

**FINAL**

**DOE/EA-1299**

**Environmental Assessment  
for the  
U.S. Department of Energy, Oak Ridge Operations  
Receipt and Storage of Uranium Materials  
from the  
Fernald Environmental Management Project Site**



**RECEIVED  
MAY 20 1999  
OSTI**

**DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED**

**MASTER**

## DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, make any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

## **DISCLAIMER**

**Portions of this document may be illegible  
in electronic image products. Images are  
produced from the best available original  
document.**

## FINDING OF NO SIGNIFICANT IMPACT

### ENVIRONMENTAL ASSESSMENT FOR THE RECEIPT AND STORAGE OF URANIUM MATERIALS FROM THE FERNALD ENVIRONMENTAL MANAGEMENT SITE

AGENCY: U. S. DEPARTMENT OF ENERGY

ACTION: FINDING OF NO SIGNIFICANT IMPACT

**SUMMARY:** The U. S. Department of Energy (DOE) has completed an environmental assessment (DOE/EA-1299) for the receipt and storage of uranium materials from the Fernald Environmental Management (FEMP) Site. Based on the results of the impacts analysis reported in EA-1299, DOE has determined that the proposed action is not a major Federal action significantly affecting the quality of the human environment within the context of the National Environmental Policy Act of 1969 (NEPA). Therefore, the preparation of an environmental impact statement (EIS) is not necessary, and DOE is issuing this Finding of No Significant Impact (FONSI).

**PUBLIC AVAILABILITY OF EA-1299 AND FONSI:** The EA-1299 and FONSI may be reviewed at and copies of documents obtained from

U. S. Department of Energy  
Public Reading Room  
230 Warehouse Road, Suite 300  
Oak Ridge, Tennessee 37830  
Phone: (423) 241-4780

Fernald Public Environmental Information Center  
10995 Hamilton Cleves Highway  
Harrison, Ohio 45030  
Phone: (513) 648-7480

Portsmouth Reading Room  
U.S. DOE Environmental Information Center  
U. S. 23 and Perimeter Road  
P.O. Box 693  
Piketon, Ohio 45661  
Phone: (740) 289-3317

Paducah Reading Room  
U.S. DOE Environmental Information Center  
175 Freedom Boulevard  
Kevil, Kentucky 42053  
Phone: (502) 462-2550

## CONTACT FOR FURTHER INFORMATION ON THE NEPA PROCESS:

David R. Allen  
NEPA Compliance Officer  
Oak Ridge Operations Office  
U. S. Department of Energy  
P. O. Box 2001  
Oak Ridge, Tennessee 37831  
Phone: (423)576-0411

**BACKGROUND:** The proposed action is to receive approximately 3800 metric tons of potentially marketable uranium material at an identified Oak Ridge Operations (ORO) site, or a combination of identified ORO sites. Identified ORO sites analyzed include storage area(s) at the Portsmouth Gaseous Diffusion Plant, Paducah Gaseous Diffusion Plant, Y-12 Plant, and East Tennessee Technology Park. This action is proposed so that the uranium material may be stored, rather than disposed of as waste, until a later time when its market potential can be realized.

The material receipt is needed to facilitate a decision of the U.S. Department of Energy to change the mission of the FEMP site to no longer include nuclear material storage. Removing this nuclear material inventory from the site by the end of fiscal year (FY) 1999 would greatly facilitate FEMP's ability to support commitments made to the state of Ohio regarding site cleanup.

**ALTERNATIVES:** In addition to the proposed action, impacts were also evaluated for the no-action alternative. Under this alternative, the uranium currently stored at the FEMP site would remain at the site. The uranium is currently stored in various container types including 55-gallon steel drums, T-hoppers, half-high boxes, and sea-land containers.

## ENVIRONMENTAL IMPACTS:

**No Action**--Under normal operations, land use, geology and soils, water resources, cultural resources and the infrastructure would remain unchanged. Air effluents would be minimal and would remain the same as the present. Since there is no new construction and there are no effluents from the stored uranium, impacts to all resources are minimal. Radiological dose rates to facility workers, co-located workers and the public under normal operations are negligible. Under accident conditions, the highest radiological risk to the public is 0.63 rem from a storage fire and 0.84 rem to a co-located worker from an earthquake with aerial dispersion of uranium materials. Since the uranium materials would remain at the FEMP site, there is no change in these exposures or risks.

**Proposed Action**--Under the proposed action the FEMP uranium materials would be located at the Portsmouth Gaseous Diffusion Plant, the Paducah Gaseous Diffusion Plant, the East Tennessee Technology Park, the Y-12 Plant or a combination of these sites.

The proposed action has been analyzed for its potential impacts to the following resources at all of the above-mentioned identified sites:

- public and worker risk
- climate and air quality
- water resources

- geology and soils
- ecological resources
- socioeconomic and environmental justice
- land use
- infrastructure
- cultural resources

No significant construction or operational impacts are expected to occur due to the implementation of the proposed action at any of the ORO sites. Selection of plant sites that would or could require construction of storage facilities (Paducah Gaseous Diffusion Plant and/or the East Tennessee Technology Park) would convert approximately 1 acre of property from open grass habitat to buildings. Construction impacts for this development would be minimal because this area size is small in comparison to other similar available property located at each of these plants. At other sites, existing buildings would be used to store the uranium materials. Operational impacts, as well as routine handling risks, at the identified sites would be negligible.

Radiological risks to humans from all accident scenarios for all areas at all ORO locations are deemed to be low. For all accident scenarios at all sites the uranium metal toxicity to aquatic biota for both acute and chronic exposures would be negligible.

**DETERMINATION:** Based on the analysis of potential impacts, DOE has been determined that implementation of the proposed action does not constitute a major Federal action affecting the quality of the human environment at the Paducah Gaseous Diffusion Plant, the Portsmouth Gaseous Diffusion Plant, the Y-12 Plant, or the East Tennessee Technology Park. Public comments on the Draft EA were fully addressed in the Final EA. An Environmental Impact Statement is not required.

Issued at Oak Ridge, Tennessee, this 13 day of April 1999.

*Steven D. Richardson*  
Steven D. Richardson  
Acting Manager  
U. S. Department of Energy  
Oak Ridge Operations  
Oak Ridge, Tennessee

**Final  
Environmental Assessment  
for the  
U. S. Department of Energy, Oak Ridge Operations  
Receipt and Storage of Uranium Materials  
from the  
Fernald Environmental Management Project Site**

April 1999

Prepared by  
Science Applications International Corporation  
800 Oak Ridge Turnpike  
Oak Ridge, Tennessee 37830

Prepared for  
U. S. Department of Energy  
Oak Ridge Operations  
Oak Ridge, Tennessee 37830

**SCIENCE APPLICATIONS INTERNATIONAL CORPORATION**

contributed to the preparation of this document and should not  
be considered an eligible contractor for its review.

## TABLE OF CONTENTS

FIGURES .....	vii
TABLES .....	vii
ACRONYMS .....	ix
1. INTRODUCTION .....	1-1
1.1 PURPOSE AND NEED FOR THE PROPOSED ACTION .....	1-1
1.2 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT .....	1-1
2. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES .....	2-1
2.1 BACKGROUND .....	2-1
2.2 NO ACTION ALTERNATIVE .....	2-1
2.3 PORTSMOUTH GASEOUS DIFFUSION PLANT .....	2-2
2.3.1 Building X-3001 .....	2-2
2.3.2 Building X-3002 .....	2-2
2.3.3 Building X-7725A .....	2-2
2.3.4 X-7745R Storage Yard .....	2-2
2.3.5 Lithium Storage Buildings .....	2-2
2.3.6 Building X-744K .....	2-5
2.3.7 Building X-744G .....	2-5
2.3.8 Building X-3346 .....	2-5
2.4 PADUCAH GASEOUS DIFFUSION PLANT .....	2-6
2.5 Y-12 PLANT .....	2-6
2.6 EAST TENNESSEE TECHNOLOGY PARK .....	2-6
2.6.1 K-1066F Area .....	2-6
2.6.2 K-131 and K-631 Buildings .....	2-6
2.6.3 K-861 Open Area .....	2-6
2.7 COMBINATION OF SITES .....	2-10
2.8 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS .....	2-10
2.8.1 Commercial Facilities .....	2-10
2.8.2 Oak Ridge National Laboratory .....	2-10
2.8.3 Other DOE Sites .....	2-10
3. AFFECTED ENVIRONMENT .....	3-1
3.1 FERNALD ENVIRONMENTAL MANAGEMENT PROJECT .....	3-1
3.1.1 Public and Worker Risk .....	3-1
3.1.2 Climate and Air Quality .....	3-1
3.1.3 Water Resources .....	3-2
3.1.4 Geology and Soils .....	3-2
3.1.5 Ecological Resources .....	3-2
3.1.6 Socioeconomics and Environmental Justice .....	3-2
3.1.7 Land Use .....	3-3
3.1.8 Infrastructure .....	3-3
3.1.9 Cultural Resources .....	3-3

3.2	PORPSMOUTH GASEOUS DIFFUSION PLANT .....	3-4
3.2.1	Public and Worker Risk .....	3-4
3.2.2	Climate and Air Quality .....	3-4
3.2.3	Water Resources .....	3-4
3.2.4	Geology and Soils .....	3-4
3.2.5	Ecological Resources .....	3-5
3.2.6	Socioeconomics and Environmental Justice .....	3-5
3.2.7	Land Use .....	3-6
3.2.8	Infrastructure .....	3-6
3.2.9	Cultural Resources .....	3-6
3.3	PADUCAH GASEOUS DIFFUSION PLANT .....	3-6
3.3.1	Public and Worker Risk .....	3-6
3.3.2	Climate and Air Quality .....	3-6
3.3.3	Water Resources .....	3-7
3.3.4	Geology and Soils .....	3-7
3.3.5	Ecological Resources .....	3-7
3.3.6	Socioeconomics and Environmental Justice .....	3-7
3.3.7	Land Use .....	3-8
3.3.8	Infrastructure .....	3-8
3.3.9	Cultural Resources .....	3-8
3.4	Y-12 PLANT .....	3-8
3.4.1	Public and Worker Risk .....	3-9
3.4.2	Climate and Air Quality .....	3-9
3.4.3	Water Resources .....	3-9
3.4.4	Geology and Soils .....	3-10
3.4.5	Ecological Resources .....	3-10
3.4.6	Socioeconomics and Environmental Justice .....	3-10
3.4.7	Land Use .....	3-11
3.4.8	Infrastructure .....	3-11
3.4.9	Cultural Resources .....	3-11
3.5	EAST TENNESSEE TECHNOLOGY PARK .....	3-11
3.5.1	Public and Worker Risk .....	3-12
3.5.2	Climate and Air Quality .....	3-12
3.5.3	Water Resources .....	3-12
3.5.4	Geology and Soils .....	3-13
3.5.5	Ecological Resources .....	3-13
3.5.6	Socioeconomics and Environmental Justice .....	3-14
3.5.7	Land Use .....	3-14
3.5.8	Infrastructure .....	3-14
3.5.9	Cultural Resources .....	3-14
4.	ENVIRONMENTAL CONSEQUENCES .....	4-1
4.1	PUBLIC AND WORKER RISK .....	4-1
4.2	NO ACTION ALTERNATIVE .....	4-3
4.2.1	Normal Operations .....	4-3
4.2.2	Accidents .....	4-3
4.3	PORPSMOUTH GASEOUS DIFFUSION PLANT .....	4-4
4.3.1	Normal Operations .....	4-4
4.3.2	Accidents .....	4-5

4.4	PADUCAH GASEOUS DIFFUSION PLANT .....	4-5
4.4.1	Normal Operations .....	4-5
4.4.2	Accidents .....	4-6
4.5	Y-12 PLANT .....	4-6
4.5.1	Normal Operations .....	4-7
4.5.2	Accidents .....	4-7
4.6	EAST TENNESSEE TECHNOLOGY PARK .....	4-8
4.6.1	Normal Operations .....	4-8
4.6.2	Accidents .....	4-9
4.7	CONCLUSIONS .....	4-9
4.8	CUMULATIVE IMPACTS .....	4-9
5.	REFERENCES .....	5-1
6.	LIST OF PREPARERS .....	6-1
7.	LIST OF AGENCIES/INDIVIDUALS CONSULTED .....	7-1

## APPENDICES

A	DOE-FEMP NEPA Coverage for Disposition of Nuclear Material Inventory .....	A-1
B	FEMP Uranium Inventory Proposed to be Moved to Other DOE Site(s) .....	B-1
C	Release Assumptions and Accident Modeling Results .....	C-1
D	Uranium Metal Toxicity and Aquatic Biota .....	D-1
E	Comments and Responses .....	E-1



## FIGURES

2.1	Current Uranium Storage Locations at FEMP .....	2-3
2.2	Portsmouth Gaseous Diffusion Plant with Proposed Uranium Storage Locations .....	2-4
2.3	Paducah Gaseous Diffusion Plant with Proposed Uranium Storage Locations .....	2-7
2.4	Y-12 Plant with Proposed Uranium Storage Locations .....	2-8
2.5	East Tennessee Technology Park with Proposed Uranium Storage Locations .....	2-9

## TABLES

2.1	FEMP Uranium Proposed for Receipt and Storage at Other DOE Site(s) .....	2-1
3.1	Population, Income, and Employment in the Fernald Region of Influence for Hamilton County and Cincinnati Metropolitan Statistical Area .....	3-3
3.2	Population, Income, and Employment in the Portsmouth Region of Influence for Pike County and Scioto County .....	3-5
3.3	Population, Income and Employment in the PGDP Region of Influence for McCracken County .....	3-8
3.4	Population, Income, and Employment in the Y-12 Plant Region of Influence for Anderson County and Roane County .....	3-11



## ACRONYMS

ARF	airborne release fraction
BMP	best management practice
DCF	dose conversion factor
DCG	derived concentration guide
DOE	U.S. Department of Energy
DR	damage ratio
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
ETTP	East Tennessee Technology Park
FEMP	Fernald Environmental Management Project
FTE	full-time equivalent
GCEP	Gas Centrifuge Enrichment Plant
HQ	hazard quotient
HVAC	heating, ventilation, and air conditioning
LLW	low-level radioactive waste
MAR	material at risk
MSA	Metropolitan Statistical Area
MTU	metric tons of uranium
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
O/H	overhead
ORNL	Oak Ridge National Laboratory
ORO	Oak Ridge Operations
ORR	Oak Ridge Reservation
PGDP	Paducah Gaseous Diffusion Plant
PORTS	Portsmouth Gaseous Diffusion Plant
PSD	prevention of significant deterioration
RF	respirable fraction
ROI	region of influence
SHPO	State Historic Preservation Officer
TSCA	Toxic Substances Control Act
TSS	tension-support structure
TVA	Tennessee Valley Authority

## **1. INTRODUCTION**

### **1.1 PURPOSE AND NEED FOR THE PROPOSED ACTION**

Through a series of material transfers and sales agreements over the past 6 to 8 years, the Fernald Environmental Management Project (FEMP) has reduced its nuclear material inventory from 14,500 to approximately 6800 metric tons of uranium (MTU). This effort is part of the U.S. Department of Energy's (DOE's) decision to change the mission of the FEMP site; it is currently shut down and the site is being remediated. Removing this remaining nuclear material inventory from the site by the end of fiscal year (FY) 1999 would greatly facilitate FEMP's ability to support commitments made to the state of Ohio regarding site cleanup. Interest in the material has been expressed by the U.S. Department of Defense and other commercial ventures. However, the timing for transfer will not support the regulatory commitments. Of the remaining inventory there are approximately 3800 metric tons of potentially marketable uranium material. It would be in the best interest of DOE to maintain and eventually market or use these materials. Oak Ridge Operations (ORO) has committed to receiving and storing the material at an undetermined site. The purpose of, and need for, this action is to receive this material at an acceptable site, or sites, so that its market value can be realized rather than disposing of the material as waste. Approximately 800 metric tons of low-enriched uranium (LEU) are currently in the process of being sold by the Ohio Field Office. Should this sale not go through, then these materials would need to be stored until reused or sold; the LEU is part of the 3800 metric tons evaluated in this Environmental Assessment (EA).

### **1.2 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT**

This EA focuses on the receipt and storage of uranium materials at various DOE-ORO sites. The packaging and transportation of FEMP uranium material has been evaluated in previous NEPA and other environmental evaluations. A summary of these evaluation efforts is included as Appendix A. The material would be packaged in U.S. Department of Transportation-approved shipping containers and removed from the FEMP site and transported to another site for storage. The Ohio Field Office will assume responsibility for environmental analyses and documentation for packaging and transport of the material as part of the remediation of the site, and ORO is preparing this EA for receipt and storage at one or more sites.

## 2. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

### 2.1 BACKGROUND

DOE proposes to place up to 3800 MTU of nuclear materials product currently stored at the FEMP site at another suitable DOE site. This includes the approximately 800 metric tons of LEU currently out for bid. If the 800 metric tons out for bid are not sold expeditiously, then it is proposed that the LEU would also be moved to another DOE site. Uranium to be moved from the FEMP site to another site includes normal uranium [same assay as natural uranium (0.711%  $^{235}\text{U}$ ) but created by a man-made process], depleted uranium (assay less than natural uranium), and LEU (assay >0.711% and <20%). Table 2.1 provides a summary of the uranium inventory at the FEMP site, relative amounts of each type, and the approximate storage space required for each type. Appendix B provides more detail on each type of uranium with a breakdown of each type according to its composition (metal,  $\text{UF}_4$ , etc.).

**Table 2.1. FEMP Uranium Proposed for Receipt and Storage at Other DOE Site(s)**

Uranium	Pounds (millions)	Metric Tons Uranium (MTU)	Storage Space Requirements (approximate in $\text{ft}^2$ )
Normal	0.434	193	600
Depleted	7.085	2,761	17,200
Low-Enriched	<u>2.205</u>	<u>799</u>	<u>12,500</u>
<b>TOTALS</b>	<b>9.724</b>	<b>3,753</b>	<b>30,300</b>

Five DOE site alternatives, Portsmouth Gaseous Diffusion Plant (PORTS), Paducah Gaseous Diffusion Plant (PGDP), Oak Ridge National Laboratory (ORNL), the Y-12 Plant, and the East Tennessee Technology Park (ETTP), were considered for receipt and storage of these materials. At some of these DOE sites, various locations/building variations were considered. Storage at a licensed, commercial facility was also considered initially but was ruled out because of schedule constraints. The no action alternative is to leave the uranium at FEMP.

Receipt and storage of the uranium products would require that suitable existing buildings with sufficient floor space at the various DOE sites be made available. Approximately 50,000  $\text{ft}^2$  of space is required, and buildings would have to be available in time to receive all product before the end of the fourth quarter of FY 1999. Alternatively, if existing buildings are not available, an area where at least two tension-support structures (TSSs) could be built would have to be identified (or a combination thereof). These TSSs would have concrete floors, a rigid frame, and tarpaulin roof and sides, and they would provide approximately 27,000  $\text{ft}^2$  each in storage space. DOE inventoried buildings and space availability at five sites—Portsmouth, Ohio; Paducah, Kentucky; and three sites (the Y-12 Plant, ORNL, and ETTP) in Oak Ridge, Tennessee. As noted in Sect. 2.8, the ORNL site was dropped from consideration due to mission-related land use conflicts.

### 2.2 NO ACTION ALTERNATIVE

Under this alternative, the uranium currently stored at the FEMP site would remain at the site. The uranium is currently stored in various container types including 55-gallon steel drums, T-hoppers, half-high boxes, and sea-land containers. A description of these containers is provided at the end of Appendix B.

Currently, the nuclear material is predominantly located in Buildings 4B, 77, and 54B but would be moved to TS-4 and TS-5 at Plant Pad 1. The nuclear material would be located in two TSSs in the northwest quadrant of the site (see Fig. 2.1). Since a No Action alternative would leave uranium materials in place at FEMP, it does not support a regulatory commitment made to the state of Ohio.

## **2.3 PORTSMOUTH GASEOUS DIFFUSION PLANT**

Under this alternative, the DOE PORTS site in Piketon, Ohio, would receive and store up to 3800 MTU product from the FEMP site. The uranium would be stored in some existing buildings or in a storage yard. Eight location alternatives within the PORTS site are considered (Fig. 2.2).

### **2.3.1 Building X-3001**

Building X-3001 is a very large building formerly used as a process building. This single-story building has an 87-ft ceiling and is comprised of four 630- by 104-ft bays. Each bay is equipped with a serviceable 7.5-ton crane. All bays have existing fire suppression and are heated and well lighted. Part of this building is still being used to store some Gas Centrifuge Enrichment Plant (GCEP) equipment as well as waste materials. Over 50,000 ft<sup>2</sup> of space is available, and all the Fernald nuclear material could be stored here. Building X-3001 is located in the southwest portion of the PORTS site, just north of Lewis Street (Fig. 2.2).

### **2.3.2 Building X-3002**

Building X-3002 is identical to Building X-3001 except this building is empty and has no contamination. The building could easily store all the Fernald nuclear materials. Building X-3002 is located immediately east of Building X-3001 and near the corner of Grebe Avenue and Lewis Street (Fig. 2.2).

### **2.3.3 Building X-7725A**

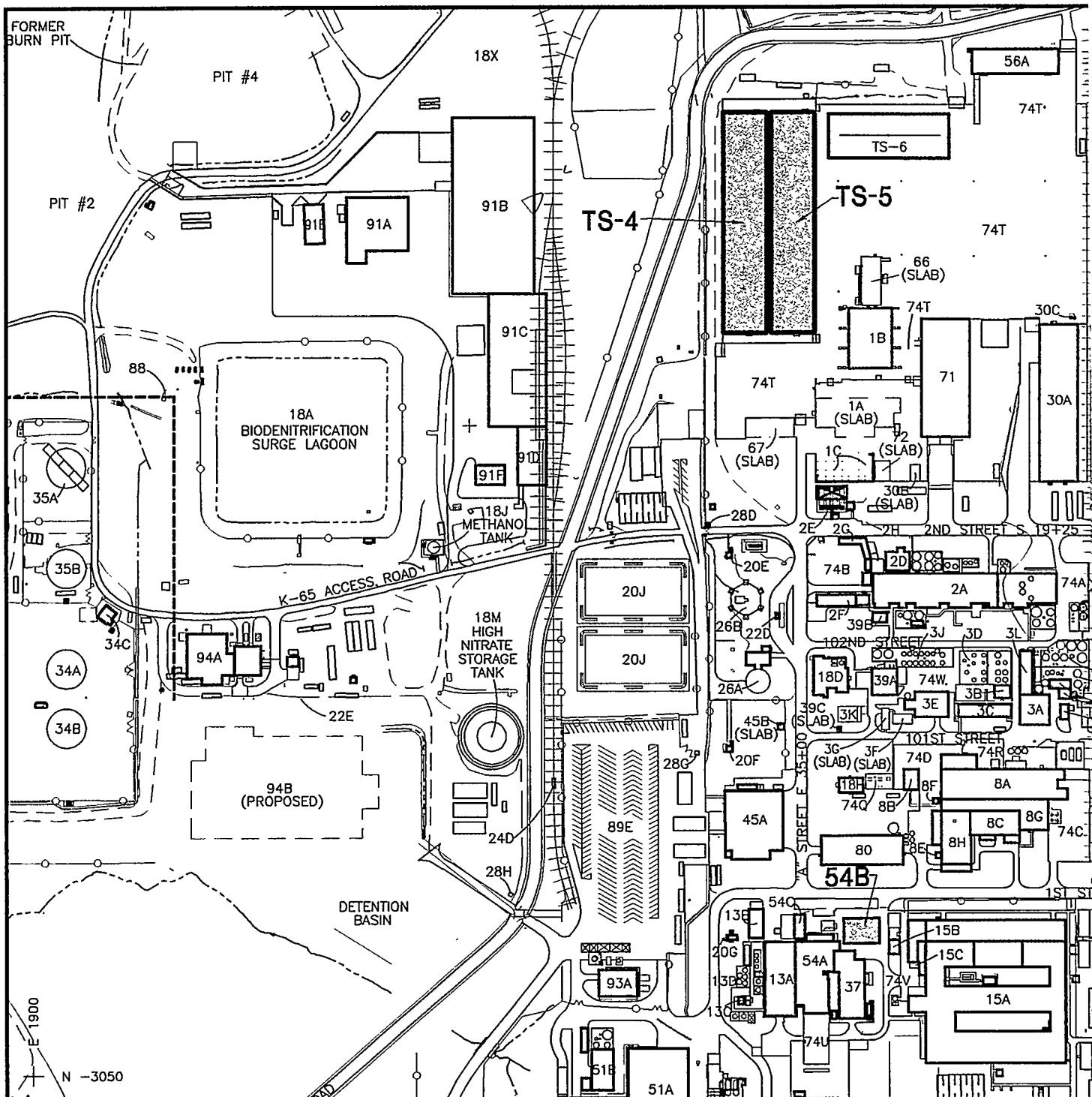
Building X-7725A is referred to as the GCEP Waste Accountability Facility; it is a one-story light steel and metal-clad structure. Building X-7725A is located east of the Perimeter Road and Contractor Access Road (Fig. 2.2). This building is being used as a Toxic Substances Control Act (TSCA) building (used to store polychlorinated biphenyls) and has a sealed, curbed floor for this purpose. It has approximately 29,400 ft<sup>2</sup> of floor space and is currently about half full. The building has an overhead (O/H) fire suppression sprinkler system and is well lighted. The building also is equipped with a radiation detection system.

### **2.3.4 X-7745R Storage Yard**

This storage yard is located north of Rush Street and north of Building X-3002 (Fig. 2.2). There is sufficient space here to construct two TSSs and to store all the Fernald nuclear material proposed for receipt and storage. A concrete pad is already in place; however, the pad is currently used for the storage of low-level radioactive waste (LLW) containers and appears to be completely full. The existing LLW would obviously have to be moved to another area before this storage yard could be used for uranium storage.

### **2.3.5 Lithium Storage Buildings**

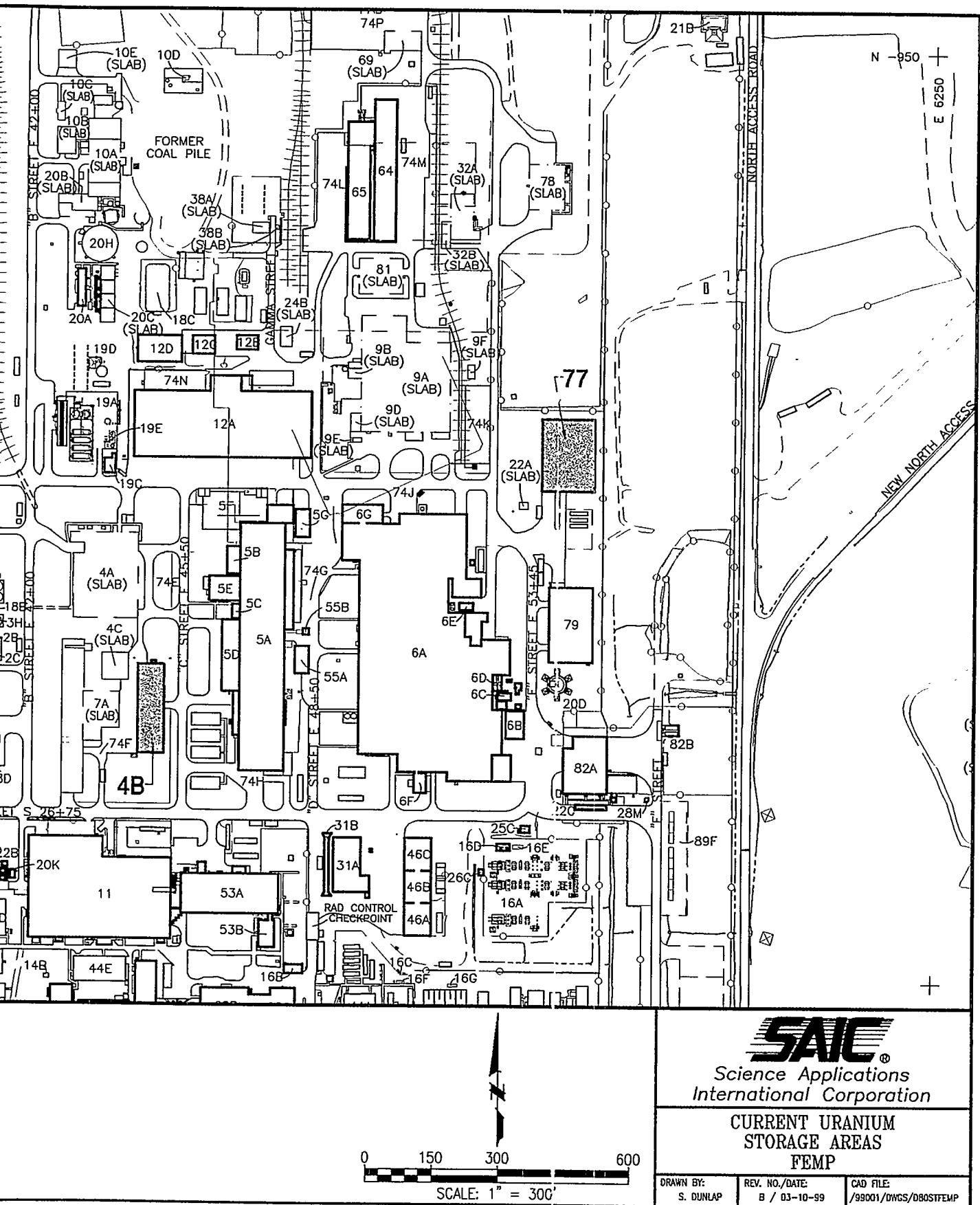
Buildings X-744S, X-744T, and X-744U were used for lithium storage. Buildings X-744U and X-744S are physically connected and, combined, provide sufficient floor space (48,000 ft<sup>2</sup> in X-744S and 98,000 ft<sup>2</sup>



**LEGEND:**

.....	PRIMARY BUILDINGS
.....	SECONDARY BUILDINGS
.....	CURRENT URANIUM STORAGE AREA
.....	PRIMARY ROADS
.....	PRIMARY ROADS
.....	SECONDARY ROADS
.....	RAILROAD TRACKS
.....	FENCE LINE
.....	CREEK OR STREAM
.....	DITCH
.....	BERM

Figure 2.1. Current Uranium S



in X-744U). Some clean-out and painting will have to be done, and lighting will have to be installed. A 30- by 40-ft concrete receiving dock would be constructed immediately adjacent to Building X-744U beside "C" Road which runs west of, and parallels the length of, the buildings (Fig. 2.2). Building X-744T is the westernmost of the three former lithium storage buildings and would likely require the most upgrading. It has approximately 98,000 ft<sup>2</sup> of available floor space. Access to this building would be from an unnamed road paralleling the building to the west, and a receiving dock would be needed for this building as well. The building heights vary from approximately 14 ft at the eaves to approximately 22 ft at the center of the buildings. The buildings are equipped with an O/H fire suppression sprinkler system, but the sprinklers are currently disconnected from the fire water mains and are no longer functional. There is no lighting or heating because the electric power has been disconnected. These buildings are currently used for lithium hydroxide drum storage. This material is gradually being sold commercially and removed offsite.

### **2.3.6 Building X-744K**

Building X-744K is a relatively small structure (36,000 ft<sup>2</sup>) located approximately 800 ft north of the X-230K South Holding Pond and just south of 2nd Street. This building was formerly used as a lithium warehouse. The building has been emptied of lithium and is currently leased to the Ohio Army National Guard for storage of military vehicles. Big Run Creek shows as a "blue line" (permanent) stream within 200 ft of Building X-744K.

### **2.3.7 Building X-744G**

Building X-744G is located south of 18th Street between Brown Avenue and Athens Avenue at the northeast corner of the PORTS site. It has 107,000 ft<sup>2</sup> available for storage. The interior height of the building is approximately 22 ft. The building is equipped with an O/H fire suppression dry-pipe sprinkler system and is well lighted. The building is equipped with a criticality alarm system but is not heated. This warehouse is currently used to store some uranium oxide and contaminated alumina trap material.

### **2.3.8 Building X-3346**

This building is referred to as the GCEP Feed and Withdrawal Facility and is a two-story heavy structural steel and metal-clad building with concrete floors on both the first and second levels. This building encompasses approximately 110,000 ft<sup>2</sup>, and the first floor is basically divided into three large rooms. One of the rooms is a high bay area which was to be the Autoclave area. The concrete floor throughout this area is at various elevations, and container storage in this area would be difficult. A considerable amount of floor space in the other areas is taken up by abandoned process piping and equipment which has not been removed.

The building is equipped with an O/H fire suppression sprinkler system and is heated and well lighted. Based on the current use of the building, the combustible loading is moderate and primarily consists of hydraulic fluids, gas cylinders, lubricants, and other associated materials required for vehicle maintenance activities.

This building is currently being leased to the Ohio Army National Guard and is used for miliary vehicle maintenance and storage, as well as parts and maintenance material storage.

## **2.4 PADUCAH GASEOUS DIFFUSION PLANT**

A greenfield/brownfield site inside the DOE Paducah site boundary would be used. Two TSSs and an off-loading dock would be built and the uranium stored in the TSSs. Figure 2.3 shows the proposed location for the TSSs. They will be oriented east-west in an open field which is just west of 10th street and north of Virginia Avenue and Building C-752.

## **2.5 Y-12 PLANT**

Two buildings, 9204-4 and 9720-33, are proposed for receipt and storage of the FEMP site nuclear materials. Building 9204-4 has approximately 5,000 ft<sup>2</sup> of space available, and Building 9720-33 has 40,000 ft<sup>2</sup>. Combined, the buildings have approximately 45,000 ft<sup>2</sup> of potentially available space—5,000 ft<sup>2</sup> less than the maximum space estimated to be needed. Building 9720-33 has material in it that would require removal before use as a uranium storage facility. Building 9204-4 is located toward the west end of the Y-12 Plant near the Bear Creek Portal. The building is located south of First Street and west of “J” Road (Fig. 2.4). Building 9720-33 is located southwest of Building 9204-4, between Second Street and West Third Street.

## **2.6 EAST TENNESSEE TECHNOLOGY PARK**

Three sites were evaluated at the ETTP (Fig. 2.5). This site was formerly named the Oak Ridge Gaseous Diffusion Plant (ORGDP) and often referred to as the K-25 Site.

### **2.6.1 K-1066F Area**

One site, K-1066F, is a paved lot immediately south of the UF<sub>6</sub> cylinder yard (K-1066-J). This site is approximately 150 ft south of Poplar Creek at its closest point and immediately north of 19th Street. It is an open lot with sufficient space to construct two TSSs and store all the uranium materials from the FEMP site (Fig. 2.5).

### **2.6.2 K-131 and K-631 Buildings**

The basement floor of each building is available for use. The basement floor is the ground-level floor on the north side of each building and would be accessed from this side. Building K-131 has a nominal basement floor space of 19,902 ft<sup>2</sup> with usable space of approximately 17,900 ft<sup>2</sup>. Building K-631 has approximately 14,000 ft<sup>2</sup> of usable space in two wings of the basement. The nominal basement size is 22,765 ft<sup>2</sup>. Thus, both buildings would have approximately 31,900 ft<sup>2</sup>, which is less than the minimum space requirement to store all the FEMP site materials.

These buildings are approximately 200 ft south of Poplar Creek at its closest point.

### **2.6.3 K-861 Open Area**

This large, open area is immediately east of Building 861 and immediately west of Avenue North. This area is approximately 300 ft west of Poplar Creek (Fig. 2.5). The area is large enough to construct the two TSSs needed to store all the Fernald nuclear materials. This site has been identified as having some existing

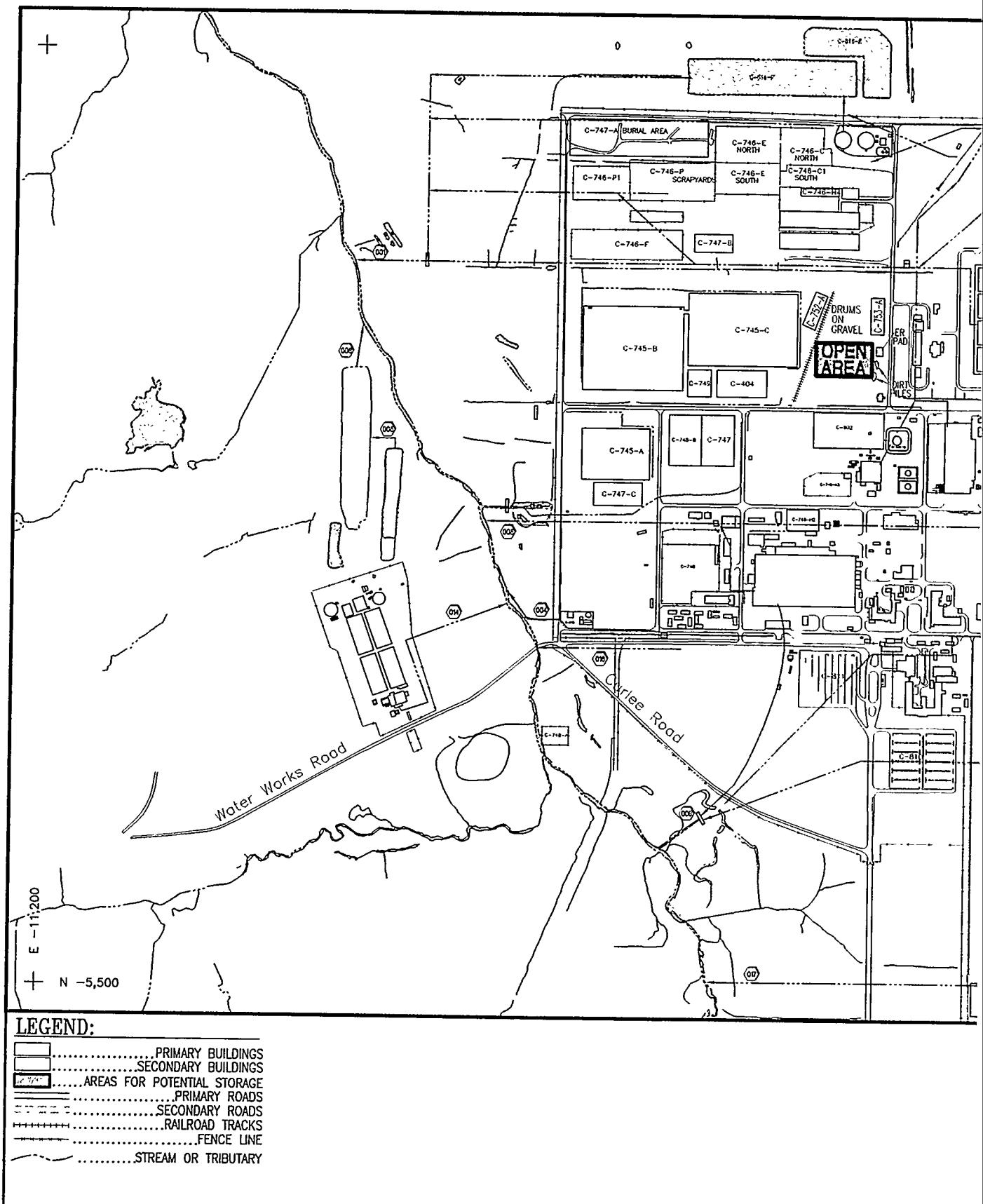
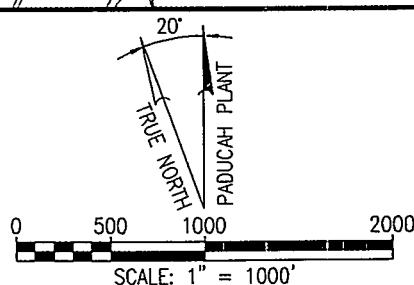
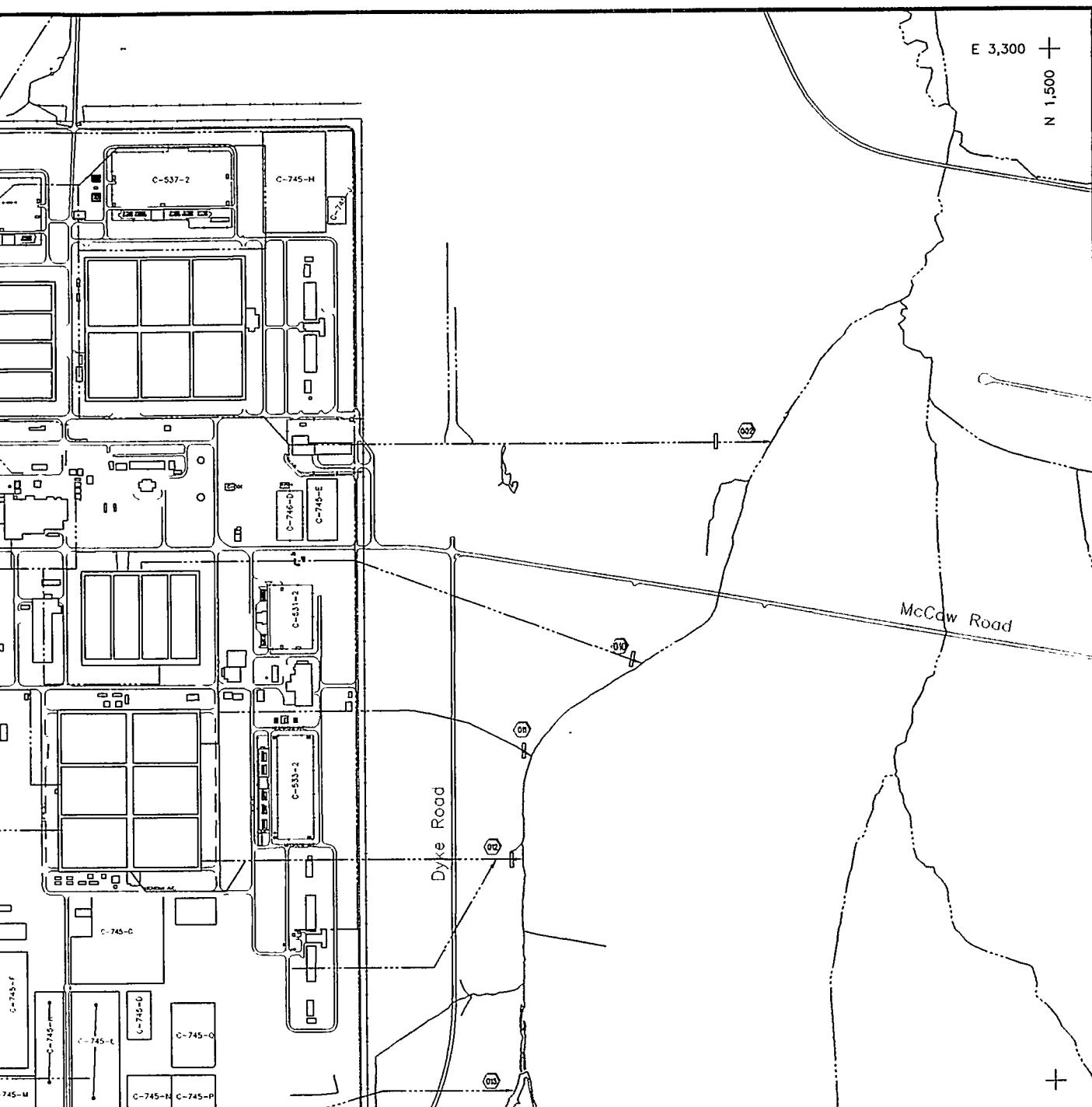


Figure 2.3. Paducah Gaseous Diffusion Pl



Science Applications  
International Corporation

POTENTIAL URANIUM STORAGE AREAS  
PADUCAH GASEOUS DIFFUSION PLANT  
PADUCAH, KENTUCKY

DRAWN BY: S. DUNLAP	REV. NO./DATE: B / 03-10-99	CAD FILE: /99001/DWGS/0805PAD
------------------------	--------------------------------	----------------------------------

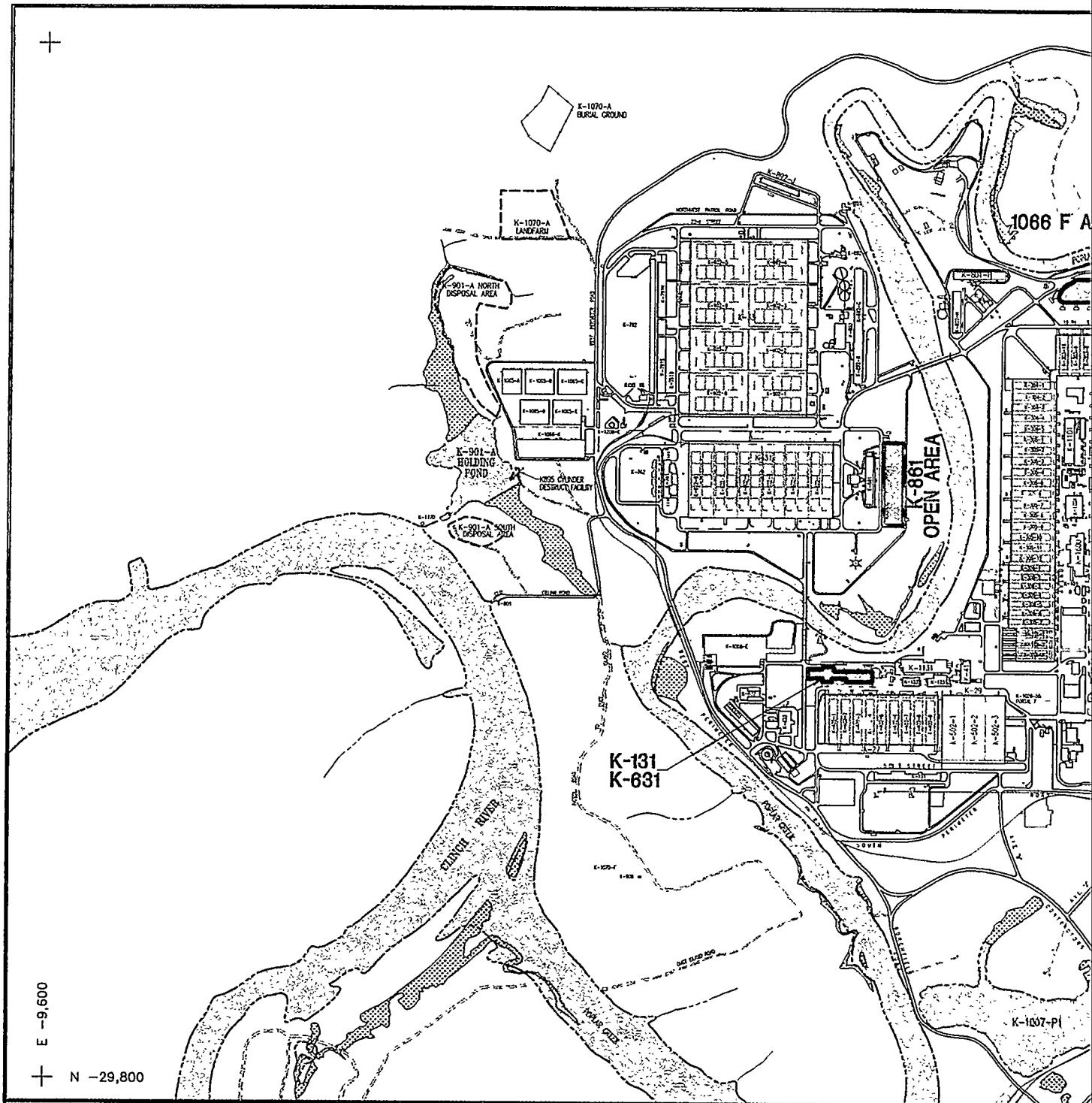
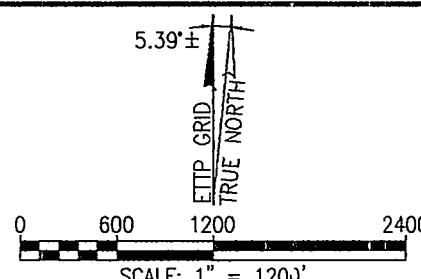
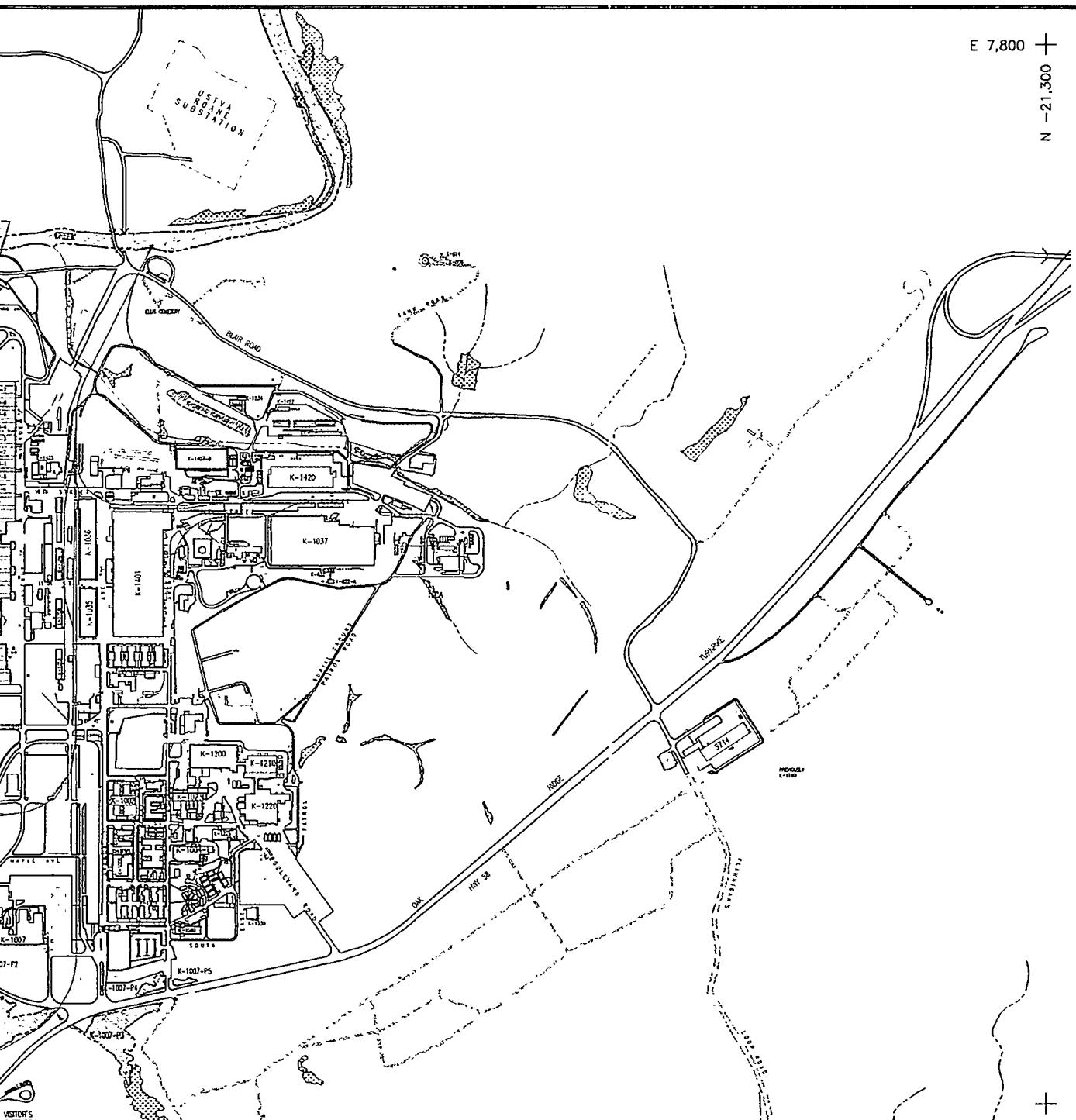


Figure 2.5. East Tennessee Technology Park



**SAIC**  
Science Applications  
International Corporation

**POTENTIAL URANIUM STORAGE AREAS  
ETTP AREA  
OAK RIDGE, TENNESSEE**

DRAWN BY: S. DUNLAP	REV. NO./DATE: A / 01-21-99	CAD FILE: /99001/DWGS/D805ETTP
------------------------	--------------------------------	-----------------------------------

### 3. AFFECTED ENVIRONMENT

#### 3.1 FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

The Fernald site is currently termed the FEMP site and was formerly known as the Feed Materials Production Center. The site is located just north of Fernald, Ohio, in southwest Ohio about 17 miles northwest of downtown Cincinnati. The 1050-acre site began operation in 1952 with its primary mission to purify uranium metal and uranium compounds for use at other DOE defense facilities. A small amount of thorium processing has also been conducted at the FEMP site (DOE 1997b). By the late 1980s production was suspended, and the site's mission changed from uranium production to site environmental restoration.

##### 3.1.1 Public and Worker Risk

The uranium currently stored in Buildings 54B, 77, and 4B will be consolidated at one location (Plant Pad 1) where two TSSs are available for long-term storage. During storage of uranium, materials workers could be exposed to direct radiation from surface contamination on the storage containers. However, the containers have been checked and overpacked if deemed necessary. Therefore, worker exposure due to routine operations associated with surveillance and maintenance of stored materials is expected to be less than detectable levels.

In addition to surface contamination, a radiation dose from the stored uranium materials can be expected. Dose rates from any single stored container are no more than 3 to 4 mrem/h. The dose rate at a distance of 1 ft from a container is ~1 mrem/h, and the dose rate at a distance of 20 ft is <0.5 mrem/h (approximately the same as normal background radiation doses) (personal communication with Scott Tolar, Fernald Site, with Carol Mason, SAIC, January 13, 1999). These dose rates are not affected by stacking the containers because the containers and the materials themselves provide significant shielding.

The radiological risk associated with various accident scenarios is presented in detail in Appendix C. In summary, the risks for various accident scenarios were calculated for the public, the facility worker, and the co-located worker at the FEMP site. Doses to the facility worker, co-located worker, and the public associated with general handling accidents, storage area fires, and seismic events are summarized in Table 4.1 in Sect. 4. The highest radiological risk to the public (0.63 rem dose) is from a storage area fire and to the co-located worker (0.84 rem) is from an earthquake with aerial dispersion of uranium materials.

##### 3.1.2 Climate and Air Quality

Prevailing winds are from the south-southwest 12% of the time; calm winds occur 4% of the time. The annual average wind speed recorded at the Greater Cincinnati Airport was 9 mph with 1-min sustained winds of up to 46 mph. Average monthly temperatures of 32°F to 88°F were recorded in 1992. Precipitation for the year was 38 in., and the monthly maximum was 7 in. in July (DOE 1997b).

Hamilton and Butler counties are classified as "moderate nonattainment" areas for ozone; these counties are in attainment for the remaining five criteria pollutants. The major source of air pollution at the FEMP site is the boiler plant.

