FEMP to be disposed of at an off-site facility. This relatively highly contaminated material is contained in a relatively low volume of material. Approximately 3% of the radioactivity present at the FEMP will remain on site. This 3% is distributed over 2.4 million cubic yards of soil and rubble. Shipping contaminated soil and rubble to an off-site facility in an attempt to remove as great a volume of material as possible before the off-site facility "shuts its doors" would neither guarantee a protective remedy nor constitute responsible action on the part of DOE. There is no guarantee the most highly contaminated materials would make it off site before refusal of

material by the off-site facility. In this instance a considerably greater percentage of radioactivity could remain on site than under the currently proposed alternative. Additionally, a remedy involving off-site shipment of waste has been endorsed by several out-of-state stakeholders based on the balanced approach. DOE cannot in good faith abandon this principle.

Renck, T. E. When the dump leaks in the future what will be the cost to fix it then?
10

Response:

The cost analyses presented in the Feasibility Study Report for Operable Unit 5 for alternatives considering on-property disposal included projected long-term monitoring and maintenance costs of the facility. These costs included projected routine maintenance items such as grass cutting and groundwater monitoring, and repairs to the capping system, as needed; to address concerns raised during inspections of the facility or in response to monitoring results.

It should be recognized that the probable root cause of any future increase in aquifer concentrations underlying the footprint of the disposal facility would be a localized failure of the capping system. Repairs to the capping system of the disposal facility would be readily implementable and not cost prohibitive.

Renck, T. E. Once the most hazardous material are gone the materials remaining become the most hazardous. Clean it up don't pile it up and categorize it as clean and safe.

Response:

Comment Acknowledged. The selected remedy will excavate approximately 1.8 million yards of contaminated soil to ensure the long-term protection of future human and biological receptors and the underlying Great Miami Aquifer. Soil will be removed to attain cleanup levels deemed health-protective by federal environmental regulation. The exhumed soil will be permanently isolated in an on-property disposal facility. Following completion of remedial actions and enactment of the necessary institutional provisions, the site can be categorized as "clean and safe."

DOE understands that a segment of the community near the FEMP wants the site cleaned up and all contamination removed. DOE realizes that some of the public will think that it is unfair to propose that some contaminated FEMP material remain in an engineered on-properly disposal facility. But it is equally unfair to expect other communities located in other areas of the country to accept large quantities of contaminated material from the FEMP site. The current site-wide remedial approach, of which Operable Unit 5 is a component, involves balancing the off-site disposal of large volumes of highly contaminated wastes with on-property disposal of less contaminated soil and rubble.

Renck, T. E. Does the Citizen Task Force want this dump in their back yard?
12

Response:

The Fernald Citizens Task Force issued a recommendation regarding on-property disposal at the FEMP. While the Task Force acknowledged that the FEMP was not the ideal location for the disposal of radioactive materials, they endorsed a balanced approach to site restoration and established that on-property disposal was the most prudent and effective solution. The Task Force recommendation also contained a series of considerations for the remedial design phase. These considerations will be accommodated during the design phase of the on-property disposal facility.

Renck, T. E. 13 The number of transport worker accidents involved in moving this is irrevelant to the decision. Any, all and no actions involve risk. The question is Is it a good long-term idea to site nuclear waste over an aquifer? The answer is NO.

Response:

DOE and EPA concur with the commentor that all alternatives have some associated risk. While the commentor considers the potential for transport accidents to be irrelevant to the remedy decision, the National Contingency Plan requires that short-term risks be evaluated as balancing criteria in the comparison of remedial alternatives. This analysis of short-term risks is presented in Appendix G of the Operable Unit 5 Feasibility Study Report.

Regarding the long-term effectiveness of the selected remedy, clearly the FEMP is not the optimal location for the construction of a disposal facility. The geologic conditions present at the site were subjected to in-depth analysis as part of the Operable Unit 5 remedial investigation/feasibility study process. The findings of this analysis contributed to the conceptual design configuration of the projected on-property disposal facility and to the derivation of the waste acceptance criteria. In all cases the analysis was performed on the conservative side which would produce more restrictive design requirements for the disposal facility and more limiting acceptance criteria. As a result of this process over 97% of the radioactivity present at the FEMP site is being dispositioned off site. The remaining 3% of the radioactivity is being considered for on-property disposal. This material is being considered for on-property disposal as a result of being dispersed in relatively low concentrations in approximately 2.4 million cubic yards of soil and construction rubble.

As presented in the Operable Unit 5 Feasibility Study Report, Alternative 3A provides for the long-term protection of human health and the environment, complies with all applicable or relevant and appropriate requirements, and presents the best balance of tradeoffs between the primary balancing criteria. Alternative 3A is considered to provide for long-term protectiveness through the definition of stringent design requirements for the on-property disposal facility, the adoption of strict waste acceptance criteria, and the definition of concentration-based final remediation levels. While more detail can be found in the Operable Unit 5 Feasibility Study Report, the applicable or relevant and appropriate requirements identified in Appendix B of this Record of Decision require that the on-property disposal facility be designed to attain a series of federal and state environmental and facility siting requirements. These requirements include federal and state hazardous waste regulations, federal regulations on the disposal of uranium mill tailings and State of Ohio regulations for disposal of solid wastes.

Renck, T. E. 13 (Contd.)

(Contd.) The waste acceptance criteria were derived assuming that a performance requirement of the disposal facility was the protection of the underlying aquifer for a period of 1000 years into the future. The 1000-year time frame was adopted from federal regulations on the disposal of uranium mill tailings. The waste acceptance criteria were developed assuming that the performance of the disposal facility should ensure that the facility did not permit the concentrations of contaminants in the underlying aquifer to exceed drinking water maximum contaminant levels for this 1000-year period. To accomplish this derivation, conservative assumptions were made regarding the relative leachability of the contaminants present in FEMP soil. These assumptions were based upon field analysis performed during the remedial investigation and the feasibility study. Additionally, conservative assumptions were employed in the waste acceptance criteria derivation regarding the future infiltration rate through the disposal facility. While modeling indicates that infiltration through the capping system of the disposal facility will be less than 0.1 inch per year, the acceptance criteria were based upon approximately 0.9 inch per year to accommodate a presumed failure of the

synthetic materials in the disposal facility lining and capping systems. These assumptions have yielded a disposal system which will ensure long-term performance.

Lastly, the final remediation levels for soil for the FEMP have been derived to ensure the long-term performance of the remedy. To derive the cleanup levels, cross-media impacts were considered. Cross-media impacts refer to the potential for contaminants present in the media to leach over the long-term into surface water and migrate vertically to the underlying aquifer. Traditionally, this mode of contaminant transport is not considered in the development of cleanup levels. Cross-madia impacts were considered at the FEMP to ensure that the remedy is protective over the long term. As such, the modeling performed to develop the final remediation levels for soil were based on the need to protect the underlying aquifer for the same period of 1000 years into the future. To ensure that long-term protection is provided by the final remediation levels, conservative input parameters were used in fate and transport models regarding the chemical form of the uranium and other contaminants in the soil and the adsorptive and desorptive properties of the soil column. These modeling results yielded soil cleanup levels for the selected alternative which not only provide for the permanent protection of future users of the land and soil at the site, but also present and future users of the groundwater aquifer.

Renck, T. E. 14 Now figure out the cost effective way to remove the material safely.

Response:

The selected alternative represents the best overall remedial alternative considered in the feasibility study considering the threshold and primary balancing criteria as defined by the National Contingency Plan. One of the balancing criteria used as a basis for comparing remedial alternatives is cost. The detailed backup cost estimates for the alternatives is presented in Appendix K of the Feasibility Study Report. A summary of these estimates are presented in the Proposed Plan for Operable Unit 5.

Renck, T. E. 15 Perch water areas may be under the proposed cell site which may make the cell leak into the aquifer.

Response:

As previously discussed above, the on-going siting investigation is examining the hydrogeologic and geologic conditions in the northeastern portion of the site. The investigation is designed to identify the best available geology at the FEMP site for purposes of siting the on-property disposal facility. A few of the considerations in establishing the best available geology are the thickness and relative impermeability of the existing clays and the characteristics of any perched water zones encountered within the clays. The perched water zones found at the FEMP are typically silty clay formations with increased permeability. The intent of the siting investigation is to locate the facility in an area with the thickest layer of protective clays coupled with the fewest number of significant perched water zones. The occurrence of perched water zones within the clays were considered in the derivation of the waste acceptance criteria for the various contaminants of concern within the Operable Unit 5 media.

Renck, T. E. 16 Why would Ohio EPA allow a nuclear dump to be established over on aquifer?

Response:

The siting of the on-property disposal facility at the FEMP requires the issuance of a waiver to State of Ohio solid waste disposal facility siting requirements. The regulatory basis for the issuance of waivers to facilitate the implementation of CERCLA response actions is provided in the National Contingency Plan. Discussions on the technical basis for the granting of the required waiver for the selected remedy is discussed in Section 5.6 of the Feasibility

Study Report for Operable Unit 5 and in Section 10 of this Record of Decision. OEPA has indicated that they support the issuance of the waiver as a component of an overall balanced remedy for the site. OEPA endorsed the issuance of the waiver under the stipulation that a series of technical and operational constraints be factored into remedy implementation. These constraints are listed in the correspondence from OEPA appearing in this Responsiveness Summary.

Renck, T. E. 17 Creating the dump (cell) destroys more of the site than just shipping it out.

Response:
Alternative 3A requires the permanent dedication of approximately 131 acres of the FEMP property to waste disposal (includes the disposal facility and associated buffer zone). The remaining areas of the site would be available for alternate land uses.

Renck, T. E. 18 The current projections go 1000 years into the future but just 20-30 year ago DOE thought nothing about working people without protection. The more we know about nuclear/radioactive material the worse it appears to get. The more that is moved now the better our community will be.

Response:
Comment Acknowledged. See previous response to comment numbered as T.E. Renck 11.

Renck, T. E. 19 No one knows what the future land use will be. The Citizen Task Force did not recommend a use. Someone needs to decide a real practical use, if any, before the dump (cell)/clean up is finalized.

Response:
The comment raises the need to properly align the necessary institutional control provisions for the FEMP with the future land use for the facility to ensure the continued protection of human health. DOE agrees with the need for this alignment. It is not the intent of DOE to attempt to establish a final future land use for the FEMP through this decision document. DOE does recognize that the final remediation levels identified in Section 9.0 of this Record of Decision do establish the permissible concentrations of contaminants which could remain at the site following completion of remedial actions. These remaining concentrations of contaminants will present a potential for exposure to future users of the FEMP.

The Fernald Citizens Task Force issued recommendations regarding future use of the Fernald property in May of 1995, recommending that the area of the FEMP containing the disposal facility and associated buffer zone remain under the continued ownership of the federal government. Additionally, the Task Force recommended that the remaining portions of the FEMP property be made available for the uses that are the most beneficial to the surrounding communities. While the Task Force recommended prohibiting any sort of agricultural or residential uses of the remaining portions of the FEMP property (outside the disposal facility area), the Task Force encouraged DOE to consult with the local communities to establish their preferences for future use and ownership of these areas of the site. Consistent with this recommendation, DOE does not consider it prudent to insert enforceable provisions within this Record of Decision to provide for any specific final land use for the site including any language which would require the continued federal ownership of the entire FEMP property.

Renck, T. E. 20 Why build one cell, why not turn this is a nuclear dump for all of the U.S.? If it is safe lets take it all if it is not - Then lets get rid of it. Is a little cancer OK?

(continued)

Response:

Comment Acknowledged. A general consensus of the public comments on the Operable Unit 5 Proposed Plan was that specific language should be included in the Record of Decision to preclude the acceptance of waste generated off-site into the on-property disposal facility. Consistent with this position, language has been included in Section 9 of the Record of Decision to provide such a prohibition.

Renck, T. E. 21 Is Fernald the only site in the U.S. considering on site waste disposal? Where else and why?

Response:

A number of sites across the United States have selected on-property disposal for materials similar to those being addressed under Operable Unit 5; as examples, the Weldon Spring site near St.Louis, the Maxey Flats site in eastern Kentucky, and the former Vitro Rare Metals Plant at Canonsburg, Pennsylvania. Each of these facilities adopted on-property disposal for the radioactive materials present at the sites. The decision process for the Weldon Spring and Maxey Flats sites followed CERCLA and the National Contingency Plan and therefore was based upon a weighting of the same factors considered for Operable Unit 5. The decision process for Canonsburg used the National Environmental Policy Act environmental impact statement process. This process performs similar technical evaluations to the CERCLA decision process and has been determined to be functionally equivalent to the remedial investigation/feasibility study remedy selection process.

For sites contaminated with chemical constituents, on-property land disposal has been widely applied since the inception of the Superfund program in the early 1980s. The emplacement of caps over consolidated waste materials has been widely applied at industrial sites across the United States.

Renck, T. E. 22 Who is to blame for this?

Response:

The DOE has taken clear responsibility for contaminated media associated with the FEMP. This responsibility is clearly outlined in the docket placing the FEMP (then the FMPC) on the National Priorities List and within the Findings of Fact outlined in the Amended Consent Agreement. DOE has similarly taken full responsibility for the prompt implementation of a remedial action program at the FEMP to ensure the long-term protection of human health and the environment.

Renck, T. E. 23 Who is held responsible when this cell leaks? What are the guarantees?

Response:

As indicated in Section 9 of this Record of Decision, the federal government has committed to maintaining the land associated with the on-property disposal facility under the continued ownership of the federal government. Any required maintenance of the disposal facility would be the on-going responsibility of the federal government. The CERCLA statute requires that remedies adopting on-property disposal as part of the remedy must perform reviews at least once every five years to assess the continued protectiveness of the remedy. Section 9 of this Record of Decision contains language regarding the commitment to perform these reviews. In the event these reviews indicate that the remedy is no longer protective, additional response measures would be required to be taken by the federal government to address the identified concern and ensure the permanent protection of human health and the environment.

Renck, T. E. 24 This proposal on page 32 states NO Significant long-term impact. On Water Quality, Hydrology, Air Quality Socioeconomic, Or cultural resources will be

caused by the dump. I want to know how thes conclusions were reached. To state that a cuclear dump would have no significent impact without detailed plans for future use seems unreasonable.

Response:

The statements in the Proposed Plan represent a summary of the analyses performed in Section 5 (and associated appendices) of the Feasibility Study Report for Operable Unit 5. The commentor is referred to this section of the Report for the analysis of the long-term impacts of the remedial alternatives subjected to detailed evaluation, including the alternative selected for implementation (3A).

The final remediation levels and waste acceptance criteria for the selected remedy were designed to achieve a consistent level of protectiveness to potential future human receptors, identified under Land Use Objective 3 in the Feasibility Study Report and the Proposed Plan as recreational and industrial users. These remediation levels for soil, sediment and groundwater are defined in Section 9 of this ROD and are consistent with the recommendations issued by the Fernald Citizens Task Force regarding future land use Following remedy implementation, no significant long-term exposure threat associated with site-introduced contaminants would exist for future recreational or industrial users of the site.

Renck, T. E. You seem to say different things to different groups.
25

It is safe to move nuclear material? We have never had a serious accident when moving it.

Page 33 - Don't move it some one will have a train wreck. What is it - should we all stay home from work because someone might/will die in a traffic accident if we go to work? Lets get on with the job.

Response:

DOE has attempted to provide consistent information to all parties regarding the Operable Unit 5 remedy decision process. The commentor is correct in that there has not been a serious accident involving the transportation of radioactive material in the United States to date. This statement refers to the potential impacts associated with the release of the radioactive material during a transportation accident, not to the potential for injury or death as a result of accidents involving these vehicles unrelated to the materials being conveyed.

The injury and death statistics summarized in the Proposed Plan and presented in detail in Section 5 and Appendix G of the Operable Unit 5 Feasibility Study Report, refer to accidents associated with the mode of transport unrelated to the materials being transported. As clearly indicated in the Report, the potential impacts associated with the loss of containment of the Operable Unit 5 materials during a transportation accident are extremely low or negligible. These potential impacts are minimal because of the relatively low concentrations of contaminants present in Operable Unit 5 materials. These materials do not present an acute exposure threat to human receptors.

The impacts discussed on page 33 of the Proposed Plan refer to the potential accidents associated with the bulk transport of large quantities of materials for those remedial alternatives which rely upon off-site disposal as a principal component of the response. Estimates of projected injuries and deaths associated with material transport were based upon data obtained from the Department of Transportation and the railroad industry. The data is based upon the mode of transport, the total miles transversed and the number of highway-railroad crossings (for rail transport only). These statistics did not consider the type of materials being conveyed or their potential impact to populations if released during

transportation-related accidents.

Renck, T. E. 26 Some dump somewhere out west will be glad to take our nuclear crap. Quit using this as an excuse.

Response:

There currently are only two disposal facilities in the United States with the necessary permits, licenses or authorities to receive the Operable Unit 5 materials. These facilities are the Nevada Test Site and the Envirocare facility in Clive, Utah. State authorities in both locations have endorsed the selected remedies for Operable Units 1 through 5 at the FEMP because they presents a balanced approach to site cleanup with a proper distribution of responsibility for the long-term management of site contaminated materials. While the operators of the disposal facilities may be open to the receipt of the large quantity of Operable Unit 5 materials, the associated State authorities in each location are not as receptive.

It should also be recognized that the Operable Unit 5 remedy is projected to take between 10 and 25 years to implement, dependent on future funding levels. While capacity may be available at a facility today to receive the material, the uninterrupted and continued availability of this capacity over the long term is highly uncertain. This high level of uncertainty for the continued availability of off-site disposal capacity was one factor considered in the evaluation of available options for Operable Unit 5.

Renck, T. E. The dump grew from 1610 x 1610 x 40 feet 60 acres to 2400 x 1300 x 62 feet 71 acres. Why? Woops a math error. Maybe thats only 10 years protection on the aquifer instead of 1000. Damn those decimal points!

Response:

The figures presented on page 36 in the Operable Unit 5 Proposed Plan are correct. The 60-acre area refers to the projected footprint of the disposal facility to accommodate the 1. 8 million cubic yards of contaminated soil needing excavation to attain the final remediation levels for Operable Unit 5. The 71-acre area referred to on page 42 of the Proposed Plan refers to the projected footprint of the disposal facility that would be required to accommodate the materials identified for on-property disposition based upon the integration of the anticipated final remedies for all five FEMP operable units. This projection of the site-wide remedy, including the total quantities of materials estimated to leave the site and those projected to remain following remedial actions, was provided to properly frame for the reader the role of the Operable Unit 5 decision within the overall site-wide remedial strategy. Therefore, the 71-acre disposal facility would include the Operable Unit 5 materials, approximately 600,000 cubic yards of contaminated soil and construction debris from Operable Units 1 through 4, and exhumed waste materials from Operable Unit 2 facilities, including the flyash piles and the lime sludge ponds.

Renck, T. 28 Who was notified of this? How? When? I thought all residents were to be notified. Were they?

Response:

As part of the overall site program for community involvement at Fernald, Operable Unit 5 provided the public with numerous opportunities during the past few years for commenting on proposed cleanup alternatives relating to the remediation of environmental media on and off site. The public involvement strategy consisted of a combination of written information, support of the Fernald Citizens Task Force, meetings with local trustees and

activist groups, and public workshops to solicit public input. Fernald management has consistently sought more effective ways to involve the public. One example is the envoy program DOE will continue to seek effective ways to involve the public.

The specific Operable Unit 5 community involvement program included fact sheets, monthly updates for FRESH meetings, reports, and new releases. Presentations were regularly given at public workshops and ranged from discussions on the Operable Unit 5 Remedial Investigation/Feasibility Study Report to providing information on the latest project designed to significantly reduce contamination. In addition, Operable Unit 5 supported the Fernald Citizens Task Force by fulfilling Task Force requests for information.

To enable the public to become involved early in the decision-making process, Operable Unit 5 held its first workshop on June 1, 1993. This workshop gave the public an understanding of what alternatives were being considered to clean up Operable Unit 5. The workshop focused on these issues:

- What are the eight major steps in the Initial Screening of Alternatives screening process?
- What alternatives are being developed to clean up perched and regional groundwater?
- What alternatives are being developed to clean up soil and stream sediment?
- How can the public become involved in the decision-making process?

As communications with Fernald stakeholders increased, Operable Unit 5 learned that many did not understand complex groundwater issues. On November 23, 1993, Operable Unit 5 conducted a second workshop to increase stakeholder understanding of groundwater issues so they could make more informed comments on the preferred cleanup alternative. This workshop focused on:

- What is the regional geologic setting of the FEMP and the Fernald area?
- What is the occurrence and movement of groundwater?
- What groundwater is contaminated at the FEMP and where can it spread?

As work moved beyond sampling and analysis and into preparing the very comprehensive Remedial Investigation Report, Operable Unit 5 conducted its third workshop to explain the nature and content of contamination at the site. The November 15, 1994, meeting focused on:

- What are uranium concentrations in soil and the Great Miami Aquifer?
- What are the other contaminants in soil and groundwater, and where are they going?
- What cleanup options are being considered?
- How can the public become more involved in the decision-making process?

A fourth workshop was held March 28, 1995, soon after submittal of the draft final Feasibility Study and Proposed Plan for Operable Unit 5 to EPA and OEPA. This workshop provided the public with a chance to ask questions and get information on the Feasibility Study and Proposed Plan, before the formal public comment period. This workshop focused on the following topics:

- How does DOE propose to clean up the soil, sediment, and groundwater and how did DOE arrive at this recommendation?
- What are the risks of this proposed action?
- What does DOE plan to do with disposed soil?
- How can the public become involved in decision making?

Local governmental, business, and activist group meetings attended by FEMP managers during the March-May 1995 time frame included:

March 22 -- Ross Merchants Meeting
April 17 -- Morgan Township Trustee Meeting
April 18 -- Ross Township Trustee Meeting
April 24 -- Crosby Township Trustee Meeting
April 25 -- Ross Lions Club Meeting
May 17 -- Cooperative Planning & Training Committee

Sections 3.0 and A.2.0 contain more information on public involvement and community participation. DOE will continue to seek effective ways to involve the public.

Renck, T., Transcript 29

...this needs to be taken as we're [Mr. Renck said he represented the Ross Area Merchants] taking this whole thing, which is as citizens we trusted this group to clean it up and did not become actively involved until March 17th. We now at that point found out that there was a cover-up, ...

Response:

The FEMP held routine public meetings throughout the remedial investigation/feasibility study process. At each of these meetings discussions were held or information was distributed that discussed the remedial investigation/feasibility study decision process, and DOE's and EPA's role in this process. At a number of these meetings the range of options under consideration within the feasibility study process were discussed. Additionally, the Cleanup Updates and fact sheets issued throughout the process similarly discussed the options under consideration and the remedy selection process being followed at the FEMP.

DOE and EPA consider the selected remedy to be the best available option considering the tradeoffs between the technical and economic criteria evaluated. The selected remedy restores the groundwater and soil at the site to levels considered health-protective by federal environmental regulations, and permanently isolates the removed contamination. the selected remedy provides for the full restoration and permanent protection of the Great Miami Aquifer and returns over 900 acres of land at the site for alternate future uses.

Renck, T., Transcript 30

We ... are opposed to this cell. We don't feel it's a good long-term solution.

Response:

DOE understands that a segment of the community near the FEMP site wants all contamination removed from the site and shipped to an off-site location. DOE realizes that some members of the public will think that it is unfair to propose that some contaminated FEMP material remain in an engineered on-property disposal facility. But it is equally unfair to expect other communities located in other areas of the country to accept large quantities of contaminated material from the FEMP site. The current site-wide remedial approach, of which Operable Unit 5 is a component, involves balancing the off-site disposal of the FEMP's inventory of highly contaminated wastes with on-property disposal of less contaminated soil and rubble.

Plans are to remove the materials that constitute about 97% of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

What will remain for disposal at the FEMP in the engineered disposal facility will be about 3% of the current quantity of radioactivity present at the site. This 3% is

distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials; specifically Operable Unit 5 soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from this operable unit is also being considered for on-property disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-property disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

Several different options were considered for the less contaminated material before the excavation and on-property disposal option was selected. Use of caps, in-place containment, off-site disposal, and soil washing were all considered but the risks and costs were judged to be unacceptable. The decision as to what less contaminated material would remain on site was developed with input from the Fernald Citizens Task Force and the public through numerous round tables and open forums. Waste acceptance criteria for the less contaminated material were developed for the engineered disposal facility to help ensure protection of the aquifer. Only material that falls below the contamination level of the waste acceptance criteria will be disposed of in the engineered disposal facility. Material that does not meet the criteria will have to be either treated or shipped off site.

Renck, T., Transcript 31

We feel that the Citizens Task Force is not representative of the local citizens. We don't know where these folks came from. We understood that a lot of the people tried to get on here locally. We didn't have a lot of involvement because we thought it was going to be cleaned up, so we feel that the Citizens Task Force does not represent us fairly.

Response:

In early 1993, officials with the Department of Energy met with key stakeholder groups, such as FRESH, to seek comments on the concept of creating a citizens advisory board, The DOE initially decided that creating a citizens advisory board was the best way to get public input on strategic issues related to cleaning up the Fernald site. Once the decision was made to create an advisory board, the DOE decided to use a neutral, third-party consultant - called a "convener" - to select people to serve on what would become the Fernald Citizen's Task Force. Only when stakeholders indicated their acceptance did DOE proceed with finding a convener by writing a task order and circulating it among Ohio colleges and universities.

DOE opted for the convener approach because it was perceived to be the most efficient and fairway to seek members for the advisory group. The DOE considered other approaches including:

- Empaneling a steering committee to select candidates
- Having DOE select members
- Asking a state agency to screen candidates

The convener for the Fernald Citizens Task Force was Dr. Eula Bingham, a professor of environmental health in the College of Medicine and director of the Ohio Hazardous Substances, Research, Education, and Management Institute at the University of Cincinnati. She has extensive experience with citizen advisory groups, having served on local, national, and international committees dealing with environmental and public health issues.

In addition to nominating candidates to serve on the Task Force, Dr. Bingham drafted a charter, containing the group's mission statement and purpose. She began work in May 1993 and completed her task in August 1993.

Although Dr. Bingham operated independently, some steps she took during convening included:

- Asking DOE for a list of key stakeholders' names and phone numbers. She used this list for initial contacts, a letter of introduction was sent to key stakeholders telling them that Dr. Bingham was convening an advisory group.
- Meeting with officials from DOE, EPA, and OEPA to discuss the mission of the advisory group and how it would be convened. DOE agreed to appoint the slate nominated by Dr Bingham, rather than veto individuals.
- Calling and/or meeting with stakeholders and others recommended by key stakeholders. The conversations focused on potential members and what should be contained in the draft charter. Dr. Bingham sought candidates who ensured a balanced and diverse representation of the parties affected by activities at the Fernald site.
- Holding a public work session in July 1993 to discuss how the Task Force should operate and who should serve as members. Dr. Bingham asked for volunteers as well. This meeting was advertised in area newspapers and through other publicity channels, such as flyers and announcements to stakeholder groups.

DOE also continued, as part of its public information program, providing updates on the status of the convening process to stakeholders, either through meetings or other face-to-face contact or with written materials.

When the draft charter and list of nominees were submitted to DOE, EPA, and OEPA, that information was announced to the public via news releases and other techniques.

The Task Force convened shortly after members received their appointment letters from DOE. Its first meeting was held in October 1993. The group has publicized its meetings in monthly mailings and advertisements in the Cincinnati Enquirer, the Journal-News, and the Harrison Press.

Renck, T., Transcript 3

...this Fernald information we're just overwhelmed, we're wore out, and I think that's part of the process, we get worn down trying to understand what's going on in our community. ... but the same process goes on, and the average citizen that gets involved just gets overwhelmed, and we've run out of time, we've run out of energy.

Response:

The DOE acknowledges that the volume of information supplied to the community can be overwhelming. However, it would be inappropriate for the DOE to screen the information presented to the public. For this reason the public is supplied with information on all major issues at the FEMP through many forums including meetings, reports and fact sheets. Members of the community are encouraged to select topics of personal significance and to participate to the went practical.

Ross Area Merchants Assn. 1

The Ross Area Merchants Assn. a local business organization of 60 members, is very concerned and disappointed with the current proposal to store large amounts of nuclear material on the Fernald site. It was our understanding that the Fernald site would be cleaned up. Burying nuclear waste over an aquifer is not an environmentally sound long-term solution. The original problems at Fernald were caused by this same short term thinking. This proposal would not clean up the problem, but be more like hiding the mess under a rug. We, the business leaders of the Ross area, our families and employees totally reject on site storage as a viable option. Let's get serious about doing the job right for the long term and

bring to this community a real solution we can support and live with.

Response:

DOE understands that a segment of the community near the FEMP site wants all contamination removed from the site and shipped to an off-site location. DOE realizes that some members of the public will think that it is unfair to propose that some contaminated FEMP material remain in an engineered on-property disposal facility. But it is equally unfair to expect other communities located in other areas of the country to accept large quantities of contaminated material from, the FEMP site. The current site-wide remedial approach, of which Operable Unit 5 is a component, involves balancing the off-site disposal of the FEMP's inventory of highly contaminated wastes with on-property disposal of less contaminated soil and rubble.

The selected cleanup remedy at the FEMP has three objectives related to the Great Miami Aquifer: stop existing sources of contamination to the aquifer, restore the aquifer to maximum beneficial use in a reasonable time frame, and protect the aquifer from future contamination originating from the FEMP property. DOE recognizes that the aquifer is an important national and local resource and that the FEMP site has adversely impacted an approximate 200-acre area of the aquifer system DOE also recognizes that if the FEMP is not cleaned up it poses continued contamination risk to the public and to the aquifer DOE intends to eliminate this unacceptable risk by moving forward with a balanced remediation approach. This approach gets the most contaminated materials away from the aquifer (by shipping them off site), restores the aquifer, and limits the quantity and disposal configuration of the contaminated material remaining at the site. Completion of the selected remedy will also provide for more beneficial use of the FEMP property outside the disposal facility area.

Plans are to remove the materials that constitute about 97% of the radioactivity present at the FEMP FOR disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

Ross Area
Merchants
Assn.
1 (Contd.)

What will remain for disposal at the FEMP in the engineered disposal facility will be about 3% of the current quantity of radioactivity present at the site. this 3% is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials, specifically Operable Unit 5 soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from this operable unit is also being considered for on-property disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-property disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

Several different options were considered for the less contaminated material before the excavation and on-property disposal option was selected. Use of caps, in-place containment, off-site disposal, and soil washing were all considered but the risks and costs were judged to be unacceptable. The decision as to what less contaminated material would remain on site was developed with input from, the Fernald Citizens Task Force and the public through numerous round tables and open forums. Waste acceptance criteria for the less contaminated material were developed for the engineered disposal facility to help ensure protection of the aquifer. Only material that falls below the contamination level of the waste acceptance criteria will be disposed of in the engineered disposal facility. Material that does not meet the criteria will have to be either treated or shipped off site.

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or less.

We need real time monitoring.

Also continue to evaluate technologies that would increase protection to residents and community.

No dilution of waste to meet waste acceptance criteria. Soils above 1030 to be shipped off-site.

And I do support the US EPA's waiver of siting criteria.

In conclusion, the Fernald site beyond the disposal cell should become a wetland or sanctuary, and I believe in the balance approach for all DOE sites. Thank you.

MR. STEGNER: Thank you, Edwa. Anyone else care to offer -- Ann.

MS. SCHULTE: I'm Ann Schulte, I'm a member of Ross Area Merchants Association and I am also a resident of

UNIDENTIFIED SPEAKER: We can't hear you.

MS. SCHULTE: I'm Ann Schulte and I am also a resident of Morgan Township and I am also a member of Ross Area Merchants Association. I'm

1 opposed to the public storage unit for two reasons,
2 my main reason is because it's stored over an
3 aquifer. We're talking about drinking the water
4 for a vast number of people, and I feel this is a
5 risk that doesn't need to be taken. I think we
6 have looked at convenience over the health and
7 safety of the community.
8 Also the other concern I have is once
9 this cell has been approved, how do we have the
10 control of allowing outside storage or outside
11 contaminants to come into the storage unit?
12 There's a part of it that will say it's been at
13 Fernald before, at some point it can come back here
14 again, and I don't want to be a dump site for the
15 rest of the community. Thank you.
16 MR. STEGNER: Thank you, Ann. Any
17 more comments tonight? Again be reminded that the
18 comment period is over on the 31st of May. Gary.
19 MR. STORER: I'm Gary Storer, Crosby
20 Township resident and trustee.
21 The northeast corner of the Fernald
22 site is a relatively uncontaminated zone, and my
23 idea is to locate the disposal cell -- if there has
24 to be one, I've got some thoughts about that in a

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Schulte, A. I am opposed to the on-site disposal storage cell. My concern is that the
1 radioactive material will be stored over the Great Miami Aquifer.

Response:

The selected cleanup remedy at the FEMP has three objectives related to the Great Miami Aquifer; stop existing sources of contamination to the aquifer, restore the aquifer to maximum beneficial use in a reasonable time frame, and protect the aquifer from future contamination originating from the FEMP property. DOE recognizes that the aquifer is an important national and local resource and that the FEMP site has adversely impacted an approximate 200-acre area of the aquifer system DOE also recognizes that if the FEMP is not cleaned up it poses continued contamination risk to the public and to the aquifer. DOE intends to eliminate this unacceptable risk by moving forward with a balanced remediation approach. This approach gets the most contaminated materials away from the aquifer (by shipping them off-site), restores the aquifer, and leaves the quantity and disposal configuration of the contaminated material remaining at the site. Completion of the selected remedy will also provide for more beneficial use of the FEMP property outside the disposal facility area.

Plans are to remove the materials that constitute about 97 percent of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

What will remain for disposal at the FEMP in the engineered disposal facility will be about 3 percent of the current quantity of radioactivity present at the site. This 3 percent is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials specifically Operable Unit 5. soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from this operable unit is also being considered for on-property disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-property disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

Several different options were considered for the less contaminated material before the excavation and on-property disposal option was selected. Use of caps, in-place containment, off-site disposal, and soil washing were all considered but the risks and costs were judged to be unacceptable. The decision as to what less contaminated material would remain on site was developed with input from the Fernald Citizens Task Force and the public through numerous round tables and open forums. Waste acceptance criteria for the less contaminated material were developed for the engineered disposal facility to help ensure protection of the aquifer. Only material that falls below the contamination level of the waste acceptance criteria will be disposed of in the engineered disposal facility. Material that does not meet the criteria will have to be either treated or shipped off site.

Schulte, A.
(Contd.)
1 The waste acceptance criteria considers the hydrogeologic environment of the site and the protective properties of the engineered disposal facility. Soil, for instance, would be excavated down to the proposed cleanup level of 80 parts per million total uranium outside the former production area of the FEMP and 20 parts per million within the former production area. Current estimates indicate that placing all of the lightly contaminated soil together in the disposal facility will produce an average concentration of about 100 parts per million of uranium in the facility. This average concentration is one-tenth of the waste

acceptance criteria for disposal in the on-property disposal facility, a tenfold safety factor. It should be noted that sophisticated computer model simulations used to derive the waste acceptance criteria were completed assuming that there was no active maintenance of the facility and that the synthetic barriers present in the facility (e.g., high-density polyethylene membranes) were not functioning. These simulations indicate that even under these extreme conditions, the facility would still be protective of the aquifer over the final 200- to 1000-year performance period envisioned by federal regulations.

Schulte, A. 1a — There is a law to protect this aquifer, but there is a waiver issued that will allow for the storage cell.

