DOE/EA/1118

ENVIRONMENTAL ASSESSMENT

REFURBISHMENT OF URANIUM HEXAFLUORIDE CYLINDER STORAGE YARDS C-745-K, L, M, N, AND P AND CONSTRUCTION OF A NEW URANIUM HEXAFLUORIDE CYLINDER STORAGE YARD (C-745-T) AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY

July 1996

Prepared by
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for the

United States Department of Energy
Paducah Site Office
Paducah, Kentucky

FINDING OF NO SIGNIFICANT IMPACT

REFURBISHMENT AND CONSTRUCTION OF URANIUM HEXAFLUORIDE CYLINDER STORAGE YARDS AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY

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-1118) entitled *Refurbishment of Uranium Hexafluoride (UF_6) Cylinder Storage Yards C-745-K, L, M, and P and Construction of a New Uranium Hexafluoride Cylinder Storage Yard (C-745-T) at the Paducah Gaseous Diffusion Plant (PGDP) at Paducah, Kentucky.* Based on the results of the analysis reported in the EA, DOE has determined that the proposed action is not a major Federal action that would significantly affect the quality of the human environment within the context of the National Environmental Policy Act of 1969 (NEPA). Therefore, preparation of an environmental impact statement (EIS) will not be necessary, and DOE is issuing this Finding of No Significant Impact (FONSI). Additionally, pursuant to Executive Order 11990 and DOE regulation 10 CFR 1022, *Compliance with Floodplain/Wetlands Environmental Review Requirements,* it is reported in this EA that the loss of less than one acre of wetlands at the proposed project site would not be a significant adverse impact.

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

U.S. Department of Energy
Environmental Information Center
West Kentucky Technology Park
175 Freedom Boulevard
Kevil, Kentucky 42053

INFORMATION ON THE NEPA PROCESS: For further information on the NEPA process, contact

Ms. Patricia W. Phillips, NEPA Compliance Officer
U.S. Department of Energy, Oak Ridge Operations Office
P. O. Box 2001
Oak Ridge, Tennessee 37831
Phone: (423) 576-4200.

BACKGROUND: The PGDP is a uranium enrichment facility owned by the DOE and operated by the U.S. Enrichment Corporation. Depleted uranium hexafluoride, a solid at ambient temperature, is a residual of the enrichment process. At PGDP, depleted uranium hexafluoride is stored in 32,200 steel cylinders that hold a maximum of 14 tons each.

The DOE is currently evaluating alternative strategies for Department-wide long-term management of depleted uranium hexafluoride. Engineering, cost, and environmental [Programmatic Environmental Impact Statement (PEIS)] analyses are underway. Until the PEIS is completed and a Record of Decision (ROD) is issued on the preferred long-term management strategy, DOE sites must manage cylinders of depleted uranium hexafluoride in a safe and environmentally sound manner. Storage conditions at PGDP are sub-optimal, and there is a concern that before a long-term management strategy is decided, corroding cylinders will eventually release hydrogen fluoride and uranium compounds to the environment. The cylinders are stored on poorly drained gravel pads, many in direct contact with the pad or ground surface, and they are often too close together to enable a full visual inspection of their integrity.

PROPOSED ACTION: The purpose of the proposed action is to improve short-term storage conditions for uranium hexafluoride cylinders at PGDP. To accomplish this, storage yards must be upgraded, and cylinders must be re-spaced. Storage yards C-745-A, B, C will be abandoned and a new storage yard (C-745-T) built so that all cylinder yards are co-located. The proposed action would be comprised of the following activities: (1) renovation of existing C-745-K, L, M, N, and P cylinder yards, which are contiguous and within the PGDP security fence; (2) construction of a new 4-hectare (10-acre) storage yard (C-745-T) at a proposed site immediately south of the K, L, M, N, and P yards, but outside the PGDP security fence; (3) handling and onsite transport of cylinders among existing yards to accommodate construction; and (4) after refurbishment and construction, re-stacking of cylinders to meet spacing and inspection requirements. The new and renovated cylinder storage yards would be constructed with slab-on-grade concrete and would be equipped with adequate storm water drainage systems and lighting. The existing security fence and lighting system would be removed and a new lighting system, along with an extension of the patrol road and fence, would be constructed to encompass the new yard.

ALTERNATIVES: In accordance with NEPA regulations, the no-action alternative was evaluated as an environmental baseline against which impacts of the proposed action and other alternatives were compared. If DOE takes no action, the PGDP inventory of cylinders containing uranium hexafluoride would continue to be stored in yards C-745-A, B, C, K, L, M, N, and P. Continued storage on poorly drained gravel pads would exacerbate corrosion, and inadequate space between cylinders would continue to hinder visual inspections of cylinder integrity.

The proposed action, no action, and alternate sites for the proposed action at PGDP were the only alternatives evaluated in this EA, because all other reasonably foreseeable alternatives, including other onsite storage options at PGDP and UF_6 cylinder management at other DOE sites, will be evaluated in the PEIS for long-term management and use of depleted UF_6. Consideration of any of the PEIS alternatives in this EA would be duplicative of this effort and predecisional; therefore, their analysis in this EA would be inappropriate. Also, the action proposed in this EA is allowable under 40 CFR 1506.1 as an interim action that is justified independently of the program and will not prejudice the ultimate decision of the program.

ENVIRONMENTAL IMPACTS:

PROPOSED ACTION

Geology

Construction and refurbishment would be limited to surface grading and excavation to less than 1 m (3 ft) depths. This would not significantly alter site topography and would not affect other geologic characteristics and features at the proposed site of the new yard or at any of the alternate sites.

Water Resources

The addition of concrete pavement in the new and refurbished cylinder storage yards would result in a small but permanent increase in surface runoff to onsite drainage ditches and ultimately, to National Pollutant Discharge Elimination System (NPDES)-permitted outfalls to PGDP surface waters. Also, during construction, erosion of exposed soils may increase siltation to the same ditches and NPDES-permitted outfalls. Best management practices for erosion and sedimentation control will be implemented by the construction contractor to minimize sediment runoff and subsequent increases in stream turbidity, which in turn may affect aquatic biota. Movement of cylinders among yards and storage of cylinders in the refurbished and new yards would not impact surface water and ground water. There is a very low probability of an accidental cylinder breach; however, occupational injuries from the release of hydrogen fluoride and uranium compounds could occur from an accident (see Health and Safety section below).

Water resource impacts would be the same the proposed new yard were constructed at any of the alternate sites, except that runoff would be discharged via a different permitted outfall if Alternate Site 3 is the location of the new storage yard.

Floodplain

The preferred site for the new yard, Alternate Sites 1 and 3 for the new yard, and the refurbished yards are not located within a 100-year floodplain. Portions of Alternate Site 2 are within the 100-year floodplain of a tributary to Bayou Creek.

Wetlands

At the site of the proposed new cylinder yard, six isolated wetlands covering about 0.32 hectare (0.8 acre) would be affected. The DOE was advised by the U.S. Army Corps of Engineers that filling these wetlands is allowable under Nationwide Permit 26, *Headwaters and Isolated Waters Discharges*. A Notice of Wetlands Involvement was published in the Federal Register on May 3, 1996, and a wetlands impact assessment was conducted for the proposed action. It concluded that the loss of less than an acre of wetlands at PGDP would not be a significant adverse impact.

Disturbance of wetlands could be avoided at Alternate Site 2, and Alternate Site 3 has no wetlands present. Alternate Site 1 has 1.82 hectares (4.5 acres) of wetlands that would be impacted.

Biota

Construction associated with the proposed action would disturb and/or destroy 2.02 hectares (5.0 acres) of grassland habitat, 1.21 hectares (3 acres) of mixed hardwood forest habitat, and 0.80 hectare (2.0 acres) of thicket habitat, of which 0.32 hectare (0.8 acre) is wetland. Construction at Alternate Site 1 would result in the loss of approximately 1.61 hectares (4 acres) of grassland habitat, 1.61 hectares (4 acres) of mixed hardwood habitat, and 0.8 hectare (2 acres) of thicket habitat. Construction at Alternate Site 2 would result in the loss of approximately 4 hectares (10 acres) of grassland habitat. Construction at Alternate Site 3 would result in the loss of approximately 3.24 hectares (8 acres) of mixed hardwood habitat, 0.4 hectare (1 acre) of thicket habitat, and 0.4 hectare (1 acre) of grassland habitat.

For any of the potential sites, there would be a corresponding displacement of wildlife to similar nearby habitat. If similar habitat is unavailable, wildlife populations may slightly decline. There is also a threat of direct mortality of transient wildlife during operation of heavy construction equipment and vehicles. Storage of cylinders in the new and refurbished yards would not adversely affect vegetation and wildlife, except if an accidental release of UF_6 occurs and affects water resources and the food chain.

Threatened and Endangered Species

In compliance with Endangered Species Act regulations, DOE consulted with the U.S. Fish and Wildlife Service (FWS) for current information on federally listed or proposed threatened and endangered species, including their habitat and any critical habitat potentially lost as a result of this project. The FWS advised DOE that its records show no T&E species and protected habitat within the impact area of the project, including alternate sites for the new cylinder yard.

Soils and Prime Farmland

The DOE consulted with the Natural Resources Conservation Service and was advised that prime farmland soils would not be affected by the proposed action.

Cultural Resources

In compliance with Section 106 of the National Historic Preservation Act, DOE consulted with the Kentucky State Historic Preservation Officer, who advised DOE that the proposed action would have no adverse impacts on historic resources listed or eligible for listing on the National Register of Historic Places and that no archaeological surveys are necessary for the preferred site of the new yard and the three alternate sites.

Air Quality

Excavation and grading would disturb soils, and fugitive particulates would be released to the atmosphere. In addition to particulates, vehicle and equipment operations would exhaust carbon monoxide, sulfur dioxide, nitrogen oxides, and unburned hydrocarbons. Onsite ambient concentrations of these pollutants would temporarily increase in the immediate vicinity of construction and vehicle operation. Dust suppressants would be applied to roads and construction areas to minimize fugitive particulate emissions. Offsite ambient concentrations of pollutants

regulated under the Clean Air Act would not be expected to increase because of dilution and dispersion of pollutants with increasing distance from the source. Routine storage of re-stacked cylinders would not affect air quality. Atmospheric releases of cylinder contents as a result of an accident could affect occupational health and safety (see Health and Safety section below).

Air quality impacts would be the same if the proposed new yard were constructed at any of the alternate sites.

Noise

During construction, operation of vehicles, heavy machinery, and equipment would cause short-term increases in ambient noise levels. Maintenance of the cylinder yard would sporadically increase ambient noise levels as heavy equipment is used to move cylinders. Increased ambient noise levels from activities at the preferred and alternate sites would not adversely affect the nearest human receptor in Magruder Village, which is 2.4 km (1.5 miles) away.

Socioeconomics

Construction and cylinder yard maintenance personnel would likely be drawn from the PGDP labor pool; therefore, impacts to local employment and economy would be negligible. No minority or economically disadvantaged populations in the PGDP area would be disproportionately affected by the short-term, minor impacts of the proposed action.

Onsite traffic would increase slightly as cylinders are moved among storage yards during construction. Offsite transportation would not be affected.

Land Use

Use of four hectares (10 acres) of land south of the PGDP security fence for the C-745-T Yard and at any of the alternate sites would be compatible with the adjacent industrial use of PGDP.

Transportation

Onsite truck traffic would increase temporarily because of cylinder movement during refurbishment and construction. A modest increase in offsite traffic would result from vehicles transporting construction materials to PGDP.

Waste Management

Wastes generated from earthwork, refurbishment, and construction are expected to be free of radioactive contamination; to ensure proper disposal, wastes will be surveyed prior to handling and transport. All wastes would be sored or sent to disposal at PGDP, with no offsite disposal anticipated.

Health and Safety

Sources of health and safety impacts include (1) construction activities, such as the operation of heavy equipment; (2) radioactive emissions from uranium in the cylinders during handling, transport, and storage, and (3) chemical toxicity from uranium and fluoride, if released during an abnormal event. There would be zero risk of accidents affecting public health and safety during construction because of the distance to the nearest public receptor. Occupational health and safety risk for personnel involved in refurbishment and construction would be similar to the risk associated with general construction projects. No unique hazards were identified for the proposed action.

Current storage of uranium hexafluoride at PGDP presents generally little or no risk to occupational health and safety and no risk to the public during normal activities in the cylinder yards. Occupational radiation exposures are monitored to achieve as-low-as-reasonably-achievable (ALARA) levels. Chemical exposures are extremely rare because uranium hexafluoride is adequately contained in the cylinders. There would be no public health and safety risk during cylinder storage. During an abnormal event, public risk may range from negligible to potentially significant.

More frequent cylinder movement during refurbishment and construction (as opposed to little movement during storage) would slightly increase health and safety risks for PGDP personnel. Occupational risk of physical injury, vehicle accidents, and release from a cylinder rupture would be greatest for movement of cylinders to Alternate Site 3, which is furthest from the existing storage yards. A process hazards analysis of incidents that could occur in PGDP uranium hexafluoride storage yards reported impacts that could result from equipment failure, human error, vehicle accidents, fire, and natural phenomena. Results indicated that a release of solid UF_6 would not expose cylinder yard workers, other PGDP workers, and the nearest public receptor to an unacceptable level of hydrogen fluoride and radioactivity. On the other hand, low-probability, but high-consequence events, such as a large fire or cylinder breach, have the potential to cause serious occupational injuries and fatalities.

Cumulative Impacts

Cumulative impacts are those that result from the incremental impacts of an action combined with impacts from past, present, and planned actions. The impacts of the proposed action were considered along with the impacts from the operation of the Northwest Plume Pump and Treat Facility, expansion of UF_6 cylinder storage yards C-745-G and -S, and operation and maintenance associated with day-to-day PGDP activities.

Increased runoff from pavement added to the G and S yards would be additive with the increased runoff resulting from the proposed action, and additional runoff from Alternate Site 3 would be additive with flow from the Northwest Plume facility. Detention basins would be used to regulate runoff flow to various permitted outfalls.

Fugitive particulates from construction of all cylinder yard projects would be minimized by the use of dust suppressants. Offsite ambient concentrations of regulated pollutants would not be affected because of dilution and dispersion as distance from the source increases.

Concurrent increased ambient noise levels onsite could result from vehicle and machinery operation during various construction activities. Offsite ambient sound levels would not be affected because

Concurrent increased ambient noise levels onsite could result from vehicle and machinery operation during various construction activities. Offsite ambient sound levels would not be affected because of attenuation with distance.

The proposed action, operation of the Northwest Plume Facility, and other cylinder yard refurbishment would be undertaken in previously disturbed areas at PGDP. Thus, they would not cumulatively impact vegetation and wildlife and cultural resources. The proposed action would have no floodplain impacts; therefore, it would contribute an incremental impact to floodplains impacts associated with the other projects. While the preferred location of the proposed action contains wetland areas, the U.S. Army Corps of Engineers Nationwide Permit 26 allows the proposed activities to be undertaken. The proposed action would contribute a small incremental loss of wetlands to total wetlands lost at PDGP because of other projects.

NO ACTION

If no action is taken, there would be a continuation of the occupational health and safety risks associated with a release of hydrogen fluoride and uranium compounds as a result of suboptimal storage of corroding cylinders. There would be no impacts to floodplains, wetlands, cultural resources, air quality, water resources, socioeconomics, environmental justice, ecology, vegetation and wildlife, threatened and endangered species, geology and soils if no action is taken.