### **3.1.3 Water Resources**

#### **Surface Water**

Major surface water features include Paddy's Run, which drains into the Great Miami River and ultimately into the Ohio River. There are no federally designated Wild and Scenic Rivers near to and downstream of the site. The site is located within the 100-year and 500-year floodplains of Paddy's Run. Wastewater is discharged to on-site streams and the Great Miami River.

#### **Groundwater**

The site is underlain by the Great Miami Buried Valley Aquifer, which is a sole-source aquifer.

### **3.1.4 Geology and Soils**

The FEMP site lies on a terrace above the Greater Miami River Valley, with glacial features dominating the landscape. Bedrock consists of sedimentary shales and limestone approximately 60 to 200 ft below the ground surface. The bedrock forms the floor and valley walls of the New Haven Trough. No major geologic faults have been mapped in the area (DOE 1997b).

The dominant soils at the site are silty loams of glacial origin. These soils are poorly drained, occur on relatively flat surfaces, have low permeability, and experience seasonal saturation. There is little likelihood of risk from subsidence, earthquakes, or volcanic activity.

### **3.1.5 Ecological Resources**

Vegetation consists of non-native grasses, pine plantations, deciduous woodlands, and riparian woodlands. Ecologically important habitat includes mature woodlands; pine plantations for wildlife species, such as white-tailed deer and the eastern cottontail rabbit; and riparian woodlands. Cattle grazing and brush clearing have resulted in habitat fragmentation and reduction in wildlife corridors. A total of 35.9 acres of freshwater wetlands (palustrine forested, drainage ditches/swales, and isolated persistent emergent and scrub/shrub wetlands) have been delineated at the FEMP site. There are no federally protected threatened or endangered species known at the FEMP site; however, excellent habitat exists for the Federally-endangered Indiana Bat in site riparian woodlands and the state-threatened Sloan's Crayfish inhabits portions of Paddy's Run Creek.

### **3.1.6 Socioeconomics and Environmental Justice**

#### **Socioeconomics**

The region of influence (ROI) for the Fernald site could be defined as either Hamilton County, Ohio, or the Cincinnati Metropolitan Statistical Area (MSA), since Hamilton County includes most of Cincinnati. This analysis focuses on the smaller economic unit of Hamilton County, a conservative definition designed to identify the maximum potential impact. Table 3.1 summarizes population, per capita income, and wage and salary employment for both Hamilton County and the Cincinnati MSA between 1991 and 1996, the last year for which figures were available. The Cincinnati MSA includes counties in Ohio, Kentucky, and Indiana. Cincinnati is a relatively large urban area, with a population of nearly 1.9 million and wage and salary employment over 984,000. Hamilton County represented about half of the population in the MSA and

**Table 3.1. Population, Income, and Employment in the Fernald Region of Influence for Hamilton County and Cincinnati Metropolitan Statistical Area**

Region/Variable	1991	1992	1993	1994	1995	1996	Growth 1991-96
<b>Ohio</b>							
<b>Hamilton County</b>							
Population	868,586	869,659	869,397	865,213	860,391	855,800	-0.30%
Per Capita Pers. Inc. (\$)	22,444	23,768	24,774	25,728	27,321	28,690	5.03%
Total Personal Income (Mil.\$)	19,495	20,670	21,538	22,260	23,507	24,553	4.72%
Wage & Salary Employment	567,054	568,608	570,200	579,674	586,195	596,485	1.02%
<b>Cincinnati-Hamilton Oh-Ky-In</b>							
Population	1,842,551	1,861,177	1,881,694	1,894,377	1,906,832	1,919,010	0.82%
Per Capita Pers. Inc. (\$)	19,772	20,869	21,636	22,511	23,787	24,901	4.72%
Total Personal Income (Mil.\$)	36,431	38,841	40,712	42,644	45,358	47,785	5.58%
Wage & Salary Employment	885,496	895,824	909,756	934,009	959,697	984,055	2.13%

60% of wage and salary employment, at 596,000. Total personal income was over \$24 billion, approximately half the total for the Cincinnati MSA (U.S. Bureau of Economic Analysis 1998).

### **Environmental Justice**

There are no federally recognized Native American tribes present near the site. There are no minority or low-income populations within 5 miles of the FEMP site (DOE 1997b).

#### **3.1.7 Land Use**

The site covers an area of 1050 acres, of which 275 acres are developed. Of the area that is undeveloped, 195 acres are considered environmentally sensitive. Land use around the site is predominantly agricultural.

#### **3.1.8 Infrastructure**

A public water system provides an average of 0.4 million gallons of water per day. An on-site wastewater treatment plant treats an average of 2.18 million gallons of sewage per day and discharges treated effluent to the Great Miami River. The Cincinnati Gas and Electric Company supplies power to the site; average loads are 33 MW. Transportation in the region consists of roads (State Road 126 and U.S. Route 27) and interstates (275 and 74). Rail access is by the Baltimore and Ohio Railroad, which is 3 miles west of the site.

#### **3.1.9 Cultural Resources**

Native American occupation of the FEMP area began about 14,000 years ago. European settlement began during the late Eighteenth Century. The site has 42 recorded archaeological sites, standing structures, or traditional cultural properties. Sixty-one percent of this site has been subject to a comprehensive cultural resources survey. Three areas are eligible for inclusion on the National Register of Historic Places.

## **3.2 PORTSMOUTH GASEOUS DIFFUSION PLANT**

PORTS is located approximately 22 miles northeast of Portsmouth in Pike County, Ohio, occupying an area of 3,714 acres. Construction of the site began in late 1952 and ended in 1956, one year after the start of uranium enrichment processing at the site. On July 1, 1993, DOE leased portions of PORTS to the United States Enrichment Corporation for the purpose of managing and operating the uranium enrichment enterprise. DOE retains responsibility for the non-leased portions of the site, which consist primarily of environmental restoration and waste management activities.

### **3.2.1 Public and Worker Risk**

The radiation dose from airborne radionuclides to a maximally exposed individual was 0.260 mrem, and the collective radiological dose from airborne emissions to the site ROI health risk population was 3.0 person-rem (DOE 1997b).

### **3.2.2 Climate and Air Quality**

Prevailing winds at Portsmouth are from the south to southwest, with the south averaging the highest at just over 11% of the time. Wind speeds average 5 mph, with winds up to 75 mph on record. The average annual temperature measured at the site in 1992 was 55°F with seasonal average temperatures of 32°F in the winter and 90°F in the summer (DOE 1997b).

Pike County is classified by the U.S. Environmental Protection Agency (EPA) as an attainment area for all six National Ambient Air Quality Standards (NAAQS) criteria air pollutants. The major sources of criteria pollutant emissions are three coal-fired boilers at the X-600 steam plant. Sources of radionuclide and fluoride emissions include purge cascade vents, cold recovery and wet evacuation vents, the X-344 evacuation vent, and six seal exhaust vents.

### **3.2.3 Water Resources**

#### **Surface Water**

Major surface water features include the Scioto River and its on-site tributaries—Little Beaver Creek and Big Run Creek. There are no federally designated Wild and Scenic Rivers in the ROI. Both the Scioto River and an alluvial aquifer supply water to the site, and the on-site streams and Scioto River receive treated wastewater. The site is located outside the 500-year floodplain.

#### **Groundwater**

Major groundwater units include the Mississippian shale and sandstone bedrock aquifer and the unconsolidated sediment aquifer.

### **3.2.4 Geology and Soils**

The site is on gently rolling land about 130 ft above the Scioto River and 670 ft above sea level. The predominant landform in the area is a relatively level, filled valley of the preglacial Portsmouth River, which runs north to south. Major rock units include, from oldest to youngest, the Ohio Shale, the Bedford Shale, the Berea Sandstone, the Sunbury Shale, and the Cuyahoga Shale. The site is in an abandoned river valley filled with fluvial materials. The soils in the fenced area are mostly urban land covered by roads, parking lots,

buildings, and railroads. Other soils are well-drained upland soils. No significant geologic faults exist in the ROI, and the potential for volcanic activity is small.

### 3.2.5 Ecological Resources

Vegetation consists of pastureland, old fields, oak-hickory, upland mixed hardwood, bottomland mixed hardwood, pine, second-growth hardwood, and scrub thicket. All forests and old fields are second growth. There is one acre of wetlands at the site. The federally protected, endangered Indiana Bat has been identified in the vicinity of the site, but no threatened or endangered species have been located onsite. Several state-listed species are known for the vicinity but none onsite.

### 3.2.6 Socioeconomics and Environmental Justice

#### Socioeconomics

The Portsmouth ROI includes both Pike County, where the facility is located, and Scioto County, which includes Portsmouth, the nearest city. Table 3.2 summarizes population, per capita income, and wage and salary employment for both counties from 1991 to 1996, the last year for which figures were available. Combined wage and salary employment for the region was nearly 38,000 in 1996; total personal income was \$1.7 billion (U.S. Bureau of Economic Analysis 1998). Total site employment in 1990 was 2386.

**Table 3.2. Population, Income, and Employment in the Portsmouth Region of Influence for Pike County and Scioto County**

Region/Variable	1991	1992	1993	1994	1995	1996	Growth 1991-96
<b>Pike County</b>							
Population	24,656	25,233	25,654	26,052	26,757	27,088	1.90%
Per Capita Pers. Inc. (\$)	12,469	13,323	13,937	14,543	14,751	15,462	4.40%
Total Personal Income (Mil.\$)	307	336	358	379	395	419	6.42%
Wage & Salary Employment	8,286	8,625	9,215	9,887	10,834	11,386	6.56%
<b>Scioto County</b>							
Population	80,156	80,874	80,617	80,918	81,123	80,947	0.20%
Per Capita Pers. Inc. (\$)	12,841	13,451	14,082	14,716	15,516	16,313	4.90%
Total Personal Income (Mil.\$)	1,029	1,088	1,135	1,191	1,259	1,320	5.11%
Wage & Salary Employment	22,790	23,282	24,356	25,027	26,007	26,421	3.00%
<b>Region Total</b>							
Population	104,812	106,107	106,271	106,970	107,880	108,035	0.61%
Per Capita Pers. Inc. (\$)	12,747	13,420	14,049	14,677	15,332	16,097	4.78%
Total Personal Income (Mil.\$)	1,336	1,424	1,493	1,570	1,654	1,739	5.41%
Wage & Salary Employment	31,076	31,907	33,571	34,914	36,841	37,807	4.00%

#### Environmental Justice

There are no federally recognized Native American tribes in the ROI. There are no minority populations within a 20-mile radius of the PORTS site. However, the vast majority of a 20-mile radius of the plant has low-income populations (based on population proportions greater than the national average of 13.1%).

### **3.2.7 Land Use**

The site covers approximately 6.3 square miles (4003 acres), of which 800 acres are developed and 3203 acres are undeveloped. Of the land that is undeveloped, nearly all is available for future site development. Land use surrounding the site is predominantly rural.

### **3.2.8 Infrastructure**

An on-site facility and 31 off-site wells provide an average of 14 million gallons of water per day. An on-site facility receives an average of 0.35 million gallons of sewage per day. The Ohio Electric Corporation supplies power via an electrical and coal-fired system; the current load is 1537 megawatts of electricity and 4500 tons of coal per month. Transportation in the region consists of local access roads (such as Piketon Hill Road and State Route 32) and major roads (such as Interstate 70 and U.S. Highways 23, 52, and 50). The Chesapeake and Ohio Railroad and the Norfolk and Western Railroad are the primary providers of rail service to the Portsmouth region.

### **3.2.9 Cultural Resources**

The site has no recorded archaeological sites, standing structures, or traditional cultural properties, except for two cemeteries in the northwest corner of the site. A cultural resources study was conducted for the site in 1997. The study addressed the site facilities and surrounding lands and included archaeological and historical aspects of the site.

## **3.3 PADUCAH GASEOUS DIFFUSION PLANT**

The PGDP Reservation covers 3425 acres in western Kentucky, 10 miles west of Paducah, and employs 1868 people. Paducah has been an active uranium enrichment facility since 1952. Enriched uranium is produced by the United States Enrichment Corporation for the commercial sector as fuel for nuclear power reactors in the United States and overseas. PGDP is a feed facility for Portsmouth.

### **3.3.1 Public and Worker Risk**

The radiation dose from airborne radionuclides to the maximally exposed individual was 0.0045 mrem, and the collective dose from radionuclide emissions to the site ROI health risk population was 0.017 person-rem. The ROI population was estimated at 500,502 based on 1990 census data.

### **3.3.2 Climate and Air Quality**

Prevailing winds at the Paducah Airport in 1992 were from the south 16% of the time on a yearly basis. The highest occurrence of wind speed was from 8 to 11 mph with an annual occurrence of 31%. January is the coldest month, with a daily average temperature of 35°F, while July is the warmest month with an average temperature of 79°F.

McCracken County is classified by the EPA as a marginal attainment area for ozone. The county is in attainment for the other criteria pollutants. The major sources of criteria air pollutant emissions are coal-, oil-, and gas-fired boilers. Sources of radionuclide emissions in 1997 were the cascade purge vent/stack at the C-310 purge and products building, decontamination activities at the C-400 cleaning building, and emissions from laboratory hoods in the C-710 building.

### **3.3.3 Water Resources**

#### **Surface Water**

Major surface water features include the Ohio River, which is less than 2 miles from Paducah; Metropolis Lake (1.5 miles northeast); and two small tributaries to the Ohio River (Big Bayou Creek and Little Bayou Creek) that provide surface drainage to the site. There are no federally designated Wild and Scenic Rivers in the ROI. The site is above the probable 500-year flood level. The site receives fresh water from the Ohio River, and both the two onsite streams and the Ohio River receive treated wastewater from the site.

#### **Groundwater**

Major groundwater units include, from bottom to top, the McNairy Flow System (interbedded sand, silt and clay); the terrace gravels; the Regional Gravel Aquifer (the primary aquifer in the area, composed of sand and gravel units); and the Upper Continental Recharge System (clayey silt with interbedded sand and gravel). No aquifers are considered sole-source aquifers. Two major plumes of groundwater contamination extend offsite.

### **3.3.4 Geology and Soils**

The topography slopes slightly from more than 450 ft in the southern part of the site to near 300 ft near the Ohio River. Surface sediments consist of valley fill deposits, which underlie most of the site, extending northward to the Ohio River. Major rock units include, from oldest to youngest, basement rocks; Tuscaloosa Formation basal gravels; the McNairy Formation; the Porters Creek Clay; continental deposits of gravel and clay-sand units; and a 10- to 30-ft layer of loess (windblown sediment). Soils beneath the site are nearly level and somewhat poorly drained. Geologic hazards include the potential for earthquakes. The site is near two active seismic zones, the New Madrid Fault Zone and the Wabash Valley Fault Zone. The potential for volcanic activity is small.

### **3.3.5 Ecological Resources**

Nonforested areas consisting of mowed grass and developed area cover most of the Paducah site; forested areas are small and dominated by mature hardwood upland and riparian forests. On-site wetlands consist of forested wetlands (mature riparian hardwood forest). A wetland in the West Kentucky Wildlife Management Area (the buffer area surrounding the production facilities) has been designated an area of ecological concern.

Federally listed endangered species that have been identified, or could be identified, in the vicinity of the Paducah site include the Indiana Bat, the Interior Least Tern, and four species of pearly mussels. Another species of pearly mussel is federally listed as threatened, as are the bald eagle and Evening Bat. No federally listed plant species are known to occur in the vicinity of Paducah.

### **3.3.6 Socioeconomics and Environmental Justice**

#### **Socioeconomics**

The Paducah ROI includes McCracken County, Kentucky, where the facility is located. Table 3.3 summarizes population, per capita income, and wage and salary employment from 1991 to 1996. Wage and

salary employment for the region was over 39,000 in 1996; total personal income was \$1.5 billion. Total site employment in 1990 was 1,740.

**Table 3.3. Population, Income, and Employment in the PGDP Region of Influence for McCracken County**

Region/Variable	1991	1992	1993	1994	1995	1996	Growth 1991-96
<b>Kentucky</b>							
<b>McCracken County</b>							
Population	63,237	63,729	64,171	64,646	64,600	64,701	0.46%
Per Capita Pers. Inc. (\$)	18,352	19,311	20,089	20,689	22,437	23,567	5.13%
Total Personal Income (Mil \$)	1,161	1,231	1,289	1,337	1,449	1,525	5.61%
Wage & Salary Employment	33,959	34,746	36,713	37,391	38,639	39,392	3.01%

### **Environmental Justice**

There are both low-income and minority populations near the plant site with minority populations in the City of Paducah. There are no federally recognized Native American tribes in the area.

#### **3.3.7 Land Use**

The site occupies approximately 3425 acres, of which 750 acres are developed and 2675 acres are undeveloped. Land use surrounding the site is predominantly undeveloped natural area.

#### **3.3.8 Infrastructure**

The Ohio River supplies an average of 15 million gallons of water per day; the water is treated onsite by chemical and physical processes. An on-site treatment plant receives an average of 0.2 to 0.4 million gallons of sewage per day. Sewage is treated on site. Electric Energy, Inc., supplies power; the current site load is 1564 MW. The site also uses approximately 82 tons of coal per day. Transportation in the region consists of local access roads (State Routes 1154 and 358) and major roads (Interstate 24 and U.S. Highways 45, 60, and 63). The Burlington Northern Railroad, Paducah Railroad, Louisville, and the on-site U.S. Government Railroad are primary providers of rail service to the Paducah region.

#### **3.3.9 Cultural Resources**

The site has three recorded archaeological or historic sites, and others have been identified in areas near the Paducah plant site. The site has not been subject to any systematic cultural resources surveys.

### **3.4 Y-12 PLANT**

Until 1992 the primary mission of the Y-12 Plant was the production and fabrication of nuclear weapons components. Current assignments in the Y-12 Defense Programs include dismantling nuclear weapons components returned from the national arsenal, serving as the nation's storehouse of special nuclear materials, and providing special production support to DOE programs (ORNL 1998).

### **3.4.1 Public and Worker Risk**

The calculated radiation doses to maximally exposed off-site individuals from airborne releases in 1997 was 0.33 mrem (ORNL 1998). The collective radiological dose from airborne radionuclide emissions to the site ROI health risk population was 43 person-rem (DOE 1997b).

### **3.4.2 Climate and Air Quality**

The climate of eastern Tennessee may be broadly classified as humid continental, although it is very near the region of temperate continental climate to the north. The Cumberland Mountains/Plateau to the northwest and the Great Smoky Mountains to the southeast influence the patterns of temperature and precipitation over the region, with cooler temperatures and greater precipitation generally occurring at the higher elevations. The average annual temperature in Oak Ridge, based on a 30-year period from 1961 to 1990, is 56.6°F and precipitation is 53.8 in. per year. Precipitation is fairly evenly distributed most of the year. The average wind speed is approximately 4 mph (at 10 m above the ground), and the highest wind speed, 79 mph, was associated with a tornado in Bear Creek Valley during the afternoon of February 21, 1993. Prevailing wind directions are from the northeast and southwest, reflecting the channeling of winds parallel to the ridges and valleys in the area.

Roane County and all surrounding counties are in attainment for NAAQS criteria pollutants. The nearest nonattainment area is Polk County, which is about 40 miles south of the Y-12 Plant. Air quality in the region is generally good. The ozone standard is occasionally exceeded in Knoxville; however, Knox County is in attainment of the ozone standard.

The release of radiological contaminants, primarily uranium, into the atmosphere at the Y-12 Plant occurs almost exclusively as a result of plant production, maintenance, and waste management activities. In 1997, only 0.013 curies of uranium were released from Y-12. However, ORNL releases are much larger with over 10,000 curies from the High Flux Isotope Reactor in 1997 (ORNL 1998). Measurements at the perimeter of the Oak Ridge Reservation (ORR) indicate ambient air concentrations are less than 1% of their respective derived concentration guides (DCGs) given in DOE Order 5400.5 (DOE 1997a). A DCG is a concentration of a given radionuclide for one exposure pathway (e.g., inhalation) that would result in an effective dose equivalent of 100 mrem per year to reference man, as defined by the International Commission on Radiological Protection.

The nearest prevention of significant deterioration (PSD) Class I area to the Y-12 Plant is the Great Smoky Mountains National Park approximately 30 miles south of the Y-12 Plant. The Joyce Kilmer Wilderness Area, which is also a Class I area, is just south of the western end of the Great Smoky Mountains National Park. The median visibility range at the park is 24 miles with a summer median of 12 miles.

### **3.4.3 Water Resources**

The Y-12 Plant is approximately 2 miles from the Melton Hill Reservoir and Clinch River. Onsite, two streams originate approximately in the middle of the plant. Bear Creek flows directly west from its headwaters at the Y-12 Plant; East Fork Poplar Creek flows east before turning north and west and flowing through the city of Oak Ridge. These two creeks merge near the ETTP, which is approximately 10 miles west of the Y-12 Plant. The major groundwater unit for the ORR is the Knox Aquifer, composed of the Knox Group and the Maynardville Limestone. No aquifers are considered sole-source aquifers (DOE 1997b).

#### **3.4.4 Geology and Soils**

On a regional scale, the ORR, which includes the Y-12 Plant, is located on the western part of the Valley and Ridge Province (DOE 1998). The stratigraphic section of the ORR is stacked along three major thrust faults. The eastern portion of the Y-12 Plant is located on the White Mountain thrust sheet. This fault has not been historically active (DOE 1998).

Bear Creek Valley, to the west, is underlain by rocks of three regionally important stratigraphic units: the Rome Formation, the Conasauga Formation, and the Knox Group that typically dip 45° to the southeast (DOE 1997). The geology of Bear Creek Valley displays an inclined layer cake-style stratigraphy that is observed on a variety of scales: on a regional scale where limestone- and dolomite-dominated rock groups are interbedded with predominantly clastic shale groups, and on the scale of outcrops where clastic beds are interlayered with carbonate beds. This layered structure exerts a strong influence on groundwater flow (DOE 1997).

#### **3.4.5 Ecological Resources**

The ORR consists of diverse habitats and supports a rich variety of flora and fauna. Vegetation is characteristic of that found in the intermountain regions of central and southern Appalachia. The Y-12 Plant site is covered in mowed grass, concrete, gravel, asphalt, and industrial structures. Thus, the site does not have unique habitats or a wide diversity of flora or fauna. Upper East Fork Poplar Creek lacks riparian vegetation because much of the stream is channelized and maintained. Lake Reality is a 2.5-acre, plastic-lined, flat-bottomed settling and spill control structure located near the east end of the plant on East Fork Poplar Creek.

There are no federally protected threatened or endangered species known on the Y-12 Plant site. Although surveys for protected species are not comprehensive enough to rule out all possible federal- or state-listed vertebrates, the likelihood of finding such species seems very low (DOE 1998).

There is a small wetland (0.45 acres) in a small wooded area between New Hope Cemetery and Bear Creek Road.

#### **3.4.6 Socioeconomics and Environmental Justice**

The Y-12 Plant is one of three sites located on the DOE ORR, which includes portions of both Anderson and Roane counties in Tennessee. This region also includes the city of Oak Ridge, which provides a substantial portion of the work force for the three facilities. To generate the most conservative estimates of potential impact, the ROI includes only these two counties. Actual impacts are likely to be distributed over a wider area, since Anderson County is also part of the MSA for the much larger city of Knoxville and draws commuters from at least 12 counties in eastern Tennessee.<sup>1</sup>

Table 3.4 summarizes population, per capita income, and wage and salary employment from 1991 to 1996. Wage and salary employment for the region was over 64,000 in 1996; total personal income was over \$2.5 billion. The Scarboro Community, which borders the fence line of the plant's northern boundary, is predominantly an African-American Community.

---

<sup>1</sup>Commuting data taken from Oak Ridge Chamber of Commerce website, [www.orcc.org/labor.html](http://www.orcc.org/labor.html).

### 3.4.7 Land Use

Land use within 50 miles of the Y-12 Plant is primarily agricultural except for the city of Knoxville and the city of Oak Ridge (DOE 1994). The Y-12 Plant is an industrial site that has been in operation since World War II. The city of Oak Ridge forms much of the northern boundary to the site, and the Tennessee Valley Authority's (TVA's) Melton Hill Reservoir and the Clinch River form the eastern and southern boundaries. Recreational uses of the surrounding area include fishing, boating, hunting, and camping. Several recreational areas are within 5 miles of the site.

**Table 3.4. Population, Income, and Employment in the Y-12 Plant Region of Influence for Anderson County and Roane County**

Region/Variable	1991	1992	1993	1994	1995	1996	Growth 1991-96
<b>Tennessee</b>							
<b>Anderson County</b>							
Population	69,208	70,361	70,648	70,878	71,292	71,479	0.65%
Per Capita Pers. Inc. (\$)	18,040	19,101	20,092	20,690	21,715	22,292	4.32%
Total Personal Income (Mil \$)	1,249	1,344	1,419	1,466	1,548	1,593	4.99%
Wage & Salary Employment	37,395	39,102	41,296	40,698	42,922	41,010	1.86%
<b>Roane County</b>							
Population	47,639	47,880	47,985	48,763	48,986	49,673	0.84%
Per Capita Pers. Inc. (\$)	15,551	16,705	17,740	18,158	19,070	19,601	4.74%
Total Personal Income (Mil \$)	741	800	851	885	934	974	5.62%
Wage & Salary Employment	21,305	22,186	23,055	24,235	23,550	23,633	2.10%

### 3.4.8 Infrastructure

Sanitary wastewater from the Y-12 Plant is discharged to the City of Oak Ridge publicly owned treatment works under an industrial and commercial wastewater discharge permit. Sanitary sewer radiological sample results at the Y-12 Plant are routinely reviewed to determine compliance with DOE Order 500.5 "Radiological Protection of the Public and the Environment." No radiological parameter that is monitored (including uranium) has exceeded a DCG (ORNL 1998). Typically, sample results indicate the Y-12 Plant radiological discharges are three orders of magnitude below their respective DCG (ORNL 1998).

### 3.4.9 Cultural Resources

Native American occupation of the Oak Ridge area began about 12,000 years ago. European settlement began in the Eighteenth Century. Much of the current Y-12 Plant site was farmed before World War II when the site was secured by the federal government as part of the Manhattan Project. A recent draft Cultural Resources Survey identified an historic district with 93 contributing buildings that is eligible for inclusion in the National Register of Historic Places.

## 3.5 EAST TENNESSEE TECHNOLOGY PARK

ETTP, formerly known as the ORGDP or K-25 Site, is located in Roane County, Tennessee, and is one of three large facilities comprising the ORR. The site is located on a level 1500-acre tract of land near the

confluence of Poplar Creek and the Clinch River. ETTP is approximately 35 miles west of Knoxville and approximately 8 miles southwest of the city of Oak Ridge.

### **3.5.1 Public and Worker Risk**

The calculated radiation doses to maximally exposed off-site individuals from airborne releases in 1997 was 0.59 mrem (ORNL 1998). The collective radiological dose from airborne radionuclide emissions to the site ROI health risk population was 43 person-rem (DOE 1997b).

### **3.5.2 Climate and Air Quality**

The climate of eastern Tennessee may be broadly classified as humid continental, although it is very near the region of temperate continental climate to the north. The Cumberland Mountains/Plateau to the northwest and the Great Smoky Mountains to the southeast influence the patterns of temperature and precipitation over the region, with cooler temperatures and greater precipitation generally occurring at the higher elevations. The average annual temperature in Oak Ridge, based on a 30-year period from 1961 to 1990, is 56.6°F and precipitation is 53.8 in. per year. Precipitation is fairly evenly distributed most of the year. The average wind speed is approximately 4 mph (at 10 m above the ground) and the highest wind speed, 79 mph, was associated with a tornado in Bear Creek Valley during the afternoon of February 21, 1993. Prevailing wind directions are from the northeast and southwest, reflecting the channeling of winds parallel to the ridges and valleys in the area.

Roane County and all surrounding counties are in attainment for NAAQS criteria pollutants. The nearest nonattainment area is in Polk County, which is about 45 miles south of ETTP. Air quality in the region is generally good. The ozone standard is occasionally exceeded in Knoxville; however, Knox County is in attainment of the ozone standard.

For radiological pollutants, emissions are variable and emanate mostly from the TSCA incinerator. Measurements at the perimeter of the ORR indicate ambient air concentrations are less than 1% of their respective DCGs given in DOE Order 5400.5 (DOE 1997a).

The nearest PSD Class I area to ETTP is the Great Smoky Mountains National Park, 35 miles south of ETTP. The Joyce Kilmer Wilderness Area, which is also a Class I area, is just south of the western end of the Great Smoky Mountains National Park. The median visibility range at the park is 24 miles with a summer median of 12 miles.

### **3.5.3 Water Resources**

#### **Surface Water**

ETTP is directly adjacent to the Clinch River along the northwest boundary of the ORR. Poplar Creek is a moderately wide (30- to 70-ft) stream that enters the north side of ETTP about 0.3 miles downstream of the confluence of the east and west forks of Poplar Creek. The lower reach of Poplar Creek meanders sharply along the southwest side of the ETTP and enters the Clinch River.

TVA performed an analysis of floods on the Clinch River and Poplar Creek. TVA concluded that most of ETTP is above the probable maximum flood level. The only facilities identified at risk during major floods were the K-25 power plant and the pumping station for ETTP's water filtration plant. The source of flooding at ETTP would be backwater from the Clinch River near the confluence of Poplar Creek. All proposed storage locations are above the 100-year flood level.

## Groundwater

Groundwater occurs at ETTP in both the unconsolidated overburden and underlying bedrock as a single, unconfined water table aquifer. With few exceptions the water table occurs in the overburden overlying bedrock with the saturated overburden ranging up to 70 ft. In general, the water table is encountered within several feet of the surface adjacent to major water features and in incised ravines.

Groundwater flows in bedrock are controlled by hydraulic gradients, fracture networks, and karst solution features. Typically, bedrock flowpaths tend to follow geologic strike. Karst features are present in bedrock at ETTP, but conduit-dominated flow has been confirmed only in portions underlain by Knox carbonate along Black Oak Ridge.

The nearest domestic water supply wells are located approximately 2 miles southwest of ETTP on the opposite side of the Clinch River. It is unlikely that these wells could be affected by groundwater flowpaths from ETTP, should such a pathway exist. Additionally, there are nearly a dozen domestic wells along Black Oak Ridge, west of the DOE boundary. Four of these wells were sampled recently and found to be uncontaminated.

### 3.5.4 Geology and Soils

In general, ETTP is underlain by bedrock that can be broadly characterized as carbonate (Chickamauga and Knox Group) or clastic (Rome Formation). The carbonates underlie the majority of the main plant area. The eastern part of the site is underlain by clastic bedrock of the Cambrian Rome Formation. The structural geology of the ETTP is complex; the principal faults in the area include the White Oak Fault, a major regional thrust fault located along the south side of the ETTP. Seismic activity in the southern Appalachian Mountains that has affected the site area has been recorded 45 times since 1800. The probability of future seismic damage is moderate.

### 3.5.5 Ecological Resources

The ORR consists of diverse habitats and supports a rich variety of flora and fauna. Vegetation is characteristic of that found in the intermountain regions of central and southern Appalachia. Vegetation around the buildings within the fenced area on the ETTP proper is a mixture of mowed grasses with a few shrubs and trees. Many of the shrubs and trees have been planted as landscaping, although some native species are found in unmowed areas around ponds and waterways.

Since ETTP proper is primarily planted in non-native grasses, it has very little habitat available for native animals except along Poplar Creek. The majority of animal species found within ETTP's boundaries are species that adapt well to disturbance and the presence of humans. There are no known federally protected plant or animal species on the ETTP site, although suitable habitat exists for the endangered bald eagle on Melton Hill Reservoir and the Clinch River. Sixteen plant species and 18 animal species that are considered rare, threatened, or endangered by the State of Tennessee are found on or near ETTP.

The Lower Poplar Creek Rookery is the only environmentally sensitive area within ETTP. It is approximately 6.5 acres in size and is located on the north bank of Poplar Creek in the middle of the plant site.

### **3.5.6 Socioeconomics and Environmental Justice**

Like the Y-12 Plant, ETTP is located on the DOE ORR, and the region of impact is identical to the ROI for the Y-12 Plant alternative. See Sect. 3.4.6 for summaries of population, income, and employment within the region. ETTP is in proximity to low-income populations on Blair Road (which runs behind the Park).

### **3.5.7 Land Use**

The approximately 1500 acres of land in the ETTP site are industrial. The site formerly produced enriched uranium using a gaseous diffusion process. Portions of the site have been used for waste storage since the facility ceased enrichment operations. Efforts are under way to convert existing buildings into productive use through reindustrialization.

### **3.5.8 Infrastructure**

Treatment of domestic wastewater is performed at the ETTP Sewage Treatment Plant which is operating within its National Pollutant Discharge Elimination System permit. The operating capacity of the treatment plant is about 600,000 gallons per day (gpd) with a current load of half that capacity (DOE 1997a). The ETTP water treatment plant is currently producing 800,000 gpd to 1.4 Mgd of potable water. Capacity of the system is roughly three times the current use. Highways in the area of the site include State Routes 95 and 58.

### **3.5.9 Cultural Resources**

The K-25 Site was established as part of the Manhattan Project to develop and produce highly enriched uranium nuclear fuel for the atomic bomb used in World War II. The Manhattan Project was the first industrial process for separating the uranium isotopes by the gaseous diffusion method. A summer 1994 cultural resources survey of the former K-25 Site identified a “Main Plant Historic District,” with 120 “contributing” buildings, that is eligible for inclusion on the National Register of Historic Places.

## 4. ENVIRONMENTAL CONSEQUENCES

At all sites the environmental impacts associated with minimal construction and operations, including risks associated with receipt and offloading of uranium materials and normal operations, are minimal and negligible. Postulated accident scenarios at all the DOE sites and buildings/areas within DOE sites result in low to negligible potential risk. Buildings or areas located relatively close to the facility boundaries (e.g., K-1066F Area at ETTP) have the highest potential for adverse consequences (but still low risk) under certain hypothetical accident scenarios.

The first part of this chapter (Sect. 4.1) establishes the methodology used to calculate public and worker risk under both routine operations and under various accident scenarios. The uranium source term, the assumed accident frequencies, and other parameters needed to model the accident scenarios will be defined in Appendix C. The detailed results of the modeling will be presented in tables showing all storage alternatives under all the hypothetical accident scenarios. The second part of this chapter (Sects. 4.2 through 4.6) summarizes the environmental consequences at each of the five alternative storage sites [No Action (FEMP), PORTS, PGDP, Y-12 Plant, and ETTP].

### 4.1 PUBLIC AND WORKER RISK

This section describes risk to the public, co-located worker, and facility worker due to continued storage of uranium materials at the FEMP site, or receipt and storage of these materials at other DOE-ORO sites described in Sect. 2. Risks are evaluated for routine operations and non-routine (accident) conditions. Offsite releases were determined to be minor at all sites.

The number of parameters that could affect the off-site human health and environmental consequences of a catastrophic release are vast. For example, the assumptions regarding wind speed, wind direction, height of plume, the amount of uranium affected, the amount of dilution, and the area of deposition could vary in some cases by orders of magnitude. Because of the complexity involved with multiple varying assumptions, worst-case assumptions for off-site transport and human health dose at each potential storage location are employed according to the following rationale.

For assessment of environmental consequences, the worst-case accident is assumed to be a seismic event and resulting fire which breaches much of the primary and secondary containment and results in a plume that entrains a large portion of the uranium source material. It is further assumed that the plume moves directly via the shortest distance from the storage locations to a potential receptor at the facility boundary, and that all of the uranium in the plume is respirable. However unlikely this scenario is, given fire alarm and suppression capabilities, it is still assumed that a resulting plume from a seismic event and fire would be the most likely worst-case accident to get the highest concentration of source material to the nearest off-site receptor (i.e., compared to a tornado or aircraft impact). This is especially true given the form of the majority of the uranium (e.g., ingots, recyclable pieces of metal.) While a tornado might lift a large majority of the source term and drop it in off-site areas, the material would not exist in a respirable fraction. The hypothetical seismic/fire scenario also results in the worst-case exposure pathway (inhalation), since uranium is predominately an alpha-particle emitter. This will be addressed in greater detail in Appendix C.

Uranium that is released from primary and secondary containment under the accident scenario described above and modeled later in this section can be deposited on surface soils and be subject to movement with soil water through the vadose zone into groundwater. The material could also be deposited directly into water

bodies or move from the surface soil overland into water bodies. As described below, any exposure pathway to human receptors via soil, groundwater, or surface water would be relatively unimportant compared to the inhalation pathway to the nearest off-site receptor.

Upon deposition of the uranium entrained in the plume, the fate and transport of uranium is a function of the environmental site characteristics and the physical/chemical properties of uranium. Such properties include uranium's solubility in water, the tendency of uranium to transform or degrade (e.g.,  $^{238}\text{U}$  has a half-life of 4.5 billion years), and chemical affinity for solids or organic matter (described as a partitioning coefficient  $K_d$ ). An average  $K_d$  value for uranium is 15 L/kg, although the possible range of  $K_d$ s can vary widely (Sheppard and Thibault 1990). Contaminants with small  $K_d$ s will be leached more effectively into the groundwater (i.e., be more mobile) than those with larger  $K_d$ s. For example, uranium is much less mobile than  $^{99}\text{Tc}$ , which has a  $K_d$  of 0.1 L/kg.

In addition, uranium can be transformed to other oxidation states in soil, further reducing its mobility. If organic matter, clay, and hydrous oxides are present in the receiving soils, adsorption of the uranium metal may occur onto these materials, also reducing the uranium's mobility and toxicity. The soils described in Sect. 3 are generally clay- and organic-matter rich and would be effective in retarding the mobility of uranium. Further, even if resuspended and available to an off-site receptor via inhalation, uranium concentrations would be diluted compared to the concentrations available in the original plume.

Each of the potential storage locations described in Sect. 3 is located within water-rich environments (i.e., each site is near major rivers). Therefore, even though the previous section supports minimal mobility of uranium in the soil, upon any accidental release, a fraction of the uranium could enter the water system, especially by direct deposition from the plume. The mobility of uranium deposited onto water depends upon the type of complex (cationic or anionic) formed as a result of the physical processes acting on the uranium. Cationic species tend to adsorb to soil, and anionic species tend to move with water. Uranium released in a fire would be oxidized (be cationic) and would tend to adsorb to the soil particles entrained in the water. As with uranium deposited upon the soil, the doses to a receptor in contact with uranium in water or associated sediment would be less significant than those of the receptor exposed to the initial plume.

Once in the off-site environment, the source material is assumed to intercept a human receptor. In general, uranium compounds are not easily absorbed across the gastrointestinal tract. Soluble uranium compounds demonstrate the best absorption, but this absorption is still low. Uranium is known to be a chemical toxicant, exposure to which leads to nephritis in the kidney. Uranium can also induce cancer when organs and tissues are exposed to alpha particles emitted from decaying uranium atoms. While other energetic emissions from radioactive decay of atoms, such as beta particles and gamma rays, also cause molecular ionization, these radiations do not produce the density of ionizations that alpha particles do when inside the human body. The ionization events cause biological damage, which is believed to be responsible for inducing cells to become cancerous. The types of uranium (e.g., natural, enriched, and depleted) under consideration are important because different types of uranium have different specific activities (the amount of radioactivity per unit mass). The difference between natural, enriched, and depleted uranium is defined by the percent  $^{235}\text{U}$  mass enrichment. The higher the  $^{235}\text{U}$  enrichment, the higher the specific activity of the mixture. The different quantities of source material and their associated activities are considered in the quantitative assessment that follows.

In summary, the potential adverse effects of the uranium source material in environmental media such as groundwater, surface water, soil, or sediment are relatively unimportant when compared to a release of the source material into the air from various accident scenarios. Therefore, the quantitative assessment

provided in this section will address the inhalation exposure pathway and the resulting calculated dose from both routine operations and various accident scenarios.

## 4.2 NO ACTION ALTERNATIVE

Under this alternative, the uranium currently stored at the FEMP site would remain at the site. The uranium is currently in various container types including 55-gallon steel drums, T-hoppers, half-high boxes, and sea-land containers. Currently, the nuclear material is located in Buildings 4B, 77, and 54B but would be moved to TS-4 and TS-5 at Plant Pad 1 and would be located under two existing TSSs (see Fig. 2.1).

### 4.2.1 Normal Operations

Under normal operations, land use, geology and soils, water resources, cultural resources, and the infrastructure would remain unchanged. Air effluents associated with uranium inventory maintenance would be minimal and would remain the same as present. Since there is no new construction and there are no effluents from the stored uranium, plant and animal species would not be adversely affected and cultural resources would not be impacted. Some continued maintenance of these buildings would be required, and monitoring and surveillance by FEMP site personnel would continue. The socioeconomic impact analysis assumes little or no construction activity and that the employees currently monitoring the uranium will continue to do so. Under these assumptions, there is no change in expenditures or employment and, consequently, no impact. Even if three additional workers were hired for monitoring, they would represent a minimal increase to the more than 590,000 existing wage and salary workers in Hamilton County. In the absence of important impacts, environmental justice concerns do not arise.

During storage of uranium materials, workers could be exposed to direct radiation from surface contamination on the storage containers. However, the containers have been checked and overpacked if deemed necessary. Therefore, worker exposure due to routine operations associated with surveillance and maintenance of stored materials is expected to be less than detectable levels.

In addition to surface contamination, a radiation dose from the stored uranium materials can be expected. Dose rates from any single stored container are no more than 3 to 4 mrem/h. The dose rate at a distance of 1 ft from a container is ~1 mrem/h, and the dose rate at a distance of 20 ft is <0.5 mrem/h (approximately the same as normal background radiation doses). These dose rates are not affected by stacking the containers because the containers and the materials themselves provide significant shielding. These dose rates are considered negligible to any receptor (facility worker, co-located worker, or public).

### 4.2.2 Accidents

The accident risk calculated for the baseline condition would not change. Various accident scenarios are calculated for both the public and the co-located worker at the DOE sites, including the FEMP site. Doses to the facility worker, co-located worker, and the public associated with general handling accidents, storage area fires, and seismic events are summarized in Table C.8 in Appendix C. The highest radiological risk to the public (0.63 rem dose) is from a storage area fire and to the co-located worker (0.84 rem) is from an earthquake with aerial dispersion of uranium materials. Average annual exposure to natural sources is approximately 0.29 rem. Since the uranium materials would continue to remain at the FEMP site, there is no change in these exposures or risks. These risks would continue to exist for the public and the workers. These exposures constitute a low risk and are environmentally negligible.

## 4.3 PORTSMOUTH GASEOUS DIFFUSION PLANT

The proposed action is to place up to 3800 MTU of nuclear materials product currently stored at the FEMP site to another DOE-ORO site. PORTS qualifies as such a site and has a long history of handling uranium and other nuclear products.

### 4.3.1 Normal Operations

Under normal operations, land use, cultural resources, and infrastructure would remain unchanged. Construction would be involved only at the X-7745R Storage Yard for two TSSs and receiving docks at the lithium buildings, and possibly Building X-744K. Construction would occur within the existing plant boundary in an industrial area. The receiving docks would be immediately adjacent to existing buildings, and each would be 30 by 40 ft in size. The amount of land disturbance would result in minor impacts to soils or biota. In those areas where some existing grass and open area exists, this permanent conversion is less than 0.3 acre and would be inconsequential. The area required for the TSSs at X-7745R Storage Yard would be slightly over 1 acre; however, the area is already covered by a concrete pad and no additional impacts to soils, air quality, or biota are expected. Building X-744K is approximately 200 ft from Big Run Creek and 800 ft from a holding pond associated with Big Run Creek.

Under normal operations no impacts to the water quality or aquatic biota in this holding pond or Big Run Creek are expected. Should a receiving dock be required for this building, it would be constructed on the opposite side of the building from Big Run Creek, and standard best management practices (BMPs) will be followed to ensure that construction-related runoff is controlled. No increase in turbidity in Big Run Creek or the holding pond is expected.

The socioeconomic impact analysis assumes a maximum of \$5 million in construction expenditures to be spent in the current fiscal year for a combination of building upgrades and TSS construction. Up to three full-time equivalent (FTE) jobs would be required to operate the facility. If one assumes that all of the construction funds are spent on labor, and that the three new facility employees earn the average per capita income for the ROI, the impact on income in the first year would be \$5.05 million, or 0.3% of the ROI 1996 baseline. This represents a conservative upper bound, since some of the construction investment will represent materials purchases rather than labor, and actual construction expenditures may be smaller. After the first year, the impact on income would be limited to the salaries of the three employees, an even smaller fraction of the local economic base.

Based on this analysis, the proposed action would be inconsequential. In the absence of any important impacts, including effluent releases, environmental justice issues do not arise.

The impact on employment and population is similarly small. If one assumes that the construction workers each earn the average per capita income, the initial \$5 million expenditure implies roughly 310 construction jobs in the first year, and three full-time workers to operate the facility. The first-year impact then represents 0.8% of the wage and salary workers shown in Table 3.2. For subsequent years, the impact of three full-time jobs in this region is negligible. If the new employees moved into the region with their families, the impact on the population base would be even smaller than the employment impact.

During storage of uranium materials, workers could be exposed to direct radiation from surface contamination on the storage containers. However, the containers have been checked, overpacked if deemed necessary, and certified for transport before storage. Therefore, worker exposure due to routine operations associated with surveillance and maintenance of stored materials is expected to be less than detectable levels.

In addition to surface contamination, radiation doses from the stored uranium materials can be expected. Dose rates from any single stored container are no more than 3 to 4 mrem/h. The dose rate at a distance of 1 ft from a container is ~1 mrem/h, and the dose rate at a distance of 20 ft is <0.5 mrem/h (approximately the same as normal background radiation doses). These dose rates are not affected by stacking the containers because the containers and the materials themselves provide significant shielding. These dose rates are considered negligible to any receptor (facility worker, co-located worker, or public).

#### 4.3.2 Accidents

##### **Human Health**

Various accident scenarios are calculated for both the public, facility worker, and the co-located worker at PORTS. Doses to the facility worker, co-located worker, and the public associated with general handling accidents, storage area fires, and seismic events are summarized in Table C.8 in Appendix C. The highest radiological risk to the public (0.63 rem dose) is from a storage area fire and to the co-located worker (0.84 rem) is from an earthquake with aerial dispersion of uranium materials. These exposures constitute a low risk and are environmentally negligible.

##### **Biota**

For all accident scenarios (see Table D.3), uranium metal toxicity to aquatic biota for both acute and chronic exposure is negligible with all Hazard Quotients (HQs) less than one. An HQ is a ratio, calculated by dividing the environmental concentration of a chemical constituent by that chemical's acute or chronic toxicity benchmark for a given ecological receptor. If the HQ is less than 1, adverse affects to the receptor are assumed to be negligible, whereas an HQ greater than 1 implies potential adverse impacts.

### **4.4 PADUCAH GASEOUS DIFFUSION PLANT**

The proposed action is to place up to 3800 MTU of nuclear materials product currently stored at the FEMP site to another DOE-ORO site. PGDP qualifies as such a site and has a long history of handling uranium and other nuclear products.

#### 4.4.1 Normal Operations

At PGDP, site construction of two TSSs, including a concrete pad, would be required to store the uranium product. Land use would not be altered since the TSS location would be in the middle of the industrial part of the plant, and the proposed location would not impact any known cultural resources. BMPs will be followed during construction, and no impacts to water resources or aquatic biota or habitat are expected. The infrastructure is expected to be unchanged. Some compaction of the soil under the concrete pad would occur, but in the long term this effect is negligible.

Some minor and temporary fugitive dust would be generated during the grading of the site before the concrete pad is installed. Also, construction equipment would temporarily increase airborne exhaust emissions. These emissions would be typical of other common construction practices, and impacts would be temporary and negligible.

The TSS location would involve the permanent removal of approximately 1 acre of open field habitat. Plants and non-mobile animals occupying the site would be killed, and animals that currently use the field for foraging or nesting habitat would have to relocate. However, the amount of habitat affected is very small

in relation to the size of similar habitat in and around the PGDP site, and impacts to the ecosystem are minor. No threatened or endangered species, or their habitat, would be affected.

The socioeconomic impact analysis assumes a maximum of \$5 million in construction expenditures to be spent in the current fiscal year, and a maximum of three FTE jobs required to operate the facility. Assuming all of the construction funds are spent on labor and that the three new facility employees earn the average per capita income for the ROI, the impact on income in the first year would be \$5.07 million, or 0.3% of the ROI 1996 baseline. This represents a conservative upper bound, since some of the construction investment will represent materials purchases rather than labor, and actual construction expenditures may be smaller. After the first year, the impact on income would be limited to the salaries of the three employees, an even smaller fraction of the local economic base.

The impact on employment is similarly small. Assuming that the construction workers each earn the average per capita income, the initial \$5 million expenditure implies roughly 212 construction jobs in the first year and three full-time workers to operate the facility. The first-year impact then represents 0.5% of the wage and salary workers shown in Table 3.3. For subsequent years, the impact of three full-time jobs in this county is negligible. If the new employees moved into the region with their families, the impact on the population base would be even smaller than the employment impact.

Based on this analysis, the proposed action would be inconsequential. In the absence of any important impacts including effluent releases, environmental justice concerns do not arise.

During storage of uranium materials, workers could be exposed to direct radiation from surface contamination on the storage containers. However, the containers have been checked, overpacked if deemed necessary, and certified for transport before storage. Therefore, worker exposure due to routine operations associated with surveillance and maintenance of stored materials is expected to be less than detectable levels.

In addition to surface contamination, radiation doses from the stored uranium materials can be expected. Dose rates from any single stored container are no more than 3 to 4 mrem/h. The dose rate at a distance of 1 ft from a container is ~1 mrem/h, and the dose rate at a distance of 20 ft is <0.5 mrem/h (approximately the same as normal background radiation doses). These dose rates are not affected by stacking the containers because the containers and the materials themselves provide significant shielding. These dose rates are considered negligible to any receptor (facility worker, co-located worker, or public).

#### 4.4.2 Accidents

Various accident scenarios are calculated for both the public, facility worker, and the co-located worker at PGDP. Doses to the facility worker, co-located worker, and the public associated with general handling accidents, storage area fires, and seismic events are summarized in Table C.8 in Appendix C. The highest radiological risk to the public (0.63 rem dose) is from a storage area fire and to the co-located worker (0.84 rem) is from an earthquake with aerial dispersion of uranium materials. These exposures constitute a low risk and are environmentally negligible.

### 4.5 Y-12 PLANT

The proposed action is to place up to 3800 MTU of nuclear materials product currently stored at the FEMP site to another DOE-ORO site. The Y-12 Plant qualifies as such a site and currently is storing some LEU onsite.

#### 4.5.1 Normal Operations

Storage of uranium products at the Y-12 Plant would involve preparation of existing buildings (9720-33 and 9204-4) including removing some existing materials from 9720-33 and building upgrades. The west end of the Y-12 Plant where these two buildings are located is highly developed and industrialized. Land use would not be altered. There would be no impact to cultural resources, biota, water resources, the infrastructure (except minor improvements to the buildings themselves), or geology and soils. Some very minor air emissions would be associated with preparing the buildings for receipt of uranium.

The socioeconomic impact analysis assumes a maximum of \$5 million in construction expenditures to be spent in the current fiscal year, and a maximum of three FTE jobs required to operate the facility. If one assumes that all of the construction funds are spent on labor and that the three new facility employees earn the average per capita income for the ROI, the impact on income in the first year would be \$5.06 million, or 0.2% of the ROI 1996 baseline. This represents a conservative upper bound, since some of the construction investment will represent materials purchases rather than labor and actual construction expenditures may be smaller. After the first year, the impact on income would be limited to the salaries of the three employees, an even smaller fraction of the local economic base.

The impact on employment is similarly small. If one assumes that the construction workers each earn the average per capita income, the initial \$5 million expenditure implies approximately 236 construction jobs in the first year, and three full-time workers to operate the facility. The first-year impact then represents 0.4% of the wage and salary workers shown in Table 3.4. For subsequent years, the impact of three full-time jobs in this region is negligible. If the new employees moved into the region with their families, the impact on the population base would be even smaller than the employment impact.

Based on this analysis, the proposed action would be inconsequential. In the absence of any important impacts including effluent releases, environmental justice concerns do not arise.

During storage of uranium materials, workers could be exposed to direct radiation from surface contamination on the storage containers. However, the containers have been checked, overpacked if deemed necessary, and certified for transport before storage. Therefore, worker exposure due to routine operations associated with surveillance and maintenance of stored materials is expected to be less than detectable levels.

In addition to surface contamination, radiation doses from the stored uranium materials can be expected. Dose rates from any single stored container are no more than 3 to 4 mrem/h. The dose rate at a distance of 1 ft from a container is ~1 mrem/h, and the dose rate at a distance of 20 ft is <0.5 mrem/h (approximately the same as normal background radiation doses). These dose rates are not affected by stacking the containers because the containers and the materials themselves provide significant shielding. These dose rates are considered negligible to any receptor (facility worker, co-located worker, or public).

#### 4.5.2 Accidents

Various accident scenarios are calculated for both the public, facility worker, and the co-located worker at the Y-12 Plant. Doses to the facility worker, co-located worker, and the public associated with general handling accidents, storage area fires, and seismic events are summarized in Table C.8 in Appendix C. The highest radiological risk to the public (0.63 rem dose) is from a storage area fire and to the co-located worker (0.84 rem) is from an earthquake with aerial dispersion of uranium materials. These exposures constitute a low risk and are environmentally negligible.

## 4.6 EAST TENNESSEE TECHNOLOGY PARK

The proposed action is to place up to 3800 MTU of nuclear materials product currently stored at the FEMP site to another DOE-ORO site. The ETTP, formerly known as the ORGDP or K-25 Site, qualifies as such a site and has a long history of handling uranium and other nuclear products.

### 4.6.1 Normal Operations

Both the use of existing buildings (K-131 and K-631) and the site construction of two TSSs at two possible locations (K-861 Open Area and K-1066F Area) were evaluated. At each TSS location a concrete pad would be constructed. Land use would not be altered since the buildings and the TSS locations would be within the boundaries of the industrial part of the plant. None of the three proposed locations for uranium storage would impact any known cultural resources. BMPs will be followed during construction of the TSSs at the K-861 Open Area and the K-1066F Area, and no impacts to water resources or aquatic biota or habitats are expected. The infrastructure is expected to remain unchanged. Some compaction of the soil under the concrete pads would occur, but in the long term this effect is insignificant.

Some minor and temporary fugitive dust would be generated during the grading of the sites before the concrete pads are installed. Also, construction equipment would temporarily increase airborne exhaust emissions. These emissions would be typical of other common construction practices, and impacts would be temporary and insignificant.

The TSS locations would involve the permanent removal of approximately 1 acre of open field habitat at each of the two locations (K-861 Open Area and K-1066F Area). Plants and non-mobile animals occupying the sites would be killed, and animals that currently use the fields for foraging or nesting habitat would have to relocate. However, the amount of habitat affected is very small in relation to the size of similar habitat in and around the ETTP site, and impacts are insignificant. No threatened or endangered species, or their habitat, would be affected.