Response:

The DOE considers the restoration and protection of the sole-source Great Miami Aquifer one of its highest priorities. The selected alternative for Operable Unit 5 includes an expenditure in excess of $160 million on aggressive groundwater extraction and treatment. In light of DOE's commitment to restore and protect the aquifer. the decision to recommend an on-property facility was not made lightly. After detailed analysis of several potential alternatives on the basis of implementability, risk and cost, an on-property disposal facility was determined to be the only alternative that was implementable and practical. Treatment alternatives were eliminated based on their inability to attain the cleanup goals and off-site disposal was eliminated based on uncertainties regarding the availability of disposal capacity throughout the duration of the project and on cost.

As a result of this analysis, the DOE recommended an on-property disposal facility that requires a waiver of the State of Ohio prohibition on siting a landfill over a sole-source aquifer. There are two facts to be noted regarding the sole-source aquifer prohibition and the waiver. First, the prohibition is intended to encourage the siting of new commercial facilities in geologically appropriate areas by prohibiting their siting over an aquifer. The prohibition is relevant to the FEMP and warrants a great deal of consideration, although the situation here differs from that of a commercial enterprise intent on profiting from anew disposal facility. The DOE's intent is to improve conditions at an already contaminated facility. As discussed above, the on-property facility is the only practical and implementable remedy.

Second, in order to waive a state requirement, the EPA must require that the DOE demonstrate that the selected alternative will attain a standard of performance that is equivalent to what would have been provided under the otherwise applicable requirement. In this case, the DOE demonstrated to EPA's satisfaction of the siting of a disposal facility at the FEMP would not result in concentrations of contaminants exceeding drinking water standards in the aquifer throughout a performance period of 1000 years.

Use of the aquifer will in no way be impacted by the disposal facility. The DOE (or a successor federal entity) will maintain a groundwater monitoring program to ensure protection of the Great Miami Aquifer and take corrective action if unacceptable impacts are detected.

Schulte, A. 2 — I feel that cost and convenience has taken a preference over health and safety.

Response:

Public and worker health and safety were primary considerations, along with the ability of the remedy to comply with identified applicable or relevant and appropriate requirements, in the remedy decision process for Operable Unit 5. Cost was evaluated as a balancing criteria consistent with the requirements of the National Contingency Plan. The discussion on the detailed analysis of the remedial alternatives is presented in Section 5 of the Operable Unit 5 FS Report. Convenience is not an evaluation criteria defined by federal

regulation and was not considered in remedy selection. One parallel criteria defined by regulation is implementability. Under this criterion the ability to implement the remedial alternatives under consideration are evaluated in respect to existing or projected future technology, institutional or administrative barriers which prevent prompt or continuous implementation of a remedy. One consideration in the selection of the Operable Unit 5 remedy was the high uncertainty in the availability of off-site disposal capacity for the 1.8 million yards of contaminated soil within Operable Unit 5. Public and worker health and safety will continue to be a primary concern to DOE, EPA and OEPA as the selected remedy is implemented.

Schulte, A. 3 Transcript

Also the other concern I have is once this cell has been approved, how do we have the control of allowing outside storage or outside contaminants to come into the storage unit? There's a part of it that will say it's been at Fernald before, at some point it can come back here again, and I don't want to be a dump site for the rest of the community.

Response:

DOE has no plans to bring contaminants to the FEMP site to be cleaned and then placed in the on-property disposal facility. However, DOE is evaluating the potential cost savings of treating some materials from other DOE sites at the FEMP and then shipping them back to the originating facility for final disposal. There is much public concern regarding placement of off-site waste in the site engineered disposal facility. The facility is being designed to correct a problem that already exists at the FEMP. No consideration is being given to placing waste from other sites in the FEMP engineered disposal facility.

Schulte, J. 1

I am opposed to the on-site disposal storage cell. If this is approved, I feel the aquifer will be at risk.

Response:

The selected cleanup remedy at the FEMP has three objectives related to the Great Miami Aquifer; stop existing sources of contamination to the aquifer, restore the aquifer to maximum beneficial use in a reasonable time frame, and protect the aquifer from future contamination originating from the FEMP property. DOE recognizes that the aquifer is an important national and local resource and that the FEMP site has adversely impacted an approximate 200-acre area of the aquifer system DOE also recognizes that if the FEMP is not cleaned up it poses a continued contamination risk to the public and to the aquifer DOE intends to eliminate this unacceptable risk by moving forward with a balanced remediation approach. This approach gets the most contaminated materials away from the aquifer (by shipping them off site), restores the aquifer, and limits the quantity and disposal configuration of the contaminated material remaining at the site. Completion of the selected remedy will also provide for more beneficial use of the FEMP property outside the disposal facility area.

Plans are to remove the materials that constitute about 97 percent of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5, in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product. What will remain for disposal at the FEMP in the engineered disposal facility will be about 3 percent of the current quantity of radioactivity present at the site. This 3 percent is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials, specifically Operable Unit 5 soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from this operable unit is also being considered for on-site disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-site disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and

the Great Miami Aquifer.

Several different options were considered for the less contaminated material before the excavation and on-property disposal option was selected. Use of caps, in-place containment, off-site disposal, and soil washing were all considered but the risks and costs were judged to be unacceptable. The decision as to what less contaminated material would remain on site was developed with input from the Fernald Citizens Task Force and the public through numerous round tables and open forums. Waste acceptance criteria for the less contaminated material were developed for the engineered disposal facility to help ensure protection of the aquifer. Only material that falls below the contamination level of the waste acceptance criteria will be disposed of in the engineered disposal facility. Material that does not meet the criteria will have to be either treated or shipped off site.

Schulte, J
1

The waste acceptance criteria considers the hydrogeologic environment of the site and the protective properties of the engineered disposal facility. Soil, for instance, would be excavated down to the proposed cleanup level of 80 parts per million total uranium outside the former production area of the FEMP and 20 parts per million within the former production area. Current estimates indicate that placing all of the lightly contaminated soil together in the disposal facility will produce an average concentration of about 100 parts per million of uranium in the facility. This average concentration is one-tenth of the waste acceptance criteria for disposal in the on-property disposal facility, a tenfold safety factor. It should be noted that sophisticated computer model simulations used to derive the waste acceptance criteria were completed assuming that there was no active maintenance of the facility and that the synthetic barriers present in the facility (e.g., high-density polyethylene membranes) were not functioning. These simulations indicate that even under these extreme conditions, the facility would still be protective of the aquifer over the full 200- to 1000-year performance period envisioned by federal regulations.

Schulte, J. Also the potential exists for waste, not presently at the site, to be added to the storage cell. I realize that this could be put in the proposal that no outside waste be shipped and added to the storage cell. But if the funds to complete the project are cut at some point, it would be very helpful to accept additional waste in order to fund the completion of the project.

Response:

DOE has no plans to bring contaminants to the FEMP site to be cleaned and then placed in the on-property disposal facility. However, DOE is evaluating the potential cost savings of treating some materials from other DOE sites at the FEMP and then shipping them back to the originating facility for final disposal. There is much public concern regarding placement of off-site waste in the site engineered disposal facility. The facility is being designed to correct a problem that already exists at the FEMP. No consideration is being given to placing waste from other sites in the FEMP engineered disposal facility.

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opposed to the public storage unit for two reasons, my main reason is because it's stored over an aquifer. We're talking about drinking the water for a vast number of people, and I feel this is a risk that doesn't need to be taken. I think we have looked at convenience over the health and safety of the community.

Also the other concern I have is once this cell has been approved, how do we have the control of allowing outside storage or outside, contaminants to come into the storage unit? There's a part of it that will say it's been at Fernald before, at some point it can come back here again, and I don't want to be a dump site for the rest of the community. Thank you.

MR. STEGNER: Thank you, Ann. Any more comments tonight? Again be reminded that the comment period is over on the 31st of May. Gary.

MR. STORER: I'm Gary Storer, Crosby Township resident and trustee.

The northeast corner of the Fernald site is a relatively uncontaminated zone, and my idea is to locate the disposal cell -- if there has to be one, I've got some thoughts about that in a

minute -- if there has to be a disposal cell, it should be located over the production area. Waiver should be -- we should seek a waiver to allow for this to happen. The main reason I feel this way is that could be usable, a usable strip from that northeast corner south to Wiley Road, future use, land uses for township use or residents or whatever.

Over the production area there's already recovery measures in place to either clean up contamination that might leak into the aquifer, so those recovery measures are already in place. Even though the northeast corner has a layer of clay, I believe the layer of clay serves the same purpose as the recovery measures that are already in place over the production area.

I'm opposed to the on-site disposal cell. I would be willing to take a risk of shipping this stuff off-site until we're told we cannot do so. There are sites willing to take the contaminated materials. I also do not agree with the transportation risk that I've been told is associated with transporting this contaminated material off-site.

I also heard rumors, I haven't been able to trace down the facts yet, about shifting the disposal cell southward farther into Crosby Township. I certainly would be opposed to this also. I think if a disposal cell is also located on-site, that security needs to be beefed up on-site. I know the security officers no longer carry arms, firearms. I think that would be a necessity due to the recent hostilities that we've all heard about in the news directed toward the federal government.

Thank you for this opportunity to express myself.

MR. STEGNER: Thank you, Gary. I think it's important to note that Tom did ask for an extension of the comment period, and it's something that we can't unilaterally do, Tom. We will take it under advisement, and I would say the chances are extremely good you will get your wish on this, but I can't state it right now, but we will get you a response to that very soon.

MS. CRAWFORD: Will you let us know if they are going to indeed do that? That means we don't have to spend Memorial Day writing these

Storer, G. All waste should be shipped offsite to Envirocare, NTS or other disposal sites. None should be remain over the aquifer. The risk transportation and shipment are minimal compare to leaving contaminants over the aquifer requiring monitoring, security measures etc and placing the tri state at risk.

Response:

DOE acknowledges that no one wants contamination near where they live but contaminated material already exists at the FEMP. The cleanup plan proposed for the FEMP will address this existing contamination and reduce the levels in the soil and groundwater to concentrations deemed to be health protective by federal environmental regulation.

The selected cleanup remedy at the FEMP has three objectives related to the Great Miami Aquifer; stop existing sources of contamination to the aquifer, restore the aquifer to maximum beneficial use in a reasonable time frame, and protect the aquifer from future contamination originating from the FEMP property. DOE recognizes that the aquifer is an important national and local resource and that the FEMP site has adversely impacted an approximate 200-acre area of the aquifer system. DOE also recognizes that if the FEMP is not cleaned up it poses continued contamination risk to the public and to the aquifer. DOE intends to eliminate this unacceptable risk by moving forward with a balanced remediation approach. This approach gets the most contaminated materials away from the aquifer (by shipping them off site), restores the aquifer, and limits the quantity and disposal configuration of the contaminated material remaining at the, site. Completion of the selected remedy will also provide for more beneficial use of the FEMP property outside the disposal facility area.

Plans are to remove the materials that constitute about 97 percent of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

What will remain for disposal at the FEMP in the engineered disposal facility will be about 3 percent of the current quantity of radioactivity present at the site. This 3 percent is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. All material will consist of lightly contaminated materials, specifically Operable Unit 5 soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from this operable unit is also being considered for on-property disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-property disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

Storer, G.
(Contd.)
1

Several different options were considered for the, less contaminated material before the excavation and on-property disposal option was selected. Use of caps, in-place containment, off-site disposal, and soil washing were all considered but the risks and costs were judged to be unacceptable. The decision as to what less contaminated material would remain on site was developed with input from the Fernald Citizens Task Force and the public through numerous round tables and open forums. Waste acceptance criteria for the less contaminated material were developed for the engineered disposal facility to help ensure protection of the aquifer. Only material that falls below the contamination level of the waste acceptance criteria will be disposed of in the engineered disposal facility. Material that does not meet the criteria will have to be either treated or shipped off site.

The waste acceptance criteria considers the hydrogeologic environment of the site and the protective properties of the engineered disposal facility. Soil, for instance, would be excavated down to the proposed cleanup level of 80 parts per million total uranium, outside the former production area of the FEMP and 20 parts per million within the former production area. Current estimates indicate that placing all of the lightly contaminated soil together in the disposal facility will produce an average concentration of about 100 parts per million of uranium in the facility. This average concentration is one-tenth of the waste acceptance criteria for disposal in the on-property disposal facility, a tenfold safety factor. It should be noted that sophisticated computer model simulations used to derive the waste acceptance criteria were completed assuming that there was no active maintenance of the facility and that the synthetic barriers present in the facility (e.g., high-density polyethylene membranes) were not functioning. These simulations indicate that even under these extreme conditions, the facility would still be protective of the aquifer over the full 200- to 1000-year performance period envisioned by federal regulations.

Storer, G. If the disposal cell is a reality, it should be located on the old production area. Recovery measures are already in place in case of leakage, aquifer contamination, acts of terrorism, etc. The northeast corner is really uncontaminated and it does not make sense to introduce more contamination to this area. The clay base should not be a determining factor in more than recovery measures under the old production area. The land from the northeast corner running South to Willey Road still would have potential productive land useage.

Response:

The justification for obtaining the EPA-CERCLA applicable or relevant and appropriate requirement waiver of the Ohio solid waste siting criteria rests primarily with DOE constructing the disposal facility over the most suitable geology available at the FEMP in order to provide the greatest amount of natural protection for the aquifer. The existence of media contamination before the construction of the disposal facility is not a significant concern because remediation would have already occurred, thereby removing any concerns associated with the effects of residual contamination in the soil or perched groundwater. There are significant logistical concerns associated with constructing the disposal facility over the former production area given the time required to remove the buildings and remediate the soil and perched water, yet have the disposal facility available to accept wastes in order to eliminate any double handling.

Storer, G. 3 FERMCO security force needs to be reissued firearms. A disposal cell onsite will require more security. Citizens throughout the US have demonstrated hostilities toward the federal government. Armed security officer will provide added protection to employees, contractors and ultimately the citizens and residents.

Response:

The on-property disposal facility would lead to the consolidation of contaminated materials exceeding cleanup levels into a 131-acre area, 72 acres would constitute the disposal facility plus the required 300-foot buffer area. The 131 acres will remain under the continued ownership of the federal government. The Operable Unit 5 remedy involves the excavation and placement of contaminated soil which exceeds 80 parts per million uranium and is less than the waste acceptance criterion of 1030 parts per million for uranium into the on-property engineered disposal facility. The disposal facility is designed to ensure the protection of the Great Miami Aquifer from contaminants leaching from the buried waste materials over the 200- to 1000-year time frame required by EPA regulations. Due to the nature and concentration of the contaminants within the soil and groundwater media at the FEMP (essentially low concentrations of uranium), the potential threat which is being managed by the on-property disposal facility is from chronic exposures over the long term, not from potential acute releases or exposures to the contaminants. The engineered disposal facility will not possess

qualities that make it a target for sabotage.

Storer, G. I'm opposed to the on-site disposal cell. I would be willing to take a risk of
4 shipping this stuff off-site until we're told we cannot do so. There are other sites willing to take the contaminated materials. I also do not agree with the transportation risk that I've been told is associated with transporting this contaminated material offsite.

Response:

The selected alternative for Operable Unit 5 is one part of an overall site strategy which applies a balanced approach to remediation of the FEMP site as a whole. This is approach includes off-site disposal of all of the more highly contaminated materials found at the FEMP in, all operable units.

Plans are to remove the materials that constitute about 97 percent of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

What will remain for disposal at the FEMP in the engineered disposal facility will be about 3 percent of the current quantity of radioactivity present at the site. This 3 percent is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials, specifically Operable Unit 5 soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from, this operable unit is also being considered for on-property disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-property disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

Several different options for the less contaminated material were considered before an option for the construction of an on-property disposal facility was selected. Use of caps, in-place containment, off-site disposal, and soil washing were all considered but the risks and costs were judged to be unacceptable. The decision as to what less contaminated material would remain on-property was developed with input by the Fernald Citizens Task Force and the public through numerous public round tables and open forums. Waste acceptance criteria for the less contaminated material were developed for the engineered disposal facility to help ensure protection of the public and the aquifer. Only less contaminated material that falls below the contamination level of the waste acceptance criteria will be disposed of in the engineered disposal facility. Materials that do not meet the criteria will have to be either treated or shipped off site.

The detailed analysis of the short-term risks associated with each remedial alternative under consideration, including the selected remedy, is provided in Appendix G to the Operable Unit 5 FS Report. Included in these analyses are the evaluations of the transportation risks associated with the implementation of each alternative. The evaluation of transportation risks employ Department of Transportation factors on the incidence of injuries and fatalities associated with rail and truck transport in the United States. These factors were emp1oyed to derive similar projections for injuries and fatalities associated with each of the FEMP remedial alternatives. The detailed short-term risk assessment results presented in Appendix G of the FS Report were subjected to the review and approval of the EPA and the review of OEPA.

Storer. G. I also heard rumors, I haven't been able to trace down the facts yet, about shifting the disposal cell southward farther into Crosby Township. I certainly would be opposed to this also.

Response:
The exact location of the on-property disposal facility has not been finalized. Various locations and sizes of the facility footprint have been depicted as the Operable Unit 2 and Operable Unit 5 remedies have been defined. The reasons for the various depictions of size and location are due to refinements to the estimated volume of material to be placed in the facility and to interpretation of additional geologic information collected this past winter and spring.

DOE submitted a Site Selection Report to EPA in late July for their review and approval. This report depicts an 800 x 4300-foot proposed footprint of the facility along the eastern boundary of the FEMP. The southern end of the proposed facility footprint would be approximately at the same latitude as the southern end of the existing parking lot. The Site Selection Report is available for public viewing at the PEIC on Route 128. After EPA comments are received and addressed, the Site Selection Report and thus the location of the disposal facility will be final. This is anticipated to occur later this summer or early fall.

Storer, G. 6 I think if a disposal cell is also located on-site, that security needs to be beefed up on-site. I know the security officers no longer carry arms, firearms. I think that would be a necessity due to the recent hostilities that we've all heard about in the news directed toward the federal government.

Response:
Please refer to response to Storer Comment 3.

Utah Dept. of Environmental Quality We continue to support a balanced process which includes shipment of wastes off-site to Envirocare and the NTS combined with some stabilization of wastes on-site. This balanced approach continues to support the perception that objective, technical-based decision making has been used in this process. This will allow the continues use of Envirocare for disposal of out of state remediation waste.

Response:
Comment acknowledged. EPA and DOE have applied the best scientific knowledge available to the decision to build an on-property disposal facility and will continue to do so throughout the remedial design/remedial action process. There is agreement that the combination of some on-site and some off-site disposal of wastes provides the best solution to the problem and helps ensure the ongoing availability of storage space.

Walther, J. Locating permanent storage of any type of toxic waste over or near the Great Miami Aquifer within several hundred feet of homes and a heavily traveled state road (#126) indicates blatant deliberate disregard for public health, environmental concerns, and long term cost effectiveness. What plastic liner will not fail due to stress cracking?

Response:
DOE acknowledges that no one wants contamination near where they live, but contaminated material already exists at the FEMP. The cleanup plan proposed for the FEMP will address this existing contamination and reduce the levels in the soil and groundwater to concentrations deemed to be health protective by federal environmental regulation.

The selected cleanup remedy at the FEMP has three objectives related to the Great Miami Aquifer; stop existing sources of contamination to the aquifer, restore the aquifer to maximum beneficial use in a reasonable time frame, and protect the aquifer from future contamination originating from the FEMP property. DOE recognizes that the aquifer is an important national and local resource and that the FEMP site has adversely impacted an

approximate 200-acre area of the aquifer system DOE also recognizes that if the FEMP is not cleaned up it poses continued contamination risk to the public and to the aquifer. DOE intends to eliminate this unacceptable risk by moving forward with a balanced remediation approach. This approach gets the most contaminated materials away from the aquifer (by shipping them off site), restores the aquifer, and limits the quantity and disposal configuration of the contaminated material remaining at the site. Completion of the selected remedy will also provide for more beneficial use of the FEMP property outside the disposal facility area.

Plans are to remove the materials that constitute about 97 percent of the radioactivity present at the FEMP for disposal at an off-site disposal facility. This will be accomplished via completion of the selected remedies for Operable Units 1, 2, 4, and 5 in conjunction with the anticipated Operable Unit 3 remedy and the current plans to remove the site legacy waste and uranium product.

What will remain for disposal at the FEMP in the engineered disposal facility will be about 3 percent of the current quantity of radioactivity present at the site. This 3 percent is distributed over an estimated 2.4 million cubic yards of soil and rubble at the site. This material will consist of lightly contaminated materials; specifically Operable Unit 5 soil, Operable Unit 2 material, and Operable Unit 4 construction rubble. While the remedy for Operable Unit 3 has not been finalized, rubble from this operable unit is also being considered for on-property disposal. All material will have to pass stringent waste acceptance criteria before being placed in the on-property disposal facility. These waste acceptance criteria were conservatively developed for the long-term protection of the public and the Great Miami Aquifer.

Walther, J. (Contd.)
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Several different options were considered for the less contaminated material before the excavation and on-property disposal option was selected. Use of caps, in-place containment, off-site disposal, and soil washing were all considered but the risks and costs were judged to be unacceptable. The decision as to what less contaminated material would remain on property was developed with input from the Fernald Citizens Task Force and the public through numerous round tables and open forums. Waste acceptance criteria for the less contaminated material were developed for the engineered disposal facility to help ensure protection of the aquifer. Only material that falls below the contamination level of the waste acceptance criteria will be disposed of in the engineered disposal facility: Material that does not meet the criteria will have to be either treated or shipped off site.

The waste acceptance criteria consider the hydrogeologic environment of the site and the protective properties of the engineered disposal facility. Soil, for instance, would be excavated down to the proposed cleanup level of 80 parts per million total uranium outside the former production area of the FEMP and 20 parts per million within the former production area. Current estimates indicate that placing all of the lightly contaminated soil together in the disposal facility will produce an average concentration of about 100 parts per million of uranium in the facility. This average concentration is one-tenth of the waste acceptance criteria for disposal in the on-property disposal facility, a tenfold safety factor. It should be noted that sophisticated computer model simulations used to derive the waste acceptance criteria were completed assuming that there was no active maintenance of the facility and that the synthetic barriers present in the facility (e.g., high-density polyethylene membranes) were not functioning. These simulations indicate that even under these extreme conditions, the facility would still be protective of the aquifer over the full 200- to 1000-year performance period envisioned by federal regulations.

The long-term cost effectiveness of the selected Operable Unit 5 remedy was evaluated against other alternatives in the FS detailed evaluation of alternatives. Comprehensive cost estimating in this evaluation indicated that even with the inclusion of conservative long-term monitoring and maintenance costs of the disposal facility, it was still much more cost effective to dispose of some material on property rather than ship a the material off site.

Walther, J. Unbelievable that any scientifically knowledgeable honest person would want to be even remotely associated with such an ill conceived short-sighted proposal!

Response:
Statement acknowledged.

Walther, J. What a waste of time and money not to do the job correctly the first time around to ship all toxic material offsite to an adequately buffered safe area so that if something does go wrong (as is sure to happen), public health and environmental damage due to toxic waste migration will be minimized.

Response:
As noted above, the DOE, EPA, and OEPA believe that the current balanced approach to on-property and off-site disposal is the best option. The on-property disposal facility is being designed and will be built with the primary objectives of short-term and long-term protection of public health and safety and the long-term protection of the Great Miami Aquifer.

<IMG SRC 0596312J4>

Gary Stegner
Public Information Officer
U.S. Department of Energy, Fernald Area Office
PO Box 538705
Cincinnati, OH 45253-9985

Dear Mr. Stegner:

In this letter, I am submitting formal comments on the Proposed Plan for Operable Unit 5. Some of the critical comments are directed at all parties, the Department of Energy and the regulatory agencies. I want to say at the outset that a good faith effort has been made by all parties. Having said that, I also must say that this project is large enough and important enough to do it the way a unique project should be done; it is not adequate or acceptable to apply rules that may conflict with each other and have varying degrees of scientific foundation to conditions at Fernald. It is only possible to get a high degree of remediation and protection of public health and the environment if all factors are taken into account simultaneously, acknowledging that tradeoffs are necessary in one area in order to increase protectiveness in another area.

This takes me to the heart of the argument. One way of thinking about OU5 is that is what is left after the other operable units have been remediated. The material remaining in OU5 is generally very low in uranium concentration. There are a few, but only a few, exceptions to this statement. Moreover, the amount of material which has higher concentrations is very small, in the order of a few hundred thousand cubic yards rather than a couple million cubic yards. The areas that have the higher levels of uranium--in OU1-4--also are the areas more likely to have the more soluble compounds of uranium. The remaining parts of OU5, which have the lowest levels of uranium, and account for the largest part of the material to be placed in the on-site disposal cell, are more likely to have the less soluble compounds of uranium.

A major part of the proposed remedy is to excavate material that has uranium in concentrations higher than those which would result in either unacceptable levels of uranium at the surface for the intended uses, or that would contaminate the Great Miami Aquifer. This material would then be placed in an on-site disposal cell. While I certainly support the on-site disposal cell, I strongly oppose moving so much material into it. The reasons for my opposition are several-fold.

First, an inappropriate standard is being applied to the levels necessary to assure a safe drinking water supply in the Great Miami Aquifer (the figure proposed in the draft rule under the Safe Drinking Water Act). At a minimum, the higher figure in the final rule issued under the Uranium Mill Tailings Radiation Control Act should be applied. This change alone would result in significantly less material being moved to the disposal cell. Because there is some reason to believe the final rule under the Safe Drinking Water Act will have MCLs for uranium even higher than those under UMTRCA, no decision should be made that locks in the unnecessarily low values for which the current plan has been developed.

Second, I think it is a mistake to assume that the uranium compounds which are now soluble will remain soluble for an extended period of time. They inevitably will be transformed into less soluble compounds, with attendant smaller effects on the Great Miami Aquifer.

Third, a balancing of risk needs to be done between protection of the aquifer and airborne pollutants that would be generated under the current plan. A large residential subdivision lies just off-site, downwind from the site, directly in the path which would be taken by these airborne pollutants during construction. Even if there were no uranium or other contaminants in the surface soils which are to be moved to the disposal cell, the risks to human health are unacceptably high compared to the almost negligible risk of slightly elevated levels in the aquifer. The human population in this area should not be subjected to this burden and this risk. To date, the presence of this subdivision has been barely acknowledged. For an activity that will take place over several years, it is hard to imagine that any activity at the site would be more detrimental than these airborne particles.

Fourth, it is difficult for me to see how we can, in good conscience, propose a solution that makes such a small contribution to risk reduction at such an enormous cost. The arguments I have made above would lead to moving a much smaller amount of soil into the disposal cell than the recommended solution. The resulting savings have been estimated by DOE/FERMCO to be in the order of several hundred million dollars.

I urge that, in the construction of the lining system, more attention be given to preventing downward migration of water to the underlying aquifer. This can be done

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with a thicker layer of sand and gravel, sloped to the edges of the cell. It should not be done by relying on a synthetic liner. The synthetic liner is important in the early part of the disposal cell's life, but there is no reason to consider that the synthetic liner should function more than a couple decades.

I next wish to endorse several parts of the proposed plan. First is the on-site disposal cell. It would be very foolish to consider transporting this material to Utah or Nevada. Second is the removal of uranium from the Great Miami Aquifer by pumping and treating. I feel it will be found desirable to re-inject the treated water into the aquifer, thereby reducing costs and further flushing the aquifer. I regret this step was not undertaken earlier when it would have been possible to prevent some of the migration of uranium down-aquifer. The barrier wells are better than nothing, but the better results could have been obtained by pumping from locations farther up-aquifer, where contaminant levels are higher. Finally, I endorse the treatment of contaminated storm water runoff.

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Willeke, G. First, an inappropriate standard is being applied to the levels necessary to assure a safe drinking water supply in the Great Miami Aquifer (the figure proposed in the draft rule under the Safe Drinking Water Act). At a minimum, the higher figure in the final rule issued under the Uranium Mill Tailings Radiation Control Act should be applied. This change..."

Response:

DOE disagrees with the reviewer's comment that an inappropriate standard has been applied to the restoration of the Great Miami Aquifer; however, DOE agrees that the quantity of contaminated soil and material ultimately placed in the disposal facility as well as their associated costs and the costs for the restoration of the Great Miami Aquifer are very sensitive to the established final groundwater cleanup limits. Therefore, consistent with Section 300.430(e)(2)(i)(C) of the National Contingency Plan, the DOE has adopted the maximum contaminant levels under the Safe Drinking Water Act as relevant and appropriate requirements for the restoration of the Great Miami Aquifer. Lacking a final promulgated maximum, contaminant level for uranium, DOE adopted, as part of the selected remedy; the maximum, contaminant level proposed by EPA in July 1991 under the Safe Drinking Water Act for uranium, of 20 parts per billion as the final remediation level for restoration of the aquifer. This proposed standard was adopted as a "To Be Considered" requirement to the selected remedy.

However, the DOE recognizes, in its role as the steward of public funds, that funds should only be committed to remedial activities which yield a commensurate environmental or human health-related benefit. As such, the DOE must evaluate the technical and economic implications of pursuing adoption of the final maximum contaminant level for uranium, once it is promulgated by EPA. Such a technical and economic evaluation will be warranted regardless of whether the final maximum contaminant level for uranium. represents a higher or lower concentration-based level than the proposed 20 parts per billion standard. In the event DOE considers it appropriate to pursue a change to the final remediation level for uranium in groundwater identified in this decision document, DOE will initiate such a change in a manner consistent with CERCLA, the National Contingency Plan and the terms of the Amended Consent Agreement.

Section 9 of this ROD adopts the proposed maximum contaminant level of 20 parts per billion for total uranium as the final remediation level for affected regions of the Great Miami Aquifer, with the caveat that once the final maximum contaminant level for uranium is promulgated by EPA, a technical and economic evaluation of the final maximum contaminant level will be performed. Based on this evaluation, the DOE will decide whether to initiate a change to the final remediation level for uranium in groundwater.

Willeke, G. "Second, I think it is a mistake to assume that the uranium compounds which are
2 now soluble will renutin soluble for an extended period of time. They inevitably will be transformed into less soluble compounds, with attendant smaller effects on the Great Miami Aquifer."

Response:

Under static or nondynamic conditions, it is true that uranium compounds in soil would gradually transform into less soluble uranium compounds, although the physical/chemical process would probably take decades before an observable decrease in the uranium solubility could be seen. However, certain physical processes such as surface water runoff-induced conduits, occur in much shorter time periods, on the order of weeks, resulting in the uranium compounds reaching the Great Miami Aquifer and potential receptors before any solubility changes can occur. An example of this occurs with the surface water runoff from the eastern portion of the FEMP, the area cast of the north access road, which drains to the storm sewer outfall ditch and ultimately to Paddys Run, both of which provide direct conduits for the uranium compounds to

the Great Miami Aquifer. Additionally, it is important to point out that the disposal facility will isolate this uranium-contaminated soil and material thereby providing the optimal conditions by which the uranium compounds can become less soluble before they have any chance of impacting the Great Miami Aquifer.

Willeke, G. 3 "Third, a balancing of risk needs to be done between protection of the aquifer and airborne pollutants that would be generated under the current plan. A large residential subdivision lies just off-site, downwind from the site...."

Response:

Appendix G to the Operable Unit 5 FS Report presents the results of an assessment of the short-term risks associated with the implementation of each of the remedial alternatives considered. This short-term risk assessment evaluated the potential carcinogenic, noncarcinogenic and mechanical risks to a series of hypothetical receptors including remediation workers, near-property residents, and the public along the transportation route. In the evaluation of near-property residents, the assessment evaluated the potential carcinogenic and noncarcinogenic risks associated with potential inhalation of dust resuspended during site excavation, on-property transport, soil staging and disposal activities. The short-term risk assessment was performed consistent with the EPA Risk Assessment Guidance for Superfund, Parts A and C.

The findings of the short-term risk assessment for the selected alternative (3A) indicated that the projected carcinogenic risk to the reasonably maximally exposed near-property resident due to the potential inhalation of dust particles generated during Operable Unit 5 cleanup activities is 3.4 x 10-7. This carcinogenic risk represents the sum of the projected risk from both the radiological and chemical carcinogens potentially present in the resuspended dust particles. The short-term risk assessment estimated that the projected noncarcinogenic risk to the same receptor from the implementation of the selected remedy was less than a hazard index of 0.01. These projected risks are based upon a maximally exposed hypothetical receptor located immediately adjacent to the FEMP property boundary for the entire duration of the FEMP cleanup process. The projected risk to a near-property receptor located at any other position would be expected to be less than these projections. Additionally, the application of mitigative measures during soil excavation, transport and disposal activities to reduce fugitive dust emissions would reduce these projected risks. These risk estimates are almost one order of magnitude less than the permissible risk range defined by the National Contingency Plan of 1 x 10-4 to 1 x 10-6 and less than a hazard index of 1. These projected short-term risks are over 3 orders of magnitude less than the projected carcinogenic risks to a potential future off-property user of groundwater under an alternative which does not remove soil presenting a cross-media impact to the Great Miami Aquifer.

DOE considers it a prudent measure to remove the soil that presents a long-term threat to the underlying aquifer. DOE considers that the selected remedy provides the proper balance of minimizing short-term impacts to the public and workers with the need to ensure the long-term performance of the remedy.

Willeke, G. 4 Fourth, it is difficult for me to see how we can, in good conscience, propose a solution that makes such a small contribution to risk reduction at such an enormous cost...

Response:

A reduction in the volume of soil that is placed in the disposal facility will reduce costs. However, on the basis of the responses to the preceding comments, the suggestions

made cannot be used to reduce the volume of soil to be placed in the facility beyond what is currently projected. First, the Uranium Mill Tailings Radiation Control Act standard cannot be used as the basis for the final remediation level for the Great Miami Aquifer because such a remediation level is not acceptable to EPA and OEPA. As noted above, DOE will consider adoption of the final maximum contaminant level for uranium, when promulgated, as the final remediation level for uranium. Second, as explained above, it is necessary to assume that some uranium will be in a soluble form, because of the potential for uranium to reach groundwater relatively quickly by way of Paddys Run. Finally, engineering controls and monitoring will be used to ensure that no significant releases of contaminants and no significant impacts occur during remediation. The short-term risks have been evaluated, including those to the off-property public during remediation, and are considered to be acceptable.

The risk-based remedial alternative evaluations in the Operable Unit 5 FS Report show that the greatest risk reduction afforded through the completion of the Operable Unit 5 remedial activities would be realized through the elimination of the cross-media impacts associated with the leaching of uranium compounds from the surface soil to the Great Miami Aquifer. Without the elimination of the cross-media impacts the projected incremental lifetime cancer risk to a hypothetical groundwater user at the eastern fence line has been estimated to be approximately 2 x 10-3 within the next 100 years; whereas, the projected carcinogenic risk associated with the excavation and placement of contaminated soil in the on-property engineered disposal facility has been estimated to be approximately 3.4 x 10-7.

Willeke., G. I urge that, in the construction of the lining system, more attention be given to preventing downward migration of water to the underlying aquifer. This can be done with a thicker layer of sand and gravel, sloped to the edges of the facility. It should not be done by relying on a synthetic liner. The synthetic liner is important in the early part of the disposal facility's life, but there is no reason to consider that the synthetic liner should function more than a couple decades.

Response:
The design of the engineered disposal facility is being addressed by the remedial design activities for Operable Unit 2. A major aspect of the design of the facility will be to minimize the migration of water into the facility and ultimately into the underlying aquifer.

Willeke, G. I next wish to endorse ... the on-site disposal facility. It would be very foolish to consider transporting this material to Utah or Nevada.

Response
Statement acknowledged. The selected remedy for Operable Unit 5 is consistent with the "balanced approach" whereby more heavily contaminated materials will be shipped for off-site disposal, while the large volume of materials exhibiting low concentrations of contaminants will remain in the on-property engineered disposal facility.