DETERMINATION: Based on the findings of the EA, DOE has determined that the proposed refurbishment of cylinder yards C-745-K, L, M, N, and P; construction of a new cylinder storage yard (C-745-T); and re-stacking of cylinders at the PGDP do not comprise a major federal action that would significantly affect the quality of the human environment within the context of the NEPA of 1969. Therefore, preparation of an EIS will not be necessary.

Issued at Oak Ridge, Tennessee, this 25th day of July 1996.

James C. Hall
Manager
U.S. Department of Energy
Oak Ridge Operations Office
Oak Ridge, Tennessee

PREFACE

This *Environmental Assessment Refurbishment of Uranium Hexafluoride Cylinder Storage Yards C-745-K, L, M, N, and P and Construction of a New Uranium Hexafluoride Cylinder Storage Yard (C-745-T) at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE/EA/1118) was prepared in accordance with the requirements of the National Environmental Policy Act. Publication of this document meets a primary document deliverable milestone for the Paducah Gaseous Diffusion Plant Environmental Management and Enrichment Facilities Program. This document provides the United States Department of Energy with documentation of completion of National Environmental Policy Act requirements for the described action.

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APPENDICES

FIGURES

ACRONYMS AND ABBREVIATIONS

^{235}U	uranium-235
bls	below land surface
BMP	best management practice
C.F.R.	Code of Federal Regulations
cm	centimeter
COE	United States Army Corps of Engineers
CWA	Clean Water Act
DE	district engineer
DGA	dense-grade aggregate
DOE	United States Department of Energy
EA	environmental assessment
ERPG	emergency response planning guideline
ft	foot (feet)
ft^2	square feet
ft^3	cubic feet
H_20	water
HF	hydrogen fluoride
K.A.R.	Kentucky Administrative Regulations
KDEP	Kentucky Department for Environmental Protection
km	kilometer(s)
KSNPC	Kentucky State Nature Preserves Commission
LMES	Lockheed Martin Energy Systems, Inc.
LMUS	Lockheed Martin Utility Services, Inc.
m	meter(s)
m^2	square meters
m^3	cubic meters
mg	milligram(s)
mrem	millirem
NEPA	National Environmental Policy Act
NRC	Nuclear Regulatory Commission
NRCS	Natural Resources Conservation Service
NWP	Nationwide Permit
PCB	polychlorinated biphenyl(s)

PGDP	Paducah Gaseous Diffusion Plant
pH	logarithm of the reciprocal of the hydrogen-ion concentration
PH	person hours
PHA	Process Hazards Analysis
PEIS	programmatic environmental impact statement
RC	risk coefficient
RCRA	Resource Conservation and Recovery Act
rem	roentgen equivalent man
RGA	Regional Gravel Aquifer
SHPO	State Historic Preservation Officer
T&E	threatened and endangered
U.S.C.	United States Code
U.S.C.A	United States Code Annotated
U_3O_8	uraninite (or pitchblende)
UCRS	Upper Continental Recharge System
UF_6	uranium hexafluoride
UO_2	uranium oxide
UO_2F_2	uranyl fluoride
USEC	United States Enrichment Corporation
USFWS	United States Fish and Wildlife Service
WKWMA	West Kentucky Wildlife Management Area
WQC	Water Quality Certification

EXECUTIVE SUMMARY

The Paducah Gaseous Diffusion Plant (PGDP), located in western Kentucky, is a uranium enrichment facility owned by the United States Department of Energy (DOE) and operated by the United States Enrichment Corporation. A residual of the uranium enrichment process is depleted uranium hexafluoride (UF6). Depleted UF6, a solid at ambient temperatures, is stored in large steel cylinders weighing up to 14 tons each. The DOE is responsible for approximately 32,200 cylinders of UF6 stored at the PGDP. Storage conditions are suboptimal and have resulted in accelerated corrosion of cylinders, increasing the potential for a release of hazardous substances. Consequently, the DOE has proposed refurbishment of certain existing yards and construction of a new storage yard.

This environmental assessment (EA) evaluates the impacts of the proposed action and no action and considers alternate sites for the proposed new storage yard. The no action alternative provides a baseline against which impacts of the proposed action can be compared. For the purpose of this assessment, no action means that UF6 cylinders would continue to be stored where they are presently located. The proposed action includes (1) renovating the existing C-745-K, L, M, N, and P cylinder yards; (2) constructing a new UF6 storage yard (C-745-T); (3) handling and onsite transport of cylinders among existing yards to accommodate construction; and (4) after refurbishment and construction, re-stacking of cylinders to meet spacing and inspection requirements. The new and renovated cylinder storage yards would be constructed with slab-on-grade concrete and would be equipped with adequate storm water drainage systems and lighting. The existing security fence and lighting system would be removed and a new lighting system, along with an extension of the patrol road and fence, would be constructed to encompass the new yard.

The findings of this EA are as follows:

PROPOSED ACTION

Geology

Construction and refurbishment would be limited to surface grading and excavation to less than 1 m (3 ft) depths. This would not dramatically alter site topography and would not affect other geologic characteristics and features at the proposed site of the new yard or at any of the alternate sites.

Water Resources

The addition of concrete pavement in the new and refurbished cylinder storage yards would result in a small but permanent increase in surface runoff to onsite drainage ditches and ultimately, to Kentucky Pollutant Discharge Elimination System (KPDES)-permitted outfalls to PGDP surface waters. Also, during construction, erosion of exposed soils may increase siltation to the same ditches and KPDES-permitted outfalls. Best management

increase siltation to the same ditches and KPDES-permitted outfalls. Best management practices for erosion and sedimentation control will be implemented by the construction contractor to minimize sediment runoff and subsequent increases in stream turbidity, which in turn may affect aquatic biota. Movement of cylinders among yards and storage of cylinders in the refurbished and new yards would not impact surface water and ground water. There is a very low probability of an accidental cylinder breach; however, occupational injuries from the release of hydrogen fluoride and uranium compounds could occur from an accident (see Health and Safety section below).

Water resource impacts would be the same the proposed new yard were constructed at any of the alternate sites, except that runoff would be discharged via a different permitted outfall if Alternate Site 3 is the location of the new storage yard.

Floodplain

The preferred site for the new yard, Alternate Sites 1 and 3 for the new yard, and the refurbished yards are not located within a 100-year floodplain. Portions of Alternate Site 2 are within the 100-year floodplain of a tributary to Bayou Creek.

Wetlands

At the site of the proposed new cylinder yard, six isolated wetlands covering about 0.32 hectare (0.8 acre) would be affected. The DOE was advised by the U.S. Army Corps of Engineers that filling these wetlands is allowable under Nationwide Permit 26, *Headwaters and Isolated Waters Discharge.* Pursuant to the requirements of Executive Order 11990 and DOE regulation 10 CFR 1022, a Notice of Wetlands Involvement was published in the Federal Register on May 3, 1996 and a wetlands assessment was conducted for the proposed action. DOE concluded that the loss of less than one acre of wetlands at the project site would not be a significant adverse impact.

Disturbance of wetlands could be avoided at Alternate Site 2, and Alternate Site 3 has no wetlands present. Alternate Site 1 has 1.82 hectares (4.5 acres) of wetlands that would be impacted.

Biota

Construction associated with the proposed action would disturb and/or destroy 2.02 hectares (5.0 acres) of grassland habitat, 1.21 hectares (3 acres) of mixed hardwood forest habitat, and 0.80 hectare (2.0 acres) of thicket habitat, of which 0.32 hectare (0.8 acre) is wetland. Construction at Alternate Site 1 would result in the loss of approximately 1.61 hectares (4 acres) of grassland habitat, 1.61 hectares (4 acres) of mixed hardwood habitat, and 0.8 hectare (2 acres) of thicket habitat. Construction at Alternate Site 2 would result in the loss of approximately 4 hectares (10 acres) of grassland habitat. Construction at Alternate Site 3 would result in the loss of approximately 3.24 hectares (8 acres) of mixed hardwood habitat, 0.4 hectare (1 acre) of thicket habitat, and 0.4 hectare (1 acre) of

For any of the potential sites, there would be a corresponding displacement of wildlife to similar nearby habitat. If similar habitat is unavailable, wildlife populations may slightly decline. There is also a threat of direct mortality of transient wildlife during operation of heavy construction equipment and vehicles. Storage of cylinders in the new and refurbished yards would not adversely affect vegetation and wildlife, except if an accidental release of UF_6 occurs and affects water resources and the food chain.

Threatened and Endangered Species

In compliance with Endangered Species Act regulations, DOE consulted with the U.S. Fish and Wildlife Service (FWS) for current information on federally listed or proposed threatened and endangered species, including their habitat and any critical habitat potentially lost as a result of this project. The FWS advised DOE that its records show no T&E species and protected habitat within the impact area of the project, including alternate sites for the new cylinder yard.

Soils and Prime Farmland

The DOE consulted with the Natural Resources Conservation Service and was advised that prime farmland soils would not be affected by the proposed action.

Cultural Resources

In compliance with Section 106 of the National Historic Preservation Act, DOE consulted with the Kentucky State Historic Preservation Officer, who advised DOE that the proposed action would have no adverse impacts on historic resources listed or eligible for listing on the National Register of Historic Places and that no archaeological surveys are necessary for the preferred site of the new yard and the three alternate sites.

Air Quality

Excavation and grading would disturb soils, and fugitive particulates would be released to the atmosphere. In addition to particulates, vehicle and equipment operations would exhaust carbon monoxide, sulfur dioxide, nitrogen oxides, and unburned hydrocarbons. Onsite ambient concentrations of these pollutants would temporarily increase in the immediate vicinity of construction and vehicle operation. Dust suppressants would be applied to roads and construction areas to minimize fugitive particulate emissions. Offsite ambient concentrations of pollutants regulated under the Clean Air Act would not be expected to increase because of dilution and dispersion of pollutants with increasing distance from the source. Routine storage of re-stacked cylinders would not affect air quality. Atmospheric releases of cylinder contents as a result of an accident could affect occupational health and safety (see Health and Safety section below).

Air quality impacts would be the same if the proposed new yard were constructed at any

of the alternate sites.

Noise

During construction, operation of vehicles, heavy machinery, and equipment would cause short-term increases in ambient noise levels. Maintenance of the cylinder yard would sporadically increase ambient noise levels as heavy equipment is used to move cylinders. Increased ambient noise levels from activities at the preferred and alternate sites would not adversely affect the nearest human receptor in Magruder Village, which is 2.4 km (1.5 miles) away.

Socioeconomics

Construction and cylinder yard maintenance personnel would likely be drawn from the PGDP labor pool; therefore, impacts to local employment and economy would be negligible. No minority or economically disadvantaged populations in the PGDP area would be disproportionately affected by the short-term, minor impacts of the proposed action.

Onsite traffic would increase slightly as cylinders are moved among storage yards during construction. Offsite transportation would not be affected.

Land Use

Use of four hectares (10 acres) of land south of the PGDP security fence for the C-745-T Yard and at any of the alternate sites would be compatible with the adjacent industrial use of PGDP.

Transportation

Onsite truck traffic would increase temporarily because of cylinder movement during refurbishment and construction. A modest increase in offsite traffic would result from vehicles transporting construction materials to PGDP.

Waste Management

Wastes generated from earthwork, refurbishment, and construction are expected to be free of radioactive contamination; to ensure proper disposal, wastes will be surveyed prior to handling and transport. All wastes would be stored appropriately or sent to disposal at PGDP, with no offsite disposal anticipated.

Health and Safety

Sources of health and safety impacts include (1) construction activities, such as the operation of heavy equipment; (2) radioactive emissions from uranium in the cylinders

Health and Safety

Sources of health and safety impacts include (1) construction activities, such as the operation of heavy equipment; (2) radioactive emissions from uranium in the cylinders during handling, transport, and storage, and (3) chemical toxicity from uranium and fluoride, if released during an abnormal event. There would be zero risk of accidents affecting public health and safety during construction because of the distance to the nearest public receptor. Occupational health and safety risk for personnel involved in refurbishment and construction would be similar to the risk associated with general construction projects. No unique hazards were identified for the proposed action.

Current storage of uranium hexafluoride at PGDP presents generally little or no risk to occupational health and safety and no risk to the public during normal activities in the cylinder yards. Occupational radiation exposures are monitored to achieve as-low-as-reasonably-achievable (ALARA) levels. Chemical exposures are extremely rare because uranium hexafluoride is adequately contained in the cylinders. There would be no public health and safety risk during cylinder storage. During an abnormal event, public risk may range from negligible to potentially significant.

More frequent cylinder movement during refurbishment and construction (as opposed to little movement during storage) would slightly increase health and safety risks for PGDP personnel. Occupational risk of physical injury, vehicle accidents, and release from a cylinder rupture would be greatest for movement of cylinders to Alternate Site 3, which is furthest from the existing storage yards. A process hazards analysis of incidents that could occur in PGDP uranium hexafluoride storage yards reported impacts that could result from equipment failure, human error, vehicle accidents, fire, and natural phenomena. Results indicated that a release of solid UF_6 would not expose cylinder yard workers, other PGDP workers, and the nearest public receptor to an unacceptable level of hydrogen fluoride and radioactivity. On the other hand, low-probability, but high-consequence events, such as a large fire or cylinder breach, have the potential to cause serious occupational injuries and fatalities.

Cumulative Impacts

Cumulative impacts are those that result from the incremental impacts of an action combined with impacts from past, present, and planned actions. The impacts of the proposed action were considered along with the impacts from the operation of the Northwest Plume Pump and Treat Facility, expansion of UF_6 cylinder storage yards C-745-G and -S, and operation and maintenance associated with day-to-day PGDP activities.

Increased runoff from pavement added to the G and S yards would be additive with the increased runoff resulting from the proposed action, and additional runoff from Alternate Site 3 would be additive with flow from the Northwest Plume facility. Detention basins would be used to regulate runoff flow to various permitted outfalls.

Concurrent increased ambient noise levels onsite could result from vehicle and machinery operation during various construction activities. Offsite ambient sound levels would not be affected because of attenuation with distance.

The proposed action, operation of the Northwest Plume Facility, and other cylinder yard refurbishment would be undertaken in previously disturbed areas at PGDP. Thus, they would not cumulatively impact vegetation and wildlife and cultural resources. The proposed action would have no floodplain impacts; therefore, it would contribute an incremental impact to floodplains impacts associated with the other projects. While the preferred location of the proposed action contains wetland areas, the U.S. Army Corps of Engineers Nationwide Permit 26 allows the proposed activities to be undertaken. The proposed action would contribute a small incremental loss of wetlands to total wetlands lost at PDGP because of other projects.

NO ACTION

If no action is taken, there would be a continuation of the occupational health and safety risks associated with a release of hydrogen fluoride and uranium compounds as a result of suboptimal storage of corroding cylinders. There would be no impacts to floodplains, wetlands, cultural resources, air quality, water resources, socioeconomics, environmental justice, ecology, vegetation and wildlife, threatened and endangered species, geology and soils if no action is taken.

1. INTRODUCTION

1.1 BACKGROUND

The Paducah Gaseous Diffusion Plant (PGDP), located in western Kentucky (Figure 1-1), is a uranium enrichment facility owned by the United States Department of Energy (DOE). Effective July 1, 1993, the DOE leased the plant production operations facilities to the United States Enrichment Corporation (USEC) which, in turn, contracted with Lockheed Martin Utility Services, Inc. (LMUS) to provide operation and maintenance services. Lockheed Martin Energy Systems, Inc. (LMES) operates the Environmental Management and Enrichment Facilities Program activities and legacy items for the DOE.