Since the ROI for this alternative is the same as for the Y-12 Plant alternative in Sect. 4.4.1, the calculations are identical. Based on this analysis, the proposed action will have no significant socioeconomic impact. In the absence of significant impacts, environmental justice concerns do not arise.

During storage of uranium materials, workers could be exposed to direct radiation from surface contamination on the storage containers. However, the containers have been checked, overpacked if deemed necessary, and certified for transport before storage. Therefore, worker exposure due to routine operations associated with surveillance and maintenance of stored materials is expected to be less than detectable levels.

In addition to surface contamination, radiation doses from the stored uranium materials can be expected. Dose rates from any single stored container are no more than 3 to 4 mrem/h. The dose rate at a distance of 1 ft from a container is ~1 mrem/h, and the dose rate at a distance of 20 ft is <0.5 mrem/h (approximately the same as normal background radiation doses). These dose rates are not affected by stacking the containers because the containers and the materials themselves provide significant shielding. These dose rates are considered negligible to any receptor (facility worker, co-located worker, or public).

#### 4.6.2 Accidents

##### Human Health

Various accident scenarios are calculated for both the public, facility worker, and the co-located worker at ETTP. Doses to the facility worker, co-located worker, and the public associated with general handling accidents, storage area fires, and seismic events are summarized in Table C.8 in Appendix C. Risks to the public are dependent on how close the proposed storage locations are to the public. The K-1066F Area has the highest radiological risk to the public (1.26 rem, which is still low) with the other areas and buildings at ETTP having a negligible risk. This risk is associated with aerial dispersion of uranium materials after an earthquake. These exposures constitute a low risk and are environmentally negligible.

##### Biota

For all accident scenarios (see Table D.2), uranium metal toxicity to aquatic biota for both acute and chronic exposure is negligible with all HQs less than one.

#### 4.7 CONCLUSIONS

Construction-related impacts at all sites are minor to negligible. The sites that propose the use of TSSs (PGDP and the K-861 Open Area and K-1066F Area at ETTP) would have approximately 1 acre of land, which is now open grass habitat, converted permanently to buildings. However, this acreage is unimportant in comparison to the similar acreage in and around these plant sites. TSSs are proposed at the X-7745R Storage Area at PORTS, but a concrete pad already exists and only very minor land disturbance would occur.

Operations impacts are also negligible. Routine operations would result in negligible risks. Accident-related risks range from negligible for general handling (off-loading operations, storage, and maintenance) at all sites to negligible and low risk at various sites, depending on the type of accident involved. Generally, dispersion of uranium material associated with a storage area fire and/or earthquake results in the highest radiological risk. Even the highest radiological risk to both the public and the co-located worker (1.26 rem) at the K-1066F Area at ETTP is still considered a low risk and is environmentally insignificant. Uranium metal toxicity to aquatic biota from all accident scenarios at all sites is negligible.

#### 4.8 CUMULATIVE IMPACTS

All four DOE-ORO sites have been and are still undergoing changes from their historical missions. Environmental cleanup has become a majority priority over the past decade, the need for uranium production has declined sharply, and the facilities at all the sites are aging. Cumulative impacts are impacts associated with the proposed action when combined with other past, present, or reasonably foreseeable future impacts. There are no significant impacts associated with the proposed action, except for potential short-term effects to aquatic biota at two sites under worst-case accident conditions. When the insignificant impacts associated with construction and normal operation of the proposed storage facilities are added to the baseline environment at each of the sites, and taking into account historical uses and projected future changes, no significant cumulative impacts would occur. The receipt and storage of the uranium materials at one or more of the DOE-ORO sites has the effect either of using existing buildings or developing small (approximately 1-acre) areas within heavily industrialized sites which are undergoing the changes mentioned above. Cumulative impacts from these actions are minimal and insignificant.

## 5. REFERENCES

DOE (U.S. Department of Energy) 1994. *Environmental Assessment for the Proposed Sale of Radioactively-Contaminated Nickel Ingots Located at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*. May. Oak Ridge Operations.

DOE 1997a. *Final Environmental Assessment, Lease of Land and Facilities within the East Tennessee Technology Park, Oak Ridge, Tennessee*. DOE/EA-1175. November. Oak Ridge, Tennessee, Oak Ridge Operations Office.

DOE 1997b. *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage and Disposal of Radioactive and Hazardous Waste*. DOE/EIS-200-F. May. Washington, D.C., Office of Environmental Management.

DOE 1997c. *Report on the Remedial Investigation of Bear Creek Valley at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee, Volume I*. DOE/OR/01-1455/V1&D2. March. Oak Ridge, Tennessee.

DOE 1998. *Report on the Remedial Investigation of Upper East Fork Poplar Creek Characterization Area at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee, Volume I*. DOE/OR/01-1641/V1&D2. August. Oak Ridge, Tennessee.

Mason, C. Science Applications International Corporation 1999. Personal communication to Scott Toler, Fernald Site (January 13, 1999).

Oak Ridge Chamber of Commerce website, [www.orcc.org/labor.html](http://www.orcc.org/labor.html).

Oak Ridge National Laboratory 1998. *Oak Ridge Reservation Annual Site Environmental Report for 1997*. ES/ESH-78. October. Oak Ridge, Tennessee.

Sheppard, M. I., and D. H. Thibault 1990. "Default Soil Solid/Liquid Partition Coefficients for Four Major Soil Types: A Compendium." *Health Phys.*, 59(4), pp. 471-482.

U.S. Bureau of Economic Analysis 1998. BEA website, [www.bea.doc.gov](http://www.bea.doc.gov).

## 6. LIST OF PREPARERS

Name	Degree/Discipline	Professional Experience	Responsibility
Wayne Tolbert	Ph.D. Ecology	23 years experience in environmental compliance; 18 years in NEPA compliance	Project Manager; primary customer point of contact; overall responsibility for EA; affected environment and normal operations impacts
Timothy Solack	M.S. Civil Engineering	20 years experience in engineering, radiation safety, and safety analysis	Deputy Project Manager; Engineering walk-down of PORTS and Fernald sites; safety analysis
Carol Mason	M.S. Chemical Engineering	20 years experience in engineering, radiation safety, and safety analysis	Accident analysis development and calculations
Karen Golden	Ph.D. Microbiology	12 years experience in human health risk assessment and public health	Human health risk and environmental risk of accidents
Vicki Brumback	M.S. Geology	10 years experience in environmental fate and transport	Environmental risk of accidents; fate and transport
Sharon Bell	M.S. Economics	21 years experience in socioeconomic, environmental justice, and statistics	Socioeconomics including environmental justice
Steven Mitz	M.S. Aquatic Toxicology	17 years experience in aquatic toxicology, chemistry and NEPA aquatic impact assessment	Aquatic ecology
Issac Diggs, P.E.	M.S. Engineering Mechanics	25 years experience, including 5 years at the Fernald site	Technical review
Alauddin Khan	Ph.D. Chemical Engineering	9 years experience	Contaminant fate and transport (pathways development)
James Elmore	Ph.D. Ecology	18 years NEPA experience	Purpose and need; DOE technical reviewer

DOE = U.S. Department of Energy

EA = Environmental Assessment

NEPA = National Environmental Policy Act

PORTS = Portsmouth Gaseous Diffusion Plant

## **7. LIST OF AGENCIES/INDIVIDUALS CONSULTED**

This chapter contains copies of correspondence with the State Historic Preservation Officers (SHPOs) in Tennessee, Kentucky, and Ohio and with the U.S. Fish and Wildlife Service and state conservation departments.





## Department of Energy

Oak Ridge Operations Office  
P.O. Box 2001  
Oak Ridge, Tennessee 37831—

March 9, 1999

Mr. Joseph Garrison  
Tennessee Historical Commission  
Department of Environment and Conservation  
2941 Lebanon Road  
Nashville, Tennessee 37243-0442

Dear Mr. Garrison:

### **NATIONAL HISTORIC PRESERVATION ACT, SECTION 106 COMPLIANCE, RECEIPT AND STORAGE OF URANIUM MATERIALS FROM FERNALD ENVIRONMENTAL PROJECT - OAK RIDGE OPERATIONS**

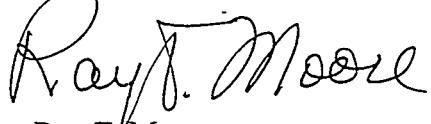
Enclosed is a Project Summary for the proposed Receipt and Storage of Uranium Materials from the Fernald Environmental Management Project. A description and discussion of the proposed project is included in the enclosed Project Summary and Archeological Historical Review (AHR).

The Department of Energy Oak Ridge Operations (DOE ORO) has determined that the proposed project would have no effect on historical, archeological, or cultural resources included or eligible for inclusion in the National Register of Historic Places (National Register). This determination is included with the Project Summary. This type of proposed activity is addressed in the *Programmatic Agreement Among The Department Of Energy Oak Ridge Operations Office, The Tennessee State Historic Preservation Officer, And The Advisory Council On Historic Preservation Concerning The Management Of Historical And Cultural Properties At The Oak Ridge Reservation (PA)* in Section III. Section A.2.B.

DOE ORO requests documentation of your concurrence with the determination for the proposed Tennessee sites. With your concurrence DOE ORO's responsibilities for compliance with Section 106 of the National Historic Preservation Act as related to the proposed activities in Tennessee will be completed for this project.

If you have questions or need additional information related to this proposed project please call me at (423) 576-9574.

Sincerely,



Ray T. Moore  
DOE ORO Cultural Resources  
Management Coordinator

Enclosure

cc w/enclosure:

Richard Frounfelker, EM-96, ETTP Site Office  
Susan Morris, DP-81, Y-12 Site Office  
Dave Snyder, Ohio Historic Preservation Office, OH  
David Morgan, Kentucky Heritage Council  
and State Historic Preservation Office  
EC Document Center Bldg. 9734, MS-8130 (w/maps)

## PROJECT SUMMARY

### SECTION 106 ARCHEOLOGICAL AND HISTORICAL REVIEW

#### RECEIPT AND STORAGE OF URANIUM MATERIALS

#### FROM FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

**PROPOSED ACTION:** The U. S. Department of Energy Oak Ridge Operations (DOE ORO), is in the process of preparing an Environmental Assessment (EA), DOE/ORO-2078, for the Receipt and Storage and Uranium Materials from the Fernald Environmental Management Project (FEMP). Storage at a licensed, commercial facility was also initially considered but was ruled out because of schedule constraints. The no action alternative is to leave the uranium at FEMP.

**LOCATION OF THIS ACTION:** Five DOE site alternatives were considered for receipt and storage of these materials, Oak Ridge National Laboratory (ORNL) in Anderson County, the Y-12 Plant in Anderson County, and the East Tennessee Technology Park (ETTP) in Roane County, and also Portsmouth Gaseous Diffusion Plant (PORTS), Paducah Gaseous Diffusion Plant (PGDP). The ORNL site was dropped from consideration due to mission-related land use conflicts. At some of these DOE sites, various locations/building variations were considered.

**DISCUSSION:** DOE proposes to place up to 3800 Metric Tons Uranium (MTU) of nuclear materials product currently stored at the FEMP site at another suitable DOE site. The type and amount of uranium product is listed in Table 2.1.

Table 2.1. FEMP Uranium Proposed for Receipt and Storage at Other DOE Site(s)

Uranium	Pounds (millions)	Metric Tons Uranium (MTU)	Storage Space Requirements (approximate in ft <sup>2</sup> )
Normal	0.434	193	600
Depleted	7.085	2,761	17,200
Low-Enriched	<u>2.205</u>	<u>799</u>	<u>12,500</u>
<b>TOTALS</b>	<b>9.724</b>	<b>3,753</b>	<b>30,300</b>

Receipt and storage of the uranium products would require that suitable existing buildings with sufficient floor space at the various DOE sites be made available. Approximately 50,000 ft<sup>2</sup> of space is required, and buildings would have to be available in time to receive all product before the end of the fourth quarter of FY 1999. Alternatively, if existing buildings are not available, an area where at least two Tension-Support Structures (TSSs) would be built (or a combination thereof). These TSSs would have concrete floors, a rigid frame, and tarpaulin roof and sides, and

they would provide approximately 27,000 ft<sup>2</sup> each in storage space. DOE inventoried buildings and space availability at five sites — three sites (the Y-12 Plant, ORNL, and ETTP) in Oak Ridge, Tennessee; Portsmouth, Ohio; and Paducah, Kentucky. The ORNL site was dropped from consideration due to mission-related land use conflicts.

#### Tennessee Sites

Enclosed are figures 2.4 and 2.5, from the draft EA, showing the various building locations proposed at the Oak Ridge Reservation. Two existing buildings, 9204-4 and 9720-33, are proposed to be used at the Y-12 Plant. Building 9204-4 was identified as a contributing property to the proposed Y-12 Historic District. Building 9720-33 was constructed in 1967 and is not a contributing property. Two existing buildings, K-131 and K-631, and two open areas (K-861 and 1066F) are proposed at the ETTP. Buildings K-131 and K-631 are located in the K-25 Historic District and are contributing properties. K-861 is located in the K-25 Historic District and 1066F is not located in the K-25 Historic District. Neither of these open areas are considered eligible or contributing properties for inclusion in the National Register of Historic Places. The proposed project would not require modification to any of the buildings and only a TSS would be added to the open areas.

**DETERMINATION:** DOE ORO personnel have reviewed this proposed project in accordance with the *Programmatic Agreement (PA) Among the Department of Energy, Oak Ridge Operations, the Tennessee State Historic Officer, and the Advisory Council on Historic Preservation Concerning Management of Historical and Cultural Properties at the Oak Ridge Reservation*. The proposed project is addressed in the PA in Section III. Section A.2. B. DOE ORO has determined that the proposed project would have no adverse effect on historical, archeological, or cultural resources included or eligible for inclusion in the National Register of Historic Places for the proposed Y-12 and ETTP sites located in Tennessee.



## Department of Energy

Oak Ridge Operations Office  
P.O. Box 2001  
Oak Ridge, Tennessee 37831—

March 9, 1999

Mr. David Morgan  
Kentucky Heritage Council  
and State Historic Preservation Office  
300 Washington Street  
Frankfort, Kentucky 40601

Dear Mr. Morgan:

### **NATIONAL HISTORIC PRESERVATION ACT, SECTION 106 COMPLIANCE, RECEIPT AND STORAGE OF URANIUM MATERIALS FROM FERNALD ENVIRONMENTAL MANAGEMENT PROJECT - OAK RIDGE OPERATIONS**

Enclosed is a Project Summary for the proposed Receipt and Storage of Uranium Materials from the Fernald Environmental Management Project. A description and discussion of the proposed project is included in the enclosed Project Summary and Archeological Historical Review (AHR).

The Department of Energy Operations (DOE ORO) has determined that the proposed project would have no effect on historical, archeological, or cultural resources included or eligible for inclusion in the National Register of Historic Places (National Register). This determination is included with the Project Summary.

DOE ORO requests documentation of your concurrence with the determination for the proposed Paducah Gaseous Diffusion Plant, Kentucky site. With your concurrence DOE ORO's responsibilities for compliance with Section 106 of the National Historic Preservation Act as related to the proposed activities in Kentucky will be completed for this project.

If you have questions or need additional information related to this proposed project please call me at (423) 576-9574.

Sincerely,



Ray T. Moore  
DOE ORO Cultural Resources  
Management Coordinator

Enclosure

cc w/enclosure:

David Tidwell, EF-22, PORTS

Wayne Tolbert, SAIC, OR

Joseph Garrison, Tennessee Historical Commission

Dave Snyder, Ohio Historic Preservation Office

EC Document Center Bldg. 9734, MS-8130 (w/maps)

## PROJECT SUMMARY

### SECTION 106 ARCHEOLOGICAL AND HISTORICAL REVIEW

#### RECEIPT AND STORAGE OF URANIUM MATERIALS

#### FROM FERNALD ENVIRONMENTAL PROJECT

**PROPOSED ACTION:** The U. S. Department of Energy Oak Ridge Operations (DOE ORO), is in the process of preparing an Environmental Assessment (EA), DOE/ORO-2078, for the Receipt and Storage and Uranium Materials from the Fernald Environmental Management Project (FEMP). Storage at a licensed, commercial facility was also initially considered but was ruled out because of schedule constraints. The no action alternative is to leave the uranium at FEMP.

**LOCATION OF THIS ACTION:** Five DOE site alternatives were considered for receipt and storage of these materials, Oak Ridge National Laboratory (ORNL), the Y-12 Plant, and the East Tennessee Technology Park (ETTP) in Oak Ridge Tennessee, the Portsmouth Gaseous Diffusion Plant (PORTS), and the Paducah Gaseous Diffusion Plant (PGDP). The ORNL site was dropped from consideration due to mission-related land use conflicts. At some of these DOE sites, various locations/building variations were considered.

**DISCUSSION:** DOE proposes to place up to 3800 Metric Tons Uranium (MTU) of nuclear materials product currently stored at the FEMP site at another suitable DOE site. The type and amount of uranium product is listed in Table 2.1.

**Table 2.1. FEMP Uranium Proposed for Receipt and Storage at Other DOE Site(s)**

Uranium	Pounds (millions)	Metric Tons Uranium (MTU)	Storage Space Requirements (approximate in ft <sup>2</sup> )
Normal	0.434	193	600
Depleted	7.085	2,761	17,200
Low-Enriched	<u>2.205</u>	<u>799</u>	<u>12,500</u>
<b>TOTALS</b>	<b>9.724</b>	<b>3,753</b>	<b>30,300</b>

Receipt and storage of the uranium products would require that suitable existing buildings with sufficient floor space at the various DOE sites be made available. Approximately 50,000 ft<sup>2</sup> of space is required, and buildings would have to be available in time to receive all product before the end of the fourth quarter of FY 1999. Alternatively, if existing buildings are not available, an area where at least two tension-support structures (TSSs) would be built (or a combination

thereof). These TSSs would have concrete floors, a rigid frame, and tarpaulin roof and sides, and they would provide approximately 27,000 ft<sup>2</sup> each in storage space. DOE inventoried buildings and space availability at five sites — three sites (the Y-12 Plant, ORNL, and ETTP) in Oak Ridge, Tennessee; PORTS, Portsmouth, Ohio; and PGDP, Paducah, Kentucky. The ORNL site was dropped from consideration due to mission-related land use conflicts.

#### PGDP Site - Kentucky

Enclosed is figure 2.3, from the draft EA, showing the proposed location at the PGDP in Paducah Kentucky. The proposed location is an open areas in the previously disturbed plant area and two TSSs would need to be built at this area.

**DETERMINATION:** DOE ORO personnel have reviewed this proposed project and has determined that the proposed project would have no adverse effect on historical, archeological, or cultural resources included or eligible for inclusion in the National Register of Historic Places for the proposed site at PGDP.



## Department of Energy

Oak Ridge Operations Office  
P.O. Box 2001  
Oak Ridge, Tennessee 37831—

March 9, 1999

Mr. Dave Snyder  
Ohio Historic Preservation Office  
567 Hudson Street  
Columbus, Ohio 43211-1030

Dear Mr. Snyder:

**NATIONAL HISTORIC PRESERVATION ACT, SECTION 106 COMPLIANCE,  
RECEIPT AND STORAGE OF URANIUM MATERIALS FROM FERNALD  
ENVIRONMENTAL MANAGEMENT PROJECT - OAK RIDGE OPERATIONS**

Enclosed is a Project Summary for the proposed Receipt and Storage of Uranium Materials from the Fernald Environmental Management Project. A description and discussion of the proposed project is included in the enclosed Project Summary and Archeological Historical Review (AHR).

The Department of Energy Oak Ridge Operations (DOE ORO) has determined that the proposed project would have no effect on historical, archeological, or cultural resources included or eligible for inclusion in the National Register of Historic Places (National Register). This determination is included with the Project Summary.

DOE ORO requests documentation of your concurrence with the determination for the proposed PORTS, Ohio site. With your concurrence DOE ORO's responsibilities for compliance with Section 106 of the National Historic Preservation Act as related to the proposed activities in Ohio will be completed for this project.

If you have questions or need additional information related to this proposed project please call me at (423) 576-9574.

Sincerely,



Ray T. Moore  
DOE ORO Cultural Resources  
Management Coordinator

Enclosure

cc w/enclosure:

Dee Perkins, EF-21, PORTS

Wayne Tolbert, SAIC, OR

Joseph Garrison, Tennessee Historical Commission

David Morgan, Kentucky Heritage Council

and State Historic Preservation Office

EC Document Center Bldg. 9734, MS-8130 (w/maps)

## PROJECT SUMMARY

### SECTION 106 ARCHEOLOGICAL AND HISTORICAL REVIEW

#### RECEIPT AND STORAGE OF URANIUM MATERIALS

#### FROM FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

**PROPOSED ACTION:** The U. S. Department of Energy Oak Ridge Operations (DOE ORO), is in the process of preparing an Environmental Assessment (EA), DOE/ORO-2078, for the Receipt and Storage and Uranium Materials from the Fernald Environmental Management Project (FEMP). Storage at a licensed, commercial facility was also initially considered but was ruled out because of schedule constraints. The no action alternative is to leave the uranium at FEMP.

**LOCATION OF THIS ACTION:** Five DOE site alternatives were considered for receipt and storage of these materials, Oak Ridge National Laboratory (ORNL), the Y-12 Plant, and the East Tennessee Technology Park (ETTP) in Oak Ridge Tennessee, the Portsmouth Gaseous Diffusion Plant (PORTS), and the Paducah Gaseous Diffusion Plant (PGDP). The ORNL site was dropped from consideration due to mission-related land use conflicts. At some of these DOE sites, various locations/building variations were considered.

**DISCUSSION:** DOE proposes to place up to 3800 Metric Tons Uranium (MTU) of nuclear materials product currently stored at the FEMP site at another suitable DOE site. The type and amount of uranium product is listed in Table 2.1.

Table 2.1. FEMP Uranium Proposed for Receipt and Storage at Other DOE Site(s)

Uranium	Pounds (millions)	Metric Tons Uranium (MTU)	Storage Space Requirements (approximate in ft <sup>2</sup> )
Normal	0.434	193	600
Depleted	7.085	2,761	17,200
Low-Enriched	<u>2.205</u>	<u>799</u>	<u>12,500</u>
<b>TOTALS</b>	<b>9.724</b>	<b>3,753</b>	<b>30,300</b>

Receipt and storage of the uranium products would require that suitable existing buildings with sufficient floor space at the various DOE sites be made available. Approximately 50,000 ft<sup>2</sup> of space is required, and buildings would have to be available in time to receive all product before the end of the fourth quarter of FY 1999. Alternatively, if existing buildings are not available, an area where at least two Tension-Support Structures (TSSs) would be built (or a combination thereof). These TSSs would have concrete floors, a rigid frame, and tarpaulin roof and sides, and

they would provide approximately 27,000 ft<sup>2</sup> each in storage space. DOE inventoried buildings and space availability at five sites — three sites (the Y-12 Plant, ORNL, and ETTP) in Oak Ridge, Tennessee; PORTS, Portsmouth, Ohio; and PGDP, Paducah, Kentucky. The ORNL site was dropped from consideration due to mission-related land use conflicts.

#### PORTS Site - Ohio

Enclosed is figure 2.2, from the draft EA, showing the various building locations proposed at the PORTS Site in Portsmouth Ohio. Eight existing buildings were identified that could be used for storage of the FEMP material. The proposed project would not require modification to any of the buildings. One outside storage area was identified. This storage area is within the previously disturbed plant area and a concrete pad is presently at this location. One TSS would need to be built at this area.

**DETERMINATION:** DOE ORO personnel have reviewed this proposed project and has determined that the proposed project would have no adverse effect on historical, archeological, or cultural resources included or eligible for inclusion in the National Register of Historic Places for the proposed sites at PORTS.

United States Government

Department of Energy

Oak Ridge Operations Office

# Memorandum

DATE: April 5, 1999

REPLY TO

ATTN OF: SE-32:Moore

SUBJECT: NATIONAL HISTORIC PRESERVATION ACT, SECTION 106 COMPLIANCE,  
RECEIPT AND STORAGE OF URANIUM MATERIALS FROM FEMP - OAK RIDGE  
OPERATIONS

TO: J. Dale Jackson, Executive Director, Office of Assistant Manager for Enrichment Facilities, EF-20

Attached is a letter from the Tennessee State Historic Preservation Officer (SHPO) that concurs with the Department of Energy Oak Ridge Operations (DOE ORO) determination that the proposed project would have no effect on historical, archeological, or cultural resources included or eligible for inclusion in the National Register of Historic Places (National Register) in the State of Tennessee. With the SHPO's determination, DOE ORO has complied with Section 106 of the National Historic Preservation Act for proposed activities in Tennessee.

If you have questions or need additional information please call me at (423) 576-9574.



Ray T. Moore  
DOE ORO Cultural Resources  
Management Coordinator

Attachment

cc w/attachment:

Richard Frounkfelker, EM-96, ETTP Site Office  
Susan Morris, DP-81, Y-12 Site Office  
David Tindell, EF-22, PAD  
Dee Perkins, EF-21, PORTS  
Sheila Thornton, BJC LLC, Bldg. K-1550-E, MS 7235  
Jennifer Webb, LMES, Bldg. 9115, MS 8219, Y-12  
James Hall, LMER, Bldg. 1061, MS-6429  
Mick Wiest, LMES, Bldg. 9116, MS 8098, Y-12  
Jack Newman, BJC LLC, 55 Jefferson, Room 117, MS 7604  
Wayne Tolbert, SAIC, Oak Ridge  
Dave Snyder, Ohio Historic Preservation Office  
David Morgan, Kentucky Heritage Council and State Historic Preservation Office  
EC Document Center Bldg. 9734, MS-8130





TENNESSEE HISTORICAL COMMISSION  
DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
2941 LEBANON ROAD  
NASHVILLE, TN 37243-0442  
(615) 532-1550

March 17, 1999

Mr. Ray T. Moore  
USDOE/Oak Ridge Operations  
Post Office Box 2001  
Oak Ridge, Tennessee 37831-8739

RE: DOE, ORNL/URANIUM STORAGE/FERNAND, OAK RIDGE, ANDERSON COUNTY

Dear Mr. Moore:

Pursuant to your request received on Wednesday, March 10, 1999, this office has reviewed documentation concerning the above-referenced undertaking. This is a requirement of the Agreement Document ratified to ensure compliance with Section 106 of the National Historic Preservation Act as codified at 36 CFR 800 (51 FR 31115, September 2, 1986) and an Agreement Document.

Considering available information, we find that the project as currently proposed will not adversely affect any property that is eligible for listing in the National Register of Historic Places. Therefore, this office has no objection to the implementation of this project. Please direct questions and comments to Joe Garrison (615)532-1559. We appreciate your cooperation.

Sincerely,

Herbert L. Harper  
Executive Director and  
Deputy State Historic  
Preservation Officer

HLH/jyg

OFFICIAL FILE COPY  
AMESQ

Log No. C 0378

Date Received MAR 23 1999

File Code 2182.15





George V. Voinovich • Governor  
Donald C. Anderson • Director

March 11, 1999

James L. Elmore  
Department of Energy  
Oak Ridge Operations Office  
P.O. Box 2001  
Oak Ridge, TN 37831

Dear Dr. Elmore:

Your letter to Jennifer Windus regarding the receipt and storage of uranium materials from the Fernald site was referred to me for response. I have enclosed listings of rare animals and plants recorded in our Natural Heritage Database for Butler and Hamilton counties (FEMP site) and for Pike County (Portsmouth Gaseous Diffusion Plant site). Scientific name, common name state and federal status are shown for each species. Status code definitions are provided on an accompanying sheet.

I have also included our data request form and brochure should you require a more detailed database search for your sites. Please note that we charge for this service. You can contact me at (614) 265-6472 if you have any questions about these materials.

Sincerely,

Patricia D. Jones  
Data Services Administrator  
Division of Natural Areas & Preserves

Enclosures

OPTIONAL FILE COPY  
APR 15 1999  
Log No. C 03.31  
Date Received MAR 15 1999  
File Copy

Division of Natural Areas and Preserves  
Ohio Department of Natural Resources

Endangerment Codes

Federal Status Codes

LE= Endangered  
LT= Threatened  
PE= Proposed Endangered  
PT= Proposed Threatened

Ohio Status Codes

Animals: (Assigned by the Ohio Division of Wildlife)

E= State Endangered  
\* T= Threatened (not a legal designation)  
\* S= Special Interest (not a legal designation)  
\* X= Extirpated from Ohio

\* Animals without a status are inventoried by the Division of Natural Areas & Preserves, but have not been assigned a state status by the Ohio Division of Wildlife.

Plants: (Assigned by the Division of Natural Areas & Preserves)

E= State Endangered  
T= State Threatened  
\* P= Potentially threatened (not a legal designation)  
\* X= Presumed extirpated from Ohio  
\* A= A species recently added to the inventory, a state endangerment status has not yet been determined.

\* Administrative statuses, these are not legal designations.

OHIO DEPARTMENT OF NATURAL RESOURCES  
 DIVISION OF NATURAL AREAS & PRESERVES  
 BUTLER COUNTY: RARE ANIMAL & PLANT SPECIES

PAGE: 1 10 MAR 1999

FEDERAL STATUS	OHIO STATUS	SCIENTIFIC NAME	COMMON NAME
T		<i>BARTRAMIA LONGICAUDA</i>	UPLAND SANDPIPER
		<i>CAMBARUS ORTMANNI</i>	CINCINNATI CRAYFISH
		<i>CLONOPHIS KIRTLANDII</i>	KIRTLAND'S SNAKE
E		<i>EURYCEA LUCIFUGA</i>	CAVE SALAMANDER
T		<i>EXOGLOSSUM LAURAE</i>	TONGUE-TIED MINNOW
S		<i>HIODON TERGIUS</i>	MOONEYE
E		<i>IXOBRYCHUS EXILIS</i>	LEAST BITTERN
E		<i>MYOTIS SODALIS</i>	INDIANA BAT
LE		<i>NYCTICORAX NYCTICORAX</i>	BLACK-CROWNED NIGHT-HERON
T		<i>ORCONECTES SLOANII</i>	SLOAN'S CRAYFISH
S		<i>PORZANA CAROLINA</i>	SORA
P		<i>ARABIS HIRSUTA</i> VAR. <i>ADPRESSIPILIS</i>	SOUTHERN HAIRY ROCK-CRESS
E		<i>ARABIS HIRSUTA</i> VAR. <i>PYCNOCARPA</i>	WESTERN HAIRY ROCK-CRESS
X		<i>CUSCUTA PENTAGONA</i>	FIVE-ANGLED DODDER
E		<i>ECHINODORUS ROSTRATUS</i>	BUR-HEAD
T		<i>LOPHOTOCARPUS CALYCINUS</i>	SOUTHERN WAPATO
E		<i>PRENANTHES CREPIDINEA</i>	NODDING RATTLESNAKE-ROOT
E		<i>RIBES MISSOURIENSE</i>	MISSOURI GOOSEBERRY
E		<i>SALIX CAROLINIANA</i>	CAROLINA WILLOW
T		<i>SILENE NIVEA</i>	SNOWY CAMPION
E		<i>VIBURNUM MOLLE</i>	SOFT-LEAVED ARROW-WOOD

OHIO DEPARTMENT OF NATURAL RESOURCES  
 DIVISION OF NATURAL AREAS & PRESERVES  
 HAMILTON COUNTY: RARE ANIMAL & PLANT SPECIES

PAGE: 1 10 MAR 1999

FEDERAL STATUS	OHIO STATUS	SCIENTIFIC NAME	COMMON NAME
S		ACCIPITER STRIATUS	SHARP-SHINNED HAWK
E	S	ACIPENSER FULVESCENTS	LAKE STURGEON
		ANODONTA SUBORBICULATA	FLAT FLOATER
		APALONE MUTICA	SMOOTH SOFTSHELL
E	E	BOTAURUS LENTIGINOSUS	AMERICAN BITTERN
		CHONDESTES GRAMMACUS	LARK SPARROW
		CICINDELA MARGINIPENNIS	COBBLESTONE TIGER BEETLE
T	E	CISTOTHORUS PLATENSIS	SEDGE WREN
		CLONOPHIS KIRTLANDII	KIRTLAND'S SNAKE
T	E	CYCLEPTUS ELONGATUS	BLUE SUCKER
		CYCLONAIAS TUBERCULATA	PURPLE WARTYBACK
		ELLIPSARIA LINEOLATA	BUTTERFLY
		ELLIPTIO CRASSIDENS CRASSIDENS	ELEPHANT-EAR
		EPIOBLASMA TRIQUETRA	SNUFFBOX
		EURYCEA LUCIFUGA	CAVE SALAMANDER
		FUSCONAIIA EBENA	EBONYSHELL
		GRAPTEMYS PSEUDOGEOGRAPHICA	FALSE MAP TURTLE
		HETERODON PLATIRHINOS	EASTERN HOGNOSE SNAKE
		HIODON TERGISUS	MOONEYE
		ICHTHYOMYZON UNICUSPIS	SILVER LAMPREY
		LANIUS LUDOVICIANUS	LOGGERHEAD SHRIKE
		LOTA LOTA	BURBOT
		MEGALLONIAS NERVOSEA	WASHBOARD
		MOXOSTOMA CARINATUM	RIVER REDHORSE
		NOTROPIS BOOPS	BIGEYE SHINER
		NOTURUS ELEUTHERUS	MOUNTAIN MADTOM
		NOTURUS STIGMOSUS	NORTHERN MADTOM
		NYCTANASSA VIOLACEA	YELLOW-CROWNED NIGHT-HERON
		NYCTICORAX NYCTICORAX	BLACK-CROWNED NIGHT-HERON
		OBLIQUARIA REFLEXA	THREEHORN WARTYBACK
		OBOVARIA OLIVARIA	HICKORYNUT
		OPHEODRYS AESTIVUS	ROUGH GREEN SNAKE

OHIO DEPARTMENT OF NATURAL RESOURCES  
 DIVISION OF NATURAL AREAS & PRESERVES  
 HAMILTON COUNTY: RARE ANIMAL & PLANT SPECIES

PAGE: 2 10 MAR 1999

FEDERAL STATUS	OHIO STATUS	SCIENTIFIC NAME	COMMON NAME
T	S	ORCONECTES SLOANI	SLOAN'S CRAYFISH
S	S	PERCINA PHOXOCEPHALA	SLENDERHEAD DARTER
T	T	PERCINA SHUMARDII	RIVER DARTER
E	E	PLETHOBASUS CYPHYUS	SHEEPNOSE
E	E	PLEUROBEMA CORDATUM	OHIO PIGTOE
S	S	PORZANA CAROLINA	SORA
POTAMILUS OHIENSIS	PINK PAPER SHELL		
QUADRULA METANEVRA	MONKEYFACE		
QUADRULA NODULATA	WARTYBACK		
TRACHEMYS SCRIPTA ELEGANS	RED-EARED SLIDER		
TRUNCILLA DONACIFORMIS	FAWNSFOOT		
TRUNCILLA TRUNCATA	DEERTOE		
CORALLORHIZA WISTERIANA	SPRING CORAL-ROOT		
DESMODIUM PAUCIFLORUM	FEW-FLOWERED TICK-TREFOIL		
ELEOCHARIS QUADRANGULATA	FOUR-ANGLED SPIKERUSH		
JUGLANS CINEREA	BUTTERNUT		
LIPOCARPHA MICRANTHA	DWARF BULRUSH		
LOPHOTOCARPUS CALYCINUS	SOUTHERN WAPATO		
PASPALUM FLUITANS	RIVERBANK PASPALUM		
PASSIFLORA INCARNATA	PASSION-FLOWER		
PHACELIA BIPINNATIFIDA	FERN-LEAF SCORPION-WEED		
RUELLIA CAROLINENSIS	CAROLINA RUELLIA		
SAGITTARIA ASTRALIS	LONG-BEAKED ARROWHEAD		
SALIX CAROLINIANA	CAROLINA WILLOW		
SCIRPUS PURSHIANUS	PURSH'S BULRUSH		
SIDA HERMAPHRODITA	VIRGINIA MALLOW		
SPERMACOCE GLABRA	SMOOTH BUTTONWEED		
TRIFOLIUM STOLONIFERUM	RUNNING BUFFALO CLOVER		
TRILLIUM RECURVATUM	PRAIRIE WAKE-ROBIN		
TRIphORA TRIANTHOPHORA	THREE-BIRDS-ORCHID		
VIBURNUM RUFIDULUM	SOUTHERN BLACK-HAW		

OHIO DEPARTMENT OF NATURAL RESOURCES  
 DIVISION OF NATURAL AREAS & PRESERVES  
 PIKE COUNTY: RARE ANIMAL & PLANT SPECIES

PAGE: 1 10 MAR 1999

FEDERAL STATUS	OHIO STATUS	SCIENTIFIC NAME	COMMON NAME
S	S	ACCIPITER STRIATUS	SHARP-SHINNED HAWK
S	S	CAECIDOTEA ROTUNDA	FROST CAVE ISOPOD
S	T	CAPRIMULGUS CAROLINENSIS	CHUCK-WILL'S-WIDOW
T	E	CLINOSTOMUS FUNDULOIDES	ROSY-SIDE DACE
E	E	CROTALUS HORRIDUS	TIMBER RATTLESNAKE
E	E	EPIOBIAZMA TRIQUETRA	SNUFFBOX
E	E	FUSCONIA EBENA	EBONY SHELL
S	E	GRAPTEMYS PSEUDOGEOGRAPHICA	FALSE MAP TURTLE
E	S	HIODON ALOSOIDES	GOLDEYE
S	T	HIODON TERGIUS	MOONEYE
S	S	ICHTHYOMYZON UNICUSPIIS	SILVER LAMPREY
S	S	LAMPROPELTIS GETULA NIGRA	BLACK KINGSNAKE
E	E	LAMPSILLIS TERES ANODONTOIDES	YELLOW SANDSHELL
E	E	LEPISOSTEUS PLATOSTOMUS	SHORTNOSE GAR
S	S	MOXOSTOMA CARINATUM	RIVER REDHORSE
T	T	NOTROPIS BOOPS	BIGEYE SHINER
S	T	OBLIQUARIA REFLEXA	THREEHORN WARTYBACK
S	S	OPHEODRYS AESTIVUS	ROUGH GREEN SNAKE
E	T	PLETHOBASUS CYPHYUS	SHEEPNOSE
POLYODON SPATHULÄ	PADDLEFISH		
POTAMILUS OHIENSIS	PINK PAPER SHELL		
THRYSOMANES BEWICKII	BEWICK'S WREN		
TRUNCILLA DONACIFORMIS	FAWNS FOOT		
TRUNCILLA TRUNCATA	DEERTOE		
ARABIS HIRSUTA VAR. ADPRESSIPILLIS	SOUTHERN HAIRY ROCK-CRESS		
ARENARIA STRICTA	ROCK SANDWORT		
ARISTIDA PURPURASCENS	PURPLE TRIPLE-AWNED GRASS		
ASCLEPIAS AMPLEXICAULIS	BLUNTLEAF MILKWEED		
ASCLEPIAS VIRIDIFLORA	GREEN MILKWEED		
ASPLENIUM BRADLEYI	BRADLEY'S SPLEENWORT		
ASPLENIUM RUTA-MURARIA	WALL-RUE		
ASTER SOLIDAGINEUS	NARROW-LEAVED ASTER		

OHIO DEPARTMENT OF NATURAL RESOURCES  
 DIVISION OF NATURAL AREAS & PRESERVES  
 PIKE COUNTY: RARE ANIMAL & PLANT SPECIES

PAGE: 2 10 MAR 1999

FEDERAL STATUS	OHIO STATUS	SCIENTIFIC NAME	COMMON NAME
P	T	<i>BAPTISIA LACTEA</i>	PRairie FALSE INDIGO
T	T	<i>BUCHNERA AMERICANA</i>	BLUEHEARTS
P	T	<i>CAREX DEBILIS</i> VAR. <i>DEBILIS</i>	WEAK SEDGE
P	T	<i>CAREX JUNIPERORUM</i>	JUNIPER SEDGE
P	T	<i>CAREX RETROFLEXA</i> VAR. <i>RETROFLEXA</i>	REFLEXED SEDGE
P	P	<i>CASTANEA DENTATA</i>	AMERICAN CHESTNUT
P	P	<i>CELTIS TENUIFOLIA</i>	DWARF HACKBERRY
P	P	<i>CLITORIA MARIANA</i>	BUTTERFLY-PEA
P	P	<i>CYPRIOPEDIUM CALCEOLUS</i> VAR. <i>PUBESCENTS</i>	LARGE YELLOW LADY'S-SLIPPER
P	T	<i>CYSTOPTERIS TENNESSEENSIS</i>	TENNESSEE BLADDER FERN
P	T	<i>DESCURAINIA PINNATA</i>	TANSY-MUSTARD
T	T	<i>DRABA CUNEIFOLIA</i>	WEDGE-LEAF WHITLOW-GRASS
E	T	<i>ECHINODORUS ROSTRATUS</i>	BUR-HEAD
E	E	<i>EUPATORIUM ALBUM</i>	WHITE THOROUGHWORT
E	E	<i>EUPHORBIA PURPUREA</i>	GLADE SPURGE
E	E	<i>GALACTIA VOLUBILIS</i>	MILK-PEA
P	P	<i>GRATIOLA VISCIDULA</i>	SHORT'S HEDGE-HYSSOP
P	P	<i>HEDYOTIS NIGRICANS</i>	NARROW-LEAVED SUMMER BLUETS
P	P	<i>HELIANTHUS OCCIDENTALIS</i>	WESTERN SUNFLOWER
P	P	<i>JUGLANS CINEREA</i>	BUTTERNUT
E	E	<i>JUNCUS DIFFUSISSIMUS</i>	DIFFUSE RUSH
JUNCUS INTERIOR	T		INLAND RUSH
JUNCUS SECUNDUS	T		ONE-SIDED RUSH
LEAVENWORTHIA UNIFLORA	T		MICHAUX'S LEAVENWORTHIA
LECHEA MINOR	T		THYME-LEAF PINWEED
LIATRIS CYLINDRACEA	T		SLENDER BLAZING-STAR
LILIUM SUPERBUM	P		TURK'S-CAP LILY
LINUM SULCATUM	P		GROOVED FLAX
LONICERA RETICULATA	P		GRAPE HONEYSUCKLE
MAIAXIS UNIFOLIA	P		GREEN ADDER'S-MOUTH
MATELEA OBLIQUA	P		ANGLE-POD
MELICA NITENS	E		THREE-FLOWERED MELIC

OHIO DEPARTMENT OF NATURAL RESOURCES  
 DIVISION OF NATURAL AREAS & PRESERVES  
 PIKE COUNTY: RARE ANIMAL & PLANT SPECIES

PAGE: 3 10 MAR 1999

FEDERAL STATUS	OHIO STATUS	SCIENTIFIC NAME	COMMON NAME
P	P	<i>ONOSMODIUM HISPIDISSIMUM</i>	FALSE GROMWELL
P	P	<i>OPUNTIA HUMIFUSA</i>	PRICKLY PEAR
P	P	<i>ORBEXIUM PEDUNCULATUM</i>	FALSE SCURF - PEA
P	P	<i>PANICUM LAXIFLORUM</i>	PALE GREEN PANIC - GRASS
E	P	<i>PANICUM VERRUCOSUM</i>	WARTY PANIC - GRASS
P	P	<i>PHACELIA BIPINNATIFIDA</i>	FERN - LEAF SCORPION - WEED
P	P	<i>PHASEOULUS POLYSTACHIOS</i>	WILD KIDNEY BEAN
E	E	<i>PHYLLANTHUS CAROLINIENSIS</i>	CAROLINA LEAF - FLOWER
T	P	<i>POLYGALA INCARNATA</i>	PINK MILKWORT
P	P	<i>QUERCUS MARilandica</i>	BLACKJACK OAK
P	P	<i>RHEXIA VIRGINICA</i>	VIRGINIA MEADOW - BEAUTY
E	E	<i>RHODODENDRON CALLENDULACEUM</i>	FLAME AZALEA
P	P	<i>RHODODENDRON NUDIFLORUM VAR. ROSEUM</i>	NORTHERN ROSE AZALEA
P	P	<i>SAGITTARIA AUSTRALIS</i>	LONG - BEAKED ARROWHEAD
P	P	<i>SCIRPUS PURSHIANUS</i>	PURSH ' S BULRUSH
P	P	<i>SCLERIA TRIGLOMERATA</i>	TALL NUT - RUSH
P	P	<i>SCUTELLARIA INTEGRIFOLIA</i>	HYSSOP SKULLCAP
E	E	<i>SILENE CAROLINIANA VAR. WHERRYI</i>	WHERRY ' S CATCHFLY
P	P	<i>SILENE ROTUNDIFOLIA</i>	ROUND - LEAVED CATCHFLY
P	P	<i>SPARGANIUM ANDROCLADUM</i>	KEELED BUR - REED
P	P	<i>SPIRANTHES LUCIDA</i>	SHINING LADIES ' - TRESSES
P	P	<i>SPIRANTHES OVALIS</i>	LESSER LADIES ' - TRESSES
T	T	<i>STENANTHIIUM GRAMINEUM</i>	FEATHER - BELLS
P	P	<i>SULLIVANTIA SULLIVANTII</i>	SULLIVANTIA
E	E	<i>TRICHOSTEMA DICHOTOMUM VAR. LINEARE</i>	NARROW - LEAVED BLUECURLS
E	E	<i>TRIFOLIUM REFLEXUM</i>	BUFFALO CLOVER
P	P	<i>VERBESINA HELIANTHOIDES</i>	HAIRY WING - STEM
E	E	<i>VERBESINA OCCIDENTALIS</i>	YELLOW CROWNBEARD



## DATA REQUEST

OHIO DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF NATURAL AREAS AND PRESERVES  
HERITAGE DATA SERVICES  
1889 FOUNTAIN SQUARE COURT, BUILDING F-1  
COLUMBUS, OHIO 43224  
PHONE: 614-265-6453; FAX: 614-267-3096

### INSTRUCTIONS:

Please fill out both sides of this data request form, sign it and return it to the address or fax number listed above along with: (1) a letter formally requesting data and describing your project, and (2) a map detailing the boundaries of your study area. A photocopy from the pertinent portion of a USGS 7.5 minute topographic map is preferred but other maps are acceptable. Our turnaround time is two weeks, although we can often respond more quickly.

### FEES:

Fees are determined by the amount of time it takes to complete your project. The charge is \$25.00 per  $\frac{1}{2}$  hour with a  $\frac{1}{2}$  hour minimum. We can perform a data search manually or by computer. The Heritage Data Services staff will determine the most cost-efficient method of doing your search. A cost estimate can be provided upon request. Unless otherwise specified, an invoice will accompany the data services response.

\*\*\*\*\*

This request is being submitted by:  fax  mail  both

Date: \_\_\_\_\_

Your  
Agency/Organization: \_\_\_\_\_

Your Name/Title: \_\_\_\_\_

Address: \_\_\_\_\_

City/State/Zip: \_\_\_\_\_

Phone/Fax: \_\_\_\_\_

Project Name/Number: \_\_\_\_\_

Project is located on the following USGS 7.5 minute topographic map(s): \_\_\_\_\_

If there is a program or contracting agency requiring this information, please give the name and phone number of a contact person:





# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Ecological Services  
6950 Americana Parkway, Suite H  
Reynoldsburg, Ohio 43068-4132

March 12, 1999

James L. Elmore, Ph.D.  
Department of Energy  
Oak Ridge Operations Office  
P.O. Box 2001  
Oak Ridge, Tennessee 37831

Dear Dr. Elmore:

This responds to your request for information about federally listed endangered and threatened species that could be affected by the transfer of Uranium containing materials from the Fernald Environmental Management Project (FEMP) to the Portsmouth Gaseous Diffusion Plant (PORTS), both facilities being located in Ohio. Our comments apply only to the PORTS site in Pike County, Ohio, and do not apply to FEMP or the route of transfer.

**ENDANGERED SPECIES COMMENTS:** The project lies within the range of the Indiana bat, a federally listed endangered species. Due to the project type, size, and location, the proposed project will have no effect on this species. This precludes the need for further action on this project under the 1973 Endangered Species Act, as amended. Should the project be modified or new information become available that indicates listed or proposed species may be affected, consultation should be initiated with this office.

Two divisions of the Ohio Department of Natural Resources, the Division of Wildlife (614-265-6300) and the Division of Natural Areas and Preserves (614-265-6472), maintain lists of plants and animals of concern to the State of Ohio. If you have not already done so, you may wish to contact each of these agencies to obtain site-specific information on species of state concern.

If you have questions or we may be of further assistance in this matter, please contact Mr. Bill Kurey of this office at 614-469-6923 ext. 14.

Sincerely,

*Kent E. Kroonemeyer*  
Kent E. Kroonemeyer  
Supervisor

OFFICIAL FILE COPY  
AMESQ

Log No. C 0362

Date Received MAR 19 1999

File Code

cc: J. Marshall, ODOW





## United States Department of the Interior

FISH AND WILDLIFE SERVICE  
446 Neal Street  
Cookeville, TN 38501

March 26, 1999

OFFICIAL FILE COPY  
AMESO

Dr. James L. Elmore  
U.S. Department of Energy  
Oak Ridge Operations Office  
P.O. Box 2001  
Oak Ridge, Tennessee 37831

Log No. C 0421  
Date Received MAR 29 1999  
File Code

Dear Dr. Elmore:

Thank you for your letter and enclosures of March 4, 1999, regarding the preparation of an Environmental Assessment (EA) for the Receipt and Storage of Uranium Materials from the Fernald Environmental Management Project Site. Proposed storage locations include the Paducah Gaseous Diffusion Plant in McCracken County, Kentucky, and two sites on the Oak Ridge Reservation in Anderson and Roane Counties, Tennessee. U.S. Fish and Wildlife Service (Service) personnel have reviewed the information submitted and offer the following comments for consideration.

According to our records, the following federally listed endangered species are known to occur near the potential project impact areas:

## Paducah Gaseous Diffusion Plant

### Indiana bat (*Myotis sodalis*)

## Orange-foot pimpleback pearlymussel (*Plethobasus cooperianus*)

## Oak Ridge Reservation

### Gray bat (*Myotis griseescens*)

### Pink mucket pearlymussel (*Lampsilis abrupta*)

Qualified biologists should assess potential impacts and determine if the proposed project may affect the species. We recommend that you submit a copy of your assessment and finding to this office for review and concurrence. A finding of "may affect" could require the initiation of formal consultation procedures.

These constitute the comments of the U.S. Department of the Interior in accordance with provisions of the Endangered Species Act (87 Stat. 884, as amended: 16 U.S.C. 1531 et seq.). We appreciate the opportunity to comment. Should you have any questions or need further assistance, please contact Steve Alexander of my staff at 931/528-6481, ext. 210.

Sincerely,

A handwritten signature in black ink, appearing to read "Lee A. Barclay".

Lee A. Barclay, Ph.D.  
Field Supervisor

DONALD S. DOTT, JR.  
DIRECTOR



PAUL E. PATTON  
GOVERNOR

COMMONWEALTH OF KENTUCKY  
**KENTUCKY STATE NATURE PRESERVES COMMISSION**

801 SCHENKEL LANE  
FRANKFORT, KENTUCKY 40601-1403  
(502) 573-2886 VOICE  
(502) 573-2355 FAX

March 17, 1999

James L. Elmore, Ph.D.  
Department of Energy  
P.O. Box 2001  
Oak Ridge, TN 37831

SEARCHED INDEXED  
SERIALIZED FILED  
C. W. S.  
MAR 22 1999

Data Request 99-145

Dear Mr. Elmore:

This letter is in response to your data request of 10 March 1999 for the Paducah Gaseous Diffusion Plant project. We have reviewed our Natural Heritage Program Database to determine if any of the endangered, threatened, or special concern plants and animals or exemplary natural communities monitored by the Kentucky State Nature Preserves Commission occur in the area specified on the Heath, Ky. and Joppa, Ill.-Ky. USGS 7.5 minute series topographic quadrangles. Based on our most current information, we have determined that twelve occurrences of the plants or animals and no occurrences of the exemplary natural communities that are monitored by KSNPC are reported as occurring in the specified area. A data report is attached to this response.

Please note that the quantity and quality of data collected by the Kentucky Natural Heritage Program are dependent on the research and observations of many individuals and organizations. In most cases, this information is not the result of comprehensive or site-specific field surveys; many natural areas in Kentucky have never been thoroughly surveyed, and new plants and animals are still being discovered. For these reasons, the Kentucky Natural Heritage Program cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of Kentucky. Heritage reports summarize the existing information known to the Kentucky Natural Heritage Program at the time of the request regarding the biological elements or locations in question. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments. We would greatly appreciate receiving any pertinent information obtained as a result of on-site surveys.



Data Request 99-145  
March 17, 1999  
Page 2

If you have any questions or if I can be of further assistance, please do not hesitate to contact me.

Sincerely,



Amy Covert  
Acting Data Manager

BDF/ALC

Enclosures: Data Interpretation Key  
Endangered, Threatened, and Special Concern Plants and Animals of Kentucky  
Plants and Animals Presumed Extinct or Extirpated from Kentucky  
Monitored Natural Communities of Kentucky

**Data Key for Element and Occurrence Reports (v. 3.98)**  
**Kentucky State Nature Preserves Commission**  
**Natural Heritage Program Data Services**

Many of the data fields on the enclosed report are easily understood. Other fields, however, use abbreviations and formats that are not always self-explanatory. A key to these fields follows. Your report may contain some or all of the following data fields.