Willeke, G. I endorse ... the removal of uranium from the Great Miami Aquifer by pumping
7 and treating. I feel it will be found desirable to re-inject the treated water into the aquifer, thereby reducing costs and further flushing the aquifer. I regret this step was not undertaken earlier when it would have been possible to prevent some of the migration of uranium down-aquifer. The barrier wells are better than nothing, but the better results could have been obtained by pumping from locations farther up-aquifer, where contaminant levels are higher. Finally, I endorse the treatment of contaminated storm water runoff.

Response:
Comment acknowledged. As identified in the Proposed Plan, the FEMP is presently

evaluating the potential application of reinjection techniques to the restoration of the Great Miami Aquifer.

Regarding the need to pump from locations farther upgradient in the aquifer from the present South Plume recovery wells, an analyses of more optimal well locations is presently underway. The more optimal groundwater extraction well configuration for the South Plume would be implemented as part of the remedial design and remedial action phase.

Yocum, E. 1 Alternative 3A is acceptable under certain conditions as listed.

Response:
Comment acknowledged.

Yocum, E. 2 Place at least a three hundred foot Buffer Zone around the entire disposal cell. Add a ten ft. chain link fence skirting the Buffer Zone. This is to protect the trespasser.

Response:
Current State of Ohio siting requirements for newly constructed solid waste disposal facilities, which have been adopted as design requirements for the FEMP on-property disposal facility, require a minimum, 300-foot buffer from disposed waste to the nearest property line. DOE will incorporate this requirement into the siting of the on-property disposal facility.

Regarding the 10-foot chain link fence, the intent of this fence is to protect the trespasser from the disposal facility. DOE will consider such a fence or other methods (i.e., natural tree barriers, etc.), to provide the needed protection and demarcation of the disposal facility area. Design drawings indicating the proposed siting and configuration of the disposal facility will be provided to the public for review during the remedial design process.

Yocum, E. 3 NO off-site waste for disposal at Fernald.
- NO long term storage of off-site waste on Fernald site.

Response:
The DOE concurs with the comment, and has no intention of using the disposal facility associated with the Operable Unit 5 remedy to address wastes generated from off-site locations. Additionally, the DOE has no intention of using existing or newly constructed storage facilities located at the FEMP for the long-term storage of wastes generated from off-site locations. Specifically excluded from this prohibition are laboratory wastes generated at off-site facilities resulting directly from the chemical, radiological or engineering analysis of FEMP waste materials/contaminated media or generated during the conduct of treatability or demonstration type studies on FEMP waste materials/contaminated media. Such analyses and studies are typically performed as an integral part of implementing a selected remedy at a cleanup site.

Yocum, E. 4 Future ownership of Fernald site should remain in the hands of the Federal government.

Response:
The comment raises the need to properly align the necessary institutional control provisions for the FEMP with the future land use for the facility to ensure the continued protection of human health. DOE agrees with the need for this alignment. It is not the intent of DOE to attempt to establish a final future land use for the FEMP through this decision document. DOE does recognize that the final remediation levels identified in Section 9.0 of this ROD do

establish the permissible concentrations of contaminants which could remain at the site following completion of remedial actions. These remaining concentrations of contaminants will present a potential for exposure to future users of the FEMP.

The Fernald Citizens Task Force issued recommendations regarding future use of the Fernald property in May of 1995, recommending that the area of the FEMP containing the disposal facility and associated buffer zone remain under the continued ownership of the federal government. Additionally, the Task Force recommended that the remaining portions of the FEMP property be made available for the uses that are the most beneficial to the surrounding communities. While the Task Force recommended prohibiting any sort of agricultural or residential uses of the remaining portions of the FEMP property (outside the disposal facility area), the Task Force encouraged DOE to consult with local communities to establish their preferences for future use and ownership of these areas of the site. Consistent with this recommendation, DOE does not consider it prudent to insert enforceable provisions within this ROD to provide for the continued federal ownership of the entire FEMP property.

Additionally, DOE considers that final, enforceable institutional control measures for postremedial conditions at the FEMP should be established based upon an analysis of the actual residual concentrations as measured in site soil and groundwater following the completion of remedial actions; the measured concentrations and spatial distribution may differ from FS projections. This difference in estimated versus measured concentrations could have a significant impact on the required institutional controls necessary to maintain continued protectiveness. In this ROD, DOE has elected to define that institutional controls are a necessary component of the remedy to ensure continued protectiveness, but that the specific institutional control provisions necessary to be applied to postremedial site conditions will be defined during remedial design. The institutional control provisions defined during remedial design may be modified during the remedial action phase to accommodate the progressive findings of the field certification efforts. As with all remedial design and remedial action documentation, the plan for institutional controls at the FEMP, and any necessary modifications to it, will be subject to approval by EPA and review by OEPA.

The need for institutional controls during the conduct of remedial actions and the requirement for continued federal ownership of the disposal facility area on the FEMP have been specifically identified in this ROD. More specific detail on the actual implementation of these controls will be defined during remedial design.

Section 9 of this ROD provides a discussion on the role of institutional controls as a necessary component of the Operable Unit 5 remedy. The language of the ROD provides for the following institutional control provisions:

- Continuation of access controls at the FEMP during the period of remediation

- Provision of alternate water throughout the period of remediation to residences and industrial users whose current wells are located within an area of the aquifer which exhibit concentrations exceeding the final remediation levels for groundwater

- Continued federal ownership of the area comprising the disposal facility and associated buffer zones

- Implementation of dead restrictions or continued federal ownership of the remaining areas of the FEMP, as necessary to ensure the continued protection of

human health. If ownership of portions of the FEMP is transferred in the future, restrictions will be included in the deed, and proper notifications will be provided as required by CERCLA.

Yocum, E. NO characteristic hazardous waste disposed in cell. (flammable, toxic, corrosive).

Response:

DOE agrees with the technical issues raised by this comment concerning the disposal of RCRA hazardous waste (in particular, the disposal of RCRA characteristic waste that was raised by OEPA) in the on-property disposal facility. The Operable Unit 5 remedy proposed by DOE is fully protective of human health and the environment for all contaminants of concern that are present in the soil, including those contaminants that qualify (and require management) as regulated hazardous waste under RCRA. Specific waste acceptance criteria have been developed for the on-property disposal facility to ensure that all of the materials placed in the facility will be consistent with the need for a fully protective remedy. In particular, the waste acceptance criteria are intended to limit the placement in the facility of RCRA contaminants exhibiting toxicity to levels that are protective of the Great Miami Aquifer. (Along with the waste acceptance criteria developed for the materials exhibiting toxicity, DOE also proposes to prohibit the placement of materials which qualify as ignitable, corrosive, or reactive characteristic waste under RCRA). The approach used to develop limits for the placement of these RCRA contaminants in the facility is the same as that used to establish limits on radiological contaminants, such as uranium. The waste acceptance criteria developed for the RCRA contaminants satisfy the regulatory requirements of EPA's RCRA corrective action management unit rule, which has been adopted as an applicable or relevant and appropriate requirement for Operable Unit 5.

In addition to the requirement that a health-protective remedy be adopted for a site undergoing cleanup for RCRA-regulated substances (which is satisfied by the health-protective waste acceptance criteria and final remediation levels adopted for the Operable Unit 5 contaminated media), the corrective action management unit rule requires that the remedy satisfy a regulatory preference for methods that enhance the long-term effectiveness of the remedy through the application, as appropriate, of treatment technologies that reduce toxicity, mobility, or volume of wastes that will remain in place after site closure. In their comments on the Operable Unit 5 Proposed Plan, OEPA raised a stipulation requiring treatment of the Operable Unit 5 soil materials that qualify as RCRA characteristic hazardous waste (i.e., to remove the characteristic property associated with the material) before placement in the disposal facility. Recognizing that DOE has developed health-protective final remediation levels and waste acceptance criteria for all of the Operable Unit 5 contaminants of concern, OEPA's additional stipulation concerning the on-property disposal of characteristic waste has its origin in the need to satisfy, on a site-specific basis, the regulatory preference for remedies that employ treatment. As stated in the corrective action management unit rule, the decision to apply cost-effective treatment is a case-by-case decision that must consider waste- and site-specific factors. OEPA has designated the Operable Unit 5 soil that qualifies as RCRA characteristic waste as a site-specific quantity of material that offers a reasonable opportunity to apply additional treatment measures. Upon review of the site characterization data from the Operable Unit 5 remedial investigation coupled with historical process knowledge, six geographic areas of the FEMP have been identified where a reasonable potential exists for the presence of soil that qualifies as containing RCRA characteristic waste. DOE agrees that these six areas offer a reasonable, site-specific, and cost-effective opportunity to treat additional materials before on-property disposal, in the interest of enhancing the long-term, effectiveness of the remedy through treatment techniques. The remedy described in Section 9.0 of the ROD includes a commitment by DOE to search for and employ treatment as necessary for characteristic hazardous waste in soil that originates from within the six geographic areas.

Yocum, E.
5 (Contd.)

RCRA characteristic waste. DOE agrees that these six areas offer a reasonable, site- specific, and cost-effective opportunity to treat additional materials before on-property disposal, in the interest of enhancing the long-term effectiveness of the remedy through treatment techniques. The remedy described in Section 9.0 of the ROD includes a commitment by DOE to search for and employ treatment as necessary for characteristic hazardous waste in soil that originates from within the six geographic areas.

Yocum, E. Ground water should be remediated to drinking water standards of 20 ppb or less. (20 part per billion)

Response:

Consistent with Section 300.430(e)(2)(i)(C) of the National Contingency Plan, the DOE has adopted the maximum contaminant levels under the Safe Drinking Water Act as relevant and appropriate requirements to the restoration of the Great Miami Aquifer. Lacking a final promulgated maximum contaminant level for uranium, DOE adopted, as part of the selected remedy, the maximum contaminant level proposed by EPA in July 1991 under the Safe Drinking Water Act of 20 parts per billion as the final remediation level for restoration of the aquifer. This proposed standard was adopted as a "To Be Considered" requirement to the selected remedy.

The estimated costs for the restoration of the Great Miami Aquifer are, as would be expected, very sensitive to the established final groundwater cleanup goals (final remediation levels). While DOE is committed to fully restoring the aquifer to health-protective levels, DOE must do so in full recognition of its role as a steward of public funds. Within its stewardship role, the DOE must ensure that public funds are committed only to remedial activities which yield a commensurate environmental or human health-related benefit. As such, the DOE must evaluate the technical and economic implications of pursuing adoption of the final maximum contaminant level for uranium, once promulgated by EPA. Such a technical and economic evaluation will be warranted regardless of whether the final maximum contaminant level for uranium represents a higher or lower concentration-based limit than the proposed 20 parts per billion standard. In the event DOE considers it appropriate to pursue a change to the final remediation level for uranium in groundwater identified in this decision document, DOE will initiate such a change in a manner consistent with CERCLA, the National Contingency Plan and the terms of the Amended Consent Agreement. As done throughout the remedial investigation/ feasibility study decision malting process, the DOE will involve the public in any attempt to modify the final remedial goal for uranium in the Great Miami Aquifer from the 20 parts per billion value identified in Section 9 of this ROD.

Yocum, E. Real time monitoring.
7

Response:

DOE is committed to executing a responsible and technically defensible environmental monitoring program during the conduct of remedial actions at the FEMP. The specifics of this program will be defined during the remedial design phase. DOE will take into consideration commercially available and emerging monitoring techniques that could provide real-time or near real-time data on environmental releases.

Yocum, E. Continued to evaluate technologies that would increase protection to Residents and
8 community.

Response:

DOE agrees that the FEMP should continue to be open to new technologies that may

reduce the volume, toxicity or mobility of wastes being disposed of on site. Language expressing this commitment was provided in the Proposed Plan in the description of the preferred alternative, and has been incorporated in Section 9 of this ROD.

Yocum, E. NO dilution of waste to meet waste acceptance criteria. soils above 1030 to be shipped off site.

Response:
DOE agrees that an important consideration during the remedy implementation phase is to ensure that proper excavation control and waste management practices are applied to prevent the dilution of contaminated soil and increase the volume of soil requiring disposal. DOE has no intention of using dilution as a mechanism to attain the waste acceptance criteria for the disposal facility. DOE is compiling detailed procedures to guide site-wide excavation operations for contaminated soil. These procedures, which will be developed during the remedial design phase for Operable Unit 5, will clearly define intended excavation methods which will ensure against such dilution taking place.

The selected remedy provides that soil exceeding this waste acceptance criteria will be shipped for off-site disposal at an appropriate facility. DOE is committed to implementing this remedy as defined in this decision document. However, DOE must also bring to the commentor's attention that the availability of off-site disposal capacity cannot be assured over the 10- to 25-year cleanup program associated with Operable Unit 5. In the event off-size disposal capacity becomes unavailable or cost prohibitive at some point in the future, DOE considers it important that flexibility be maintained and indicated in the ROD so as to permit the application of treatment technologies to soil exceeding these acceptance criteria to convert them to a form suitable for on-property disposal. The application of such technologies would only occur following receipt of approval by EPA and input from OEPA.

Yocum, E. I do support the US EPA Waiver of siting criteria.
10

Response:
Comment acknowledged.

Yocum, E. In conclusion the Fernald site beyond the disposal cell should become a wet land a
11 sanctuary.

Response:
Comment acknowledged. As discussed in the response to the comment listed as Yocum 4, the DOE will be soliciting public input into the specific land use to be adopted for the areas outside the disposal facility. Land uses currently under consideration include the establishment of a wetland and/or a wildlife sanctuary.

Yocum, E. I believe in the balance approach for all DOE sites.
12

Response:
Comment acknowledged. The selected remedy is consistent with the "balanced approach whereby the smaller volume, more heavily contaminated process wastes are disposed of off property, while the larger volume, low concentration contaminated materials are placed into an on-property disposal facility.

A.4.0 REMEDIAL DESIGN/REMEDIAL ACTION CONCERNS

EPA guidance requires that the Responsiveness Summary highlight specific issues raised during the public comment period which pertain to the remedial design and remedial action process. The

following provides a summary of the concerns raised during the public comment period for Operable Unit 5. Individual responses to these concerns are provided in Section 3 of this appendix.

- The FEW should implement a responsible monitoring program during remedy implementation to detect airborne discharges and/or releases to surface water. This monitoring program should use real-time monitoring techniques to the extent possible. Data from the program should be provided to the State of Ohio and the public in a timely fashion. The DOE should continue to evaluate their monitoring program throughout remedy implementation to possibly identify and apply, if practical, new or improved methods of measurement.

- The FEW should develop action levels for the monitoring program to establish thresholds above which ongoing cleanup activities will be suspended until appropriate weather conditions occur or work controls are implemented.

- Pollution prevention techniques should be implemented during remedial actions to minimize or eliminate releases occurring during remedial actions.

- The principles of 'as low as reasonably achievable' should be considered during all remedial design efforts.

- Groundwater pumping activities should not be completed until stakeholder input is received.

- The FEW should continue its excellent community involvement program throughout the remedial design and remedial action process.

- The soil excavation techniques implemented at the FEW should minimize the potential for dilution of contaminated soil with clean material.

- The location of existing flood and perched water zones should be properly accommodated within the design process for the on-property disposal facility.

- The on-property disposal facility design process should consider the possible implications of the effects of tornados, earthquakes and acts of terrorism.

- The on-property disposal facility should consider the establishment of a minimum 300-foot buffer zone surrounding the facility. Public access to this buffer zone and the disposal facility should be limited through the construction of a perimeter fence or some other formidable barrier.

- Long-term environmental monitoring should be provided to assess the continued performance of the disposal facility. Clear responsibility should be established for the long-term monitoring and upkeep of the facility.

- The FEMP should continue to evaluate and apply, if deemed practical, new and emerging technologies which might provide improvements to the overall protectiveness or performance of the remedy by reducing the volume, mobility or toxicity of the Operable Unit 5 contaminated material.

- A consideration during the design process for the on-property disposal facility should

be
the possible economical retrieval of the contents.

- Stringent and continuous oversight should be provided by an independent expert during the design, construction and filling of on-property disposal facility.

- DOE should treat soil that contains RCRA characteristic properties to remove the characteristic before on-property disposal.

ATTACHMENT A.I

TRANSCRIPT OF THE OPERABLE UNIT 5 PUBLIC MEETING

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

OPERABLE UNIT 5

PUBLIC MEETING ON THE

FEASIBILITY STUDY & PROPOSED PLAN

May 23, 1995

The Plantation

PHONE (513) 381-3330 FAX (513) 381-3342

MR. STEGNER: Good evening and welcome. Thank you all for coming. My name is Gary Stegner, I work for Public Affairs for the Department of Energy for Fernald. Soon I'll be turning it over to Rob Jenke, our manager of Operable Unit 5 at the Department of Energy at Fernald.

If you haven't done so, I would urge you, everybody that has shown up tonight, to register at the door, at least before you leave this evening, and if you want to speak during the public comment period, the formal part of the evening, if you would just indicate that on the sign-in, that way we'll be sure to get you. It's not required that you do so, but we'll have an open mike, and that will give us a better idea of how to allocate our time tonight. I would appreciate if you do that, plus by signing in, you will be sure to get on the mailing list and get all the proceedings that happen tonight.

Also I want to tell you all there's a lot of handouts here this evening there in the back of the room that gives you a better explanation of Operable Unit 5 and our proposed plan for Operable

Unit 5, and I would urge you to pick that stuff up and take it home with you this evening also.

Let's talk a little bit about what we're going to do tonight. We have two hours scheduled. That should allow us plenty of time for questions and comments. If it doesn't, we'll stay here for as long as it takes. We know this is an important issue in the community and we want to make sure everybody gets their say. I want to make sure everybody realizes that you do not have to speak tonight to issue a formal comment on the Operable Unit 5 proposed plan. You can do it in writing, send it to me. The address and a response card are included with the proposed plan document, assembly document.

Again, this is a public hearing tonight. We have a court reporter here with us to transcribe the meeting. A copy of the transcript will be placed in the Public Environmental Information Center located on 128, very close to the site. Probably be there within a couple of weeks. Anyone who is interested in what's going on here can review that transcript.

Rob will speak for about 20 to 30

1 minutes tonight, give you kind of a review of
2 operable Unit 5. For some of you, this may be your
3 first exposure to a Fernald meeting. Normally
4 we're very casual, you can shout questions out
5 pretty much at any time. Tonight I would ask that
6 everyone, just for the sake of getting through this
7 initial presentation, to hold their questions until
8 the question and answer period. Prior to going
9 into the official public comment section this
10 evening, we will take questions and answers.
11 Obviously this is a complicated
12 issue, we would urge you guys to ask a lot of
13 questions. We have people up here very, very
14 capable of responding to I think most of the
15 questions you folks would have tonight.
16 Fernald is a complicated place, a lot
17 of issues going on around there, but tonight I'm
18 going to try to keep the evening focused on
19 Operable Unit 5. Again, for the sake of conserving
20 time and since this is a formal public hearing
21 tonight, I want to keep it as focused as we
22 possibly can. So if you would, keep your questions
23 and comments, at least in the meeting part, focused
24 on Operable Unit 5. If you have questions outside

the realm of this document, we'll be around during the break, we'll he around after the meeting to answer your questions. And again, we're only a phone call away.

When is the formal comment period over? 31st of May. So if you do not choose to speak tonight, you do not choose to hand any comments in tonight, you have until the 31st of May to send your comments in to me to get them into the formal record.

What I want to do now is turn the next part of the evening over to Rob Jenke. Following Rob we'll have some comments from our regulators, Ohio and US EPA's. Then we'll have the informal question and answer period. It shows it on here being 35 minutes. We can go longer than that if necessary, but again, we're here as long as you want us to be, and following that we'll take a 10-minute break. Then we'll go formal into the formal public hearing part of our evening. So, Rob.

MR. JENKE: Okay. Thanks a lot, Gary. I guess with that, I'll begin the presentation. I appreciate you all coming

tonight. As Gary said, this is the formal public meeting on the Operable Unit 5 Proposed Plan and Feasibility Study, and this presentation should take about 30 minutes.

Before I get into the presentation, I'd like to first start off with I guess a bit of thanks to the team sitting here at the table. I'm a relatively newcomer, as probably many of you know, to Operable Unit 5. Most of my time at the site with DOE has been spent in Operable Unit 3. I just came on board to Operable Unit 5 about nine months ago, I guess August of '94, and it's been, to be quite honest, a great learning experience. I think I've learned a lot, and I think each of the members of the team, both from FERMCO and the people that were in DOE Operable Unit 5 at the time, have been very helpful and I think supportive of that transition, so I would like to thank them. And I think a special thanks goes to Dennis and Mark who put in long hours on this project, and I think it's, this represents really a focal point to all that hard work. I would just like to thank them.

With that in mind, I would like to

1 jump into -- Can everybody hear me okay without
2 this microphone because if you don't mind I'm going
3 to pull this away. I guess to start off with why
4 we're here tonight. We're here to share with you
5 how we came about the decision, the remedy, the
6 proposed remedy, that is, for Operable Unit 5.
7 What we want to I guess convey is the options that
8 we looked at, the range~of options, the factors
9 that went into coming up with those range of
10 options, and the tradeoffs that we encountered
11 along the way. Ultimately what you'll find at the
12 end, those of you who have already read the
13 proposed plan, certainly it represents in many ways
14 a compromise. The purpose of tonight's meeting is
15 to go over that in basically summary form.
16 What we'd like to have in terms of
17 feedback is feedback in terms of how we look at the
18 process. Are there things that we left out,
19 considerations, technical considerations that we
20 didn't include in our analysis, assumptions that
21 maybe are invalid. Basically do you see any flaws
22 in our logic. With that in mind, a brief overview
23 of tonight's presentation.
24 I'm going to start off with a little

1 bit of a description of operable Unit 5, sort of a
2 background description, more focused on the way it
3 fits in with the other operable units in terms of
4 volumes cf waste, contaminated soils in terms of
5 OU-5, that's what we're talking about, and in terms
6 of levels of contamination that exist in Operable
7 Unit 5. Then I'll move on to -- That will be the
8 overview, the contamination or the RI of Operable
9 Unit 5. Then we will move to how we determine
10 cleanup levels in the operable unit, and then
11 finally the path forward for using those cleanup
12 levels.
3 Operable Unit S represents the soil
14 and groundwater media at the site. It essentially
15 the receiving end of all the past operations and
16 discharges. It's not a source operable unit,
17 meaning that we don't have a waste unit there we
18 have to remove and then treat and put back. We
19 basically have contaminated soil. So it's a little
20 different than Operable Unit 1, which is the pits,
21 or operable Unit 4, which represents the silos.
22 Specifically Operable Unit 5
23 represents the soil, the groundwater, perched
24 water, surface water, sediment, flora and fauna. I

1 think most of you are familiar with this. It's
2 been around the process for a while, but just to go
3 over it briefly.
4 In terms of FEMP waste volumes, what
5 does Operable Unit 5 mean to the site as a whole?
6 It represents about 60 percent of the FEMP waste in
7 terms of contaminated waste. Operable Unit 3,
8 which is roughly 6.6 percent of the waste by
9 volume, this slide is a little deceiving in that
10 Operable Unit 3, the pink area, is 6.6 percent, but
11 then we have uranium and thorium residues, which
12 are roughly 1.5 percent. Together we have about 8
13 percent at Operable Unit 3. In contrast, Operable
14 Unit 1 is approximately 20 percent by volume of
15 representing the waste at the site. This is
16 important because in terms of total radioactivity,
17 Operable Unit 5 represents the smallest
18 contribution, especially when we balance that off
19 the total volumes. Roughly about 2 percent.
20 Operable Unit 2 isn't shown, basically because it
21 represents roughly .2 percent, so it would be
22 basically incremental to the Operable Unit 5 waste
23 volume, actually radioactivity increment.
24 As you can see, the Operable Unit 3

1 materials in terms of uranium product, the legacy
2 waste and the thorium waste represents around 50
3 percent of the total radioactivity but only about
4 8 percent of the volume.
5 In terms of Records of Decisions and
6 remedies that we've basically established so far,
7 there's been four Records of Decisions that are
8 either in process, I'm not completely sure of
9 Operable Unit 2's status, but I believe we have
10 four signed Records of Decision.
11 We have a Record of Decision for
12 Operable Unit 1, which is the waste pits, to
13 excavate and ship to Envirocare in Utah.
14 For Operable Unit 2, that's the
15 soils, soils in the South Field area and connected
16 with the flyash piles and the sewage sanitary
17 landfill, that material will be excavated and
18 disposed of on property.
19 Operable Unit 3, although disposition
20 decision hasn't been determined, the decision to
21 bring all the buildings down has, and we have an
22 Interim Record of Decision on that.
23 Operable Unit 4, which is the K-65
24 silos, the high radium bearing waste, that will be

vitrified and shipped to the Nevada Test Site.

Again, the purpose of tonight's discussion is Operable Unit 5. In terms of that total radioactivity, where is that on the site or around the site? This aerial isopleth basically outlines the level of uranium contamination around the site at a concentration of between 5 and 20 ppm, parts per million of uranium. As you can see, at those levels it extends off property to some degree, which resulted from the years of process operations and discharges from the roughly I guess two to three -- well, I guess nine process plants.

In terms of on property contamination, uranium contamination, the levels range between the southern portion of the property 5 to 10 parts per million on average, there's hot areas -- I forgot my pointer, I apologize, but down in the South Field areas there's concentrations that are fairly high, but on average the concentration is 5 to 10. The waste pit area, those areas that are anywhere from a hundred to a thousand, but on average around 10 to 20. The production area is roughly a hundred to 10,000 in places.

Formerly we used to have some contamination out near the incinerator that was fairly high, in the order of 25,000 parts per million. That soil has since been removed. So in terms of peripheral area of the site, we're basically down around the 5 to 10 or the 10 to 20 reading.

In terms of groundwater contamination, depending on where you're at, there's various plumes, we have the 3 to 20 plume right here, represents the largest size, that's 3 parts per billion, less than 20 parts per billion. In terms of 20 parts per billion plume, which is in green, the largest section of that is in the South Field area extending off-site. Within the production area of Plant 6 we have a plume that is greater than 20. I think in terms of maximum concentrations in the South Field we're up around 300 I believe.

MR. CARR: Off-site-300, on-site about a thousand.

MR. JENKE: On-site about a thousand.

Given these levels of contamination

in the soil and groundwater, the goal, the objective of operable Unit 5 was to determine or develop cleanup levels for these media, essentially surface soils and groundwater. The issue from the, I guess from the start was given that we have large quantities of soil that have concentrations of uranium in it anywhere from 5 to 10,000 parts per million on average across the site, we're probably looking at a hundred parts per million, how do we address that. We know background for uranium is around 4 parts per million in soil, there aren't any action levels in the regulations, EPA or state regulations that we can adopt and say this is what we're going to clean up the soils to at Fernald. We're basically given the process we have to follow under CERCLA and NCP and we have to develop cleanup levels. A guiding requirement under developing those cleanup levels is to make sure we remediate to health-protective levels for both the soil and the groundwater.

In terms of the groundwater, we knew from the beginning that our really only option is to, one, restore it to its maximum beneficial use and, two, protect it in the future from the

1 continued or possible continued migration of
2 contaminants from the surface soil, those that are
3 there now or those that we may leave in the future
4 after we determine the cleanup level to make sure
5 we don't recontaminate the groundwater. Those are
6 basically our guiding principles.
7 With that in mind, we have basically
8 two constraints or two needs to allow us to develop
9 a framework for developing these cleanup levels.
10 One is the need to address cross-media impacts,
11 which I just touched on, which is the process by
12 which contaminants, whether they be uranium,
13 radium, thorium, or other contaminants, migrate
14 through the surface soil and contaminate the
15 groundwater. It's a possible or potential exposure
16 pathway in the future and in the present, and
17 whatever cleanup level you achieve for or develop
18 for soils, that number has to be protected for the
19 groundwater in the future.
20 The other need or requirement that
21 allow us to set up this framework is a need to
22 develop receptor-specific exposure levels. Given
23 that we don't have a number that we can look up in
24 the regulations, whether it be EPA regulations or

state regulations or DOE orders, or NRC regulations to say that we need to clean up uranium to this concentration. Instead EPA has developed a process developing cleanup levels, so the site specific process. The reason for that is, depending on the level of use at the facility, ultimate use in the future, the cleanup levels will vary. So the process really calls for you to develop this receptor-specific exposure scenario framework.

To do that we developed or postulated four different receptors: A residential farming receptor, an industrial/commercial worker receptor, similar to the workers that exist who are working on the site right now; a developed parkland receptor, developed parkland would be a situation where you had, you cleared the site off and you had picnic tables, you had a park, restroom facilities, you had possibly ball parks and swing sets and things like that; or an undeveloped parkland, which is basically green space with possibly hiking trails or a bike trail, maybe an extension of the Great Miami bike trail.

Given those receptors, we had to develop ultimately land uses to go along with

them. Before we developed land uses, or I guess in concert with developing land uses, we had a, we have a rule book that we have to follow for developing the cleanup levels, sort of a check point on the cleanup levels. A framework for determining whether levels are too high or too low, really actually for the most part too high. There's three parts to that rule book. The NCP is certainly the overall guiding process which establishes a risk range 10 to the minus 6 to 10 to the minus 4, which is an incremental lifetime cancer risk that someone could get from being exposed to the contaminants at the site. That's the risk range that we have to work within in developing the cleanup levels.

Another criterion or rule book, component of the rule book which represents a lot of different standards and regulations and guidelines is what's called ARARs, which are applicable, relevant, and appropriate requirements. The ARARs really, in some cases they represent MCL's or specific cleanup levels, MCL's or maximum contaminant levels for a specific contaminant. In some cases they are specific for a

contaminant. For uranium they're not, at least at the soils. And for other actions they represent standards or processes that you have to follow to implement the action. So there's a large number of ARARs that have to be factored into the decision.

The last component of our rule book, which is really in part included under the risk range or the process for using the risk range as well as ARARs, is to evaluate or consider ecological effects. Ultimately the cleanup levels that we choose for the soil and groundwater have to be protective of ecological receptors that live in and around the site and may ultimately be exposed to contaminants.

Given that rule book, the question I guess that certainly comes up in one's mind is how do you go from that rule book and these exposure scenarios and receptors to needing to know what the future land use is. Quite simply, cleanup levels vary with respect to future land use. As the level of activity on the site, the future use of the site goes up, cleanup levels go down. The reason for that is as the level of activity, i.e., something like farming occurs, you have a lot more exposure

to the contaminant. The farmer is out plowing the fields, he's planting crops, there's just a lot more time outdoors in which to gain exposure. As that exposure goes up, his corresponding risk to contaminants goes up; therefore, cleanup levels, acceptable cleanup levels go down.

On the opposite end is, would probably be a trespasser receptor, where a trespasser being 'an individual that maybe crosses or transverses the site a few times a year and has very minimal exposure. If you-take those two receptors, it essentially establishes the range or the magnitude, the difference between cleanup levels within our land uses.

More specifically in terms of land uses, we looked at four land use objectives, the first one being unrestricted use, which would correspond to the residential farmer. That's basically we clean the soil up to levels that would permit an individual to come on and farm the land. The fences are torn down, the buildings and everything are taken away, and basically the site is just released, no strings attached.

The next, how should I say, level of

decreased activity would he land use objective number two, where we released the outer peripheral area of the site and maintain the center portion of the site for a no access region. In that area we evaluated a couple options. We evaluated on-site disposal in a couple options or a couple ways or manners in that area.

The third land use objective we looked at was essentially a restricted use of the outer portion of the site and then again no access in the center. So the difference between two and three is this would be a farmer and this would be some type of restricted use, such as a developed or undeveloped park or commercial/industrial scenario or a trespasser, something along those lines.

Four would essentially be a fence around the entire property, which would, of course, correspond to the highest cleanup levels, the least amount of remediation, at least of the soils.

In terms of, jumping back to groundwater, in terms of the groundwater, I think we knew right away that, I think even the community and certainly EPA and Ohio, US EPA and Ohio EPA I think recognized right away there's not a lot of

1 option in the groundwater. As you can see from the
2 earlier viewgraph on uranium contamination in the
3 aquifer, it's a very large plume. The Great Miami
4 Aquifer is rather large, as most of you, if not all
5 of you, realize or know. The options for restoring
6 or remediating the aquifer are somewhat limited.
7 You basically have to pump and treat it.
8 So up front we recognize that first
9 we had to restore the aquifer to maximum beneficial
10 use. Then we had to decide what level are we going
11 to remediate the aquifer, are we going to remediate
12 it to a risk space level of 1 times 10 to the minus
13 4 or one times 10 to the minus 5 or one times 10 to
14 the minus 6. As you I guess decrease or increase
15 your level of remediation to achieve levels such as
16 10 to the minus 6, the amount of pumping and
17 treatment that you have to do go up considerably.
18 In addition to looking at risk, we
19 looked at the use of maximum contaminant levels.
20 For uranium we only have proposed numbers. These
21 proposed numbers have been on the books for some
22 time. That's all we had and that's what we used.
23 Proposed MCL, maximum contaminant level for
24 uranium. We decided based on the work that EPA had

done on coming up with that proposed number, as well as where that proposed MCL fell within our risk assessment process, we did look at risk space c1eanup levels for the groundwater, we decided to go with the MCL. That established -- by coming up with 20, that established the contour of our plumes, which is why that graph earlier showed 20. It also established to a great extent how much we have to pump and where the wells would be located.

In any event, the really only option for the groundwater is to pump and treat.

In terms of soil, at least conceptually one would think there's a lot more options. You could somehow put some type of cap on it, in-place containment, that was examined. You could maybe theoretically, one would think you could maybe treat the soils in place, you could treat VOC's, volatile organic compounds, in place by stripping them, air stripping them or using some type of biological agents to break them down. Maybe something could be done with uranium. Unfortunately, there are no more options there. You can't eliminate radioactivity, you can't break it down. You can only move it around. So that

1 really didn't prove very feasible.

2 We looked into washing, and those of

3 you who have been involved in the process, there's

4 a lot of detail on it, just how hard we looked at

5 soil washing, basically in the form or the process

6 of removing the soil, running it through a process,

7 multi-step process to wash uranium from it with

8 using strong or weak acids and water to basically

9 rinse it from the various fractions in which it

10 resides within the soil, the clays, the silts, the

11 sand. The problem with soil washing is we found

12 it's very expensive. I believe the numbers are

13 roughly a factor of three greater. It doesn't

14 achieve the lowest cleanup level within the area of

15 the production area, so it's not -- one could say

16 it's not protected in terms of achieving all our

17 cleanup levels for uranium, and, three, we had

18 concerns with its implementability, given that we

19 have to start up this large process and we would

20 have to run approximately two million cubic yards

21 of soil through it. That raised a lot of concerns

22 with us in terms of the number of chemicals that we

23 would have to bring onto the site in order to run

24 the process, the length of time that it would take

do it. All of these point to soil washing as not being very viable.

The only option left, if you look at the top three in the feasibility study, the only option left was to excavate and dispose. Once we got to that point, we realized that with excavation disposition or disposal, the issue is really on-site or off-site. With that, we started looking at considerations for on-site and off-site ultimately, which became our remedy or our proposed remedy for soil, is it on-site or off-site. Well, we looked at, consulted with, and listened to the Task Force recommendations for on-site disposal, we've attended and conducted numerous public round tables, open forums with many of the members of the public on the issue of on and off-site disposal. We've had a lot of, as you can imagine, many of you realize, a lot of negative I guess feelings about on-site disposals. It wasn't something we certainly preferred, but, nevertheless, we have considered numerous people's input on the issue.

We also looked at the availability, the uncertainty of off-site disposal. Given that the action associated with Operable Unit 5 is going

to span probably 20 years, and the large part is due to length of time it is going to take to get the buildings down and out of the way in order to get to the production area soils. That's a long time frame in order to be sure or be, how shall I say, enthusiastic that we have disposal capacity there. There's concerns that have been expressed to us from the states of Nevada and Utah to us sending all of our stuff out there, as well as people along the routes. The cost of off-site disposal initially, given our cost numbers that we have today, are approximately twice the on-site disposal option, not quite twice. The cost over the long term were very unpredictable, uncertain.