Uranium is a naturally occurring radioactive element containing different isotopes, notably uranium-238 and uranium-235 (^{235}U). The use of uranium as an energy source requires increasing the proportion of ^{235}U through the enrichment process. One method for enriching uranium is gaseous diffusion. Gaseous diffusion divides a single stream of gaseous uranium hexafluoride (UF_6), a mixture of uranium and fluorine, into two separate streams: one enriched in ^{235}U (enriched uranium), and the other depleted in ^{235}U (depleted UF_6). A consequence of the enrichment process is the accumulation of depleted UF_6, which is a solid at ambient temperatures. Depleted UF_6 is stored in steel cylinders weighing up to 14 tons each. The continued storage of these cylinders at the PGDP is the focus of this document.

1.2 PURPOSE AND NEED

Until a decision is made on the long-term management of depleted UF_6, the DOE is responsible for storing approximately 32,200 UF_6 cylinders at the PGDP. Current storage conditions for 18,804 cylinders of depleted UF_6, at cylinder yards C-745-A, B, C, K, L, M, N, and P are suboptimal and have contributed to accelerated corrosion of the cylinders, increasing the potential for a release of hazardous substances [hydrogen fluoride (HF) and uranium compounds]. The cylinders are stored on poorly drained, large gravel pads. Many of the cylinders are in direct contact with this surface and are too close together to allow a full visual inspection. The purpose of the proposed action is to improve short-term storage conditions for UF_6 cylinders. To accomplish this, storage yards must be upgraded and cylinders must be re-spaced. However, there is not sufficient space available in other existing yards to accommodate all cylinders. Consequently, a new storage facility for relocating the cylinders is needed.

1.3 RELATIONSHIP TO OTHER UNITED STATES DEPARTMENT OF ENERGY ACTIONS

The DOE and the Defense Nuclear Facilities Safety Board recently agreed upon a strategy to improve safety at UF_6 cylinder storage sites [60 Fed. Reg. 25893 (May 15, 1995) and 60 Fed. Reg. 36789 (July 18, 1995)] in accordance with the Atomic Energy Act of 1954 [42 U.S.C. § 2286(a)(5) (1991)]. Under this strategy, the DOE will focus on:

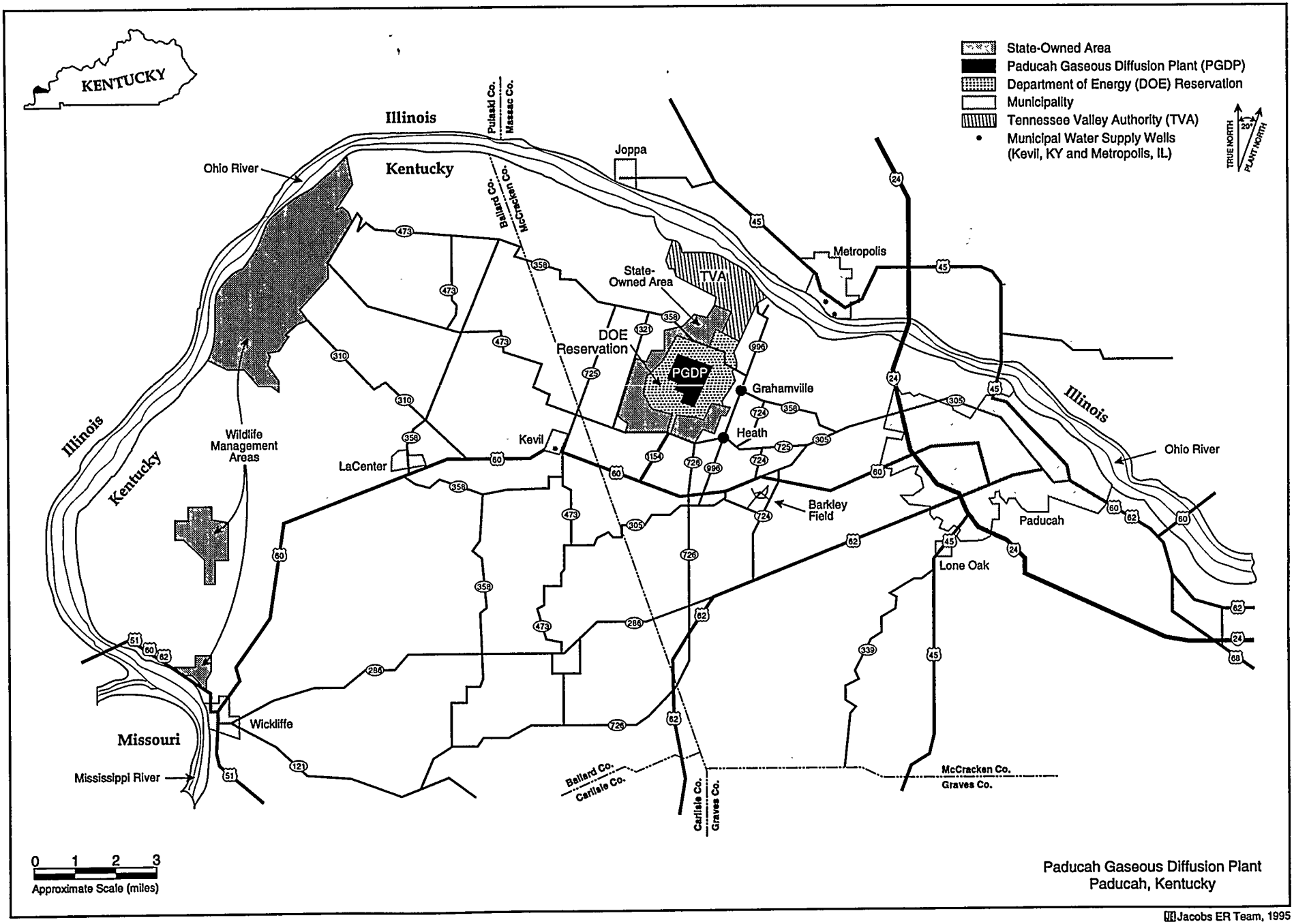


Figure 1-1. Paducah Gaseous Diffusion Plant Vicinity Map

- Repainting cylinders as needed to prevent excessive corrosion;
- Relocating cylinders from contact with the ground and keeping all cylinders from further ground contact;
- Relocating all cylinders into adequate inspection configuration and maintaining them as such; and
- Updating handling and inspection procedures and site-specific safety analysis reports.

In conjunction with the aforementioned, the DOE is conducting engineering and cost analyses and preparing a programmatic environmental impact statement (PEIS) to evaluate alternative strategies for the long-term management of depleted UF_6 at various DOE facilities, including the PGDP. A Notice of Intent to prepare the PEIS was published in the Federal Register, Vol. 61, No. 17, p. 2239, January 25, 1996. Alternatives assessed in the PEIS will include long-term storage of depleted uranium as UF_6, conversion to an oxide [uranium oxide (UO_2) or uraninite (U_3O_8)] followed by extended storage or disposal, and conversion to UO_2 or uranium metal followed by use of this material. Until the PEIS is completed and a long-term strategy is determined, the DOE will provide continued storage of the cylinders in a safe, suitable, and practical manner.

2. PROPOSED ACTION AND ALTERNATIVES

2.1 NO ACTION

The no action alternative is considered in accordance with NEPA regulations and provides an environmental baseline against which impacts from the proposed action can be compared. For the purposes of this assessment, no action means that UF_6 cylinders would continue to be stored in the existing yards (C-745-A, B, C, K, L, M, N, and P) under current conditions. The cylinders are stored directly on poorly drained, large gravel pads and are too close together to allow a full visual inspection. Continuation of these practices could allow cylinders to further corrode, maintain contact with the ground in places, and prevent adequate visual inspections. Consequently, no action would not remediate health and safety risks associated with cylinder breaches via corrosion. Also, under the no action alternative, cylinders would be occasionally moved. With no action, existing environmental conditions, described in Chapter 3, would be maintained. Consequently, impacts associated with the proposed action, described in Chapter 4, can be compared to baseline conditions described in Chapter 3.

2.2 PROPOSED ACTION

The proposed action includes refurbishment of existing storage yards C-745-K, L, M, N, and P; construction of a new UF_6 cylinder storage yard (C-745-T); and re-stacking the cylinders in the existing and new yard to meet spacing and inspection requirements.

2.2.1 Project Location

Storage yards C-745-K, L, M, N, and P are contiguous and located within the secured area of the PGDP at the southern end of the plant (Figure 2-1). A new cylinder yard, the C-745-T Yard, would provide a storage area of 4 hectares (10 acres). The proposed C-745-T Yard would be located south of the existing yards (Figure 2-1). Existing yards C-745-A, B, and C would no longer be used for UF_6 cylinder storage.

The proposed C-745-T Yard would permanently accommodate the cylinders from the C-745-A, B, and C yards and temporarily accommodate cylinders from the C-745-K, L, M, N, and P yards. The C-745-A, B, and C yards currently contain 5,129 DOE cylinders and the C-745-K, L, M, N, and P yards contain 13,675 cylinders. Therefore, a total of 18,804 cylinders would require movement.

Alternate sites for the proposed C-745-T Yard were chosen using the following criteria:

- No structures may be placed on property leased to the USEC, or on easements (e.g., power line right-of-way);

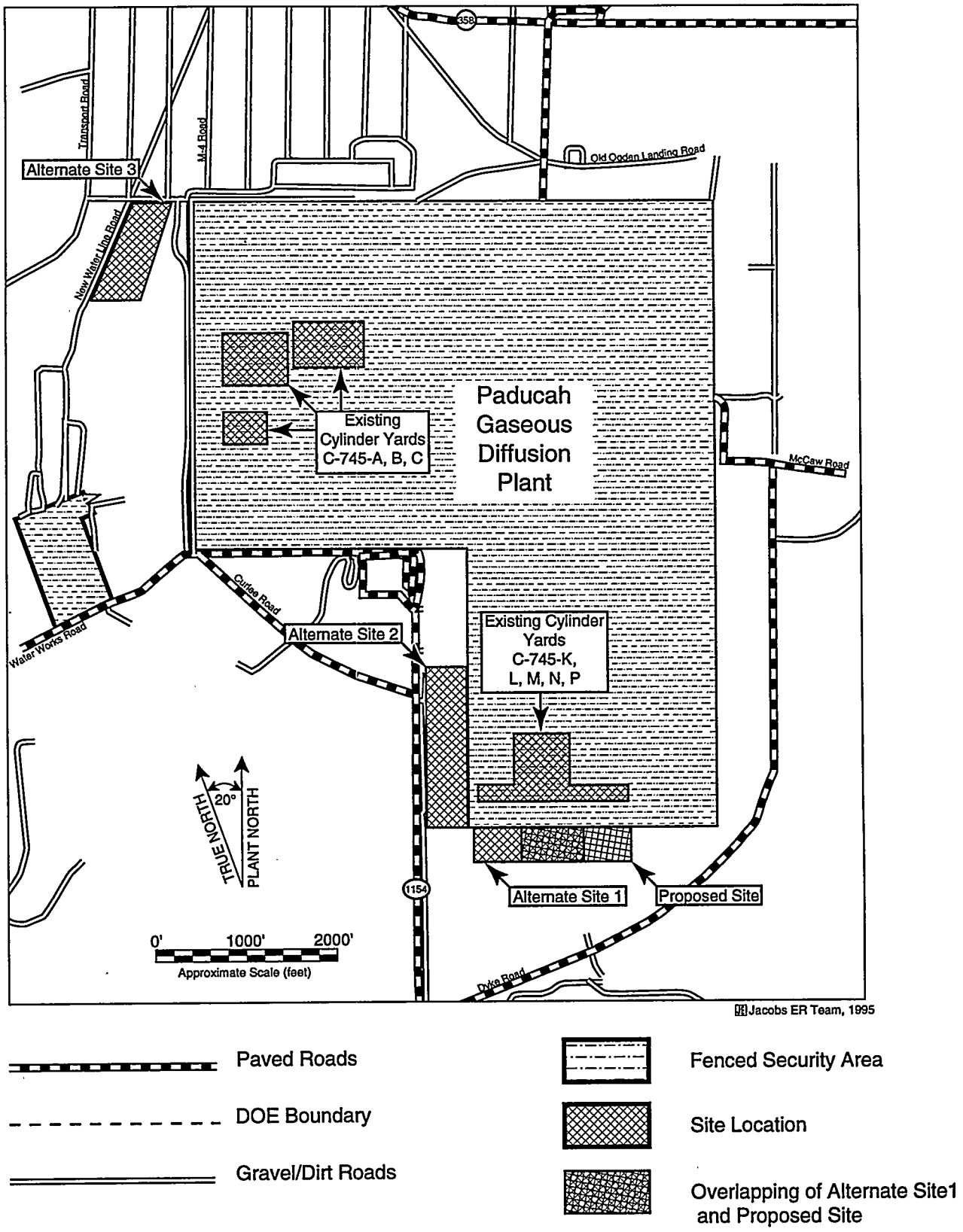


Figure 2-1. Locations of Current, Proposed, and Alternate Sites for Storage of Uranium Hexafluoride Cylinders at the Paducah Gaseous Diffusion Plant.

- Avoid or minimize demolition or relocation of current or planned structures and facilities;

- Per security requirements, no structures may be placed within 6 m (20 ft) of the PGDP security fence;

- Per the Conceptual Design Report For The Paducah Gaseous Diffusion Plant UF_6 Cylinder Storage Yards, Phase IX (MMES, 1995a), a minimum of 4 hectares (10 acres) is required to accommodate cylinders to be relocated as a result of spacing/re-stacking requirements;

- The new cylinder storage yard must be reasonably close to existing or planned cylinder yards to minimize risks, costs, and time associated with cylinder relocation (i.e., UF_6 cylinders should be collocated to the maximum extent practicable); and

- All activities must avoid or minimize impacts to environmentally sensitive resources.

These criteria, in conjunction with the DOE-USEC lease agreement, the latest draft DOE Site Development Plan, available information on environmental site conditions, and appropriate DOE-NEPA guidance, resulted in the selection of four possible sites for the proposed 4 hectares (10 acres) C-745-T Yard (Figure 2-1):

(1) The proposed C-745-T Yard;

(2) An area overlapping and to the west of the proposed C-745-T Yard (Alternate Site 1);

(3) An open, undeveloped area immediately west of existing DOE C-745-K, L, M, N, and P cylinder yards and bounded to the west by the plant access road (Alternate Site 2); and

(4) An area just outside the northwest corner of the plant bounded to the south by Outfall 001, to the west by Transport Road, and to the north by Patrol Road #2 extension (Alternate Site 3).

2.2.2 Construction

During construction, cylinders would be moved to adjacent cylinder yards having available space. The proposed C-745-T Yard would be constructed first. After completion of the proposed C-745-T Yard, cylinders from C-745-A, B, C, and K would be relocated to the proposed C-745-T Yard. Refurbishment of C-745-K Yard would occur next and, once complete, cylinders from C-745-L would be relocated onto the C-745-K and T yards. Refurbishment of C-745-L, M, N, and P yards would follow, in that

order, and cylinders would be moved onto each completed yard as each yard is completed. At this time, all cylinders would be properly located and stacked to allow adequate inspection.