BEARING:	Bearing in degrees from a center point to an occurrence's latitude and longitude. This field is masked for sensitive occurrences; contact KSNPC in these cases. Omitted for G, U, and Q precision occurrence records.
BESTSOURCE:	Best available reference to the occurrence: literature citation, collector, collection number, museum or herbarium code, etc.
COMMENTS:	Additional information about the occurrence including identification, taxonomy, or date of occurrence.
DIRECTIONS:	Directions to an occurrence. This field is masked for sensitive occurrences; contact KSNPC in these cases.
DISTANCE:	Distance from a center point to an occurrence's latitude and longitude. Units coded as M (miles), K (kilometers), and F (feet). This field is masked for sensitive occurrences; contact KSNPC in these cases. Omitted for G, U, and Q precision occurrence records.
ELCODE:	Element (species) code.
EOCODE:	Element (species) code, occurrence number (last three digits), and state.
EODATA:	Occurrence population data: date of observation, number of individuals, health, size of colony, flowering data, etc.
EORANK:	Judgement of occurrence quality: A = excellent, B = good, C = marginal, D = poor, E = verified extant but quality not judged, O = obscure (not found at reported site but more searching needed), H = historically known from site but no known observation or collection since 1975, X = extirpated from site.
FIRSTOBS:	Year of first known observation or collection.
GENDESC:	Description of an occurrence's habitat.
GRANK:	Estimate of element abundance on a global scale: G1 = extremely rare, G2 = rare, G3 = uncommon, G4 = common, G5 = very common, GH = historically known and expected to be rediscovered, GU = uncertain, GX = extinct. Subspecies and variety abundances are coded with a 'T' suffix; the 'G' portion of the rank then refers to the entire species.
HABITAT:	General description of the element's habitat across its range.
IDENT:	Whether the identification has been checked by a reliable individual and is believed to be correctly identified: Y = identification confirmed and believed correct, N = No, identification determined to be wrong despite reports to the contrary, ? = Whether identification is correct or not is confusing or disputed, blank or U = unknown whether identification correct or not, assumed correct.
KSNPC:	Kentucky State Nature Preserves Commission status: N or blank = none, E = endangered, T = threatened, S = special concern, H = historic, X = extirpated.
LASTOBS:	Year(-month-date) of most recent known observation or collection.
LAT:	Latitude. This field is masked for sensitive occurrences; contact KSNPC in these cases. Omitted for G, U and Q precision occurrences.
LONG:	Longitude. This field is masked for sensitive occurrences; contact KSNPC in these cases. Omitted for G, U and Q precision occurrences.
MAP NUMBER:	Number used to location the element on KSNPC Heritage maps.
MARGNUM:	See MAP NUMBER.
PREC:	See PRECISION.
PRECISION:	Precision of the latitude, longitude, directions, and plotted location: S = location accurate to within three seconds of latitude-longitude, M = location accurate to within

one minute of latitude-longitude, G = location plotted according to general locality information and accurate to one USGS 7.5 minute quadrangle, Q = element known from the quadrangle but site-specific locations are not recorded by KSNPC because the species may be relatively frequent on the quadrangle or is known to frequently move, U or blank = accuracy of location unknown or not specified.

The accuracy of an occurrence's location is designated by the precision code assigned to the record. Only 'S' precision occurrence records are reliably mapped at or near their precise locations. While an attempt is made to map 'M' precision occurrences as accurately as possible, the plotted locations, lat, long, directions, bearing, and distance data fields may or may not be correct. 'G' and 'Q' precision occurrence locations are very unreliable and only should be used to indicate the possibility that the species is in the area.

SPROT:

See KSNPC.

SRANK:

Estimate of element abundance in Kentucky: S1 = extremely rare, S2 = rare, S3 = uncommon, S4 = many occurrences, S5 = very common, SA = accidental in state, SE = exotic, SH = historically known in state, SN = migratory or nonbreeding, SR = reported but without persuasive documentation, SRF = reported falsely in literature, SU = uncertain, SX = extirpated.

USES A:

U.S. Fish and Wildlife Service status: N or blank = none, C1 = category 1 status review, C2 = category 2 status review, 3A = considered to be extinct, 3B = not considered a species under the Endangered Species Act, 3C = considered to be more abundant than previously thought, LT = listed as threatened, LE = listed as endangered, PT = proposed as threatened, PE = proposed as endangered.

WATERBODY:

Name of the the EPA Waterbody in which the occurrence is plotted. Codes used are: D--downstream, M--mainstem, T--tributary.

WATERSHED:

See WATERBODY.

# Endangered, Threatened, Special Concern, and Historic Plants and Animals of Kentucky

Kentucky State Nature Preserves Commission  
July, 1997

	STATUS			STATUS	
	KSNPC	US		KSNPC	US
<b>NONVASCULAR PLANTS</b>					
<i>Sphagnum quinquefarium</i> A sphagnum moss	E		<i>Aristida ramosissima</i> Branched three-awn grass	H	
<i>Tortula norvegica</i> Tortula	E		<i>Armoracia lacustris</i> Lake cress	T	
<b>VASCULAR PLANTS</b>					
<i>Acer spicatum</i> Mountain maple	E		<i>Aster concolor</i> Eastern silvery aster	T	
<i>Aconitum uncinatum</i> Blue monkshood	T		<i>Aster drummondii</i> var. <i>texanus</i> Texas aster	T	
<i>Adiantum capillus-veneris</i> Southern maidenhair-fern	T		<i>Aster hemisphericus</i> Tennessee aster	E	
<i>Adlumia fungosa</i> Climbing fumitory	E		<i>Aster phyllolepis</i> Western silky aster	S	
<i>Aesculus pavia</i> Red buckeye	T		<i>Aster pilosus</i> var. <i>priceae</i> White heath aster	T	
<i>Agalinis obtusifolia</i> Ten-lobe false foxglove	E		<i>Aster saxicastellii</i> Rockcastle aster	T	
<i>Agalinis skinneriana</i> Pale false foxglove	E		<i>Aureolaria patula</i> Spreading false foxglove	S	
<i>Ageratina luciae-brauniae</i> Lucy Braun's white snakeroot	S		<i>Baptisia australis</i> var. <i>minor</i> Blue wild indigo	S	
<i>Agrimonia gryposepala</i> Tall hairy groovebur	T		<i>Baptisia bracteata</i> var. <i>leucophaea</i> Cream wild indigo	S	
<i>Amianthium muscitoxicum</i> Fly-poison	T		<i>Baptisia tinctoria</i> Yellow wild indigo	T	
<i>Amsonia tabernaemontana</i> var. <i>gattingeri</i> Eastern blue-star	T		<i>Bartonia virginica</i> Yellow screwstem	T	
<i>Anemone canadensis</i> Canada anemone	H		<i>Berberis canadensis</i> American barberry	E	
<i>Angelica triquinata</i> Filmy angelica	E		<i>Berchemia scandens</i> Supplejack	T	
<i>Apios priceana</i> Price's potato-bean	E	LT	<i>Botrychium matricariifolium</i> Matricary grapefern	E	
<i>Arabis missouriensis</i> Missouri rock cress	E		<i>Botrychium oneidense</i> Blunt-lobe grapefern	E	
<i>Arabis perstellata</i> Braun's rock cress	T	LE	<i>Boykinia aconitifolia</i> Brook saxifrage	T	
			<i>Cabomba caroliniana</i> Carolina fanwort	T	
			<i>Calamagrostis canadensis</i> var. <i>macouniana</i>	E	
			Blue-joint reed grass		
			<i>Calamagrostis porteri</i> ssp. <i>insperata</i>	E	
			Reed bent grass		

Endangered, Threatened, Special Concern, and Historic Plants and Animals of Kentucky (July, 1997)

	STATUS			STATUS	
	KSNPC	US		KSNPC	US
<i>Calamagrostis porteri</i> ssp. <i>porteri</i> Porter's reed grass	T		<i>Castilleja coccinea</i> Scarlet Indian paintbrush	E	
<i>Callirhoe alcaeoides</i> Clustered poppy-mallow	H		<i>Ceanothus herbaceus</i> Prairie redroot	T	
<i>Calopogon tuberosus</i> Grass-pink	E		<i>Cheilanthes alabamensis</i> Alabama lip fern	E	
<i>Calycanthus floridus</i> var. <i>glaucus</i> Sweetshrub	T		<i>Cheilanthes feei</i> Fee's lip fern	E	
<i>Calylophus serrulatus</i> Yellow evening primrose	H		<i>Chelone obliqua</i> var. <i>obliqua</i> Red turtlehead	E	
<i>Carex aestivalis</i> Summer sedge	E		<i>Chelone obliqua</i> var. <i>speciosa</i> Rose turtlehead	S	
<i>Carex alata</i> Broadwing sedge	T		<i>Chrysogonium virginianum</i> Green-and-gold	E	
<i>Carex atlantica</i> ssp. <i>capillacea</i> Prickly bog sedge	E		<i>Chrysosplenium americanum</i> American golden-saxifrage	E	
<i>Carex austrocaroliniana</i> Tarheel sedge	S		<i>Cimicifuga rubifolia</i> Appalachian bugbane	T	
<i>Carex buxbaumii</i> Brown bog sedge	E		<i>Circaea alpina</i> Small enchanter's-nightshade	S	
<i>Carex comosa</i> Bristly sedge	H		<i>Clematis crispa</i> Blue jasmine leather-flower	T	
<i>Carex craccae</i> Crake's sedge	S		<i>Coeloglossum viride</i> var. <i>virescens</i> Long-bract green orchis	H	
<i>Carex crebriflora</i> Coastal plain sedge	T		<i>Collinsonia verticillata</i> Whorled horse-balm	E	
<i>Carex decomposita</i> Epiphytic sedge	T		<i>Comptonia peregrina</i> Sweet-fern	E	
<i>Carex gigantea</i> Large sedge	T		<i>Conradina verticillata</i> Cumberland-rosemary	E	LT
<i>Carex hystericina</i> Porcupine sedge	H		<i>Convallaria montana</i> American lily-of-the-valley	E	
<i>Carex joorii</i> Cypress-swamp sedge	E		<i>Corallorrhiza maculata</i> Spotted coralroot	E	
<i>Carex juniperorum</i> Cedar sedge	E		<i>Coreopsis pubescens</i> Star tickseed	S	
<i>Carex lanuginosa</i> Woolly sedge	E		<i>Crataegus engelmannii</i> Engelmann's hawthorn	H	
<i>Carex leptopoda</i> Finely-nerved sedge	E		<i>Cymophyllum fraserianus</i> Fraser's sedge	E	
<i>Carya aquatica</i> Water hickory	T		<i>Cyperus plukenetii</i> Plukenet's cyperus	H	
<i>Castanea dentata</i> American chestnut	E		<i>Cypripedium candidum</i> Small white lady's-slipper	E	
<i>Castanea pumila</i> Allegheny chinkapin	T		<i>Cypripedium kentuckiense</i> Kentucky lady's-slipper	S	

Endangered, Threatened, Special Concern, and Historic Plants and Animals of Kentucky (July, 1997)

	STATUS			STATUS	
	KSNPC	US		KSNPC	US
<i>Cypripedium parviflorum</i>	T		<i>Eupatorium steelei</i>		E
Small yellow lady's-slipper			Steele's joe-pye-weed		
<i>Cypripedium reginae</i>	H		<i>Euphorbia mercurialina</i>		T
Showy lady's-slipper			Mercury spurge		
<i>Delphinium carolinianum</i>	T		<i>Fimbristylis puberula</i>		T
Carolina larkspur			Hairy fimbristylis		
<i>Deschampsia cespitosa</i> ssp. <i>glauca</i>	E		<i>Forestiera ligustrina</i>		S
Tufted hair grass			Upland privet		
<i>Deschampsia flexuosa</i>	T		<i>Gentiana decora</i>		S
Crinkled hair grass			Showy gentian		
<i>Dichanthelium boreale</i>	S		<i>Gentiana flava</i>		E
Northern witch grass			Yellow gentian		
<i>Didiplis diandra</i>	S		<i>Gentiana puberulenta</i>		E
Water-purslane			Prairie gentian		
<i>Dodecatheon frenchii</i>	S		<i>Glandularia canadensis</i>		T
French's shooting-star			Rose verbena		
<i>Draba cuneifolia</i>	E		<i>Glyceria acutiflora</i>		T
Wedge-leaf whitlow-grass			Sharp-scaled manna grass		
<i>Drosera brevifolia</i>	E		<i>Gnaphalium helleri</i> var. <i>micradenium</i>		H
Dwarf sundew			Small rabbit-tobacco		
<i>Drosera intermedia</i>	H		<i>Gratiola pilosa</i>		T
Spoon-leaved sundew			Shaggy hedge-hyssop		
<i>Dryopteris carthusiana</i>	S		<i>Gratiola viscidula</i>		S
Spinulose wood fern			Short's hedge-hyssop		
<i>Dryopteris ludoviciana</i>	H		<i>Gymnopogon ambiguus</i>		S
Southern shield wood fern			Bearded skeleton grass		
<i>Echinodorus berteroii</i>	T		<i>Gymnopogon brevifolius</i>		E
Burhead			Shortleaf skeleton grass		
<i>Echinodorus parvulus</i>	E		<i>Halesia tetrapeta</i>		T
Dwarf burhead			Common silverbell		
<i>Eleocharis olivacea</i>	S		<i>Hedeoma hispidum</i>		T
Olivaceous sedge			Rough pennyroyal		
<i>Elodea nuttallii</i>	T		<i>Helianthemum bicknellii</i>		T
Waterweed			Plains frostweed		
<i>Elymus svensonii</i>	S		<i>Helianthemum canadense</i>		E
Svenson's wild rye			Canada frostweed		
<i>Eriophorum virginicum</i>	E		<i>Helianthus eggertii</i>		T
Tawny cotton-grass			Egger's sunflower		PT
<i>Eryngium integrifolium</i>	E		<i>Helianthus silphioides</i>		E
Blue-flower coyote-thistle			Silphium sunflower		
<i>Erythronium rostratum</i>	S		<i>Heracleum lanatum</i>		E
Golden-star			Cow-parsnip		
<i>Eupatorium maculatum</i>	H		<i>Heteranthera dubia</i>		S
Spotted joe-pye-weed			Grassleaf mud-plantain		
<i>Eupatorium semiserratum</i>	E		<i>Heteranthera limosa</i>		S
Small-flowered thoroughwort			Blue mud-plantain		

Endangered, Threatened, Special Concern, and Historic Plants and Animals of Kentucky (July, 1997)

	STATUS			STATUS	
	KSNPC	US		KSNPC	US
<i>Heterotheca subaxillaris</i> var. <i>latifolia</i> Broad-leaf golden-aster	T		<i>Leavenworthia exigua</i> var. <i>laciniata</i> Glade cress	T	
<i>Hexastylis contracta</i> Southern heartleaf	E		<i>Leavenworthia torulosa</i> Necklace glade cress	T	
<i>Hexastylis heterophylla</i> Variable-leaved heartleaf	S		<i>Leiophyllum buxifolium</i> Sand-myrtle	H	
<i>Hieracium longipilum</i> Hairy hawkweed	T		<i>Lesquerella globosa</i> Lesquereux's bladderpod	T	
<i>Houstonia serpyllifolia</i> Michaux's bluets	E		<i>Lesquerella lescurii</i> Lescur's bladderpod	S	
<i>Hydrocotyle americana</i> American water-pennywort	E		<i>Leucothoe recurva</i> Fetterbush	E	
<i>Hydroclea ovata</i> Ovate fiddleleaf	E		<i>Liatris cylindracea</i> Slender blazingstar	T	
<i>Hydrophyllum virginianum</i> Virginia waterleaf	S		<i>Lilium philadelphicum</i> Wood lily	T	
<i>Hypericum adpressum</i> Creeping St. John's-wort	H		<i>Lilium superbum</i> Turk's cap lily	T	
<i>Hypericum crux-andreae</i> St. Peter's-wort	T		<i>Limnobium spongia</i> American frog's-bit	T	
<i>Hypericum nudiflorum</i> Pretty St. John's-wort	H		<i>Liparis loeselii</i> Loesel's twayblade	T	
<i>Hypericum pseudomaculatum</i> Large spotted St. John's-wort	H		<i>Listera australis</i> Southern twayblade	E	
<i>Iris fulva</i> Copper iris	E		<i>Listera smallii</i> Kidney-leaf twayblade	T	
<i>Isoetes butleri</i> Butler's quillwort	E		<i>Lobelia appendiculata</i> var. <i>gattingeri</i> Gattinger's lobelia	E	
<i>Isoetes melanopoda</i> Blackfoot quillwort	E		<i>Lobelia nuttallii</i> Nuttall's lobelia	T	
<i>Juglans cinerea</i> White walnut	S		<i>Lonicera dioica</i> var. <i>orientalis</i> Wild honeysuckle	E	
<i>Juncus articulatus</i> Jointed rush	S		<i>Lonicera reticulata</i> Grape honeysuckle	E	
<i>Juncus ellottii</i> Bog rush	E		<i>Ludwigia hirtella</i> Hairy ludwigia	E	
<i>Juncus filipendulus</i> Long-styled rush	T		<i>Lycopodiella appressa</i> Southern bog club-moss	E	
<i>Juniperus communis</i> var. <i>depressa</i> Ground juniper	T		<i>Lycopodiella clavatum</i> Running-pine	E	
<i>Koeleria macrantha</i> June grass	E		<i>Lycopodiella inundatum</i> Northern bog club-moss	E	
<i>Lathyrus palustris</i> Vetchling peavine	T		<i>Lysimachia fraseri</i> Fraser's loosestrife	E	
<i>Lathyrus venosus</i> Smooth veiny peavine	S		<i>Lysimachia radicans</i> Trailing loosestrife	H	

Endangered, Threatened, Special Concern, and Historic Plants and Animals of Kentucky (July, 1997)

	STATUS			STATUS	
	KSNPC	US		KSNPC	US
<i>Lysimachia terrestris</i>	E		<i>Nemophila aphylla</i>		T
Swamp-candles			Small-flower baby-blue-eyes		
<i>Maianthemum canadense</i>	T		<i>Nestronia umbellula</i>		E
Wild lily-of-the-valley			Conjurer's-nut		
<i>Maianthemum stellatum</i>	E		<i>Oenothera linifolia</i>		E
Starflower false solomon's-seal			Thread-leaf sundrops		
<i>Malus angustifolia</i>	S		<i>Oenothera oakesiana</i>		H
Southern crabapple			Evening primrose		
<i>Malvastrum hispidum</i>	T		<i>Oenothera perennis</i>		E
Hispid false mallow			Small sundrops		
<i>Marshallia grandiflora</i>	E		<i>Oenothera triloba</i>		T
Barbara's-buttons			Stemless evening-primrose		
<i>Matelea carolinensis</i>	E		<i>Oldenlandia uniflora</i>		E
Carolina anglepod			Clustered bluets		
<i>Melampyrum lineare</i> var. <i>latifolium</i>	T		<i>Onosmodium molle</i> ssp. <i>hispidissimum</i>		E
American cow-wheat			Hairy false gromwell		
<i>Melampyrum lineare</i> var. <i>pectinatum</i>	E		<i>Onosmodium molle</i> ssp. <i>molle</i>		E
American cow-wheat			Soft false gromwell		
<i>Melanthium parviflorum</i>	E		<i>Onosmodium molle</i> ssp. <i>occidentale</i>		E
Small-flowered false hellebore			Western false gromwell		
<i>Melanthium virginicum</i>	E		<i>Orobanche ludoviciana</i>		H
Virginia bunchflower			Louisiana broomrape		
<i>Melanthium woodii</i>	T		<i>Orontium aquaticum</i>		T
False hellebore			Goldenclub		
<i>Minuartia cumberlandensis</i>	E	LE	<i>Oxalis priceae</i>		H
Cumberland sandwort			Price's yellow wood sorrel		
<i>Minuartia glabra</i>	T		<i>Parnassia asarifolia</i>		E
Appalachian sandwort			Kidney-leaf grass-of-parnassus		
<i>Mirabilis albida</i>	E		<i>Parnassia grandifolia</i>		E
Pale umbrella-wort			Largeleaf grass-of-parnassus		
<i>Monarda punctata</i>	E		<i>Paronychia argyrocoma</i>		E
Spotted bee-balm			Silverling		
<i>Monotropis odorata</i>	T		<i>Paspalum boscianum</i>		S
Sweet pinesap			Bull paspalum		
<i>Muhlenbergia bushii</i>	E		<i>Paxistima canbyi</i>		T
Bush's muhly			Canby's mountain-lover		
<i>Muhlenbergia cuspidata</i>	T		<i>Pedicularis lanceolata</i>		H
Plains muhly			Swamp lousewort		
<i>Muhlenbergia glabriiflora</i>	S		<i>Perideridia americana</i>		T
Hair grass			Eastern euphorbus		
<i>Myriophyllum heterophyllum</i>	S		<i>Phacelia ranunculacea</i>		S
Broadleaf water-milfoil			Blue scorpion-weed		
<i>Myriophyllum pinnatum</i>	T		<i>Philadelphus inodorus</i>		T
Cutleaf water-milfoil			Mock orange		
<i>Najas gracillima</i>	S		<i>Philadelphus pubescens</i>		E
Thread-like naiad			Hoary mock orange		

Endangered, Threatened, Special Concern, and Historic Plants and Animals of Kentucky (July, 1997)

	STATUS			STATUS	
	KSNPC	US		KSNPC	US
<i>Phlox bifida</i> ssp. <i>bifida</i> Cleft phlox	T		<i>Pycnanthemum albescens</i> White-leaved mountain-mint		E
<i>Phlox bifida</i> ssp. <i>stellaria</i> Starry cleft phlox	T		<i>Pyrola americana</i> American wintergreen		H
<i>Plantago cordata</i> Heartleaf plantain	H		<i>Ranunculus ambigens</i> Water-plantain		S
<i>Platanthera cristata</i> Yellow-crested orchid	T		<i>Rhododendron canescens</i> Hoary azalea		E
<i>Platanthera integrilabia</i> White fringeless orchid	T		<i>Rhynchosia tomentosa</i> Hairy snout-bean		E
<i>Platanthera psycodes</i> Small purple-fringed orchid	E		<i>Rhynchospora globularis</i> Globe beaked-rush		S
<i>Poa saltuensis</i> Drooping blue grass	E		<i>Rhynchospora macrostachya</i> Tall beaked-rush		E
<i>Podostemum ceratophyllum</i> Threadfoot	S		<i>Rubus canadensis</i> Smooth blackberry		E
<i>Pogonia ophioglossoides</i> Rose pogonia	E		<i>Rubus whartoniae</i> Wharton's dewberry		T
<i>Polygala cruciata</i> Cross-leaf milkwort	E		<i>Rudbeckia subtomentosa</i> Sweet coneflower		E
<i>Polygala nuttallii</i> Nuttall's milkwort	H		<i>Sabatia campanulata</i> Slender marsh-pink		E
<i>Polygala polygama</i> Racemed milkwort	T		<i>Sagittaria graminea</i> Grass-leaf arrowhead		T
<i>Polymnia laevigata</i> Tennessee leafcup	E		<i>Sagittaria rigida</i> Sessile-fruit arrowhead		E
<i>Pontederia cordata</i> Pickerel-weed	T		<i>Salix amygdaloides</i> Peachleaf willow		H
<i>Potamogeton illinoensis</i> Illinois pondweed	S		<i>Salix discolor</i> Pussy willow		H
<i>Potamogeton pulcher</i> Spotted pondweed	T		<i>Salvia urticifolia</i> Nettle-leaf sage		E
<i>Prenanthes alba</i> White rattlesnake-root	E		<i>Sambucus racemosa</i> ssp. <i>pubens</i> Red elderberry		E
<i>Prenanthes aspera</i> Rough rattlesnake-root	E		<i>Sanguisorba canadensis</i> Canada burnet		E
<i>Prenanthes barbata</i> Barbed rattlesnake-root	E		<i>Saxifraga michauxii</i> Michaux's saxifrage		T
<i>Prenanthes crepidinea</i> Nodding rattlesnake-root	T		<i>Saxifraga micranthidifolia</i> Lettuce-leaf saxifrage		E
<i>Psoralidium tenuiflorum</i> Few-flowered scurf-pea	E		<i>Saxifraga pensylvanica</i> Swamp saxifrage		H
<i>Ptilimnium capillaceum</i> Mock bishop's-weed	T		<i>Schisandra glabra</i> Bay starvine		E
<i>Ptilimnium nuttallii</i> Nuttall's mock bishop's-weed	E		<i>Schizachne purpurascens</i> Purple-oat		T

Endangered, Threatened, Special Concern, and Historic Plants and Animals of Kentucky (July, 1997)

	STATUS				STATUS	
	KSNPC	US			KSNPC	US
<i>Schwalbea americana</i>				<i>Solidago squarrosa</i>		H
Chaffseed	H	LE		Squarrose goldenrod		
<i>Scirpus expansus</i>			E	<i>Sparganium eurycarpum</i>		E
Woodland beak-rush				Large bur-reed		
<i>Scirpus fluviatilis</i>			E	<i>Sphenopholis pensylvanica</i>		S
River bul-rush				Swamp wedgescale		
<i>Scirpus hallii</i>			E	<i>Spiraea alba</i>		E
Hall's bul-rush				Narrow-leaved meadowsweet		
<i>Scirpus heterochaetus</i>			E	<i>Spiraea virginiana</i>		T
Slender bul-rush				Virginia spiraea		LT
<i>Scirpus microcarpus</i>			E	<i>Spiranthes lucida</i>		T
Small-fruit bul-rush				Shining ladies'-tresses		
<i>Scirpus verecundus</i>			E	<i>Spiranthes magnicamporum</i>		T
Bashful bul-rush				Great plains ladies'-tresses		
<i>Scleria ciliata</i> var. <i>ciliata</i>			E	<i>Spiranthes odorata</i>		E
Fringed nut-rush				Sweetscent ladies'-tresses		
<i>Scleria muellenbergii</i>			H	<i>Sporobolus clandestinus</i>		T
Pitted nut-rush				Rough dropseed		
<i>Scutellaria saxatilis</i>			T	<i>Sporobolus heterolepis</i>		E
Rock skullcap				Northern dropseed		
<i>Sedum telephiooides</i>			T	<i>Stachys eplingii</i>		E
Allegheny stonecrop				Epling's hedge-nettle		
<i>Sida hermaphrodita</i>			S	<i>Stellaria fontinalis</i>		T
Virginia-mallow				Water stichwort		
<i>Silene ovata</i>			E	<i>Stellaria longifolia</i>		S
Ovate catchfly				Longleaf stichwort		
<i>Silene regia</i>			E	<i>Streptopus roseus</i> var. <i>perspectus</i>		E
Royal catchfly				Rosy twistedstalk		
<i>Silphium laciniatum</i> var. <i>laciniatum</i>			E	<i>Symporicarpos albus</i>		E
Compassplant				Snowberry		
<i>Silphium laciniatum</i> var. <i>robinsonii</i>			T	<i>Talinum calcaricum</i>		E
Compassplant				Limestone fameflower		
<i>Solidago albopilosa</i>			T	<i>Talinum teretifolium</i>		T
White-haired goldenrod		LT		Roundleaf fameflower		
<i>Solidago buckleyi</i>			S	<i>Taxus canadensis</i>		T
Buckley's goldenrod				Canadian yew		
<i>Solidago caesia</i> var. <i>curtisii</i>			T	<i>Tephrosia spicata</i>		E
Curtis' goldenrod				Spiked hoary-pea		
<i>Solidago puberula</i>			S	<i>Thaspium pinnatifidum</i>		T
Downy goldenrod				Cutleaf meadow-parsnip		
<i>Solidago roanensis</i>			T	<i>Thermopsis mollis</i>		E
Roan mountain goldenrod				Soft-haired thermopsis		
<i>Solidago shortii</i>			E	<i>Thuja occidentalis</i>		T
Short's goldenrod		LE		Northern white-cedar		
<i>Solidago simplex</i> ssp. <i>randii</i>			S	<i>Torreyochloa pallida</i>		E
Rand's goldenrod				Pale manna grass		

Endangered, Threatened, Special Concern, and Historic Plants and Animals of Kentucky (July, 1997)

	STATUS			STATUS	
	KSNPC	US		KSNPC	US
<i>Toxicodendron vernix</i> Poison sumac	E		<i>Xerophyllum asphodeloides</i> Eastern turkeybeard	H	
<i>Tragia urticifolia</i> Nettle-leaf noseburn	E		<i>Xyris difformis</i> Carolina yellow-eye-grass	E	
<i>Trepocarpus aethusae</i> Trepocarpus	T		<i>Zizania palustris</i> var. <i>interior</i> Indian wild rice	H	
<i>Trichostema setaceum</i> Narrow-leaved bluecurls	E		<i>Zizaniopsis miliacea</i> Southern wild rice	T	
<i>Trientalis borealis</i> Northern starflower	E				ANIMALS
<i>Trifolium reflexum</i> Buffalo clover	E				
<i>Trifolium stoloniferum</i> Running buffalo clover	T	LE	<b>Gastropods</b>		
<i>Trillium nivale</i> Snow trillium	E		<i>Anguispira rugoderma</i> Pine Mountain disc	T	
<i>Trillium pusillum</i> var. <i>ozarkanum</i> Ozark least trillium	E		<i>Antroserolatus spiralis</i> Shaggy cavesnail	S	
<i>Trillium pusillum</i> var. <i>pusillum</i> Least trillium	E		<i>Glyphaalinia raderi</i> Maryland glyph	S	
<i>Trillium undulatum</i> Painted trillium	T		<i>Glyphaalinia rhoadsi</i> Sculpted glyph	T	
<i>Triplasis purpurea</i> Purple sand grass	H		<i>Helicodiscus notius specus</i> A snail	T	
<i>Ulmus serotina</i> September elm	S		<i>Helicodiscus punctatellus</i> Punctate coil	S	
<i>Utricularia macrorhiza</i> Greater bladderwort	E		<i>Leptoxis praerosa</i> Onyx rocksнail	S	
<i>Vallisneria americana</i> Eel-grass	S		<i>Lithasia armigera</i> Armored rocksнail	S	
<i>Vernonia noveboracensis</i> New York ironweed	S		<i>Lithasia geniculata</i> Ornate rocksнail	S	
<i>Veronica americana</i> American speedwell	H		<i>Lithasia salebrosa</i> Muddy rocksнail	S	
<i>Viburnum molle</i> Missouri arrow-wood	T		<i>Lithasia verrucosa</i> Varicose rocksнail	S	
<i>Viburnum nudum</i> Possum haw viburnum	E		<i>Mesodon chilhoweensis</i> Queen crater	S	
<i>Viola septemloba</i> var. <i>egglestonii</i> Eggleson's violet	S		<i>Mesodon panselenus</i> Virginia bladetooth	S	
<i>Viola walteri</i> Walter's violet	T		<i>Mesodon wetherbyi</i> Clifty covert	S	
<i>Vitis rupestris</i> Sand grape	T		<i>Mesomphix rugeli</i> Wrinkled button	T	
<i>Woodsia appalachiana</i> Mountain woodsia	E		<i>Pilsbryna</i> sp. 1 A snail (undescribed)	E	
			<i>Pleurocera alveare</i> Rugged hornsнail	S	

Endangered, Threatened, Special Concern, and Historic Plants and Animals of Kentucky (July, 1997)

	STATUS KSNPC US			STATUS KSNPC US	
<i>Pleurocera curta</i> Shortspire hornsail	S		<i>Lasmigona subviridis</i> Green floater		E
<i>Rabdotus dealbatus</i> Whitewashed rabdotus	T		<i>Lexingtonia dolabelloides</i> Slabside pearlymussel		H
<i>Rhodacme elatior</i> Domed aencylid	S		<i>Obovaria retusa</i> Ring pink	E	LE
<i>Triodopsis dentifera</i> Big-tooth whitelip	T		<i>Pegias fabula</i> Little-wing pearlymussel	E	LE
<i>Triodopsis multilineata</i> Striped whitelip	T		<i>Plethobasus cooperianus</i> Orange-foot pimpleback	E	LE
<i>Vertigo bollesiana</i> Delicate vertigo	E		<i>Plethobasus cyphyrus</i> Sheepnose	S	
<i>Vertigo clappi</i> Cupped vertigo	E		<i>Pleurobema clava</i> Clubshell	E	LE
<i>Vitrinizonites latissimus</i> Glassy grapeskin	T		<i>Pleurobema oviforme</i> Tennessee clubshell	E	
<b>Unionids (Mussels)</b>			<i>Pleurobema plenum</i> Rough pigtoe	E	LE
<i>Alasmidonta atropurpurea</i> Cumberland elktoe	E	LE	<i>Pleurobema pyramidatum</i> Pyramid pigtoe	E	
<i>Alasmidonta marginata</i> Elktoe	T		<i>Potamilus capax</i> Fat pocketbook	E	LE
<i>Anodontoides denigratus</i> Cumberland papershell	E		<i>Potamilus purpuratus</i> Bleufer	E	
<i>Cumberlandia monodonta</i> Spectaclecase	E		<i>Ptychobranchus subtentum</i> Fluted kidneyshell	T	
<i>Cyprogenia stegaria</i> Fanshell	E	LE	<i>Quadrula cylindrica cylindrica</i> Rabbitsfoot	T	
<i>Epioblasma brevidens</i> Cumberlandian combshell	E	LE	<i>Simpsonaias ambigua</i> Salamander mussel	T-	
<i>Epioblasma capsaeformis</i> Oyster mussel	E	LE	<i>Toxolasma lividum</i> Purple lilliput	E	
<i>Epioblasma obliquata obliquata</i> Catspaw	E	LE	<i>Toxolasma texensis</i> Texas lilliput	E	
<i>Epioblasma torulosa rangiana</i> Northern riffleshell	E	LE	<i>Villosa fabalis</i> Rayed bean	E	
<i>Epioblasma triquetra</i> Snuffbox	S		<i>Villosa lienosa</i> Little spectaclecase	S	
<i>Fusconaia subrotunda subrotunda</i> Long-solid	T		<i>Villosa ortmanni</i> Kentucky creekshell	T	
<i>Lampsilis abrupta</i> Pink mucket	E	LE	<i>Villosa trabalis</i> Cumberland bean	E	LE
<i>Lampsilis ovata</i> Pocketbook	E		<i>Villosa vanuxemensis</i> Mountain creekshell	T	
<i>Lasmigona compressa</i> Creek heelsplitter	E				

Endangered, Threatened, Special Concern, and Historic Plants and Animals of Kentucky (July, 1997)

	STATUS			STATUS	
	KSNPC	US		KSNPC	US
<b>Crustaceans</b>					
<i>Barbicambarus cornutus</i>	S		<i>Dryobius sexnotatus</i>		T
Bottlebrush crayfish			Sixbanded longhorn beetle		
<i>Bryocamptus morrisoni elegans</i>	T		<i>Litobrancha recurvata</i>		S
A copepod			A burrowing mayfly		
<i>Caecidotea barri</i>	E		<i>Lordithon niger</i>		H
Clifton Cave isopod			Black lordithon rove beetle		
<i>Cambarellus puer</i>	E		<i>Lytrosis permagnaria</i>		E
A dwarf crayfish			A geometrid moth		
<i>Cambarellus shufeldtii</i>	S		<i>Manophylax butleri</i>		S
Cajun dwarf crayfish			A limnephilid caddisfly		
<i>Cambarus parvoculus</i>	E		<i>Nicrophorus americanus</i>	T	LE
A crayfish			American burying beetle		
<i>Cambarus veteranus</i>	S		<i>Ophiogomphus howei</i>		S
A crayfish			Pygmy snaketail		
<i>Gammarus bousfieldi</i>	E		<i>Papaipema eryngii</i>		E
Bousfield's amphipod			Rattlesnake-master borer moth		
<i>Macrobrachium ohioense</i>	E		<i>Phyciodes batesii</i>		T
Ohio shrimp			Tawny crescent		
<i>Orconectes australis</i>	T		<i>Pseudanophthalmus abditus</i>		T
A crayfish			Concealed cave beetle		
<i>Orconectes bisectus</i>	T		<i>Pseudanophthalmus audax</i>		T
Crittenden crayfish			Bold cave beetle		
<i>Orconectes inermis</i>	S		<i>Pseudanophthalmus caecus</i>		T
A crayfish			Clifton Cave beetle		
<i>Orconectes jeffersoni</i>	E		<i>Pseudanophthalmus calcareus</i>		T
Louisville crayfish			Limestone Cave beetle		
<i>Orconectes lancifer</i>	E		<i>Pseudanophthalmus catoryctos</i>		E
A crayfish			Lesser Adams Cave beetle		
<i>Orconectes palmeri</i>	E		<i>Pseudanophthalmus conditus</i>		T
A crayfish			Hidden cave beetle		
<i>Orconectes pellucidus</i>	S		<i>Pseudanophthalmus exoticus</i>		H
A crayfish			Exotic cave beetle		
<i>Palaemonias ganteri</i>	E	LE	<i>Pseudanophthalmus frigidus</i>		T
Mammoth Cave shrimp			Icebox Cave beetle		
<i>Procambarus viaeviridis</i>	T		<i>Pseudanophthalmus globiceps</i>		T
A crayfish			Round-headed cave beetle		
<i>Stygobromus vitreus</i>	S		<i>Pseudanophthalmus horni</i>		S
An amphipod			Garman's cave beetle		
<b>Insects</b>			<i>Pseudanophthalmus hypolithos</i>		T
			Ashcamp cave beetle		
<i>Celithemis verna</i>	S		<i>Pseudanophthalmus inexpectatus</i>		T
Double-ringed pennant			Surprising cave beetle		
<i>Cheumatopsyche helma</i>	H		<i>Pseudanophthalmus major</i>		T
Helma's net-spinning caddisfly			Beaver Cave beetle		
			<i>Pseudanophthalmus parvus</i>		T
			Tatum Cave beetle		

Endangered, Threatened, Special Concern, and Historic Plants and Animals of Kentucky (July, 1997)

	STATUS			STATUS	
	KSNPC	US		KSNPC	US
<i>Pseudanophthalmus pholeter</i>	E		<i>Erimystax insignis</i>		E
Greater Adams Cave beetle			Blotched chub		
<i>Pseudanophthalmus pubescens intrepidus</i>	T		<i>Erimyzon suetta</i>		T
A cave beetle			Lake chubsucker		
<i>Pseudanophthalmus puteanus</i>	T		<i>Esox niger</i>		S
Old Well Cave beetle			Chain pickerel		
<i>Pseudanophthalmus rogersae</i>	T		<i>Etheostoma chienense</i>		E
Rogers' cave beetle			Relict darter		LE
<i>Pseudanophthalmus scholasticus</i>	T		<i>Etheostoma cinereum</i>		S
Scholarly Cave beetle			Ashy darter		
<i>Pseudanophthalmus simulans</i>	T		<i>Etheostoma fusiforme</i>		E
Cub Run Cave beetle			Swamp darter		
<i>Pseudanophthalmus tenebrosus</i>	T		<i>Etheostoma lynceum</i>		S
Stevens Creek Cave beetle			Brighteye darter		
<i>Pseudanophthalmus troglodytes</i>	T		<i>Etheostoma maculatum</i>		T
Louisville cave beetle			Spotted darter		
<i>Pyrgus wyandot</i>	T		<i>Etheostoma microlepidum</i>		E
Appalachian grizzled skipper			Smallscale darter		
<i>Speyeria idalia</i>	H		<i>Etheostoma nigrum susanae</i>		T
Regal fritillary			Johnny darter		
<i>Stenonema bednariki</i>	S		<i>Etheostoma parvipinne</i>		S
A heptageniid mayfly			Goldstripe darter		
<i>Stylurus notatus</i>	H		<i>Etheostoma percnurum</i>		E
Elusive clubtail			Duskytail darter		LE
<b>Fishes</b>					
<i>Acipenser fulvescens</i>	E		<i>Etheostoma proeliare</i>		T
Lake sturgeon			Cypress darter		
<i>Alosa alabamae</i>	E		<i>Etheostoma pyrrhogaster</i>		S
Alabama shad			Firebelly darter		
<i>Amblyopsis spelaea</i>	S		<i>Etheostoma sagitta spilotum</i>		S
Northern cavefish			Arrow darter		
<i>Ammocrypta clara</i>	E		<i>Etheostoma swaini</i>		S
Western sand darter			Gulf darter		
<i>Ammocrypta pellucida</i>	S		<i>Fundulus chrysotus</i>		E
Eastern sand darter			Golden topminnow		
<i>Atractosteus spatula</i>	E		<i>Fundulus dispar</i>		E
Alligator gar			Starhead topminnow		
<i>Clinostomus funduloides</i>	S		<i>Hybognathus hayi</i>		E
Rosy side dace			Cypress minnow		
<i>Cyprinella camura</i>	S		<i>Hybognathus placitus</i>		S
Bluntnose shiner			Plains minnow		
<i>Cyprinella venusta</i>	S		<i>Hybopsis amnis</i>		H
Blacktail shiner			Pallid shiner		
			<i>Ichthyomyzon castaneus</i>		S
			Chestnut lamprey		
			<i>Ichthyomyzon fossor</i>		T
			Northern brook lamprey		

Endangered, Threatened, Special Concern, and Historic Plants and Animals of Kentucky (July, 1997)

	STATUS			STATUS	
	KSNPC	US		KSNPC	US
<i>Ichthyomyzon gagei</i> Southern brook lamprey	H		<i>Phenacobius uranops</i> Stargazing minnow	S	
<i>Ichthyomyzon greeleyi</i> Mountain brook lamprey	T		<i>Phoxinus cumberlandensis</i> Blackside dace	T	LT
<i>Ictiobus niger</i> Black buffalo	S		<i>Platygobio gracilis</i> Flathead chub	S	
<i>Lampetra appendix</i> American brook lamprey	T		<i>Rhinichthys cataractae</i> Longnose dace	E	
<i>Lepomis marginatus</i> Dollar sunfish	E		<i>Scaphirhynchus albus</i> Pallid sturgeon	E	LE
<i>Lepomis miniatus</i> Redspotted sunfish	T		<i>Thoburnia atripinnis</i> Blackfin sucker	S	
<i>Lota lota</i> Burbot	S		<i>Typhlichthys subterraneus</i> Southern cavefish	S	
<i>Macrhybopsis gelida</i> Sturgeon chub	H	C	<i>Umbra limi</i> Central mudminnow	T	
<i>Macrhybopsis meeki</i> Sicklefin chub	H	C			
<i>Menidia beryllina</i> Inland silverside	T				
<i>Moxostoma poecilurum</i> Blacktail redhorse	S		<b>Amphibians</b>		
<i>Nocomis biguttatus</i> Hornyhead chub	S		<i>Amphiuma tridactylum</i> Three-toed Amphiuma	E	
<i>Notropis albizonatus</i> Palezone shiner	E	LE	<i>Eurycea longicauda guttolineata</i> Three-lined Salamander	T	
<i>Notropis hudsonius</i> Spottail shiner	S		<i>Hyla avivoca</i> Bird-voiced Treefrog	T	
<i>Notropis maculatus</i> Taillight shiner	T		<i>Hyla cinerea</i> Green Treefrog	S	
<i>Notropis</i> sp. Sawfm shiner (undescribed)	E		<i>Hyla gratiosa</i> Barking Treefrog	S	
<i>Noturus exilis</i> Slender madtom	E		<i>Hyla versicolor</i> Gray Treefrog	S	
<i>Noturus hildebrandi</i> Least madtom	S		<i>Plethodon cinereus</i> Redback Salamander	S	
<i>Noturus phaeus</i> Brown madtom	S		<i>Plethodon wehrlei</i> Wehrle's Salamander	E	
<i>Noturus stigmosus</i> Northern madtom	S		<i>Rana areolata circulosa</i> Northern Crawfish Frog	S	
<i>Percina macrocephala</i> Longhead darter	T		<i>Rana pipiens</i> Northern Leopard Frog	S	
<i>Percina squamata</i> Olive darter	E				
<i>Percopsis omiscomaycus</i> Trout-perch	S				
			<b>Reptiles</b>		
			<i>Apalone mutica mutica</i> Midland Smooth Softshell	S	
			<i>Chrysemys picta dorsalis</i> Southern Painted Turtle	S	

Endangered, Threatened, Special Concern, and Historic Plants and Animals of Kentucky (July, 1997)

	STATUS KSNPC US			STATUS KSNPC US	
<i>Clonophis kirtlandii</i> Kirtland's Snake	E		<i>Ardea herodias</i> Great Blue Heron		S
<i>Elaphe guttata guttata</i> Corn Snake	S		<i>Asio flammeus</i> Short-eared Owl		E
<i>Eumeces anthracinus anthracinus</i> Northern Coal Skink	T		<i>Asio otus</i> Long-eared Owl		E
<i>Eumeces anthracinus pluvialis</i> Southern Coal Skink	E		<i>Bartramia longicauda</i> Upland Sandpiper		H
<i>Eumeces inexpectatus</i> Southeastern Five-lined Skink	S		<i>Botaurus lentiginosus</i> American Bittern		H
<i>Farancia abacura reinwardtii</i> Western Mud Snake	S		<i>Bubulcus ibis</i> Cattle Egret		S
<i>Lampropeltis triangulum elapoides</i> Scarlet Kingsnake	S		<i>Certhia americana</i> Brown Creeper		E
<i>Macroclemys temminckii</i> Alligator Snapping Turtle	T		<i>Chondestes grammacus</i> Lark Sparrow		T
<i>Nerodia cyclopion</i> Mississippi Green Water Snake	E		<i>Circus cyaneus</i> Northern Harrier		T
<i>Nerodia erythrogaster neglecta</i> Copperbelly Water Snake	S	PT	<i>Cistothorus platensis</i> Sedge Wren		S
<i>Nerodia fasciata confluens</i> Broad-banded Water Snake	E		<i>Corvus corax</i> Common Raven		E
<i>Ophisaurus attenuatus longicaudus</i> Eastern Slender Glass Lizard	T		<i>Corvus ossifragus</i> Fish Crow		S
<i>Pituophis melanoleucus melanoleucus</i> Northern Pine Snake	T		<i>Dendroica fusca</i> Blackburnian Warbler		T
<i>Sistrurus miliarius streckeri</i> Western Pigmy Rattlesnake	T		<i>Dolichonyx oryzivorus</i> Bobolink		S
<i>Thamnophis proximus proximus</i> Western Ribbon Snake	T		<i>Egretta caerulea</i> Little Blue Heron		E
<i>Thamnophis sauritus sauritus</i> Eastern Ribbon Snake	S		<i>Empidonax minimus</i> Least Flycatcher		E
<b>Birds</b>					
<i>Accipiter striatus</i> Sharp-shinned Hawk	S		<i>Fulica americana</i> American Coot		H
<i>Actitis macularia</i> Spotted Sandpiper	E		<i>Gallinula chloropus</i> Common Moorhen		T
<i>Aimophila aestivalis</i> Bachman's Sparrow	E		<i>Haliaeetus leucocephalus</i> Bald Eagle	E	LE
<i>Ammodramus henslowii</i> Henslow's Sparrow	S		<i>Ictinia mississippiensis</i> Mississippi Kite		S
<i>Anas discors</i> Blue-winged Teal	E		<i>Ixobrychus exilis</i> Least Bittern		T
<i>Ardea alba</i> Great Egret	E		<i>Junco hyemalis</i> Dark-eyed Junco		S
			<i>Lophodytes cucullatus</i> Hooded Merganser		T

Endangered, Threatened, Special Concern, and Historic Plants and Animals of Kentucky (July, 1997)

	STATUS			STATUS	
	KSNPC	US		KSNPC	US
<i>Nyctanassa violacea</i>	T		<b>Mammals</b>		
Yellow-crowned Night-Heron					
<i>Nycticorax nycticorax</i>	T		<i>Clethrionomys gapperi maurus</i>	S	
Black-crowned Night-Heron			Kentucky Red-backed Vole		
<i>Pandion haliaetus</i>	T		<i>Corynorhinus rafinesquii</i>	T	
Osprey			Rafinesque's Big-eared Bat		
<i>Passerculus sandwichensis</i>	S		<i>Corynorhinus townsendii virginianus</i>	E	LE
Savannah Sparrow			Virginia Big-eared Bat		
<i>Phalacrocorax auritus</i>	H		<i>Mustela nivalis</i>	S	
Double-crested Cormorant					
<i>Pheucticus ludovicianus</i>	S		<i>Myotis austroriparius</i>	E	
Rose-breasted Grosbeak			Southeastern Myotis		
<i>Picoides borealis</i>	E	LE	<i>Myotis grisescens</i>	E	LE
Red-cockaded Woodpecker			Gray Myotis		
<i>Podilymbus podiceps</i>	E		<i>Myotis leibii</i>	E	
Pied-billed Grebe			Eastern Small-footed Myotis		
<i>Pooecetes gramineus</i>	E		<i>Myotis sodalis</i>	E	LE
Vesper Sparrow			Indiana Myotis		
<i>Rallus elegans</i>	E		<i>Nycticeius humeralis</i>	T	
King Rail			Evening Bat		
<i>Riparia riparia</i>	S		<i>Peromyscus gossypinus</i>	T	
Bank Swallow			Cotton Mouse		
<i>Sterna antillarum athalassos</i>	E	LE	<i>Sorex cinereus</i>	S	
Interior Least Tern			Masked Shrew		
<i>Thryomanes bewickii</i>	S		<i>Sorex dispar blitchi</i>	E	
Bewick's Wren			Long-tailed Shrew		
<i>Tyto alba</i>	S		<i>Spilogale putorius</i>	S	
Barn Owl			Eastern Spotted Skunk		
<i>Vermivora chrysoptera</i>	T		<i>Ursus americanus</i>	S	
Golden-winged Warbler			Black Bear		
<i>Vireo bellii</i>	S				
Bell's Vireo					
<i>Wilsonia canadensis</i>	S				
Canada Warbler					

**Key to Status Categories**

(KSNPC) Kentucky State Nature Preserves Commission

- E: Endangered. A taxon in danger of extirpation and/or extinction throughout all or a significant part of its range in Kentucky.
- T: Threatened. A taxon likely to become endangered within the foreseeable future throughout all or a significant part of its range in Kentucky.
- S: Special Concern. A taxon that should be monitored because (a) it exists in a limited geographic area, (b) it may become threatened or endangered due to modification or destruction of habitat, (c) certain characteristics or requirements make it especially vulnerable to specific pressures, (d) experienced researchers have identified other factors that may jeopardize it, or (e) it is thought to be rare or declining but insufficient information exists for assignment to the threatened or endangered status categories.
- H: Historic. A taxon documented from Kentucky but not observed reliably since 1975.

Endangered, Threatened, Special Concern, and Historic Plants and Animals of Kentucky (July, 1997)

---

(US) Endangered Species Act of 1973

For status category definitions see:

United States Fish and Wildlife Service. 1992. Endangered Species Act of 1973 as amended through the 100th Congress. United States Government Printing Office, Washington, District of Columbia;

United States Fish and Wildlife Service. 1993. Endangered and threatened wildlife and plants; review of plant taxa for listing as endangered or threatened species. Federal Register 58:51144-51190; and

United States Fish and Wildlife Service. 1996. Endangered and threatened wildlife and plants; review of plant and animal taxa that are candidates for listing as endangered or threatened species. Federal Register 61:7596-7613.

US statuses were taken from:

United States Fish and Wildlife Service. 1996. Endangered and threatened wildlife and plants. United States Government Printing Office, Washington, District of Columbia;

United States Fish and Wildlife Service. 1996. Endangered and threatened wildlife and plants; review of plant and animal taxa that are candidates for listing as endangered or threatened species. Federal Register 61:7596-7613; and

United States Fish and Wildlife Service. 1997. Endangered and threatened wildlife and plants; determination of endangered status for the Cumberland elktoe, Oyster mussel, Cumberlandian combshell, Purple bean, and Rough rabbitsfoot. Federal Register 62:1647-1658.

LE: Listed Endangered

LT: Listed Threatened

PT: Proposed Threatened

C: Candidate

Kentucky State Nature Preserves Commission  
801 Schenkel Lane  
Frankfort, KY 40601-1403  
(502) 573-2886 phone  
(502) 573-2355 fax



# Plants and Animals Presumed Extinct or Extirpated from Kentucky

Kentucky State Nature Preserves Commission  
July, 1997

US STATUS	US STATUS
<b>PLANTS</b>	
<i>Caltha palustris</i> var. <i>palustris</i> Marsh Marigold	
<i>Orbexilum stipulatum</i> Stipuled Scurf-pea	3A
<i>Physostegia intermedia</i> Slender Dragon-head	
<i>Polytaenia nutallii</i> Prairie Parsley	
<b>ANIMALS</b>	
Unionids (Mussels)	
<i>Dromus dromas</i> Dromedary pearlymussel	LE
<i>Epioblasma arcaeformis</i> Sugarspoon	3A
<i>Epioblasma biemarginata</i> Angled riffleshell	3A
<i>Epioblasma flexuosa</i> Leafshell	3A
<i>Epioblasma florentina florentina</i> Yellow blossom	LE
<i>Epioblasma florentina walkeri</i> Tan riffleshell	LE
<i>Epioblasma haysiana</i> Acornshell	3A
<i>Epioblasma lewisii</i> Forkshell	3A
<i>Epioblasma obliquata perobliqua</i> White catspaw	LE
<i>Epioblasma personata</i> Round combshell	3A
<i>Epioblasma propinqua</i> Tennessee riffleshell	3A
<i>Epioblasma sampsonii</i> Wabash riffleshell	
<i>Epioblasma stewartsoni</i> Cumberland leafshell	3A
<i>Epioblasma torulosa torulosa</i> Tuberclined blossom	LE
<i>Hemistena lata</i> Cracking pearlymussel	LE
<i>Leptodea leptodon</i> Scaleshell	
<i>Plethobasus cicatricosus</i> White wartyback	LE
<i>Quadrula fragosa</i> Winged mapleleaf	
<i>Quadrula tuberosa</i> Rough rockshell	
Insects	
<i>Pentagenia robusta</i> Robust pentagenian burrowing mayfly	3A
Fishes	
<i>Ammocrypta vivax</i> Scaly sand darter	
<i>Crystallaria asprella</i> Crystal darter	
<i>Erimystax x-punctatus</i> Gravel chub	
<i>Etheostoma microperca</i> Least darter	
<i>Hemitremia flammea</i> Flame chub	
<i>Moxostoma lacerum</i> Harelip sucker	
<i>Moxostoma valenciennesi</i> Greater redhorse	
<i>Percina burtoni</i> Blotchside logperch	
Reptiles	
<i>Masticophis flagellum flagellum</i> Eastern Coachwhip	
Birds (* extirpated as nesting species)	
<i>Anhinga anhinga</i> Anhinga	
<i>Campephilus principalis</i> Ivory-billed Woodpecker	LE

Plants and Animals Presumed Extinct or Extirpated from Kentucky (July, 1997)

US STATUS	US STATUS
<i>Chlidonias niger</i> *	Mammals
Black Tern	
<i>Conuropsis carolinensis</i>	<i>Bos bison</i>
Carolina Parakeet	American Bison
<i>Ectopistes migratorius</i>	<i>Canis lupus</i>
Passenger Pigeon	Gray Wolf
<i>Elanoides forficatus forficatus</i>	<i>Canis rufus</i>
Swallow-tailed Kite	Red Wolf
<i>Falco peregrinus</i> *	<i>Cervus elaphus</i>
Peregrine Falcon	Elk
<i>Tympanuchus cupido</i>	<i>Felis concolor cougar</i>
Greater Prairie-chicken	Eastern Cougar
<i>Vermivora bachmanii</i>	
Bachman's Warbler	

Key to Status Categories

(US) Endangered Species Act of 1973

For status category definitions see:

United States Fish and Wildlife Service. 1992. Endangered Species Act of 1973 as amended through the 100th Congress. United States Government Printing Office, Washington, District of Columbia; and  
 United States Fish and Wildlife Service. 1993. Plant taxa for listing as endangered or threatened species; notice of review. Federal Register 58:51144-51190.

US statuses were taken from:

United States Fish and Wildlife Service. 1989. Endangered and threatened wildlife and plants; animal notice of review. Federal Register 54:554-579;  
 United States Fish and Wildlife Service. 1993. Endangered and threatened wildlife and plants; review of plant taxa for listing as endangered or threatened species. Federal Register 58:51144-51190; and  
 United States Fish and Wildlife Service. 1996. Endangered and threatened wildlife and plants. United States Government Printing Office, Washington, District of Columbia.