Given those considerations, we basically came up with a proposed remedy which you'll see in the proposed plan. There's a number of components of the proposed remedy. This slide tries to I guess provide a summary of the more important ones. I believe the proposed remedy that's in your handout is, the language is slightly different than this one. This one was modified as of later this afternoon so it didn't get in the slides. We tried to convey a few more of the

factors.

2 Ultimately, as I indicated earlier,
3 our primary goal is the restoration of the Great
4 Miami Aquifer, first and foremost. In terms of
5 soils, we're going to excavate all contaminated
6 soils down to our cleanup level. It's discussed
7 under alternative 3A in the proposed plan. Those
8 soils will be deposited in an on-property
9 engineered disposal facility, those that meet the
10 waste acceptance criteria for an on-property
11 disposal facility. Soils that don't will have to
12 be either treated or shipped off-site.
13 We'll continue to look at
14 technologies and innovations over the long haul to
15 make sure this was the right decision. That's a
16 tough, that will be a tough process. It will
17 always have to be balanced of with protectiveness
18 and its implementability and its practicality.
19 And I guess to sum up the proposed
20 remedy, we're going to try to maximize the release
21 of the largest portion of the site for reuse.
22 What's outlined in the proposed plan under
23 alternative 3A is an undeveloped park scenario, but
24 within that alternative there's a range of cleanup

1 levels associated with other receptors.
2 Now, within the rule book once again,

3 the NCP allows us to go from 10 to the minus 6 to
4 10 to the minus 4, so essentially we, in terms of
5 the ultimate land use, we can move between those
6 receptors and still stay within the acceptable risk
7 range and modify the ultimate use it's agreed to or
8 desired I guess by the public down the road.
9 The proposed plan in our draft Record
10 of Decision when it's written up and sent into EPA
11 will not pick 'a particular land use. That wasn't
12 envisioned that that could be done at this time.
13 Back to on-site disposal, and this is
14 a slide that we put into our presentation just of
15 late because of the numerous, I guess all the
16 feedback we've gotten from the community on just
17 how unfavorable on-site disposal is. I guess I
18 wanted to touch on this a little bit because this
19 is real important. In terms of uranium, and I
20 mentioned this earlier, we take all the soils
21 across the site and we excavate them down to our
22 cleanup level, which under the proposed plan is 80
23 parts per million for uranium, and we take all
24 those soils together, we're going to have an

average concentration on a maximum end probably of 700 parts per million uranium. It's essentially 20 parts per million above our cleanup level. That is approximately one-tenth of the waste acceptance criteria for disposal in our on-property disposal cell, so essentially we have a tenfold safety factor there.

In terms of what's the purpose of the on-site engineered disposal facility, we've had a lot of comments on that in terms of how big the buffer area is going to be, where the fence is going to be located, how high the fence is going to be, all very good questions. They're questions that we're not answering in the proposed plan, we haven't answered, nor will they be answered in the ROD. It's a process we want to get as much feedback as we can as we go through design. They're issues that need to be worked out at that time

The important point that I want to make is the purpose of the engineered disposal facility isn't to keep one from being exposed to the contamination in there from air pathway or direct radiation pathway, although it will do that

1 certainly, it will make it off limits, it will be
2 monitored, there will be so many feet of cover on
3 top with a liner, there will be a fence around it.
4 The primary purpose for it is to protect the
5 aquifer, to protect the migration of the
6 contamination once you pile it all up in the soil
7 from migrating through the top of the soil and into
8 the aquifer and exceeding the MCL's.
9 With that in mind, what are the
10 concerns associated with off-site disposal. I
11 touched on some of these earlier when we were
12 talking about options of on and off-site disposal.
13 There were transportation risks and logistical
14 concerns associated with shipping this large a
15 quantity of soil across the country approximately
16 2,000 miles. There were uncertainties with the
17 availability of off-site capacity for this large a
18 quantity, given all the other things that are being
19 shipped from this site from the other operable
20 units. Once again, they represent by far the
21 magnitude of radioactivity at the site. There was
22 issues with the state acceptance on the receiving
23 end. And there are issues of cost. When we factor
24 all those factors in, that's how we got to the

proposed remedy of on-site disposal.

In terms of our path forward tonight, as Gary indicated earlier, the public comment period will end, it's scheduled to end May 31st unless a member of the public, the community would like to see it extended for some reason. If you do, tonight would be a good time to talk about that. We have received approval on the proposed plan for Operable Unit 5, which is being handed out and I guess was distributed at the beginning of the comment period on May 1st from US and Ohio.

So where we're at in the process right now is we're drafting up a Record of Decision, and we're planning, as long as the public comment period isn't extended, our plan is to submit that to EPA, US and Ohio, on July 2nd. What that will have in it is a more detailed description of the proposed remedy. It will have a more detailed description of the RI component, the remedial investigation component. It will basically be a formal document on the proposed plan that will ultimately establish the decision for Operable Unit 5.0

Attached to that document will be a

responsiveness summary, which will be formulated from all the public comments that we have received. There will be responses to those comments, and they will be attached in draft form and submitted to EPA for review and approval.

With that, I am done. I would like to at this time turn it back over to you, Gary.

MR. STEGNER: Thanks, Rob.

You see on the agenda the next item is comments by our regulators, so Jim Saric from Region 5, US EPA, if you would please lead it off.

MR. SARIC: How is everybody doing this evening, all right?

This remedy that has been proposed by DOE is one that's been a long time coming. We've worked a lot directly with Ohio EPA, with DOE, with the Fernald Citizens Task Force, and we worked through a lot of these issues, as Rob talked about, the soil washing and the different alternatives that were there. We spent a lot of time looking at earlier drafts, earlier revisions, the various remedies trying to figure out what is the best thing to do with this material, this large volume of material at this highly contaminated site that

we have here at Fernald.

When all was said and done, when we reviewed this document very critically and had lots of comments and had lots of meetings over our comments and what to do, we're very supportive of this remedy as it stands.

This remedy is part of a large scale strategy. It's a protective remedy that includes both basically off-site disposal of the most contaminated materials on-site and then on-site disposal of the much larger volume of materials that are lower level contamination that's there.

And the thing about this remedy, it's not limiting the land use I think here, but it actually provides some type of future vision to what the land use can be. As Rob said, it speaks for the undeveloped park, but there's other land uses that can come from this site if it so be it in the future, and that's not why we're here to make that decision on the ultimate land use, and I think it's the people in the community who will make those decisions ultimately what happens there.

And so I guess with that, you know, I think that we really encourage your comments here

tonight because they're a very important part of this remedy selection process. It is not complete, and we welcome all the comments that you have here.

If you have any questions tonight, I'll be glad to answer them, and I'll stick around to answer those. But certainly this is part of a large scale remedy of the site, and I sit back and think about -- I was involved in the site, I became involved in May of '91 was really when I got heavily involved, and this site has come a long way from the time which I think none of us really knew exactly what direction we were ultimately headed and we were studying the problem, studying the site and how many samples to take here or there, what are we going to do with this place. Ultimately I think we've moved forward towards cleanup and we have really tried to keep things rolling trying to clean this place up. I think we're moving towards that, we have direction, and certainly I'm very interested in everyone's input.

With that, I'm done. Gary.

MR. STEGNER: Thank you, Jim. Next we have Tom Schneider from Ohio EPA.

MR. SCHNEIDER: Good evening, glad you all could make it out tonight. It's quite evident that you're all committed to the public participation process because you drove around the barricades that say don't go this way. We all drove through it too because we don't know any other way to get here. We appreciate you being out, it's a good time to be involved in the public participation process at Fernald, and it is a time of moving forward and making decisions. It's the year of decisions; from about December of '94 and through December of this year we'll have made Records of Decisions for OU-4, OU-1, and OU-2 and 0U-5, so we'll have the site pretty much wrapped up as far as decisions and how we move forward from here from now to the end of the year. So now is the time to be involved. If you're going to be involved, this is when the most impact can be made. So your comments now are most timely and have a significant impact on how we move forward with the site.

With regard to OU-5, Ohio EPA supports the proposed or the preferred remedy. We think it's both protective and implementable, with

a lot of emphasis on implementable. Rob talked a little bit about potential problems with off-site disposal. We think it is important to take our aggressive move forward and try to get this site off the books so that we can choose the tough decisions so we can move forward, and that's the on-site alternative for the large volume lower contamination materials. So the State of Ohio supports the preferred alternative, we think it is going to be protective. It takes into account what's been referred to on a number of occasions as the balanced approach, and that's what's really the important thing here. We're looking at this as the site-wide perspective, not just one operable unit at a time. You really have to keep in mind the whole size of the whole project, and as well on a national perspective you have to keep in mind that there are other people out there who have back yards just like we do.

So, anyway, I just wanted to let you know that the State of Ohio supports it, and we really want your public comments and this is the document to do it on. Granted, this is the Reader's Digest version of the much larger FS that

has all the details in it, but we want to make sure you all have the opportunity, we put this nice little page on here so you can write your comment out, and we will pay for the postage to get it back to us. Probably the easiest way that's ever been developed for you to make your comments. You don't even have to turn them in tonight or figure out how to address it.

Anyway, I look forward to your comments. Don't forget, the 31st is the last date to do that, and if you have any questions, you can chase me down after the meeting, my phone number is in the book. Thanks.

MR. STEGNER: Thank you, Tom.

I think now we'll move directly into the informal question and answer period. I think probably most of you are very familiar with what we're doing here at Operable Unit 5. If you still have questions, details you want clarified, main issues you want painted up more clearly, now is the time to do that, and we will proceed as -- you can use the microphone, you can holler them out, please if you do, ask make sure that you're loud enough so that the court reporter can get the questions. Now

if you want to use the microphone, if you just want to holler them out, I would suggest somebody could start off with the first question.

MR. JENKE: Can I interject just one thing before we get started, just so -- I don't think I officially introduced all the panel. On my left is Kathy Nickel, she's with the Department of Energy at Fernald. We have Mark Jewett, who is with FERMCO. Dennis Carr is with FERMCO, and Bill Hertel is also with FERMCO. Between our panel here and Gary, I think we can answer your questions.

MR. STEGNER: Between the panel there, they can answer your questions I'm sure. Pam.

MS. DUNN: I just have a couple quick ones. We can fax comments in on Wednesday, can't we?

MR. STEGNER: Yes, you can.

MS. DUNN: How much time do we have after this before public meetings will start on the RDRA; I mean is there going to be a little bit of time where there won't be any meetings or are those meetings going to get started right away?

UNIDENTIFIED SPEAKER: Gary, aren't

you planning to have a meeting on the 13th?

MR. STEGNER: My sense is that I suspect we will start relatively soon, Pam. I think this is something the public has a great deal of interest in, the on-site disposal in particular. This is something we want to keep them apprised of exactly where we're headed. So I think you can probably count on public involvement fairly early and fairly often for the foreseeable future on this.

MR. JENKE: Johnny had a comment.

MR. REISING: We had a meeting a couple of months ago on the RD process. At that point in time we tried to explain that 60 days after finalization of the Record of Decision of OU-5, that is the signature by the agencies, that we're required to submit our work plan to the agencies. That RD work plan will have a schedule of subsequent deliverables as far as design packages, and then, as you know, we have a relatively well-defined process to inform you when these design packages are going to be submitted and an opportunity to comment on that. So again 60 days afterwards we will - the RD will be

submitted, the agencies will comment on it, we will submit our work plan with the design packages, and you will have an opportunity to comment on that.

MS. DUNN: We don't get a break.

MR. REISING: Right.

MR. STEGNER: Yes, sir.

UNIDENTIFIED SPEAKER: What is the projected lifetime of the Miami aquifer? I didn't see that anywhere reading in the book. You're basing your proposal on 1,000 years, and I'd like to know what's the proposal on or what's the lifetime of that aquifer system to be around?

MR. JENKE: To be around?

UNIDENTIFIED SPEAKER: How long has it been there?

MR. JENKE: It's been there since --

MR. HERTEL: It's been there for about 150,000 years.

UNIDENTIFIED SPEAKER: You're only basing your plan for a thousand years and you're putting it on top of the aquifer.

MR. JEWETT: I think the key is the thousand years is really a target time frame that we have to design against. It's kind of mankind's

way of basically putting a number into an indefinite performing engineering structure, and if you can design for a thousand, that's kind of an engineer's way of saving this thing can perform indefinitely, it's a way of putting a time frame on indefiniteness, and that's how the regulation is developed. So it's not like we're planning at year 1,000 for everything to fail. That is probably the key point.

MR. STEGNER: Any other questions before we move into the break and then reconvene for the public comment period?

MS. SCHULTE: The way I understand there is a law that prohibits a storage unit over the aquifer, and because of the fact that Fernald existed before this law went on the books, there's going to be a waiver for that, and my question is if this is a new site coming into view and was not a pre-existing unit, why does the EPA look at it in the same light to grant a waiver for this storage unit?

MS. NICKEL: As you know, I think what you're referring to is the sole source prohibition as part of Ohio's solid waste

So with those reasons behind us, we went to EPA and requested a waiver. To get that waiver we had to demonstrate that our disposal facility would be as protective as if we had fully complied with that regulation, i.e., hadn't located there. So what we had to do was to provide some assurance that for that thousand year, i.e., indefinite period of time that the aquifer would not be impacted, and the way we did that was by eliminating the concentration of what could go into the cell. As Rob talked, about we have waste acceptance criteria of 1,030. What will go in there is actually almost 10 times less than that.

If you have an opportunity to look in the back, we have columns more or less that show the liner and the cap design. It's a cap designed to funnel water away from the facility and to prevent infiltration into the facility, to prevent contaminants from leaving the facility. With that and also locating the facility on the site in the best geological area, where the on-site clay is the thickest, we were able to provide EPA with enough assurance that we would protect the aquifer. That's probably more of an explanation than you

regulations. Originally the regulations were targeted at limiting new sources of contamination of the aquifer by encouraging sanitary landfills, new commercial disposal facilities to locate geologically appropriate places, not over an aquifer. As you know, our situation is really quite a bit different. We are already a source of contamination to the Great Miami aquifer, but our objective is to minimize or eliminate actually that source. For that reason, we view that in a different light. However, we did view that sole source prohibition as an applicable regulation to us. We took it really very seriously, but as Rob mentioned, we have an aggressive groundwater restoration component to our alternative that is going to carry a price tag of $160 million with it. Clearly we're not interested in a proposed remedy that is going to put that aquifer at risk and at going through that effort of getting it cleaned up, but again, as Rob discussed, after we went through an evaluation of the alternatives, the on-site disposal facility really panned out to be the only option that we could insure its implementability as a practical alternative.

wanted.

MR. JENKE: Can I add one thing to that in terms of, I think maybe Jim or maybe Tom would like to comment on it in terms of another site that was clean and exists on top of an aquifer, whether or not they would site it over an aquifer, a disposal facility over an aquifer, I believe they could answer the question or would answer the question that, no, it probably wouldn't be granted. I don't know if that was part of your question.

MS. SCHULTE: That's exactly what my question is. If this was a different site, a new site being looked at, this would not be considered a good location for this because it's located over an aquifer.

MR. JENKE: That's correct.

MS. NICKEL: The difference is we're taking already a bad situation, something that is already at risk to the aquifer and trying to improve it as opposed to trying to locate a new commercial disposal facility.

MR. JENKE: Something that should be added to it is we could have provided the Ohio and

I guess US, both Ohio and US could go along with it, we could have proposed something such as a cap that would not have required a waiver. What requires a waiver is the fact we're digging it up, putting it back down.

MS. SCHULTE: But that would not have provided enough protection?

MR. JENKE: That would have been less protective, certainly less protective than an engineered disposal facility.

MS. NICKEL: And the big difference is if you're a new commercial disposal facility, you have options, you can go someplace else, you don't have to locate over an aquifer. Because we're already existing over the aquifer, we really don't have a choice, we have to do something with the facility we have at hand.

MR. STEGNER: Any more questions before we break and reconvene for the formal part?

Let's take a 10-minute break now and then we'll reconvene, we'll change the configuration here.

(Brief recess.)

MR. STEGNER: So far I only have two

folks who have asked to enter comments into the record tonight. Again, this is the formal part of the evening where your comments will be entered into the record. They will be responded to in the responsiveness summary section of our document. We would ask that for this part you use the microphone if you want to speak, and state your name, and if you have a written comment that you want to submit also, please let me know and you can hand it to me after your comments. Also please remember that this period lasts until the 31st of May, so if you have comments you want to send me, fax to me between now and then, please feel free to do so. You do not have to speak tonight to have your comments entered into the record.

So with that, Mr. Boudreau of the Cincinnati Health Department has asked that I read his comments, which I will do now. Mr. Boudreau endorses land use objective one, full unrestrictive use. This is the only means of insuring environmental stability and protecting the Great Miami Aquifer. The soil is contaminated with uranium at 100 times background levels to a depth of 20 feet. The highest level, 8,000 parts per

million, is 1600 times background level. Contamination near processing facilities of acidic uranium solutions is 400 parts per million, which is 80 times background level. Another 11 square miles which is approximately two times background levels has all contributed to contamination of the Great Miami Aquifer. The radioactive half life of the uranium isotopes is 234 to 238 is 2.45 times 10 to the fifth to 4.46 times 10 to the ninth years respectively (this is almost a million to many, many millions of years). The contamination of groundwater in the Great Miami Aquifer ranges from 50 parts per billion at the former production area to 2100 parts per billion at South Field, a solid waste disposal area. The highest projected contamination levels in the aquifer will occur within 1,000 years.

Consideration of Alternative 3A, engineered disposal facility (on-site) will place the Great Miami Aquifer at an unacceptable risk to introduction of additional radioactive material contamination over time.

I also have a comment, and the gentleman had to leave, from Marvin W. Clawson.

His comment: I agree with remedial action for Operable Unit 5 is Alternative 3A. My concern is the 300 foot area around disposal cell should be planted in trees and fenced on outside of 300 foot area so it would make it difficult for a trespasser to enter the area. DOE should monitor area and be responsible for upkeep of disposal cell forever.

I also have three other comments here which I will now read into the record. I formally submit the following comment no name associated with this. At a recent Fernald Citizens Task Force meeting, Mr. Willeke brought up the issue that Operable Unit 5 was using a proposed drinking water standard for uranium. Mr. Willeke further noted that the standard is expected to be finalized in the next year and is anticipated to increase from the current 20 parts per billion. I concur with Mr. Willeke's position that the Operable Unit 5 decision should permit the adoption of the final uranium drinking water standard when available.

This approach is consistent with the recommendations of the task force and with the spirit and intent of federal environmental regulations. Such an approach provides adequate

protection to the aquifer and the public and would save the government in excess of $150 million. Such a savings must be taken seriously in these times of financial crisis at the federal level.

Also attached, I formally submit the following comment: During the Operable Unit 2 public meeting, a representative of Ohio EPA noted that the disposal facility would not receive hazardous waste. Of issue was soil containing lead from a firing range.

At the October 15th Ohio EPA meeting, representatives of the agency again recommended that the public submit comments requesting a prohibition of hazardous waste in the disposal facility. For Operable Unit 5, again this appears focused on lead contaminated soil from a trap range and possibly some other soils containing metals.

I question the sensibility of the Ohio EPA position. It is inconceivable that a disposal facility designed to contain uranium for 1000 years cannot be designed to address spent lead bullets and other metals. The Ohio EPA position presents an inconsistent message to the public. It cuts at the foundation of the disposal facility

1 concept; that of long-term performance.

2 At a recent Fernald Citizens Task

3 Force meeting, waste acceptance criteria for the

4 disposal facility were discussed. At this session

5 it was noted that criteria were being developed for

6 uranium and a series of other contaminants. It

7 would seem appropriate that these criteria address

8 lead and other metals.

9 In summary, I request that DOE

10 develop waste acceptance criteria for all

11 contaminants found in soil at the site. I further

12 request that soil received at the facility be

13 measured against these criteria, regardless of a

14 regulatory label (i.e., hazardous waste). This

15 will provide a consistent message to the public on

16 the disposal facility.

17 And, finally, I submit the following

18 comment: The operable Unit 5 proposed plan notes

19 that treatment will be applied to wastewater and

20 groundwater streams such that the "blended"

21 concentration is less than the federal drinking

22 water standards. DOE needs to revise this

23 position.

24 Why does DOE feel it necessary to

spend hard earned taxpayer money to treat water for drinking and then dump it to the river. This is inconceivable in this time of shrinking budgets. We all need to tighten our belts. Here we need to simply abandon such an idea and treat only as necessary to protect the river (fish, et cetera) and recreational users of the river. Anybody using the river for drinking (Note: I don't know of any) would be required to treat the water anyway.

Those were submitted into the record this evening.

Now I have a request by Tom Renck to speak with Ross Area Merchants. Tom. You can use this microphone here or that one there, either one.

MR. RENCK: I'm Tom Renck, I'm representing the Ross Area Merchants. I have seven points to make, and I am going to start off I think with my conclusion, which I think this needs to be taken as we're taking this whole thing, which is as citizens we trusted this group to clean it up and did not become actively involved until March 17th. We now at that point found out that there was a cover-up, and we've wrote a letter and the

merchants, which represents about 60 businesses in the local area, are opposed to this cell. We don't feel it's a good long-term solution.

You folks have been studying this for two years. We're given 30 days to comment on this, we don't feel that's long enough. This is one of our busiest times in the year in this farming community. Everybody is out in the fields tonight, that's why there aren't people here that should have been here. So we would like to have another 30 days to comment on this process.

We feel that the Citizens Task Force is not representative of the local citizens. We don't know where these folks came from. We understood that a lot of the people tried to get on here locally. We didn't have a lot of involvement because we thought it was going to be cleaned up, so we feel that the Citizens Task Force does not represent us fairly.

Seems to be an awful lot of jargon used in this, Operable Unit Number 5, on-site engineered disposal facility. We call this a dump, and I think when all this information is being given out to people, they're getting very, very

confused. I've involved about two months, and this is the amount of material that I've received to study, read, revise, look at. I mean this is not my job, and I'm overwhelmed. I have another cardboard box at home that I throw all this Fernald information in, and it's about two or three foot high of stuff that I can glean at and get rid up, but we're just overwhelmed, we're wore out, and I think that's part of the process, we get worn down trying to understand what's going on in our community.

Last week I attended a meeting that I thought was important, same notification. Operable Unit No. 5 deals with 9,800,000 cubic yards of material. This thing dealt with 3,400 barrels of material. It's just a drop in the bucket, but the same process goes on, and the average citizen that gets involved just gets overwhelmed, and we've run out of time, we've run out of energy.

I have another document that has 30 comments about the document Operable Unit 5, so I'm submitting the letter from the Ross Area Merchants in opposition to this and my 30 comments in writing, and I will hand this to Gary when I get

done.

MR. STEGNER: Thank you, Tom.

Do we have anyone else wanting to speak. Edwa Yocum.

MS. YOCUM: Edwa Yocum, Crosby Township resident, 9860 Hamilton Cleves Pike, Harrison, Ohio. I live in Crosby Township, where 90 percent of the disposal cell will be in Hamilton County. I support the alternative 3A. Also I have other comments such as place at least a 300-foot buffer zone around the entire disposal cell. Add a 10-foot chain link fence skirting the buffer zone, so this would protect the trespassers.

No off-site waste for disposal at Fernald. No long-term storage of off-site waste on Fernald site.

Future ownership of Fernald site should remain in the hands of the federal government.

No characteristic hazardous waste disposed in the cell, such as flammable, toxic, or corrosive.

Groundwater should be remediated to the drinking water standard of 20 parts per billion

or less.

We need real time monitoring.

Also continue to evaluate technologies that would increase protection to residents and community.

No dilution of waste to meet waste acceptance criteria. Soils above 1030 to be shipped off-site.

And I do support the US EPA's waiver of siting criteria.

In conclusion, the Fernald site beyond the disposal cell should become a wetland or sanctuary, and I believe in the balance approach for all DOE sites. Thank you.

MR. STEGNER: Thank you, Edwa. Anyone else care to offer -- Ann.

MS. SCHULTE: I'm Ann Schulte, I'm a member of Ross Area Merchants Association and I am also a resident of --

UNIDENTIFIED SPEAKER: We can't hear you.

MS. SCHULTE: I'm Ann Schulte and I am also a resident of Morgan Township and I am also a member of Ross Area Merchants Association. I'm

opposed to the public storage unit for two reasons, my main reason is because it's stored over an aquifer. We're talking about drinking the water for a vast number of people, and I feel this is a risk that doesn't need to be taken. I think we have looked at convenience over the health and safety of the community.

Also the other concern I have is once this cell has been approved, how do we have the control of allowing outside storage or outside contaminants to come into the storage unit? There's a part of it that will say it's been at Fernald before, at some point it can come back here again, and I don't want to be a dump site for the rest of the community. Thank you.

MR. STEGNER: Thank you, Ann. Any more comments tonight? Again be reminded that the comment period is over on the 31st of May. Gary.

MR. STORER: I'm Gary Storer, Crosby Township resident and trustee.

The northeast corner of the Fernald site is a relatively uncontaminated zone, and my idea is to locate the disposal cell -- if there has to be one, I've got some thoughts about that in a

minute -- if there has to be a disposal cell, it should be located over the production area. Waiver should be -- we should seek a waiver to allow for this to happen. The main reason I feel this way is that could be usable, a usable strip from that northeast corner south to Wiley Road, future use, land uses for township use or residents or whatever.

Over the production area there's already recovery measures in place to either clean up contamination that might leak into the aquifer, so those recovery measures are already in place. Even though the northeast corner has a layer of clay, I believe the layer of clay serves the same purpose as the recovery measures that are already in place over the production area.

I'm opposed to the on-site disposal cell. I would be willing to take a risk of shipping this stuff off-site until we're told we cannot do so. There are sites willing to take the contaminated materials. I also do not agree with the transportation risk that I've been told is associated with transporting this contaminated material off-site.

I also heard rumors, I haven't been able to trace down the facts yet, about shifting the disposal cell southward farther into Crosby Township. I certainly would be opposed to this also. I think if a disposal cell is also located on-site, that security needs to be beefed up on-site. I know the security officers no longer carry arms, firearms. I think that would be a necessity due to the recent hostilities that we've all heard about in the news directed toward the federal government.

Thank you for this opportunity to express myself.

MR. STEGNER: Thank you, Gary. I think it's important to note that Tom did ask for an extension of the comment period, and it's something that we can't unilaterally do, Tom. We will take it under advisement, and I would say the chances are extremely good you will get your wish on this, but I can't state it right now, but we will get you a response to that very soon.

MS. CRAWFORD: Will you let us know if they are going to indeed do that? That means we don't have to spend Memorial Day writing these

things.

MR. STEGNER: Absolutely, we will let you know.

MR. REISING: We will make a decision within a couple of days.

MR. STEGNER: By your meeting this week you should know.

MR. SARIC: Yeah, you can go ahead and take your 30 days.

MR. STEGNER: Thank you, Jim. That was pretty simple. There's your approval authority right there.

MS. CRAWFORD: So we have until June 30th now?

MR. SARIC: That's right, 30 plus one.

MR. STEGNER: So enjoy your weekend everyone. Do we have anymore individuals wanting to comment? Yes, sir.

MR. KALLILE: My name is Jim Kallile, I'm with the Ohio Department of Health. I would like to say that based upon our point of view, we also endorse the alternative for building an on-site disposal cell, and we believe when you

consider the risks and costs involved with remediation of the entire site, we believe this is the appropriate remedy.

MR. STEGNER: Thank you. Anyone else right now?

Again, be reminded that now we have until June 30th to get your comments in. And also be reminded that the document, a form for comment is included in the proposed plan summary which are available in the back of the room. I thank you all for coming tonight. We appreciate your input. It is very valuable to us and all your comments will be responded to in the responsiveness summary.

Thank you all very, very much. Be careful going home.

PUBLIC MEETING CONCLUDED

C E R T I F I C A T E

I, LOIS A. ROELL, RPR, the undersigned, a notary public-court reporter, do hereby certify that at the time and place stated herein, I recorded in stenotypy and thereafter had transcribed with computer-aided transcription the within (58) fifty-eight pages, and that the foregoing transcript of proceedings is a complete and accurate report of my said stenotypy notes.

MY COMMISSION EXPIRES: LOIS A-ROELL, RPR
AUGUST 12, 1997. NOTARY PUBLIC-STATE OF OHIO

APPENDIX B

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO BE CONSIDERED REQUIREMENTS FOR OPERABLE UNIT 5

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LIST OF ACRONYMS

AEA	Atomic Energy Act
ALARA	as low as reasonably achievable
ARAR	applicable or relevant and appropriate requirement
AWWT	advanced wastewater treatment [facility]
BAT	best available technology
BUSTR	Bureau of Underground Storage Tank Regulations
CAA	Clean Air Act
CAMU	corrective action management unit
CEDE	committed effective dose equivalent
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	constituent of concern
CWA	Clean Water Act
DCG	derived concentration guide
DFO	director's findings and orders
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FHBM	flood hazard boundary maps
FIRM	flood insurance rate maps
GMA	Great Miami Aquifer
HWMU	hazardous waste management unit
LDR	land disposal restriction
MCL	maximum contaminant level [under SDWA]
MCL	maximum concentration level [under RCRA)
MCLG	maximum contaminant level goal [under SDWA]
MTR	minimum technology requirements
NAAQS	National Ambient Air Quality Standards
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants

NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
NWP	Nationwide Permit [Program]

LIST OF ACRONYMS (Continued)

OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
ORC	Ohio Revised Code
OU5	Operable Unit 5
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
pCi	picocurie
ppb	parts per billion
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
SCS	Soil Conservation Survey
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Office
SOWC	Southwestern Ohio Water Company
SSOD	storm sewer outfall ditch
STP	site treatment plan
SWMU	solid waste management unit
TBC	to be considered
TSCA	Toxic Substances Control Act
TU	temporary unit
UMTRCA	Uranium Mill Tailings Radiation Control Act
UST	underground storage tank
VOC	volatile organic compound
WAC	waste acceptance criteria

FOREWORD

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
AND TO BE CONSIDERED REQUIREMENTS FOR OPERABLE UNIT 5

The tables in this appendix identify the chemical-, location-, and action-specific applicable or relevant and appropriate requirements (ARARs) for Operable Unit 5; two types of tables are provided for each.

The first type (Tables B.1, B.2 and B.3) identifies the regulations that are ARARs or to be considered (TBC) criteria for the anticipated Operable Unit 5 remedial activities at the FEMP, and includes: 1) an explanation of what the requirement is about, 2) identification as an ARAR or TBC, and 3) why it is an ARAR or TBC. Note that the requirements column in these tables provides only a summary; the regulation, statute, or Federal Register citation listed in the tables should be consulted for a full description of the requirement.

The second type (Tables B.4.A through B.4.C) summarizes the methods of compliance with the requirements for the Operable Unit 5 selected remedy. TBCs (proposed requirements) are not

included in these tables because they are not ARARs. Therefore, they are not used to determine if the selected remedy will be in compliance with environmental regulations.

TABLE B.1

Citation	Requirement	ARAR/TBC	Rationale
DRINKING WATER			
	MCLs for Radiological Contaminants		
EPA National Primary Drinking Water drinking Regulations remediation. 40 CFR §141.15 and §141.16 sole-source Ohio Drinking Water Regulations OAC 3745-81-15 OAC 3745-91-16	The following are maximum contaminant levels for radiological contaminants: Combined radium-226 and -228 ..... 5 pCi/L Gross alpha particle activity ..... 15 pCi/L (including radium-226 but excluding radon and uranium) Beta and photon radioactivity ..... 4 mrem/year from man-made radionuclides Strontium-90 ..... 8 pCi/L	Relevant and Appropriate	This requirement is not applicable to OU5 activities because there are no public water systems involved with this The MCLs are considered relevant and appropriate to the GMA as it is a aquifer currently used to supply drinking water to the regional area.
	Proposed MCLs for Radiological Contaminants		
56 Federal Register 33050 (July 18, 1991)	The following are the proposed maximum contaminant levels for radiological contaminants: Radium-226 ..... 20 pCi/L Radium-228 ..... 20 pCi/L Radon-222 ..... 300 pCi/L Uranium ..... 20 :g/L Beta and photon emitters ..... 4 mrem cede/year (excluding radium-228) Adjusted gross alpha emitters ..... 15 pCi/L (excluding radium-226, uranium, and radon-222)	TBC	These proposed MCLs are not ARARs because they are not promulgated. The proposed MCLs have been adopted as TBCs because they represent health-based guidance for application to the GMA to ensure protectiveness of human health.

TABLE B-1 (Continued)
CHEMICAL-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	Groundwater Standards (Uranium Mill Tailings Radiation Control Act)		
Groundwater Standards for Remedial Actions at Inactive Uranium Processing Sites requirement 40 CFR § 192.02(a)(3)	The following are drinking water standards for processed and unprocessed uranium mill tailings: Uranium (234+238) ..... 30 pCi/L Molybdenum .... 0.1 mg/L	Relevant and Appropriate	These standards are relevant and appropriate because uranium Mill tailings were processed at the FEMP. Compliance with standards set for other constituents under this will be met through the Safe Drinking Water Act as prescribed by the NCP.
	MCLs and MCLGs for Volatile Organic Contaminants (Safe Drinking Water Act)		
EPA National Primary Drinking Water Standards drinking for MCLGs remediation. 40 CFR §141.12 and §141.50 regional EPA National Primary Drinking Water Standards for MCLs Ohio 40 CFR §141.61 Ohio Drinking Water Regulations for MCLs OAC 3745-81-12	The following are the nonzero federal maximum contaminant level goals (MCLG) and State of Ohio and federal maximum contaminant levels (MCL) for volatile organic contaminants in mg/L:	Relevant and Appropriate	This requirement is not applicable to OU5 activities because there are no public water systems involved with this The MCLs and nonzero MCLGs are considered relevant and appropriate to the GMA as it is a sole-source aquifer currently used to supply drinking water to the area. Where the State of Ohio standard is more stringent then the federal standard, the standard is presented. - = Represents a MCLG of zero. Only nonzero MCLGS are pertinent per CERCLA.

	Federal MCLG (mg/L)	Federal or Ohio MCL (mg/L)
Benzene	-	0.005
Carbon tetrachloride	-	0.005
Chloroform	-	0.1/0.08
Dibromochloropropane (DBCP)	-	0.0002
Dichloroethane (1,2-)	-	0.005
Dichloroethylene (1,1-)	0.007	0.007
Dichloromethane	-	0.005
Dichloropropane (1,2-)	-	0.005
Ethylbenzene	0.7	0.7
Monochlorobenzene	0.1	0.1
Styrene	0.1	0.1
Toluene	1	1
Trichloroethane (1,1,1-)	0.2	0.2
Trichloroethane (1,1,2-)	0.003	0.005
Trichloroethylene	-	0.005
Vinyl chloride	-	0.002
Xylenes	10	10

TABLE B.1 (Continued)
CHEMICAL-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	MCLs and MCLGs for Semivolatile Organic Contaminants (Safe Drinking Water Act)		
EPA National Primary Drinking Water drinking Regulations for MCLGs and MCLs 40 CFR 141.11 40 CFR 141.51 40 CFR 141.62 Ohio Drinking Water Regulations OAC 3745-81-11 OAC 3745-81-23	The following are the federal maximum contaminant level goals (MCLG) and State of Ohio and federal maximum contaminant levels (MCL) for semivolatile organic contaminants in mg/L.	Relevant and Appropriate	This requirement is not applicable to OU5 activities because there are no public systems involved with this remediation. The MCLs and MCLGs are considered relevant and appropriate to the GMA as it is a sole-source aquifer currently used to supply drinking water to the regional area. - = Represents a MCLG of zero. Only nonzero MCLGs are pertinent per CERCLA.