The proposed C-745-T Yard and the refurbished storage yards would be constructed with slab-on grade concrete, appropriate storm water drainage systems, and lighting. The existing security fence and lighting system would be removed and replaced by a new lighting system and an extension of the patrol road and fence.

Vegetation would be cleared prior to contouring and preparation of the subgrade surface. The concrete pad for each of the cylinder storage areas would be of 35 cm (14-inches) thick, unreinforced concrete in 7.5 to 15 m (25 to 50 ft) widths with slight grading to allow for drainage. A storm water drainage system would be constructed of reinforced concrete pipe and precast catch basins around the perimeter of each pad (MMES, 1995a).

The new lighting system would include additional transformers, lighting contactors, and new lighting poles with multiple 400-watt lighting fixtures. Power would be transmitted to the new area through underground power ducts as well as new overhead power lines along the perimeter of the yard. The security fence and patrol road would extend around the perimeter of the new cylinder yard. The patrol road extension would be constructed from dense-grade aggregate (DGA) and asphalt and would allow security monitoring along the entire perimeter of the new cylinder yard.

2.2.3 Cylinder Movement

Trailers equipped with saddles would be used for intraplant cylinder movements. Forklifts would be used to move 2.5-ton cylinders and cylinder stackers would be used to stack and move 2.5-, 10-, and 14-ton cylinders in storage yards within the plant. Standard safety procedures (USEC, 1995) would be followed to ensure that a release of UF_6 does not occur. The routes utilized for cylinder movement during the proposed action would be confined to the secured area of the PGDP.

2.2.4 Waste Management

Construction of the proposed C-745-T Yard would require clearing trees and shrubs located south of the southern end of the plant. Site characterization has been completed and results indicated that soil is uncontaminated and could be used as fill over the construction site.

Renovation of the existing C-745-K, L, M, N, and P yards would require removal and disposal of existing wood and metal utility poles, electrical lines, metal fencing, light fixtures and various other materials. An estimated 25 wooden poles, 25 steel poles, and 65 light fixtures/ballasts would require storage or disposal as a result of the cylinder yard refurbishment and expansion. The DGA and subgrade would be removed in order to

construct the 35-cm (14-inch) forms. Removal of existing storm drains may also be required before construction.

Wastes would be classified, handled, and stored as appropriate following these PGDP management practices (LMES, 1995; White, 1995):

- Concrete, asphalt, and uncontaminated soil would be stored in an existing stockpile area or disposed in the existing on-site landfill;
- Steel poles and scrap metal would be stored in the uncontaminated scrap metal storage yard or in the contaminated scrap yard, depending on characterization;
- Wooden poles would be stored in the C-747-B Scrap Yard;
- Electrical cables would be containerized in strong, tight containers, sampled for PCB, and, if determined uncontaminated, can be disposed in the uncontaminated metal scrap yard;
- Lamps and ballasts would be containerized in open-head drums, sampled for PCBs, and stored at C-747-B; and
- Any other contaminated material associated with this project would be managed in accordance with PGDP waste management policy and procedures.

2.3 OTHER ALTERNATIVES

Due to stacking requirements, UF_6 safe-handling procedures, and a lack of additional space inside the PGDP, no other on-site storage alternatives are feasible (USEC, 1995). Additionally, there are no reasonably foreseeable alternatives to continued on-site storage of depleted UF_6 in cylinders. Other management alternatives, such as off-site storage, will be evaluated in an PEIS of the DOE for the long-term management of depleted UF_6 resources at several geographical locations as discussed in Section 1.3. Consequently, these management alternatives are not addressed in this environmental assessment (EA). The DOE has not irretrievably or irreversibly committed any resources that would bias the selection of either alternatives or sites for the new cylinder storage yard discussed in this document.

3. AFFECTED ENVIRONMENT

At the PGDP, the DOE owns approximately 300 hectares (740 acres) within a security fence that is surrounded by approximately 1,090 hectares (2,695 acres) of which 850 hectares (2,100 acres) are leased to the Commonwealth of Kentucky as part of the West Kentucky Wildlife Management Area (WKWMA) (Figure 3-1). This section describes the various resources present on portions of this land that may be affected by the proposed action. Unless otherwise specified, no impacts to any resources would occur from activities associated with the C-745-A, B, C, K, L, M, N, and P cylinder yards.

3.1 GEOLOGY

Background geologic information on the PGDP area can be found in the Report of the Paducah Gaseous Diffusion Plant Groundwater Investigation Phase III (MMES, 1992) and the draft Northeast Plume Preliminary Characterization Summary Report (DOE, 1995a).

The stratigraphic sequence in the PGDP region consists of Cretaceous, Tertiary, and Quaternary sediments unconformably overlying Paleozoic bedrock.

No mineral deposits have been identified at the PGDP, and the only economic geological resource in the vicinity is the Terrace Gravels, which are mined primarily for use as aggregate in road construction. Currently, gravel pits are located about 2.4 km (1.5 miles) to the south and west from the plant site.

3.2 WATER RESOURCES

The sources for the following discussion of regional surface water (Section 3.2.1) and ground water hydrology (Section 3.2.2) include the Results of the Site Investigation, Phase II Paducah Gaseous Diffusion Plant, Paducah, Kentucky (CH2M HILL, 1992), the Report of the Paducah Gaseous Diffusion Plant Groundwater Investigation Phase III (MMES, 1992) and the draft Northeast Plume Preliminary Characterization Summary Report (DOE, 1995a) at the PGDP.

3.2.1 Surface Water

Surface water originating from the plant drains into Ohio River tributaries (Figure 3-2). Because of a local drainage divide, the PGDP surface water flow is either to the east and northeast toward Little Bayou Creek, or to the west and northwest toward Bayou Creek. Both Bayou Creek and Little Bayou Creek are perennial streams that discharge into the Ohio River and are designated for all uses by the Commonwealth of Kentucky.

At the PGDP, man-made drainage ditches receive storm water and effluent from the plant which is routed through 18 Kentucky Pollutant Discharge Elimination System (KPDES)-permitted outfalls (Figure 3-2) and eventually discharged into Bayou and Little Bayou

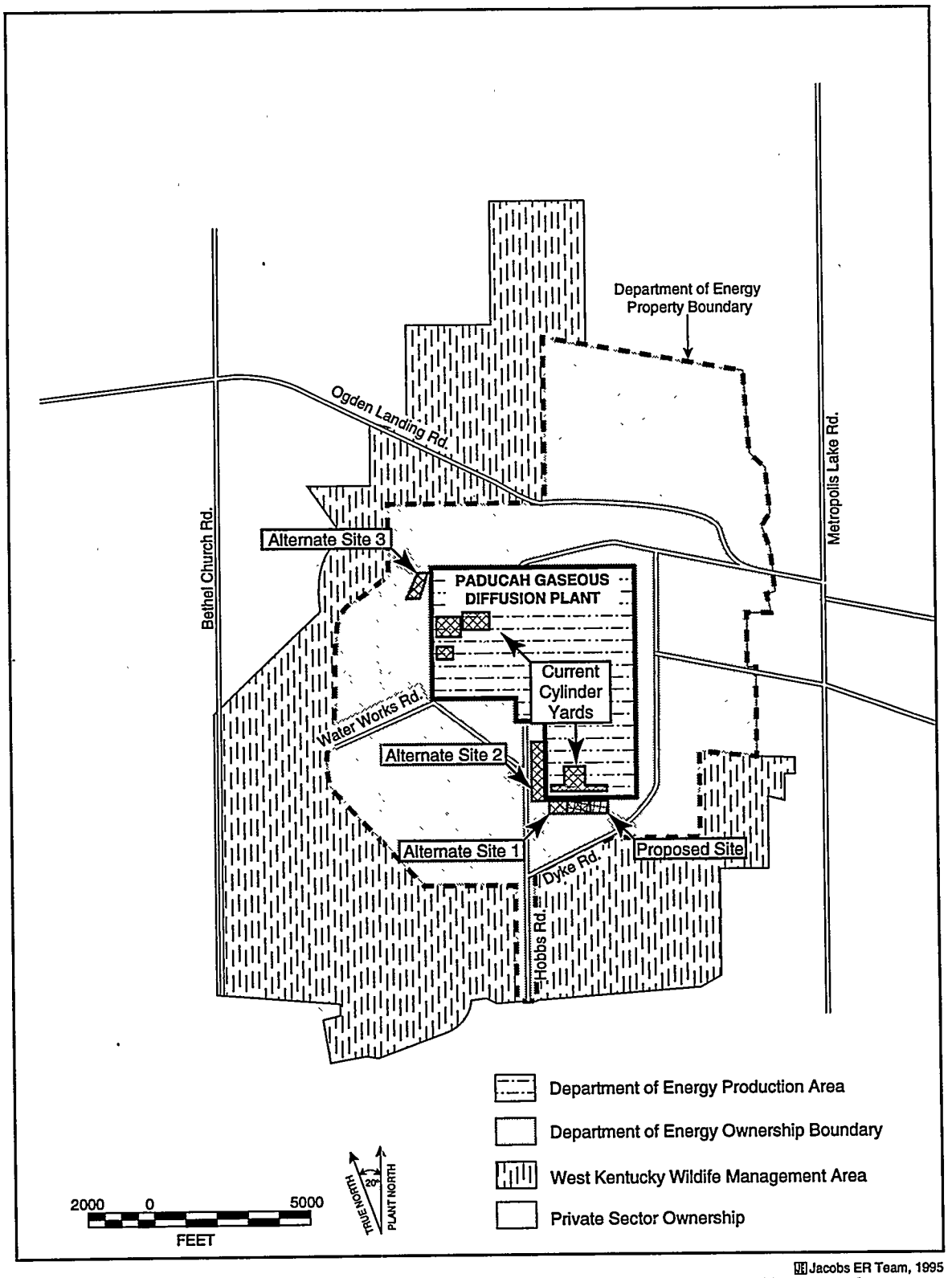
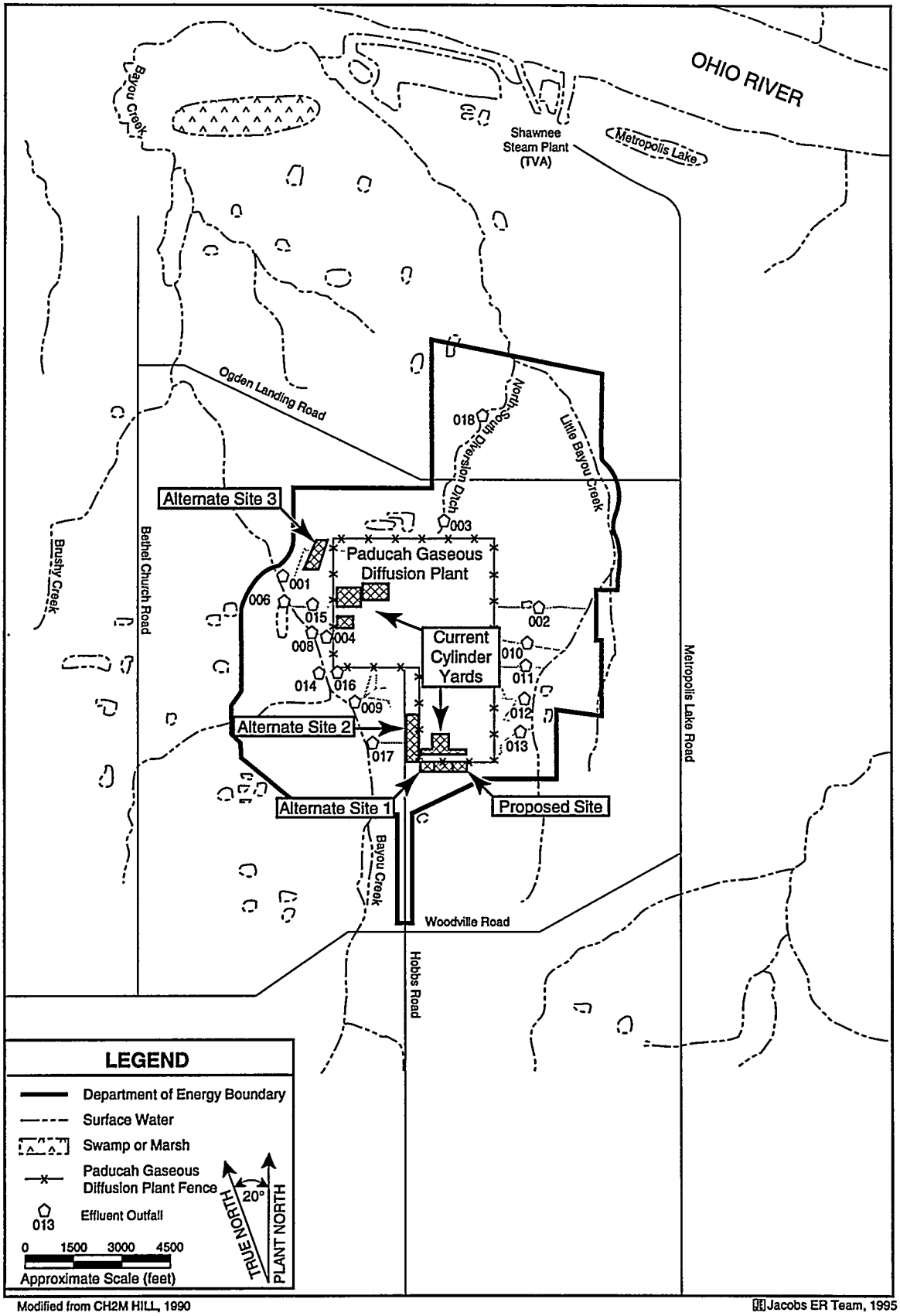


Figure 3-1. Current Land Ownership at the Paducah Gaseous Diffusion Plant



Modified from CH2M HILL, 1990

Jacobs ER Team, 1995

Figure 3-2. Surface Water Features and Permitted Effluent Outfalls in the Vicinity of the Paducah Gaseous Diffusion Plant

creeks. Most of the flow in these creeks can be attributed to effluent water from the plant (MMES, 1994). The 18 outfalls have a combined average daily flow of 18.5 million liters per day (4.88 million gallons per day). All outfalls mentioned in this document are monitored for radionuclides including uranium, various other chemicals and contaminants, and have maximum flow volumes (KPDES Permit No. KY0004049). Cylinder yards C-745-K, L, M, N, and P discharge storm water runoff into outfalls 012 and 013. Flow through these outfalls empties into Little Bayou Creek. Cylinder yards C-745-A, B, and C discharge storm water runoff into outfalls 004, 008, and 015. Flow through these outfalls empties into Bayou Creek. Storm water runoff from the proposed C-745-T Yard site flows mostly to the north and then to the east (Figure 3-3). It then flows through Outfall 013 and on to Little Bayou Creek. On the west side of the site, flow is to the north and west and drains into a northward flowing ditch next to the plant entrance road (Figure 3-3). Eventually, the water flows to the west through Outfall 017 and into Bayou Creek.

Storm water runoff from Alternate Site 1 drains mostly to the north and the west. This water then drains to a northward flowing ditch next to the plant entrance road. Eventually, the water flows to the west through Outfall 017 and into Bayou Creek.