LE: Listed Endangered

3A: Considered extinct

Kentucky State Nature Preserves Commission  
 801 Schenkel Lane  
 Frankfort, KY 40601-1403  
 (502) 573-2886 phone  
 (502) 573-2355 fax

# Monitored Natural Communities of Kentucky

Kentucky State Nature Preserves Commission  
March, 1998

The Kentucky State Nature Preserves Commission monitors exemplary examples of the following natural communities. Exemplary natural communities are relatively undisturbed or have recovered sufficiently from previous disturbances and have the flora and fauna that represents, to the best of our knowledge, the natural communities that existed in Kentucky at the time of European colonization.

## LACUSTRINE COMMUNITY

Floodplain lake

## PALUSTRINE COMMUNITIES

Riparian forest

Alluvial forest

Floodplain ridge/terrace forest

Bottomland hardwood forest

Wet prairie

Bottomland marsh

Sinkhole/depression marsh

Sinkhole/depression pond

Floodplain slough

Coastal plain slough

Acid seep

Calcareous seep

Cretaceous hills forested acid seep

Appalachian open acid seep

Depression swamp

Cypress/tupelo swamp

Shrub swamp

Bottomland hardwood swamp

## RIVERINE COMMUNITIES

Sand bar

Mud flat

Typic gravel/cobble bar

Cumberland plateau gravel/cobble bar

## TERRESTRIAL COMMUNITIES

Deep soil mesophytic forest

Acidic mesophytic forest

Calcareous mesophytic forest

Acidic sub-xeric forest

Calcareous sub-xeric forest

Xeric acidic forest

Xeric calcareous forest

Xerohydric flatwoods

Appalachian mesophytic forest

Appalachian sub-xeric forest

Cumberland highlands forest

Coastal plain mesophytic cane forest

Bluegrass mesophytic cane forest

Appalachian pine-oak forest

Redcedar-oak forest

Hemlock-mixed forest

Virginia pine forest

Siltstone/shale glade

Limestone slope glade

Limestone flat rock glade

Dolomite glade

Cumberland plateau sandstone glade

Shawnee hills sandstone glade

Sandstone prairie

Limestone prairie

Tallgrass prairie

Sandstone barrens

Shale barrens

Limestone barrens

Bluegrass savanna-woodland

Pine savanna-woodland



Standard Occurrence Report  
Monitored Elements  
Reported From the Heath, Ky. and Joppa, Ill.-Ky. Quadrangles

ECOCODE	SNAME	SCOMNAME	BRANK	LASTOBS	COUNTY	7.5 MINUTE QUADRANGLE	LAT	LONG	EPA WATERBODY	DIRECTIONS	HABITAT
***Vascular Plants											
POFAB0GHH41913(KY)	BAPTISIA BRACTEATA	CREAM WILD	G4G S3 S	Y 1997-05-11	S C	McCracken	HEATH, KY.	37063N	884816W	BAYOU CREEK BASIN	WEST KY WMA, RD AROUND NUCLEAR PLANT (DYKE RD).
VAR LEUCOPHAEA	INDIGO	PLANT	5T4T 5	1993-07	S C	McCracken	HEATH, KY.	370543N	884947W	BAYOU CREEK BASIN	WEST KENTUCKY WILDLIFE MANAGEMENT AREA, BETWEEN SPRING BAYOU (BAYOU CREEK) AND ACID RD, CA 1.5 AIR MILES NNE OF SPRING BAYOU CHURCH.
POFAB18L08205(KY)	SILPHIUM LACINIATUM	COMPASS	G5T7 S2 T	Y 1993-07	S A	McCracken	HEATH, KY.	370601N	884949W	BAYOU CREEK BASIN	WEST KENTUCKY WILDLIFE MANAGEMENT AREA, ALONG BOTH SIDES OF UNNAMED GRAVEL RD, CA 0.1 AIR MILES OF SOUTH ACID RD (MARGNUM 23), (MARGNUM 32, 370610N, 884935W), (MARGNUM 40, 370553N, 884949W), (MARGNUM 41, 370548N, 884952W), (MARGNUM 42, 370546N, 884945W), (MARGNUM 43, 370544N, 884952W), (MARGNUM 44, 370541N, 884957W).
VAR ROBINSONII	SILPHIUM LACINIATUM	COMPASS	G5T7 S2 T	Y 1993-07	S A	McCracken	HEATH, KY.	370601N	884949W	BAYOU CREEK BASIN	WEST KENTUCKY WILDLIFE MANAGEMENT AREA, ALONG BOTH SIDES OF UNNAMED GRAVEL RD, CA 0.1 AIR MILES OF SOUTH ACID RD (MARGNUM 23), (MARGNUM 32, 370610N, 884935W), (MARGNUM 40, 370553N, 884949W), (MARGNUM 41, 370548N, 884952W), (MARGNUM 42, 370546N, 884945W), (MARGNUM 43, 370544N, 884952W), (MARGNUM 44, 370541N, 884957W).
POFAB18L082016(KY)	SILPHIUM LACINIATUM	COMPASS	G5T7 S2 T	Y 1993-07	S A	McCracken	HEATH, KY.	370601N	884949W	BAYOU CREEK BASIN	WEST KENTUCKY WILDLIFE MANAGEMENT AREA, ALONG BOTH SIDES OF UNNAMED GRAVEL RD, CA 0.1 AIR MILES OF SOUTH ACID RD (MARGNUM 23), (MARGNUM 32, 370610N, 884935W), (MARGNUM 40, 370553N, 884949W), (MARGNUM 41, 370548N, 884952W), (MARGNUM 42, 370546N, 884945W), (MARGNUM 43, 370544N, 884952W), (MARGNUM 44, 370541N, 884957W).
VAR ROBINSONII	PLANT										

THESE DATA ARE VALID ONLY ON THE DATE ON WHICH THE REPORT WAS GENERATED  
THESE DATA MAY BE USED ONLY FOR THE PROJECT NAMED ABOVE

Provided to James L. Einode, Ph.D.  
Department of Energy

Standard Occurrence Report

Monitored Elements

Reported From the Heath, Ky. and Joppa, Ill.-Ky. Quadrangles

EOCODE	NAME	SCINNAME	COMPASS	LASTOBS	COUNTY	7.5 MINUTE QUADRANGLE	LAT	LONG	EPA WATERBODY	DIRECTIONS	HABITAT
PIDASBL0020191KY	SILPHIUM LACINIATUM	PLANT	G517 S2 T Y 1993-07 S B	McCracken	HEATH, KY.	370503N 884859W	BAYOU CREEK BASIN	WEST KENTUCKY WILDLIFE MANAGEMENT AREA, N OF KY 725 BETWEEN KY 726 AND KY 1154 (MARGNUM 34, 370505N, 884838W), (MARGNUM 35, 370513N, 884835W), (MARGNUM 36, 370521N, 884806W), (MARGNUM 37, 370515N, 884808W), (MARGNUM 38, 370517N, 884816W); JCT OF MAGRUDER RD AND ILL GULF CENTRAL RR TRACKS (MARGNUM 22); S SIDE OF KY 725, CA 0.3 RD N E OF KY 1154 (MARGNUM 39, 370513N, 884819W).		PRRIES INCL. REMNANTS OF THIS FLORA ON ROADSIDES AND FIELDS.	
AFCG00703000227KY	ICTIOBUS NIGER	BLACK BUFFALO	G5 S2 S Y 1997-03 S D	McCracken	JOPPA, ILL-KY.	370736N 884928W	BAYOU CREEK BASIN	BIG BAYOU CREEK (CA. 0.4 STREAM KM S OF WEST BOONE RD CROSSING).	RESERVOIRS AND MEDIUM TO LARGE RIVERS WITH MODERATE TO LOW GRADIENT AND SOMETIMES SWIFT CURRENT (BECKER 1983, PFLEIGER 1975, SMITH 1979, TRAUTMAN 1981, AND BURR AND WARREN 1986).		
AFCDB112010321KY	LEPOMIS MINIATUS	REDSPOTTED SUNFISH	G5 S2 T Y 1997-03 S D	McCracken	HEATH, KY.	370650N 884710W	BAYOU CREEK BASIN	LITTLE BAYOU CREEK AT KY 358 (SITE 12). OCCURS IN WELL-VEGETATED SWAMPS, SLOUGHS, BOTTOMLAND LAKES, AND LOW GRADIENT STREAMS (BURR AND MAYDEN 1979, PFLEIGER 1975, SMITH 1979, BURR AND WARREN 1986, ETNIER AND STARNES 1993).			
AFCDB101040141KY	RANA AREOLATA	NORTHERN CRAWFISH FROG	G414 S3 S Y 1991-03-18 S C	McCracken	JOPPA, ILL-KY.	370750N 884917W	BAYOU CREEK BASIN	WEST KENTUCKY WILDLIFE MANAGEMENT AREA, CA 0.6 RD MI SW OF JCT KY 995 AND KY 358, CA 0.15 AIR MI W OF KY 995, CA 0.5 RD MI GRASSLANDS AND MEADOWS, SW OF AREA OFFICE (LOGGE).			
**Fishes											
**Amphibians											
THESE DATA ARE VALID ONLY ON THE DATE ON WHICH THE REPORT WAS GENERATED THESE DATA MAY BE USED ONLY FOR THE PROJECT NAMED ABOVE											

Standard Occurrence Report  
Monitored Elements  
Reported From the Heath, Ky. and Joppa, Ill.-Ky. Quadrangles

ECODE	SNAME	SCNAME	SPRTRANK	SPRTRANK	LASTBRS	REC	COUNTY	7.5 MINUTE QUADRANGLE	LAT	LONG	EPA WATER BODY	DIRECTIONS	HABITAT	
AAABH01014008KY	RANA AREOLATA	NORTHERN CRAWFISH FROG	G414 S3 S	Y	1991-03-20	S	C	McCracken	HEATH, KY.	370530N	885002W	BAYOU CREEK BASIN	CIRCA 0.4 AIR MI NW OF SPRING BAYOU CHURCH ON KY 725 (MARGINUM 11). CA 0.7 RD MI W OF SPRING BAYOU CHURCH ON KY 725 ON N SIDE OF RD (MARGINUM 12, 370524N, 885030W).	BREEDS IN PONDS IN FARMLAND AND EDGE. REMAINS UNDERGROUND THROUGHOUT MOST OF THE YEAR, USING CRAYFISH BURROWS IN MOIST GRASSLANDS AND MEADOWS.
AAABH01014009KY	RANA AREOLATA	CIRCULOSA	G414 S3 S	Y	1991-03-18	S	C	McCracken	HEATH, KY.	370648N	884944W	BAYOU CREEK BASIN	WEST KENTUCKY WILDLIFE MANAGEMENT AREA, N SIDE WATER WORKS RD JUST W OF FILTRATION PLANT.	BREEDS IN PONDS IN FARMLAND AND EDGE. REMAINS UNDERGROUND THROUGHOUT MOST OF THE YEAR, USING CRAYFISH BURROWS IN MOIST GRASSLANDS AND MEADOWS.
AAABH01014010KY	RANA AREOLATA	CIRCULOSA	G414 S3 S	Y	1991-03-20	S	C	McCracken	HEATH, KY.	370710N	884728W	BAYOU CREEK BASIN	WEST KENTUCKY WILDLIFE MANAGEMENT AREA, CA 0.3 RD MI NW JCT KY 358 AND OGDEN LANDING RD (MARGINUM 14). WEST KY WMA, CA 1.3 RD MI W JCT KY 986 AND KY 358 ON N SIDE KY 358 (MARGINUM 15, 370723N, 884738W). WEST KY WMA, 1.5 RD MI W OF JCT KY 986 AND KY 358. 0.15 AIR MI S OF KY 358 (MARGINUM 16, 370718N, 884755W). WEST KY WMA, CA 1.7 RD MI W OF JCT KY 358 AND KY 986. CA 0.10 AIR MI S OF KY 358 (MARGINUM 17, 370725N, 884805W).	BREEDS IN PONDS IN FARMLAND AND EDGE. REMAINS UNDERGROUND THROUGHOUT MOST OF THE YEAR, USING CRAYFISH BURROWS IN MOIST GRASSLANDS AND MEADOWS.
AAABH01014015KY	RANA AREOLATA	CIRCULOSA	G414 S3 S	Y	1998-02-27	S	C	McCracken	JOPPA, ILL-KY.	370757N	884845W	BAYOU CREEK BASIN	WEST KENTUCKY WILDLIFE MANAGEMENT AREA, CA 0.1 RD MI NW OF JCT KY 358 AND KY 985. DOWN THE YEAR, USING CRAYFISH BURROWS IN MOIST ROAD JUST SE OF LODGE (MARGINUM 36), AND CA 0.15 RD MI NW OF JCT KY 358 AND KY 985, DOWN RD JUST SE OF LODGE (MARGINUM 39).	BREEDS IN PONDS IN FARMLAND AND EDGE. REMAINS UNDERGROUND THROUGHOUT MOST OF THE YEAR, USING CRAYFISH BURROWS IN MOIST GRASSLANDS AND MEADOWS.

THESE DATA ARE VALID ONLY ON THE DATE ON WHICH THE REPORT WAS GENERATED  
THESE DATA MAY BE USED ONLY FOR THE PROJECT NAMED ABOVE

Standard Occurrence Report  
Monitored Elements  
Reported From the Heath, Ky. and Joppa, Ill.-Ky. Quadrangles

ECODE	SNAME	SCOMNAME	SRANK	SPROT	SESEA	DET	LASTOBS	DATE	COUNTY	7.5 MINUTE QUADRANGLE	LAT	LONG	EPA WATERBODY	DIRECTIONS	HABITAT	
ASPBW01100229KY	VIREO BELLII	BELT'S VIREO	G5	SSS	S	Y	1994-05-05	S	C	McCracken	JOPPA, ILL-KY.	31073SN	884905W	BAYOU CREEK BASIN	WEST KENTUCKY WMA, W SIDE OF MAIN GRAVEL RD, CA 1.0 MI S OF ENTRANCE ON KY 358. WOODLAND, BOTTOMLANDS, WOODLAND EDGE, SCATTERED COVER AND HEDGEROWS IN CULTIVATED AREAS, OPEN WOODLAND, BRUSH IN WINT.	DENSE BRUSH, MESQUITE, STREAMSIDE THICKETS, AND SCRUB OAK, IN ARID REGIONS BUT OFTEN NEAR WATER (BS3COM01NA). MOIST WOODLAND, BOTTOMLANDS, WOODLAND EDGE, SCATTERED COVER AND HEDGEROWS IN CULTIVATED AREAS, OPEN WOODLAND, BRUSH IN WINT.

12 Records Processed.



Education, Arts and Humanities Cabinet

**KENTUCKY HERITAGE COUNCIL**

The State Historic Preservation Office

Paul E. Patton  
Governor  
Roy Peterson  
Cabinet Secretary

David L. Morgan  
Executive Director  
and SHPO

April 6, 1999

Mr. Ray T. Moore  
DOE ORO Cultural Resources  
Management Coordinator  
Department of Energy  
Oak Ridge Operations Office  
P.O. Box 2001  
Oak Ridge, Tennessee 37831

Re: Proposed Receipt and Storage of Uranium Materials from the  
Fernald Environmental Project  
Paducah Gaseous Diffusion Plant, McCracken County, Kentucky

Dear Mr. Moore:

Thank you for your letter concerning the above referenced project. Our review of this project indicates that it will have no effect on any property listed in or eligible for listing in the National Register of Historic Places. Therefore, I have no objections.

If you have any questions concerning this project please feel free to contact David Pollack of my staff at 502-564-7005.

Sincerely,

David L. Morgan, Director  
Kentucky Heritage Council and  
State Historic Preservation Officer

300 Washington Street  
Frankfort, Kentucky 40601  
An equal opportunity employer M/F/D



Telephone (502) 564-7005  
FAX (502) 564-5820

Printed on recycled paper

Ohio Historic Preservation Office

567 East Hudson Street  
Columbus, Ohio 43211-1030  
614/ 297-2470 Fax: 614/ 297-2496

Visit us at [www.ohiohistory.org/resource/hislpres/](http://www.ohiohistory.org/resource/hislpres/)



April 5, 1999

Ray T. Moore  
DOE ORO Cultural Resources  
Department of Energy, Oak Ridge  
P.O. Box 2001  
Oak Ridge, TN 37831

Re: Storage of Uranium Materials from Fernald  
Portsmouth Gaseous Diffusion Plant, Pike County, Ohio

Dear Mr. Moore,

This is in response to correspondence from your office dated March 9, 1999 (received March 10) regarding the above referenced project. The comments of the Ohio Historic Preservation Office (OHPO) are submitted in accordance with provisions of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 [36 CFR 800]).

Portsmouth Gaseous Diffusion Plant is being considered as one alternative to receive and store uranium materials from Fernald. The materials would be stored within existing facilities or within one or two specially constructed structures. It is our understanding that the use of existing structures will not require alterations or modifications of qualities or characteristics that give significance to this facility. The proposed new structures, if needed, are of small scale relative to other structures within the facility and would be located in an area where there has been previous construction. Based on the information presented in your correspondence, we concur with your assessment that the proposed project will have no effect on any property that is eligible for inclusion or included in the National Register of Historic Places. The finding of no effect ends the requirement for consultation with this office for this project. If changes in the scope of work could result in changes or modifications that would have an effect, even if the effect is not considered to be adverse, then further coordination with this office is recommended.

Any questions concerning this matter should be addressed to David Snyder at (614) 297-2470, between the hours of 8 am. to 5 pm. Thank you for your cooperation.

Sincerely,

A handwritten signature in cursive ink that reads "David Snyder".

David Snyder, Archaeology Reviews Manager  
Resource Protection and Review

DMS/ds

cc: DeWintus Perkins, U.S. Department of Energy, Portsmouth Site Office, P.O. Box 700, Piketon, OH 45661-0700

## **APPENDIX A**

### **DOE-FEMP NEPA COVERAGE FOR DISPOSITION OF NUCLEAR MATERIAL INVENTORY**



## APPENDIX A. DOE-FEMP NEPA COVERAGE FOR DISPOSITION OF NUCLEAR MATERIAL INVENTORY

This appendix is provided to demonstrate that the analysis for packaging and transportation of FEMP uranium materials was included in previous NEPA and other environmental evaluations.

The Department of Energy - Fernald Environmental Management Project (DOE-FEMP) has addressed compliance with the National Environmental Policy Act for disposition of nuclear material from the Fernald Site to off-site locations pursuant to DOE's NEPA Implementing Regulations at 10 CFR 1021. The disposition of nuclear material inventories from the Fernald Site was initiated as part of Removal Actions #12, Safe Shutdown of the former production facilities at the FEMP. DOE determined that the implementation of the Safe Shutdown Removal Action (including material disposition) was excluded from requiring a detailed NEPA evaluation (e.g., an Environmental Assessment).<sup>1</sup>

In 1994, DOE-FEMP developed an integrated Proposed Plan-Environmental Assessment (PP-EA) that identified the dismantling and decontamination of all structures contained within Operable Unit (OU) 3 as an appropriate Interim Remedial Action at the FEMP. The PP-EA followed the process required by 10 CFR 1021 for preparation of Environmental Assessments, including public involvement. The PP-EA identified a number of removal actions that required completion as part of the remediation of Operable Unit 3. One of the removal actions was the Safe Shutdown which included the disposition of nuclear materials from the FEMP to off-site receptors. The public was provided an opportunity to comment on the PP/EA during the public review period held in 1994. An Interim Record of Decision<sup>2</sup> was approved in July of 1994 for implementation of the Interim Remedial Action after completion of the public involvement process.

In 1996, DOE-FEMP developed an Integrated Remedial Investigation/Feasibility Study which evaluated the appropriate final remedial action for Operable Unit 3. Pursuant to DOE's revised policy statement on NEPA issued in June, 1994, NEPA values were incorporated into the Integrated RI/FS and the public involvement process pursuant to CERCLA was followed. The integrated RI/FS did not reconsider decisions made in previous documents (e.g., OU 3 IROD), but it once again identified the Removal Actions (including Safe Shutdown) that required completion as part of the remediation of OU 3. The final ROD<sup>3</sup> for OU 3 was approved in September of 1996 after completion of the public involvement process.

The disposition of nuclear materials is a fundamental component of the CERCLA actions being conducted at the FEMP. The DOE's NEPA Implementing Regulations consider transportation as an activity that is necessary and included within the scope of CERCLA Removal Actions. All material shipped from the FEMP will be packaged in accordance with Title 49 Code of Federal Regulations. Although DOE excludes CERCLA Removal Actions from requiring detailed NEPA documentation, two separate integrated CERCLA/NEPA processes (with full public involvement) were carried out at the FEMP which identified the disposition of nuclear material as a fundamental component of the remediation of OU 3. The documents referenced above are available in the Fernald Public Environmental Information Center at (513) 648-7480.

The outbound shipments from ORO will move in DOE approved packaging, subject to DOE radiation, contamination or fissile controls and other DOE Federal or State requirements.

1. Letter; Kim Hayes to Thomas Rowland, April 12, 1993; subject: Safe Shutdown Environmental Assessment.
2. June 1994; Operable Unit 3 Record of Decision for Interim Remedial Action. Fernald Environmental Management Project, Fernald Ohio.
3. August 1996; Operable Unit 3 Record of Decision for Final Remedial Action. Fernald Environmental Management Project, Fernald Ohio.

## **APPENDIX B**

### **FEMP URANIUM INVENTORY PROPOSED TO BE MOVED TO OTHER DOE SITE(S)**



# Potential Movement of FEMP Uranium to Other DOE Site(s)

Normal Uranium	Pounds (millions)	MTU* for Movement	Justification for Movement
Metal:			
Fuel Elements	0.030	14	Blend Stock
Ingots	0.041	19	Blend Stock
Recycle Pieces	0.353	156	Blend Stock
Total Metal	0.424	189	
UF <sub>4</sub>	0.010	4	Blend Stock
<b>Total All Normal</b>	<b>0.434</b>	<b>193</b>	

\*Metric Tons Uranium

**WAREHOUSE SPACE REQUIREMENTS FOR NORMAL URANIUM**

DESCRIPTION/ TOTAL NET LBS.	CONTAINER COUNT (AS STORED)	ASSUMED PACKAGING	REQUIRED NO. OF PKGS. (AS SHPD)	COMMENT	NO. OF FINISHED UNITS ON FLOOR			TOTAL SQ.FT. EACH
					NO. OF SKIDS	PACK 2/BOX STACKED 5 HIGH	17	
PRIMARY INGOTS 112,956	16 SKIDS	STRONG/TIGHT G4273-5 OR 6 WOODEN BOX	83					
PRODUCT INGOTS 40,979	7 SKIDS	STRONG/TIGHT G4273-5 OR 6 WOODEN BOX		PACK IN BOXES STACKED 5 HIGH				
DERBIES 8,384	3 SKIDS	STRONG/TIGHT G4214 WOODEN BOX	12	PACK IN BOXES STACKED 5 HIGH		3	4	12
CORES 30,633	51 DRUMS	STRONG/TIGHT DRUMS		SHIP AS IS IN DRUMS PALLETIZED 4/PALLET STACKED 3 HIGH				
CLAD METAL 60,239	77 DRUMS	STRONG/TIGHT DRUMS	360	PALLETIZE 4/PALLET, STACKED 3 HIGH		30	16	480
RECYCLE METAL 169,239	222 VARIOUS	STRONG/TIGHT DRUMS		1000 LBS./BOX STACKED 3 HIGH				

TOTAL NET LBS.: 422,410      TOTAL PACKAGES AS SHIPPED 445      TOTAL UNITS ON FLOOR 50      628

\* For the wooden boxes, the assumptions are within the guidelines of the Safety Analysis Report NLCO-1107, Rev. 1., which allows stacking the boxes five (5) high.

# Potential Movement of FEMP Uranium to Other DOE Site(s)

<u>Depleted Uranium</u>	<u>Pounds (millions)</u>	<u>MTU* for Movement</u>	<u>Justification for Movement</u>
<b>Metal:</b>			
Fuel Elements	1.331	604	Shielding
Ingots	1.505	683	Shielding
Recycle Pieces	0.108	50	Shielding
Total Metal	2.944	1,337	
 <b>UF<sub>4</sub></b>			
<b>Total All Depleted</b>	<b>4.141</b>	<b>1,424</b>	Army Use
<b>*Metric Tons Uranium</b>	<b>7.085</b>	<b>2,761</b>	

ESTIMATED WAREHOUSE SPACE REQUIREMENTS FOR DEPLETED URANIUM - MAY VARY DEPENDING UPON FINAL PACKAGING DECISIONS

DESCRIPTION/ TOTAL NET LBS.	PIECE/CONT. COUNT (AS STORED)	ASSUMED PACKAGING	NO. OF PKGS. (AS SHPD)	COMMENT	AISLE SPACING 3' ON ALL SIDES	FINISHED UNITS ON FLOOR	SQ.FT. EACH	TOTAL SQ.FT. 2157
UF4 4,141,234	14490 10-G	TOC METAL BOX (~9000 LBS/BOX)	483	TOC BOXES STACKED 3' HIGH = 170 STACKS/4 ROWS	(ASSUMES BACK- TO-BACK PKGS, AISLES EVERY 2 ROWS)	161	33	5313
64 T-H "AS IS" (~14000 LBS/EA)	64	64 "AS IS" (~14000 LBS/EA)	547	DOUBLE-STACKED		32	16	512 7982
PRIMARY INGOTS 735,531	138 WMB	STRONG/TIGHT METAL BOX (~9000 LBS/EA)	138	HALF-HIGH METAL STACKED 3 HIGH 46 STACKS/2 ROWS	3' ON ALL SIDES (ASSUMES BACK- TO-BACK PKGS)	46	33	810 1518 2328
PRODUCT INGOTS 769,820	107 WMB	STRONG/TIGHT METAL BOX (~9000 LBS/EA)	107	HALF-HIGH METAL STACKED 3 HIGH 36 STACKS/2 ROWS	3' ON ALL SIDES (ASSUMES BACK- TO-BACK PKGS)	36	33	660 1188 1848
CORES 1,329,318	1512 WOODEN BOXES	STRONG/TIGHT METAL BOX (~9000 LBS/EA)	222	ASSUMED 6000 LBS./BOX STACKED 3 HIGH 74 STACKS/2 ROWS	3' ON ALL SIDES (ASSUMES BACK- TO-BACK PKGS)	74	33	2230 2442 4672
RECYCLE METAL 109,410	122 VARIOUS	TOC METAL BOX (~9000 LBS/EA)	18	ASSUMED 6000 LBS./BOX STACKED 3 HIGH 6 STACKS/1 ROW	3' ON ALL SIDES (ASSUMES BACK- TO-BACK PKGS)	6	33	141 198 339
TOTAL NET LBS.: 7,085,313	TOTAL PACKAGES AS SHIPPED	1032						17169

MTC - Material Description Code  
G - Gallon  
LSA - Low Specific Activity (Shipping designation)  
T-H - T-hopper  
TOC - Thorium Overpack Container  
WMB - white metal box

# Potential Movement of FEMP Uranium to Other DOE Site(s)

Low Enriched Uranium	Pounds (millions)	MTU* for Movement	Justification for Movement
Miscellaneous UO <sub>2</sub>	0.006	2.5	Recovery
Miscellaneous Metals, Oxides, Compounds (commercial sale)	1.555	540.0	Interim Storage
UO <sub>3</sub> and Derbies (Programmatic Use)	0.644 2.205	256.0 798.5	Interim Storage
*Metric Tons Uranium			

ESTIMATED PACKAGINGS AND SPACE REQUIREMENTS  
(ENRICHED URANIUM PRODUCT)

5) TE	DESCRIPTION	QUANTITY (NET LBS.)	QUANTITY (MTU)	PLANNED PACKAGING	REQUIRED NO. EST. OF PACKAGES TRUCKS/ (AS SHIPPED) PKGS/TRK	SQ.FT. PER PACKAGE	ESTIMATED TOTAL SQ.FT.
1	>1% U235 UO3 OXIDE	432,887	182	BU-J 198 lbs/net 450 lbs./gross	2208 31 TRKS 72 PKGS	16 AISLE SPACING (4 DRUMS/PALLET) STACKED 4 HIGH	2208 1404
2	0.72 - 1.0% U235 U300 OXIDE	709,433	222	55-GALLON DRUM 880 lbs. net ea. -930 lbs./gross	808 25 TRKS 32 PKGS#	16 AISLE SPACING (INCL WITH ITEM 3) (4 DRUMS/PALLET) STACKED 4 HIGH	808
3	>1% U235 U308	240,021	73	BU-J 198 lbs/net 450 lbs./gross	1224 17 TRKS 72 PKGS	16 AISLE SPACING (4 DRUMS/PALLET) STACKED 4 HIGH	1224 1380
4	0.72 - 1.00% U235 UF4	18,344	6	55-GALLON DRUM 880 lbs. net ea. -930 lbs./gross	19 6.5 TRKS	16 AISLE SPACING (4 DRUMS/PALLET) STACKED 4 HIGH	16
5	1.0 - 2.0% U235 UF4 COMPOUND	112,910	38	30-GALLON INNER 55-GALLON OUTER -76 lbs/net (350gU235) -928 lbs/gross	1,744 24 TRKS 72 PKGS**	16 AISLE SPACING (4 DRUMS/PALLET) STACKED 4 HIGH	1744 1194
6	1.25% U235 PRIMARY INGOTS METAL	42,768	20	WOODEN BOX 1 PER BOX -2000 lbs/net -2200 lbs/gross	25 3 TRKS 9 PKGS**	16 AISLE SPACING (4 DRUMS/PALLET) STACKED 5 HIGH	7.28 37 *
7	1.25% U235 PRODUCT INGOTS METAL	6,094	2	WOODEN BOX -2000 lbs/net -2200 lbs/gross	3 PARTIAL	7.28 22 STACKED 5 HIGH	7.28 22
8	<1% U235 CLAD METAL	61,724	20	WOODEN BOX -1252 lbs/net -1332 lbs/gross	49 7 TRKS 7 PKGS**	16 AISLE SPACING (4 DRUMS/PALLET) STACKED 5 HIGH	7.28 39
9	>1% U235 CLAD METAL	7,302	4	WOODEN BOX -1252 lbs/net -1332 lbs/gross	6 1 TRK	16 AISLE SPACING (4 DRUMS/PALLET) STACKED 5 HIGH	3.92 8
10	1.25% U235 DERBY METAL	206,288	94	WOODEN BOX 800 lbs/net 800 lbs/gross	355 15 TRKS 24 PKGS**	16 AISLE SPACING (4 DRUMS/PALLET) STACKED 5 HIGH	3.92 278
11	1.25% U235 RECYCLE METAL	146,682	67	WOODEN BOX -1252 lbs/net -1332 lbs/gross	119 17 TRKS 7 PKGS**	16 AISLE SPACING (4 DRUMS/PALLET) STACKED 5 HIGH	3.92 93
12	0.95% U235 RECYCLE METAL	180,883	82	WOODEN BOX -1252 lbs/net -1332 lbs/gross	144 21 TRKS 7 PKGS**	16 AISLE SPACING (4 DRUMS/PALLET) STACKED 5 HIGH	3.92 114
13	1.0 - 19.9% U235 UO2	6,413	2	WOODEN BOX -1252 lbs/net -1332 lbs/gross	176 3 TRKS 72 PKGS**	16 AISLE SPACING (4 DRUMS/PALLET) STACKED 5 HIGH ITEMS 6 - 12	176 424 1302 12469
	TOTAL	2,172,729	799		8,878 164 TRKS		8,878 164 TRKS

\* - Weight restriction

\*\* - Certificate of Compliance or Department of Transportation regulation restriction.

Note: Aisle spacing assumes a double-row, back-to-back arrangement; if that is not feasible, add 2876 sq.ft.

## ASSUMED PACKAGING FOR URANIUM STORAGE

Container Type	Outside Dimensions	Gross Weight, lb/container	Description
T-Hopper	~6 ft long x 4 ft wide	14,000	Steel, cone-bottom container with bolted openings on opposite ends, enclosed in a steel frame.
Thorium Overpack Container	83 in. long x 56.5 in. wide x 46 in. high	9,000	Steel box, certified to pass 4-ft drop test, equipped with lifting straps on lid and interior plywood inserts that allow several layers of drums or cans to be placed inside the box.
Strong, tight metal boxes	83.5 in. long x 47.5 in. wide x: • 44.5 in. high • 20.5 in. high	Depends on size	Steel boxes with wood shoring between stored items to prevent contact and shifting; steel lids secured with locks; equipped with lifting straps on lid.
Strong, tight wooden box	Variety of sizes	Variety of capacities	Wooden boxes strengthened with horizontal and vertical steel bands. There are two types: a box with a cover and a pallet with an inverted box as the cover. The steel bands are closed with notched seals. All wood boxes are mounted on two or three wooden skids to allow handling via forklifts.
Strong, tight metal drums			Steel drums with tops secured by locking rings.
• 55-gal	• 24 in. diam x 34 in. high	930	
• 30-gal inner, 55-gal outer	• 20 in. diam x 28.5 in. high	930 (350 g U-235 limit)	
Sea-land containers	Variety of sizes	Variety of capacities	Designed as an overpack container to be used for storing wooden boxes after they are received at the storage location in order to protect them from rain or water inleakage.

## **APPENDIX C**

### **RELEASE ASSUMPTIONS AND ACCIDENT MODELING RESULTS**



## APPENDIX C. RELEASE ASSUMPTIONS AND ACCIDENT MODELING RESULTS

### C.1 PUBLIC AND WORKER RISK

This section describes risks to the public, co-located worker, and facility worker due to continued storage of uranium materials at the Fernald Environmental Management Project (FEMP) site, or receipt and storage of these materials at other Oak Ridge Operations (ORO) sites described in Sect. 2. Risks are evaluated for routine operations and non-routine (accident) conditions.

#### C.1.1 Routine Operations

During storage of uranium materials at any of the proposed sites, workers could be exposed to direct radiation from surface contamination on storage containers. However, all containers will have been checked, overpacked if deemed necessary, and certified for transport before storage. Therefore, worker exposure due to routine operations associated with surveillance and maintenance of stored materials is expected to be less than detectable levels.

In addition to surface contamination, radiation dose from the stored uranium materials can be expected. Dose rates from any single stored container are no more than 3 to 4 mrem/h. The dose rate at a distance of 1 ft from a container is ~1 mrem/h, and the rate at a distance of 20 ft is <0.5 mrem/h (approximately the same as normal background radiation doses). These dose rates are not affected by stacking the containers because the containers and the materials themselves provide significant shielding. These dose rates are considered negligible to any receptor (facility worker, co-located worker, or public).

#### C.1.2 Accidents

Accidents that could occur under the proposed action(s) are analyzed in this section. Potential accidents could be initiated during facility operations or could be caused by natural phenomena (earthquake and wind). Reasonably foreseeable accidents have been screened to identify the accident with the greatest consequences to co-located workers and the public. These are the “bounding” accidents that provide an envelope for the consequences of other potential accidents with less impact.

The analysis is based on accidents that could occur during storage in the facilities described in Sect. 2 as the proposed action and alternatives. The inventories for each option are the same and are shown in Table B.1.

Each facility is assumed to consist of one or more storage areas. Fire suppression systems may be available for storage in existing buildings. On-site fire department response, however, is assumed for all options.

#### C.1.2.1 Postulated Accident Scenarios

Postulated accidents have been identified by a review of current safety documentation, such as Bases for Interim Operations for current storage locations at the FEMP site.

Table C.1. Inventory and Storage Requirements

	Inventory (lb)	MTU	Assumed Physical Form	Assumed Packaging <sup>a</sup>	Number of Packages	Average Inventory per Package
<b>Normal uranium</b>						
Primary ingots	1.13E+05	4.99E+01	Solid metal	Wooden boxes	6.10E+01	8.18E-01
Product ingots	4.10E+04	1.90E+01	Solid metal	Wooden boxes	2.20E+01	8.64E-01
Derbies	8.38E+03	3.71E+00	Solid metal	Wooden boxes	1.20E+01	3.09E-01
Cores	3.06E+04	1.40E+01	Solid metal	Drums	5.10E+01	2.75E-01
Clad metal	6.02E+04	2.66E+01	Solid metal	Drums	7.70E+01	3.46E-01
Recycle metal	1.69E+05	7.48E+01	Solid metal	Drums	2.22E+02	3.37E-01
Total normal	4.22E+05	1.88E+02			4.45E+02	
<b>Depleted uranium</b>						
Primary ingots	7.36E+05	3.34E+02	Solid metal	Metal boxes	1.38E+02	2.42E+00
Product ingots	7.70E+05	3.49E+02	Solid metal	Metal boxes	1.07E+02	3.26E+00
Cores	1.33E+06	6.04E+02	Solid metal	Metal boxes	2.22E+02	2.72E+00
Recycle metal	1.09E+05	5.00E+01	Solid metal	Metal boxes	1.80E+01	2.78E+00
UF <sub>4</sub>	4.14E+06	1.42E+03	Composite solid	Metal boxes	5.47E+02	2.60E+00
Total depleted	7.09E+06	2.76E+03			1.03E+03	
<b>Low-enriched uranium</b>						
>1% <sup>235</sup> U UO <sub>3</sub> oxide	4.33E+05	1.62E+02	Composite solid	Wooden boxes	2.21E+03	7.34E-02
0.72-1.0% U <sub>3</sub> O <sub>8</sub> oxide	7.09E+05	2.22E+02	Composite solid	Drums	8.06E+02	2.75E-01
>1% <sup>235</sup> U U <sub>3</sub> O <sub>8</sub> oxide	2.40E+05	7.30E+01	Composite solid	Wooden boxes	1.22E+03	5.96E-02
0.72-1.0% <sup>235</sup> U UF <sub>4</sub>	1.63E+04	5.00E+00	Composite solid	Drums	1.90E+01	2.63E-01
1-2% <sup>235</sup> U UF <sub>4</sub>	1.13E+05	3.80E+01	Composite solid	Drums	1.74E+03	2.18E-02
1.25% <sup>235</sup> U primary ingots	4.28E+04	2.00E+01	Solid metal	Wooden boxes	2.50E+01	8.00E-01
1.25% <sup>235</sup> U product ingots	5.09E+03	2.00E+00	Solid metal	Wooden boxes	3.00E+00	6.67E-01
<1% <sup>235</sup> U clad metal	6.17E+04	2.80E+01	Solid metal	Wooden boxes	4.90E+01	5.71E-01
>1% <sup>235</sup> U clad metal	7.30E+03	4.00E+00	Solid metal	Wooden boxes	6.00E+00	6.67E-01
1.25% <sup>235</sup> U derby metal	2.08E+05	9.40E+01	Solid metal	Wooden boxes	3.55E+02	2.65E-01
1.25% <sup>235</sup> U recycle metal	1.49E+05	6.70E+01	Solid metal	Wooden boxes	1.19E+02	5.63E-01
0.95% <sup>235</sup> U recycle metal	1.81E+05	8.20E+01	Solid metal	Wooden boxes	1.44E+02	5.69E-01
1.0-19.9% <sup>235</sup> U UO <sub>2</sub>	6.41E+03	2.00E+00	Composite solid	Wooden boxes	1.76E+02	1.14E-02
Additional aisle spacing						
Total low enriched	2.17E+06	7.99E+02			6.88E+03	
<b>Total</b>	<b>9.68E+06</b>	<b>3.75E+03</b>			<b>8.36E+03</b>	

<sup>a</sup>All wooden boxes placed in metal, sea-land container upon receipt prior to storage.

MTU = metric tons of uranium.

Types of accidents that could occur during implementation of the proposed action(s) can be grouped into two classes. As shown in Table B.2, these classes are fire and mechanical upset. External events such as natural phenomena are potential initiating mechanisms for both classes of accidents. The accidents shown in Table B.2 are determined to be "credible," a term that is used in safety analysis to mean that the accident has an annual probability of 1E-6 or greater. U.S. Department of Energy (DOE) Standard 3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports* (DOE 1994a), defines frequency classes as shown in Table B.3.

**Table C.2. Postulated Accidents Identified for Uranium Storage Facility**

Operation	Operational Events		External Events
	Fire	Container Breach	
Handling	Forklift fire affecting small number of containers	Forklift impact with storage containers  Container(s) dropped during handling	Not applicable; containers handled for short period of time
Storage (includes surveillance and maintenance)	Large fire affecting storage containers in single storage area	Forklift impact with storage containers	Release, small fires in all storage areas
	Small fire affecting limited number of storage containers	Corrosion, degradation of storage containers	

**Table C.3. Frequency Classes Considered in Accident Analysis**

Frequency Class	Frequency, events/year	Definition
Likely	>1E-2	May be expected to occur once or more during the lifetime of the facility
Unlikely	1E-4 to 1E-2	Not expected but may occur during the lifetime of the facility
Extremely unlikely	1E-6 to 1E-4	Will probably not occur during the lifetime of the facility
Not credible	<1E-6	Has extremely low probability of occurring

The accidents shown in Table B.2 were selected to represent the range of postulated accidents that could occur under the proposed action and alternatives. Accidents are shown for general handling and storage operations. Bounding accidents are discussed below.

### Fires

Fires resulting in release of uranium are postulated for both handling and storage operations. The types of fires include gasoline/diesel fuel fires caused by forklift accidents and fires involving storage containers. An unmitigated fire could spread to all storage containers in a single storage area; therefore, the entire contents of all containers in that area become the material at risk (MAR). However, this is an extremely unlikely event due to minimal ignition sources and combustible loading. Small fires, involving limited numbers of containers, are more likely but result in substantially smaller releases to the atmosphere.

## Container Breach

Container breach includes events such as releases from leaking containers (primarily due to long-term corrosion), forklift puncture during movement of other containers, and dropping containers during placement into long-term storage. The container breach would result in small releases to the atmosphere.

Single-container handling accidents are considered “bounding” because these events dominate the radiological risk to workers due to the relatively high frequency of such events and the proximity of the workers to any release. Such events include handling and movement of storage containers from the loading dock to the final storage location. These operations are prone to mechanical stresses in industrial accidents, such as drops and releases from a container or punctures by a forklift; however, airborne releases resulting from breaches in a single container are relatively insignificant compared with releases involving fires. As a result, these handling accidents usually constitute little hazard to the general public.

## Natural Phenomena

Natural phenomena events such as high wind and earthquake have the potential to cause damage to buildings and structures leading to consequences that equal or exceed the consequences of operational accidents. For natural phenomena events, evaluation criteria for design basis events are based on the Performance Category 3 natural phenomena intensities specified for each site for Hazard Category 2 nuclear facilities and are shown in Table B.4 (doe 1994b).

**Table C.4. Natural Phenomena Intensities**

Site	Event	Intensity	Frequency/year
Fernald	Earthquake	0.16 g	5E-4
	Straight wind	70 mph	2E-2
	Tornado	139 mph	1E-3
Portsmouth	Earthquake	0.19 g	5E-4
	Straight wind	70 mph	2E-2
	Tornado	110 mph	1E-3
Paducah	Earthquake	0.35 g	5E-4
	Straight wind	70 mph	2E-2
	Tornado	144 mph	1E-3
Oak Ridge	Earthquake	0.19 g	5E-4
	Straight wind	70 mph	2E-2
	Tornado	113 mph	1E-3

During the seismic event defined above, all facility structures are assumed to be destroyed, and nothing but rubble remains. All utilities are lost. All releases are at ground level. Radiological materials that can be suspended in air in respirable form and be available for transport are considered to be released from direct seismic accelerations.

Following the seismic event, a number of small fires may occur due to electrical shorts or downed power lines. Any fires would be scattered throughout the rubble and would be exposed to the outside elements since no building structure remains. The top layer of rubble would consist primarily of noncombustible materials such as reinforced concrete and structural steel from buildings, or structural supports from TSSs. The fire is assumed to be slow-burning amid the rubble and fallen/breached storage containers. All fire mitigation facilities are assumed destroyed, and all roadways are blocked by debris. Therefore, there is no fire mitigation by either the on-site fire department or other outside agencies.

Seismic events are used as the surrogate initiator for straight winds or tornadoes for the overriding reason that standard atmospheric dispersion modeling predicts greater dispersion (and hence greatly reduced airborne concentration) for high wind conditions than for the stable wind conditions assumed to be present during earthquakes. Existing analyses in DOE safety analysis reports suggest that seismic events generally bound the risks of winds or tornadoes, including the risks from wind-driven projectiles. With respect to such projectiles, unpublished preliminary analyses for waste drums stored on outdoor pads show that damage from projectiles could exceed damage caused by seismic events primarily because of the stability of the drum-stacking arrangement and the lack of protection against projectiles. The same phenomenon is assumed to apply to the containers proposed for uranium storage. To appropriately bound potential damage by projectiles to unprotected storage areas, the damage assumed for seismic events is conservatively defined to have higher damage ratios than those that might otherwise be used to bound the damage caused by high winds or wind-driven projectiles.

Although not explicitly determined, it is assumed that the uranium storage facility is a Hazard Category 2 facility based on the criteria of DOE-STD-1027-92 (DOE 1992). The frequencies shown in Table B.4 represent the frequencies of facility failure under challenge from natural phenomena.

### **C.1.2.2 Development of Source Terms for Accident Sequences**

The approach taken in this assessment is to convert MAR quantities to atmospheric source terms using conservative release factors. These source term factors, based on DOE-HDBK-3010-94 (DOE 1994c), take into account the physical mechanism through which material becomes airborne as well as the fraction of airborne materials in the respirable particle size range (<10 microns). The source term associated with each accident is the product of four factors that vary for type of material and container affected by the accident:

$$\text{Source term} = \text{MAR} \times \text{DR} \times \text{ARF} \times \text{RF}$$

where:

MAR = material at risk,  
DR = damage ratio,  
ARF = airborne release fraction,  
RF = respirable fraction.

### **C.1.2.3 Evaluation of Source Term Parameters and Frequencies**

This section discusses the development of frequency and source term data for general handling accidents and storage accidents.

#### **General Handling Accidents**

The dominant contributor to worker risk from radioactive material releases is expected to result from mechanical breaches of storage containers during handling accidents. This expectation stems from the relatively high frequency of such occurrences and the proximity of the worker to the point of release in such events. Handling accidents include container breaches caused by drops or forklifts or other vehicular impact.

Although one container would generally be breached in an accident, rupture of multiple containers could occur in instances when several containers are being handled at a time.

**Source Term Parameters.** The MAR for handling operations with stacked arrays generally varies from one to four drums, depending on the method of stacking and the arrangement of the array. The maximum MAR for a pallet of four drums containing normal uranium-clad metal is 0.35 metric tons of uranium (MTU) per drum. The maximum MAR for a single box is 2.6 MTU UF<sub>4</sub> in the form of composite or aggregate solids or 3.3 MTU product ingots (both depleted uranium). The damage ratio (DR) for the MAR depends on several factors, including physical form of the MAR and the severity of the accident stress. In general, breached containers with solid metal uranium forms (ingots, derbies, cores, recycle metals) are assumed to have DRs of no greater than 0.10 (i.e., no more than 10% of the material is directly impacted or damaged by the event). For other containers with UF<sub>4</sub> and U<sub>3</sub>O<sub>8</sub> (assumed to be in the form of a composite or aggregate solid), the single-container DR is assumed to be 0.25. The combined airborne release fraction/respirable fraction (ARF/RF) for composite solids subjected to free-fall spill and impaction stress is ~1E-5. The combined ARF/RF for metals is essentially negligible but is estimated to be 1E-6 as a conservative assumption.

**Frequency.** On the basis of numerous studies evaluated for other environmental impact statements, a probability of one handling error per 10,000 containers handled is used in this analysis. It is assumed that two severe breaches of confinement occur for each inventory of 10,000 containers handled. All containers will be moved into place within a relatively short period of time (assumed to be no more than 6 months) and will not be handled again after they are placed in storage. Based on the estimated total number of containers handled at the storage facility (see Table B.1), the frequency of handling breaches is 3.3/year (anticipated).

### **Storage Area Fires**

For the purposes of this assessment, the single largest storage area, based on estimated storage area, is assumed to bound the risk to workers and the public. This event is a fire that involves the entire inventory of depleted uranium stored primarily in metal boxes.

**Source Term Parameters.** The MAR is the entire inventory of depleted uranium (see Table B.1). The DR for materials in metal containers exposed to fires is 0.1. The ARF and RF for airborne release of particulates during complete oxidation of uranium metal mass are 1E-3 and 1.0, respectively. For composite solids, the ARF and RF are 6E-3 and 1E-2, respectively.

**Frequency.** Although fire data from DOE sites indicate that facility fires are credible, fires of this magnitude in storage facilities with low combustible loading and limited ignition sources are considered extremely unlikely.

### **Storage Area Seismic Event**

The dominant contributor to risk from uranium releases is expected to result from breaches of storage containers in an earthquake followed by a number of small fires. The event would impact all storage containers in the facility.

**Source Term Parameters.** The MAR is shown in Table B.1. DRs for stacked storage containers are estimated to be 0.075 for metal boxes and drums (all wooden boxes placed in metal sea-land containers before storage). The combined ARF/RFs for metals and composite solids are the same as those for general handling accidents. Release factors for subsequent fires are the same as those described for storage area fires; however, the MAR is 10% of the actual inventory because the fires are small, distributed throughout the storage areas, and impact only the outside layers of the rubble and fallen/breached storage containers.

**Frequency.** The annual frequencies of seismic events exceeding the design basis for Hazard Category 2 facilities were shown in Table B.4. Conditional probabilities are estimated to be 0.05 for inducing a number of unmitigated fires. The overall frequency for each site is 2.5E-5/year (unlikely).

#### C.1.2.4 Results

Radiological source terms and consequences for the bounding accident scenarios are presented in this section.

#### Source Terms for Bounding Accident Scenarios

Airborne source terms are estimated based on MARs and release parameters identified in Sect. B.1.2.3 and are expressed in units of grams. The activity (Ci/g) for each type of material released is based on enrichment estimates shown in Table B.1. Normal and depleted uranium is considered to be no more than 0.71%  $^{235}\text{U}$  with specific activity of 3.5E-7 Ci/g. Low-enriched uranium (LEU) can have enrichments up to 20%  $^{235}\text{U}$  with specific activities as high as 7.0E-7 Ci/g. These activities are used to estimate airborne source terms in units of curies. These source term estimates are shown in Table B.5.

#### Consequences for Bounding Accident Scenarios

Consequences to facility workers, co-located workers (assumed to be located 100 m from the release point), and the public are estimated for each bounding accident scenario at each proposed facility location. For the facility worker and co-located worker, the consequences are the same regardless of site. For the public, consequences vary depending on distances to the site boundaries. Distances and associated dispersion parameters for each site are shown in Table B.6 for ground-level releases (general handling events and direct seismic event). For elevated releases (15 m) due to hot air buoyancy effects from fires, the maximum dispersion parameter occurs at a distance of 270 m from the release point. This value (3.51E-4 s/m<sup>3</sup>) is used for releases due to fires for all sites regardless of distance to the site boundary and is, therefore, conservative (i.e., dispersion parameters due to elevated releases for receptors located at other distances are lower). Dispersion parameters are based on a point-source Gaussian dispersion model described in *Handbook on Atmospheric Diffusion* (DOE/TIC-11223, Hanna et al. 1982) and are evaluated for F-Class wind stability with windspeed of 1.5 m/s. All receptors are considered to be at ground level.

Consequences are shown in Table B.7 for all receptors for the facility at each site with the largest dispersion parameter (i.e., closest distance to site boundary). The exception is the ETTP site where one facility (K-1066F) is less than 100 m from the site boundary and is evaluated separately. Other parameters included in estimating consequences include:

- Breathing rate of 3.3E-4 m<sup>3</sup>/s based on recommendations from the International Commission on Radiological Protection.
- Inhalation 50-year committed effective dose equivalent dose conversion factor (DCF) for uranium of 1.2E+8 rem/Ci (*Internal Dose Conversion Factors for Calculation of Dose to the Public*, DOE/EH-0071, DOE 1988).

Table C.5. Source Terms for Bounding Accident Scenarios

Type of Uranium	MAR, MTU	Assumed Physical Form	Assumed Packaging	Airborne			Airborne		
				DR	ARF	RF	Source Term (g)	Activity (Ci/g)	Source Term (Ci)
<b>General Handling Accidents</b>									
Clad metal	Normal	1.38E+00	Solid metal	Drums	1.00E-01	1.00E-06	1.00E+00	1.26E-01	3.50E-07
Product ingots	Depleted	3.26E+00	Solid metal	Metal boxes	1.00E-01	1.00E-06	1.00E+00	2.96E-01	3.50E-07
UF <sub>4</sub>	Depleted	2.60E+00	Composite solid	Metal boxes	2.50E-01	1.00E-05	1.00E+00	5.90E+00	3.50E-07
<b>Storage Area Fire</b>									
Solid metal	Depleted	1.34E+03	Solid metal	Metal boxes	1.00E-01	1.00E-03	1.00E+00	1.21E+05	3.50E-07
UF <sub>4</sub>	Depleted	1.42E+03	Composite solid	Metal boxes	1.00E-01	6.00E-03	1.00E-02	7.73E+03	3.50E-07
Total									4.51E-02
<b>Storage Area Seismic Event</b>									
Solid metal	Normal	7.26E+01	Solid metal	Metal boxes	7.50E-02	1.00E-06	1.00E+00	4.94E+00	3.50E-07
Solid metal	Normal	1.15E+02	Solid metal	Drums	7.50E-02	1.00E-06	1.00E+00	7.85E+00	3.50E-07
Solid metal	Depleted	1.34E+03	Solid metal	Metal boxes	7.50E-02	1.00E-06	1.00E+00	9.09E+01	3.50E-07
UF <sub>4</sub>	Depleted	1.42E+03	Composite solid	Metal boxes	7.50E-02	1.00E-05	1.00E+00	9.66E+02	3.50E-07
U <sub>3</sub> O <sub>8</sub> , UF <sub>4</sub>	Low-enriched	2.37E+02	Composite solid	Metal boxes	7.50E-02	1.00E-05	1.00E+00	1.61E+02	7.02E-07
U <sub>3</sub> O <sub>8</sub> , UF <sub>4</sub>	Low-enriched	2.65E+02	Composite solid	Drums	7.50E-02	1.00E-05	1.00E+00	1.80E+02	3.74E-07
Solid metal	Low-enriched	2.97E+02	Solid metal	Metal boxes	7.50E-02	1.00E-06	1.00E+00	2.02E+01	3.60E-07
Total									0.0005562
<b>Storage Area Seismic Event Fire</b>									
Solid metal	Normal	7.26E+01	Solid metal	Metal boxes	7.50E-02	1.00E-03	1.00E+00	6.59E+04	3.50E-07
Solid metal	Normal	1.15E+02	Solid metal	Drums	7.50E-02	1.00E-03	1.00E+00	7.85E+03	3.50E-07
Solid metal	Depleted	1.34E+03	Solid metal	Metal boxes	7.50E-02	1.00E-03	1.00E+00	9.09E+04	3.50E-07
UF <sub>4</sub>	Depleted	1.42E+03	Composite solid	Metal boxes	7.50E-02	6.00E-03	1.00E-02	5.80E+03	3.50E-07
U <sub>3</sub> O <sub>8</sub> , UF <sub>4</sub>	Low-enriched	2.37E+02	Composite solid	Metal boxes	7.50E-02	6.00E-03	1.00E-02	1.29E+04	7.02E-07
U <sub>3</sub> O <sub>8</sub> , UF <sub>4</sub>	Low-enriched	2.65E+02	Composite solid	Drums	7.50E-02	6.00E-03	1.00E-02	1.08E+03	3.74E-07
Solid metal	Low-enriched	2.97E+02	Solid metal	Metal boxes	7.50E-02	1.00E-03	1.00E+00	2.02E+04	3.60E-07
Total									0.00467

MAR = material at risk.  
 MTU = metric tons of uranium.