	Federal MCLG (mg/L)	Federal or Ohio MCL (mg/L)
Benzo(a)pyrene (PAH)	-	0.0002
Dichlorobenzene o-	0.6	0.6
Dichlorobenzene -m	0.6	0.6
Dichlorobenzene p-	0.075	0.075
Hexachlorobenzene	-	0.001
Hexachlorocyclopentadiene	0.05	0.05
Pentachlorophenol	-	0.001
2,3,7,8-TCDD (Dioxin)	-	3E-08
Trichlorobenzene (1,2,4)	0.07	0.07

	Proposed MCLs and MCLGs for Semivolatile Organic Contaminants (Safe Drinking Water Act)		
55 Federal Register 30370 (July 25,1990)	The following are proposed nonzero federal maximum contaminant level goals (MCLG) and maximum contaminant levels for semivolatile organic contaminants in mg/L:	TBC	These proposed MCLs are not ARARs because they are not promulgated. The proposed MCLs have been adopted as TBCs because they represent health-based guidance for application to the GMA to ensure protectiveness of human health. - = Represents a MCLG of zero. Only nonzero MCLGs are pertinent per CERCLA. NA = Not Available

	Federal MCLG (mg/L)	Federal or Ohio MCL (mg/L)
Benzo(a)anthracene (PAH)	-	0.0001
Benzo(b)fluoranthene (PAH)	-	0.0002
Benzo(k)fluoranthene (PAH)	-	0.0002
Bromodichloromethane	-	0.1/0.08
Butyl benzyl phthalate (PAE)	-	0.1
Chloroform	-	0.1/0.08
Chrysene (PAH	-	0.0002
Dibenz(a,h)anthracene (PAH)	-	0.0003
Hexachlorobutadiene	0.001	NA
Indenol(1,2,3,-c,d)pyrene (PAH)	-	0.0004

TABLE B.1 (Continued)
CHEMICAL-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	MCLs and MCLGs for Pesticides/PCB Contaminants (Safe Drinking Water Act, continued...)		
EPA National Primary Drinking Water drinking Regulations for MCLGs and MCLs 40 CFR 141.11 40 CFR 141.51 40 CFR 141.62 Ohio Drinking Water Regulations OAC 3745-81-11 OAC 3745-81-23	The following are the nonzero federal maximum contaminant level goals (MCLG) and State of Ohio and federal maximum contaminant levels (MCL) for pesticides/PCB contaminants in mg/L.	Relevant and Appropriate	This requirement is not applicable to OU5 activities because there are no public systems involved with this remediation. The MCLs and MCLGs are considered relevant and appropriate to the GMA as it is a sole-source aquifer currently used to supply drinking water to the regional area. tt = Ohio Drinking Water MCL - = Represents a MCLG of zero. Only nonzero MCLGs are pertinent per CERCLA. NA = Not Available

	Federal MCLG (mg/L)	Federal or Ohio MCL (mg/L)
Adipate (diethylbexyl)	0.4	0.4
Aroclor	-	0.002
Atrazine	0.003	0.003
Chlordane	-	0.002
Endrin	-	0.0002 tt
Heptachlor	-	0.0004
Heptachlor epoxide	-	0.0004
Lindane	0.0002	0.0002
Methoxychlor	0.04	0.04
Polychlorinated biphenyls (PCBs)	-	0.0005
Toxaphene	-	0.003

	MCLs and MCLGs for Herbicide Contaminants (Safe Drinking Water Act)		
EPA National Primary Drinking Water drinking Regulations for MCLGs and MCLs 40 CFR 141.11 40 CFR 141.51 40 CFR 141.62 Ohio Drinking Water Regulations OAC 3745-81-11 OAC 3745-81-23	The following are the nonzero federal maximum contaminant level goals (MCLG) and State of Ohio and federal maximum contaminant levels (MCL) for herbicide contaminants in mg/L.	Relevant and Appropriate	This requirement is not applicable to OU5 activities because there are no public systems involved with this remediation. The MCLS and MCLGs are considered relevant and appropriate to the GMA as it is a sole-source aquifer currently used to supply drinking water to the regional area. tt = Ohio Drinking Water MCL

	Federal MCLG (mg/L)	Federal or Ohio MCL (mg/L)
2,4-D	0.07	0.07
Dinoseb	0.007	0.007
2,4,5-TP	0.05	0.01 tt

TABLE B.1 (Continued)
CHEMICAL-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	MCLs and MCLGs for Inorganic Contaminants (Safe Drinking Water Act, continued...)		
EPA National Primary Drinking Water drinking Regulations for MCLGs and MCLs 40 CFR 141.11 40 CFR 141.51 40 CFR 141.62 Ohio Drinking Water Regulations OAC 3745-81-11 OAC 3745-81-23	The following are the federal nonzero maximum contaminant level goals (MCLG) and State of Ohio and federal maximum contaminant levels (MCL) for inorganic contaminants in mg/L.	Relevant and Appropriate	This requirement is not applicable to OU5 activities because there are no public systems involved with this remediation. The MCLs and MCLGs are considered relevant and appropriate to the GMA as it is a sole-source aquifer currently used to supply drinking water to the regional area. tt = Ohio Drinking Water MCL TT = Copper - action level 1.3 mg/L; Lead - action level 0.015 mg/L. - = Represents a MCLG of zero. Only nonzero MCLGs are pertinent per CERCLA.

Antimony	Federal MCLG (mg/L) 0.006	Federal or Ohio MCL (mg/L) 0.006
Barium	2	2
Beryllium	0.004	0.004
Cadmium	0.005	0.005
Chromium (total)	0.1	0.05 tt
Copper	1.3	TT
Lead	-	TT
Mercury	0.002	0.002
Nickel	0.1	0.1
Selenium	0.05	0.01
Thallium	0.0005	0.002

Citation	Requirement	ARAR/TBC	Rationale
	Proposed MCLs and MCLGs for Inorganic Contaminants (Safe Drinking Water Act)		
EPA National Primary Drinking Water drinking Regulations for MCLGs and MCLs 40 CFR 141.11 40 CFR 141.51 40 CFR 141.62 Ohio Drinking Water Regulations OAC 3745-81-11 OAC 3745-81-23	The following are the proposed federal nonzero maximum contaminant level goals (MCLG) and State of Ohio and federal maximum contaminant levels (MCL) for inorganic contaminants in mg/L.	Relevant and Appropriate	This requirement is not applicable to OU5 activities because there are no public systems involved with this remediation. The MCLs and MCLGs are considered relevant and appropriate to the GMA as it is a sole-source aquifer currently used to supply drinking water to the regional area. NA = Not Available

Arsenic	Federal MCLG (mg/L) NA	Federal or Ohio MCL (mg/L) 0.05
Cyanide	0.2	0.2
Silver	0.05	0.05

TABLE B.1 (Continued)
CHEMICAL-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	MCLs for Resource Conservation and Recovery Act, Subtitle C and D		
Chemicals in Drinking Water (Solid Waste appropriate Disposal Facility) 40 CFR 257.4 Ohio Solid Waste Regulations OAC 3745-27-10(D) Chemicals in Drinking Water (Hazardous Waste Disposal Facility) 40 CFR 264.94 Ohio Hazardous Waste Regulations OAC 3745-54-94	A solid waste disposal facility shall not contaminate an underground drinking water source beyond the solid waste boundary (outermost perimeter of the waste). The concentration of chemicals shall not exceed background levels or listed MCLs, whichever is higher. A hazardous waste disposal facility must comply with the requirements specified in the facility permit for the uppermost aquifer underlying the waste management area beyond the point of compliance, which is a vertical surface located at the hydraulically downgradient limit of waste management that extends down into the uppermost aquifer underlying the regulated area. The concentration of chemicals in groundwater shall not exceed background levels or the listed maximum concentration level (MCL) of the constituent for groundwater protection, whichever is higher.	Relevant and Appropriate	40 CFR 257.4 and 440 CFR 264.94 and their Ohio equivalents are relevant and because OU5 contains several of the chemicals listed in the regulation. compliance with the MCLGs and MCLs Under the Safe Drinking Water Act (SDWA) will assure compliance with these RCRA MCLs as discussed in the NCP. The RCRA MCLs reflect earlier versions of the SDWA but the intent is to follow the updated standards of the SDWA (Compliance With Other Laws Manual).

	Solid Waste RCRA MCL (mg/L)	Hazardous Waste RCRA MCL (mg/L)
Inorganic Chemicals		
Arsenic	0.05	0.05
Barium	1.00	1.00
Cadmium	0.01	0.01
Chromium	0.05	0.05
Lead	0.05	0.05
Mercury	0.002	0.002
Selenium	0.01	0.01
Silver	0.05	0.05
Organic Chemicals		
Benzene	.005	NA
Carbon tetrachloride	.005	NA
1,2-Dichloroethane	.005	NA
1,1-Dichloroethene	.007	NA
Trichloroethylene	.005	NA
Radionuclides		
Combined Ra-226 & Ra-228	5 pCi/L	
Gross alpha particle activity (excluding radon & uranium)	15 pCi/L	

NA = Not Available

TABLE B.1 (Continued)
CHEMICAL-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
SURFACE WATER			
	Discharges of Liquid Waste to Surface Waters		
Ohio Water Quality Standards OAC 3745-1-04	"Five Freedoms" for Surface Water are provided by the State of Ohio: All surface waters of the State shall be free from: Ä Objectionable suspended solids Ä Floating debris, oil and scum Ä Materials that create a nuisance Ä Toxic, harmful or lethal substances Ä Nutrients that create nuisance growth	Relevant and Appropriate	OAC 3745-1-04 pertains to both discharges to surface waters of the State as a result of remediation and any on-site surface waters affected by site conditions.
	Use Designation of Surface Water		
Ohio Water Quality Standards OAC 3745-1-21	Paddys Run and the Great Miami River are designated as: Ä Warm water aquatic life habitat Ä Agricultural and industrial water supply Ä Primary contact recreation	Applicable	The Great Miami River between Ross Road [River Mile (RM) 95.71] to Taylorsville Dam (RM 92.6) is a state resource water and RM 130 and 118 are public water supplies. Discharges to the Great Miami River and Paddys Run must not cause a violation of applicable numeric or narrative water quality standards for these designations.

TABLE B.1 (Continued)
CHEMICAL-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	Warm Water Habitat Water Quality Criteria		
Ohio Water Quality Standards OAC 3745-1-07	Surface waters in the State of Ohio must comply with the maximum concentrations of each contaminant listed below for inside and outside the mixing zones of the receiving water to protect warm water aquatic habitats. "Outside Mixing Zone" shall be met after the effluent and the receiving water have been determined to be reasonably well mixed based upon information readily available to the Director. The criteria listed as "Inside Mixing Zone Maximum" shall be applicable as end-of-pipe maximum effluent limits or as criteria to be met within a short distance of the effluent pipe if it can be demonstrated that discharge-induced mixing occurs as per the definition of "area of initial mixing" in rule OAC 3745-1-02.	Applicable	OAC 3745-1-07 is applicable because the site is bordered by the Great Miami River and Paddys Run.

Parameter (:g/L or as marked)	Outside Mixing Zone Max.	Outside Mixing Zone 30-Day Avg.	Inside Mixing Zone Max.	
Antimony (total)	650	190	1,300	NA = Not Available
Arsenic	360	190	720	
Benzene	1,100	560	2,100	
Beryllium (total)	520	23	1,000	Beryllium is based on a presumed water Hardness of 100 mg/L calcium carbonate CaCO 3
Bis(2-ethylhexyl) phthalate	1,100	8.4	2,200	
Cadmium	5.6	1.4	11	
Carbon tetrachloride	1,800	280	3,500	
Chlordane	NA	0.01	NA	
Chlorobenzene	590	26	1,200	
Chromium	1,800	210	3,600	
Chloroform	1,800	79	3,600	
2-Chlorophenol	200	8.8	400	
Copper (total)	18	12	35	Copper is based on a presumed water hardness of 100 mg/L CaCO 3
Cyanide (free)	46	12	92	
1,2-Dichloroethane	12,000	3,500	24,000	
Dieldrin	NA	0.005	NA	

TABLE B.1 (Continued)
CHEMICAL-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC			Rationale
		Outside Mixing Zone		Inside Mixing Zone	
	Parameter (:g/L) or as marked)	Max.	30-Day Avg.	Max.	
	Lead (total)	130	6.9	260	Lead is based on a presumed water hardness of 100 mg/L CaCO 3
	Mercury (total)	1.1	0.2	2.2	
	Methylene chloride	9,700	430	19,000	
	Nickel (total)	1,600	170	3,100	Nickel is based on a presumed water hardness of 100 mg/L CaCO 3
	Pentachlorophenol	5.3	3.2	11	
	PCBs	NA	0.001	NA	
	Selenium (total)	20	5.0	40	
	Silver (total)	1.6	1.3	3.2	Silver is based on a presumed water hardness of 100 mg/L CaCO 3
	Tetrachloroethylene	540	73	1,100	
	Trichloroethylene	1,700	75	3,400	
	Thallium (total)	71	16	140	
	Zinc (total)	120	110	230	Zinc is based on a presumed water hardness of 100 mg/L CaCO 3

TABLE B.1 (Continued)
CHEMICAL-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	Human Health and Agricultural Water Supply Criteria		
Ohio Water Quality Standards OAC 3745-1-07	See previous requirement for explanation of inside/outside mixing zones. The maximum (outside mixing zone) concentrations for contaminants listed below are based on the designated use of the surface water body as Human Health or Agricultural.	Applicable	OAC 3745-1-07 is applicable because the site is bordered by the Great Miami River and Paddys Run.

Parameter (:g/L or as marked)	Outside Mixing Zone 30-Day Average	
	Human Health	Agricultural
Antimony (total)	4,300	NA
Arsenic	NA	100
Benzene	710	NA
Beryllium (total)	1.17	100
beta-BHC	0.55	NA
Bis(2-ethylhexyl) phthalate	59	NA
Cadmium	NA	50
Carbon tetrachloride	44	NA
Chromium (total)	3,433,000	100
Copper (total)	NA	500
1,2-Dichloroethane	990	NA
Dieldrin	0.00076	NA
Fluoride (mg/L)	NA	2.0
Lead (total)	NA	100
Mercury (total)	0.012	10
Nickel (total)	4,600	200
N-Nitrosodi-n-propylamine	12.4	NA
PCBs	0.00079	NA
PAHs	0.31	NA
Selenium (total)	NA	50
Thallium (total)	48	NA
Vinyl chloride	5,250	NA
Zinc Total	NA	25,000

NA = Not Available

TABLE B.1 (Continued)
CHEMICAL SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	Human Health and Agricultural Water Supply Criteria (Continued...)		
Management and Control of Radioactive Materials in Liquid Discharges DOE Order 5400.5 Chapter II, (3)	In addition to the requirements to limit dose to members of the public (on site and off site) in accordance with the standards established in paragraphs II(1)(a) and II(1)(d), further controls are imposed on liquid releases to protect resources such as surface water. Derived concentration guides (DCGs) are not release limits, but rather are screening values for considering best available technology (BAT) for these discharges and for making dose estimates. These requirements apply at the point of discharge from the conduit to the environment (see DCGs in DOE Order 5400.5 Chapter III (3)).	TBC	DOE orders are not ARARs because they are not promulgated. This DOE order is a TBC because of the potential to result in exposure to members of the public. 10 CFR 834 is included as a TBC because it is presently a proposed rule.
Radiation Protection of the Public and the Environment DOE Order 5400.5 Chapter II (3)(a) 10 CFR 834 (PROPOSED)	The BAT is the prescribed level of treatment for liquid radioactive discharges to surface water that would otherwise contain radioactive concentrations greater than the DCG values. Implementation of the BAT process is not required for waste streams that contain radionuclide concentrations of not more than the DCG values at the point of discharge to a surface waterway. Residual concentrations of radionuclides in water that may be ingested are listed in tabular form in DOE Order 5400.5 Chapter III. The DCGs for the COCs are based on a committed effective dose equivalent (CEDE) of 100 mrem/yr, assuming ingestion of 2 liters/day. Note that these DCGs apply only if ingestion is the single pathway of exposure.		
DOE Order 5400.5 Chapter II (3)(a)(5) 10 CFR 834 (PROPOSED)	The absorbed dose to native aquatic animal organisms shall not exceed 1 red per day from exposure to the radioactive material in liquid wastes discharged to natural waterways.	TBC	DOE orders are not ARARs because they are not promulgated. This DOE order is a TBC because of the potential to result in exposure to members of the public. 10 CFR 834 is included as a TBC because it is presently a proposed rule.

TABLE B.1 (Continued)
CHEMICAL-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
RADIATION LIMITS			
	Dose Limits for Individual Members of the Public		
Ohio General Radiation Protection Standards not OAC 3701-38-15(A)(1),(B) DOE Order 5400.5 Chapter II (1)(a) result 10 CFR 834 (PROPOSED)	Operations causing air emissions shall be conducted such that: - The total effective dose equivalent to individual members of the public from the operation does not exceed 0.1 rem (100 mrem) in a year - The dose in any unrestricted area from external sources does not exceed 0.002 rem (2mrem) in any one hour	Relevant and Appropriate	This OAC standard is not applicable because it applies to radiation sources which are regulated by the U.S. Atomic Energy Act authority. However, this standard is relevant and appropriate because of the potential to in the exposure to members of the public. NESHAP 40 CFR 61.91 will assure compliance with the first bullet. The second bullet is not found in NESHAP or in DOE Orders. 10 CFR 834 is included as a TBC because it is presently a proposed rule.
Radiation Dose Limit Radiation Protection of the Public and the Environment DOE Order 5400.5 Chapter II (1) DOE Order 5400.5, Chapter II (1)(a) DOE Order 5400.5, Chapter II (1)(a)(3) 10 CFR 834 (PROPOSED)	The public dose limits include consideration of all exposure modes from all DOE activities (including remedial activities). The radiation dose limit is the sum of the effective dose equivalent (weighted summation of doses to various organs of the body) from exposures to radiation sources external to the body during the year plus the committed effective dose equivalent from radionuclides taken into the body during the year. Medical sources, consumer products, residual fallout from past nuclear accidents and weapons tests and naturally occurring radiation sources are not included in this summation. The exposure of members of the public to radiation sources as a consequence of all routine DOE activities shall not cause, in a year, an effective dose equivalent of more than 100 mrem for all exposure pathways. If unusual circumstances affect a DOE activity in such a manner that the potential public dose could exceed an effective dose equivalent of 0. 1 rem (100 mrem) in a year, DOE may authorize a temporary increase (if the dose limit up to 0.5 rem (500 mrem).	TBC	DOE orders are not ARARs because they are not promulgated. This DOE order is a TBC because of the potential to result in exposure to members of the public. 10 CFR 834 is included as a TBC because it is presently a proposed rule.

TABLE B.1 (Continued)
CHEMICAL-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	Dose Limits for Individual Members of the Public, Continued...		
As Low As Reasonably Achievable (ALARA) DOE Order 5400.5 Chapter II, 2. 10 CFR 834 (PROPOSED)	Field elements shall develop a program and shall require contractors to implement an ALARA process for DOE activities and facilities that have the potential to cause radiation exposure to the public.	TBC	DOE orders are not ARARs because they are not promulgated. This DOE order is a TBC because of the potential to result in exposure to members of the public. 10 CFR 834 is included as a TBC because it is presently a proposed rule.
	STORAGE OF RADIOACTIVE MATERIAL		
Control of Residual Radioactive Material DOE Order 5400.5 Chaplet IV (6)(b) 10 CFR 834 (PROPOSED)	Interim storage must provide: 1) Control and stabilization features shall be designed to provide, to the, extent reasonably achievable, an effective life of 50 years with a minimum life of at least 25 years. 2) Controls shall be designed such that radon-222 concentrations in the atmosphere. above facility surfaces or openings in addition to background levels, will not exceed: (a) 100 pCi/L at any given point; (b) An annual average concentration of 30 pCi/L over the facility site; and (c) An annual average concentration of 3 pCi/L at or above any location outside the facility site. (d) Flux rates from the storage of radon producing wastes shall not exceed 20 pCi/m, ^{2}/sec, as required by 40 CFR Part 61. 3) Controls shall be designed such that concentrations of radionuclides in the groundwater and quantities of residual radioactive material will not exceed applicable federal or state standards. 4) Access to a property and use of on-site material contaminated by residual radioactive material should be controlled through appropriate administrative and physical controls such as those described in 40 CFR Part 192. These control features should be designed to provide, to the extent reasonable, an effective life of at least 25 years.	TBC	The selected remedy will provide for the interim storage of contaminated materials. 10 CFR 834 is included as a TBC because it is presently a proposed rule.

TABLE B.1 (Continued)
CHEMICAL-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	STORAGE OF RADIOACTIVE MATERIAL (Continued)		
Control of Residual Radioactive Material selected DOE Order 5400.5 Chapter IV (6)(d) exposure 10 CFR 834 (PROPOSED)	1) Long-term management of uranium, thorium, and their decay products must provide: (a) Control and stabilization features designed to provide, to the extent reasonably achievable, an effective life of 1000 years with a minimum life of at least 200 years. (b) Control and stabilization features designed to limit radon-222 emanation to the atmosphere from the wastes to less than an annual average release rate of 20 pCi/m ^{2}/sec and prevent increases in the annual average radon-222 concentration at or above any location outside the boundary of the contaminated area by more than 0.5 pCi/L. Field verification of emanation rates shall be in accordance with the requirements of 40 CFR Part 61. (c) A long-term management facility for any potentially biodegradable contaminated wastes properly conditioned so that the generation and escape of biogenic gases will not cause the requirement in paragraph IV.6d(1)(b) to be exceeded and that biodegradation within the facility will not result in premature structural failure in violation of the requirements in paragraph IV.6d(a). (d) Groundwater protection in accordance with legally applicable federal and state standards. (e) Access to a property and use of on-site material contaminated by residual radioactive material controlled through appropriate administrative and physical controls such as those described in 40 CFR Part 192 for uranium mill tailings designed to be effective to the extent reasonable for at least 200 years. 2) In addition, long-term management of other radionuclides shall be in accordance with Chapters II, III, and IV of DOE 5820.2A, as applicable.	TBC	The long term management of radioactive materials will be necessary under the remedy. DOE orders are not ARARs because they are not promulgated. This DOE order is a TBC because the selected remedy has the potential to result in to members of the public. 10 CFR 834 is included as a TBC because it is presently a proposed rule.

TABLE B.1 (Continued)
CHEMICAL-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
AIR			
	National Emissions Standards for Emissions of Radionuclides Other than Radon From DOE facilities		
National Emission Standards for Hazardous Air Pollutants explicitly 40 CFR §61.190,61.192 Subpart Q	No source at a DOE facility shall emit more then 20 pCi/m ²/sec of radon-222 as an average for the entire source into the air.	Applicable	This requirement is applicable because the FEMP presently and/or will continue to be a storage and disposal facility for radium-bearing material. This requirement includes the FEMP in its designation of facilities.
National Emission Standards for Hazardous Air Pollutants 40 CFR §61.90,61.91 and 61.92-.97 Subpart H	These requirements are applicable to DOE-owned and operated facilities that emit any radionuclides other then radon-222 and radon-220 into the air. Emissions of radionuclides (except radon-220 and radon-222) to the ambient air from DOE. facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr. To determine compliance with the standard, radionuclide emissions shall be determined and effective dose equivalent values to members of the public calculated using EPA-approved sampling procedures, computer models CAP-88 or AIRDOS-PC, or other procedures for which EPA has granted prior approval.	Applicable	The selected remedy has the potential to release radionuclides to the atmosphere through fugitive dust and/or point source emissions.
	Control of Radon Emissions		
Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings 40 CFR §192.06(b) Subpart A 40 CFR §192.32(b)(1)(ii) Subpart D National Emission Standards for Hazardous Air Pollutants, Radon-222 Emissions 40 CFR 61, Subpart Q	The following standards apply to the: • Control of residual radioactive materials from inactive uranium processing sites. • Management of uranium byproduct materials after closure of a disposal area. • Long-term management of uranium, thorium, and their decay products. Controls shall be designed to provide reasonable assurance that releases of radon-222 from the above materials to the atmosphere will not: • Exceed an average release rate of 20 pCi/m ²/sec (averaged over the entire surface of the disposal site and over at least a one-year period). • Increase the annual average concentration of radon-222 in air or above any location outside the disposal site by more than 0.5 pCi/L.	Relevant and Appropriate	Radioactive materials in this operable unit are a result of releases from uranium processing. Contaminated soil and sediment are similar in characteristic to materials addressed by these regulations. Requirements for design of controls for on-property disposal should be consistent with design for control of other residual radioactive materials such as mill tailings.

TABLE B.1 (Continued)
CHEMICAL-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	AIR EMISSION STANDARDS		
Lead in Air EPA Regulations on National Primary and Secondary Ambient Air Quality Standards as 40 CFR 50.12 Ohio Ambient Air Quality OAC 3745-17-08	Lead and itsc ompounds measured as elemental lead should not exceed 1.5 micrograms per cubic meter, maximum arithmetic mean averaged over a calendar quarter.	Relevant and Appropriate	The federal regulation at 40 CFR 50.12 is relevant and appropriate because it sets a standard for lead in air and lead has been identified as a contaminant of concern at OU5. The selected remedy has a potential to release quantities of lead-bearing soil fugitives during excavation and disposal operations. Additionally, lead could be a contaminant in particulate emissions from point source discharges from sludge dewatering and soil treatment/stabilization.
Definition of Derived Concentration Guides for Radionuclides DOE Order 5400.5 Chapter III 10 CFR 834 (PROPOSED)	The derived concentration guides (DCGs) are provided as reference values for conducting radiological environmental protection programs at operational DOE facilities and sites. A Ingestion of water A Inhalation of air A Immersion in a gaseous cloud The DCG values for internal exposure are based on a committed effective dose equivalent of 100 mrem for the radionuclide taken into the body by ingestion or inhalation during one year. The DCG values account for only three exposure pathways (ingested water or inhaled air or air immersion) and do not include other potentially significant pathways. When more complex environmental pathways are involved, a more complete pathway analysis is required for calculating public radiation doses resulting from the operation of DOE facilities.	TBC	DOE orders are not ARARs because they are not promulgated. This DOE order is a TBC because of the potential of remedial actions to result in exposure to members of the public. 10 CFR 834 is included as a TBC because it is presently a proposed rule.

TABLE B.1 (Continued)
CHEMICAL-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	AIR EMISSION STANDARDS (Continued)		
Derived Concentration Guides for Radionuclides DOE Order 5400.5 Chapter III, 3	The DCGs are given for different lung retention classes (noted as D, W, or Y, where D equals a removal half-time of 0.5 days, W equals a removal half-time of 50 days, and Y equals a removal half-time of 500 days), Derived Concentration Guide	TBC	DOE orders are not ARARs because they are not promulgated. This DOE order is a TBC because of the potential for remedial actions to result in exposure to members of the public.
10 CFR 834 (PROPOSED)	ISOTOPE :Ci/mL D W Y Uranium-235 5 x 10 12 2 x 10 12 1 x 10 13 Uranium-236 5 x 10 12 2 x 10 12 1 x 10 13 Uranium-238 5 x 10 12 2 x 10 12 1 x 10 13 Exposure conditions assume an inhalation rate of 8400 m 3 of air per year (based on an exposure over 24 hours per day, 365 days per year).		10 CFR 834 is included as a TBC because it is presently a proposed rule.
Radiation Protection of the Public and the Environment DOE Order 5400.5 Chapter III	Residual concentrations of radionuclides in air in an uncontrolled area are limited to the following (for known mixtures of radionuclides, the sum of the ratios of the observed concentration of each radionuclide to its corresponding limit must not exceed 1.0). Derived Concentration Guide	TBC	DOE orders are not ARARs because they are not promulgated. This DOE order is a TBC because of the potential for remedial actions to result in exposure to members of the public.
10 CPR 834 (PROPOSED)	ISOTOPE :Ci/mL D W Y Actinium-227 2 x 10 15 7 x 10 15 1 x 10 14 Lead 9 x 10 13 -- Polonium-210 1 x 10 12 1 x 10 12 Protactinium-231 -- 9 x 10 15 1 x 10 14 Radium-224 -- 4 x 10 12 Radium-226 -- 1 x 10 12 Radium-228 -- 3 x 10 12 Technetium-99 1 X 10 8 2 x 10 9 Strontium-90 5 x 10 11 -- Thorium-228 -- 5 x 10 14 4 x 10 14 Thorium-230 -- 4 x 10 14 5 x 10 14 Thorium-232 -- 7 x 10 15 1 x 10 14 Uranium-234 4 x 10 12 2 x 10 12		10 CFR 834 is included as a TBC because it is presently a proposed rule.

TABLE B.1 (Continued)
CHEMICAL-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
SOIL AND CONTAMINATED MATERIALS			
	Cleanup of Soil Contaminated with Residual Radioactive Materials		
Health and Environmental Protection Standards for uranium Uranium and Thorium Mill Tailings FEMP 40 CFR 192.02 Subpart A	Remedial actions shall be conducted so as to provide reasonable assurance that, as a result of residual radioactive materials, the concentration of radium-226 in land averaged over any area of 100 m² shall not exceed the background level by more than: • 5 pCi/g averaged over the first 15 cm of soil below the surface, and • 15 pCi/g, averaged over 15-cm-thick layers of soil more then 15 cm below the surface.	Relevant and Appropriate	The contaminated materials associated with OU5 are similar in characteristics to Mill tailings. This regulation is not applicable as the is not a designated uranium mill tailings facility.
40 CFR 192.12(a) Subpart B	Compliance with this requirement should be shown through measurements performed within The accuracy of currently available types of field and laboratory instruments in conjunction with reasonable survey and sampling procedures.		
40 CFR 192.20 Subpart C			
Health and Environmental Protection Standards for mill Uranium and Thorium Mill Tailings 40 CFR 192.21 (f) and 192.22(b) Subpart C	Where radionuclides other than radium-226 and its decay product are present in sufficient quantity and concentration to constitute a significant radiation hazard from residual radioactive materials, remedial actions shall, in addition to satisfying the standards of 40 CFR 192.02, Subpart A and 192.12, Subpart B (both listed above), reduce other residual radioactivity to levels that are as low as is reasonably achievable.	Relevant and Appropriate	Contaminated material associated with OU5 are similar in characteristics to uranium tailings.
Post Closure Standards for Uranium and Thorium Mill mill Tailings 40 CFR 192.32(b)(2) Subpart D	The requirements for the management of uranium byproduct materials after closure of a disposal area (40 CFR 192.32(b)(1)) shall not apply to any portion of a disposal site which contains a concentration of radium-226 in land, averaged over areas of 100m², which, as a result of uranium byproduct material, does not exceed the background level by more than: • 5 pCi/g averaged over the first 15 cm of soil below the surface, and • 15 pCi/g, averaged over 15-cm-thick layers of soil more then 15 cm below the surface.	Relevant and Appropriate	Contaminated materials associated with OU5 are similar in characteristics to uranium tailings.
Management of Thorium Mill Tailings mill 40 CFR 192.40-192.42 Subpart E	The following are requirements for the management of thorium byproduct materials: • The provisions for the management of uranium byproduct material (40 CFR §192.32) shall apply to thorium byproduct material and: • Provisions applicable to the element uranium shall also apply to the element thorium • Provisions applicable to radon-222 shall also apply to radon-220	Relevant and Appropriate	Contaminated material associated with OU5 are similar in characteristics to uranium tailings.

- Provisions applicable to radium-226 shall also apply to radium-228

With the concurrence of EPA, alternative provisions may be substituted for any of the above requirements provided the alternative provisions will provide at least an equivalent level of protection for human health and environment.

TABLE B.1 (Continued)
CHEMICAL-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	HOT SPOTS		
Radiation Protection of the Public and the Environment - Soil Contamination DOE Order 5400.5 Chapter IV (4)(a)(1) 10 CFR 834 (PROPOSED)	If the average residual concentration of radionuclides in any surface soil or below surface area less than or equal to 25 m² exceeds the limit or guideline by a factor of (100/A) 0.5 (where A is the area (in square meters) of the region in which the concentrations are elevated], limits for "hot spots" shall also be developed and applied. Procedures for calculating these hot spots limits, which depend on the extent of the elevated local concentrations, are given in DOE/CH-8901. In addition, reasonable efforts shall be made to remove any source of radionuclide that exceeds 30 times the appropriate limit in (he soil, irrespective of the average concentration in the soil.	TBC	The selected remedy involves the excavation of contaminated soil and sediment. DOE Orders provide guidance on addressing contaminated soil and sediment at DOE facilities. DOE orders are TBCs, rather than ARARs because they are not promulgated. 10 CFR 834 is included as a TBC because it is presently a proposed rule.
Radiation Protection of the Public and the Environment DOE Order 5400.5 federal Chapter IV (4)(a)(2)(3) 834 10 CFR 834 (PROPOSED) a	The generic guidelines for residual concentrations of radium-226, radium-228, thorium-230, and thorium-232 are: - 5 pCi/g, averaged over the first 15 cm of soil below the surface; and - 15 pCi/g, averaged over 15-cm-thick layers of soil mom than 15 cm below the surface. These guidelines take into account ingrowth of radium-226 from thorium-230 and of radium-228 from thorium-232, and assume secular equilibrium. If both thorium-230 and radium-226, or both thorium-232 and radium-228, are present and not in secular equilibrium, the appropriate guideline is applied as a limit for the radionuclide with the higher concentration. If other mixtures of radionuclides occur, the concentrations of individual radionuclides shall be reduced so that either the dose for the mixture will not exceed the basic dose limit or the sum of the ratios of the soil concentration of each radionuclide to the allowable limit for that radionuclide will not exceed 1. Explicit formulas for calculating residual concentrations guidelines for mixtures are given in DOE/CH-8901.	TBC	Radionuclides are COCs for soil within the scope of OU5. DOE orders am TBC rather than ARARs because they are not promulgated. This citation is included as a TBC as it is more restrictive then the standard in 40 § CFR 192.02, .12(a), .20, .21(f), .22(b), .32(b)(2), .40-.42. 10 CFR is included to a TBC because it is presently proposed rule.
Guidelines for Residual Radioactive Material-Surface contamination DOE Order 5400.5, Chapter IV (4)(d)	These generic surface contamination guidelines are applicable to existing structures and equipment. These guidelines are generally consistent with standards of the NRC (1982) and functionally equivalent to Section 4, "Decontamination for Release for Unrestricted Use," of Regulatory Guide 1.86, but apply to nonreactor facilities. These limits apply to both interior equipment and building components that are potentially salvageable or recoverable scrap. If a building is demolished, the guidelines in paragraph IV (6)(a) are applicable to the resulting contamination in the ground.	TBC	These criteria will be used for any process facility building built and/or used for the remedial action, including the AWWT, soil washing, soil staging, etc., structures and buildings. DOE orders are not ARARs because they are not promulgated. This DOE order is a TBC because of the

10 CFR 834 (PROPOSED)	potential of remedial actions to result in structures and equipment containing residual radioactivity. 10 CFR 834 is included as a TBC because it is presently a proposed rule.