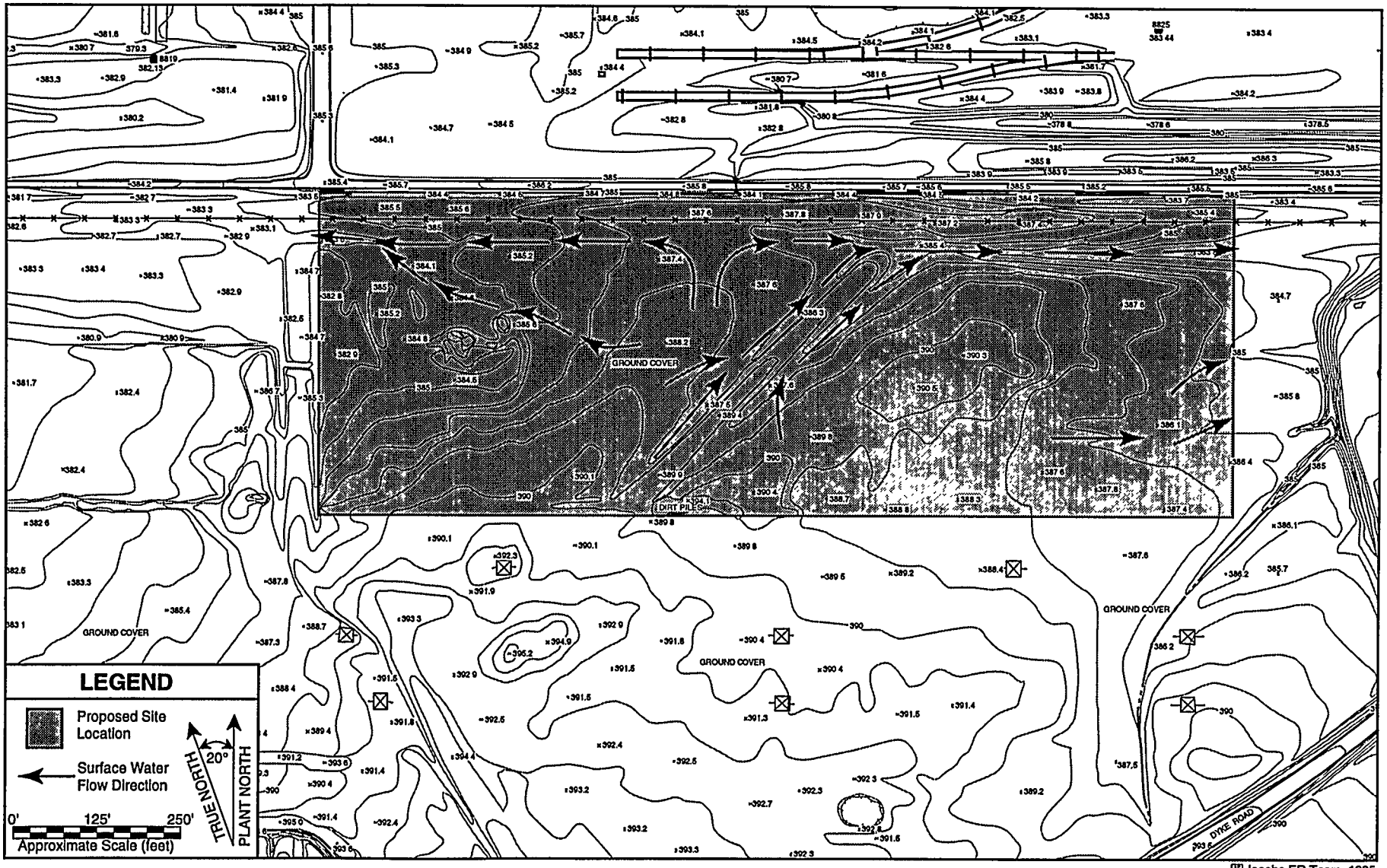
Alternate Site 2 storm water runoff flows into ditches at the east and west sides of the site or into the westward trending ditches that cross the site. The surface water in these ditches eventually flows through Outfall 017 and into Bayou Creek.

Alternate Site 3 runoff ultimately discharges into the ditch that borders the site on the east. This ditch carries surface water to the Outfall 001 ditch. The Outfall 001 ditch borders the south side of the site and carries surface flow west through Outfall 001 and into Bayou Creek.

3.2.2 Ground Water

Two units present in the vicinity of the PGDP are the Upper Continental Recharge System (UCRS) and the Regional Gravel Aquifer (RGA). The UCRS is a hydrogeologic unit contained within the loess layer and the Upper Continental Deposits. The ultimate flow direction in the UCRS is downward. The RGA is a hydrogeologic unit that is primarily contained within the Lower Continental Deposits. The RGA also encompasses sands at the base of the Upper Continental Deposits directly overlying the Lower Continental gravels. In addition, the RGA has been found to include sands in the upper part of the McNairy Formation directly below the gravel.

The RGA typically has a relatively high hydraulic conductivity and so serves as the dominant ground water flow system in the area. The predominant flow direction in the RGA is northward toward the Ohio River. The RGA ranges in thickness from 3 to 12.1 m (10 to 40 ft) and pinches out at the base of the Porters Creek Clay Terrace. The RGA has been identified as the uppermost aquifer at the PGDP and is the major water supply aquifer for the region. The ground water level in the area of the proposed C-745-T



Jacobs ER Team, 1995

Figure 3-3. Surface Water Flow at the Proposed Location of C-745-T Uranium Hexafluoride Cylinder Yard at the Paducah Gaseous Diffusion Plant

Yard, and alternate sites 1 and 2, is at approximately 4.6 m (10 ft) below land surface (bls).

The existing C-745-K, L, M, N, and P cylinder yards, the proposed C-745-T Yard, and alternate sites 1 and 2 are located south of the terrace face where the RGA is not present. The Terrace Gravels would be the only water-bearing zone above the Porters Creek Clay at these sites. Both the UCRS and the RGA are present beneath Alternate Site 3.

3.2.3 Floodplains

Flooding at the PGDP is associated with the Ohio River, Bayou Creek, and Little Bayou Creek. The majority of overland flooding on the DOE reservation is associated with Bayou and Little Bayou creeks.

Floodplains at the PGDP were identified by the United States Army Corps of Engineers (COE) (COE, 1994). The Hydrologic Engineering Center Computer Program model was used to estimate 100- and 500-year flood elevations. Alternate Site 2 is bisected by a 100-year floodplain contained within a drainage running east and west (COE, 1994). No other floodplains were identified at any of the other sites.

3.2.4 Wetlands

No wetlands are present at the C-745-K, L, M, N, and P yards. Six small, isolated wetlands are present at the proposed C-745-T Yard, totaling 0.32 hectare (0.80 acre) [MMES, 1995c (Appendix A); CDM, 1994] (Figure 3-4). These wetlands are classified as palustrine emergent, palustrine scrub/shrub, and palustrine forested, according to the United States Fish and Wildlife Service (USFWS) wetland classification system (USFWS, 1979). Palustrine wetlands in the vicinity of the PGDP are those less than 8 hectares (20 acres) in surface area with a water depth less than 2 m (6.6 ft) during low water. Emergent vegetation is erect, rooted, non-woody; scrub/shrub vegetation is woody not exceeding 6 m (20 ft) in height, and forested vegetation is woody, exceeding 6 m (20 ft) in height. A description of wetlands at the proposed site is provided in Appendix A.

Alternate Site 1 has approximately 1.82 hectares (4.5 acres) of wetlands and Alternate Site 2 has 0.36 hectares (0.9 acres) of wetlands present (MMES, 1995d; MMES, 1995e). No wetlands are present on Alternate Site 3 (COE, 1994).

3.3 BIOTA

Most of the area in the vicinity of the PGDP has been cleared of vegetation at some time, and much of the grassland habitat is currently mowed by PGDP personnel. A large percentage of the adjacent WKWMA is managed to promote native prairie vegetation using burning, mowing, and various other techniques. These areas have the greatest potential for restoration and establishment of a sizable prairie preserve in the Jackson

Purchase area (KSNPC, 1991) and promote native prairie species such as big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*), compass plant (*Silphium laciniatum*), and rattlesnake master (*Eryngium yuccafolium*), among others. Other common grasses associated with grassland areas include broom sedge (*Agropyron virginicus*), silver plume grass (*Andropogon ternarius*), panic grass (*Panicum scoparium*), and three awn grass (*Aristida purpurescens*). However, current mowing practices make positive identification of grass species very difficult in many areas.

Dominant overstory species of the mixed hardwood forest area include oaks (*Quercus* spp.), hickories (*Carya* spp.), maples (*Acer* spp.), elms (*Ulmus americana* and *incana*), sweetgum (*Liquidambar styraciflua*), and various others. Understory species include snowberry (*Symphoricarpos orbiculatus*), poison ivy (*Toxicodendron radicans*), and Solomon's seal (*Smilacina recemosa*), among others.

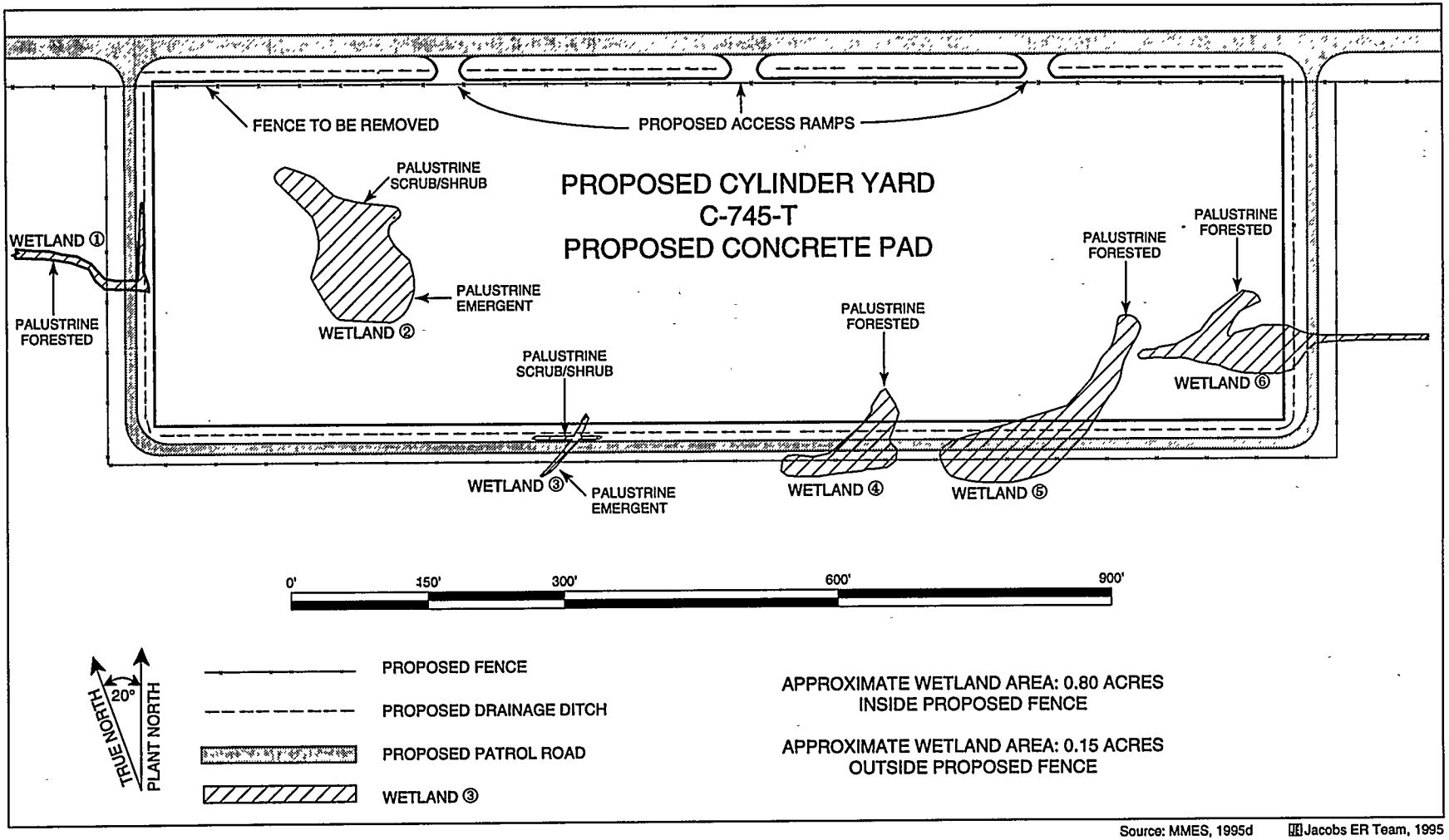
Thicket areas consist predominantly of maples, black locust (*Robinia pseudoacacia*), sumac (*Rhus* sp.), persimmon (*Diospyros verginiana*), and other mixed forest species in the sapling stage with herbaceous ground cover similar to that of the mixed hardwood forest understory.

Wetland vegetation consists of species such as sedges (*Carex* spp.), rushes (*Juncus* and *Scirpus* spp.), spikerushes (*Eleocharis* spp.), and various other grasses and forbs in the emergent portions; red maple (*Acer rubrum*), sweet gum (*Liquidamber styraciflua*), oaks, and hickories in the forested portions; and black willow (*Salix nigra*) and various other saplings of forested species in the thicket portions. A more detailed description of wetland species present in the proposed C-745-T Yard is given in Appendix A.

The proposed C-745-T Yard and Alternate Site 1 consist of grassland, mixed hardwood, thicket, and wetland habitats. Alternate Site 2 consists of mowed grassland and palustrine emergent wetland habitats. Alternate Site 3 consists of mixed hardwood, thicket, and grassland habitats.

Wildlife commonly found in the area are species indigenous to open grassland, thicket, mixed hardwood, and wetland habitats. Species present in the WKWMA are the same as those found in corresponding habitats in the project area. The following are species that have been documented to occur in the area and would likely be found in the habitats associated with the proposed project.

Small mammal surveys conducted on the WKWMA documented the presence of southern short-tail shrew (*Blarina carolinensis*), prairie vole (*Microtus ochrogaster*), house mouse (*Mus musculus*), rice rat (*Oryzomys palustris*), and deer mouse (*Peromyscus* spp.) (KSNPC, 1991). Large mammals commonly present in the area include coyote (*Canis latrans*), eastern cottontail (*Sylvilagus floridanus*), opossum (*Didelphis marsupialis*), groundhog (*Marmota monax*), whitetail deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), and gray squirrel (*Sciurus carolinensis*).



Source: MMES, 1995d Jacobs ER Team, 1995

Figure 3-4. Wetlands Associated with the Proposed Site for C-745-T Uranium Hexafluoride Cylinder Yard at the Paducah Gaseous Diffusion Plant

Typical birds of the area include European starling (*Sturnus vulgaris*), cardinal (*Cardinalis cardinalis*), red-winged blackbird (*Agelaius phoenicieus*), mourning dove (*Zenaida macroura*), bobwhite quail (*Coinus virginianus*), turkey (*Meleagris gallopavo*), killdeer (*Charadrius rociferus*), American robin (*Turdus migratorius*), eastern meadowlark (*Sturnella magna*), eastern bluebird (*Sialia sialis*), bluejay (*Cyanocitta cristata*), red-tail hawk (*Buteo jamaicensis*), and great horned owl (*Bubo virginianus*).

Amphibians and reptiles present include cricket frog (*Acris crepitans*), Fowler's toad (*Bufo woodhousii fowleri*), common snapping turtle (*Chelydra serpentina*), green treefrog (*Hyla cinerea*), chorus frog (*Pseudacris triseriata*), southern leopard frog (*Rana utricularia utricularia*), eastern fence lizard (*Sceloporus undulatus*), and red-eared slider (*Trechemys scripta elegans*) (KSNPC, 1991).