**Table C.6. Distances and Dispersion Parameters for Ground-Level Releases for Bounding Accident Scenarios**

Site	Building	Distance to Site Boundary (m)	Dispersion Parameter X/Q (s/m <sup>3</sup> )
All sites	--	1.00E+02	3.43E-02
Fernald	Plant 1 Pad	3.35E+02	3.21E-03
Portsmouth	X-3001	8.76E+02	5.43E-04
	X-3002	1.07E+03	3.84E-04
	X-7725A	7.82E+02	6.68E-04
	X-7745R	1.06E+03	3.84E-04
	Lithium Storage	7.86E+02	6.68E-04
	X-744K	8.70E+02	5.43E-04
	X-744G	7.15E+02	8.47E-04
Paducah	C-752/greenfield	5.11E+02	1.56E-03
Y-12 Plant	9204-4	5.37E+02	1.56E-03
	9720-33	5.37E+02	1.56E-03
ETTP	K-1066F	7.60E+01	5.33E-02
	K-131, 631	8.38E+02	6.68E-04
	K-861 Open Area	6.10E+02	1.12E-03

ETTP = East Tennessee Technology Park.

Table C.7. Consequences to Facility and Co-Located Workers for Bounding Accident Scenarios

Accident	Site	Airborne Source Term (Ci)	Breathing Rate (m <sup>3</sup> /s)	DCF (rem/Ci)	Worker Dose (rem) <sup>b</sup>	Co-located Worker <sup>a</sup>		Public Dose (rem) (rem)	Maximum Consequence Category
						X/Q (s/m <sup>3</sup> )	Dose (rem)		
General handling	Fernald	2.06E-06	3.33E-04	1.20E+08	3.14E-03	3.43E-02	2.82E-03	3.21E-03	2.64E-04
	Portsmouth	2.06E-06	3.33E-04	1.20E+08	3.14E-03	3.43E-02	2.82E-03	8.47E-03	6.97E-05
	Paducah	2.06E-06	3.33E-04	1.20E+08	3.14E-03	3.43E-02	2.82E-03	1.56E-03	1.28E-04
	Y-12 Plant	2.06E-06	3.33E-04	1.20E+08	3.14E-03	3.43E-02	2.82E-03	1.56E-03	1.28E-04
	ETTP (K-1066F)	2.06E-06	3.33E-04	1.20E+08	3.14E-03	5.33E-02	4.39E-03	5.33E-02	Negligible
	ETTP (other)	2.06E-06	3.33E-04	1.20E+08	3.14E-03	3.43E-02	2.82E-03	1.12E-03	9.22E-05
	All	4.51E-02	3.33E-04	1.20E+08	n/a	3.51E-04	6.33E-01	0.0004	Low
	Fernald	5.62E-04	3.33E-04	1.20E+08	n/a	3.43E-02	7.70E-01	3.21E-03	7.21E-02
	Portsmouth	5.62E-04	3.33E-04	1.20E+08	n/a	3.43E-02	7.70E-01	8.47E-04	1.90E-02
	Paducah	5.62E-04	3.33E-04	1.20E+08	n/a	3.43E-02	7.70E-01	1.56E-03	3.50E-02
Storage area fire	Y-12 Plant	5.62E-04	3.33E-04	1.20E+08	n/a	3.43E-02	7.70E-01	1.56E-03	3.50E-02
	ETTP (K-1066F)	5.62E-04	3.33E-04	1.20E+08	n/a	5.33E-02	1.20E+00	5.33E-02	1.20E+00
	ETTP (other)	5.62E-04	3.33E-04	1.20E+08	n/a	3.43E-02	7.70E-01	1.12E-03	2.52E-02
	All	4.67E-03	3.33E-04	1.20E+08	n/a	3.51E-04	6.55E-02	3.51E-04	6.55E-02
	Fernald								
	Portsmouth								
	Paducah								
	Y-12 Plant								
	ETTP (K-1066F)								
	ETTP (other)								
Total seismic									

<sup>a</sup>Maximum downwind exposure assumed for both co-located worker and public.

<sup>b</sup>Facility workers assumed to evacuate during fire or seismic event before significant exposure can occur.

DCF = dose conversion factor.

ETTP = East Tennessee Technology Park.

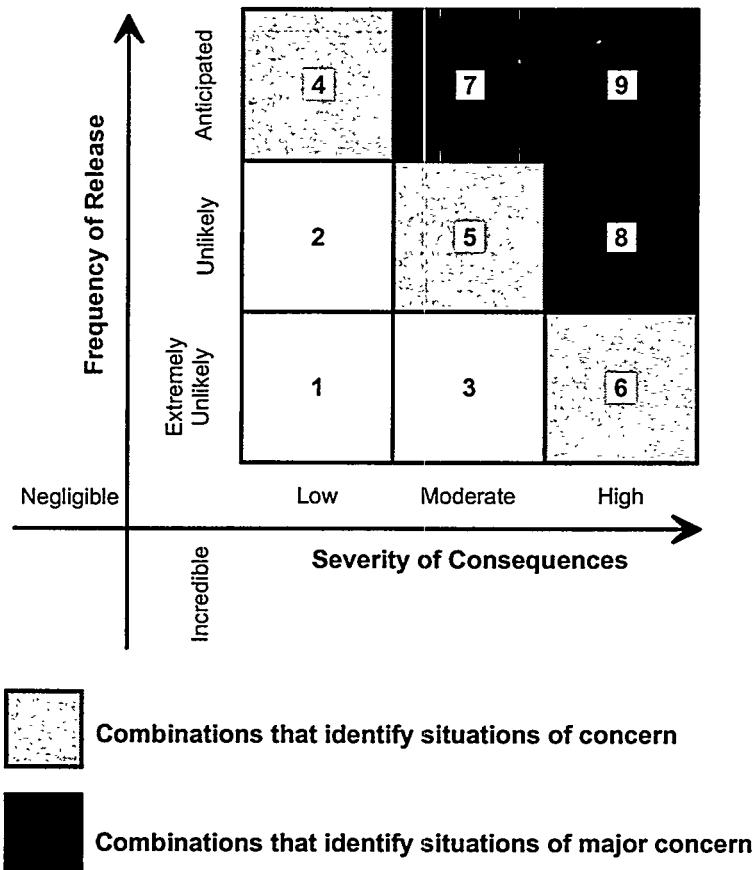
- Worker dose estimates based on instantaneous dispersion into a hemisphere 10 m in diameter. The worker walks through the hemisphere at a rate of 1 m/s for a maximum exposure time of 10 s. Consequences to facility workers during fires or natural phenomena events are considered to be negligible because these workers are assumed to evacuate the area before significant exposure can occur. This assumption is based on standard DOE site emergency response procedures that require facility worker evacuation in the event of accidents.
- It is assumed that the co-located workers and the public are both exposed to the maximum downwind consequence. This is a conservative assumption because in most cases the location of maximum consequence occurs at a distance beyond the location of the co-located worker (i.e., 270 m versus 100 m for the co-located worker). If actual dispersion parameters for elevated releases and receptors at 100 m were used, the estimated consequences would be significantly less.
- Exposure duration is assumed to be the same as release duration for all events. This is a conservative assumption for fires because downwind receptors are not likely to remain in a smoke plume once it is detected, and fire duration is several hours. For handling events or direct release from a seismic event, it is also a conservative assumption because the materials forms are such that the radioactive materials must be dislodged before they become airborne, and the overall airborne release rate is slow relative to the rate of uptake by the receptor.

Table C.7 also indicates the maximum consequence level for each scenario at each site. These levels are based on the consequence categories shown below.

Descriptive Word	Radiological Consequence Levels	
	Public	Facility and Co-located Worker
Negligible	$\leq 0.1$ rem	$\leq 1$ rem
Low	$\geq 0.1$ to $< 5$ rem	$> 1$ to $\leq 5$ rem
Moderate	$> 5$ to $\leq 25$ rem	$> 5$ to $\leq 100$ rem
High	$> 25$ rem	$> 100$ rem

### C.1.3 Public and Worker Risk Summary

Public and worker risks due to normal operations and accidents are shown in Table B.8. The risk categories are based on the accident frequency and maximum radiological consequence level as shown in Figure B.1. Those accident scenarios that fall within regions 7, 8, and 9 of the matrix are considered high risk and those accident scenarios that fall within regions 4, 5, and 6 are considered moderate risks. Those accident scenarios that fall within regions 1 through 3 of the matrix are considered low risk and represent less than a marginal concern.



**Figure C.1. Risk Ranking Matrix**

Table C.8. Public and Worker Risks due to Normal Operations and Accidents

Accident Scenario	Site	Frequency	Facility	Co-Located		Public Dose	Risk
			Worker	Dose	Worker		
Normal operations	All	Anticipated	Negligible	Negligible	Negligible	Negligible	Negligible
General handling	Fernald	Anticipated	0.003 rem	0.003 rem	<0.001 rem	Negligible	Negligible
	Portsmouth	Anticipated	0.003 rem	0.003 rem	<0.001 rem	Negligible	Negligible
	Paducah	Anticipated	0.003 rem	0.003 rem	<0.001 rem	Negligible	Negligible
	Y-12 Plant	Anticipated	0.003 rem	0.003 rem	<0.001 rem	Negligible	Negligible
	ETTP (K-1066F)	Anticipated	0.003 rem	0.004 rem	0.004 rem	Negligible	Negligible
	ETTP (other)	Anticipated	0.003 rem	0.003 rem	<0.001 rem	Negligible	Negligible
Storage area fire	All	Extremely unlikely	Negligible	0.63 rem	0.63 rem	Low	Low
Seismic	Fernald	Unlikely	Negligible	0.84 rem	0.14 rem	Low	Low
	Portsmouth	Unlikely	Negligible	0.84 rem	0.08 rem	Negligible	Negligible
	Paducah	Unlikely	Negligible	0.84 rem	0.10 rem	Low	Low
	Y-12 Plant	Unlikely	Negligible	0.84 rem	0.10 rem	Low	Low
	ETTP (K-1066F)	Unlikely	Negligible	1.26 rem	1.26 rem	Low	Low
	ETTP (other)	Unlikely	Negligible	0.84 rem	0.09 rem	Negligible	Negligible

ETTP = East Tennessee Technology Park.

## C.2 REFERENCES

DOE (U.S. Department of Energy) 1988. *Internal Dose Conversion Factors for Calculation of Dose to the Public*. DOE/EH-0071. July.

DOE 1992. *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*. DOE-STD-1027-92. December.

DOE 1994a. *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports*. DOE Standard 3009-94. July.

DOE 1994b. *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities*. DOE-STD-1020-94. April.

DOE 1994c. *Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities*. October.

Hanna, S. R., et al. 1982. *Handbook on Atmospheric Diffusion*. DOE/TIC-11223. 1982.

**APPENDIX D**

**URANIUM METAL TOXICITY AND AQUATIC BIOTA**



## APPENDIX D. URANIUM METAL TOXICITY AND AQUATIC BIOTA

This appendix describes the methods used to estimate the uranium metal toxicity effects to aquatic life at sites with bodies of water close to the proposed uranium material storage locations. The source of the uranium is from fires from various accident scenarios analyzed in Appendix B.

### D.1 Description of how the Risks of Impacts Were Estimated for Aquatic Biota at the ETTP Site

At the ETTP, the K-131/K-631 location was evaluated for the upper-bound risks to aquatic biota from the four accidental release scenarios. This location was chosen for the upper-bound risks because of its very close proximity to Poplar Creek, and the prevailing winds from the southwest which would mean a maximal deposition of aerial contamination in the surrounding Poplar Creek during the accident scenarios. Impacts to aquatic biota from accidents associated with the uranium being stored at either of the two alternative locations at ETTP (i.e., the open area or 1066-F) would be very similar to, but not likely greater than, those evaluated for the K-131/K-163 location.

Risks to aquatic biota were evaluated by calculating estimated deposition mass of uranium for each accident scenario (Table D.1) to calculate an estimated concentration in the volume of Poplar Creek water receiving the deposition, and comparing to acute and chronic non radionuclide toxicity benchmarks. For the General Handling and Storage Area Seismic Event accident scenarios, only composite solid uranium mass is used for the airborne source term because the solid metal is not presumed to be bioavailable to aquatic biota. However, for the Storage Area Fire scenario and Storage Area Seismic Event Fire scenario, both the composite solid and solid metal forms of uranium are used to calculate the airborne source term because fire could volatize the uranium solid metal. Estimates of the percentage of the aerial plume that would be expected to deposit in Poplar Creek were derived by calculating the area of Poplar Creek within a 2400 ft perimeter of the boundaries of the K-131/K-631 location, and dividing that creek area by the total perimeter area that is 2400 ft from the K-131/K631 boundaries. The total deposited uranium for each accident scenario was then calculated by multiplying the total aerial source term by the estimated percentage of aerial plume expected to deposit in Poplar Creek (Table D.2). The volume of water in the affected portion of Polar Creek was estimated by assuming an average stream width of 225 ft , along with a estimated average depth of 4 ft, and stream length of 14770 ft ( $1.329E+07$  cu.ft =  $3.7462E+08$  L). Estimated uranium concentrations in Poplar Creek for each accident scenario were derived using the estimated mass of aerial deposition (in ug) into  $3.7462E+08$  L. Bcuase uranium compoudns are relatively insoluble (Clayton & Clayton 1981) the dissolved uranium fraction was estimated to be 0.001 of the net aerial deposition amount

Potential adverse affects to populations of aquatic biota were evaluated by dividing estimated concentrations of uranium in Poplar Creek by non radiological toxicity benchmarks for uranium. The toxicity benchmarks used for this analysis were EPA Tier II values. The EPA Tier II secondary acute and chronic toxicity benchmark values for uranium are 46 ug/L and 2.6 ug/L, respectively (Suter and Tsao 1996). The Tier II values are developed for chemicals without national ambient water quality criteria (NAWQC), and are concentrations that are expected to exceed NAWQC only 20% of the time. The acute NAWQC are intended to correspond to concentrations that would cause less than 50% mortality in 5% of exposed aquatic biota populations during a brief exposure. The estimated uranium concentrations in the pond were divided by the acute and chronic toxicity benchmarks to obtain acute and chronic HQs. HQs greater than 1 indicate potential adverse affects to populations of aquatic biota.

**Table D.1. Source terms for bounding accident scenarios for aquatic biota at ETTP locations**

<b>Types of uranium</b>		<b>Airborne source term (<math>\mu</math>g)</b>
<b>General Handling Accidents</b>		
UF4	Depleted	5.90E+06
Total		5.90E+06
<b>Storage Area Fire</b>		
Solid metal	Solid metal	1.21E+11
UF4	Composite solid	7.73E+09
Total		1.29E+11
<b>Storage Area Seismic Event</b>		
UF4	Depleted	9.66E+08
U3O8, UF4	Low-enriched	1.61E+08
U3O8, UF4	Low-enriched	1.80E+08
Total		1.30E+09
<b>Storage Area Seismic Event Fire</b>		
Solid metal	Normal	6.59E+10
Solid metal	Normal	7.85E+09
Solid metal	Depleted	9.09E+10
UF4	Depleted	5.80E+09
U3O8, UF4	Low-enriched	1.29E+10
U3O8, UF4	Low-enriched	1.08E+09
Solid metal	Low-enriched	2.02E+04
Total		2.05E+11

**Table D.2. Summary of uranium deposition, concentrations in Poplar Creek, and acute and chronic Hazard Quotients for biota at ETTP**

Total airborne source term (µg)	Plume deposition factor	Net aerial deposition (µg)	Total Dissolved Uranium <sup>a</sup> (µg)	Estimated maximum uranium concentration in Poplar Creek <sup>b</sup> (µg/L)	Acute HQ	Chronic HQ
<b>General Handling Accidents</b>						
5.90E+06	1.25E-01	7.38E+05	7.38E+02	2.57E-05	5.59E-07	9.89E-06
<b>Storage Area Fire</b>						
1.287E+11	1.25E-01	1.61E+10	1.61E+07	5.61E-01	1.22E-02	2.16E-01
<b>Storage Area Seismic Event</b>						
1.31E+09	1.25E-01	1.63E+08	1.63E+05	5.70E-03	1.24E-04	2.19E-03
<b>Storage Area Seismic Event Fire</b>						
2.05E+11	1.25E-01	2.56E+10	2.56E+07	8.92E-01	1.94E-02	3.43E-01

Plume deposition factor = (area of Poplar Creek within 2400 ft perimeter around K-131/K-163 boundaries)/(total area of the 2400 ft perimeter around the K-131/K-163 boundaries).

Net aerial deposition = (total airborne source term) \* (plume deposition factor).

<sup>a</sup>Dissolved uranium = net aerial deposition/1000 (to account for insolubility of U-308 and UF<sub>4</sub>).

<sup>b</sup>Dissolved uranium/volume of Poplar Creek in affected area (where volume is 2.867E+08 L).

Acute HQ = Estimated maximum concentration of uranium in Poplar Creek/Tier II secondary acute value of 46 mg/L.

Chronic HQ = Estimated maximum concentration of uranium in Poplar Creek/Tier II secondary chronic value of 2.6 mg/L.

**APPENDIX E**  
**COMMENTS AND RESPONSES**



## APPENDIX E. COMMENTS AND RESPONSES

**Response to Comments on the Environmental Assessment  
for the U. S. Department of Energy, Oak Ridge Operations  
Receipt and Storage of Uranium Materials  
from the  
Fernald Environmental Management Project Site (DOE/ORO-2078)**

**Walter Frazier  
2230 Russell Avenue  
West Portsmouth, Ohio 45663-6247**

1. Mr. Frazier indicates that he has 53 acres of land in Texas which he offers would be willing to discuss with DOE as a possible storage site.

**Response: The uranium materials discussed in this EA are not suitable for storage without proper surveillance. The cost of establishing a new site is likely prohibitively expensive and could not be done in the time required. As noted in section 2.8.1 no commercial facilities were considered.**

**Mr. Alfred B. Puckett  
6365 Bethel Ct. Rd.  
Kevil, Ky. 42053**

1. I am opposed to the DOE plan to make west Kentucky a nuclear waste dump. The Paducah plant site is on a major earthquake fault and our experts say the big one could happen anytime and be a major disaster. We don't need any more nuclear waste; in fact, the nuclear waste we now have should be sent someplace else.

**Response: The uranium material discussed in this EA is not a waste; it is a product. Comment noted.**

**Robert Peele  
130 Oklahoma Avenue  
Oak Ridge, TN. 37830**

1. I found no information on the toxic effects of uranium other than the radioactivity.

**Response: Information on the toxic effects of uranium metal, especially to aquatic organisms, has been added to the EA.**

2. The reader is told of the distance from Poplar Creek of prospective storage locations at ETTP, but the elevation above creek level and flooding history were not mentioned.

**Response: Information in section 3.5.3 indicates that most of the ETTP site is above the probable maximum flood. Text has been added to specifically state that all proposed storage locations at ETTP are above the 100-year flood level. According to the USGS topographic map for ETTP (DOE 1999), storage location K-131/K-631 elevation is approximately 780 ft, which is about 40 feet above the Poplar Creek level of 735-740 ft. The open area location elevation is about 760 ft, some 20 feet above the Poplar Creek level. Storage location K-1066 F elevation is also approximately 780 feet.**

Water levels in Poplar Creek, which is a tributary of the Clinch River, are controlled to a large extent by Melton Hill Dam approximately 18 km (11 miles) upstream from the confluence of Poplar Creek and the Clinch River. All three locations are outside the 100-year flood plain boundary of Poplar Creek.

3. No information is given on the average isotopic composition of the depleted uranium present. If the U has nearly natural composition, then the material could compete as feed material for gaseous diffusion. If it has the 0.3 or 0.4% U-235 content usual for depleted uranium, the likelihood of sale in the near future may be small.

**Response: For the purposes of the risk assessment, as stated on page B-9 of the Draft EA, for normal and depleted uranium is considered to be no more than 0.71% U235. This value is considered conservative. The uranium materials discussed in this EA or slated to be marketed or used.**

4. I could not readily determine the basis of the risk calculations. Statements about air concentrations near the ORR seem questionable. Pg. 3-1 suggests the normal background dose rate is 0.5mrem/hr. Unusual! **The information provided on page 3-1 on radiation dose rates from stored uranium materials at Fernald is (and the association to background) is from a personal communication. This has been added. Information on ORR air concentrations were taken from documented sources.**

5. The description of the hypothetical accidents was inconsistent or at least so obscure I could not follow it.

**Response: DOE attempted to help the reader by providing details on methodology, assumptions, and results in Appendix B. DOE believes the results to be consistent with the methods employed.**

6. How on earth did this project become such an emergency that work must be completed this fiscal year, so adequate comment time cannot be afforded.

**Response: The comment period on this EA was extended to one month.**

7. Why did DOE/ORO agree to accept the material before the EA was available.

**Response: DOE determined that the uranium material was a valuable product and its safe storage and eventual use was appropriate to DOE's mission.**

8. Regardless of the above points, it appears to this reader that the facility in Portsmouth is the logical choice for storage because:

- an appropriate building has been identified where the material can be accommodated
- storage of such material is aligned with the site mission more correctly at considered locations other than ETTP in Oak Ridge
- at Portsmouth the material will stay within the same regulatory framework as at present, and
- since the EA was issued, I read that Tennessee (TDEC) has been promised that stores of depleted uranium hexafluoride will be removed from the state within ten years. If so, there would be little sense in shipping a supply of a different fluoride to Tennessee in the near future.

**Response: Comment noted.**

**Mark Donham**  
**Kristi Hanson**  
**RACE/Heartwood**  
**RR # 1, Box 308**  
**Brookport, IL 62910**  
**618-564-3367(H)**  
**502-443-3082(W)**

1. The purpose of an EA is to determine the potential significance of a proposed action. Certain factors are required by the CEQ in their NEPA regs to be considered by the agency in making this determination. These factors are found at 40 CFR 1508.27. This is, in fact, a site-specific project, and therefore, requires a site-specific context in applying these factors in the significance determination. It is our opinion that a compliant application of these factors would not result in a finding of no significant impact. Factor # 7 is the requirement that the agency look at cumulative effects during the significance determination. Some courts (for example, the 5<sup>th</sup> circuit) have ruled that during the threshold determination of significance, the duty to look at cumulative effects is even more detailed than during the EIS process, for if a FONSI is issued, this will be the only look at cumulative effects of the proposal.

**Response:** Cumulative impacts were examined and documented in section 4.8. DOE used the definition of cumulative effects defined in the CEQ Regulations. The effects of the proposed action when combined with past, present, and reasonably foreseeable future actions do not result in significant adverse impacts.

2. On its face, this EA is deficient. The EA inappropriately segments the actions into transportation, storage, and final disposition for purposes of NEPA analysis. This is a clear violation of NEPA. In a convoluted "Addendum", the agency tries to fast talk its way out of its duties to consider the combined effects of the storage, transportation, and long-term disposal, but this fails miserably. This is a site specific proposal, and a 1994 EA done for another part of the project, which, while it should have included the entire process, could not have because the proposal to move the material had not been made, cannot be adequate to meet the public information and scrutiny aspects of NEPA. This is not fully informing the public.

**Response:** As shown in the Addendum, DOE fully considered transportation of the uranium materials in several documents beginning in 1994. NEPA and CERCLA were followed and public review and comment were solicited on these actions. Further, the outbound shipments from ORO will move in DOE-approved packaging, subject to DOE radiation, contamination or fissile controls and other DOE Federal or State requirements.

3. In addition, there are cumulative effects from other ongoing projects at Paducah. These are clearly documented in the site management plan, which has not undergone NEPA review. While the management at Paducah keeps repeating as its mantra that the CERCLA analysis meets all the requirements of NEPA, the transportation addendum flatly contradicts this, stating, (finally) that "...DOE excludes Removal actions from requiring detailed NEPA documentation..." There is no doubt that there needs to be a cumulative effects analysis done of ALL the action ongoing at the site, and segmenting each individual project into a discreet analysis unit is not in compliance with NEPA. If such an analysis were undertaken, there would be no doubt that the impact would be potentially significant and require an EIS. This would and should be the site-wide EIS we have been calling for years. At a bare minimum, this should require a supplement to the EIS process ongoing for the depleted uranium, but DOE isn't even doing this. This EIS process is fatally flawed unto itself for being segmented into a discreet unit, while there are considerable and significant other actions ongoing at the site with cumulative impacts.

**Response:** The complete quotation from the Addendum states " Although DOE excludes CERCLA Removal Actions from requiring detailed NEPA documentation, two separate integrated CERCLA/NEPA processes (with full public involvement) were carried out at FEMP which identified

**the disposition of nuclear material as a fundamental component of the remediation of OU 3.” Further, see responses to comments 1 and 2 above.**

4. Two other factors which are potentially significant relevant to this process are the effects on public health and safety, and the scientific uncertainty surrounding the proposal. Clearly, if there is emissions and escape of radio nuclides or uranium element into the environment which gets distributed into the food chain or into an environmental media which could cause any kind of ecological or human exposure, there is clearly a public health and safety concern which is significant. While DOE, as typical, attempts to brush these concerns off with a broad brush of statements of no impact, these conclusory statements are supported on the record with nothing. They do not comply with NEPA, which requires that findings such as this be supported with valid, objective data, which can be obtained by the public, and which is clearly identified in the record. Conclusory statements of no impact impress us not, and are in violation of NEPA. What are the emission rates of the various materials, and what are the exposure routes. What are the ecological effects, and what is the time span these effects could continue. These questions are not adequately answered or supported in the EA.

**Response: As indicated in the DEA, emissions under normal operating conditions are effectively zero. The outside of the containers in which this material is packaged can be safely handled and workers require no special protection when working near the containers. Under accident situations, the doses (facility worker, co-located worker, and the public) are computed and the risk of exposure determined (see Table B.8).**

5. The biggest scientific uncertainty associated with the Paducah site is the seismic hazard. It is common knowledge that the site is within a high risk seismic zone. Just recently, there has been renewed media stories about the Central Midwest Consortium's annual meeting and their call for earthquake preparedness in our region. Yet, DOE brushes this off inexplicably. This is clearly potentially significant, and needs a hard look site-wide.

**Response: The radiological risk associated with seismic events at all sites was evaluated in Sections C.1.2.1 and C.1.2.3. Although the intensity for a seismic event with a frequency of 5E-4/yr is higher at the Paducah site (0.35g) than at other sites (e.g., 0.19g at Portsmouth), the same assumptions concerning damage and release were applied at all sites. These conservative assumptions include loss of all structures and utilities, fires subsequent to the initial seismic event, and ground-level releases. In reality these effects would be less at the sites with the lower seismic intensities; however, because the actual seismic design criteria for the sites are unknown, the same assumptions were applied to all sites.**

6. In addition, just the fact that DOE is calling this a temporary move because they don't know what to do with the materials long term is clear evidence that there is strong scientific uncertainty associated with these materials.

**Response: The uranium materials are being moved from FEMP in order to comply with a regulatory commitment made to the state of Ohio. DOE expects to use these materials as commercial product.**

7. Another factor is the effects on federally listed species. While the EA lists the evening bat as federally listed, we don't believe that is correct. However, the Indiana Bat is clearly critically endangered. The conclusion that it does not occur on the plant site is not supported by the record. A clear look at the record on Indiana Bats shows that their foraging range could easily put them into the range of impact. They could easily consume insects which have become contaminated with emissions from this material. If this affects their reproductive capacity, which some evidence suggests, then this could be construed as "harm", which would be a take. It is the opinion of the commentors that an incidental take permit is necessary at this point to continue any cleanup or production activities at the plant, and failure to have completed formal Section

7 consultation to implement conservation guidelines to minimize the take is a violation of the Endangered Species Act, which would be potentially significant also under the CEQ guidelines.

**Response: DOE is consulting with the U. S. Fish and Wildlife Service and state fish and game departments regarding any potential adverse impact to protected species.**

8. Another potential regulatory requirement which is not mentioned in the EA is the possible requirement for a point source runoff permit for the storage area and the immediate adjacent lands. Where will this area drain, and what kind of contamination can we expect in these runoffs? Finally, wouldn't this require a RCRA permit? How would the lands being proposed for storage be regulated? What capacities would be allowed? What storage requirements would be set? How would the public be involved in this process?

**Response: DOE will comply with all regulatory requirements. DOE expects no contamination from surface runoff with the possible exception of minor erosion from the construction activities.**

**Mr. Graham E. Mitchell**  
**Chief, Office of Federal Facilities Oversight**  
**Ohio EPA**  
**State of Ohio Environmental Protection Agency**  
**401 East Fifth Street**  
**Dayton, OH 45402-2911**

Listed below are Ohio EPA's comments on the Uranium Receipt and Storage EA:

**General Comments**

1. Ohio EPA concurs with the EA conclusion that the DOE Fernald site does need to remove 3800 metric tons of uranium from the site in order to complete cleanup activities at Fernald.

**Response: Comment noted.**

2. If the ultimate location for this material is to be at the DOE of Oak Ridge facility in Tennessee, we would recommend that the material be sent there directly from Fernald to Oak Ridge. This will reduce overall shipping costs and reduce transportation risks by handling this material only once.

If any of this material is shipped to the Portsmouth Gaseous Diffusion Plant for interim or long term storage, funding should be provided to the Portsmouth site to cover the costs of managing this material. The Portsmouth cleanup budgets have been out significantly in the past several years and this storage effort should not further impact the Portsmouth cleanup program.

**Response: Comment noted.**

**Specific Comments**

3. Page 3.1.8 Infrastructure

Fernald discharges treated effluent to the Great Miami River not the Little Miami River.

**Response: Text changed to reflect comment.**

**Ms. Susan L. Gawarecki, Ph.D., P.G.**  
**Executive Director**  
**LOC Inc**  
**Oak Ridge Reservation**  
**Local Oversight Committee**  
**136 S. Illinois Ave., Suite 208**  
**Oak Ridge, TN 37830**

1. The Oak Ridge Reservation (ORR) Local Oversight Committee, Inc. (LOC) submits the following comments on the subject draft EA. The LOC Board of Directors voted unanimously to comment that the LOC would have no objection to storage of uranium materials at Y-12 that are consistent with its mission.  
**Response: Comment noted.**

2. However, the LOC objects to storage of additional uranium materials at K-25, also known as East Tennessee Technology Park (ETTP), considering that the uranium hexafluoride (UF6) cylinders currently stored there are disincentive to re-industrialization and a potential hazard to workers.

**Response: Comment noted.**

3. The LOC is a non-profit regional organization funded by the State of Tennessee and established to provide local government and citizen input into the environmental management and operation of the DOE ORR. The board of Directors of the LOC is composed of the County Executives of Anderson, Knox, Loudon, Meigs, Morgan, Rhea, and Roane Counties; the Mayor of the City of Oak Ridge; and the Chairs of the Roane County Environmental Review Board, the City of Oak Ridge Environmental Quality Review Board, and the LOC Citizens' Advisory Panel (CAP). The CAP has up to 20 volunteer members with diverse backgrounds who represent the greater ORR region.

No preferred alternative is given in the EA. The CAP proposes that storage of the uranium materials at the Portsmouth Gaseous Diffusion Plant be the preferred alternative, for the following reasons:

The Portsmouth facility offers the most options and even has an empty building (X-3002) suitable for storing the uranium material. The proposed action is consistent with the current mission at Portsmouth. Storing the uranium material at Portsmouth also avoids transfer of materials across state lines.

Receipt and storage of these materials is not consistent with the current ETTP mission. The Oak Ridge public and the Tennessee state regulators are increasingly unwilling to accept the continued storage of the depleted UF6 at ETTP, as there is no defined use for the material in the foreseeable future and the cylinders require ongoing surveillance and maintenance to ensure that they are not breached. DOE should not propose storage of additional depleted uranium when the existing stockpile is destined for removal and/or conversion to a stable oxide form.

Most of the uranium is depleted (2761 metric tons); locating it at Y-12 in its doubly secure area is not in keeping with the current Y-12 mission. However, locating the 799 metric tons of low-enriched uranium (LEU) at Y-12 until its sale is finalized appears commensurate with the plant's mission.

The Paducah site is limited in space and has increased earthquake and wind hazards. The action is otherwise consistent with its mission, although it is a less advantageous location than Portsmouth for these reasons and due to the transportation distance.

**Response: Comments on the various alternatives sites and reasons for recommending Portsmouth are noted.**

**Mr. Ronald Lamb  
10990 Ogden Landing Road  
Kevil, KY 42053**

I wish to submit my comments on the Fernald EA. There are several reasons for not moving the uranium metal to Paducah. The first is Paducah is a small site and has more than our fair share of waste, such as 40,000 cylinders of our own and several tons of scrap metals. Paducah does not have a facility to store this metal and would have to build one. The second reason is that the Paducah plant is near the New Madrid earthquake zone. Geologists predict a severe quake to strike the region in the next few years. For this reason the Paducah plant should move our waste out of the region. I feel certain that the Department of Energy would disagree since a lot of our waste lies in 14 ton cylinders, but these cylinders have small 2 inch fill valves with very little protection. I feel there will be a numerous breaches of these fill valves during an earthquake. I believe we should be reducing the waste at Paducah instead of bringing more to this area for storage. I have included information of the fault from the earthquake consortium and a list of seismic data activity.

**Response: The uranium materials are considered by DOE to be valuable product, not waste. DOE appreciates the information supplied on the New Madrid Fault. Seismic activity was considered in the accident analysis for this EA.**

**Paducah Gaseous Diffusion Plant  
Site Specific Advisory Board**

**General Comments:**

1. The Paducah SSAB recommends that Fernald pursue amendments to the appropriate regulatory documents allowing the uranium materials to be retained at the Fernald site pending resolution of the long-term disposition strategy.

Notwithstanding this recommendation, if the DOE decides to move the uranium materials, the Paducah SSAB recommends that the uranium materials should be moved the least distance possible to reduce the environmental impact of transportation hazards.

**Response: DOE must move these materials in order to comply with a state of Ohio regulatory commitment. Recommendation for reducing transportation hazards noted.**

**Specific Comments:**

2. Page 2-7: Drawing is out of date even though it says rev. 1/20/99. There are buildings and pads in the general area designated for the storage area.

**Response: Figure updated to show some additional buildings and pads in this general area; however, the area proposed for the storage of uranium is an open field.**

3. Page 2-11, Paragraph 1: What is the benefit of using a combination of sites?

**Response: There are several possible advantages. The risk of accidental release due to fire or other natural events is lessened somewhat by having materials in different locations. Some plants, such as Y-12, are already storing LEU and it would be comparatively easy administratively to add more LEU at Y-12 than some of the other inventory materials. Also using a combination of sites could result in using existing buildings to a greater extent than might otherwise be the case, negating the need for greater ground disturbance associated with TSS construction.**

4. Page 2-11, Paragraph 2: The first sentence appears to be poor planning, not a justification for not considering commercial facilities.

**Response: Comment noted.**

5. Page 2-11, Paragraph 4: "to support compliance with regulatory requirement" seems to use this as an excuse for poor planning and as a hammer to make something happen.

**Response: Comment noted.**

6. Page 3-6, Paragraph 4: Change "PGDP" to "DOE" reservation."

**Response: Sentence modified to "PGDP reservation".**

7. Page 3-6, Paragraph 5: Where did these numbers come from? Is this 1992 data?

**Response: Numbers came from the Final Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste (DOE/EIS-0200-F).**

8. Page 3-6, Paragraph 6: Using 1992 data seems outdated.

**Response: Comment noted.**

9. Page 3-6, Paragraph 7: Why not look at 1998 or even 1997 radionuclides sources rather than 1992? If you bother checking, we believe you will find the vapor degreasers in C-400 are no longer operating. Didn't anyone visit the site or talk to the people at the Paducah Site?

**Response: text has been updated to cite information from the USEC SAR dated December 15, 1997. Corrected text includes removal of the vapor degreasers in C-400 as an emission source since they are now out of operation.**

10. Page 3-7, Paragraph 2: Check on numbers of plumes—believe there are 3 now (major or minor?).

**Response: There are two major ground water plumes generally recognized at the plant.**

11. Page 3-7, Paragraph 5: List source of the identification of the federally listed species. A 1994 Corp Study did not list the evening bat in this area and identified the pearly mussel as endangered. Also, none of these species should be included.

**Response: DOE is consulting with the U. S. Fish and Wildlife Service and state fish and game departments regarding any potential adverse impact to protected species.**

12. Page 3-8, Paragraph 4: Sewage is treated "onsite" not "offsite."

**Response: Text modified.**

13. Page 3-8, Paragraph 5: The Corp has performed a cultural resources survey. I believe it was completed in 1994.

**Response: The Corps of Engineers archaeological survey covered the area outside the immediate plant boundary. There has been no systematic cultural resources survey completed which addresses resources within the plant boundary and covers historic buildings and well as archaeological sites. Text not modified.**

14. Page 4-5, Paragraph 4: What about waste from the construction/site preparation. I believe soil in that area is PCB contaminated. There are building and pads that are not depicted on your map, will their existence change preferred location?

**Response: Possibly there are traces of PCBs in the soil but nothing of significance. The construction of concrete pads over any soil would have the effect of reducing mobility of soil contaminants.**

15. Page 4-9, Paragraph 3: I believe USEC might disagree that cleanup is the major priority at the site. I would like the source of the baseline identified and a list of "future changes."

**Response: The baseline refers to the environmental baseline discussed in the Affected Environment chapter.**

16. Page 5-1: Why wasn't up-to-date information about Paducah used?

**Response: Sources used ranged from publication dates of 1990 to 1998. Some later information has been considered.**

17. Page 6-1: Appears "walk-downs" were performed at Portsmouth and Fernald, why not Paducah and Oak Ridge?

**Response: Building walk-downs were done at various sites but not Paducah. PGDP personnel provided a map location of a brownfield site (open area); it was assumed there would be little gained by a special trip to view such a site.**

18. Page B-9, Paragraph 6: What goes in the blank?

**Response: This breathing rate is based on recommendations from the International Commission on Radiological Protection. This source information has been added.**

19. The information used was significantly out of date, and in some cases, totally incorrect. The general impression of this project is that Fernald has a regulatory driver and it will be met. How long has this project been going on? It appears this part of the project is being rushed.

**Response: Comment addressed above.**

**Mary Byrd Davis  
Yggdrasil Institute  
P.O. Box 131  
Georgetown, KY 40324**

1. I believe that the 3800 metric tons of depleted uranium now at Fernald should stay where they are until they are sold, rather than be moved to any of the alternative sites. Surely the agreement between the Department of Energy and the State of Ohio can be amended to make this common sense step possible. If the material is valuable, can it not be sold within a short time period?

**Response: Comment noted. DOE does not project transfer to DOD within the regulatory time period allotted.**

2. The storage at the alternative sites may not itself involve risks, but there is always risk in transportation. The tonnage involved would mean a major shipping initiative. Furthermore, transportation would mean a waste of resources: the consumption of fossil fuels and the consequent increase air pollution.

**Response: These risks were examined earlier and found to be minor.**

**Diana Cahall  
7019 Ashridge Arnhelm Road  
Sardinia, Ohio 45171**

**Note: Due to the length of several comments, they are summarized here. The reader can find the full text of Ms. Cahall's comments in the letters/comments portion of this appendix.**

1. Although I definitely feel that a 30 day comment period fails to provide sufficient time for public review and comment by all parties who have an interest in the proposed action, extension of the public comment period does provide opportunity for limited review and participation by a few members of the public other than those representing the interests of the Fernald Environmental Project Site (FEMP).

**Comment noted.**

2. The commentor provided several paragraphs dealing with the proposed sale of uranium and the failure of DOE to properly declare this material "excess".

**Response:** The uranium meets DOE's mission if not FEMP's. DOE expects much of the material to be transferred via an interagency transfer to the DOD. At the present time, the uranium is not "excess"; should any be declared excess in the future, then public notification would occur at that time.

3. DOE cannot reasonably assert that materials with hazardous and toxic characteristics can be safely isolated from the human and natural environment simply by calling them "nuclear materials" with an economic value rather than waste.

**Response:** DOE makes no such assertion. The EA evaluates the potential impacts to the human and natural environment under both normal operating conditions and under accident conditions at each of the possible storage sites.

4. Draft EA defines the economic impact of the proposed action much too narrowly. A structure to temporarily store 3,800 metric tons of nuclear materials at other DOE sites until sale or transfer does not address the total foreseeable economic impacts of the DOE action. Five million dollars and three new worker jobs to monitor materials in the interim fails to include: (1) packaging costs for transport from FEMP, (2) transportation costs to one or more of DOE's candidate receiving sites, (3) transportation from the candidate/host site, (4) revenue from the sale of the materials, (5) cost to construct the other facilities required by "disposition" of these nuclear materials to private, commercial ventures and (6) remediation/cleanup of nuclear waste disposal costs from the operation of commercial reuse or recycling/reprocessing facilities which DOE reasonably can foresee and predict to result from the proposed action.

**Response:** Items 1 and 2 were dealt with in the CERCLA ROD for FEMP. Transportation from the candidate site is the responsibility of another federal agency, such as the Department of Defense, should they acquire the materials. At present, commercial ventures cannot buy the material; another federal agency could acquire it via an interagency transfer. Thus sales revenues would not occur. Regarding impacts associated with use by another agency, any such impacts would have to be addressed by the respective agency when and if they acquire the materials. DOE cannot predict who would acquire what materials, where the materials would go, what specific uses they would be put or how decontamination might occur after transfer and use.

5. DOE is mandated to comply with Executive Order 12866, and all others.

**Response:** Comment noted.

6. DOE has failed to consider the direct and indirect foreseeable impacts of the proposed action, including the considerable long and short term costs, risks to the public and worker safety, and environmental consequences in draft EA.

**Response:** DOE disagrees with this statement. The EA evaluated pertinent direct and indirect effects and in particular focused on public and worker safety (see Appendix B).

7. Note that EA presents dose calculations based upon incomplete/missing data. Breathing rate of 3.3 E-4 m<sup>3</sup>/s based on \_\_\_\_\_.

**This rate is based on recommendations from the International Commission on Radiological Protection. This source information has been added.**

8. Transportation is an obvious requirement/result of the proposed action, as in the impacts associate with transfer. Communities along the transportation routes are not even mentioned in passing (by rail or truck) in DOE EA.

**Response: Transportation impacts have already been considered in previous documentation. DOE decided to provide an addendum to the DEA in order to address any transportation-related concerns. This information has been incorporated into a new appendix and included as part of the FEA.**

9. Conclusion of the Transportation Addendum provides no meaningful information whatsoever about what is being moved, where the material is being moved from (ORO may be a misprint) since all other transportation discussion is focused upon removal of nuclear materials from the FEMP site as part of remediation activities of the site), what standards of protection and regulation apply and how DOE proposes to comply.....

**Response: In section 1.1 DOE indicated that 3800 metric tons of uranium material is to be moved from the FEMP to another ORO site. Paragraph 5 of the Addendum explained that “all material shipped from FEMP will be packaged in accordance with Title 49 Code of Federal Regulations. In paragraph 6, DOE declares its intention to move the materials “in DOE-approved packaging, subject to DOE radiation, contamination or fissile controls and other Federal or State requirements”.**

10. DOE is being disingenuous in multiple failures to address transportation in a manner compliant with agency policy and guidelines. DOE cannot avoid addressing transportation due to implementation of transportation requirement in DOE proposed action by an outside/independent contractor. DOE and other agencies should not attempt to avoid disclosure of the total plan by hiding “the plan” behind Fernald/FEMP cleanup which is precisely what has been attempted in draft EA.

**Response: On the contrary, DOE has already evaluated transportation as part of the integrated CERCLA/NEPA process. This process had full public involvement. Transportation-related impacts were identified as minor. Therefore, DOE chose to focus on the receipt and storage of these uranium materials at other ORO sites since that analysis had not been previously performed.**

11. Scope of EA is narrowly focused upon movement of nuclear materials from FEMP site as a part of the site’s remediation while failing to address and disclose what disposition is proposed for these materials after they are shipped from FEMP to other DOE site(s). DOE actions and intentions require full explanation in final EA.

**Response: DOE has properly focused on analyzing the potential environmental impacts of receipt and storage of uranium materials at one or more ORO sites. DOE has no specific agreements in place to transfer these materials to a third party. Until final use is determined, DOE cannot where or precisely how the materials would be used. As appropriate, DOE will determine the level of NEPA action required for subsequent actions.**

12. “Commitments made to the state of Ohio” require full explanation. Both DOE and state of Ohio have failed to disclose the commitments which cause the actions proposed in the EA to occur, and would provide information as to the total scope and purpose of the proposed action(s).

**Response: The statements referring to commitments made to the State of Ohio actually addresses both direct and indirect commitments made to both the U.S. EPA and Ohio EPA. In 1993 plans and budgets were developed and put into place to address the disposition issues associated with the Nuclear Materials. In this same time frame, Records of Decision for the various Operable Units were being drafted to address the cleanup efforts at the site. The Nuclear Material Disposition Project represented a significant impediment to the D&D and soil remediation schedules, therefore, as a result**

commitments were made to the state and federal regulatory agencies concerning the removal of nuclear materials from the FEMP. In this period of time, from 1993 through 1998 more than 5 million pounds of nuclear materials were removed from the FEMP, however there still remains more than 10 million pounds (4700 MTU) of nuclear materials that need to be dispositioned. In late 1998 DOE-FEMP committed to both the U.S.EPA and OEPa that a firm date for removal of all of the nuclear material would be provided by April 1, 1999. Schedules and budgets are currently being developed to provide the firm date to the regulators by this date.

13. DOE is required to notify interested and adversely affected parties by legal notification process. How and when was this done? I can find no public notification of draft EA's availability for public comment in the federal register or in legal notice in subscription newspapers available within the Brown County, Ohio area which properly notified the public of any proposed agency transport of nuclear (fissile) materials through local communities.

**Response:** Public notices were published in late January (January 21 for most papers) in several local newspapers including the Oak Ridger, Knoxville News Sentinel, Portsmouth Daily Times, Paducah Sun, and Hamilton Journal News. In addition, at this same time DOE sent news releases to local TV and radio stations regarding availability of the EA. The news releases were also sent to the following news papers—the Jackson Times Journal, the Chillicothe Gazette, Pike County News Watchman, Portsmouth Daily Times Columbus Dispatch, Cincinnati Enquirer, and the Louisville Courier Journal.

14. DOE is requested to prepare program-wide EA/EIS which address the major federal actions being proposed for implementation in draft EA.

**Response:** Comment noted.

15. DOE is also required to comply with Executive Order 12898, February 16, 1994 which mandates federal agencies to avoid actions resulting in disproportionate adverse environmental and health impacts in low-income and minority communities.

**Response:** Socioeconomics and Environmental Justice were addressed for each of the DOE/ORO sites (see sections 3.1.6, 3.2.6, 3.3.6, 3.4.6, and 3.5.6) and corresponding impacts sections.

16. Given the arbitrary nature of the process used by DOE to date in declaring "excess property" in inventory, statement of DOE intent is required in final EA. DOE has considerable reason to predict that implementation of FEMP environmental management and restoration will likely result in the FEMP site (land) becoming excess real property. What are the agency's intentions after remediation is completed at FEMP?

**Response:** That decision is beyond the scope of this EA.

17. Current proposals for FEMP future uses include giving the FEMP site back to the Indians. Does DOE intend to use FEMP as a "pilot program" for giving other DOE/federally owned sites /land back to Native Americans, including the Hanford site in Washington state?

**Response:** Approximately 1050 acres of FEMP land is being evaluated for alternative uses. DOE is being assisted in this process by local groups and other agencies. A majority (884 acres) is proposed to undergo natural resource restoration. A 23-acre plot in the south-central portion of the site may be set-aside for potential commercial development. No final decisions on land reuse have been made at this time.

18. The agency has failed to include data necessary to justify a finding of no significant impact.

**Response:** DOE has analyzed the potential environmental impacts of receipt and storage of 3800 metric tons uranium at several ORO sites. Both normal operations and accident situations have been

**examined. No significant environmental impacts have been identified. Some site locations pose more exposure risk than others.**

19. DOE is capable of applying considerably higher standards of agency review and oversight and is herein requested to do so.

**Response: Comment noted.**

**Gregory L. Simonton  
SODI Executive Director  
Southern Ohio Diversification Initiative  
1864 Shyville Road  
Piketon, OH 45661**

**RE: USDOE Fernald Material Relocation**

The Southern Ohio Diversification Initiative (SODI) wishes to make comments regarding the destination of material from the USDOE Fernald Site, especially related to the USDOE Portsmouth Site.

1. The SODI is working cooperatively with the local communities and the Department of Energy to develop and implement programs that will lessen the impacts resulting from the reductions of employment at the local site. A central theme, and the key to our long -term transition success, is the reuse of buildings, lands, and equipment located on the Portsmouth Reservation.

We believe that relocating the material from Fernald to the Portsmouth Site negatively impacts our re-industrialization efforts. Public perception will play a vital role in our marketing program and reuse success, both of which are targeting a variety of companies to diversify our regional economy.

We recognize the Department of Energy has obligations with the regulatory agency(s) concerning removal of the Fernald material. With that in mind, we make the following recommendations:

Any material transferred to the Portsmouth Site should not be stored in facilities with a viable potential for reuse and alternate job creation. Specifically, any facility targeted for storage should be reviewed and approved by the SODI-DOE's designated Community Reuse Organization. This will ensure the negative impacts to our Re-industrialization Strategy will be minimized.

Buildings X-3002, 3001, 3346, 3000, 1000 (and other facilities) are initial priorities for our Re-industrialization Strategy and should not be considered for Fernald material storage.

If Portsmouth is to receive a portion of the Fernald material, new facilities should be constructed to house the same.

**Response: Comments and recommendations are noted.**

**William M. Pardue, Chair**  
**Oak Ridge Reservation Environmental Management**  
**Site Specific Advisory Board**  
**Oak Ridge, TN 37830**

In analyzing the relative appropriateness of Oak Ridge Operations (ORO) for the receipt and storage of uranium materials from the Fernald Environmental Management Project Site:

1. The distance from Poplar Creek to prospective storage sites at East Tennessee Technology Park (ETTP) is discussed, but the elevation above creek level and flooding history were not mentioned.

**Response:** Information in section 3.5.3 indicates that most of the ETTP site is above the probable maximum flood. Text has been added to specifically state that all proposed storage locations at ETTP are above the 100-year flood level. According to the USGS topographic map for ETTP (DOE 1999), storage location K-131/K-631 elevation is approximately 780 ft, which is about 40 feet above the Poplar Creek level of 735-740 ft. The open area location elevation is about 760 ft, some 20 feet above the Poplar Creek level. Storage location K-1066 F elevation is also approximately 780 feet.

**Water levels in Poplar Creek, which is a tributary of the Clinch River, are controlled to a large extent by Melton Hill Dam approximately 18 km (11 miles) upstream from the confluence of Poplar Creek and the Clinch River. All three locations are outside the 100-year flood plain boundary of Poplar Creek.**

2. No information is given on the average isotopic composition of the depleted uranium (U) present. If the U has nearly natural composition, then the material could compete as feed for gaseous diffusion. If it has the 0.3 or 0.4% U-235 content usual for depleted uranium, the likelihood of sale in the near future may be small.

**Response:** For the purposes of the risk assessment, as stated on page B-9 of the Draft EA, for normal and depleted uranium is considered to be no more than 0.71% U235. This value is considered conservative. The uranium materials discussed in this EA or slated to be marketed or used.

3. How did this project become such an emergency that work must be completed this year, with the result that stakeholders are prevented from having the opportunity for meaningful input?

**Response:** The public has opportunity for meaningful input.

4. Why did DOE-ORO agree to accept the material before the EA was made available?

**Response:** DOE determined that the uranium material was a valuable product and its safe storage and eventual use was appropriate to DOE's mission.

5. It appears that the facility at Portsmouth is a more appropriate site for storage:

- An appropriate site at Portsmouth (X-3002) has been identified where the material can be accommodated.
- Storage of this material is consistent with the Portsmouth mission; it is inconsistent with the current mission at ETTP.
- At Portsmouth, the material will stay within the same regulatory framework as at present.
- The State of Tennessee (TDEC) has reached agreement with DOE to remove stores of depleted uranium hexafluoride from ETTP within the next ten years. There is little sense in shipping a supply of a different fluoride to Tennessee in the near future.

**Response:** Comment noted.

**Earl C. Leming**  
**Director/State of Tennessee**  
**Department Of Environment and Conservation**  
**DOE Oversight Division**  
**761 Emory Valley Road**  
**Oak Ridge, Tennessee 37830**

The Tennessee Department of Environment and Conservation, DOE Oversight Division (TDEC/DOE-O) has reviewed the subject document in accordance with the requirements of the National Environmental Policy Act (NEPA) and associative regulations of 40 CR 1500-1508 and 10 CFR 1021 as implemented.

The State of Tennessee strongly supports the Defense and National Security missions on the Oak Ridge Reservation. The State has not supported use of the Oak Ridge Reservation for storage off offsite materials that have no identified future use or may be declared a waste at some future date.

The Draft EA appears to propose a Monitored Retrievable Storage Facility (MRS) at a site other than Fernald. The Draft EA has not demonstrated that such a facility meets present or future Defense Programs needs for the material or other national security interest, nor has it provided sufficient information to allow the State to consider the overall positive and negative impacts resulting from a transfer of the materials to Oak Ridge.

The Division appreciates the early interaction with the DOE on this issue. We believe cooperation and issue resolution is more likely when the State is involved early in the NEPA process. We would like to see this process continued.

Enclosed for your review and response are general and specific comments.

**Response: Comments are addressed individually below.**

**Tennessee Department of Environment and Conservation/DOE-Oversight  
Comments on the Draft Environmental Assessment  
DOE/ORO-2078, February 1, 1999  
The U.S. Department of Energy, Oak Ridge Operations  
Receipt and Storage of Uranium  
Material from the Fernald Environmental Management Project Site**

**General Comments:**

1. In order to reasonably assess whether the Fernald material is an asset material required for Defense needs or other national security considerations the EA should provide information on existing complex wide inventories of similar material and how much has been transferred over the past five years to the Department of Defense or "other interests."