TABLE B.1 (Continued)
CHEMICAL-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

citation	Requirement	ARAR/TBC	Rationale
	Lead Soil Cleanup Standards		
Resource Conservation and Recovery Act 40 CFR 268.41	The maximum concentration of lead (5.0 mg/L) may not be exceeded whether it is the extract of a waste or waste treatment residual.	Applicable	Lead is a COC in soil and sediment in OU5.
Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities OSWER Directive # 9355.4-12 to	This lead soil guidance states the following: Screening level of 400 ppm for lead in soil is proposed for residential land use; Site-specific preliminary remediation goals (PRGs) at CERCLA sites and media cleanup standards (MCLs) at RCRA corrective action facilities for residential land use are described; and A plan for soil lead cleanup at CERCLA sites and RCRA Corrective Action facilities that have multiple sources of lead is described.	TBC	This policy is not ARAR because it is not a promulgated regulation. This interim directive is a TBC because it establishes an approach for determining protective levels for lead in soil at CERCLA sites and RCRA facilities that are subject corrective action under RCRA Section 3004(v) or 3008(h).
	PCB Soil Cleanup Standards		
PCB Spill Cleanup Policy 40 CFR 761.125 40 CFR 761.125(c)(4)(v)	PCBs at concentration of greater than 50 ppm are subject to TSCA decontamination requirements in 40 CFR 761.120(b). Soil in nonrestricted access areas contaminated by a PCB spill will be decontaminated to 10 ppm PCBs by weight, provided that the soil is excavated to a minimum depth of 10 inches. The excavated soil will be replaced with clean soil, i.e., containing less then 1 ppm PCBs, and the spill site will be restored (e.g., replacement of turf) [761.125(c)(4)(v)]. For soil in restricted access areas, decontamination will be to 25 ppm PCBs by weight [761.125(c)(3)(v)].	TBC	PCBs are a COC in soil for OU5. Concentrations of PCBs at OU5 are expected to be less than 50 ppm. Although published in the Code of Federal Regulations, this is policy, not A promulgated rule, and hence a TBC. This TBC is pertinent to all Operable Unit 5 final remediation levels for soil containing PCBs as CERCLA wastes, per the NCP.

TABLE B.2

LOCATION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
THREATENED & ENDANGERED SPECIES			
	HABITAT PROTECTION		
Procedures for Implementing the National Environmental Policy Act 40 CFR §6.302(h) 10 CFR 1021 Endangered Species Act 16 U.S.C. §1531, et seq. Endangered and Threatened Wildlife and Plants 50 CFR §17.21, §17.31, §17.61, §17.71, and §17.94 Interagency Cooperation-Endangered Species Act 50 CFR §402.01	All federal agencies must ensure that any action authorized, funded, or carried out by them is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of the constituent elements essential to the conservation of a listed species within a defined critical habitat. Additional requirements apply if it is determined that a proposed activity could adversely affect these species or their habitat.	Applicable	In 1993 and 1994 updated surveys at the FEMP determined the presence of the state-listed Sloan's crayfish (Orconectes sloanii) in Paddys Run. Additionally, it was determined that good habitat exists for the federally listed endangered Indiana bat (Myotis sodalis) along Paddys Run and the storm sewer outfall ditch. Moderate and marginal habitat exist in a very limited area for the state-listed endangered cave salamander (Eurycea lucifuga). Surveys did not locate habitat or populations for the federally listed endangered running buffalo clover (Trifolium stoloniferum) or the state-listed endangered mountain bindweed (Polygonum cilinode) and slender fingergrass Digitaria filiformis). In addition, neither habitat nor populations of the state-listed threatened spring coralroot (Corallorhiza wisteriana) were found on FEMP property.
Interagency Cooperation-Endangered Species Act 50 CFR §402.12 (a),(b)	A biological assessment shall evaluate the potential effects of the action on listed and proposed critical habitat and determine whether any such species or habitat are likely to be adversely affected by the action and is used in determining whether formal consultation or a conference is necessary.	Applicable	These procedures are required for federal actions that are "major construction activities."

TABLE B.2 (Continued)
LOCATION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	SPECIES PROTECTION		
Ohio Endangered Species Regulations ORC 1531.25	No person shall take or possess any native species of wild animal, or any eggs or offspring thereof, that is endangered with state-wide extinction.	Applicable	Updated surveys in 1993-94 found state-listed threatened Sloan's crayfish (Orconectes sloanii) populations in sections of Paddys Run. Moderate habitat for the state-listed endangered cave salamander (Eurycea lucifuga) was also determined during a 1993 survey of the FEMP.
Ohio Endangered Species Regulations ORC 1518.02 OAC 1501:18-1	No person shall root-up, injure, destroy, remove, or carry away on or from public highways, public property, or waters of the state, or on or from the property of another, without the written permission of the owner, lessee, or other person entitled to possession, any endangered plant listed in OAC 1501:18-1.	Applicable	Surveys in 1994 did not locate the federally listed endangered running buffalo clover (Trifolium stoloniferum), the state-listed endangered mountain bindweed (Polygonum cilinode) or slender finger grass (Digitaria filiformis), or state-listed threatened spring coralroot (Corallorhiza wisteriana).
Classification of Solid Waste Disposal Facilities and Practices	Solid waste disposal facilities or practices shall not cause or contribute to the taking of any endangered or threatened species of plants, fish, or wildlife.	Applicable	This regulation is applicable to the use of engineered cells.
40 CFR §257.3-2	Solid waste disposal facilities or practices shall not result in the destruction or adverse modification of the critical habitat of endangered or threatened species as identified in 50 CFR Part 17.		
HISTORIC AND CULTURAL RESOURCE PROTECTION			
	ANTIQUITY AND HISTORIC SITE PRESERVATION		
Antiquities Act of 1906 16 U.S.C. §431-433 and Historic Sites Preservation Act 16 U.S.C, §461-467	No person may appropriate, excavate, injure, or destroy any historic or prehistoric ruin or monument, or any object of antiquity situated or controlled by the Government of the United States without an applicable permit. Identification and preservation of cultural resources on federal lands is required, including natural landmarks.	Applicable	Proposed areas of disturbance associated with Operable Unit 5 remedial actions will be surveyed and the Advisory Council on Historic Preservation and the State Historic Preservation Office (SHPO) will be consulted as agreed upon in a programmatic agreement with DOE, SHPO, and the Advisory Council. This regulation is applicable to soil excavation.

TABLE B.2 (Continued)
LOCATION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	ARCHAEOLOGICAL RESOURCE RECOVERY AND PRESERVATION		
Procedures for Implementing the National Environmental Policy Act 40 CFR §6.301 (c) Archaeological Resources Protection Act (16 USC § 47099-47011) Protection of Archaeological Resources 43 CFR §7.4(a)	No person may excavate, remove, damage, or otherwise alter or deface or attempt to excavate, remove, damage, or otherwise alter or deface any archaeological resource located on public lands unless such activity is pursuant to a permit.	Applicable	Compliance will be coordinated through Section 106 of the National Historic Preservation Act.
	HISTORIC PRESERVATION		
National Historic Preservation Act 16 USC § 470C Consideration of Historic Properties 36 CFR Part 800	DOE must take into account the effect of an undertaking on historic properties and accord the Advisory Council on Historic Preservation a reasonable opportunity to comment. Historic properties are defined as any prehistoric or historic district, budding, site, structure, or object included in or eligible for inclusion in the National Register of Historic Places. This term includes artifacts, records, and persons released to and located within such properties. Historic properties that are to be substantially altered or demolished must be recorded for future use and reference.	Applicable	Areas of disturbance associated with Operable Unit 5 remedial activities will be surveyed to determine applicable requirements and the Advisory Council will be consulted as agreed upon in a programmatic agreement with DOE, SHPO, and the Advisory Council.
Archaeological and Historic Preservation Act 16 U.S.C. §469, §470	Upon discovery that a project may cause the irreparable loss, destruction, significant scientific finding, prehistorical finding, or loss of historical or archeological data, DOE must notify the Dept. of the Interior in writing and provide appropriate information concerning the project. DOE must, with possible assistance from SHPO, undertake recovery, protection, and preservation of the data.	Applicable	See previous comment.

TABLE B.2 (Continued)
LOCATION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	HISTORIC PRESERVATION (Continued)		
American Indian Religious Freedom Act 42 U.S.C. §1996	Provides for tribal access by native peoples to grave sites and sites of cultural, symbolic, or religious significance.	Applicable	See previous comment.
Executive Order 11593, Protection and Enhancement of Cultural Environment 3 CFR 54	An inventory of a site with potential historic places is required for eligibility in the National Register of Historic Places.	Applicable	See previous comment.
Native American Graves Protection and Repatriation Act 25 U.S.C. §3001	Identification and preservation of cultural resources on federal lands is required, including natural landmarks. DOE must consult with appropriate Indian tribes prior to the intentional excavation or removal after an inadvertent discovery of Native American cultural items including human remains and objects of cultural significance.	Applicable	See previous comment.
SENSITIVE ENVIRONMENTAL LOCATIONS			
	FLOODPLAIN/WETLANDS		
DOE Compliance with Floodplain/Wetlands Environmental Review Requirements	Concurrent with its review of a proposed action to determine appropriate NEPA requirements, DOE shall determine applicability of the floodplain management and wetlands protection requirements of this part.	Applicable	Review will be conducted concurrently with NEPA determinations for proposed actions.
10 CFR §1022.11 (a), (b), (c)	In making a floodplain determination, DOE shall utilize the Flood Insurance Rate Maps (FIRMs) or the Flood Hazard Boundary Maps (FHBMs) prepared by the Federal Insurance Administration of the Department of Housing and Urban Development to determine if a proposed action is located in the base or critical action floodplain, as appropriate. For a proposed action in an area of predominately federal or state land holdings where FIRM or FHBM maps are not available, information shall be sought from the land administering agency (e.g., Bureau of Land Management, Soil Conservation Service, etc.) or from agencies with floodplain analysis expertise.		

TABLE B.2 (Continued)
LOCATION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	FLOODPLAIN/WETLANDS (Continued)		
DOE Compliance with Floodplain/Wetlands Assessments 10 CFR §1022.12(a)	Prior to any proposed remedial action, DOE shall prepare a floodplain/wetlands assessment.	Applicable	Floodplain/wetland assessments will be prepared as required.
DOE Compliance with Floodplain/Wetlands Environmental Review Requirements 10 CFR §1022.15(a)	If DOE finds that no practicable alternative to locating in the floodplain/wetland is available, consistent with the policy set forth in Executive Order 11988, DOE shall, prior to talking action, design, or modify its action in order to minimize potential harm to or within the floodplain or wetland.	Applicable	Floodplain/wetland impacts will be avoided and minimized to the maximum extent practicable.

TABLE B.2 (Continued)
LOCATION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	FLOODPLAIN/WETLANDS (Continued)		
DOE Compliance with Floodplain/Wetlands Environmental Review Requirements 10 CFR §1022.3(a), (b)(1),(2),(3),(5),(6),(c), (d),(e)	DOE shall exercise leadership and take action to: • Avoid to the extent possible the long- and short-term adverse impacts associated with the destruction of wetlands and the occupancy and modification of floodplains and wetlands, and avoid direct and indirect support of floodplain and wetland development wherever there is a practicable alternative. • Incorporate floodplain management goals and wetlands protection considerations into its planning, regulatory, and decision-making processes and shall to the extent practicable: - Reduce the hazard and risk of flood loss. - Minimize the impact of floods on human safety, health, and welfare. - Restore and preserve natural and beneficial values served by the floodplain. - Minimize the destruction, loss, or degradation of wetlands. - Preserve and enhance the natural and beneficial values of wetlands. • Undertake a careful evaluation of the potential effects of any DOE action taken in a floodplain and any new construction undertaken by DOE in wetlands not located in a floodplain. • Identify, evaluate, and as appropriate, implement alternative actions which may avoid or mitigate adverse floodplain/wetlands impacts. • Provide opportunity for early public review of any plans or proposals for actions in floodplains and new construction in wetlands.	Applicable	Short and long term impacts associated with Operable Unit 5 remedial activities will be avoided and minimized to the maximum extent practicable.
W			
DOE Compliance with Floodplain/Wetlands Environmental Review Requirements 10 CFR §1022.5(b),(h)	This part shall apply to all proposed floodplain/wetlands actions, including those sponsored jointly with other agencies, where practicable alternatives to the proposed actions are still available. The policies and procedures of this part which are applicable to floodplain actions shall apply to all proposed actions which occur in a wetlands located in a floodplain.	Applicable	Short and long term impacts associated with Operable Unit 5 remedial activities will be avoided and minimized to the maximum extent practicable.

TABLE B.2 (Continued)
LOCATION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	WETLANDS		
Procedure for Implementing the identified National Environmental Policy Act 40 CFR §6.302(a) [Executive Order 11990]	Federal agencies conducting certain activities must avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands when a practicable alternative exists.	Applicable	Approximately 35.9 acres of jurisdictional wetlands and 8.9 acres of waters of the United States were onsite as a result of the 1993 FEMP Wetland Delineation. The U.S. Army Corps of Engineers officially approved the delineation on August 19, 1993. Wetland impacts associated with Operable Unit 5 remedial activities will be minimized and avoided to the maximum extent practicable.
Executive Order 11990, Protection of Wetlands	This order requires that federal agencies take action to avoid. adversely impacting wetlands wherever possible, to minimize the wetland destruction and to preserve the values of wetlands.	Applicable	Wetland impacts associated with Operable Unit 5 remedial activities will be avoided and minimized to the maximum extent practicable.
Nationwide Permit (NWP) Program 33 CFR §330	The U.S. Army Corps of Engineers has authorized certain categories of activities involving the discharge of dredged and fill material into wetlands and waters of the United States under the NWP program. Impacts involving the discharge of dredged and fill material will be conducted in accordance with the substantive requirements of applicable NWPs as required. Discharges not authorized by NWP will be conducted in accordance with the substantive requirements of 33 CFR 323 and 40 CFR 230.	Applicable	Approximately 35.9 acres of jurisdictional wetlands and 8.9 acres of waters of the United States have been identified on site. Impacts to these areas will be avoided and minimized to the maximum extent practicable. Discharges of dredged and fill material authorized by NWPs will be conducted in accordance with the substantive requirements of the respective permits.
Permits for the Discharge of Dredged and Fill Material into waters of the United States 33 CFR §323	Remedial actions involving the discharge of dredge and fill material into these areas shall meet the substantive requirements of this section and 40 CFR §230.	Applicable	Discharges of dredged and fill material not authorized by NWP will be conducted in accordance with the substantive requirements of these regulations.

TABLE B.2 (Continued)
LOCATION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	WETLANDS (Continued)		
Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged and Fill Material 40 CPR §230	40 CFR 230 sets guidelines for evaluation of discharges of dredged and fill material into wetlands and waters of the United States. The requirements specify that no discharge of dredged or fill material shall take place unless the permit authorizing agency makes a determination of the short-term effects of the discharge on the environment of the site, and if: 1. There is no practicable alternative to the action; 2. A state water quality standard will not be violated; and 3. It does not contribute to or causes the significant degradation of waters of the United States.	Applicable	Discharges of dredged and fill material associated with Operable Unit 5 remedial actions will be evaluated and conducted against the substantive requirements of these regulations.
Section 401 State Water Quality Certifications OAC 3745-32	Section 401 State Water Quality Certification is required to conduct dredge and fill activities within wetlands or waters of the United States, State Water Quality Certification is granted provided: 1. The discharge does not prevent or interfere with the attainment or maintenance of applicable water quality standards; and 2. The discharge does not result in a violation of any applicable provisions of the CWA.	Applicable	Discharges of dredged and fill material associated with Operable Unit 5 remedial actions will meet the substantive requirements of these regulations.
Protection of Wetlands 40 CFR §258.12	New municipal solid waste landfill units must not be located in wetlands unless Ohio approves otherwise.	Applicable	Wetland impacts associated with Operable Unit 5 remedial actions will be avoided and minimized to the maximum extent practicable.
Ohio Solid Waste Disposal Regulations the OAC 3745-27-07 (G)(15)	A solid waste disposal facility may not be located in a floodway.	Applicable	Floodway impacts associated with Operable Unit 5 remedial activities will be avoided and minimized to maximum extent practicable,
Ohio Solid Waste Disposal Regulations OAC 3745-27-07 (H)(4)(d)	The limits of waste placement cannot be located within 200 feet of a stream, lake, or natural wetland, unless deemed acceptable by the Director of the OEPA.	Applicable	Wetland impacts associated with Operable Unit 5 remedial actions will be avoided and minimized to the maximum extent practicable.

TABLE B.2 (Continued)
LOCATION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	FLOODPLAINS		
Ohio Solid Waste solid Disposal Regulations OAC 3745-27-07 (G)(15)	The limits of solid waste placement and the leachate management system cannot be located in a regulatory floodplain, unless deemed acceptable by the Director of the OEPA.	Applicable	This requirement is applicable to the siting of a waste disposal facility.
Ohio Solid Waste Disposal Regulations OAC 3745-29-07 (G)(15)	The limits of solid waste placement and the leachate management system cannot be located in a regulatory floodplain, unless deemed acceptable by the Director of the OEPA.	Applicable	This requirement is applicable to the siting of a solid waste disposal facility.
Procedures for Implementing the the National Environmental Policy Act 40 CFR §6.302(b)	Federal agencies must evaluate the potential effects of actions they may take in a floodplain to avoid, to the extent possible, adverse effects associated with direct and indirect development of a floodplain.	Applicable	Floodplain impacts associated with Operable Unit 5 remedial activities will be avoided and minimized to maximum extent practicable.
Floodplain Management Executive Order 11988 the	This order requires federal agencies undertaking actions within a floodplain to evaluate the potential for adverse impact on the floodplain. If it is determined that adverse impacts could occur, the effects of the action must be minimized to the extent practical.	Applicable	Floodplain impacts associated with Operable Unit 5 remedial activities will be avoided and minimized to maximum extent practicable.
SOLID WASTE SITING CRITERIA			
	SOLE-SOURCE AQUIFERS		
Siting Over a Sole-Source Aquifer Safe Drinking Water Act 42 U.S.C. §1424(e)	All federal financially assisted projects constructed in the area of a sole-source aquifer and its principal recharge zone will be subject to EPA's review to ensure that these projects are designed and constructed so that they do not create a significant hazard to public health.	Applicable	A notice in 53 FR 15876 (May 4, 1988) designated the Buried Valley Aquifer System of the Great Miami/ Little Miami River Basins of southwestern Ohio as a sole or principal source of drinking water. The FEMP site is located above this aquifer.

TABLE B.2 (Continued)
LOCATION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	SOLE-SOURCE AQUIFERS (Continued)		
Ohio Solid Waste Disposal Regulations OAC 3745-27-07 (H)(2)(c)	A solid waste landfill facility cannot be located above an aquifer declared by the federal government under the Safe Drinking Water Act to be a sole-source aquifer.	Applicable	This requirement is applicable to the on-property disposal of solid waste.
OEPA Guidance on Solid Waste Siting Criteria: GD202.101	The Director may grant an exemption to the prohibition of siting a solid waste landfill facility over a sole-source aquifer (OAC 3745-27-07(H)(2)(c)) under ORC 3743.02(G). In order to grant an exemption, the Director needs to determine that no adverse impact to human health or safety or the environment will occur due to granting the exemption. The decision to grant an exemption from this rule is made on a site-by-site basis. Among the items that should be considered when determining if a waiver will be granted are whether a significant thickness of low permeable material exists between the landfill facility liner and the sole-source aquifer and whether there is an interconnection between the sole-source aquifer and any significant saturated zones which exist above the sole-source aquifer.	TBC	This requirement is applicable to the on-property disposal of solid waste.
Ohio Solid Waste Disposal Regulations OAC 3745-27-07 (H)(2)(d)	A solid waste landfill, facility cannot be located above an unconsolidated aquifer capable of sustaining a yield of 100 gallons per minute for a 24-hour period to a water supply well located within 1000 feet of the limits of solid waste placement, unless deemed acceptable by the Director of the OEPA.	Applicable	This requirement is applicable to the on-property disposal of solid waste.

TABLE B.2. (Continued)
LOCATION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	SOLE-SOURCE AQUIFERS (Continued)		
OEPA Guidance on Solid Waste Siting Criteria: 100 Gallon Per Minute Aquifer GD202.102	An exemption to the prohibition of siting a solid waste landfill facility over an unconsolidated aquifer capable of sustaining a yield of 100 gallons per minute for a 24-hour period (OAC 3745-27-07(H)(2)(d)) may be obtained by demonstrating that the thickness and lack of permeability of the sediment that exists between the bottom of the proposed landfill facility liner and the top of the unconsolidated high-yield aquifer provide adequate protection to the unconsolidated high-yield aquifer from the effects of a release of leachate from the solid waste landfill facility. The sediment should prevent leachate, from migrating from the bottom of the facility liner to the high-yield aquifer in a time period equal to the active life of the facility, including the postclosure care period.	TBC	This guidance is a TBC rather than a ARAR because it is not promulgated. This guidance is a TBC for the use of the on-property disposal facility.
	OTHER SOLID WASTE SITING LIMITATIONS		
Distance from a Public Water Supply, Ohio Solid Waste Disposal Regulations OAC 3745-27-07 (H)(3)(a)	A solid waste landfill facility may not be located within the surface and subsurface areas surrounding a public water supply well through which contaminants may move toward and may reach the public water supply well within a period of five (5) years.	Applicable	This requirement is applicable to the on-property disposal of solid waste.
Ohio Solid Waste Disposal Regulations OAC 3745-27-07 (G)(16)	The limits of solid waste placement and a leachate management system may not be located within 200 feet of a fault that has displacement in Holocene time.	Applicable	This requirement is applicable to the on-property disposal of solid waste.

TABLE B.2 (Continued)
LOCATION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	OTHER SOLID WASTE SITING LIMITATIONS (Continued)		
Ohio Solid Waste Disposal Regulations OAC 3745-27-07 (H)(3)(c)	The limits of solid waste placement cannot be located within 1000 feet of a water supply well or developed spring unless it is deemed acceptable by the Director of the OEPA or it is: A Controlled by the applicant, is needed as a source of nonpotable water, no other reasonable alternate water source is available, and the well is constructed to prevent contamination of the groundwater; or A Located at least 500 feet hydrogeologically upgradient from the limits of solid waste placement; or A Separated from the limits of solid waste placement by a hydrogeologic barrier; or A Constructed and used solely for monitoring groundwater quality.	Applicable	This requirement is applicable to the on-property disposal of solid waste.
Ohio Solid Waste Disposal Regulations OAC 3745-27-07 (H)(4)(b)	The limits of waste placement cannot be located within 300 feet of the solid waste landfill facility's property line, unless deemed acceptable by the Director of the OEPA.	Applicable	This requirement is applicable to the on-property disposal of solid waste.
Ohio Solid Waste Disposal Regulations OAC 3745-27-07 (H)(4)(c)	The limits of solid waste placement cannot be located within 1000 feet of a domicile whose owner has not consented in writing to the location of the landfill facility.	Applicable	This requirement is applicable to the on-property disposal of solid waste.
Ohio Solid Waste Disposal Regulations OAC 3745-27-07 (H)(2)(e)	The isolation distance between the uppermost aquifer system and the bottom of the recompacted soil liner of a solid waste landfill system cannot be less than 15 feet of in situ or added geologic material deemed acceptable by the Director of the OEPA.	Applicable	This requirement is applicable to the on-property disposal of solid waste,

TABLE B.2 (Continued)
LOCATION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	OTHER SOLID WASTE SITING LIMITATIONS (Continued)		
OEPA Guidance on Solid Waste Siting Criteria: Minimum Distance From a Public Water Supply Well GD202.105	The minimum distance to a public water supply well (OAC 3745-27-07 (H)(3)(c)) will be considered by the application of this criteria: - The five-year time of travel shall be calculated between the boundary of the solid waste landfill facility and the closest public water supply. A period of no less than five years will be required before groundwater flowing in a downgradient direction from the facility can intersect with a public water supply well screen. To be considered for an exemption from this rule, the following will need to be demonstrated: - That there is at least 50 feet of separation between the bottom of the solid waste landfill facility liner and the aquifer system in which the public water supply well is screened. - That any release of leachate will be detected before reaching the aquifer system in which the public water supply well is screened. - That once leachate is released below the liner, the leachate will not reach the aquifer system in which the public water supply well is screened within a time span of 100 years plus the anticipated life of the solid waste landfill facility, which shall include the 30-year postclosure care period.	TBC	This guidance is a TBC rather than a ARAR because it is not promulgated. This guidance is a TBC for the on-property disposal of solid waste. A public water supply exists outside of the five-year time of travel from the FEMP property boundary.
OEPA Guidance on Solid Waste Siting Criteria: Minimum Isolation Distances to Wells and Developed Springs GD0202.103	This guidance clarifies when exceptions to the required 1000-foot isolation distance from water supply wells and developed springs (OAC 3745-27-07 (H)(3)(c)) apply and when a situation contrary to the rule can be deemed acceptable to the Director of the OEPA.	TBC	This guidance is a TBC rather than a ARAR because it is not promulgated.

TABLE B.2 (Continued)
LOCATION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
	OTHER SOLID WASTE SITING LIMITATIONS (Continued)		
OEPA Guidance on Solid Waste Siting Criteria: Material Acceptable to the Director GD202.104	For geologic material to be deemed acceptable to the Director of the OEPA as added fill under OAC Rule 3745-27-07 (H)(2)(e), it must be able to meet the following criteria: A The geologic material must be impermeable enough so it will not store, transmit or yield a significant amount of water to a well or spring A The geologic material must be able to impede, both physically and chemically, the flow of leachate constituents through it. In order to meet both criteria listed above, the added geologic material should: A Be classified as CL, SC, GC, CL-ML, or CH under the Unified Soil Classification System A Be composed of particles of which at least 25% by dry weight will pass through a No. 200 (75 :m) sieve A Be composed of particles of which no more than 25% by dry weight will not pass through a No. 4 sieve A No particle should be greater than 8 inches in diameter A Have a final permeability of no more than 1x10-5 cm/sec A Be recompacted in a manner that when the landfill is constructed on it, no damage to the landfill liner will occur due to settling of the added material.	TBC	This guidance is a TBC rather than a ARAR because it is not promulgated.

TABLE B.2 (Continued)
LOCATION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Rationale
HAZARDOUS WASTE			
	LOCATION OF HAZARDOUS WASTE FACILITIES		
Hazardous Waste Facility or Environmental Impact OAC 3745.05(D)(6)(c)	A hazardous waste facility installation and operation permit shall not be approved unless it is proven that the facility represents the minimum adverse environmental impact, considering the state of available technology, the nature and economics of various alternatives and other pertinent considerations	Applicable	This requirement is applicable for treatment, storage, disposal of hazardous wastes if HWMUs are to be constructed during remediation. This requirement may serve as a siting criteria.
Hazardous Waste Facility Minimum Risk OAC 3745.05(D)(6)(d)	A hazardous waste facility installation and operation permit shall not be approved unless it is proven that the facility represents the minimum risk of all the following: 1) contamination of groundwater and surface water; 2) fires or explosions from treatment, storage, or disposal methods; 3) accidents during transportation; 4) impact to public health and safety; 5) air pollution; and 6) soil contamination.	Applicable	Use of any existing or potential HWMUs for remediation where hazardous wastes may be stored, treated, or disposed of must meet these substantive requirements. This requirement may serve as a siting criteria.

TABLE B.3

ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
HAZARDOUS WASTES			
	HAZARDOUS WASTE STORAGE		
Empty Containers OAC 3745-51-07 (A) and (B) RCRA 40 CFR 261.7 Subpart A	Any hazardous waste remaining in either an empty container or an inner liner removed from an empty container is not subject to regulation under 40 CFR Parts 261 through 265 (RCRA requirements). A container is empty if: 1) All wastes have been removed that can be removed using the practices commonly employed to remove materials from that type of container (e.g., pouring, pumping, and aspirating); and 2) No more than 2.5 cm (1 inch) of residue remains on bottom of the container or inner liner; or 3) No more than 3% by weight of the total capacity of the container remains in the container or inner liner if the container is less than or equal to 110 gal. in size, or no more than 0.3% by weight of the total capacity of the container remains in the container or inner liner if the container is greater than 110 gal. in size.	Relevant and Appropriate	This requirement is relevant and appropriate when containerizing soil contaminated by RCRA waste. This requirement would also be relevant and appropriate for containerizing any treatment residues exhibiting RCRA characteristics including advanced wastewater treatment (AWWT) sludges and soil decontamination residues. OEPA has the overriding authority for on-site management of RCRA wastes.
Condition of Containers OAC 3745-66-71 through 74, 76 and 77 RCRA 40 CFR 265.171 through .174, .176 and .177 Subpart I	If a container holding hazardous waste is not in good condition (e.g., severe rusting, apparent structural defects) or begins to leak, the owner or operator must transfer the hazardous waste from this container to a container that is in good condition or manage the waste in some other way that complies with this requirement.	Relevant and Appropriate	This requirement is relevant and appropriate to handling containers holding environmental media contaminated with RCRA waste. OEPA has the overriding authority for on-site management of RCRA wastes.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	HAZARDOUS WASTE STORAGE (Continued)		
Waste Storage Piles OAC 3745-56-51, (A) through (F), 54 (A) and (B), 56 (A) and (B), 57 (A)(B) and (C), 58 (A)(B) and (C) 40 CFR 264.251 through .259	A waste pile used to store or treat hazardous waste must have: 1) A liner that is designed, constructed, and installed to prevent any migration of waste out of the pile into the adjacent subsurface soil or groundwater or surface water at any time during the active life (including the closure period) of the waste pile, and 2) A leachate collection and removal system immediately above the liner that is designed, constructed, maintained, and operated to collect and remove leachate from the pile. The owner/operator must design, construct, operate, and maintain a run-on control system capable of preventing flow onto the active portion of the pile during peak discharge from at least a 25-yr storm and manage a runoff management system to collect and control at least the water volume resulting from a 24-hr, 25-yr storm. Collection and holding facilities associated with run-on and runoff control system must be inspected weekly and be emptied or otherwise managed expeditiously after storms to maintain design capacity of the system. If the pile contains any particulate matter which may be subject to wind dispersal, the owner or operator must cover or otherwise manage the pile to control wind dispersal. Ignitable, reactive, or incompatible waste must not be added to a waste pile, unless specified in OAC 3745-56-56 (A) and (B) or 57 (A)(B) and (C). During construction or installation, liners and cover systems must be inspected for uniformity, damage, and imperfections. At closure, the owner/operator must remove or decontaminate all waste residues, contaminated containment system components, contaminated subsoil, and structures and equipment contaminated with waste and leachate, and manage them as hazardous waste unless OAC 3745-51-03(D) applies. If, after removing or decontaminating all residues and making all reasonable effort to effect removal or decontamination of contaminated components, subsoil, structures and equipment, the owner/operator finds that not all contaminated subsoil can be practically removed or decontaminated, he must close the facility and perform postclosure care in accordance with OAC 3745-57-10.	Relevant and Appropriate	This requirement is relevant and appropriate for on-site hazardous waste piles used for longer than 90 days unless the CAMU Rule is applied.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	HAZARDOUS WASTE STORAGE (Continued)		
Containment OAC 3745-55-75 RCRA 40 CFR 265.175(a) through (c) Subpart I	A containment system for RCRA containment storage areas must be designed and operated to provide: 1) A sufficiently impervious base, which is sloped to collect any leaking liquids. 2) Sufficient capacity to contain liquids. 3) Prevention of run-on into the containment system. 4) A sump to prevent overflow of the collection system. Storage areas for containers holding only wastes that do not contain free liquids need not have a containment system, provided that: 1) The storage area is sloped or is otherwise designed and operated to drain and remove liquid resulting from precipitation, or 2) The containers are elevated or are otherwise protected from contact with accumulated liquid.	Relevant and Appropriate	This requirement is relevant and appropriate to handling soil contaminated with listed or characteristic RCRA waste. A Part B Permit Application for RCRA storage has been submitted to the OEPA.
Containment Building RCRA 40 CFR 264.1100 through .1102 Subpart DD 57 FR 37194 8/18/92	The owner or operator is not subject to the definition of land disposal in RCRA Section 3004(k) provided that the unit: 1) Is a completely enclosed, self-supporting structure that is designed and constructed of synthetic materials of sufficient strength and thickness to support themselves, the waste contents, and any personnel and heavy equipment that operate within the unit, and to prevent failure due to pressure gradients, settlement, compression, or uplift, physical contact with the hazardous wastes to which they are exposed, climatic conditions, and the stresses of daily operation, including the movement of heavy equipment within the unit and contact of such equipment with containment walls; 2) Has a primary barrier for management of solids, in addition to a liquid collection system and secondary containment for management of liquids. 3) Has controls sufficient to prevent fugitive dust emissions to meet the no visible emission standard in Sec. 264.1101(c)(1)(iv); and 4) Is designed and operated to ensure containment and prevent the tracking of materials from the unit by personnel or equipment. At closure, the owner or operator must remove or decontaminate all waste residues, contaminated containment system components, contaminated subsoil, and structures and equipment contaminated with waste and leachate, and handle them as a hazardous waste.	Relevant and Appropriate	This requirement is not applicable because the facility is currently in interim status; 40 CFR 264 requirements only apply to facilities with a Part B Permit. Excavated RCRA soil and sediment may require temporary storage during the remedial action.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	HAZARDOUS WASTE MANAGEMENT AND DISPOSAL		
Preparing and Transporting Hazardous Waste Off-site RCRA 40 CFR 262.20 through .23, .30 and .33 Subparts B and C OAC 3745-53-20 through 31 OAC 3745-52-30 and 33	General requirements for transporting hazardous waste for off-site disposal require a Manifest. Pretransporting requirements include appropriate packaging, labeling, marking, and placarding.	Applicable	Any residues determined to be RCRA hazardous waste destined for off-site disposal are subject to manifest requirements. Remedial actions involving off-site disposal of RCRA wastes will be subject to this requirement.
Landfill Design RCRA 40 CFR 265.301(a) OAC 3745-68-011	Construction of a landfill must include two (2) or more liners and a leachate collection and removal system above and between such liners.	Applicable	This requirement will be applicable to on-property disposal.
Land Disposal Restrictions RCRA 40 CFR 268.40 through .44 Subpart D OAC 3745-59	A restricted hazardous waste may be land disposed only if: 1) An extract of the waste or of the treatment residue of the waste does not exceed the value shown in 40 CFR 268.41. 2) It is treated using a technology specified in 40 CFR 268.42(a) or an equivalent treatment method. 3) The constituent concentrations in the waste or treatment residue of the waste do not exceed the value shown in 40 CFR 268.43.	Applicable	This requirement is applicable to those RCRA-listed hazardous wastes that will be disposed of off-site. Land disposal restrictions will not apply to on-property disposal within a CAMU under the CAMU Rule.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	HAZARDOUS WASTE MANAGEMENT AND DISPOSAL (Continued)		
Contaminated Debris RCRA 40 CFR 268.2 Subpart A 40 CFR 268.45 Subpart D 40 CFR 261.3 Subpart A	Debris means solid material exceeding a 60-mm particle size that is intended for disposal and that is a manufactured object, plant or animal matter, or natural geologic material. Hazardous debris means debris that contains a listed hazardous waste, or that exhibits a characteristic of hazardous waste. Hazardous debris must be treated prior to land disposal unless the EPA determines that the debris is no longer contaminated with hazardous waste or the debris is treated to the waste-specific treatment standard for the waste contaminating the debris. Provided the debris does not exhibit a RCRA characteristic it is not subject to regulation under 40 CFR parts 260, 261 to 266, 268, or 270 if: 1) The hazardous debris has been treated using one of the required extraction or destruction technologies specified in 40 CFR 268.45; or 2) The debris, considering the extent of contamination, is determined to no longer be contaminated with hazardous waste.	Applicable	This requirement is applicable to hazardous debris that will be disposed of off site. Land disposal restrictions will not apply to on-property disposal within a CAMU.
	GENERAL FACILITY STANDARDS		
Hazardous Waste Determination RCRA 40 CFR 262.11 Subpart A OAC 3745-52-11 (A) through (F)	A person who generates a solid waste must determine if that waste is a hazardous waste using the following method: 1) First determine if the waste is not a solid waste (40 CFR 261.4). 2) Then determine if the waste is listed as a hazardous waste in Subpart D of 40 CFR Part 261. 3) For purposes of compliance with 40 CFR Part 268 or if the waste is not listed in Subpart D of 40 CFR part 261, the generator must then determine whether the waste is identified in Subpart C [characteristic] of 40 CFR part 261.	Relevant and Appropriate	This requirement is relevant and appropriate for soil contaminated with a RCRA listed waste or a RCRA characteristic waste, and for residues from treatment of soil contaminated with RCRA listed waste, if the waste is to be managed or stored on-property within a CAMU. This requirement would further apply to waste sludges generated by the AWWT or the soil decontamination process where RCRA constituents may be present. A hazardous waste determination will be applicable for any RCRA regulated waste destined for off-site disposal