Mist netting activities in the area have captured red bat (*Lasiurus borealis*), little brown bat (*Myotis licifugus*), Indiana bat (*Myotis sodalis*), northern long-eared bat (*Myotis septentrionalis*), evening bat (*Nycticeus humeralis*), and eastern pipistrelle (*Pipistrellus subflavus*) (KSNPC, 1991).

3.4 THREATENED AND ENDANGERED SPECIES

To comply with the Endangered Species Act [16 U.S.C.A. 1531 et seq. (1991)], a threatened and endangered (T&E) species survey was conducted for the proposed action (MMES, 1995e). The results of that survey indicate that no federally listed T&E species, potential habitat, or critical habitat for T&E species is present on the proposed site for the proposed C-745-T Yard or the C-745-K, L, M, N, and P yards. Alternate Sites 1, 2, and 3 were surveyed during the 1994 COE environmental investigation of the PGDP area with the same results (COE, 1994). The USFWS indicated during informal consultation that they have no records of federally listed threatened or endangered species within the impact area of the project and that the requirements of Section 7 of the Endangered Species Act are fulfilled. (Appendix B). No T&E regulations for the Commonwealth of Kentucky are promulgated at this time. However, a species list is maintained by the Kentucky State Nature Preserves Commission for monitoring purposes. Species on this list, that have potential habitat in the project area, were included in the previously mentioned surveys. These surveys conclude that no known populations of species on this list would be impacted by the proposed action as no species were observed or are known to exist in the proposed sites.

3.5 SOILS AND PRIME FARMLAND

Six soil types are associated with the PGDP as mapped by the Natural Resources Conservation Service (NRCS), formerly the Soil Conservation Service (Humphrey, 1976). These soil types are Calloway silt loam, Grenada silt loam, Loring silt loam, Falaya-Collins silt loam, Vicksburg silt loam, and Henry silt loam.

Prime farmland, as defined by the NRCS, is land that is best suited for food, feed, forage, fiber, and oilseed productions, excluding "urban built-up land or water" [7 C.F.R. §§ 657 and 658 (1994)]. The NRCS determines prime farmland based on soil types found to exhibit properties best suited for growing crops. These characteristics include suitable moisture and temperature regimes, logarithm of the reciprocal of the hydrogen-ion concentration (pH), drainage class, permeability, erodibility factor, and other properties needed to produce sustained high yields of crops in an economical manner. All potential project areas are located on Henry silt loams, which are not prime farmland soils. The NRCS has concurred with this determination (Appendix B).

3.6 CULTURAL RESOURCES

To comply with the National Historic Preservation Act [16 U.S.C.A. § 470 (1991)], a cultural resources assessment was completed for the proposed action. The results of this survey indicate that the proposed C-745-T Yard and Alternate Site 1 have been disturbed as a result of previous construction activities (MMES, 1995g). Alternate sites 2 and 3 also consist of areas considered to be previously disturbed (COE, 1994). Consequently, no cultural resources could be left intact in any of the proposed areas. The State Historic Preservation Officer (SHPO) has concurred with this determination (Appendix B).

3.7 AIR QUALITY

The PGDP is located in the Paducah-Cairo Interstate Air Quality Control Region of Kentucky. This region includes McCracken County and 16 other counties in western Kentucky. The state monitors the region's ambient air quality for pollutants (ozone, nitrogen oxides, carbon monoxide, particulates, lead, and sulfur dioxide) and determines if the area meets the National Ambient Air Quality Standards. McCracken County's attainment status for total suspended solids, sulfur dioxide, carbon monoxide, ozone, and nitrogen oxides is classified as "better than standards" (401 K.A.R. 51:010). In addition to monitoring conducted by the state, the PGDP operates a monitoring system to assess the impact on ambient air quality from various air contaminants emitted by the PGDP. Twelve continuous samplers [four fence-line and eight off-site (MMES, 1994)] are used to monitor gaseous fluorides and radioactive particulates (gross alpha and gross beta). Six additional monitoring stations—one inside the plant, two on DOE property, and three offsite—are operated by LMUS and have been in operation since early summer. In 1992, the off-site ambient concentrations of radionuclides and fluorides at the PGDP were well below the standards set by the United States Environmental Protection Agency (40 C.F.R. § 61.90) and the Kentucky Division of Air Quality (401 K.A.R. 53:010).

3.8 NOISE

Noises associated with plant activities are generally restricted to areas inside buildings located onsite. Currently, noise levels beyond the security fence are limited to wildlife, hunting, traffic moving through the area, construction, and operation and maintenance activities associated with outside waste storage areas located close to the security fence. The nearest residential receptors are 2.4 km (1.5 miles) from the fence.

3.9 SOCIOECONOMICS

The PGDP is located in McCracken County of western Kentucky. The small communities of Grahamville, Heath, and Kevil are within a 4.9-km (3-mile) radius of the DOE property boundary. Larger municipalities such as Paducah and LaCenter, Kentucky, and Joppa and Metropolis, Illinois are within a 16.3- to 32-km (10- to 20-mile) radius of the site.

The population for McCracken County, as of July 1994, was reported at 64,630 persons with 26,853 persons residing in the city of Paducah. Two counties near to McCracken reported the following populations: (1) Ballard County, Kentucky 8,080; and (2) Massac County, Illinois, 15,189 (DOC, 1994a). The total population within an 80.46-km (50-mile) radius of the plant was estimated at 500,000, with approximately 66,000 residing within a 16.3-km (10-mile) radius of the PGDP (DOC, 1994a).

McCracken County's labor force in June 1995 was recorded at 33,000 persons. Employment was recorded at 31,900 persons, with unemployment recorded as 1,100 persons (LeVasseur, 1995). Unemployment in McCracken County (3.4%), was less than the Commonwealth of Kentucky (5.0%) and the United States as a whole (5.8%) (LeVasseur, 1995). Construction accounted for 4% of employment, retail sales accounted for 27%, and manufacturing 14% (DOC, 1994b). The PGDP employs approximately 1,750 workers (PGDP, 1995) and the Shawnee Steam Plant employs 425 workers (TVA, 1995). The average 1993 per capita income in McCracken County was $19,647 as compared to 1994 averages of $17,807 per capita in Kentucky and $21,809 in the United States (DOC, 1995). The nearest minority and low-income populations are located within the city limits of Paducah (DOE, 1995b).

3.10 LAND USE

The industrial portion of the PGDP is situated within a fenced security area and makes up about 300 hectares (740 acres). Within this area, designated as industrial land use, are numerous buildings and offices, support facilities, equipment storage areas, and operational and non-operational waste management units. The DOE UF_6 cylinder yards are within the secured plant site in the south and northwest areas of the plant. The south area of the plant contains the storage yards in which renovation is planned as well as three of the four identified sites for the proposed new cylinder yard. To the north and northeast of this area are several buildings, the closest being approximately 450 m (1,500 ft), which are currently occupied by approximately 300 workers.

Surrounding the plant are 1,090 hectares (2,695 acres) maintained by the DOE. While approximately 30 m (100 ft) of this area along the perimeter of the fence is mowed, the majority is generally covered with varying amounts of vegetation (including trees and shrubs) and open, grass-covered areas. The entire DOE reservation makes up approximately 1,390 hectares (3,435 acres) of which approximately 850 hectares (2,100 acres) of land is leased by the DOE to the Commonwealth of Kentucky as part of the WKWMA. The DOE-retained portions are designated as industrial and the portion leased to the WKWMA is designated as recreational. The recreational portion is used periodically for outdoor recreation such as hunting. The nearest residential cluster, consisting of 18 homes, is located 2.4 km (1.5 miles) southwest of the PGDP. Figure 3-5 details the land use surrounding the PGDP.

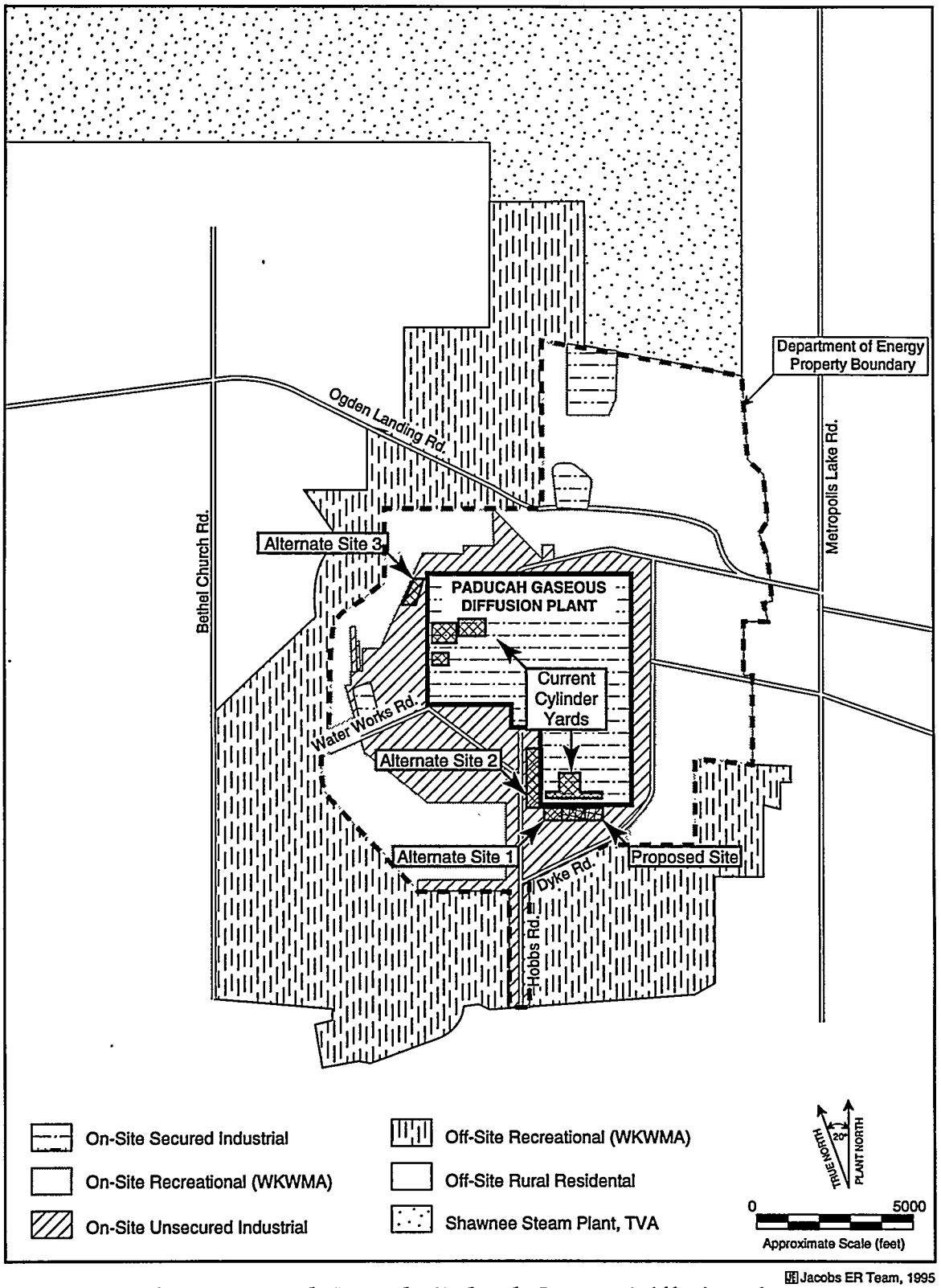


Figure 3-5. Land Use at the Paducah Gaseous Diffusion Plant

4. POTENTIAL IMPACTS

No state or national parks, forests, conservation areas, wild and scenic rivers, or other areas of unique recreational, ecological, scenic, or aesthetic importance occur within the fenced security area or on DOE-owned land. Additionally, no Native Americans and/or minority and low-income populations would be affected by the proposed action. Consequently, additional requirements under NEPA, the Wild and Scenic Rivers Act [16 U.S.C.A. § 1271 (1991)], the Native Americans Concerns Act [16 U.S.C.A. § 470 (1991)], and Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low Income Populations*, have been met; therefore, they are not addressed in the following text.

4.1 ALTERNATIVE 1 - NO ACTION

No impacts to the physical and biological environment would result from the no action alternative; current resources would be maintained as described in Chapter 3. However, continued corrosion of cylinders could lead to cylinder breaches, which may affect public and worker health and safety. Present storage conditions are conducive to cylinder degradation, which further increases the probability of a cylinder breach. In addition, cylinder movement in inadequate storage space could result in accidental breaches. During visual inspections, cracked or degraded cylinders and cylinder breaches of improperly stored cylinders may not be noticed. Consequently, the possibility for potential impacts to health and safety would increase with time, and risks from cylinder storage would be greater for the no action alternative than the proposed action. Health and safety impacts of no action are compared with those of the proposed action in Section 4.3.

4.2 ALTERNATIVE 2 - PROPOSED ACTION

Potential impacts were assessed, and results are discussed in the following sections. If no impacts to a specific resource were identified as the result of this action, those resources are not discussed further.

4.2.1 Geology

Construction associated with this project would be limited to surface grading and excavation to a depth of 1 m (3 ft). The C-745-K, L, M, N, and P cylinder yards, the proposed C-745-T Yard, and Alternate Sites 1 and 2 are in an area where the Terrace Gravels are present at a depth of 4.6 to 6.1 m (15 to 20 ft) bls and are 1.5 to 10.7 m (5 to 35 ft) thick. Because of its depth, the Terrace Gravels would not likely be excavated for construction or other purposes. In addition, Terrace Gravels in these areas are at least partially saturated with ground water, depreciating its economic use as aggregate. Alternate Site 3 is located off the terrace where the Terrace Gravels are not present. Consequently, no effects to economic geologic resources are anticipated from this project.