**Response:** As stated in the EA, FEMP has reduced its uranium inventory from 14,500 to approximately 6,800 metric tons over the past 6 to 8 years. There have been expressions of interest in acquiring the 3,800 MTU product by both private concerns and other federal agencies. Currently there is a temporary moratorium on sales of uranium to private concerns; however, DOE can transfer the material to another agency as the need arises.

2. The EA does not describe a contingency plan for the storage and eventual disposition of this material in case no markets are developed. Although the EA states on page 1-1 there is an "interest" the material is "potentially marketable," and it is in the best interest of DOE to "eventually market or use" the material, DOE may require long-term management of the material. The draft EA risk analysis indicates that a container breach would occur primarily from long-term corrosion. Without proper storage and maintenance the material from Fernald could experience corrosion. The DOE should avoid this situation with the Fernald material by planning for adequate funding for storage and maintenance. The EA should address associated cost for transportation, long term storage, and disposition (including disposal). It should also address any plans for cost recovery through sales or other forms of revenue exchange. The EA should clearly identify the DOE program, which would be responsible for the material and that programs funding assurance or needs to properly store, maintain, and disposition the material. It should also address future decontamination and decommissioning cost of equipment and facilities.

**Response:** DOE-ORO carefully evaluated the FEMP materials and determined what materials were waste and what were product. DOE anticipates an economic or interagency use for the product analyzed in this EA.

3. The draft EA is inconsistent in many areas of consideration. A description of existing, contamination, fire suppression systems, and ventilation was provided for some candidate site buildings, while the buildings at Y-12 and ETTP did not receive the same consideration. Some proposed areas were evaluated as flood zones while areas at Y-12 and ETTP did not have the same evaluation. Other sites were evaluated for upgrades to facilities while there were no assessments done for the buildings at Y-12 and ETTP. In order to evaluate this document for issuance of an EIS or FONSI, complete and consistent information must be provided.

**Response:** While some buildings have fire suppression and other systems, DOE took no credit for these systems during a potential accident event. As noted on page B-6 of the Draft EA—"all facility structures are assumed to be destroyed and nothing but rubble remains. All utilities are lost." DOE believes this approach is conservative. It removes uncertainties from the analysis associated with the whether and/or how well a particular fire suppression system may operate during an emergency or the degree to which a particular building can withstand an earthquake or other natural disaster.

4. It has been indicated that material exists in the inventory that requires a Nuclear Category 2-storage facility. The category should be described and the site(s) under consideration evaluated to determine if they meet the same nuclear category or what will be required to upgrade the facilities to a Category 2. The amount of material requiring Nuclear Category 2 storage must also be identified.

**Response:** The term Nuclear Category 2 refers to the inventory of material and not to the building or storage facility capability.

5. The radioactive contamination levels of candidate buildings must be described. The presentation made to this Division clearly indicated that the material from Fernald would be in clean packages, i.e.: free from external contamination, and would be placed in "pristine" facilities.

**Response:** It is DOE's intent to place the FEMP materials in clean facilities. Buildings that do not or cannot be made to meet this criterion in the time needed will not be used.

6. The transportation evaluations for moving the material were absent from the draft EA and provided only after request. If the containers are transported off site, they must be evaluated for transport suitability, as the document states there have been problems with long-term corrosion.

**Response:** This information is in Appendix A. All material proposed to be shipped from FEMP would be packaged in accordance with Title 49 CFR. Outbound shipments will move in DOE-approved packaging, subject to DOE radiation, contamination or fissile controls and other DOE Federal or state requirements.

7. The EA must address the inspection and maintenance programs that have allowed the long-term corrosion to occur. The final EA should include all incidents of container breaches and releases of material. The final EA should also describe the storage containers including type and thickness of metal.

**Response:** The FEMP materials will be repackaged or refurbished to meet DOT requirements for shipment. The materials will be under a surveillance program, which meets or exceeds DOE requirements.

8. Requested funding in FY 2000 to upgrade the existing facilities at Y-12 for storage of highly enriched uranium has been cut. Additional material stored in substandard facilities increases the risk of release to the environment and exposure to the public. It does not appear the risk analysis used substandard facilities in the evaluation.

**Response:** As noted above, DOE took no credit for building integrity in the event of a natural disaster.

9. At the request of Tennessee, DOE has imposed a limit for storage of LEU at 6 MTU for the Y-12 site. No inventory above that limit is allowed as specified in the Finding of No Significant Impact (FONSI) for the Environmental Assessment (EA) of the "Proposed Interim Storage of Enriched Uranium Above Maximum Historical Storage Level at Y-12 Plant, Oak Ridge, Tennessee."

**Response:** Comment noted.

#### Specific Comments:

##### **10. Page 1-1, Section 1.1 PURPOSE AND NEED FOR THE PROPOSED ACTION**

*"Of the remaining inventory there are approximately 3800 metric tons of potentially marketable material...."* This remaining 3000 metric tons of uranium material that is not potentially marketable should be considered waste.

**Response:** It is considered waste and is being dealt with accordingly.

11. Page 2-1, Section 2.1 BACKGROUND

*“...an area where at least two tension-support structures...”*

The EA should clearly indicate that these are temporary tent-like structures and not permanent buildings.

**Response:** The EA notes that the TSSs would have tarpaulin roofs and sides.

12. Page 2-8, 2.5 Y-12 Plant

The Nuclear Category level and contamination levels (if levels exist) of the buildings should be described.

**Response:** The Nuclear Category level refers to the inventory and not to the building/facility.

13. Page 2-8, 2.6-1 K-1066F Area

The draft EA should specifically state whether the K-1066F area is or is not within a flood zone.

**Response:** A sentence has been added to section 3.5.3, which states that all proposed storage locations at ETTP are above the 100-year flood level.

14. Page 2-8, 2.6-2 K-131 and K-631 Buildings

The *“Remedial Investigation Report for the East Tennessee Technology Park, Oak Ridge, Tennessee, Volume 5”* does not list K-131 as having a basement. Additionally, both buildings are listed as having contamination areas, failing a screen for the report, and requiring further evaluation in the feasibility study. These buildings are currently listed on a decontamination and decommissioning list. During the presentation made to the Division, it was stated by DOE that the storage of this material was to be “pristine” facilities. Storage in contaminated buildings would not meet that goal.

**Response:** Buildings would only be used if they were “clean”. DOE would not use contaminated buildings. It is unlikely that these specific buildings could meet programmatic requirements for storage of this uranium.

15. *“These buildings are approximately 200 ft south of Poplar Creek at its closest point.”*

Explain the significance of this statement in terms of flooding.

**Response:** See response to comment 13 above.

16. Provide information for the meaning of “nominal” in the statement

*“The nominal basement size is 22,765 ft....”*

**Response:** The usable, available space in a building can be slightly smaller than the actual/nominal square footage.

17. Page 2-1, 2.8.1 Commercial Facilities

The requirement to have all the uranium removed from the FEMP site by September 30, 1999, should be cited. Although the draft EA states there *“was not enough time to prepare and issue a competitive request for proposal...”* the DOE has known for some time this material needed to be removed from the FEMP site.

**Response:** Comment noted.

18. Page 3-3 and 3-11, Table 3.1 and Table 3.4

A comparison of Table 3.1 and 3.4 indicates that Cincinnati was included for the Fernald site analysis, but Knoxville was not included in the Oak Ridge site analysis. Knoxville is as close to Oak Ridge as Cincinnati is to Fernald, therefore, Knoxville should have been included in the analysis of the Oak Ridge sites.

**Response:** The Draft EA indicated that the socioeconomic region of influence for FEMP could either be Hamilton County, Ohio or the Cincinnati Metropolitan Statistical Area. DOE chose to include data from both areas. Given the small potential economic impact associated with the proposed action, inclusion of Knoxville data would make no difference to the analysis or conclusions.

19. Page 3-9, Section 3.4.2 Climate and Air Quality

*"For radiological pollutants, emissions are variable and emanate mostly from the TSCA incinerator."* TSCA is not the primary source of radiological emissions. In the 1997 ASER, less than one Curie of radiation was reported as being emitted from the TSCA stack. Over 10,000 Curies were reported as being emitted from the HFIR stack. Only .013 Curies of uranium were released from Y-12 during 1997; however, Y-12 was still in "stand-down" mode. The most effected individual for the ORR was closest to the HFIR stack not the TSCA stack. Please revise this section to reflect the above statistics.

**Response:** Text corrected.

20. Page 3-9, Section 3.4.1 Public and Worker Risk

Y-12 should have the same considerations as Portsmouth and Paducah sites for "radiation dose from airborne radionuclides..." and "collective radiological dose from airborne emissions..." The document is inconsistent in its evaluations.

**Response:** Information added to text.

21. Page 3-9, 3.4.3 Water Resources

Floodplains are not addressed nor is groundwater. This section is inconsistent in evaluation with other sites' sections.

**Response:** Text added.

22. Page 3-10, 3.4.5 Ecological Resources

Lake Reality is not considered waters of the State and is a man-made, spill containment pond that has heavy mercury and PCB contamination. Its location is now adjacent to Upper East Fork Poplar Creek.

**Response:** Comment noted.

23. Page 3-11, Section 3.5 EAST TENNESSEE TECHNOLOGY PARK (formerly K-25 Site)

This section discusses the East Tennessee Technology Park (ETTP) as a possible site. The ETTP is being re-industrialized. The use of the site as a storage area for Uranium material does not appear to meet the current mission for the ETTP. The EA should address the D&D Trust Fund which is the main source of funding for ETTP operations and how ETTP funds would be used to store and disposition the Fernald material.

**Response:** Through 2001 monies to meet the proposed action would come from the FEMP budget. After 2001, funding will be presented as part of DOE-ORO budget request but separate from the D & D Trust Fund.

24. Page 3-11, Table 3.4

Please explain what the "Fernald Region of Influence" (in table title) means and how it impacts Anderson and Roane counties. The "Fernald Region of Influence" is also mentioned in Tables 3.2 and 3.3.

**Response:** Table titles have been corrected.

25. Page 3-11, 3.5.1 Public and Worker Risk

ETTP should have the same considerations as the Portsmouth and Paducah sites for "radiation dose from airborne radionuclides..." and "collective radiological dose from airborne emissions..." Again, the document is inconsistent in its evaluations.

**Response:** Text added.

26. Page 3-12, 3.5.3 Water Resources, Surface Water

*"...most of ETTP is above maximum flood level"* does not adequately describe the potential for flooding at proposed storage sites. Flood levels are measured in terms of "X" year floods, that is, a 25-year flood will reach a certain elevation above sea level in a certain location, while a 100-year flood will reach a higher

elevation in the same location. The proposed locations for this material are located near Poplar Creek. The paragraph should provide specific information whether or not a flood could inundate the area and the flood plain year (25, 100, etc.)

**Response:** Requested information added.

**27. Page 3-12, 3.5.3 Water Resources, Groundwater**

*“...conduit-dominated flow has been confirmed only in portions underlain by Knox carbonate along Black Oak Ridge.”* One-third of all bedrock wells at ETTP intersects cavities, which are generally water-filled. At least one of the proposed locations had adjacent dolines shown on topographic and geologic maps of the area. Conduit flow should be and is the base assumption for unconfined carbonate aquifers such as those that underlie the ETTP proposed storage sites. The fact that conduit flow has only been delineated in one area at ETTP should not be used to imply that conduit flow does not exist in other carbonate units beneath the site.

**Response: Comment noted.** DOE considered all activities associated with the proposed action including both normal operations and accident conditions. Surface and ground water resources would not be adversely affected.

**28. Page 4-1, 4.1 Public and Worker Risk, first paragraph**

Provide information for the statement *“In addition, the initial assessment to determine...”* specifically outlining what is meant by *“a review of the fate of the uranium in the off-site environment...”* Also provide information as to where this assessment appears in the appendices.

**Response:** Accidental release of uranium has been evaluated for each site. Additional information on metal toxicity was added to the EA in section 4.0 and text revised.

**29. Page 4-2, 4.1 Public and Worker Risk, first and second paragraph**

*“Uranium that is released from primary and secondary containment...”* It appears that the modeling did not use the tension support structures proposed for storage of this material.

**Response:** As noted in the response to comment # 3 above, DOE took no credit for building integrity during a seismic-fire event. Thus releases during these accident conditions are assumed to be the same for a permanent brick-and-mortar building as for a TSS. This assumption is environmentally conservative and likely over estimates adverse effects in many situations.

**30. Page 4-8, 4.6.1 Normal Operations, fifth paragraph**

*“...Workers could be exposed to direct radiation from surface contamination”*

Storage containers should not have any surface contamination. The DOE’s original presentation to this Division stressed the packages would be clean and kept in a clean environment. Although these packages may be stored on brown field areas, they are not scheduled to be in any type of secondary containment building. Containers should be free of contamination to prevent release of surface contamination to areas outside the designated storage.

**Response:** This is correct; storage containers should not have any surface contamination and the EA notes the precautions taken to prevent such an occurrence.

**31. Page A-3, Appendix A**

To prevent moving the material twice or more, the 193 MTU of normal uranium scheduled to be used for blend stock should be moved directly to the sites using the material. Furthermore, if other users for the inventory are identified, the material should be transported directly from Fernald to the user to avoid transporting twice. The total pounds and MTU amounts do not match the total s given on page A-4 and Table B.1

**Response:** Comment noted.

32. Page A-5, Appendix A

The chart is describing “depleted” uranium but the total is stated for “all normal.”

**Response:** Chart corrected.

33. Page B-4, Appendix B, Table B.1

The inventory amounts for the total normal uranium MTU do not match the amount listed in Appendix A, page A-3. The total low-enriched uranium pound amount does not match the amount listed in Appendix A, page A-7.

**Response:** Comment noted.

34. Page B-6, Table B.4

The tornado wind speed for Oak Ridge is less than Fernald and Paducah. How was the wind speed determined, and why was it less for Oak Ridge?

**Response:** The source document for these data were added to the appendix. The information is based on historical data. A variety of factors determine tornado wind speed; however, the hilly topography in the Oak Ridge area is a likely contributor to lower wind speeds other areas with flatter terrain.

35. Page B-6, Appendix B, page B-5, Table B.2, and Container Breach

It is listed that an accident involving a container breach due to corrosion or degradation of the storage containers could occur. The condition and age of the storage containers should be fully examined and included in the final EA. The material also needs to be fully evaluated for transportation in the final EA.

**Response:** Virtually all containers are new and in excellent condition. The T-hoppers are older but are very thick walled vessels. All containers will meet DOE transportation requirements. The containers are proposed to be stored in the dry in buildings or Tension Support Structures. The uranium is relatively inert, insoluble, and non-corrosive. Container breach would most likely under an accident scenario rather than from corrosion.

36. Page B-7, Appendix B, third paragraph

*“...it is assumed that the uranium storage facility is a Hazard Category 2 facility...”* The hazard analysis appears to assess storage in a Hazard Category 2 facility but not storage in the tension-support structures (TSS) or outside storage pads.

**Response:** see response to comment #12 above.

37. Page B-9, Appendix B

Please explain the blank line for the first bullet regarding breathing rate.

**Response:** This rate is based on recommendations from the International Commission on Radiological Protection. This source information has been added.

38. Page B-15, Appendix B, Table B.8

The calculations for public dose needs to be re-evaluated as the ETTP site is undergoing re-industrialization, members of the public are not restricted to outside the site fence boundaries.

**Response:** Industrial workers are treated in the assessment as workers or co-located workers.

**Ms. Joelle Key**  
**Health Physicist**  
**Department of Environment and Conservation**  
**Division of Radiological Health**  
**3<sup>rd</sup> Floor, L & C Annex**  
**401 Church Street**  
**Nashville, TN 37243-1532**

Thank you for the opportunity to review the Environmental Assessment for the Receipt and Storage of Uranium Materials from Fernald Environmental Management Project Site. The Division of Radiological Health has the following comments about this document:

1. There are a number of special security considerations for the movement and storage of the LEU material. Since the Y-12 site currently stores some HEU and LEU, that site appears to be the best location for the storage of the LEU material if it is to be stored in Oak Ridge.

**Response: Comment noted.**

2. This proposal treats the uranium in question as a “product” but the only mention of an actual customer for the product is for the LEU. The State of Tennessee already contains hundreds of cylinders of Depleted Uranium in the form of UF6 which the Department insists can be marketed as a product, but for which they have been unable to find a buyer. While the UF6 situation is different because of the need to convert the uranium to a usable form, the situation is similar.

**Response: The Department of Defense uses depleted uranium in certain weapon systems.**

3. In the proposal to store the material at K-25, the “co-located worker” is considered to be closer than the member of the public. This is not an accurate assessment of this site. Due to the re-industrialization of the ETTP site members of the public work at and visit this site regularly. The concept of a “co-located worker” for non-radiation workers is a DOE fabrication and is not recognized elsewhere.

**Response: DOE believes the assessment of industrial workers at re-industrialized facilities as co-located workers is accurate and appropriate.**

4. The EA states that the intent is to get approval for storage of the material at “one or more site.” If the intent of this statement is to leave several options open then we have no objection to this intention. If on the other hand the intention is to scatter the material to different sites then this causes us concern. Storing the DU and HEU at different sites may be necessary but scattering the DU material to various locations appears inefficient. For example, using more than one site would require that personnel be hired and trained to monitor the material at each of the sites. This does not appear to be the most efficient use of resources. Some of the sites being considered, such as the Y-12 site, do not have enough storage space for all of the material. If a site cannot contain all of the DU material, then we do not think it should be considered for storage of this material.

**Response: Comment noted.**

5. The accident assessment for the ETTP site and specifically for the K-1066F site describes the worst credible accident dose to the public as a low dose. The dose calculated is 1.26 rem. This should not be considered a low dose. Evacuation of the public is recommended at a projected dose of greater than 1 rem.

**Response: The methodology for risk and associated terminology used is presented in Appendix C.**

6. On page B-9, the first bullet at the bottom of the page is incomplete. It contains a blank underlined space, which was most likely intended to be filled in. The information is included on the page but should also be included in the bulleted line.

**Response: This rate is based on recommendations from the International Commission on Radiological Protection. This source information has been added.**

7. On page B-11, a chart lists the distances to the site boundary from each building considered. This distance was used in the accident assessment as the distance to the nearest member of the public. Given the development of private enterprise on this site ETTP is a public site. Given this, the site boundary is not a reasonable measurement for this calculation for those three buildings. The accident assessment for all three buildings should be reevaluated, this includes the K1066F site which already represents the highest accident dose of 1.26 rem.

**Response: DOE believes the assessment of industrial workers at re-industrialized facilities as co-located workers is accurate and appropriate. The boundaries to the public are correct.**

8. Page B-13 includes a table that lists radiological consequence levels to the public and to workers and associates these with a descriptive word. A public dose ranging from  $\geq 0.1$  rem to  $< 5$  rem is described as having low consequences. This seems an unreasonably high range for a low consequence dose.

**Response: The methodology for risk and associated terminology used is presented in Appendix C.**

9. Many of the proposed storage locations are not in the form of already existing buildings, but are empty lots on which Tension Support Structures (TSS) would be built. These buildings do not appear to be as secure as a real building. How reasonable is it to store this type of material in this type of building?

**Response: All the uranium product is packaged in containers suitable for transport and will be stored in this packaging. There is practically no risk during normal operations in any structures. During accident conditions, risks are minimal even taking into consideration that DOE takes no credit for containment by buildings during the seismic-fire event. Use of TSSs appears to be a viable method of storage. All buildings and TSSs are proposed in locations that are in DOE property protection areas and are thus secure.**



MR. DAVID R ALLEN  
ORO NEPA Compliance officer  
DEPT OF ENERGY  
OAK RIDGE OPERATIONS OFFICE  
P.O. BOX 2001  
OAK RIDGE, TENNESSEE 37831

02-05-99

DEAR MR. ALLEN:

THANK YOU VERY MUCH FOR THE DRAFT  
DOE/ORO - 2078. I WANT TO MAKE THE  
COMMISSION AWARE THAT I HAVE 53 ACRES  
OF LAND 18 MILES EAST OF SIERRA BLANCA,  
TEXAS WHICH IS 88 MILES EAST OF EL PASO,  
TEXAS.

I KNOW THAT NUCLEAR WASTE IS BEING  
STORED HERE BY THE SIGNS ETC, AND  
A VISIT TO MY PROPERTY. I MAKE MY PROPERTY  
AVAILABLE AT A GOOD COST TO THE D.O.E,  
AND I KNOW A LOT OF OTHER ACREAGE  
WOULD BE AVAILABLE.

THANK YOU & PLEASE REPLY.

*Walter Frazier*

Mr. Walter Frazier  
2230 Russell Ave.  
West Portsmouth, Ohio 45663-6247

OFFICIAL FILE COPY  
AMESQ

Log No. C 0139  
Data Received FEB 10 1999  
File Code                   

PH-1-740-858-2614

to  
The U.S. Department of Energy

Dear Sir

I am opposed to the D.O.E.  
Plan to make West Kentucky a  
nuclear waste dump. The Paducah  
plant site is on a major earthquake  
fault and our experts say the big one  
could happen any time and be a  
major desaster. We don't need any  
more nuclear waste in fact the nuclear  
waste we now have should be sent  
some place else.

Yours truly  
A.B. Pickett



Mr. Alfred B. Puckett  
6365 Bethel Ct. Rd.  
Kevil, KY 42053

PADUCAH, KY 42001-0213/361381-1  
1983



Carrie Allen  
N.E.PA Compliance Officer  
Oak Ridge Operations  
S.E.-32  
PO Box 2081  
Oak Ridge, TN 37831

130 Oklahoma Avenue  
Oak Ridge, TN 37830  
February 14, 1999

David R. Allen  
ORO NEPA Compliance Officer  
Dept. of Energy Oak Ridge Operations Office  
PO Box 2001  
Oak Ridge, TN 37831-2001

Dear Mr. Allen:

**Subject: Comment on EA for USDOE/ORO Receipt and Storage of Uranium Materials from the Fernald EM Project Site.**

The subject document has some notable deficiencies from the perspective of the attentive public concerned about decisions affecting the Oak Ridge environment:

- I found no information on the toxic effects of uranium other than the radioactivity.
- The reader is told of the distance from Poplar Creek of prospective storage locations at ETTP, but the elevation above creek level and flooding history were not mentioned.
- No information is given on the average isotopic composition of the depleted uranium present. If the U has nearly natural composition, then the material could compete as feed material for gaseous diffusion. If it has the 0.3 or 0.4 % U-235 content usual for depleted uranium, the likelihood of sale in the near future may be small.
- I could not readily determine the basis of the risk calculations. Statements about air concentrations near the ORR seem questionable. Pg. 3-1 suggests the normal background dose rate is 0.5 mrem/hr. Unusual!
- The description of hypothetical accidents was inconsistent or at least so obscure I could not follow it.

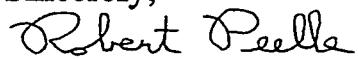
Since willingness of the public to accept risks from any project must depend on potential benefits or at least whether the project makes any sense, other questions intruded which need consideration in the final alternative selection:

- How on earth did this project become such an emergency that work must be completed this fiscal year, so adequate comment time cannot be afforded?
- Why did DOE/ORO agree to accept the material before the EA was made available?

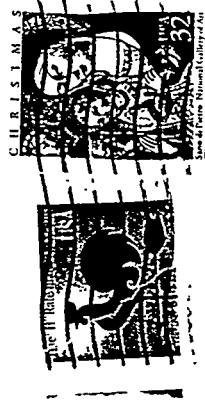
Regardless of the above points, it appears to this reader that the facility in Portsmouth is the logical choice for storage because:

- An appropriate building has been identified where the material can be accommodated,
- Storage of such material is aligned with the site mission more correctly at considered locations other than ETTP in Oak Ridge,
- At Portsmouth the material will stay within the same regulatory framework as at present, and
- Since the EA was issued, I read that that Tennessee (TDEC) has been promised that stores of depleted uranium hexafluoride will be removed from the state within ten years. If so, there would be little sense in shipping a supply of a different fluoride to Tennessee in the near future!

Sincerely,



Robert Peelle



Mr. Robert W. Peele  
130 Oklahoma Ave.  
Oak Ridge, TN 37830-8604

Mr. David R. Allen  
ORO NEPA Compliance Officer  
Dept. of Energy Oak Ridge Operations Office  
PO Box 2001  
Oak Ridge, TN 37831-2001

John, These are Kristi and my comments on the Fernald EA on behalf of ourselves and RACE. Could you forward these to David Allen or send me his email address so I can submit them today? thanks a lot. If you have any questions, let me know. Mark D.

David Allen  
U.S Dept. of Energy  
Oak Ridge Region  
March 4, 1999

Dear DOE,

These are the comments of the undersigned on the draft EA for the movement of uranium materials from Fernald.

1. The purpose of an EA is to determine the potential significance of a proposed action. Certain factors are required by the CEQ in their NEPA regs to be considered by the agency in making this determination. These factors are found at 40 CFR 1508.27. This is, in fact, a site-specific project, and therefore, requires a site-specific context in applying these factors in the significance determination. It is our opinion that a compliant application of these factors would not result in a finding of no significant impact. Factor # 7 is the requirement that the agency look at cumulative effects during the significance determination. Some courts (for example, the 5th circuit) have ruled that during the threshold determination of significance, the duty to look at cumulative effects is even more detailed than during the EIS process, for if a FONSI is issued, this will be the only look at cumulative effects of the proposal.

**Response:** Cumulative impacts were examined and documented in section 4.8. DOE used the definition of cumulative effects defined in the CEQ Regulations. The effects of the proposed action when combined with past, present, and reasonably foreseeable future actions do not result in significant adverse impacts.

2. On its face, this EA is deficient. The EA inappropriately segments the actions into transportation, storage, and final disposition for purposes of NEPA analysis. This is a clear violation of NEPA. In a convoluted "Addendum", the agency tries to fast talk its way out of its duties to consider the combined effects of the storage, transportation, and long-term disposal, but this fails miserably. This is a site specific proposal, and a 1994 EA done for another part of the project, which, while it should have included the entire process, could not have because the proposal to move the material had not been made, cannot be adequate to meet the public information and scrutiny aspects of NEPA. This is not fully informing the public.

**Response:** As shown in the Addendum, DOE fully considered transportation of the uranium materials in several documents beginning in 1994. NEPA and CERCLA were followed and public review and comment were solicited on these actions. Further, the outbound shipments

from ORO will move in DOE-approved packaging, subject to DOE radiation, contamination or fissile controls and other DOE Federal or State requirements.

3. In addition, there are cumulative effects from other ongoing projects at Paducah. These are clearly documented in the site management plan, which has not undergone NEPA review. While the management at Paducah keeps repeating as its mantra that the CERCLA analysis meets all the requirements of NEPA, the transportation addendum flatly contradicts this, stating, (finally) that "...DOE excludes Removal actions from requiring detailed NEPA documentation..." There is no doubt that there needs to be a cumulative effects analysis done of ALL the action ongoing at the site, and segmenting each individual project into a discreet analysis unit is not in compliance with NEPA. If such an analysis were undertaken, there would be no doubt that the impact would be potentially significant and require an EIS. This would and should be the site-wide EIS we have been calling for years. At a bare minimum, this should require a supplement to the EIS process ongoing for the depleted uranium, but DOE isn't even doing this. This EIS process is fatally flawed unto itself for being segmented into a discreet unit, while there are considerable and significant other actions ongoing at the site with cumulative impacts.

**Response:** Comment noted; see responses to comments 1 and 2 above.

4. Two other factors which are potentially significant relevant to this process are the effects on public health and safety, and the scientific uncertainty surrounding the proposal. Clearly, if there is emissions and escape of radio nuclides or uranium element into the environment which gets distributed into the food chain or into an environmental media which could cause any kind of ecological or human exposure, there is clearly a public health and safety concern which is significant. While DOE, as typical, attempts to brush these concerns off with a broad brush of statements of no impact, these conclusory statements are supported on the record with nothing. They do not comply with NEPA, which requires that findings such as this be supported with valid, objective data, which can be obtained by the public, and which is clearly identified in the record. Conclusory statements of no impact impress us not, and are in violation of NEPA. What are the emission rates of the various materials, and what are the exposure routes. What are the ecological effects, and what is the time span these effects could continue. These questions are not adequately answered or supported in the EA.

**Response:** As indicated in the DEA, emissions under normal operating conditions are effectively zero. The outside of the containers in which this material is packaged can be safely handled and workers require no special protection when working near the containers. Under accident situations, the doses (facility worker, co-located worker, and the public) are computed and the risk of exposure determined (see Table B.8).

5. The biggest scientific uncertainty associated with the Paducah site is the seismic hazard. It is common knowledge that the site is within a high risk seismic zone. Just recently, there has been renewed media stories about the Central Midwest Consortium's annual meeting and their call for earthquake preparedness in our region. Yet, DOE brushes this off inexplicably. This is clearly potentially significant, and needs a hard look site-wide.

**Response:** The radiological risk associated with these uranium materials was determined for several scenarios including seismic risk (Table B.8).

6. In addition, just the fact that DOE is calling this a temporary move because they don't know what to do with the materials long term is clear evidence that there is strong scientific uncertainty associated with these materials.

**Response:** The uranium materials are being moved from FEMP in order to comply with a regulatory commitment made to the state of Ohio. DOE expects to sell these materials as commercial product.

7. Another factor is the effects on federally listed species. While the EA lists the evening bat as federally listed, we don't believe that is correct. However, the Indiana Bat is clearly critically endangered. The conclusion that it does not occur on the plant site is not supported by the record. A clear look at the record on Indiana Bats shows that their foraging range could easily put them into the range of impact. They could easily consume insects which have become contaminated with emissions from this material. If this affects their reproductive capacity, which some evidence suggests, then this could be construed as "harm", which would be a take. It is the opinion of the commentors that an incidental take permit is necessary at this point to continue any cleanup or production activities at the plant, and failure to have completed formal Section 7 consultation to implement conservation guidelines to minimize the take is a violation of the Endangered Species Act, which would be potentially significant also under the CEQ guidelines.

**Response:** DOE is consulting with the U. S. Fish and Wildlife Service and state fish and game departments regarding any potential adverse impact to protected species.

8. Another potential regulatory requirement which is not mentioned in the EA is the possible requirement for a point source runoff permit for the storage area and the immediate adjacent lands. Where will this area drain, and what kind of contamination can we expect in these runoffs?

Finally, wouldn't this require a RCRA permit? How would the lands being proposed for storage be regulated? What capacities would be allowed? What storage requirements would be set? How would the public be involved in this process?

**Response:** DOE will comply with all regulatory requirements.

These are all questions which need to be answered.

Thank you for considering these comments, and please keep us on the mailing

list to receive future mailings regarding this proposal.

Mark Donham  
Kristi Hanson  
RACE/Heartwood  
RR # 1, Box 308  
Brookport, IL 62910  
618-564-3367(H)  
502-443-3082(W)

# OhioEPA

State of Ohio Environmental Protection Agency

## Southwest District Office

401 East Fifth Street  
Dayton, OH 45402-2911

TELE: (937) 285-8357 FAX: (937) 285-6249

George V. Voinovich, Governor  
Nancy P. Hollister, Lt. Governor  
Ronald R. Schegardus, Director

March 3, 1999

Post-It™ brand fax transmitted memo 7671		# of pages
To: STEVEN WYATT	From: GRAHAM MCFARLAND	2
Co: DOE - ORO	Co: DIA - EPA	
Dept:	Phone #	
FAX # 423-576-1665	FAX # 937-285-6249	

Mr. David Allen  
NEPA Compliance Officer  
U.S. Department of Energy  
Oak Ridge Operations Office  
SE-32  
P. O. Box 2001  
Oak Ridge, TN 37831-2001

Dear Mr. Allen:

Listed below are Ohio EPA's comments on the Uranium Receipt and Storage EA:

### General Comments

1. Ohio EPA concurs with the EA conclusion that the DOE Fernald site does need to remove 3800 metric tons of uranium from the site in order to complete cleanup activities at Fernald.
2. If the ultimate location for this material is to be at the DOE Oak Ridge facility in Tennessee, we would recommend that the material be sent there directly from Fernald to Oak Ridge. This will reduce overall shipping costs and reduce transportation risks by handling this material only once.
3. If any of this material is shipped to the Portsmouth Gaseous Diffusion Plant for interim or long term storage, funding should be provided to the Portsmouth site to cover the costs of managing this material. The Portsmouth cleanup budgets have been cut significantly in the past several years and this storage effort should not further impact the Portsmouth cleanup program.

### Specific Comments

1. Page 3.1.8 Infrastructure  
Fernald discharges treated effluent to the Great Miami River not the Little Miami River.

OFFICIAL FILE COPY

AMESQ

Log No. C 0278

Date Received MAR 04 1999

File Code

Printed on Recycled Paper

Mr. David Allen  
March 3, 1999  
Page 2

Please contact me if you have any questions about these comments.

Sincerely,



Graham E. Mitchell  
Chief, Office of Federal Facilities Oversight

cc: Tom Schneider, OEPA  
Donna Goodman, OEPA  
Melody Stewart, OEPA  
Diana Cahall  
Jack Craig, DOE Fernald  
Melda Raferty, DOE Portsmouth



**LOC**  
INC  
**Oak Ridge Reservation  
Local Oversight Committee**

OPTIONAL FORM 98 (7-90)

March 2, 1999

Mr. David Allen  
NEPA Compliance Officer  
Oak Ridge Operations, SE-32  
U. S. Department of Energy  
P.O. Box 2001  
Oak Ridge, TN 37831

**FAX TRANSMITTAL**

# of pages ▶ **12**

To	Wayne Tolbert	From	Melisa Hart
Dept/Agency	SAIC	Phone #	576-8983
Fax #	481-8797	Fax #	
NSN 7540-01-317-7368		5069-101	
GENERAL SERVICES ADMINISTRATION			

**Subject:** *Comments on the Draft Environmental Assessment (EA) for the U.S. Department of Energy, Oak Ridge Operations, Receipt and Storage of Uranium Materials from the Fernald Environmental Management Project Site (DOE/ORO-2078)*

Dear Mr. Allen:

The Oak Ridge Reservation (ORR) Local Oversight Committee, Inc. (LOC) submits the following comments on the subject draft EA. The LOC Board of Directors voted unanimously to comment that the LOC would have no objection to storage of uranium materials at Y-12 that are consistent with its mission. However, the LOC objects to storage of additional uranium materials at K-25, also known as East Tennessee Technology Park (ETTP), considering that the uranium hexafluoride (UF6) cylinders currently stored there are a disincentive to reindustrialization and a potential hazard to workers.

The LOC is a non-profit regional organization funded by the State of Tennessee and established to provide local government and citizen input into the environmental management and operation of the DOE ORR. The Board of Directors of the LOC is composed of the County Executives of Anderson, Knox, Loudon, Meigs, Morgan, Rhea, and Roane Counties; the Mayor of the City of Oak Ridge; and the Chairs of the Roane County Environmental Review Board, the City of Oak Ridge Environmental Quality Review Board, and the LOC Citizens' Advisory Panel (CAP). The CAP has up to 20 volunteer members with diverse backgrounds who represent the greater ORR region.

No preferred alternative is given in the EA. The CAP proposes that storage of the uranium materials at the Portsmouth Gaseous Diffusion Plant be the preferred alternative, for the following reasons:

1. The Portsmouth facility offers the most options and even has an empty building (X-3002) suitable for storing the uranium material. The proposed action is consistent with the current mission at Portsmouth. Storing the uranium material at Portsmouth also avoids transfer of materials across state lines.

**Anderson • Meigs • Rhea • Roane • City of Oak Ridge • Knox • Loudon • Morgan**

136 S. Illinois Ave., Suite 208 • Oak Ridge, TN 37830 • Phone (423) 483-1333 • Fax (423) 482-6572 • E-mail: loc@icx.net

D. Allen  
March 2, 1999  
Page 2

2. Receipt and storage of these materials is not consistent with the current ETTP mission. The Oak Ridge public and the Tennessee state regulators are increasingly unwilling to accept the continued storage of the depleted UF6 at ETTP, as there is no defined use for the material in the foreseeable future and the cylinders require ongoing surveillance and maintenance to ensure that they are not breached. DOE should not propose storage of additional depleted uranium when the existing stockpile is destined for removal and/or conversion to a stable oxide form.
3. Most of the uranium is depleted (2761 metric tons); locating it at Y-12 in its doubly secure area is not in keeping with the current Y-12 mission. However, locating the 799 metric tons of low-enriched uranium (LEU) at Y-12 until its sale is finalized appears commensurate with the plant's mission.
4. The Paducah site is limited in space and has increased earthquake and wind hazards. The action is otherwise consistent with its mission, although it is a less advantageous location than Portsmouth for these reasons and due to the transportation distance.

If you have any questions regarding these comments, please call me at 483-1333.

Sincerely,



Susan L. Gawarecki, Ph.D., P.G.  
Executive Director

cc: LOC Citizens' Advisory Panel  
LOC Board of Directors  
Bill Pardue, Chair, ORREMSSAB  
Earl Leming, Director, TDEC DOE-O  
Steve Richardson, Acting Manager DOE ORO  
Carol Borgstrom, Director, Office of NEPA Policy & Assistance, DOE-HQ  
Charles E. Bradley, Jr., Office of Nuclear Energy, Science and Technology

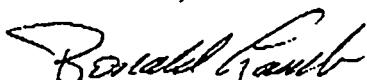
February 22, 1999

David Allen  
NEPA Compliance Officer  
Oak Ridge Operations  
SE-32  
P.O. Box 2001  
Oak Ridge Tn. 37831

Dear Mr. Allen,

I wish to submit my comments on the Fernald EA. There are several reasons for not moving the uranium metal to Paducah. The first is Paducah is a small site and has more than our fair share of waste, such as 40,000 cylinders of our own and several tons of scrap metals. Paducah does not have a facility to store this metal and would have to build one. The second reason is that the Paducah plant is near the New Madrid earthquake zone. Geologists predict a severe quake to strike the region in the next few years. For this reason the Paducah Plant should move our waste out of the region. I feel certain that the Department of Energy would disagree since a lot of our waste lies in 14 ton cylinders, but these cylinders have small 2 inch fill valves with very little protection. I feel there will be numerous breaches of these fill valves during an earthquake. I believe we should be reducing the waste at Paducah instead of bringing more to this area for storage. I have included information of the fault from the earthquake consortium and a list of seismic data activity.

Thank You,

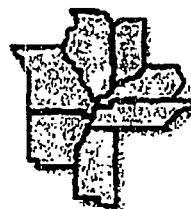


Ronald Lamb  
10990 Ogden Landing Rd.  
Kevil, Ky. 42053

OFFICIAL FILE COPY  
AMESQ

Log No. C 0250  
Date Received MAR 04 1999  
File Code

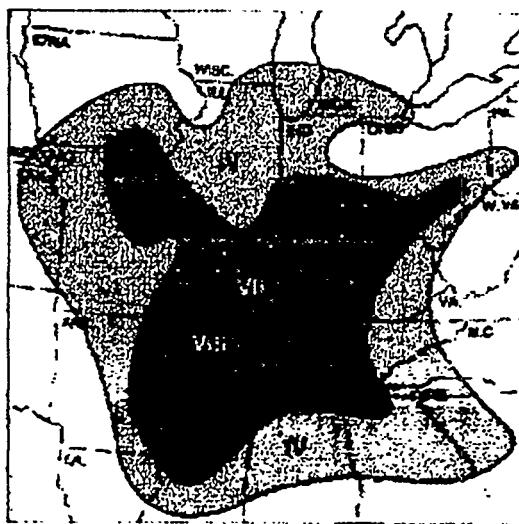
# Central United States Earthquake Consortium



## The Great New Madrid Earthquake

In the winter of 1811-1812, the central Mississippi Valley was struck by three of the most powerful earthquakes in U. S. history. Even today, this region has more earthquakes than any other part of the United States east of the Rocky Mountains. Government agencies, universities and private organizations are working to increase awareness of the earthquake threat and to reduce loss of life and property in future shocks.

The 400 terrified residents in the town of New Madrid (Missouri) were abruptly awakened by violent shaking and a tremendous roar. It was December 16, 1811, and a powerful earthquake had just struck. This was the first of three magnitude-8 earthquakes and thousands of aftershocks to rock the region that winter.



Survivors reported that the earthquakes caused cracks to open in the earth's surface, the ground to roll in visible waves, and large areas of land to sink or rise. The crew of the New Orleans (the first steamboat on the Mississippi, which was on her maiden voyage) reported mooring to an island only to awake in the morning and find that the island had disappeared below the waters of the Mississippi River. Damage was reported as far away as Charleston, South Carolina, and Washington, D.C.

These dramatic accounts clearly show that destructive earthquakes do not happen only in the western United States. In the past 20 years, scientists have learned that strong earthquakes

in the central Mississippi Valley are not freak events but have occurred repeatedly in the geologic past. The area of major earthquake activity also has frequent minor shocks and is known as the New Madrid seismic zone.

Earthquakes in the central or eastern United States effect much larger areas than earthquakes of similar magnitude in the western United States. For example, the San Francisco, California, earthquake of 1906 (magnitude 7.8) was felt 350 miles away in the middle of Nevada, whereas the New Madrid earthquake of December 1811 (magnitude 8.0) rang church bells in Boston, Massachusetts, 1,000 miles away. Differences in geology east and west of the Rocky Mountains cause this strong contrast.

The loss of life and destruction in recent earthquakes of only moderate magnitude (for example, 33 lives and \$20 billion in the 1994 magnitude-6.7 Northridge, California, earthquake and 5,500 lives and \$100 billion in the 1995 magnitude-6.9 Kobe, Japan, earthquake) dramatically emphasize the need for residents of the Mississippi Valley to prepare further for an earthquake of such magnitude. Earthquakes of moderate magnitude occur much more frequently than powerful earthquakes of magnitude 8 to 9; the probability of a moderate earthquake occurring in the New Madrid seismic zone in the near future is high. Scientists estimate that the probability of a magnitude 6 to 7 earthquake occurring in this seismic zone within the next 50 years is higher than 90%. Such an earthquake could hit the Mississippi Valley at any time.

In 1811, the central Mississippi Valley was sparsely populated. Today, the region is home to millions of people, including those in the cities of St. Louis, Missouri, and Memphis, Tennessee. Adding to the danger, most structures in the region were not built to withstand earthquake shaking, as they have been in California and Japan. Moreover, earthquake preparations also have lagged far behind.

Recognizing these problems, the U.S. Geological Survey (USGS) and other organizations are joining in actions that will greatly reduce loss of life and property in future temblors:

- In 1983, the states of Arkansas, Illinois, Indiana, Kentucky, Mississippi, Missouri, and Tennessee formed the Central United States Earthquake Consortium (CUSEC). CUSEC improves public earthquake awareness and education; coordinates multi-state planning for earthquake preparedness, response, and recovery; and encourages research in earthquake hazard reduction.
- In 1990, the USGS, advised by private, academic, and government experts, issued a plan for intensified study of the New Madrid seismic zone. At the same time, the National Earthquake Hazards Reduction Program expanded efforts in the central United States.
- Earthquake education is now part of the curriculum in the schools of many CUSEC states. In Kentucky, the state legislature has mandated that earthquake education be taught in schools.

- Earthquake Awareness Weeks have been held in Arkansas and Kentucky for several years, and in Tennessee starting in 1995.
- Volunteer earthquake advisory councils or similar organizations have been formed in most CUSEC states
- In 1993, with USGS support and collaboration, the CUSEC state geologists began a significant effort to map earthquake hazards. In 1995 they completed a regional soils map that can be used to locate areas likely to experience intense shaking in earthquakes.
- Most CUSEC states have adopted building codes containing modern earthquake design standards
- Efforts to ensure the seismic safety of critical structures, such as dams, bridges, and highways, have accelerated. For example, in 1990, transportation agencies in Illinois, Kentucky, and Tennessee initiated programs to strengthen highway bridges that do not meet earthquake design standards.

Strong earthquakes in the New Madrid seismic zone are certain to occur in the future. In contrast to the western United States the causes and effects of earthquakes in the central and eastern United States are just beginning to be understood. Through better understanding of earthquake hazards and through public education, earth scientists and engineers are helping to protect the citizens of all parts the United States from loss of life and property in future earthquakes.

*For more information Contact:*  
The U.S. Geological Survey 901-678-2007  
Center for Earthquake Research and Information  
The University of Memphis, Memphis, Tennessee 38152

*For more details Visit:*  
The Virtual Times, New Madrid Earthquake section.

*U.S. Geological Survey Fact Sheet-188-95, 1995*

## New Madrid Fault Poses Potential Risk to Midwestern States

Posted on Fri, 24 Apr 1998 17:16:21 GMT

Written by Jennifer Brill, DisasterRelief.org Writer

Six million people living in midwestern states could be at risk if an earthquake occurred along the New Madrid fault line which runs diagonally from Marked Tree, Arkansas to southeastern Missouri.

That's why the Central U.S. Earthquake Consortium headquartered its operation in Memphis, the southernmost largest city on the fault

An earthquake in this midwest region would cause more damage than one on the west coast, says Elaine Clyburn, a response planner with Red Cross Disaster Services. Clyburn is assigned to the consortium to help educate the community on earthquake preparedness.

In addition to the fault line, the region's geology poses additional challenges.

Because the soil in the central U.S. is looser and sandier than on the west coast, Clyburn says, "the shockwaves from an earthquake would travel much farther and the same magnitude earthquake on the west coast would be about 10 times worse in the central U.S."

Experts say that an earthquake could occur anywhere along the fault line running from Memphis to its northern point in St. Louis.

Seven states especially at risk from the New Madrid fault line belong to the consortium: Arkansas, Illinois, Indiana, Kentucky, Missouri, Tennessee and Mississippi.

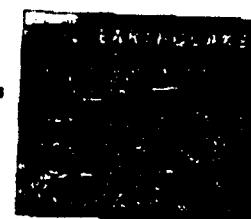
"In the central U.S., a major earthquake would affect the entire country," Clyburn says. "A lot of commerce depends on railroads and 18-wheelers. It would be like having a hole in the middle of the country."

The worst quake to hit this region occurred in 1811 when the earth moved enough to cause the Mississippi River to temporarily reverse its usual course of north to south. Whole lakes were created, such as the Reelfoot Lake in Kentucky.

In 1811 the population was a fraction of its current size. Today, many more people would be affected by a quake similar to that of 1811, which registered around 9.0 on the Richter scale. Clyburn says that would be "so scary that it's hard to talk about preparing for it."

The possibility of such a quake should offer residents a strong incentive to learn how to ready themselves for an earthquake during April's Earthquake Preparedness Month.

Clyburn says that enhanced preparation is especially necessary in the Memphis-St. Louis area where adhering to building codes is an issue.



"Humanity has not paid much attention to where we put our buildings. We like the idea of building where we want to build," which may not be such a good idea when a fault line is involved.

Each of the seven states at risk from the New Madrid fault line promotes awareness, supported by the consortium. Building awareness takes on several forms, Clyburn says, such as sponsoring poster contests for children and posting displays at the public library.

"There's no way to predict when one could happen," Clyburn says, though she adds, "There's an excellent chance that we'll have a major earthquake in the next 15 years."

The area has two earthquakes a week but they're generally not felt. Instruments placed underground, called "seismic networks," are sensitive enough to differentiate between a train and a tremor in the earth.

"It's easy to behave as if there is no threat, or to be unaware of it," Clyburn says. "That's why we try to educate people."

Since earthquakes can't be predicted, they're generally talked about in terms of probabilities and historical evidence

"A fault is buried under the earth, so it's not like looking at the sky and seeing a dark cloud," Clyburn explains.

#### Related Stories

- [Preparing for Earthquakes is a Lesson in Strength](#) -- December 2, 1997

#### Related Links

Are you Ready for an Earthquake? [English](#) or [Español](#)

[Central United States Earthquake Consortium](#)

[Los Angeles Red Cross Chapter](#)

[HOME](#)   [SEARCH](#)   [FEEDBACK](#)   [SITEMAP](#)   [COPYRIGHT](#)

The following catalog is for earthquakes in the New Madrid seismic zone, and is produced by the Cooperative New Madrid Seismograph Network (CNMSN), a member of the Council of the National Seismic System. CNMSN support comes from the United States Geological Survey and the State of Tennessee.

In the early 1800's, the New Madrid seismic zone was the site of what are considered to be the largest earthquakes to have occurred in the conterminous United States. During the winter of 1811-1812, a series of three earthquakes, estimated at magnitude 8 or larger, struck in a period of three months. There have been several magnitude 6-7 events since that time and there is a continuing activity of small earthquakes that defines the present day seismic zone. The principal seismic activity is found in western Tennessee, northeast Arkansas, and southeast Missouri.

Other catalogs for various regions of the United States can be obtained using the finger mechanism 'finger quaked@machine'. The following list gives the machine names for different regions.

gldfs.cr.usgs.gov	(USGS NEIC/NEIS world-wide)
andreas.wr.usgs.gov	(Northern California)
scec.gps.caltech.edu	(Southern California)
fm.gi.alaska.edu	(Alaska)
seismo.unr.edu	(Nevada)
mbmgsun.mtech.edu	(Montana)
eqinfo.seis.utah.edu	(Utah)
siaphys.idbsu.edu	(Idaho)
quake.eas.slu.edu	(Central United States)
tako.wr.usgs.gov	(Hawaii)

Additional catalogs and information are available on the World Wide Web at the URL '<http://www.geophys.washington.edu/seismobig.html>'.

The Date/Time is given in Universal Time Coordinates (UTC), which is 6 hours ahead of Central Standard Time (5 hours ahead of CDT).

Magnitudes are reported as Md (local duration magnitude) unless otherwise noted.

Q denotes the location quality: A = good, D = poor.

Updated on August 3 1998.

DATE-(UTC)-TIME	LAT	LON	DEP	MAG	Q	COMMENTS
yy/mm/dd hh:mm:ss	deg.	deg.	km			
98/01/09 09:05:59	36.56N	89.52W	7.0	2.2	B	New Madrid, Missouri (C)
98/01/17 19:40:07	36.59N	89.62W	6.5	2.2	B	New Madrid, Missouri (C)
98/01/27 09:58:40	36.12N	89.57W	12.0	2.5	A	Dyersburg, Tennessee (C)
98/01/28 22:05:12	36.10N	89.76W	11.4	2.7Lg	B	Caruthersville, Missouri (C)
98/02/12 09:37:49	36.14N	89.71W	9.6	3.0	A	Caruthersville, Missouri; felt in Hayti and
98/02/13 23:08:12	36.11N	89.78W	6.5	1.5	A	6.96 km east of Steele Missouri (L)
98/02/19 14:05:27	36.54N	89.58W	8.9	2.7	A	New Madrid, Missouri (C)
98/02/19 22:22:49	36.48N	89.56W	8.2	1.9	A	New Madrid, Missouri (C)
98/02/26 02:10:25	36.49N	89.56W	5.2	2.5	B	New Madrid, Missouri (C)
98/03/11 08:09:43	36.63N	89.32W	5.0	1.5	C	13.63 km northwest of Hickman, Kentucky (p)
98/03/13 03:05:27	36.26N	89.61W	7.4	2.0	B	10.69 km north of Caruthersville, Missouri
98/03/15 06:56:46	36.43N	89.52W	5.3	2.5	B	6.63 km northwest of Tiptonville TENNESSEE
98/03/21 06:52:23	36.15N	89.47W	15.8	1.6	B	12.51 km south of Ridgely TN (C)
98/04/08 18:16:49	36.94N	89.02W	13.9	3.2Lg	B	15.77 km east of Cairo IL (N)
98/04/09 05:13:41	36.40N	89.50W	6.8	2.7Lg	B	3.48 km northwest of Tiptonville, TN, Felt n
98/04/27 10:22:43	36.24N	89.48W	6.6	2.0	A	2.61 km south of Ridgely TN (L)
98/04/29 01:44:56	36.17N	89.43W	9.2	2.0	B	11.33 km south of Ridgely TN (L)
98/05/11 08:07:15	36.88N	89.07W	4.3	2.6Lg	C	14.72 km north of Columbus, KY (N)
98/05/12 09:37:10	36.42N	89.51W	7.0	1.7	A	5.44 km northwest of Tiptonville, Tennessee
98/05/21 06:37:19	36.55N	89.61W	2.6	1.5	C	8.01 km west of New Madrid, Missouri (L)
98/05/21 14:53:29	36.20N	89.43W	6.0	1.7	A	8.24 km southeast of Ridgely, TN (L)
98/05/27 06:04:52	36.11N	89.01W	4.5	2.4	D	23.63 km east of Newbern Tennessee (L)
98/06/11 07:44:12	36.17N	89.45W	9.6	1.8	A	10.35 km south of Ridgely Tennessee (L)
98/06/27 05:19:16	37.08N	89.80W	6.0	2.1	A	3.14 km east of Steele, MO (L)
98/07/05 07:48:10	36.29N	89.53W	9.3	1.4	B	7.6 km northwest of Ridgely Tennessee (C)
98/07/15 04:24:51	36.69N	89.52W	13.2	3.1Lg	B	7.5 km north of New Madrid, MO (L,N)
98/07/22 22:11:57	37.65N	90.20W	17.5	2.7	C	WOMACK, MO mbLg = 2.65 (SLU)

98/08/01 02:21:10	35.64N	90.40W	4.1	2.0	A	11.8 km north of Marked Tree, AR. (C)
98/08/16 04:23:03	36.23N	89.45W	6.5	1.9	A	5.1 km southeast of Ridgely, TN (L)
98/09/05 00:35:02	35.77N	90.20W	9.9	2.2	A	21.6 km west of Osceola, AR. (M)
98/09/06 18:35:30	36.26N	89.29W	6.2	2.3	A	15.7 km north of Newbern, TN. (L)
98/09/14 23:24:19	36.60N	89.59W	16.2	1.8	A	5.89 km west of New Madrid, MO (N)
98/09/17 08:46:41	36.85N	89.45W	1.7	2.1	B	14.02 km east of Sikeston MO (N)
98/10/05 22:50:45	36.44N	89.54W	7.5	1.8	A	8.91 km northwest of Tiptonville TN
98/10/15 09:47:22	35.62N	90.45W	12.1	2.9Lg	A	10.0 km north of Marked Tree, AR (C)
98/10/26 00:29:52	37.00N	90.88W	5.0	2.6	D	GARWOOD, MO (SLU)
98/10/26 08:46:57	35.80N	90.03W	2.0	2.0	D	12.77 km north of Osceola AR (L)
98/11/03 15:47:53	36.43N	89.52W	8.4	2.2	A	7.24 km northwest of Tiptonville TN (L)
98/11/09 18:36:47	36.50N	89.53W	5.9	2.2	A	9.06 km south of New Madrid MO (N)
98/12/16 10:45:34	35.86N	89.95W	8.6	2.4Lg	B	8.98 km south of Blytheville AR (C)
99/01/06 09:26:23	35.66N	88.33W	10.9	2.4	B	25.75 km east of Jackson, TN (C)
99/02/03 16:59:20	35.32N	90.84W	3.9	2.3	D	45.39 km southwest of Marked Tree AR (L)

**PADUCAH GASEOUS DIFFUSION PLANT  
SITE SPECIFIC ADVISORY BOARD**

Chartered under the  
Federal Advisory Committee Act

**CO-CHAIRS**

Mark Donham  
Route 1, Box 308  
Brookport, Illinois 62910  
mdonham@igc.org

Vicki Jones  
1131 Hamburg Road  
Kevil, Kentucky 42053  
jonesvw@omni.gov

**BOARD MEMBERS**

Nola Courtney  
14299 Wickliffe Road  
Kevil, Kentucky 42053  
ncourtney@bhsli.com

Edward Duff  
5134 Old 45  
Paducah, KY, 42003

Angela Farmer  
29 East, Lakewood Drive  
Metropolis, Illinois 62960

David Fuller  
670 Springwell Lane  
Paducah, Kentucky 42001

Judy Ingram  
1711 George Clark Road, South  
Benton, Kentucky 42025  
jdingram@apex.net

Ronald Lamb  
10890 Ogden Landing Road  
Kevil, Kentucky 42053  
chce@idd.net

Linda Long  
10625 Ogden Landing Road  
Kevil, Kentucky 42053

Ray McLennan  
2931 Mayfield Road  
Paducah, Kentucky 42001  
mclennan@pad-uky.campus.mci.net

Craig Rhodes  
3883 Mt. Pleasant Rd.  
Brookport, Illinois, 62910  
crhodes@midwest.net

Jim Smart  
223 North Ninth Street  
Paducah, Kentucky 42001  
jsmart@engr.uky.edu

Bill Tanner  
6072 Rosebud Road  
Metropolis, Illinois 62960

Rev. Gregory Waldrop  
4141 Buckner Lane  
Paducah, Kentucky 42001  
waldrop4@sunsix.infi.net

**MEMORANDUM**

**DATE:** March 4 1999

**TO:** David Allen, Oak Ridge Operations  
NEPA Compliance Officer

**FROM:** Paducah Site Specific Advisory Board

**SUBJECT:** Comments on the Fernald Environmental  
Assessment

At a regular meeting of the Site Specific Advisory Board (SSAB) held February 18, 1999, the board identified comments on the draft *Environmental Assessment for the U.S. Department of Energy, Oak Ridge Operations Receipt and Storage or Uranium Materials from the Fernald Environmental Management Project Site*.