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	GENERAL FACILITY STANDARDS (Continued)		
Treatment, Storage, and Disposal General Facility Standards RCRA 40 CFR 265.13 through .16 Subpart B OAC 3745-65-13 through 16	General facility standards require that operators of a facility must obtain chemical and physical analyses of a representative sample of each hazardous waste to be treated, stored, or disposed of at the facility prior to treatment, storage, or disposal. The analysis may include existing published or documented data on the hazardous waste or on hazardous waste generated from similar processes. The facility operator must also provide controlled access for the facility. In addition, the operator must maintain and inspect all monitoring equipment, safety and emergency equipment, security devices and operating and structural equipment that are important to preventing human health hazards. Operators must train personnel for procedures relevant to their emergency response training.	Relevant and Appropriate	These standards are relevant and appropriate where RCRA wastes are managed on site.
Treatment, Storage, and Disposal Facility Preparedness and Prevention RCRA 40 CFR 265.31 through .35, .37 Subpart C OAC 3745-65-31 through 35, 37	TSD facility operators must design, construct, maintain and operate facilities to minimize the possibility of fire, explosion or any unplanned sudden or nonsudden release of hazardous waste to air, soil, or surface water which might threaten human health or the environment.	Relevant and Appropriate	This requirement is relevant and appropriate for the storage and treatment of RCRA listed waste. RCRA fisted waste or characteristic waste may be disposed of in an on-property disposal facility.
Treatment, Storage, and Disposal Facility Contingency Plan and Emergency Procedures RCRA 40 CFR 265.51, .52, and .55 through .56, Subpart D OAC 3745-65-51, 52, and 55 through 56	Each facility operator must have a contingency plan designed to minimize hazards to human health and the environment due to fires, explosions, or any unplanned releases of hazardous waste constituents to air, soil or surface/groundwater.	Relevant and Appropriate	This requirement is relevant and appropriate for the storage and treatment of RCRA listed waste. RCRA listed waste or characteristic waste may be disposed of in an on-property disposal facility.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	GENERAL FACILITY STANDARDS (Continued)		
Treatment, Storage, and Disposal of Hazardous Waste in Miscellaneous Units OAC 3745-57-91 through 93 40 CFR 264.601 through .603	Prevention of any release that may have adverse effects on human health or the environment includes, but is not limited to: A. Migration of waste constituents in the groundwater or subsurface environment. B. Migration of waste constituents in surface water, or wetlands or on the soil surface. C. Migration of waste constituents in the air, Monitoring, tests, analytical data, inspections, response, and reporting procedures and frequencies must ensure compliance with pertinent portions of the OAC. A miscellaneous unit that is a disposal unit must be maintained in a manner that complies with OAC 3745-57-91 during the postclosure care period. If a treatment or storage unit has contaminated soil or groundwater that cannot be completely removed or decontaminated during closure, the unit must also meet the requirements of OAC 3745-57-91 during the postclosure care period. The postclosure plan under OAC 3745-55-18 must specify the procedures that will be used to satisfy this requirement.	Relevant and Appropriate	These requirements are relevant and appropriate to on-site facilities that treat, store, or dispose of hazardous waste in miscellaneous units unless the CAMU Rule is applied.
	GROUNDWATER MONITORING		
Groundwater Monitoring Program RCRA 40 CFR 265.90 Subpart F OAC 3745-65-90	The owner or operator of a surface impoundment, landfill, or land treatment facility which is used to manage hazardous waste must implement a groundwater monitoring program capable of determining the facility's impact on the quality of groundwater in the uppermost aquifer underlying the facility.	Applicable	This requirement is applicable to all interim-status RCRA land-based units and to the disposal of soil containing listed hazardous waste. The Ohio EPA Director's Final Findings and Orders (DFOs) signed September 10, 1993, provides an alternate groundwater monitoring program from 40 CFR 265.92, Subpart F, to integrate the RCRA program with the CERCLA response actions.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	GROUNDWATER MONITORING (Continued)		
Groundwater Protection Standard RCRA 40 CFR 264.92 through .100 Subpart F OAC 3745-54-92 through 100	The owner or operator must ensure that hazardous constituents detected in the groundwater from a regulated unit do not exceed the concentration limits for MCLs in the uppermost aquifer underlying the waste management area beyond the point of compliance during the compliance period. The groundwater monitoring requirements include procedures for detection, compliance, and corrective action monitoring programs.	Relevant and Appropriate	This requirement is relevant and appropriate to land-based units, which would include any remedial action using the on-site disposal facility. However, the FEMP is currently an interim status facility with a Part B Permit application pending.
	CLOSURE UNDER RCRA		
Closure Performance Standard for HWMUs RCRA 40 CFR 265.111 Subpart G OAC 3745-66-11	The owner or operator must close a facility in a manner that: 1) Minimizes the need for further maintenance; and 2) Controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, postclosure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground or surface waters or to the atmosphere; and 3) Complies with these closure requirements.	Applicable	This requirement is applicable to HWMU closures occurring during the remedial action. This requirement is relevant and appropriate to disposal in an on-property disposal facility.
Closure Performance Standard RCRA 40 CFR 265.114 Subpart G OAC 3745-66-14	During the partial and final closure periods, all contaminated equipment, structures, and soil must be clean closed, have risk-based closure, or be closed in place. If the owner or operator demonstrates that not all contaminated soil can be practically removed or decontaminated from a structure or land-based area, then the owner or operator must close the structure or area and perform postclosure care in accordance with the closure and postclosure care requirements that apply (40 CFR 264.310).	Applicable	This requirement is applicable to actions involving removal, treatment or storage of soil contaminated by RCRA constituents from HWMUs.
Storage Area Closure RCRA 40 CFR 264.178 Subpart I OAC 3745-55-78	At closure, all hazardous waste and hazardous waste residues must be removed from the containment system. Remaining containers, liners, bases, and soil containing, or contaminated with hazardous waste, or hazardous waste residues must be decontaminated or removed. If the owner or operator demonstrates that not all contaminated soil can be practically removed or decontaminated from a structure or land-based area, then the owner or operator must close the structure or area and perform postclosure care in accordance with the closure and postclosure care requirements that apply (40 CFR 264.310).	Relevant and Appropriate	This requirement is relevant and appropriate to Operable Unit 5 for handling hazardous waste or environmental media. This requirement is not applicable because the FEMP is currently in interim status; 40 CFR 264 requirements only apply to facilities with a Part B Permit.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	CLOSURE UNDER RCRA (continued)		
Closure of Tank Systems RCRA 40 CFR 265.197 Subpart J OAC 3745-66-97	At closure of a tank system, the owner or operator must remove or decontaminate all waste residues, contaminated containment system components (liners, etc.), contaminated soil, and structures and equipment contaminated with waste, and manage them as hazardous waste. If the owner or operator demonstrates that not all contaminated soil can be practicably removed or decontaminated then the owner or operator must close the tank system and perform postclosure care in accordance with the closure and postclosure care requirements that apply to landfills (40 CFR 264.310).	Relevant and Appropriate	This requirement is relevant and appropriate to RCRA wastes contained in tanks that will be used by Operable Unit 5 during remedial actions.
Contained-In Policy RCRA 59 FR 48092 9/14/93 Proposed rule. 58 FR 59976 11/12/93 Notice to extend comment. 59 FR 10778 3/8/93 Clarification, partial withdrawal.	Hazardous soil means sod that contains RCRA hazardous waste(s) listed in 40 CFR part 261, Subpart D, or that exhibits one or more of the characteristics of a hazardous waste as defined in 40 CFR part 261, Subpart C. This proposed rule recommends contained-in determinations for hazardous debris, hazardous soil and other environmental media. Any person may petition the Regional Administrator to exclude, under 261.(f)(2) or 261.3(g) of this chapter, hazardous debris and hazardous soil or other environmental media, including but not limited to groundwater, surface water, and sediment, from regulation as hazardous waste. The petition for a contained-in determination must include information sufficient to demonstrate that specific constituent concentrations in the hazardous debris, hazardous soil, or other environmental media to be excluded do not pose a hazard to human health and the environment at that site. (Such a petition is not necessary for remedial actions conducted pursuant to RCRA or CERCLA authorities provided that a similar determination is made by the Regional Administrator based on information substantially equivalent to the information listed below including public notice and comment requirements).	TBC	Policies are not promulgated and therefore cannot be ARARs. This policy will be considered for managing treated soil that is contaminated with RCRA waste.
Risk-Based Remediation Standards Ohio EPA Closure Plan Review Guidance for RCRA Facilities. Interim Final. 9/1/93	Federal regulations of May 2, 1986 (50 FR 16422) and March 19, 1987 (52 FR 8704) modified the closure performance Standard such that risk assessment, or what constitutes "decontamination" of a site, may be considered by the EPA as a closure option. The OEPA adopted the equivalent of the EPA's March 19, 1987, regulations on December 8, 1988 (see OAC 3745-67-28), clarifying that risk assessment may be an option. It is OEPA and Dept. of Hazardous Waste Management practice to consider risk assessment as a possible third option for closure for all types of units.	TBC	The use of risk-based closures is to be considered for closing HWMUs with media contamination as integrated with the CERCLA remedial action.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	LANDFILL CLOSURE AND CORRECTIVE ACTION		
Corrective Action Management Unit RCRA 40 CFR 264.552 Subpart S 58 FR 865829 2/16/93	Corrective action management unit or CAMU means an area within a facility that is designated by the Regional Administrator under part 264 Subpart S, for the purpose of implementing corrective action requirements under Sec. 264.101 and RCRA Section 3008(h). A CAMU shall only be used for the management of remediation wastes pursuant to implementing such corrective action requirements at the facility. For the purpose of implementing remedies under See. 264.101 or RCRA Section 3008(h), the Regional Administrator may designate an area at the facility as a corrective action management unit, as defined above. One or more CAMUs may be designated at a facility under the following conditions: 1) Emplacement of remediation wastes into or within a CAMU does not constitute land disposal of hazardous wastes. 2) Consolidation or emplacement of remediation wastes into or within a CAMU does not constitute creation of a unit subject to minimum technology requirements. The owner/operator shall provide sufficient information to enable the Regional Administrator to designate a CAMU in accordance with the criteria in Sec. 264.552. Note: RCRA regulated units (HWMUs) within a CAMU are fully subject to RCRA closure regulations.	Applicable	The CAMU concept is applicable to the remedial action for RCRA wastes. "Placement" as defined in HSWA does not occur in a CAMU. Therefore, land disposal restrictions (LDRs) and minimum technology requirements (MTRs) are not "triggered" as ARARs during and after the remedial activity within the boundaries of the CAMU.
Postclosure Care RCRA 40 CPR 265.117 Subpart G OAC 3745-66-17	Postclosure care for each hazardous waste management unit must begin after completion of closure of the unit and continue for 30 years after that date and must consist of at least the following: 1) Monitoring and reporting in accordance with the requirements of Subparts F,K,L,M,N, and X of this part; and 2) Maintenance and monitoring of waste containment systems in accordance with the requirements of Subparts F,K,L,M,N, and X of this part. Postclosure use of property on or in which hazardous wastes remain after partial or final closure must never be allowed to disturb the integrity of the final cover, liner(s), or any other component of the containment system, or the function of the facility's monitoring systems. If clean closure is performed then postclosure care is not required.	Applicable	This requirement is applicable to the closure of existing HWMUs.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	LANDFILL CLOSURE AND CORRECTIVE ACTION (Continued)		
Minimum RCRA Landfill Design Requirements for Closure RCRA 40 CFR 265.310 Subpart N OAC 3745-68-10	At final closure of the landfill or upon closure of any cell, the owner or operator must cover the landfill or cell with a final cover designed and constructed to: 1) Provide long-term minimization of migration of liquids through the closed landfill; 2) Function with minimum maintenance; 3) Promote drainage and minimize erosion or abrasion of the cover; 4) Accommodate settling and subsidence so that the cover's integrity is maintained; and 5) Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoil present. After final closure, the owner of operator must comply with all postclosure requirements, including maintenance and monitoring throughout the postclosure care period. The owner or operator must: 1) Maintain the integrity and effectiveness of the final cover, including making repairs to the cap as necessary to correct the effects of settling, subsidence, erosion, or other events; 2) Continue to operate the leachate collection and removal system until leachate is no longer detected; 3) Maintain and monitor the leak detection system; 4) Maintain and monitor the groundwater monitoring system; 5) Prevent run-on and runoff from eroding or otherwise damaging the final cover; and 6) Protect and maintain surveyed benchmarks.	Relevant and Appropriate	This requirement is relevant and appropriate for on-property disposal of material that may contain RCRA waste. This requirement is not applicable because tho FEMP is currently in interim status; 40 CFR 264 requirements only apply to facilities with a Part B Permit.
RADIOACTIVE WASTES			
	MANAGEMENT AND DISPOSAL OF URANIUM MILL TAILINGS		
Landfill Requirements AEA/UMTRCA 40 CFR 192.02(a) Subpart A	Control of residual radioactive material shall be designed to be effective for up to 1000 years, to the extent reasonably achievable, and in any case, for at least 200 years, and provide protection of groundwater.	Relevant and Appropriate	The requirement is relevant and appropriate for residual radioactive materials because they are sufficiently similar to contaminated soil and sediment being addressed by Operable Unit 5. This requirement will be met as a general performance Standard for on-property or off-site disposal.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	MANAGEMENT AND DISPOSAL OF URANIUM MILL TAILINGS (Continued)		
Implementation of Standards in 40 CFR 192, Subparts A and B AEA/UMTRCA 40 CFR 192.20 Subpart C-	Implementing agencies shall establish methods and procedures to provide reasonable assurance that the provisions of Subparts A (above) and B (Table B. 1) are satisfied. This should be done through use of analytical models and site-specific analyses for Subpart A, and through measurements performed within the accuracy of currently available types of field and laboratory instruments along with reasonable survey and sampling procedures. This includes measuring the flow rate of uranium and groundwater.	Relevant and appropriate	This requirement is relevant and appropriate for ensuring compliance with 40 CFR 192 Subparts A and B. Note that Subpart B is listed as an ARAR in the chemical-specific ARAR table, B.1.
Management of Uranium By-Product Materials AEA/UMTRCA 40 CFR 192.30 through .34 Subpart D	This subpart applies to the management of uranium by-product materials under Section 84 of the Atomic Energy Act of 1954, as amended, during and following processing of uranium ores, and to restoration of disposal sites following any use of such sites under Section 83(b)(1)(B) of the Act. Uranium, by-product materials shall be managed to conform with groundwater protection, which includes detection monitoring. Subpart D(iv) allows for alternate concentration limits of uranium to be established, as described in 264.95 and 264.94(b)	Relevant and Appropriate	This requirement is for disposal areas at active uranium mill tailing sites, and is a relevant and appropriate requirement for the engineered disposal facility.
	LOW-LEVEL RADIOACTIVE WASTE DISPOSAL		
Performance Objectives DOE Order 5820.2A, Chapter III (3)(a)	Performance objectives must: 1) Protect public health and safety in accordance with standards specified in applicable EH Orders and other DOE Orders. 2) Assure that external exposure to the waste and concentrations of radioactive material which may be released into surface water, groundwater, soil, plants and animals results in an effective dose equivalent that does not exceed 25 mrem/yr to any member of the public. Releases to the atmosphere shall meet the requirements of 40 CFR 61. Reasonable effort should be made to maintain releases of radioactivity in effluents to the general environment ALARA. 3) Assure that the committed effective dose equivalents received by individuals who inadvertently may intrude into the facility after the loss of active institutional control (100 years) will not exceed 100 mrem/yr for continuous exposure or 500 mrem for a single acute exposure. 4) Protect groundwater resources consistent with federal, state, and local requirements.	TBC	Residual radioactivity at the site above background could result in exposures to members of the public.
Disposal Methods DOE Order 5820.2A, Chapter III, (3)(i)(1)-(6)	Low-level radioactive waste shall be disposed of by methods appropriate to achieve the performance Standard objectives in (3)(a) above, consistent with the radiation dose limits in paragraph (3)(b)	TBC	This requirement is a TBC because it is not promulgated. It will be considered for on-site disposal.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	LOW-LEVEL RADIOACTIVE WASTE DISPOSAL (Continued)		
Disposal Facility and Disposal Site Design DOE Order 5820.2A, Chapter III (3)(i)(8)	Design criteria shall be established prior to selection of new disposal facilities, new disposal sites, or both. These design criteria shall be based on analyses of physiographic, environmental, and hydrogeologic data to assure that the policy and requirements of this Order can be met. The criteria shall also be based on assessments of projected waste volumes, waste characterizations, and facility and disposal site performance.	TBC	This requirement is a TBC because it is not promulgated. It will be considered for on-site disposal.
Disposal Facility Operations DOE Order 5820.2A, Chapter III (3)(i)(9)	Operating procedures shall provide security, minimum long-term control, closure/postclosure, markers for excavations, and training.	TBC	This requirement is a TBC because it is not promulgated. It will be considered for on-site disposal.
	MANAGEMENT OF LOW-LEVEL RADIOACTIVE WASTE		
Prohibits commingling of Low-Level Radioactive Wastes with Solid Waste ORC 3734.02.7 (A)(B)	Commingling of low-level radioactive waste with solid waste at a nonlicensed facility under the Atomic Energy Act of 1954 is prohibited, even if the radioactive waste is below regulatory concern.	Applicable	Low-level radioactive waste to be shipped for off-site disposal will only be sent to facilities licensed under the Atomic Energy Act of 1954.
Low-level Radioactive Waste Generation DOE Order 5828.2A, Chapter III (3)(c)	Technical and administrative controls shall be directed to reducing the gross volume of waste generated and/or the amount of radioactivity requiring disposal. Waste reduction efforts shall include consideration of process modification, process optimization, materials substitution, and decontamination. All DOE low-level waste generators shall establish auditable programs to assure that the amount of low-level waste generated and/or shipped for disposal is minimized. Each DOE low-level waste generator shall separate uncontaminated waste from low-level waste to facilitate cost-effective treatment and disposal. Each DOE low-level waste generator preparing a design for a new process or process change shall incorporate principles into the design that will minimize the generation of low-level waste.	TBC	This requirement is a TBC because it is not promulgated. It will be considered for on-site disposal.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	MANAGEMENT OF LOW-LEVEL RADIOACTIVE WASTE (Continued)		
Waste Treatment DOE Order 5820.2A, Chapter III (3)(f)	Waste shall be treated by appropriate methods so that the disposal site can meet the performance objectives stated in DOE Order 5820.2A Chapter III (3)(a). Waste treatment techniques such as incineration, shredding, and compaction to reduce volume and provide more stable waste forms shall be implemented as necessary to meet performance requirements. Use of waste treatment techniques to increase the life of the disposal facility and improve the long-term facility performance, by improved site stability and reduction of infiltrating water, is required to the extent it is cost effective. The development of large scale waste treatment facilities shall be supported by the appropriate National Environmental Policy Act documentation. Operation of waste treatment facilities shall be supported by adequate documentation.	TBC	This requirement is a TBC because it is not promulgated. It will be considered for on-site disposal.
Low-Level Radioactive Waste Shipment DOE Order 5820.2A, Chapter III (3)(g)	The volume of waste and number of shipments of low-level waste shall be minimized and the shipments conducted based on plans developed by field organizations. Generators must receive advance approval from the receiving facility and shall certify before shipment that waste meets the receiving facility waste acceptance criteria (WAC). The certification program shall be auditable and able to withstand independent review.	TBC	This requirement is not an ARAR because it is not promulgated.
Long-Term Storage DOE Order 5820.2A, Chapter III (3)(h)	Requires achieving performance objectives of DOE 5820.2A III (3)(a); requires records and documentation be maintained for low-level waste in storage; permits storage of waste until disposal by approved methods.	TBC	This requirement is not an ARAR because it is not promulgated.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	MANAGEMENT OF LOW-LEVEL RADIOACTIVE WASTE (Continued)		
Disposal Site Closure/Postclosure DOE Order 5820.2A, Chapter III (3)(j)	Site-specific comprehensive closure plan s shall be developed for new and existing operating low-level waste disposal sites. The plan shall address closure of disposal sites within a 5-year period after each is filled and shall conform to the requirements of the NEPA process. Performance objectives for existing disposal sites shall be developed on a case-by-case basis as part of the NEPA process. During closure and postclosure, residual radioactivity levels for surface soil shall comply with existing DOE decommissioning guidelines. Corrective measures shall be applied to now disposal sites or individual disposal units if conditions occur or are forecasted that could jeopardize attainment of the performance objectives of this Order. Inactive disposal facilities, disposal sites, and disposal units shall be managed in conformance with RCRA, CERCLA, and the Superfund Amendments and Reauthorization Act (SARA). Closure plans for new and existing operating low-level waste disposal facilities shall be reviewed and approved by the appropriate field organization. Termination of monitoring and maintenance activity at closed facilities or sites shall be based on an analysis of site performance at the end of the institutional control period.	TBC	This requirement is not an ARAR because it is not promulgated.
Environmental Monitoring DOE Order 5820.2A, Chapter III (3)(k)	Each operational or nonoperational low-level waste disposal facility shall be monitored by an environmental monitoring program that conforms with DOE 5484.1 and, at a minimum, meets the requirements listed below: 1) The environmental program shall be designed to measure: a) Operational effluent releases; b) Migration of radionuclides; c) Disposal units subsidence; d) Changes in disposal facility and disposal site parameters which may affect long-term site performance. 2) Based on the character of the facility monitored, the environmental monitoring program may include, but not necessarily be limited to, monitoring surface soil, air, surface water, and subsurface soil and water, both in the saturated and unsaturated zones. 3) The monitoring program shall be capable of detecting changing trends in performance far enough in advance to allow application of any necessary corrective action before exceeding performance objectives. The monitoring program shall be able to ascertain whether or not effluents from each treatment, storage, or disposal facility or disposal site meets the requirements of applicable DOE Orders.	TBC	This requirement is not an ARAR because it is not promulgated.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
UNDERGROUND STORAGE TANKS (USTs)			
	UST CLOSURE		
General Requirements RCRA 40 CFR 280.61 through .66 Subpart F OAC 1301:7-7-36	Owners and operators of petroleum or hazardous substance UST systems must, in response to a confirmed release from the UST system, comply with abatement measures, site characterization, product removal, investigations for soil and groundwater cleanup, and corrective action plans, except for USTs excluded under 280.10(b) and UST systems subject to RCRA Subtitle C corrective action requirements under Section 3004(u) of the RCRA, as amended.	Applicable	Petroleum USTs will be closed as part of site-wide remedial actions.
Ohio Petroleum Contaminated Soil Policy OEPA Policy PP 01 03 200 PP.01-03-200	The basis of the "contained in" policy is that environmental media, such as soil or groundwater, are not considered to be waste material. Because they are not a solid waste, the mixture rule, as set forth in OAC 3745-51-03, does not apply when they become contaminated with a listed hazardous waste but only contains the waste. The result of this policy is that if the waste constituents can be removed, the soil is no longer considered to contain a hazardous waste. Therefore, since soil is not a waste material it does not have to be delisted in order for it to be used for its intended purpose. However, as long as the soil contains the waste material, it must be managed as a hazardous waste. If this concept is applied to petroleum-contaminated soil, the soil containing a petroleum hydrocarbon would not need to be managed as a solid waste if the contaminants was removed.	TBC	This policy allows for treated/cleaned soil to be backfilled at the excavation site. Operable Unit 5 will consider this policy for all soil treated below final remediation levels to be backfilled as clean soil.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	BEST MANAGEMENT PRACTICES PROGRAM		
Best Management Practices (BMP) Programs Clean Water Act 40 CFR 125.104 Subpart K	BMP programs shall be developed in accordance with good engineering practices and: 1) Be documented in narrative form and include any necessary plot plans, drawings or maps; 2) Establish specific objectives for the control of toxic and hazardous pollutants: (a) Each facility component or system shall be examined for its potential for causing a release of significant amounts of toxic or hazardous pollutants to waters of the United States due to equipment failure, improper operation, natural phenomena such as rain or snowfall, etc. (b) Where experience indicates a reasonable potential for equipment failure (e.g., a tank overflow or leakage), natural condition (e.g., precipitation), or other circumstances to result in significant amounts of toxic or hazardous pollutants reaching surface waters, the program should include a prediction of the direction, rate of flow and total quantity of toxic or hazardous pollutants which could be discharged from the facility as a result of each condition or circumstance; 3) Establish specific BMPs to meet the objectives identified in (2) above, addressing each component or system capable of causing a release of significant amounts of toxic or hazardous pollutants to the waters of the United States.	Applicable	Substantive requirements of this regulation are applicable to any release of contaminants to waters of the United States if BMPs are not implemented.
AIR			
	AIR EMISSION STANDARDS FROM A STATIONARY SOURCE		
Air Emissions from Hazardous Waste Facilities ORC 3734.02 (1)	Emissions from a hazardous waste facility will not cause, or allow, any particulate matter, dust fumes, gas, mist, smoke, vapor, or odorous substance to interfere with the comfortable enjoyment of life for those individuals living near, or working in the vicinity of the facility, or that is injurious to public health.	Applicable	This requirement is applicable for the use of a hazardous waste facility which produces air emissions.
Air Emission Standards for Process Vents RCRA 40 CFR 264-1030, .1032 through .1034 Subpart AA	This subpart applies to process vents associated. with distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operations that manage hazardous wastes with organic concentrations of at least 10 ppm.	Applicable	This requirement is applicable for treating soil contaminated with RCRA waste.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	AIR EMISSION STANDARDS FROM A STATIONARY SOURCE (Continued)		
Malfunction and Maintenance of Air Pollution Control Equipment OAC 3745-15-06 (A)(1) and (A)(2)	Scheduled maintenance must be established for pollution control equipment, as well as time periods when the pollution source must be shut down during maintenance.	Applicable	This requirement is applicable for any remedial action that will use air pollution control equipment on site.
Stack Height Requirements OAC 3745-15-12 (13) and (C)	Stack height for air contaminant sources must be based on good engineering practices.	Applicable	The use of low-temperature thermal desorption must meet this requirement.
	STATIONARY SOURCE AIR EMISSIONS		
General Provisions on Air Pollution Control OAC 3745-15-07 ORC 3704.01-.05	Measures shall be taken to adopt and maintain a program for the prevention, control, and abatement of air pollution in order to protect and enhance the quality of the state's air resource so as to promote the public health, welfare, and economic vitality of the people of the state. The emission or escape into open air from any source whatsoever of smoke, ashes, dust, dirt, grime, acids, fumes, gases, vapors, odors and combinations of the above in such a manner or in such amounts as to endanger the health, safety, and welfare of the public, or to cause unreasonable injury or damage to property shall be declared to be a public nuisance. It is unlawful for any person to cause, permit, or maintain any such public nuisance.	Applicable	During the remedial action, the potential exists for emissions of radionuclides and toxic chemicals to air, which might endanger individuals or damage property.
Installation and Modification of Air Contaminant Sources OAC 3745-31-05(A)(3)	Now or modified air contaminant sources are required to employ best available technology to control emissions	Applicable	This requirement is applicable to the construction or modification of air contaminant sources.
Control of Emissions of Organic Materials from Stationary Sources OAC 3745-21-07(G)(2)	Discharges containing organic material must not exceed 40 pounds in any one day, nor eight pounds in any one hour, unless the discharge has been reduced by at least 85%.	Applicable	This requirement is applicable to the discharge of organic emissions.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	FUGITIVE AIR EMISSION STANDARDS		
Visible Particulates in Air EPA Regulations on National Primary and Secondary Ambient Air Quality Standards 40 CFR 50.6(a),(b),(c) Ohio Ambient Air Quality OAC 3745-17-07 (A)	The level of the national primary and secondary 24-hour ambient air quality standards for particulate matter is a 150 :g/m 3, 24-hour average concentration. Visible particulate emissions from any stack may exceed 20% opacity, as a six-minute average, for not more than six consecutive minutes in any 60 minutes, but shall not exceed 60% opacity, as a six-minute average, at any time. The standards for national primary and secondary standards must be #50 :g/m 3, annual arithmetic average. Particulate matter shall be measured in the gradient air as PM 10 (particles with an aerodynamic diameter less than or equal to a nominal 10 :m).	Applicable	The federal standard at 40 CFR 50.6 for particulate matter in air is applicable to remedial actions at Operable Unit 5 because remedial activities may contribute, at least temporarily, to particulate matter in the air. Particulate emissions may be generated through fugitive emissions from excavations and disposal activities and point source discharges from wastewater sludge dewatering or soil treatment/stabilization. The Ohio standard for particulates in air is not an ARAR because it is not more stringent than the federal standard at 40 CFR 50.6
Particulate Ambient Air Quality Standards OAC 3745-17-02 (C)(D)	The level of ambient air quality standards for total suspended particles is a 150 :g/m 3, 24-hour average concentration. The level of the primary and secondary annual standards for total suspended particulates is 50 :g/m 3.	Applicable	This requirement is applicable for the escape of particulates. This includes excavation, demolition, cleaning and scrubbing.
Particulate Non-Degradation Policy OAC 3745-17-05	Degradation of air quality in any area where the air quality is better than required in 3745-27-02 (described above) is prohibited.	Applicable	See comment above.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	FUGITIVE AIR EMISSION STANDARDS (Continued)		
Control of Visible Particulate Emissions for Fugitive Dust OAC 3745-17-07 (B)(4),(5),(6)	There shall be no visible particulate emissions from any paved roadway or parking area except for a period of time not to exceed six minutes during any 60-minute observation period. There shall be no visible particulate emissions from any unpaved roadway or parking area except for a period of time not to exceed 13 minutes during any 60-minute observation period. There shall be no visible particulate emissions from any material storage piles except for a period of time not to exceed 13 minutes during any 60-minute observation period.	Relevant and Appropriate	Paved and unpaved roadways, parking areas, and material storage piles will be in use during the remedial action. This requirement is not applicable as the FEMP is not located within a city or township subject to the rule; however, the requirement is relevant and appropriate for site activities during the remedial action. Grading, loading, and construction operations will occur during soil excavation, soil backfilling and during construction and capping of the disposal facility.
Ambient Air Quality Standards for Non-methane Hydrocarbons OAC 3745-21-02(C) and OAC 3745-21-03(D)	The ambient air quality guidelines for nonmethane hydrocarbons is a maximum three hour arithmetic mean concentration of 160 :g/m 3, not to be exceeded between the hours of six and nine a.m. Hourly and three-hour concentrations must be determined in accordance with prescribed methods.	Applicable	These requirements are applicable to hydrocarbon emissions.
Restriction of Emission of Fugitive Dust OAC 3745-17-08 (B)	No person shall cause or permit any fugitive dust source to be operated; or any materials to be handled, transported, or stored; or a building (or its appurtenances) or a road to be used, constructed, altered, repaired, or demolished without taking or installing reasonably available control measures to prevent fugitive dust from becoming airborne. Such reasonably available control measures shall include, but are not limited to, one or more of the following which are appropriate to minimize or eliminate visible particulate emissions of fugitive dust. - The use of water or other suitable dust suppression chemicals for the control of fugitive dust from the demolition of existing buildings or structures, construction operations, the grading of roads, or the clearing of land; or - The periodic application of asphalt, oil, water, or other suitable dust suppression chemicals on dirt or gravel roads and parking lots, and any other surfaces that may cause emissions of fugitive dust.	Relevant and Appropriate	This requirement is not applicable as the FEMP is not located within a city or township subject to the rule; however, the requirement is relevant and appropriate for site activities during the remedial action. Grading, loading, and construction operations will occur during soil excavation, soil backfilling and construction of the disposal facility.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
SOLID WASTES			
	SOLID WASTE DISPOSAL		
Facility Design Criteria OAC 3745-27-08 (C)(1) through (9); (D) through (H) 40 CFR 258.40 Subpart D	Prescriptive engineering design specifications must be followed for the solid waste landfill facility, including requirements for finer specifications, leachate management systems, leachate storage, surface water control, benchmark location, access road grading, groundwater control, explosive gas monitoring systems and structures, composite and alternate cap systems, and the final cover.	Applicable	These requirements are applicable to the on-site disposal facility. The prescriptive requirements needed for construction of a solid waste landfill will be performed. The OAC requirements are more stringent than the federal requirements, and therefore become the pertinent ARAR. Certification is not required as specified in OAC 3745-27-08 (A) and (B) because the FEMP is a CERCLA site. However, the substantive requirements will be met.
Open dumping or burning ORC 3734.03 OAC 3745-27-05 40 CFR Part 257.3-7	Open dumping or burning of solid waste or infectious wastes is prohibited.	Applicable	This requirement is applicable to site remediation.
	SOLID WASTE DISPOSAL FACILITY OPERATIONS		
Facility Operations OAC 3745-27-09 (C), (D) through (F); (K) through (Q)	Solid waste landfill facility operations requirements.	Applicable	These requirements are applicable to the on-site disposal facility.
Daily Facility Operations OAC 3745-27-09 (C) through (E), (F)(2); (J) through (R) OAC 3745-27 19	This requirement specifies procedures for daily landfill operations and maintenance and the types of waste that are acceptable.	Applicable	These requirements are applicable to the on-site disposal facility.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	SOLID WASTE DISPOSAL FACILITY OPERATIONS (Continued)		
Required Technical Information OAC 3745-7-06 (A)(B) and (C)	The minimum technical information required for a solid waste permit to install. Included are a hydrogeologic investigation report, leachate production and migration information, surface water discharge information, design calculations, and plan drawings.	Applicable	This paragraph presents the substantive requirements of a solid waste permit to install. This requirement is applicable for a new solid waste landfill facility. This rule establishes the minimum information required during the remedial design stage.
Ohio Solid Waste Disposal Regulations OAC 3745-27-19(N)	Section 3745-27-19(N) states the permittee shall submit to the Director of the OEPA, upon every 10th anniversary of the effective date of a permit to install that approved the initial construction of the facility, an analysis demonstrating that the design, construction and final closure plan of the solid waste landfill facility continue to constitute the best available technology. If the director of the OEPA determines that the design is no longer consistent with best available technology as being applied to the solid waste landfill industry in the state of Ohio, the permittee may be required to submit a permit to install application for necessary modifications to the landfill facilities. If a permit to install is required, the director of the OEPA shall not apply the siting criteria outlined in paragraph (H) of OAC 3745-27-07 when considering the permit to install application.	Relevant and Appropriate	A permit-to-install is not required for the siting of an on-property landfill at the FEMP because it is a CERCLA site. However, the substantive requirements will be met through the CERCLA 5-year review process.
	SOLID WASTE DISPOSAL FACILITY CLOSURE		
Final Closure of Solid Waste Landfill Facilities OAC 3745-27-11 (A),(B); (G)(1) through (3), (7)	It is the responsibility of the permittee to complete final closure of the solid waste landfill facility in a manner that minimizes the need for further maintenance and minimizes postclosure formation and release of leachate and explosive gases to air, soil, groundwater, or surface water to the extent necessary to protect human health and the environment. The adequacy of closure methods must be approved by OEPA for cap design, soil barrier layer, granular drainage layer and vegetative cover,	Applicable	These requirements are applicable to the on-site disposal facility.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	SOLID WASTE DISPOSAL FACILITY CLOSURE (Continued)		
Postclosure Care of Solid Waste Landfill Facilities OAC 3745-27-14 (A)(1),(2) RCRA Subtitle D	Following completion of final closure activities in accordance with Rule 3745-27-11 of the Administrative Code, the owner or operator shall conduct postclosure care activities at the solid waste landfill facility for a minimum of 30 years. Postclosure care activities for all solid waste landfill facilities shall include, but are not limited to: (1) Continuing operation and maintenance of the leachate management system, the surface water management system, any explosive gas extraction and/or control system, any explosive gas monitoring system, and the groundwater monitoring system; and (2) Maintaining the integrity and effectiveness of the cap system, including making repairs as necessary to correct the effects of settling, dead vegetation, subsidence, erosion, or other events, and preventing run-on and runoff from eroding or otherwise damaging the cap system.	Applicable	These requirements are applicable to the on-site disposal facility.
Postclosure Care EPA Criteria for Municipal Solid Waste Landfills 40 CFR §258.61	This requirement allows the State Director to direct the owner or operator to stop managing leachate if the owner or operator demonstrates that leachate no longer poses a threat to human health and the environment.	Applicable	These requirements are applicable to the on-site disposal facility
WATER			
	SURFACE WATER		
Pollution to Waters of the State ORC 6111.04	Pollution to waters of the state is prohibited.	Applicable	This requirement is applicable to any discharge to waters of the state.
Compliance with Water Pollution Control Requirements ORC 6111.07 (A)(C)	Failure to comply with water pollution control requirements is prohibited.	Applicable	See comment above.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	SURFACE WATER (Continued)		
Ohio NPDES Permits CWA OAC 3745-33-05 ORC 6111.042 40 CFR 122.41 Subpart C	The point source must be equipped with instrumentation to monitor and record data and other information about the operation of the point source. The permittee shall maintain in good working order and operate at optimum levels in accordance with good engineering practices any wastewater treatment facilities or control systems regardless of the quality of the effluent. The permittee shall provide adequately trained and qualified personnel to operate the wastewater treatment facility.	Applicable	The Ohio NPDES permit is applicable because these requirements are more stringent than the federal regulations under the Clean Water Act. These requirements are applicable for point source discharges to the Great Miami River.
Storm Water Discharges Associated with Industrial Activity 40 CFR 122.26(a)(1)(ii) 40 CFR 122.26(b)(4) and OAC 3745-38	A discharge composed entirely of storm water associated with industrial activity must obtain a NPDES permit. These categories of facilities are considered to be engaging in "'industrial activity": - Landfills, land application sites, and open dumps that receive or have received any industrial wastes (waste that is received from any of the facilities described under this subsection), including those that are subject to regulation under Subtitle D of RCRA; and - Construction activities including clearing, grading, and excavation that disturbs five acres or more of total land area.	Applicable	The Ohio NPDES permit is applicable because these requirements are more stringent than the federal regulations under the Clean Water Act. These requirements are applicable for point source discharges to the Great Miami River.
Antidegradation Policy OAC 3745-1-05 CWA 40 CFR 131.12	Existing instrearn water uses as defined in Rule 3745-1-07 of the Administrative Code and designated in Rules 3745-1-08 to 3745-1-32 of the Administrative Code, shall be maintained and protected. No further water quality degradation which would interfere with or become injurious to existing designated uses is allowable.	Applicable	This requirement is applicable for wastewater discharges to the Great Miami River, Under CERCLA, the State of Ohio has the overriding authority for the antidegradation of surface waters.
Analytical and Collection Procedures OAC 3745-01-03	Analytical methods and collection procedures for surface water discharge sampling are specified.	Applicable	This requirement is applicable to both discharges to surface waters as a result of remediation and any on-site surface waters affected by site conditions.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	SURFACE WATER (Continued)		
National Pollutant Discharge Elimination System; Wastewater Discharges Resulting From Clean-up of Response Action Sites Contaminated with Volatile Organic Compounds OEPA Policy #DSW-DERR 0100.027	Establishes response action guidelines for treatment technologies and discharge criteria for VOCs to be discharged to surface water.	TBC	This OEPA policy provides guidance for wastewater discharges which contain VOCs.
	GROUNDWATER MONITORING		
Monitoring Well System OAC 3745-27-10 (A) and (B)	Groundwater monitoring program requirements of new landfill facilities include background monitoring, detection monitoring and postclosure monitoring. The groundwater monitoring system will consist of a sufficient number of wells installed at appropriate locations and depths to yield groundwater samples from both the uppermost aquifer system and any significant zones of saturation.	Applicable	These requirements are applicable to the on-site disposal facility.
Groundwater Monitoring Program OAC 3745-27-10 (C) and (D)	Sampling and analyses procedures must be designed to provide accurate representation of groundwater quality at the background and downgradient wells. Sampling and analysis procedures must be documented in a written plan. If the landfill facility owner deviates from the monitoring parameters listed in OAC 3745-27-10 (D)(3) to (D)(6), then an alternate list may be proposed to the Director. In addition, a written quality assessment program must be prepared.	Applicable	These requirements are applicable to the on-site disposal cell. An alternate list of monitoring parameters will be required from those specified in OAC 3745-27-10(D)(3) to (D)(6).
Groundwater Quality Assessment Program OAC 3745-27-10 (E) and (P)	If a statistically significant change from background levels is identified for each parameter or constituent being monitored, then the landfill owner must submit a quality assessment program within 15 days. The plan must determine: (1) If leachate or leachate-derived constituents have entered the groundwater (2) The rate and extent of migration of leachate or leachate-derived waste in the groundwater (3) The concentrations of leachate. or leachate-derived waste in groundwater.	Applicable	These requirements are applicable to the on-site disposal facility.
Corrective Measures Study 3745-24-19(F)	After 180 days of determining that contaminants have leached from the landfill, a corrective measures study must be submitted to OEPA. Remediation must include meeting MCLs in groundwater for a risk-level of 1 x 10-6 for a cumulative lifetime risk to an individual.	Applicable	These requirements are applicable to the on-site disposal facility.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED) REMEDY