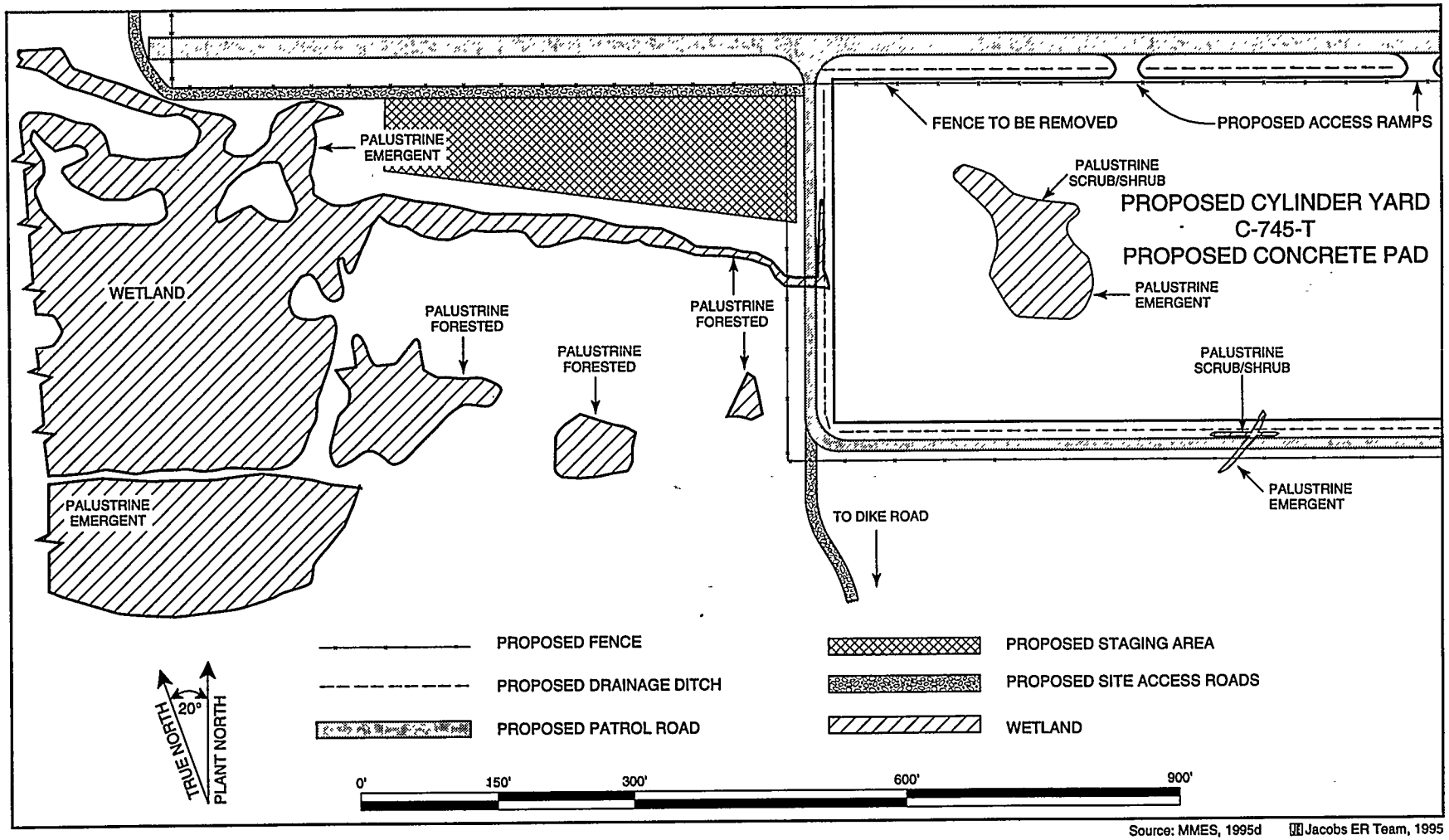


Figure 4-1. Construction Staging Area and Site Access for the C-745-T Uranium Hexafluoride Cylinder Yard at the Paducah Gaseous Diffusion Plant

4.2.2 Water Resources

The following is a summary of potential impacts to surface water, ground water, floodplains, and wetlands.

4.2.2.1 Surface water

During construction, there is a potential for an increase in the amount of sediment carried in surface water runoff to Bayou Creek from the site. The use of physical barriers such as silt fences would minimize the amount of silt reaching the surface water and reduce direct effects on water quality. If precautions are taken, the surface water would be minimally impacted by construction. No long-term impacts are expected to result from constructing a cylinder yard at the proposed C-745-T Yard. Any runoff would be channeled off the cement pad through a storm sewer system. The only potential adverse effect could be erosion at the storm sewer pipe where it enters Ditch 017. The potential for erosion would be controlled by the use of riprap, or similar force dissipating methods, at this storm sewer exit point.

Impacts for Alternate Sites 1, 2, and 3 would be similar to the proposed action. Consequently, no long-term direct or indirect effects would occur as a result of this project. A short-term increase in sedimentation due to runoff would occur; however, the amount of sedimentation would be reduced by using siltation control devices decreasing the possibility for any effects to biota or water quality.

Precautions would be taken during construction to prevent contaminant spills (e.g., fuel, oil, etc.). The possibility of migration of contaminants to soil, surface water, and ground water would be reduced by limiting construction to dry periods. Additionally, any spills during construction would be immediately cleaned up using the PGDP spill prevention, control, countermeasures, and contingency plans for oils, chemicals, and hazardous waste (MMUS, 1994). Consequently, adverse impacts to surface water and ground water would not result.

4.2.2.2 Ground water

Excavation to a depth of 1 m (3 ft) would not reach the shallow ground water levels associated with the Terrace Gravels and UCRS. Therefore, no notable direct or indirect impacts to ground water would occur as a result of this project.

4.2.2.3 Floodplains

No 100- or 500-year floodplains are present on the proposed C-745-T Yard, Alternate Site 1, or Alternate Site 3. Portions of Alternate Site 2 are within a 100-year floodplain. However, construction design could avoid the floodplain entirely.

4.2.2.4 Wetlands

Pursuant to the requirements of Executive Order 11990 and DOE regulation 10 CFR 1022, a Notice of Wetlands Involvement was published in the Federal Register on May 3, 1996 and a wetlands assessment was conducted for the proposed action. DOE concluded that the loss of less than one acre of wetlands at the project site would not result in adverse impacts for the following reasons.

The maximum wetlands area that would be disturbed by the proposed action is 0.32 hectare (0.8 acre) (See Appendix A.). The Best Management Practices (BMPs) and guidelines listed below would be implemented to minimize impacts. Under Nationwide Permit (NWP) 26, *Headwaters and Isolated Waters Discharges*, DOE may fill < 0.4 hectare (1 acre) of wetland without notifying the COE, Louisville District (33 CFR § 330). Nevertheless, DOE consulted with the COE about this project and was advised that NWP 26 would cover the proposed action (COE correspondence is provided in Appendix B).

For NWP 26, the total wetlands impacted are calculated by adding wetlands area to be filled and wetlands area that would be affected by flooding, excavation, or drainage. The 0.32 hectare (0.8 acre) wetlands area that would be affected by the proposed action includes a 33-m (100-ft) buffer around the proposed site, which makes this total a conservative estimate. Under NWP 26, the project may proceed without any COE involvement as long as the following guidelines are followed:

- Ensure that impacts are kept below the one-acre limit, drainage from the yard would be directed away from adjacent wetlands;
- Construction equipment would access the site from the south or northwest corner (Figure 4-1);
- Siltation prevention devices (e.g., silt fences or hay bales) would be used to minimize siltation of adjacent wetlands;
- Construction would occur during the dry portions of the year; and
- Heavy equipment would be stored in specified areas and not stored in or driven through adjacent wetlands (Figure 4-1).

Construction design could avoid wetland impacts at Alternate Site 2 and Alternate Site 3 does not have any wetlands. Alternate Site 1 has approximately 1.82 hectares (4.5 acres) of wetlands. If this site was to be used, additional regulatory requirements would be triggered. These requirements are detailed in Chapter 5.

4.2.3 Biota

No effects to vegetation would result from refurbishment of the existing yards, as vegetation is almost entirely absent. Any spots of invasive vegetation within the existing yards would be removed; however, very little habitat is created by these plants. Activities associated with the proposed C-745-T Yard would result in the permanent direct loss of approximately 2.02 hectares (5.0 acres) of grassland habitat, approximately 1.21 hectares (3 acres) of mixed hardwood forest habitat, and approximately 0.80 hectare (2.0 acres) of thicket habitat, of which approximately 0.32 hectare (0.8 acre) is wetland. No indirect effects to vegetation are associated with the proposed action or any alternate sites.

At Alternate Site 1, there would be a loss of approximately 1.61 hectares (4 acres) of grassland habitat, 1.61 hectares (4 acres) of mixed hardwood habitat, 0.8 hectare (2 acres) of thicket habitat, of which 1.61 hectares (4 acres) are wetlands.

At Alternate Site 2, there would be a loss of approximately 4 hectares (10 acres) of grassland habitat. At Alternate Site 3, there would be a loss of approximately 3.24 hectares (8 acres) of mixed hardwood forest habitat, 0.4 hectare (1 acre) of thicket habitat, and 0.4 hectare (1 acre) of grassland habitat.

No impacts to wildlife would result from refurbishment of C-745-K, L, M, N, and P yards; however, 4 hectares (10 acres) of mammal, bird, amphibian, and reptile habitat would be permanently lost as a result of the construction of C-745-T Yard. Direct mortality could be caused by heavy equipment during construction. However, noise and activity associated with construction activities would likely displace most wildlife from the area. Wildlife in the surrounding area would adapt to the increased activity, and long-term operation and maintenance of the cylinder yard would have minimal impacts, if any, on their behavior and migration habits.

4.2.4 Threatened and Endangered Species

The USFWS concurs that there would be no impacts to federally listed T&E species or critical habitat, from this project (Appendix B).

4.2.5 Soils and Prime Farmland

No impacts to prime farmland would occur as a result of this project. The NRCS concurs with this determination (Appendix B).

4.2.6 Cultural Resources

No areas of cultural or archaeological significance would be impacted as a result of this project. The SHPO concurs with this determination (Appendix B).

4.2.7 Air Quality

The proposed action would involve excavation, grading, and transportation of cylinders which would result in localized air quality degradation due to increased dust emissions and carbon monoxide and other pollutants discharged as exhaust from heavy equipment. Reasonable precaution would be taken to prevent particulate matter from becoming airborne in accordance with the fugitive emissions standards at 401 K.A.R. 63:010. Such reasonable precaution may include one of the following measures: use of water or chemicals for dust control during land clearing; application and maintenance of asphalt, oil, water, or suitable chemicals on roads and other surfaces which can create airborne dust; and covering, when at all times in motion, open-bodied trucks transporting materials likely to become airborne. Air quality would only be impacted temporarily during the construction phase of the proposed C-745-T Yard project when these activities are taking place. No adverse health effects would be expected because the soil is uncontaminated, and the limited duration of the construction phase would not result in chronic exposure to dust.

Another activity that could affect air quality is the burning of trees and other vegetation which is removed from the area where the proposed C-745-T Yard is to be constructed. The preferred disposal method for trees removed from the construction area would be to sell them to a local company. However, if this is not feasible, the trees would be burned in accordance with local and state regulations and permit requirements, including those codified at 401 K.A.R. 63:050. Specifically, no extraneous materials which tend to produce dense smoke, such as tires or heavy oil, would be used to cause ignition or aid combustion. Furthermore, burning would only occur on sunny days with mild winds.

Air quality degradation due to construction activities and tree burning would not result in any direct impacts to workers or members of the general public because the activities are temporary and limited in duration, and the construction areas are believed to be free of any radiological or chemical contamination. In addition, actions such as wetting the ground surface prior to excavation could be taken to minimize dust emissions. Also, particulate emissions would be monitored and any increases would be noticed and proper actions taken.

Impacts to air quality associated with Alternate Sites 1 and 3 would be the same as those discussed above for the proposed C-745-T Yard with the exception that Alternate Site 3 has a greater amount of trees than the other expansion sites. Therefore, the burning of trees from Alternate Site 3 would have a slightly greater impact on air quality. Alternate Site 2 does not have any trees present, so no burning would occur.

4.2.8 Noise

The PGDP and surrounding facilities do not measure noise levels since there are no local noise ordinances. The K.A.R 244 §§ 30 through 105 (1994) provide the Commonwealth of Kentucky noise regulations; however, the McCracken County attorney indicated that

the PGDP has never violated noise ordinances in the past and the proposed construction near the site would not create a noise violation (Grimes, 1995).

Construction activities associated with the proposed action are anticipated to result in a short-term increase in noise levels. Short- and long-term increases in ambient noise levels would not affect the surrounding human community due to the distance to the nearest residential area [2.4 km (1.5 miles)]. Noise increases may temporarily disturb wildlife.

4.2.9 Socioeconomics

The local community would receive short-term benefits in the form of new employment opportunities and revenue generated from tree sales. Operation of the new and refurbished yards would not have any long-term impacts because these areas would be maintained and operated by PGDP personnel. Socioeconomic impacts associated with Alternate Sites 1, 2, and 3 would be similar to those of the proposed action. No minority or low-income populations would be disproportionately affected by the proposed action.

4.2.10 Land Use

There are no anticipated impacts to land use associated with refurbishment and transportation because all of the existing UF_6 cylinder yards and transportation routes are within the industrial land use designated area of the PGDP.

The entire proposed C-745-T Yard is outside the security fence on the south side of the plant. While this site is within the buffer zone maintained by the DOE, it would be enclosed by the security fence. The use of the proposed C-745-T Yard would result in the loss of approximately 4 hectares (10 acres) of buffer zone which is considered industrial. Because the buffer area is considered industrial, no changes to land use would result from this project.

Impacts to current land use associated with Alternate Sites 1, 2, and 3 would be the same as those discussed for the proposed C-745-T Yard.

4.2.11 Transportation

During construction of the new C-745-T Yard, Dyke Road may be closed to reduce possible deer accidents associated with displacement. After construction, the roads would resume present traffic conditions.

Upon completion of the new C-745-T Yard, cylinders would be relocated to the new yard and rearranged during refurbishment of the existing yards. The proposed C-745-T Yard would be accessed from the north. Cylinders transported from the yards undergoing refurbishment to the sites immediately south and west of the existing cylinder yards would require less travel time. The greater time and distance required to transport and rearrange

cylinders to Alternate Site 3 would increase risks associated with cylinder handling (Section 4.3).

In order to facilitate construction of the storage pads, cylinders would initially be moved from the present locations on gravel-covered corridors and paved roads. These additional cylinder moves should not result in any direct impacts to the environment. Once the cylinders are restacked, transportation would resume to present levels. Indirect impacts from transportation would be increased noise and emissions. These impacts are discussed in sections 4.2.7 and 4.2.8.

4.2.12 Waste Management

Items would be stored onsite until they can be properly disposed onsite in existing storage areas and would follow guidelines outlined in Chapter 5. Site characterization has demonstrated that waste generated from this project would not be contaminated and, therefore, would not impact any contaminated waste storage facilities.

4.3 HEALTH AND SAFETY IMPACTS

The following are potential health and safety impacts associated with no action and the proposed action.

4.3.1 Introduction

During UF_6 cylinder storage, handling, and surveillance/maintenance, workers may be exposed to solid or gaseous UF_6, inhale/ingest transferable contaminants from the surface of the cylinders, and encounter physical hazards. Following is a brief description of these hazards. The chance of a worker encountering these hazards would increase with the amount of time cylinders are handled. Consequently, risks would increase during the cylinder relocation process and resume to current levels once cylinders are relocated.

4.3.1.1 Exposure and inhalation /ingestion hazards

Uranium hexafluoride is a compound of hexavalent uranium and fluorine. In the gaseous form, it is used in a process at the PGDP to increase the concentration of the fissionable isotope ^{235}U in natural uranium. Within the cylinder storage yards, UF_6 is stored in the solid phase. Uranium hexafluoride and hydrogen fluoride are highly corrosive when exposed to air and water. Contact with water expedites the corrosivity furthering cylinder degradation. Solid UF_6 reacts with water according to the following equation:

$$\underset{\text{(solid)}}{UF_6} + \underset{\text{(liquid)}}{1602H_20} \rightarrow \underset{\text{(liquid)}}{UO_2F_2\ (aq,\ 4HF/1600H_20)} + \text{heat}$$

As seen in the reaction, compounds with differing toxic effects are produced, including:

- Uranyl fluoride (UO_2F_2) where the uranium acts as a heavy metal poison that can affect the kidneys and results in an internal radioactive exposure;
- Hydrogen fluoride which can cause acid burns on the skin and lungs; and
- Fluoride ions which can cause metabolic poisoning in large enough quantities.

Consequences of exposure to UF_6 and its products are outlined in Appendix C.