**General Comments:**

The Paducah SSAB recommends that Fernald pursue amendments to the appropriate regulatory documents allowing the uranium materials to be retained at the Fernald site pending resolution of the long-term disposition strategy.

Notwithstanding this recommendation, if the DOE decides to move the uranium materials, the Paducah SSAB recommends that the uranium materials should be moved the least distance possible to reduce the environmental impact of transportation hazards.

**OFFICIAL FILE COPY  
AMESQ  
C 0485**

Log No. \_\_\_\_\_

Date Received MAR 05 1999

File Code \_\_\_\_\_



**Specific Comments:**

1. Page 2-7: Drawing is out of date even though it says rev. 1/20/99. There are buildings and pads in the general area designated for the storage area.
2. Page 2-11, Paragraph 1: What is the benefit of using a combination of sites?
3. Page 2-11, Paragraph 2: The first sentence appears to be poor planning, not a justification for not considering commercial facilities.
4. Page 2-11, Paragraph 4: "to support compliance with regulatory requirement" seems to use this as an excuse for poor planning and as a hammer to make something happen.
5. Page 3-6, Paragraph 4: Change "PGDP" to "DOE reservation."
6. Page 3-6, Paragraph 5: Where did these numbers come from? Is this 1992 data?
7. Page 3-6, Paragraph 6: Using 1992 data seems outdated.
8. Page 3-6, Paragraph 7: Why not look at 1998 or even 1997 radionuclides sources rather than 1992? If you bother checking, we believe you will find the vapor degreasers in C-400 are no longer operating. Didn't anyone visit the site or talk to the people at the Paducah Site?
9. Page 3-7, Paragraph 2: Check on numbers of plumes — believe there are 3 now (major or minor?).
10. Page 3-7, Paragraph 5: List source of the identification of the federally listed species. A 1994 Corp Study did not list the evening bat in this area and identified the pearly mussel as endangered. Also, none of these species were identified on the DOE Reservation. I think a list of the Kentucky E&T species should be included.
11. Page 3-8, Paragraph 4: Sewage is treated "onsite" not "offsite."
12. Page 3-8, Paragraph 5: The Corp has performed a cultural resources survey. I believe it was completed in 1994.
13. Page 4-5, Paragraph 4: What about waste from the construction/site preparation. I believe soil in that area is PCB contaminated. There are buildings and pads that are not depicted on your map, will their existence change preferred location?
14. Page 4-9, Paragraph 3: I believe USEC might disagree that cleanup is the major priority at the site. I would like the source of the baseline identified and a list of "future changes."
15. Page 5-1: Why wasn't up-to-date information about Paducah used?
16. Page 6-1: Appears "walk-downs" were performed at Portsmouth and Fernald, why not Paducah and Oak Ridge?
17. Page B-9, Paragraph 6: What goes in the blank?

The information used was significantly out of date, and in some cases, totally incorrect. The general impression of this project is that Fernald has a regulatory driver and it will be met. How long has this project been going on? It appears this part of the project is being rushed.

# Yggdrasil Institute

PO Box 131, Georgetown, KY 40324, USA  
502-868-9074 (phone and fax)

March 3, 1999

Mr. David Allen  
NEPA Compliance Officer  
DOE Oak Ridge Operations, SE-32  
PO Box 2001  
Oak Ridge, TN 37831

RE: Environmental Assessment for the US Department of Energy, Oak Ridge Operations, Receipt and Storage of Uranium Material from the Fernald Environmental Management Project Site (DO/DOE 2078)

Dear Mr. Allen:

I believe that the 3800 metric tons of depleted uranium now at Fernald should stay where they are until they are sold, rather than be moved to any of the alternative sites. Surely the agreement between the Department of Energy and the State of Ohio can be amended to make this commonsense step possible. If the material is valuable, can it not be sold within a short time period?

The storage at the alternative sites may not itself involve risks, but there is always risk in transportation. The tonnage involved would mean a major shipping initiative. Furthermore, transportation would mean a waste of resources: the consumption of fossil fuels and the consequent increase air pollution.

Sincerely,

Mary B. Davis

Mary Byrd Davis

OFFICIAL FILE COPY  
AMESQ

Log No. C 0283

Date Received MAR 05 1968

## File Code

In Norse mythology, Yggdrasil [iɡ'-druh-sil] is the world tree. Yggdrasil Institute is a project of Earth Island Institute.

OPTIONAL FORM 99 (7-90)

**FAX TRANSMITTAL**

**S of pages □ 13**

To <u>Wayne Tolbert</u>	From <u>Melisa Hart</u>
Dept/Agency <u>SAIC</u>	Phone # <u>5716-8983</u>
Fax # <u>461-8797</u>	Fax #

NSN 7640-01 317-7368

5099-101

GENERAL SERVICES ADMINISTRATION

David Allen  
NEPA Compliance Officer  
DOE Oakridge Operations  
SE-32  
P.O. Box 2001  
Oak Ridge, Tennessee 37831

Faxsimile: (423) 576-0411

Re: Public Comment on Draft Environmental Assessment for Proposed Receipt and Storage of Uranium Materials From the Fernald Environmental Management Project Site.

Dear Mr. Allen

Please include this correspondence and attachments as part of the agency's official record of proceedings on the above-referenced proposed agency action.

The following comments to the agency will contain considerable objection and criticism of the agency's public participation process, implementation of NEPA, and offer challenge to the finding of fact, Finding of No Significant Impact, proposed in draft Environmental Assessment.

Therefore, in fairness to the U.S. Department of Energy as the lead agency, I would like to begin by thanking the Department of Energy Oakridge Operations, NEPA Office for extending the public comment period originally scheduled to begin on February 1, 1999 and end on February 10, 1999 until March 4, 1999. Although, I definitely feel that 30 day comment period fails to provide sufficient time for public review and comment by all parties who have interest in the proposed action, extension of the public comment period does provide opportunity for limited review and participation by a few members of the public other than those representing the interests of the Fernald Environmental Management Project Site (FEMP).

DOE proposes to transfer some 3,800 metric tons of uranium metal in various forms to candidate sites (Portsmouth Gaseous Diffusion Plant, Piketon, Ohio, Paducah Gaseous Diffusion Plant, Paducah, Ky., and Y 12 Plant and East Tennessee Technology Park, Oakridge Tn.) for interim storage until the material can be sold at market value "rather than disposing the material as waste." Ref.: DOE/ORO-2078, 1.1 Purpose and Need for the Proposed Action.

Agency statement of "Purpose and Need" pre-determines decision/disposition by the agency to potentially offer for sale 800 Metric Tons of LEU and/or 3,000 metric tons of uranium metal in other forms from the Fernald Site. DOE proposed action has significant, i.e., programmatic impact: 1) DOE has short-circuited the process of declaring any of this material to be "Excess Property," and 2) failed to implement criteria/guidance policy in disposing of property that is declared to be "Excess Property" by such determination as stated in EA. Ref.: GAO/RCED-99-3. By implication in EA statement of purpose and need:

This effort (material transfers and sales) is part of the U.S. Department of Energy's (DOE's) decision to change the mission of the FEMP site; it is currently shut down and the site is being remediated.

This remaining nuclear material inventory must be removed from the site by the end of fiscal year (FY) 1999 (July 1, 1999) to support commitments made to the state of Ohio. Interest in the material has been by the U.S. Department of Defense and other commercial ventures.

According to FEMP Record of Decision (ROD), Operable Unit 3, August 1996.  
FEMP Site History:

Production operations began in 1952 and continued until July 1989, at which time operations were placed on standby to focus on environmental compliance and waste management initiatives. Following appropriate congressional authorizations, the facility was formally closed in June 1991. TO REFLECT A NEW MISSION FOCUSED ON ENVIRONMENTAL RESTORATION. (emphasis added) the name of the facility was changed to the FEMP in August 1991.

By considerable omission and implication in statement of purpose and need for the proposed action, DOE has flown under the radar screen of accountability to the public by agency failure to address the proposed action as a programmatic decision with considerable consequences to the public. By deciphering statement of purpose and need, DOE must be referring 1991 DOE change in mission of FEMP or DOE decision yet-to-be-made-public of FEMP's new mission. In either circumstance, DOE has failed to address the proposed action as significant in EA. "Commitments made to the state of Ohio" to remediate the FEMP site should not be co-mingled and confused with commitments to share the revenue with the state of Ohio from the sale of "Excess Property" managed by DOE for all taxpayers nationally.

Procedure for the sale of 800 metric tons of LEU by the Ohio Field Office requires full disclosure in final draft of EA. Apparently, considerable lack of accountability to the public has been allowed to occur in the procedure to sell property which DOE has yet to declare as "Excess" though any recognizable process. What is the value of this "property" in which the U.S. Department of Defense and other commercial ventures have expressed "interest." It would certainly seem apparent that the Ohio Field Office and site management contractor have implemented disposition of public property as "excess" with little review or accountability to the public in the process. Has the Office of Defense Programs declared the 800 metric tons of LEU "excess" to missions' needs? When was this done and by what mechanism? When was the 3,000 metric tons of uranium metal in various forms declared "Excess Property" and by what DOE office? Is decontamination some or all of the 3,000 metric tons required before DOE releases the property for "reuse" or sale? What is the market value/sale value of this material and what agencies/entities share the revenue from the sale to "commercial" ventures?

After the property has been determined to be excess, the regulations state that the property must first be screened for reuse or transfer to others before offering it for sale to the public. Personal property is first screened for reuse within DOE, then for

transfers to the Math and Science Education Gift Program (under Executive Order 12821) and to the Community Reuse/Economic Development Program (under P.L. 103-160). Subsequent steps include making property available to educational institutions such as colleges and universities under the Used Energy Related Laboratory Equipment Grant Program (P.L. 101-510) and to other federal agencies and state donation programs. Personal property that remains after the screening process can be sold to the public or discarded. Ref.: GAO/RCED-99-3, page 5.

It would seem disingenuous, at the very least, to 'share' the revenue generated by the sale of 800 metric tons of LEU to commercial buyers/vendors with ventures under the process described as anticipated agency procedure for disposal of excess personal property (not real property, lands, etc.). It would seem as disingenuous for colleges and universities to solicit radioactive materials including the residuals and residues owned by DOE currently on site at FEMP for medical and research purposes. Interested parties in the Pernald Uranium transfer should not be parties interested in getting a share from the proceeds of sale of these materials. DOE mission statement does not include sale of hazardous and toxic materials to the highest bidder for distribution among parties claiming an interest/share of the profits.

Obviously, DOE has pre-determined to offer nuclear materials and by-products of uranium processing for transfer and/or sale rather than dispose of these materials as 'waste' which is hazardous and toxic to humans and the natural environment. When did any such decision-making provide program-wide public participation and opportunities for comment? Again, the action proposed in draft EA fails to address connected actions with significant program-wide impacts in DOE disposition of materials.

DOE cannot reasonably assert that materials with hazardous and toxic characteristics can be safely isolated from the human and natural environment simply by calling them 'nuclear materials' with economic value rather than waste. Materials, whether classified as waste, by-product, assets, feed materials, metals, or nuclear inventory, pose the same risks to human health and the natural environment which should reasonably cause DOE to require the same standards of protection to prevent contamination. DOE actions should not seek to circumvent intent of CERCLA, SRA, and TSCA.

Draft EA defines the economic impact of the proposed action much too narrowly. A structure to temporarily store the 3,800 metric tons of nuclear materials at other DOE sites until sale or transfer does not address the total, foreseeable economic impacts of DOE action (as stated in EA purpose and intent). Five million dollars and three new worker jobs to monitor the materials in the interim fails to include: 1) packaging costs for transport from FEMP, 2) transportation costs to one or more of DOE's candidate receiving sites, 3) transportation from the candidate/host site(s), 4) revenue from the sale of materials, 5) cost to construct the other facilities required by 'disposition' of these nuclear materials to private, commercial ventures, and 6) remediation/cleanup and nuclear waste disposal costs from

the operations of commercial reuse or recycling/reprocess facilities which DOE can reasonably foresee and predict to result from the proposed action.

DOE is mandated to comply with Executive Order 12866, and all others. A significant regulatory action is defined as a rule which may result in:

- 1) \$100 million or more adverse effect upon the economy, a sector of the economy, productivity, competition, jobs, the environment, public health, safety of state, local, or Tribal governments;
- 2) create a serious inconsistency or interfere with an action planned or taken by another agency;
- 3) materially alter the budgetary impact of entitlement, grants, user fees, loan programs or the rights and obligations of loan recipients; and
- 4) raise novel legal or policy issues arising out of legal mandates.

As set forth in Executive Order 12866, DOE proposed action is significant and subject to review by the Office of Management and Budget (OMB) and requirements of E.O.12866. Note that "cost" savings must be included in determination of \$100 Million dollars economic impact. DOE has failed to consider the direct and indirect foreseeable impacts of the proposed action, including the considerable long and short term costs, risks to the public and worker safety, and environmental consequences in draft EA. The finding of no significant impact proposed by the agency is not supported by the data. DOE has failed to include the costs of transportation in proposed action.

Recent transportation contract awarded to International Technologies Inc. (IT) for transport of materials/waste from the FEMP totalled \$122,000, see Attachment 1. Obviously, agency experience would result in DOE conclusion that transport of 3,800 metric tons of uranium from the production and processing facilities at the former uranium processing facility would result in considerable dollar amount cost which should reasonably be added to the \$5,000,000. cost estimated by DOE for construction of Tension-Support Structure(s) (TSSs) at proposed interim storage sites. Failure to address the physical processes required for transport/transfer of the nuclear materials from FEMP to receiving sites represents considerable omission.

Note that EA presents dose calculations based upon incomplete/missing data. "Breathing rate of 9.3 E-4 m<sup>3</sup>/s based on \_\_\_\_\_." Lack of supporting data in calculation of public and worker risk from inhalation of uranium does inspire confidence in finding of no significant impact.

"Commitments" made to the state of Ohio referenced in purpose and need for the proposed action require explanation in EA. What "commitments" have already been made and precisely what is required to fulfill those commitments has been omitted from draft proposal. Transportation is an obvious requirement/result of the proposed action, as in the impacts associated with the transfer. Communities along the transportation routes are not even mentioned in passing (by rail or truck) in DOE EA. DOE has added Transportation Addendum to draft EA which addresses the obvious transportation requirement inherent in the proposed action. However, no discussion of mode(s) (rail, truck, air carrier) is included. Cost of feasible means of transport with DOE consideration of radiation dose exposures to the general public, workers, and freight employees is included. Bluntly stated, DOE is focused upon the impacts to the FEMP remediation ONLY, and has excluded worker exposure, risks to communities along the

transportation routes resulting from incident/accident radiation dose release in EA. DOE is required by CEQ regulations to avoid improper segmentation (by elimination) of original draft. Addendum fails to address transportation as an impact of the proposed action. Rather, DOE has listed (with no explanation) regulations that apply during transport of the nuclear materials. No discussion of cost, safety, or risk to the public is provided. DOE is required to address "worst case scenario" as a potential adverse impact from incident/accident during transport which has not been done in EA or Addendum of 1/12/99. Final paragraph in Addendum concludes:

The outbound shipments from ORO will move in DOE approved packaging, subject to DOE radiation, contamination or fissile controls and other DOE and federal requirements.

Conclusion of the Transportation Addendum provides no meaningful information whatsoever about what is being moved, where the material is being moved from (ORO may be a missprint since all other transportation discussion is focused upon removal of nuclear materials from the FEMP site as part of remediation activities of the site), what standards of protection and regulations apply and how DOE proposes to comply, whether the materials proposed to be moved require decontamination before transport from the site(s), what "fissile controls" are required, what "other DOE and federal requirements" apply and how the agency proposes to comply with these undisclosed requirements! The omission is considerable and fails to inspire trust and confidence that the total plan with considerable potential adverse impacts is being addressed in EA and its FONSI conclusion. DOE has failed to follow its own agency policy and guidance documents, as well as other federal regulations which direct the agency to avoid all actions likely to lead to loss of public trust and confidence. Transportation Addendum reference to "fissile controls" logically leads to conclusion that DOE has failed to address considerable "worst case scenario" impacts, and all others, likely to result from the proposed action.

. . . when transportation is in any respect a major factor. . . the environmental impacts of such transport should be analyzed, even when DOE is not responsible for the transportation. Transportation impacts include those from transport to a site, on-site, and from a site, when such activities are reasonably construed as part of the proposed action or analyzed alternative. If not otherwise analyzed, include any necessary loading or unloading activities in the transportation impact analysis.

Ref.: RECOMMENDATIONS FOR THE PREPARATION OF ENVIRONMENTAL ASSESSMENTS AND ENVIRONMENTAL IMPACT STATEMENTS, U.S. DEPARTMENT OF ENERGY OFFICE OF NEPA OVERSIGHT, May 1993.

Citing own guidance document (previously referenced) Recommendations for analysis of TRANSPORTATION IMPACTS are directed to:

- 1) Analyze of all links that are reasonably foreseeable parts of the proposed action which has been omitted entirely from EA and Addendum

- 2) Avoid (do not) rely exclusively on general statements that transportation will be conducted in accordance with applicable regulations and requirements of U.S. DOT, U.S. EPA, NRC, state authorities, DOE (which is precisely how EA has added Addendum "addressing" transportation to draft EA)
- 3) Evaluate both routine (incident free) transport and accidents. Give special emphasis to public or worker health impacts from exposure to radiation or chemicals (which is completely omitted from EA and Addendum)
- 4) Be sure to use defensible estimation methods for assessing the radiological impacts of transportation (such as the most current version of RADTRAN) (no methods of estimation radiological impacts have been included, the omission is indefensible due to "fissile" materials referenced in conclusion of Addendum)
- 5) Estimate the annual and total impact of all DOE and non-DOE transportation associated with the use of specific routes (if known) over the term of the proposed action. . . including the impact on a maximally exposed individual. The impacts related to transportation must be totalled over the duration of the project (e.g. 48 trips per year for 5 years). (No modes of transport or routes have been addressed, radiation dose to a maximally exposed individual has not been considered, duration of the project and number of train or truck loads required has been omitted from EA and Addendum)
- 6) In determining the cumulative impact from transportation activities, use available data to estimate, for example, the number of radioactive materials packages that were shipped over a given transport routing system over a given period of time (no cumulative impacts from rail route and truck route transportation has been included in EA shipments among the DOE sites discussed in EA and Addendum although cumulative impacts from 40 years should be considered significant in cumulative impact).

DOE is being disingenuous in multiple failures to address transportation in a manner compliant with agency policy and guidelines. DOE cannot avoid addressing transportation due to implementation of transportation requirement in DOE proposed action by an outside/independent contractor. DOE and other agencies should not attempt to avoid disclosure of the total plan by hiding "the plan" behind Pernald/PEMP clean up which is precisely what has been attempted in draft EA.

Furthermore, Addendum which addresses transportation only by stating transportation is required for PEMP remediation with conclusion referencing "outbound" shipments of "fissile" materials (indirectly by implication that fissile controls are required) provided only two of three documents referenced in Addendum. Document #1: Letter (no date) Kim Hayes (no agency affiliation or title) to Thomas Rowland (no affiliation or title), April 12, 1993; subject: Safe Shutdown Environmental Assessment cannot be located by DOE ORO or DOE Pernald! DOE has used this letter (document) in Addendum as justification for the proposed action and finding of no significant impact and is unable to produce/provide a copy of the letter. I requested a copy of this letter (FOIA) in order to include it in research for public comment period on EA and was informed by the ORO and Pernald Public Information Centers that the letter could not be located. From the lack of information provided in reference to what DOE has indicated is a crucial document in this

proposed action, this missing letter could, in fact, have absolutely nothing to do with FEMP remediation and/or the subject of EA proposed action. DOE should reasonably be able to locate and provide a letter of crucial importance in issuing a FONSI on its proposed action, but has failed to do so.

Draft EA fails to address radiological and chemical dose exposures to workers and the general public required by transport of these nuclear materials and during "interim" storage at the receiving site(s). Note that DOE has indicated a willingness to use a "hybrid alternative," i.e., shipments to more than one site for "storage" prior to ultimate/final disposition. EA implies decision to ship to more than one site is being considered, though discussion of that alternative is not addressed.

1.2 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT. 1-1 defines scope of the proposed action as:

The Ohio Field Office will assume responsibility for environmental analyses and documentation for packaging and transport of the material as part of the remediation of the site (FEMP), and ORO is preparing this EA for receipt and storage at one or more sites.

Scope of EA is narrowly focused upon movement of nuclear materials from the FEMP site as part of that site's remediation while failing to address and disclose what disposition is proposed for these materials after they are shipped from FEMP to some other DOE site(s). DOE actions and intentions require full explanation in final EA. Unnecessary segmentation of actions result in findings which are inappropriate. DOE states intention in Transportation Addendum to move the materials (from ORO?), but fails to include where the materials are to be ultimately transported and for what purposes. It would appear that "recycling" metals, metal fabrication, and other potential uses would be anticipated to cause other major polluting facilities to be constructed or converted and should be addressed in EA. DOE cannot appropriately avoid disclosure/public participation by storing, then handing off such materials to private, commercial facilities licensed by NRC rather than DOE based upon a finding of no significant impact.

"Commitments made to the state of Ohio" require full explanation. Both DOE and the state of Ohio have failed to disclose the commitments which cause the actions proposed in EA to occur, and would provide information as to the total scope and purpose of the proposed action(s). Both U.S. EPA and NRC have regulatory statutes which require DOE compliance at FEMP. DOE appears to be proposing compliance with U.S. EPA mandates at the FEMP site as an isolated action which does not require the same level of compliance with other federal and state regulations once the material leaves the Fernald Site. The finding (FONSI) and public participation process described as "public involvement" addresses the proposed action(s) from the perspective of the FEMP site ONLY. DOE is mandated to fully address the adverse impacts and consequences caused by proposed actions to "stakeholders" likely to be adversely affected as this process is implemented in final version of EA.

Public (and media) interest exist by potentially adversely effected parties, but "participation" can occur only when DOE provides information necessary for informed participation as the process is occurring, i.e., when decisions are being made by the agency. See Attachment II.

DOE is required to notify interested and adversely affected parties by legal notification process. How and when was this done? I can find no public notification of draft EA's availability for public comment in the federal register, or in legal notice in subscription newspapers available within the Brown County, Ohio area which properly notified the public of any proposed agency transport of nuclear (fissile) materials through local communities. DOE press release was available on Internet, but does not provide legal notice to the directly effected public. Editorial and newspaper reports do not provide proper, legal public notification of opportunity for participation and comment. As stated previously, extension of the public comment period from original 10 day time period is helpful, but does not meet NEPA requirements of involving the public early in the process. DOE is well-aware that participation from the FEMP/Fernald public only fails to include adversely affected parties from comment/objection/decision-making process.

DOE is requested to prepare program-wide EA/EIS which address the major federal actions being proposed for implementation in draft EA. DOE's disposition of "excess" inventory property has considerable potential impacts and should be decided in a public forum rather than tagged-on to FEMP remediation. Program-wide decision-making implications contained in EA include: 1) deplete uranium management (dispose as waste/use as restricted construction material, feed materials in nuclear fuel production), 2) recycling/recovery of uranium and uranium milling residues, including Thorium and Radium, 3) recycling of uranium metals in various forms, and 4) recycling or disposal of steel/metals when Decontamination and Decommissioning (D&D) of DOE production facilities occurs. June 1994 ROD and August 1996 ROD requires D&D of FEMP production facilities (Operable Unit 3). DOE and its contractors cannot implement D&D at FEMP in the absence of program-wide decisions without setting precedent at other DOE facilities nationally. Bluntly stated, FEMP stakeholders are certainly not the only stakeholders/affected parties by DOE decision-making regardless of commitments made to the state of Ohio! DOE cannot proceed to set precedent without providing access to decision-making process based on a narrowly focused FONSI. See previous comment on compliance required by DOE with Executive Order 12866.

DOE is also required to comply with Executive Order 12898, February 16, 1994 which mandates federal agencies to avoid actions resulting in disproportionate adverse environmental and health impacts in low-income and minority communities. DOE facilities named as potential candidate sites in EA are all located in economically depressed regions. August 1996 ROD provides for complete demolition and removal of process buildings, including contaminated concrete from the FEMP site. Movement of 3,800 metric tons of uranium materials is specifically required in order to accomplish demolition of the FEMP production buildings and processing facilities. DOE is required to include disposition of the considerable waste stream from that process in a public participation and implementation process involving more than FEMP site input. DOE is apparently using FEMP as the "pilot project" in site restoration. The agency is required to address implications from such decision-making in context of its potential to set precedent in DOE policy and future actions at other sites. (Executive Order 12866.) DOE is required to consider ultimate disposal/disposition of materials to be generated by FEMP site remediation and DOE's ultimate goal for the federally owned lands when FEMP remediation projects are completed at the site.

Given the arbitrary nature of the process used by DOE to date in declaring "excess property" in inventory, statement of DOE intent is required in final EA. DOE has considerable reason to predict that implementation of FEMP environmental management and restoration will likely result in the FEMP site (land) becoming excess real property. What are the agency's intentions after remediation is completed at FEMP? As remediation progresses, wastes are to be characterized and disposed, according to DOE decisions with U.S. EPA regulations of hazardous and toxic materials, and under NRC regulations of radioactive materials.

Current proposals for FEMP future uses include giving the FEMP site back to the Indians. Does DOE intend to use FEMP as a "pilot program" for giving other DOE/federally owned sites/land back to the Native Americans, including the Hanford site in Washington state? Bluntly stated, DOE's site contractor at FEMP also manages Hanford. In 1996 U.S. District Court Decision, Backcountry Against Dumps v. EPA, the court ruled that U.S. EPA did not have authority under RCRA to approve (or disapprove) tribal solid waste permit programs. Disposition of excess federal lands from DOE back to "the Indians" would seem to remove U.S. EPA from the permitting process required at FEMP and at other sites declared by DOE to be excess real property, as well. DOE is required to consider the proposed action in EA in context of the total remediation currently being implemented at FEMP and in context of programmatic implications.

Does DOE envision disposition of federal lands presently under DOE management becoming excess real property in DOE inventory which could be given back to the Indians? Any such potential decision-making process must be addressed by the agency in program-wide decision making process with full participation by effected and interested parties. Removal of U.S. EPA from authority under RCRA would certainly appear to create "unique" regulatory issues, or more accurately, a void thereof.

Draft EA attempts to focus upon the immediate need and requirement to transfer 3,800 metric tons of uranium from FEMP. The agency has failed to include data necessary to justify its proposed finding of no significant impact. Final draft should comply with DOE policy and guidance in implementation of NEPA and address the total impacts of the proposed agency action. The agency is requested to respond to my questions and the issues of concern raised in this correspondence. Program-wide policy decisions should be determined by program-wide decision-making documents. The agency has authority to require accountability from its contractors, including Flor Daniel at FEMP. Ref.: Price-Anderson Act. Legal and other maneuvering to exclude/remove U.S. EPA from authority at FEMP or any other DOE site should not be tolerated, and most certainly not condoned by the agency. The legacy from the nation's nuclear weapons program is considerable. Some 5,000 of the DOE's 20,000 facilities were declared "surplus" in 1996. Characterization of these 5,000 facilities has not yet been completed, but "a large number" are known to be contaminated with hazardous, toxic, and/or radioactive substances. Both the Hanford, Washington and FEMP site are known to be contaminated. Hanford (250) and Fernald (180) have the most facilities in the decommissioning process at this time and the same contractor. Procedure proposed to be implemented in the "disposition" of excess property at FEMP is disingenuous and self-serving by the parties involved at the long term expense to the public in dollars, public health and safety, and natural environment. DOE is respectfully requested to prepare a final draft of EA which includes the required data for credible finding, including policy to be

set, for the proposed agency action.

In conclusion, to avoid any misinterpretation that I am suggesting an other federal, state, local agency, or planning commission could or would be preferred to manage the considerable legacy created by former nuclear weapons production within the past 50 years, DOE can and should use the policies and procedures presently in place within the agency and its considerable resources in all agency actions, particularly the action proposed in draft EA. Final EA should address errors and omissions. DOE does provide volumes of information to the public which is not available from any other agency. The information available from DOE allows me to offer these comments on the proposed action. DOE is capable of applying considerably higher standards of agency review and oversight and is herein requested to do.

Respectfully submitted,

Diana I. Cahall  
7019 Ashridge Arnhelm Road  
Sardinia, Ohio 45171  
(937) 446-2763

Attachments

VIA THE U.S. POSTAL SERVICE, CERTIFIED MAIL, RETURN RECEIPT REQUESTED, ARTICLE NUMBER \_\_\_\_\_, ON MARCH \_\_\_. 1999.

cc:

By The U.S. Postal Service, regular mail, postage prepaid, on 3/4/99 to:

Ohio Field Office/Ohio EPA  
U.S. Department of Energy, Fernald Office  
U.S. Department of Energy, Washington, D.C.  
U.S. EPA, Region 5

-10-

Steven L Wyatt, Director  
U.S. Department of Energy  
Oak Ridge Operations  
Public Affairs Office  
Fax: (423) 576-1665

February 12, 1999

Dear Director Wyatt:

Thank you for your prompt response to my request for a copy of the "Transportation Addendum" to the Environmental Assessment/ Receipt and Storage of Uranium Materials from the Fernald Environmental Management Project Site.

My initial reading of the Transportation Addendum indicates that DOE has previously addressed Transportation as an issue included in environmental process by reference back to past DOE documents. In isolation, the Addendum doesn't provide the information I require for informed comment. Could you please provide me with a copy of each of the following documents referenced by DOE Field Office as having previously adequately addressed Transportation?

1) No title provided, document(s) referenced in INTRODUCTION, ENVIRONMENTAL ASSESSMENT FOR THE U.S. DEPARTMENT OF ENERGY, OAKRIDGE OPERATIONS, RECEIPT AND STORAGE OF URANIUM MATERIALS FROM THE FERNALD ENVIRONMENTAL MANAGEMENT PROJECT SITE.

DOE/ORO-2078, page 1-1, paragraph 1 in statement as follows: "This remaining material inventory must be removed from the site by the end of fiscal year (July 1, 1999 translation added) FY 1999 to support commitments made to the State of Ohio." Documents required which specify in detail the commitments made by DOE to the State of Ohio."

2) Document referenced in Addendum as: REMOVAL ACTIONS #12. SAFE shutdown of the former production facilities at the FEMP, paragraph 2, which continues "DOE determined that the implementation of the SAFE SHUTDOWN REMOVAL ACTION (including material disposition) was excluded from requiring a detailed NEPA evaluation (e.g. an Environmental Assessment)."

3) Letter: Kim Hayes to Thomas Rowland, April 12, 1993:  
subject: Safe Shutdown Environmental Assessment.

4) June 1994: Operable Unit 3 RECORD OF DECISION for interim Remedial Action: Fernald Environmental Management Project. (FEMP) Fernald, Ohio.

5) August 1996: Operable Unit 3 RECORD OF DECISION for Final Remedial Action. FEMP, Fernald, Ohio.

Please provide the information requested herein within 10 working days so that I will have opportunity to include the information contained therein as part

of timely public comment to the agency on the proposed action in the E.A.  
referenced previously in this correspondence.

Thank you for your timely assistance.

*Diana Cahall*  
Diana Cahall  
7019 Ashridge Arnhelm Road  
Sardinia, Ohio 45171

(937) 446-2763, telephone and facsimile

-2-

Transmitted at approx. 2:50 P.M.  
on 2/12/99.

---

2/13/99

Mr. Wyatt:  
Paper copy for  
your records -  
fax somewhat  
unreadable  
at ~~times~~ points.  
Diana

SOUTHERN  
OHIO  
DIVERSIFICATION  
INITIATIVE

reindustrializing south central ohio

1864 Spurle Road  
Piketon, Ohio 45661  
P: 740 - 289 - 3654  
F: 740 - 289 - 4591

March 4, 1999

Dave Allen  
USDOE Oak Ridge Operations  
PO Box 2001  
Oak Ridge, TN 37831

Dear Mr. Allen,

re: USDOE Fernald material relocation

The Southern Ohio Diversification Initiative (SODI) wishes to make comments regarding the destination of material from the USDOE Fernald Site, especially related to the USDOE Portsmouth Site.

The SODI is working cooperatively with the local communities and the Department of Energy to develop and implement programs that will lessen the impacts resulting from the reductions of employment at the local site. A central theme, and the key to our long term transition success, is the reuse of buildings, lands, and equipment located on the Portsmouth Reservation.

We believe that relocating the material from Fernald to the Portsmouth Site negatively impacts our reindustrialization efforts. Public perception will play a vital role in our marketing program and reuse success, both of which are targeting a variety of companies to diversify our regional economy.

We recognize the Department of Energy has obligations with the regulatory agency(s) concerning removal of the Fernald material. With that in mind, we make the following recommendations:

1. Any material transferred to the Portsmouth Site should not be stored in facilities with a viable potential for reuse and alternate job creation. Specifically, any facility targeted for storage should be reviewed and approved by the SODI-DOE's designated Community Reuse Organization. This will ensure the negative impacts to our Reindustrialization Strategy will be minimized.
2. Buildings X-3002, 3001, 3346, 3000, 1000 (and other facilities) are initial priorities for our Reindustrialization Strategy and should not be considered for Fernald material storage.
3. If Portsmouth is to receive a portion of the Fernald material, new facilities should be constructed to house same.

If you have questions or comments concerning any of the above feel free to contact me.

Sincerely,



Gregory L. Simonton  
SODI Executive Director

OFFICIAL FILE COPY  
AMESQ

Log No. C 0292

Date Received MAR 08 1999

File Code

**STATE OF TENNESSEE****DON SUNDQUIST**  
GOVERNOR

March 11, 1999

Mr. David R. Allen, ORO NEPA Compliance Officer  
U.S. Department of Energy  
PO Box 2001, SE-32  
Oak Ridge Operations Office  
Oak Ridge, TN 37831-8739

Dear Mr. Allen:

As the Governor's Lead Contact for State of Tennessee National Environmental Policy Act (NEPA) reviews, I am providing comments in response to the Draft Environmental Assessment for the Oak Ridge Operations Receipt and Storage of Uranium Material from the Fernald Environmental Management Project Site DOE/ORO-0278. The attached comments from state agencies represent the complete and official response of the State of Tennessee. These comments are limited to the scope of study appropriate for the aforementioned document. Please give these comments your full consideration.

The State of Tennessee firmly and unequivocally supports the defense and national security mission and role of the Oak Ridge Reservation. The Draft EA does not, however, clearly demonstrate that the proposed Monitored Retrievable Storage Facility at Oak Ridge would further present or future defense and national security needs. It has not provided sufficient information for the State to consider the overall impacts resulting from the transfer of materials to Oak Ridge and does not show a contingency plan for future disposal.

The State has not supported the use of the Reservation for storage of off-site materials that have no identified use. Past studies have established that Oak Ridge is a poor location for long-term storage of wastes.

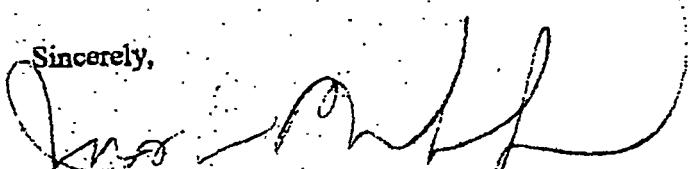
The State specifically appreciates the early communications and interaction with DOE on this issue and would like to see this process continued. We believe successful resolution is much more likely when the State is involved early in the process.

State Capitol, Nashville, Tennessee 37243-0001  
Telephone No. (615) 741-2001

Mr. Allen  
Page 2  
February 8, 1998

We appreciate the opportunity to comment. If you have any questions, please contact Earl Lemping or Dale Rector at (423) 481-0995, our staff policy analyst at 615/532-4968, or me.

Sincerely,



Justin P. Wilson  
Deputy Governor for Policy

JFW/cmw

cc: Mr. Milton H. Hamilton, Jr., Commissioner  
NEPA coordination file/Mr. Dodd Galbreath  
State NEPA Contacts



STATE OF TENNESSEE  
DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
DOE OVERSIGHT DIVISION  
701 EMORY VALLEY ROAD  
OAK RIDGE, TENNESSEE 37830-7072

March 5, 1999

David R. Allen, ORO NEPA Compliance Officer  
PO Box 2001, SE-32  
DOE Oak Ridge Operations  
Oak Ridge, Tennessee 37831-8739

Dear Mr. Allen:

**Document NEPA Review: Draft Environmental Assessment for the U.S. Department of Energy, Oak Ridge Operations Receipt and Storage of Uranium Material from the Fernald Environmental Management Project Site, DOE/ORO-2078, February 1, 1999**

The Tennessee Department of Environment and Conservation, DOE Oversight Division (TDEC/DOE-O) has reviewed the subject document in accordance with the requirements of the National Environmental Policy Act (NEPA) and associative regulations of 40 CFR 1500-1508 and 10 CFR 1021 as implemented.

The State of Tennessee strongly supports the Defense and National Security missions on the Oak Ridge Reservation. The State has not supported use of the Oak Ridge Reservation for storage of off-site materials that have no identified future use or may be declared a waste at some future date.

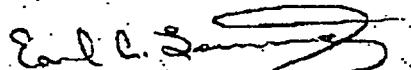
The Draft EA appears to propose a Monitored Retrievable Storage Facility (MRS) at a site other than Fernald. The Draft EA has not demonstrated that such a facility meets present or future Defense Programs needs for the material or other national security interest, nor has it provided sufficient information to allow the State to consider the overall positive and negative impacts resulting from a transfer of the materials to Oak Ridge.

The Division appreciates the early interaction with the DOE on this issue. We believe cooperation and issue resolution is more likely when the State is involved early in the NEPA process. We would like to see this process continued.

David R. Allen  
March 5, 1999  
Page Two

Enclosed for your review and response are general and specific comments. If you have questions, please contact Dale Rector or me at (423) 481-0995.

Sincerely



Earl C. Leming  
Director

xc Steve Richardson - DOE  
Dale Jackson - DOE  
Justin Wilson - Governor's Policy Office  
Dodd Galbreath - TDEC, Environmental Policy Office

el454.99

Tennessee Department of Environment and Conservation/DOE-Oversight  
Comments on the Draft Environmental Assessment  
DOE/ORO-2078, February 1, 1999

The U.S. Department of Energy, Oak Ridge Operations Receipt and Storage of Uranium  
Material from the Fernald Environmental Management Project Site

**General Comments:**

In order to reasonably assess whether the Fernald material is an asset material required for Defense needs or other national security considerations the EA should provide information on existing complex wide inventories of similar material and how much has been transferred over the past five years to the Department of Defense or "other interests."

The EA does not describe a contingency plan for the storage and eventual disposition of this material in case no markets are developed. Although the EA states on page 1-1 there is an "interest," the material is "potentially marketable," and it is in the best interest of DOE to "eventually market or use" the material, DOE may require long-term management of the material. The draft EA risk analysis indicates that a container breach would occur primarily from long-term corrosion. Without proper storage and maintenance the material from Fernald could experience corrosion. The DOE should avoid this situation with the Fernald material by planning for adequate funding for storage and maintenance. The EA should address associated cost for transportation, long term storage, and disposition (including disposal). It should also address any plans for cost recovery through sales or other forms of revenue exchange. The EA should clearly identify the DOE program, which would be responsible for the material and that programs funding assurance or needs to properly store, maintain, and disposition the material. It should also address future decontamination and decommissioning cost of equipment and facilities.

The draft EA is inconsistent in many areas of consideration. A description of existing contamination, fire suppression systems, and ventilation was provided for some candidate site buildings, while the buildings at Y-12 and ETTP did not receive the same consideration. Some proposed areas were evaluated as flood zones while areas at Y-12 and ETTP did not have the same evaluation. Other sites were evaluated for upgrades to facilities while there were no assessments done for the buildings at Y-12 and ETTP. In order to evaluate this document for issuance of an EIS or FONSI, complete and consistent information must be provided.

It has been indicated that material exists in the inventory that requires a Nuclear Category 2 storage facility. The category should be described and the site(s) under consideration evaluated to determine if they meet the same nuclear category or what will be required to upgrade the facilities to a Category 2. The amount of material requiring Nuclear Category 2 storage must also be identified.

The radioactive contamination levels of candidate buildings must be described. The presentation made to this Division clearly indicated that the material from Fernald would be in clean packages, i.e.: free from external contamination, and would be placed in "pristine" facilities.

The transportation evaluations for moving the material was absent from the draft EA and provided only after request. If the containers are transported off site, they must be evaluated for transport suitability, as the document states there have been problems with long-term corrosion.

The EA must address the inspection and maintenance programs that have allowed the long-term corrosion to occur. The final EA should include all incidents of container breaches and releases of material. The final EA should also describe the storage containers including type and thickness of metal.

Requested funding in FY 2000 to upgrade the existing facilities at Y-12 for storage of highly enriched uranium has been cut. Additional material stored in substandard facilities increases the risk of release to the environment and exposure to the public. It does not appear the risk analysis used substandard facilities in the evaluation.

At the request of Tennessee, DOE has imposed a limit for storage of LEU at 6 MTU for the Y-12 site. No inventory above that limit is allowed as specified in the Finding of No Significant Impact (FONSI) for the Environmental Assessment (EA) of the "Proposed Interim Storage of Enriched Uranium Above Maximum Historical Storage Level at Y-12 Plant, Oak Ridge, Tennessee."

#### Specific Comments:

##### Page 1-1, Section 1.1 PURPOSE AND NEED FOR THE PROPOSED ACTION

"Of the remaining inventory there are approximately 3800 metric tons of potentially marketable material...." This remaining 3000 metric tons of uranium material that is not potentially marketable should be considered waste.

##### Page 2-1, Section 2.1 BACKGROUND

"... an area where at least two tension-support structures..."  
The EA should clearly indicate that these are temporary tent-like structures and not permanent buildings.

##### Page 2-8, 2.5 Y-12 Plant

The Nuclear Category level and contamination levels (if levels exist) of the buildings should be described.

##### Page 2-8, 2.6.1 K-1066F Area

The draft EA should specifically state whether the K-1066F area is or is not within a flood zone.

##### Page 2-8, 2.6.2 K-131 and K-631 Buildings

The "Remedial Investigation Report for the East Tennessee Technology Park, Oak Ridge, Tennessee, Volume 5" does not list K-131 as having a basement. Additionally, both buildings are listed as having contamination areas, failing a screen for the report, and requiring further evaluation in the feasibility study. These buildings are currently listed on a decontamination and decommissioning list. During the presentation made to the Division, it was stated by DOE that the storage of this material was to be "pristine" facilities. Storage in contaminated buildings would not meet that goal.

"These buildings are approximately 200 ft south of Poplar Creek at its closest point." Explain the significance of this statement in terms of flooding.

Provide information for the meaning of "nominal" in the statement "The nominal basement size is 22,765 ft<sup>2</sup>..."

**Page 2-1, 12.8.1 Commercial Facilities**

The requirement to have all the uranium removed from the FEMP site by September 30, 1999, should be cited. Although the draft EA states there "was not enough time to prepare and issue a competitive request for proposal..." the DOE has known for some time this material needed to be removed from the FEMP site.

**Page 3-3 and 3-11, Table 3.1 and Table 3.4**

A comparison of Table 3.1 and 3.4 indicates that Cincinnati was included for the Fernald site analysis, but Knoxville was not included in the Oak Ridge site analysis. Knoxville is as close to Oak Ridge as Cincinnati is to Fernald; therefore, Knoxville should have been included in the analysis of the Oak Ridge sites.

**Page 3-9, Section 3.4.2 Climate and Air Quality**

"For radiological pollutants, emissions are variable and emanate mostly from the TSCA incinerator."

TSCA is not the primary source of radiological emissions. In the 1997 ASER, less than one Curie of radiation was reported as being emitted from the TSCA stack. Over 10,000 Curies were reported as being emitted from the HFIR stack. Only .013 Curies of uranium were released from Y-12 during 1997; however, Y-12 was still in "stand-down" mode. The most effected individual for the ORR was closest to the HFIR stack not the TSCA stack. Please revise this section to reflect the above statistics.

**Page 3-9, Section 3.4.1 Public and Worker Risk**

Y-12 should have the same considerations as the Portsmouth and Paducah sites for "radiation dose from airborne radionuclides..." and "collective radiological dose from airborne emissions..." The document is inconsistent in its evaluations.

**Page 3-9, 3.4.3 Water Resources**

Floodplains are not addressed nor is groundwater. This section is inconsistent in evaluation with other sites' sections.

**Page 3-10, 3.4.5 Ecological Resources**

Lake Reality is not considered waters of the State and is a man-made, spill containment pond that has heavy mercury and PCB contamination. Its location is now adjacent to Upper East Fork Poplar Creek.

**Page 3-11, Section 3.5 EAST TENNESSEE TECHNOLOGY PARK (formerly K-25 Site)**

This section discusses the East Tennessee Technology Park (ETTP) as a possible site. The ETTP is being reindustrialized. The use of the site as a storage area for Uranium material does not appear to meet the current mission for the ETTP. The EA should address the D&D Trust Fund which is the main source of funding for ETTP operations and how ETTP funds would be used to store and disposition the Fernald material.

**Page 3-11, Table 3.4**

Please explain what the "Fernald Region of Influence" (in table title) means and how it impacts Anderson and Roane counties. This "Fernald Region of Influence" is also mentioned in Tables 3.2 and 3.3.

Page 3-11, 3.5.1 Public and Worker Risk

ETTP should have the same considerations as the Portsmouth and Paducah sites for "radiation dose from airborne radionuclides..." and "collective radiological dose from airborne emissions..." Again, the document is inconsistent in its evaluations.

Page 3-12, 3.5.3 Water Resources, Surface Water

"...most of ETTP is above maximum flood level" does not adequately describe the potential for flooding at proposed storage sites. Flood levels are measured in terms of "X" year floods, that is, a 25-year flood will reach a certain elevation above sea level in a certain location, while a 100-year flood will reach a higher elevation in the same location. The proposed locations for this material are located near Poplar Creek. The paragraph should provide specific information whether or not a flood could inundate the area and the flood plain year (25, 100, etc.).

Page 3-12, 3.5.3 Water Resources, Groundwater

"...conduit-dominated flow has been confirmed only in portions underlain by Knox carbonate along Black Oak Ridge." One-third of all bedrock walls at ETTP intersects cavities, which are generally water-filled. At least one of the proposed locations had adjacent dolines shown on topographic and geologic maps of the area. Conduit flow should be and is the base assumption for unconfined carbonate aquifers such as those that underlie the ETTP proposed storage sites. The fact that conduit flow has only been delineated in one area at ETTP should not be used to imply that conduit flow does not exist in other carbonate units beneath the site.

Page 4-1, 4.1 Public and Worker Risk, first paragraph

Provide information for the statement "In addition, the initial assessment to determine..." specifically outlining what is meant by "a review of the fate of the uranium in the off-site environment..." Also provide information as to where this assessment appears in the appendices.

Page 4-2, 4.1 Public and Worker Risk, first and second paragraph

"Uranium that is released from primary and secondary containment..." It appears that the modeling did not use the tension support structures proposed for storage of this material.

Page 4-3, 4.6.1 Normal Operations, fifth paragraph

"...workers could be exposed to direct radiation from surface contamination" Storage containers should not have any surface contamination. The DOE's original presentation to this Division stressed the packages would be clean and kept in a clean environment. Although these packages may be stored on brown field areas, they are not scheduled to be in any type of secondary containment building. Containers should be free of contamination to prevent release of surface contamination to areas outside the designated storage.

Page A-3, Appendix A

To prevent moving the material twice or more, the 193 MTU of normal uranium scheduled to be used for blend stock should be moved directly to the sites using the material. Furthermore, if other users for the inventory are identified, the material should be transported directly from Fernald to the user to avoid transporting twice.

The total pounds and MTU amounts do not match the totals given on page A-4 and Table B.1.

Page A-5, Appendix A

The chart is describing "depleted" uranium but the total is stated for "all normal."

**Page B-4, Appendix B, Table B.1**

The inventory amounts for the total normal uranium MTU do not match the amount listed in Appendix A, page A-3. The total low-enriched uranium pound amount does not match the amount listed in Appendix A, page A-7.

**Page B-6, Table B.4**

The tornado windspeed for Oak Ridge is less than Fernald and Paducah. How was the wind speed determined, and why was it less for Oak Ridge?

**Page B-6, Appendix B, page B-5, Table B.2, and Container Breach**

It is listed that an accident involving a container breach due to corrosion or degradation of the storage containers could occur. The condition and age of the storage containers should be fully examined and included in the final EA. The material also needs to be fully evaluated for transportation in the final EA.

**Page B-7, Appendix B, third paragraph**

"...it is assumed that the uranium storage facility is a Hazard Category 2 facility...." The hazard analysis appears to assess storage in a Hazard Category 2 facility but not storage in the tension-support structures (TSS) or outside storage pads.

**Page B-9, Appendix B**

Please explain the blank line for the first bullet regarding breathing rate.

**Page B-15, Appendix B, Table B.8**

The calculations for public dose needs to be re-evaluated as the ETTP site is undergoing reindustrialization, members of the public are not restricted to outside the site fence boundaries.



STATE OF TENNESSEE  
DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
Division of Radiological Health  
3rd Floor, L & C Annex  
401 Church Street  
Nashville, TN 37243-1532  
815-532-0399  
INTERNET: [jkey@mail.state.tn.us](mailto:jkey@mail.state.tn.us)

March 11, 1999

Mr. David R. Allen, ORO NEPA Compliance Officer  
U.S. Department of Energy  
PO Box 2001, SE-32  
Oak Ridge Operations Office  
Oak Ridge, TN 37831-8739

Dear Mr. Allen:

Thank you for the opportunity to review the Environmental Assessment for the Receipt and Storage of Uranium Materials from the Fernald Environmental Management Project Site. The Division of Radiological Health has the following comments about this document.

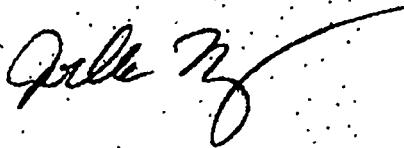
1. There are a number of special security considerations for the movement and storage of the LEU material. Since the Y-12 site currently stores some HEU and LEU, that site appears to be the best location for the storage of the LEU material if it is to be stored in Oak Ridge.
2. This proposal treats the uranium in question as a "product" but the only mention of an actual customer for the product is for the LEU. The State of Tennessee already contains hundreds of cylinders of Depleted Uranium in the form of UF6 which the Department insists can be marketed as a product, but for which they have been unable to find a buyer. While the UF6 situation is different because of the need to convert the Uranium to a usable form, the situation is similar.
3. In the proposal to store the material at K-25, the "co-located worker" is considered to be closer than the member of the public. This is not an accurate assessment of this site. Due to the reindustrialization of the ETTP site members of the public work at and visit this site regularly. The concept of a "co-located worker" for non-radiation workers is a DOE fabrication and is not recognized elsewhere.
4. The EA states that the intent is to get approval for storage of the material at "one or more sites." If the intent of this statement is to leave several options open then we have no objection to this intention. If on the other hand the intention is to scatter the material to different sites then this causes us concern. Storing the DU and the HEU

Mr. Allen  
Page 2  
March 11, 1999

at different sites may be necessary but scattering the DU material to various locations appears inefficient. For example, using more than one site would require that personnel be hired and trained to monitor the material at each of the sites. This does not appear to be the most efficient use of resources. Some of the sites being considered, such as the Y-12 site, do not have enough storage space for all of the material. If a site cannot contain all of the DU material, then we do not think it should be considered for storage of this material.

5. The accident assessment for the ETTP site and specifically for the K-1088F site describes the worst credible accident dose to the public as a low dose. The dose calculated is 1.26 rem. This should not be considered a low dose. Evacuation of the public is recommended at a projected dose of greater than 1 rem.
6. On page B-9, the first bullet at the bottom of the page is incomplete. It contains a blank underlined space, which was most likely intended to be filled in. The information is included on the page but should also be included in the bulleted line.
7. On page B-11, a chart lists the distances to the site boundary from each building considered. This distance was used in the accident assessment as the distance to the nearest member of the public. Given the development of private enterprise on this site ETTP is a public site. Given this, the site boundary is not a reasonable measurement for this calculation for those three buildings. The accident assessment for all three buildings should be reevaluated, this includes the K1088F site which already represents the highest accident dose of 1.28 rem.
8. Page B-13 includes a table which lists radiological consequence level to the public and to workers and associates these with a descriptive word. A public dose ranging from  $\geq 0.1$  rem to  $<5$  rem is described as having low consequences. This seems an unreasonably high range for a low consequence dose.
9. Many of the proposed storage locations are not in the form of already existing buildings, but are empty lots on which Tension Support Structures (TSS) would be built. These buildings do not appear to be as secure as a real building. How reasonable is it to store this type of material in this type of building?

Sincerely,



Joelle Key  
Health Physicist