Citation	Requirement	ARAR/TBC	Remarks
GROUNDWATER WELLS			
	INJECTION		
Unauthorized Injection into Groundwater OAC 3745-34-07	Movement of fluid into underground sources of drinking water that contains a contaminant which may cause a violation of any primary drinking water regulation under OAC 3745-8 is prohibited.	Applicable	This requirement is applicable to injection of groundwater.
Injection of Class IV Wells OAC 3745-34-08	Injection of hazardous or radioactive waste in Class IV wells is prohibited unless approved by the Director pursuant to provisions for cleanup of releases under Chapter 3734 of the Revised Code, CERCLA (42 U.S.C. 9601-9657), or RCRA (42 U.S.C. 6901-6987).	Applicable	This requirement is applicable to injection of groundwater.
Underground Injection Control Program OAC 3745-34-01 OAC 3745-34-13	Injection into existing and new Class V wells is authorized by rule pursuant to Section 6111.043 of the Ohio Revised Code until further requirements under future rules become applicable, unless injection is of sewage, industrial wastes or other wastes, as defined in Section 6111.01 of the Ohio Revised Code, into or above an underground source of drinking water.	Applicable	This requirement is applicable to the reinjection of treated groundwater into the GMA rather than discharging it to the Great Miami River.
Injection of Wastes into Wells ORC 6111.043 ORC 6111.044 to ORC 611.049	These sections of the Ohio Revised Code establish a program for regulations of the injection of sewage, industrial waste, hazardous waste, and other wastes into wells in order to control pollution of the waters of the state, to prevent contamination of underground sources of drinking water, and to satisfy all requirements of the Safe Drinking Water Act regarding injection wells as defined in regulations adopted under that act.	Applicable	This requirement is applicable to the reinjection of treated groundwater into the GMA rather than discharging it to the Great Miami River.
OEPA Policy 5X26 Aquifer Remediation Projects	This OEPA policy outlines requirements for groundwater remediation via subsurface injection of fluids.	TBC	This OEPA policy will provide guidance for the reinjection of treated groundwater into the GMA.
	WELL CONSTRUCTION		
Water Pollution from a Solid Waste Disposal Facility 40 CFR 257-33	Water pollution from a solid waste disposal facility is prohibited.	Applicable	This requirement is applicable for the on-property disposal facility.
Siting Monitoring Wells OAC 3745-9-04 (A)	New wells should be located where they can be maintained, and where protection of groundwater, human health and the environment is maintained,	Applicable	This requirement is applicable for the installation of new wells.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	WELL CONSTRUCTION (Continued)		
Monitoring Well Construction OAC 3745-9-05 (A)(1) and (B) through (H); 06 (A)(B)(D) and (E); 07 (A), (B), (C), (E), and (F)	New wells must be constructed with the specified criteria of this requirement to avoid contamination of groundwater.	Applicable	See comment above.
Pumping Wells OAC 3745-9-08 Paragraph (C)	Pumps may only be primed with potable water.	Applicable	This requirement is applicable for all well pumps that require priming.
Monitoring Well Maintenance and Modification OAC-3745-9-09 (A) through (C), and (E) through (G)	Monitoring wells must be maintained or modified to avoid cross-contamination of groundwater.	Applicable	This requirement is applicable for all groundwater wells.
	WELL ABANDONMENT		
Abandonment of Test Holes and Wells OAC 3745-09-10	Upon completion of testing, a test hole shall be either completely filled with grout or such other material as will prevent contaminants from entering groundwater.	Applicable	This requirement is applicable to all groundwater wells on the site that either will be installed or have been installed since February 15, 1975.
POLYCHLORINATED BIPHENYLS (PCBS)			
	PCB DISPOSAL		
Disposal Requirements TSCA 40 CFR 761.60(a)(4) Subpart D	Any nonliquid PCBS at concentrations 50 ppm or greater in the form of contaminated soil, rags, or other debris shall be disposed of in an incinerator or in a chemical waste landfill.	Applicable	In the event soil containing PCBS above 50 ppm is excavated, this requirement is applicable. PCBS were detected in soil beneath the fire training facility.

TABLE B.3 (Continued)
ACTION-SPECIFIC REQUIREMENTS FOR THE OPERABLE UNIT 5 SELECTED REMEDY

Citation	Requirement	ARAR/TBC	Remarks
	PCB TREATMENT		
TSCA 40 CFR 761.60(e) Subpart D	Any person who is required to incinerate PCBS or PCB items under this subpart and who can demonstrate that an alternate method of destroying PCBS or PCB items can achieve a level of performance equivalent to the requirements under 40 CFR 761.70 may submit a written request to either the Regional Administrator or the Director, Exposure Evaluation Division, for an exemption from the incineration requirements of 761.70 or 761.60. The applicant must show that the alternate method of destroying PCBS will not present an unreasonable risk of injury to health or the environment.	Applicable	This requirement is applicable only if PCB contaminated soil is greater than 50 ppm and is treated on-property using a method besides incineration.
	PCB STORAGE		
Storage for Disposal TSCA 40 CPR 761.65 Subpart D	This section applies to the design of storage areas to be used for later disposal of PCBS at concentrations of 50 ppm or greater.	Applicable	This requirement is applicable for storage of PCB-contaminated soil at 50 ppm or greater.
OTHER REGULATIONS			
	NOISE CONTROL		
Noise Control Act, as amended 42 USC 4901, et seq. Noise Pollution and Abatement Act 42 USC 7641	The public must be protected from noises that jeopardize health and welfare.	Applicable	Because equipment and vehicles would be involved in certain aspects of the proposed action, all substantive requirements of the act are applicable. However, appropriate engineering controls and best management practices will be implemented to reduce nuisance noise to the maximum practicable extent during conduct of the proposed actions.
	HAMILTON COUNTY EARTHWORK REGULATIONS		
Erosion Control Specifications Hamilton County Earthwork Regulations	Department of Public Works -- temporary and/or permanent erosion and sediment control features and devices shall be designed and constructed in accordance with the State of Ohio Temporary Erosion Control Specifications.	TBC	This requirement is not an ARAR because it is not promulgated. This requirement will be considered for activities that involve excavation, erosion, and sediment control features.

TABLE B.4.A

METHOD OF COMPLIANCE WITH CHEMICAL-SPECIFIC ARARs FOR OPERABLE UNIT 5 SELECTED REMEDY

Chemical ARAR	Method of Compliance
Applicable Chemical-Specific Federal ARARs	
EPA Regulations on National Emission Standards for Hazardous Air Pollutants 40 CFR 61 National Emission Standards for Emissions of Radionuclides other than Radon from DOE Facilities Subpart H	Existing site conditions currently attain compliance with this regulation through the application of appropriate waste management and maintenance activities. Dust suppression techniques will be implemented during all phases of remedial action involving the handling of contaminated materials. Additionally, all soil treatment and wastewater treatment operations with a potential to emit radionuclides to the environment will be equipped with emission control devices (i.e., HEPA filters, etc.).
National Emission Standard for Radon Emissions from DOE Facilities 40 CFR 61 Subpart Q	The existing distribution of contaminants within the affected environmental media in Operable Unit 5 attains compliance with this requirement. The disposal facility design would accommodate sufficient barriers to ensure continued compliance.
Lead in Air 40 CFR 50.12	Compliance will be met.
Relevant and Appropriate Chemical-Specific Federal ARARs	
National Primary Drinking Water Standards, Maximum Contaminant Levels and Proposed Maximum Contaminant Levels 40 CFR 141.11, 40 CFR 141.15 and 40 CFR 141.16	The existing conditions exhibit concentrations of contaminants in the aquifer exceeding MCL or proposed MCL concentrations. Affected groundwater in the glacial till (1 gpm sustained yield) and GMA exhibiting greater than MCL or proposed MCL concentrations will be extracted with recovery wells. The pumping/excavation operation is anticipated to reduce contaminant concentrations to less than the MCLs or proposed MCLs at all points in the aquifer system at and beyond the point of compliance.
Federal Nonzero Maximum Contaminant Level Goals for Organic and Inorganic Chemicals 40 CFR 141.12, 40 CFR 141.50 and 40 CFR 141.51	See comment above

TABLE B.4.A (Continued)
METHOD OF COMPLIANCE WITH CHEMICAL-SPECIFIC ARARs FOR OPERABLE UNIT 5 SELECTED REMEDY

Chemical ARAR	Method of Compliance
Relevant and Appropriate Chemical-Specific Federal ARARs (Continued)	
The National Primary Drinking Water Standards, Maximum Contaminant Levels for Organic and Inorganic Chemicals 40 CFR 141.61 and 40 CFR 141.62	See comment above
Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings 40 CFR 192.02, Subpart A; 192.12(a), Subpart B; 192.20, Subpart C; 192.21(f) and 192.22(b), Subpart C; 192.32(b)(2), Subpart D; 192.40-192.42, Subpart E	Select portions of the site exhibit existing concentrations exceeding these requirements. Soil excavation efforts for radioactive environmental media will reduce the concentration of radium-226/radium-228/thorium-230 to required levels, in addition to reducing other residual radioactivity levels to attain final remediation levels.
Chemicals in Drinking Water for a Solid Waste Disposal Facility 40 CFR 257.4	Waste generated from remedial activities may be disposed of in an on-property disposal facility. The disposal facility would be designed and the WAC established to ensure the continued protection of the underlying regional aquifer system. Through the engineering design, complemented by the WAC, this standard would be attained.
Chemicals in Drinking Water for a Hazardous Waste Disposal Facility 40 CFR 264.94	See comment above
Lead Soil Cleanup Standards (Resource Conservation and Recovery Act) 40 CFR 268.41	Soil exceeding these standards would be excavated and placed in the on-property disposal facility.
Applicable Chemical-Specific Ohio ARARs	
Ohio Water Quality Standards for Surface Water OAC 3745-1-04 and OAC 3745-1-07	All surface water discharges will be controlled to the Great Miami River (permitted under NPDES) and to Paddys Run during the period of active remediation. Storm water, process wastewaters, sanitary sewage, and recovered groundwater will be managed to ensure the water quality standards are attained. The AWWT system and an expansion of this facility will be employed to treat wastewater, storm water, and recovered groundwater, as required, to ensure compliance with the standards.
Relevant and Appropriate Chemical-Specific Ohio ARARs	
General Radiation Protection Standards OAC 3701-38-15(A)(1),(B)	Compliance will be met.

TABLE B.4.B

METHOD OF COMPLIANCE WITH LOCATION-SPECIFIC ARARs FOR OPERABLE UNIT 5 SELECTED REMEDY

Location ARAR	Method of Compliance
16 U.S.C. 470, National Historic Preservation Act and 36 CFR 60, 60.4, 63, 800 upon	Prior to remedial activities, surveys will be conducted to determine the presence of any cultural resources. Cultural resources identified will be either avoided or managed in consistence with this requirement as agreed with DOE, SHPO, and the Advisory Council in a signed programmatic agreement. Compliance will be met.
16 U.S.C. 1531, et seq., Endangered Species Act 50 CFR 402.01, 402.12, Interagency Cooperation- Endangered Species Act	Studies are being conducted to determine the presence of individuals and potential habitat of federally and state-listed animal and plant species. If habitat or individuals are found, appropriate mitigative measures would be implemented, Compliance will be met.
Archaeological Resources Protection Act (16 USC § 47099 -47011)	Compliance will be coordinated through Section 106 of the National Historic Preservation Act.
43 CFR 7.4 (a), Protection of Archaeological Resources	
16 U.S.C. 431-433, Antiquities Act of 1906	Compliance will be coordinated through Section 106 of the National Historic Preservation Act.
16 U.S.C. 461-467, 469, and 470 Historic Sites Preservation Act	Compliance will be coordinated through Section 106 of the National Historic Preservation Act.
25 U.S.C. 3001, Native American Graves Protection and Repatriation Act	Compliance will be coordinated through Section 106 of the National Historic Preservation Act.
42 U.S.C. 1996, American Indian Religious Freedom Act	Prior to remedial activities, surveys will be conducted to determine the presence of these cultural resources. Cultural resources identified will be either avoided or managed in consistence with this requirement. Compliance will be met.
42 U.S.C. 1424(e), Safe Drinking Water Act	Operable Unit 5 overlies a sole source aquifer (Great Miami Aquifer), which has been contaminated by site process activities. Contaminants will be removed to health-protective levels during remedial activities Compliance will be met.

TABLE B.4.B (Continued)
METHOD OF COMPLIANCE WITH LOCATION-SPECIFIC ARARs FOR OPERABLE UNIT 5 SELECTED REMEDY

Location ARAR	Method of Compliance
DOE Compliance with Flood Plain/Wetlands Review Requirements 10 CFR 1022.3(a), (b)(1), (2), (3), (5), (6), (c), (d), (e): .5(b), (h), 11(a), (b), (c), .12(a), .15(a)	A wetland delineation has identified freshwater wetlands within the 1050 acre FEMP property boundary. Remedial activities relative to wetland impacts will be handled through the U.S. Army Corps of Engineers Nationwide Permit (NWP) Program where possible. When not covered by a NWP, the action will meet requirements mandated by individual permits per 33 CFR 323. Compliance will be met.
Dredge and Fill 33 CFR 323, 330, 40 CFR 230	See above comment.
Procedure for Implementing the National Environmental Policy Act 40 CFR 6.301(c)	Substantive requirements will be met through the revised secretarial policy on NEPA. Compliance will be met.
Executive Order 11990, Protection of Wetlands 40 CFR 6.302(a)	Remedial design will minimize impacts to wetlands. Any unavoidable impacts will be undertaken in accordance with 33 CFR 323 or 330. Any potentially impacted wetlands will be mitigated. Compliance will be met.
Executive Order 11988, Protection of Floodplains	Remedial activities will minimize impacts to Floodplains. Impacted Floodplain areas would be backfilled with clean soil and regraded to avoid alteration of flow patterns or uses of the Floodplain.
Procedure for Implementing the National Environmental Policy Act 40 CFR 6.302(h)	Substantive requirements will be met through the revised secretarial policy on NEPA. Compliance will be met.
Location of Solid Waste Disposal Facilities 40 CFR 257.3-2 40 CFR 258.12	Any planned disposal facility will be located so at to attain these statutory requirements.

TABLE B.4.B (Continued)
METHOD OF COMPLIANCE WITH LOCATION-SPECIFIC ARARs FOR OPERABLE UNIT 5 SELECTED REMEDY

Location ARAR	Method of Compliance
Applicable Location-Specific Ohio ARARs (Continued)	
Protection of Endangered and Threatened Wildlife and Plants Additional 50 CFR 17.21, 17.31, 17.61, 17.71, and 17.94	All Federal agencies must ensure that any action authorized, funded, or carried out by them is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of the constituent elements essential to the conservation of a listed species within a defined critical habitat. requirements apply if it is determined that a proposed activity could adversely affect these species or their habitat. Compliance will be met.
Protection and Enhancement of Cultural natural Environment Executive Order 11593 3 CFR 154	Compliance will be met for identification and preservation of cultural resources on Federal land, including landmarks.
Relevant and Appropriate Location-Specific Federal ARARs	
None Identified	
Applicable Location-Specific Ohio ARARs	
Ohio Endangered Species Regulations OAC 1501: 18-1 ORC 1518.02 and ORC 1531.25	Compliance will be met.
Hazardous Waste Facility Environmental Impact OAC 3734.05 (D)(6)(c)	Compliance will be met.
Hazardous Waste Facility Minimum Risk OAC 3734.05 (D)(6)(d)	Compliance will be met.

TABLE B.4.B (Continued)
METHOD OF COMPLIANCE WITH LOCATION-SPECIFIC ARARs FOR OPERABLE UNIT 5 SELECTED REMEDY

Location ARAR	Method of Compliance
Applicable Location-Specific Ohio ARARs (Continued)	
Water use for Southwestern Ohio Tributaries OAC 3745-01-17 and OAC 3745-01-21	Compliance will be met.
Ohio Solid Waste Regulations OAC 3745-27-07(A) and (B) and OAC 3745-27-09(Y)	Any proposed disposal facility will be sited such that the facility and any associated leachate collection system will be located out of a floodway or floodplain.
State Water Quality Certifications OAC 3745-32-02	Required certifications would be attained prior to completing excavation or backfill operations within wetlands or waters of the United States. Compliance will be attained.
Relevant and Appropriate Location-Specific Ohio ARARs	
None Identified	

TABLE B.4.C

METHOD OF COMPLIANCE WITH ACTION-SPECIFIC ARARs FOR OPERABLE UNIT 5 SELECTED REMEDY

Action-Specific ARAR	Method of Compliance
Applicable Action-Specific Federal ARARs	
Preparing and Transporting Hazardous Waste Off-Site 40 CFR 262.20 through 262.23, .30 and .33 Subparts B and C OAC 3745-53-20 through 31 OAC 3745-52-30 and 33	Hazardous waste that will be disposed of off site will comply with all substantive and administrative requirements.
Groundwater Monitoring Program 40 CFR 265.90(d) Subpart F OAC 3745-65-90(d)	This requirement is being met via the September 10, 1993, Ohio EPA Director's Final Findings and Orders (DFOs). These requirements will be considered during the development of a long-term monitoring program during RD/RA.
Corrective Action Management Unit 40 CFR 264.552 Subpart S	A CAMU is designated at the FEMP to include the area within the FEMP property boundaries for remedial action. Releases of contaminants that originated from the FEMP and have reached off-property areas will also be managed within the CAMU. The CAMU also includes the on-property disposal facility.
Air Emission Standards for Process Vents 40 CFR 264.1030, 264.1032 through 264.1034 Subpart AA	Units that treat soil and waste contaminated with organic compounds will comply with air emission standards by employing control devices and monitoring.
Land Disposal Restrictions and Contaminated Debris 40 CFR 268.40 through 268.44, 268.45 Subpart D OAC 3745-59	Hazardous waste and associated debris will be treated to treatment standards for off-site disposal. On-property disposal will not require land-disposal treatment standards because of management under the CAMU Rule.
Water Pollution from a Solid Waste Disposal Facility 40 CFR 257.3-3	The on-property disposal facility design will aid in compliance with this requirement.

TABLE B.4.C. (Continued)
METHOD OF COMPLIANCE WITH ACTION-SPECIFIC ARARs FOR OPERABLE UNIT 5 SELECTED REMEDY

Action-Specific ARAR	Method of Compliance
Applicable Action-Specific Federal ARARs (Continued)	
Postclosure Care 40 CFR 265.117 Subpart G OAC 3745-66-17	Postclosure care requirements will be met for residual contaminants at the site which exceed risk-based cleanup values (i.e., the on-property disposal facility). The requirement will be satisfied by including such monitoring and maintenance requirements into the operations, & maintenance phase and long-term monitoring program of the CERCLA response action.
Underground Storage Tank (UST) Closure 40 CFR 280.60 through 280.66 Subpart F OAC 1301:7-7-36	All UST's and related petroleum-contaminated soil will undergo full closure per the requirements during the CERCLA remedial action.
Best Management Practices (BMP) Programs 40 CFR 125.104 Subpart K	The BMP requirements will be met via conducting the FEMP's BMP Plan. The BMP Plan will be progressively updated to accommodate changing site activities during the conduct of CERCLA remedial actions.
PCB Disposal, Treatment, and Storage 40 CFR 761.60(a)(4), (e), and 761.65 Subpart D	Soil containing PCBs will be excavated to attain the final remediation levels. Excavated soil will be dispositioned consistent with the WAC.
Noise Control 42 USC 4901 42 USC 7641	Engineering controls and best management practices will be implemented to reduce noise to the maximum extent practicable during the remedial action.
Particulate Air Emissions 40 CFR 50.6 (a), (b), (c)	Compliance will be met.
Empty Containers of Hazardous Waste 40 CFR 261.7 Subpart A OAC 3745-51-07	Containers that have held hazardous wastes will be considered empty if the requirements in the rule are met.

TABLE B.4.C. (Continued)
METHOD OF COMPLIANCE WITH ACTION-SPECIFIC ARARs FOR OPERABLE UNIT 5 SELECTED REMEDY

Action-Specific ARAR	Method of Compliance
Relevant and Appropriate Action-Specific Federal ARARs	
Hazardous Waste Determination 40 CFR 262.11 Subpart A OAC 3745-52-11	Soil exceeding the WAC will be treated for on-property disposal or dispositioned off site. Materials destined to off-site disposal will be properly characterized to complete the necessary hazardous waste determination.
Groundwater Protection Standard 40 CFR 264.92 through 246.100 Subpart F OAC 3745-54-92 through 100	Groundwater monitoring for the on-property disposal facility will comply with the substantive requirements.
Storage Area Closure 40 CFR 264.178 Subpart I OAC 3745-55-78	Substantive closure requirements for container storage areas involving hazardous wastes will be met after the storage area is no longer needed for the CERCLA remedial action.
Minimum RCRA Landfill Design Requirements for Closure 40 CFR 264.310 Subpart N OAC 3745-68-10	The final closure substantive requirements will be met in the on-property disposal facility design.
Containment Building 40 CFR 264.1100 through .1102 Subpart DD	Design and operation of the containment building(s) will comply with the design, operation, and closure and postclosure care substantive requirements unless provisions of the CAMU rule are applied.

TABLE B.4.C. (Continued)
METHOD OF COMPLIANCE WITH ACTION-SPECIFIC ARARs FOR OPERABLE UNIT 5 SELECTED REMEDY

Action-Specific ARAR	Method of Compliance
Relevant and Appropriate Action-Specific Federal ARARs (Continued)	
Treatment, Storage, and Disposal General Facility Standards 40 CFR 265.13 through 265.16 Subpart B OAC 3745-65-13 through 16	All general RCRA facility standards will be met during the CERCLA remedial action as necessary for activities involving the management of hazardous waste.
Treatment, Storage, and Disposal Facility Preparedness and Prevention 40 CFR 265.31 through 265.35, 265.37 Subpart C OAC 3745-65-31 through 35, 37	
Treatment, Storage, and Disposal Facility Contingency Plan and Emergency Procedures 40 CFR 265.51 and 265.52, 265.55 and 265.56 Subpart D OAC 3745-65-51 and 52, 55 and 56	
Closure Performance Standard for HWMUs 40 CFR 265.111, 265.114 Subpart G OAC 3745-66-11 and 14	All HWMUs will be closed clean or closed with the CERCLA process. The HWMU structures and contaminated soil will be fully addressed by decontamination and dismantlement under OU3, and excavation, treatment, and on- or off-site disposal of soil under OU5.
Condition of Containers 40 CFR 265.171 through 265.174, 265.175(a)-(c), 265.176, and 265.177 Subpart I OAC 3745-66-71 through 74, 76, 77 OAC 3745-55-75	Container storage requirements for hazardous wastes will be complied with by following the FEMP drum management plan as required by the SACD. Container storage areas for hazardous waste will meet the requirements for containment systems.

TABLE B.4.C. (Continued)
METHOD OF COMPLIANCE WITH ACTION-SPECIFIC ARARs FOR OPERABLE UNIT 5 SELECTED REMEDY

Action-Specific ARAR	Method of Compliance
Relevant and Appropriate Action-Specific Federal ARARs (Continued)	
Closure of Tank Systems 40 CFR 265.197 Subpart J OAC 3745-66-97	Existing tank and container storage HWMUs are proposed to be closed through an integrated RCRA/CERCLA process. The affected soil associated with these HWMUs will be removed to attain final remediation levels for each COC to fulfill RCRA closure requirements. Any new tank system or container storage facilities installed to facilitate CERCLA remedial actions will be "closed" consistent with these substantive requirements.
Control of Residual Radioactive Materials 40 CFR 192.02(a) Subpart A	The control standards will be met in the design and operation of the on-property disposal facility multilayered capping system.
Implementation 40 CFR 192.20 Subpart C	Compliance with the implementation requirements is met through the use of a verification and certification sampling program and the use of groundwater models for evaluating the long-term effectiveness.
Management of Uranium Byproduct Materials 40 CFR 192.30 through 34 Subpart D	The design of the on-property disposal facility capping system will attain these standards.
Solid Waste Disposal Facility Design Criteria 40 CFR 258.40 Subpart D	The on-property disposal facility design will, at a minimum, comply with the federal design standards for municipal solid waste landfills.
PCB Cleanup Policy 40 CFR 761.120, .125, .130 Subpart G	Soil containing PCBs will be excavated as necessary to attain final remediation levels. Removed soil will be dispositioned consistent with the WAC.

TABLE B.4.C. (Continued)
METHOD OF COMPLIANCE WITH ACTION-SPECIFIC ARARs FOR OPERABLE UNIT 5 SELECTED REMEDY

Action-Specific ARAR	Method of Compliance
Applicable Action-Specific Ohio ARARs	
Analytical and Collection Procedures OAC 3745-01-03	The analytical methods and collection procedures specified in this requirement will be utilized to the extent necessary for surface water discharges.
Antidegradation Policy OAC 3745-01-05 40 CFR 131.12	The remedial action will ensure that water quality for Paddys Run and the Great Miami River will not be degraded.
Abandonment of Test Holes and Wells OAC 3745-09-10	Existing FEMP water supply wells and all wells used in support of the RI/FS, removal actions, remedial actions, and RCRA groundwater monitoring will be properly plugged and abandoned in accordance with abandonment requirements after they are no longer needed.
Malfunction and Maintenance of Air Pollution Control Equipment OAC 3745-15-06 (A)(1) and (A)(2)	Scheduled maintenance will be established for pollution control equipment, as well as times when the pollution source will be shut down during maintenance.
General Provisions on Air Pollution Control OAC 3745-15-07 ORC 3734-02 (i)	Air pollution nuisance prohibitions will be met by employing best management practices such as dust control and air monitoring during the CERCLA remedial action.
Stack Height Requirements OAC 3745-15-12 (B) and (C)	The stack height requirements will be met for alternatives using low-temperature thermal desorption units.
Restriction on Particulate Emissions from Industrial Processes OAC 3745-17-11	Emission restrictions will be met during stabilization and any treatment by using proper operations, maintenance, management, and monitoring.
Prohibits Commingling of Low-level Radioactive Waste with Solid Waste ORC 3734.02.7 (A)(B)	Material to be disposed off site will only be sent to facilities licensed under the Atomic Energy Act of 1954.
Open Dumping or Burning OAC 3734.03	No open dumping or burning of solid waste will be performed during remedial action.

TABLE B.4.C. (Continued)
METHOD OF COMPLIANCE WITH ACTION-SPECIFIC ARARs FOR OPERABLE UNIT 5 SELECTED REMEDY

Action-Specific ARAR	Method of Compliance
Applicable Action-Specific Ohio ARARs (Continued)	
Particulate Ambient Air Quality Standards OAC 3745-17-02 (C)(D)	Compliance will be met.
Particulate Ambient Air Quality Standards OAC 3745-17-05	Compliance will be met.
Solid Waste Disposal Facility Construction Requirements OAC 3745-27-08(C)(1) through (9), (D) through (H)	The on-property disposal facility construction design will meet the solid waste landfill substantive design requirements.
Solid Waste Disposal Facility Operations OAC 3745-27-09(D) through (F), (K) through (Q) OAC 3745-27-19	The on-property disposal facility operations will meet these requirements.
Groundwater Monitoring OAC 3745-27-10	Groundwater monitoring for the on-property disposal facility will fulfill these requirements.
Solid Waste Disposal Facility Closure OAC 3745-27-11(B);(G)(1) through (3), (7)	Final "closure" of the on-property disposal facility will meet these requirements.
Solid Waste Disposal Facility Post Closure OAC 3745-27-14	Substantive requirements for postclosure care of the on-property disposal facility will be included in the operations and maintenance phase of the CERCLA response action.
Underground Injection Control Program OAC 3745-34-01 OAC 3745-34-07 OAC 3745-34-08 OAC 3745-34-13	The reinjection of treated groundwater into the GMA will comply with substantive requirements.
Pollution to Waters of the State ORC 6111.04 ORC 6111.07 (A)(C)	Compliance with water pollution control requirements will be met.

TABLE B.4.C. (Continued)

METHOD OF COMPLIANCE WITH ACTION-SPECIFIC ARARs FOR OPERABLE UNIT 5 SELECTED REMEDY

Action-Specific ARAR	Method of Compliance
Applicable Action-Specific Ohio ARARs (Continued)	
Injection of Wastes into Wells ORC 6111.043 ORC 6111.044 to ORC 6111.049	The reinjection of treated groundwater into the GMA will comply with substantive requirements.
Relevant and Appropriate Action-Specific Ohio ARARs	
Abandonment of Test Holes and Wells OAC 3745-09-10	All monitoring wells, piezometers and lysimeters will be plugged and abandoned per these requirements after they are no longer needed.
Quality Standards, Particulate in Air OAC 3745-17-07, (B)(4), (5), (6)	Appropriate mitigative measures will be applied to all excavations and material movement activities to reduce fugitive emissions. All point sources associated with remedial alternative (i.e., sludge dewatering, etc.) will employ best available emissions control technologies to mitigate particulates emissions.
Restriction of Emission of Fugitive Dust OAC 3745-17-08	Fugitive dust control will be achieved by employing control measures during grading, loading, and construction operations while soil is handled.
Ohio NPDES Permits OAC 3745-33-05 40 CFR 122.41 Subpart C	Compliance with general permit conditions for wastewater discharges will be met by employing proper operation and maintenance and monitoring during the operations and maintenance phase of the CERCLA response action.
Hazardous Waste Storage Piles OAC 3745-56-51 (A) through (F), 54 (A) and (B), 56 (A) and (B), 57 (A)(B) and (C), 58 (A)(B) and (C). 40 CFR 264.551 through .259	All general RCRA waste pile standards will be met during the CERCLA remedial action as necessary for activities involving the management of hazardous waste.
Monitoring Well Requirements OAC 3745-9-04 (A) and (B) OAC 3745-9-05 (A)(1) and (B) through (H); 06 (A)(B)(D) and (E); 07 (A), (B), (C), (E), and (F) OAC 3745-9-09 (A) through (C), and (E) through (G) OAC 3745-9-08 Paragraph (C)	Monitoring well requirements will be met to ensure protection of human health and the environment.