Exposure to ionizing radiation is administratively controlled by limiting the distance and time workers spend within the cylinder storage yard and by the Radiation Protection Program (MMES, 1995h). From 1992 through 1994, average exposures for UF_6 cylinder handlers ranged between 50 to 80 millirem (mrem)/year, which are well below the DOE standards for radiation workers. In comparison, the maximum number of medical X-rays a person should be exposed to is two per year. This is equivalent to 103 mrem/year, and does not result in any measurable adverse effects (Shapiro, 1981). Potential for impacts associated with exposure to transferable contaminants and physical hazards are controlled through adherence to health and safety procedures.

4.3.1.2 Physical hazards

Physical hazards to workers during normal operations in the UF_6 cylinder yards include falling objects, heavy machinery, noise, heat, and cold. Misuse of machinery while moving cylinders could cause severe injuries and death from blunt impact or crushing. Specific operational procedures are currently in place to minimize this hazard. Noise, heat, and cold are hazards that can be avoided by the use of personal protection equipment and adherence to safety procedures. When noise levels during operations are extremely high, the mandatory use of hearing protection minimizes hearing loss. Ambient temperature would be monitored and periodic breaks would be taken to reduce exposure hazards. Because the cylinder yards are not accessible by the general public, the opportunity for physical hazard occurrences to the general public are eliminated.

4.3.2 Impacts of Normal Operation in the C-745-T Yard

There would be little to no impact to occupational health and safety under normal operation since activities in cylinder yards are performed under strict health and safety polices and procedures (MMES, 1995h; USEC, 1995). Therefore, radiation exposures are monitored and kept as low as possible, while chemical exposures rarely occur. The only likely impacts to workers under normal operations are physical hazards. In addition, there would be no public health and safety impacts because the cylinder yards are not accessible to the public. Consequently, during normal operation of the C-745-T Yard after completion, occupational health and safety would not be impacted.

4.3.3 Accident Scenarios

The following are possible accidents associated with construction of the C-745-T Yard and cylinder movement associated with relocation of the cylinders.

4.3.3.1 Construction

The following are potential physical hazards that would be associated with construction of the proposed action. There would be no physical hazards associated with the no action alternative because no construction would take place.

The probability of construction-related injuries or fatalities is a function of hours worked. The refurbishment and construction work risks may be calculated by the following the equation:

> Risk=person hours (PH) x risk coefficient (RC) where:
>
> Risk=risk of injury or fatality;
> PH=person hours of construction work; and
> RC=injury or fatality risk coefficient (1 injury per 29,400 hours worked and 1 fatality per 2 million hours worked, respectively).

Risk coefficients used in this analysis are from the United States Department of Labor (1988). Using the above equation and the total PH estimated for the UF_6 cylinder yard expansion at the proposed C-745-T Yard (42,880 based on the current schedule), the number of construction-related injuries that may be expected is 1.5, and the number of fatalities that may be expected is 0.02. These values indicate that on average, 1 construction-related injury may be expected and no construction-related fatalities may be expected. Construction risks would be the same for Alternate Sites 1, 2, and 3 since the construction techniques and construction times are similar. Because the construction sites are inaccessible to the public, there would be no health and safety impacts to the general public from construction.

4.3.3.2 Cylinder movement

The following potential physical hazards that would be associated with cylinder movement during the proposed action and for the no action alternative.

Proposed action.

Movement of UF_6 cylinders between yards is a potential source of health and safety impacts. This activity is estimated to take four workers five years to complete. Therefore, assuming total PH of 41,600, the number of injuries that may be expected is 1.4, and the number of fatalities that may be expected is 0.02. These values indicate that on average, 1 cylinder moving-related injury may be expected and no cylinder

moving-related fatalities may be expected. Moving cylinders to Alternate Sites 1 and 2 would essentially have the same potential for worker injuries due to accidents as those for the proposed site. However, because moving the cylinders to Alternate Site 3 would require a greater transportation distance, slightly higher potential for injuries may be expected due to increased PH required to move cylinders to this location. Because the cylinder yards are inaccessible to the public, there would be no direct physical health and safety impacts to the general public from cylinder movement.

No action.

Impacts to occupational health and safety related to cylinder movement under the no action alternative would be minimal because minimal cylinder movement would occur. Because the cylinder yards are inaccessible to the public, there would be no direct physical hazards to general public health and safety from cylinder movement.

4.3.3.3 Accident analysis

The following is an analysis of exposure, ingestion, and inhalation hazards associated with possible accident scenarios identified for the proposed action.

Storage yard accidents.

A Process Hazards Analysis (PHA) was performed for the existing cylinder storage yards (MMES, 1995b). Operations in the cylinder storage yards were analyzed to identify accidents that could expose workers and the public to the hazards associated with the yards. The PHA considered internal events (e.g., active failures of equipment, passive failures, human error), external events (e.g., vehicle/equipment impacts, fires), natural phenomena (e.g., high wind, tornado, flood, earthquake, lightning), and the probability of occurrence. From this analysis, the following bounding accident scenarios were developed:

- Release of solid UF_6 due to the failure of a cylinder via corrosion or cylinder handling accident;
- Release of gaseous UF_6 due to an airplane crash or a fire involving cylinder handling equipment; and
- Criticality event.

Results of the accident analysis for the existing yards are representative of risk associated with no action. Consequences were estimated at a distance of 600 m (2,000 ft) to the nearest receptor per the DOE guidance or standards [i.e., negligible, low, moderate, or high consequences (DOE, 1994)]. In addition, the frequency of each accident was evaluated and classified as follows:

Anticipated event:	above 10^{-2}/year (one chance out of 100/year)
Unlikely event:	10^{-2} to 10^{-4}/year
Extremely unlikely event:	10^{-4} to 10^{-6}/year
Beyond extremely unlikely events:	below 10^{-6}/year

Using the consequences classification and the frequency classification, each accident was categorized in one of the following risk categories:

- Category I - Major;
- Category II - Serious;
- Category III - Marginal; and
- Category IV - Negligible.

Operation in the proposed UF_6 cylinder yard would be similar to those of the existing cylinder storage yards. The UF_6 cylinders would be stored in the proposed C-745-T Yard and activities within the yards would include handling and moving of the cylinders and periodic surveillance and maintenance on the cylinders, as required. Operation of the proposed C-745-T Yard would not introduce accidents that have not already been evaluated for the existing cylinder storage yards. Therefore, the accident analysis for the existing yards (MMES, 1995b) is applicable to accidents within the proposed C-745-T Yard and the refurbished yards.

Release of solid uranium hexafluoride.

A release of solid UF_6 may occur due to a cylinder handling accident or corrosion of a cylinder stored in the yard. The analysis found that the release of a full cylinder, 12,700 kilograms (28,000 pounds) of UF_6 enriched to 1.9% ^{235}U, would result in "low consequences" as defined in the DOE-STD-3011-94 (DOE, 1994). According to this standard, a radiological accident low-consequence level is defined for workers as solid releases of radioactivity of less than 0.1 roentgen equivalent man (rem) (100 mrem) at 600 m (2,000 ft) or no serious injuries in the facility and less than 0.01 rem (10 mrem) at the site boundary for the public. For comparison purposes, the average background radiation level in the United States is estimated to be 360 mrem/year. This average is based on the range of 100 mrem/year for people who live on sandy soil at sea level, to nearly 1,000 mrem/year for people who live in stone houses at high elevations (NCRP, 1987; NRC, 1994). Also, the 10 mrem/year limit at the site boundary for the public is equivalent to a dose expected for a person who flies across the United States twice.

A chemical accident low-consequence level is defined for workers as releases of chemicals to the air at concentrations less than the emergency response planning guideline (ERPG)-2 at 600 m (2,000 ft) or no serious injuries in the facility and less than the ERPG-1 at the site boundary for the public. The ERPG-1 is defined as "the maximum concentration below which it is believed that nearly all individuals could be exposed for up to one hour without experiencing anything more than mild transient health effects," the ERPG-2 is

defined as "the concentration below which it is believed that nearly all individuals would come to no permanent harm after one-hour exposure period," and the ERPG-3 is defined as "the maximum concentration below which it is believed that nearly all individuals could be exposed for up to one hour without experiencing life threatening health effects." For HF, the ERPG-3 is 41.5 milligram (mg)/m^3 and the ERPG-2 is 16 mg/m^3. There is no ERPG for uranium (MMES, 1995b).

The frequency of a release of solid UF_6 was estimated to be greater than 10^{-2} per year. Therefore, this type of accident was classified as an anticipated event. Using this information, an accident resulting in the release of solid UF_6 was categorized as a Category III - marginal risk accident. This analysis concludes that the release of solid UF_6 would not expose cylinder yard workers, the approximately 300 workers located nearby the existing cylinder yards and the proposed C-745-T Yard site, or any member of the general public to an unacceptable level of HF. This estimate is conservative for the general public because the analysis assumed a distance of 600 m (2,000 ft) to the nearest resident, while the nearest resident is over 2,370 m (7,900 ft) away. In addition, the potential release of airborne chemicals, particularly HF, would likely not adversely affect nearby workers in the short term (i.e., less than one-hour exposure). The likelihood of an exposure time greater than one hour is low due to the irritating property of HF. Immediate retreat from the area would follow a detection of irritating vapors.

An indirect effect is the possible contamination of soil and surface water due to deposition of contaminants from a release of material from the cylinders. Food crops could be contaminated due to uptake of the contaminants from the soil and surface water used for irrigation. However, because of the small amount of material that would be released from the most likely accident (dropped cylinder resulting in the release of solid UF_6), the lack of any agriculture fields inside the fence and within the DOE buffer, and the limited transfer of contaminants through the food chain, the amount of material ingested by a human receptor would be negligible and no adverse effects are anticipated to occur as a result of this project.

The potential for a release of solid UF_6 would be higher for the proposed action during cylinder relocation as more cylinders would be moved in a shorter period of time than with the no action alternative. However it should be noted that reconfiguration of existing cylinders would lower the potential for a cylinder breach via corrosion by: allowing adequate inspection and maintenance of cylinders thereby fixing suspect cylinders before they breach; slowing corrosion rates by removing cylinders from contact with the ground; and lessening the amount of time the cylinders are in contact with water that is pooled on the ground surface. Consequently, the proposed action would lower the likelihood of a cylinder breach via corrosion. Accidents associated with Alternate Sites 1, 2, and 3 would generally be the same as those discussed for the proposed C-745-T Yard. However, due to the increased distance required for transport of UF_6 cylinders to Alternate Site 3, the potential for accidents may increase during relocation of cylinders to this alternate site.

Release of gaseous uranium hexafluoride.

A release of gaseous UF_6 could occur only if there is a fire with sufficiently high temperature and duration to heat the solid UF_6 to the point where it undergoes sublimation (change from a solid to a gas without ever becoming a liquid). Two initiators, an airplane crash or a fire involving cylinder handling equipment, were identified. The results of the analysis for a gaseous release indicate that the potential for fatality or serious injury to operating personnel exists. Therefore, using the DOE standard (DOE, 1994), the consequences of this accident would be classified as high. According to this standard, a radiological accident high-consequence level is defined for workers as a release of radioactivity of greater than 25 rem (25,000 mrem) at 600 m (2,000 ft) or prompt death in the facility and greater than 5 rem (5,000 mrem) at the site boundary for the public. For whole body doses between 5 and 74 rem, only temporary effects would result. These effects are normally limited to temporary depression of white blood cell levels and temporary reddening of the skin (erythema) (LaMarsh, 1983). It should be noted that these effects are not observed in all people receiving a dose between 5 and 75 rem (i.e., some people suffer no effects at all).

A chemical accident high-consequence level is defined for workers as releases of chemicals to the air at concentrations greater than or equal to the ERPG-3 at 600 m (2,000 ft) or prompt death in the facility and greater than the ERPG-2 at the site boundary for the public. The frequency for each initiator was determined to be between 10^{-4} and 10^{-6} per year such that the accident was classified as an extremely unlikely event. Using the consequence and frequency rankings, an accident of this type involving the release of gaseous UF_6 was classified as a Category II - serious risk accident. This analysis suggests that the release of gaseous UF_6 under the above scenario would result in workers in the cylinder yards, as well as nearby workers receiving unacceptable doses which may lead to temporary, reversible effects, although a serious radiological accident can be classified as causing fatalities. In addition, this type of release would result in unacceptable exposure to members of the public (at the facility boundary), leading to temporary, reversible effects. It should be noted that actual dose for such residents would likely be lower, as the analysis assumed a distance of 600 m (2,000 ft), while the nearest community is over 2,370 m (7,900 ft) away.

The analysis also suggests that a release of gaseous UF_6 under a fire scenario would result in cylinder yard workers and nearby workers being exposed to concentrations of HF that may cause life-threatening health effects should exposure exceed one hour. The likelihood of an exposure time greater than one hour, however, is low due to the irritating property of HF. Immediate retreat from the area would follow a detection of irritating vapors. Also, members of the general public may be exposed to concentrations of HF at the facility boundary that could result in adverse effects should the exposure exceed one hour. Actual airborne concentrations that such residents would be exposed to would be even lower, as the analysis assumed a distance of 600 m (2,000 ft, while the nearest community is over 2,370 m (7,900 ft) away.

Since this accident scenario is not specific to the proposed action (i.e., probabilities are the same for the no action and proposed action alternatives), the consequences of the no action alternative and the proposed action would be the same.

Criticality.

Cylinders may exceed the theoretical minimum mass limit for fissile material. Therefore, the potential for criticality exists if a cylinder is breached and a sufficient quantity of water is available for moderation. A criticality event in the yards would have the potential for serious injury or fatality to operating personnel. Based on this, a criticality accident is classified as "high consequences" per the DOE standard (DOE, 1994). This accident scenario would have the same result as that previously discussed for a fire. However, the frequency of a criticality accident occurring was classified as an extremely unlikely event due to the many safety requirements of the Nuclear Criticality Safety Program (MMES, 1995g) implemented at the PGDP. Using the consequence and frequency rankings, a critical accident was classified as a Category II—serious risk accident. This analysis suggests that a criticality accident under the above scenario would only result in workers in the cylinder yards near such a criticality event receiving unacceptable doses which may lead to temporary, reversible effects, although a serious radiological accident can be classified as causing fatalities. Workers in nearby buildings would not likely receive unacceptable doses due to the increased distance from a criticality event in a cylinder yard, as well as the shielding effect by the building structures. It should be noted, however, that current monitoring for a criticality events would alert the facility so that appropriate actions are taken to protect workers. Also, due to distance between the cylinder yards and off-site residents, no unacceptable doses would be expected.

Since this accident scenario is not specific to the proposed action (i.e., probabilities are the same for the no action and proposed action alternatives), the consequences of the no action alternative and the proposed action would be the same.

4.4 CUMULATIVE IMPACTS

Cumulative impacts are those effects that result from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (federal or nonfederal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Specific ongoing and planned actions considered in this section are the Northwest Plume Pump and Treat Facility and phases VII and VIII of the UF_6 cylinder yards expansion. The Northwest Plume Pump and Treat Facility is a small sheet metal building constructed on an approximately 30 x 15 m (100 x 50 ft) concrete pad located near the northwest corner of the PGDP (Figure 4-2). This facility receives ground water from north of the building through a pipeline and treats it for contaminants before discharging it through Outfall 001. The phases VIII and VII cylinder yard expansions involve cylinder yards C-745-G and S

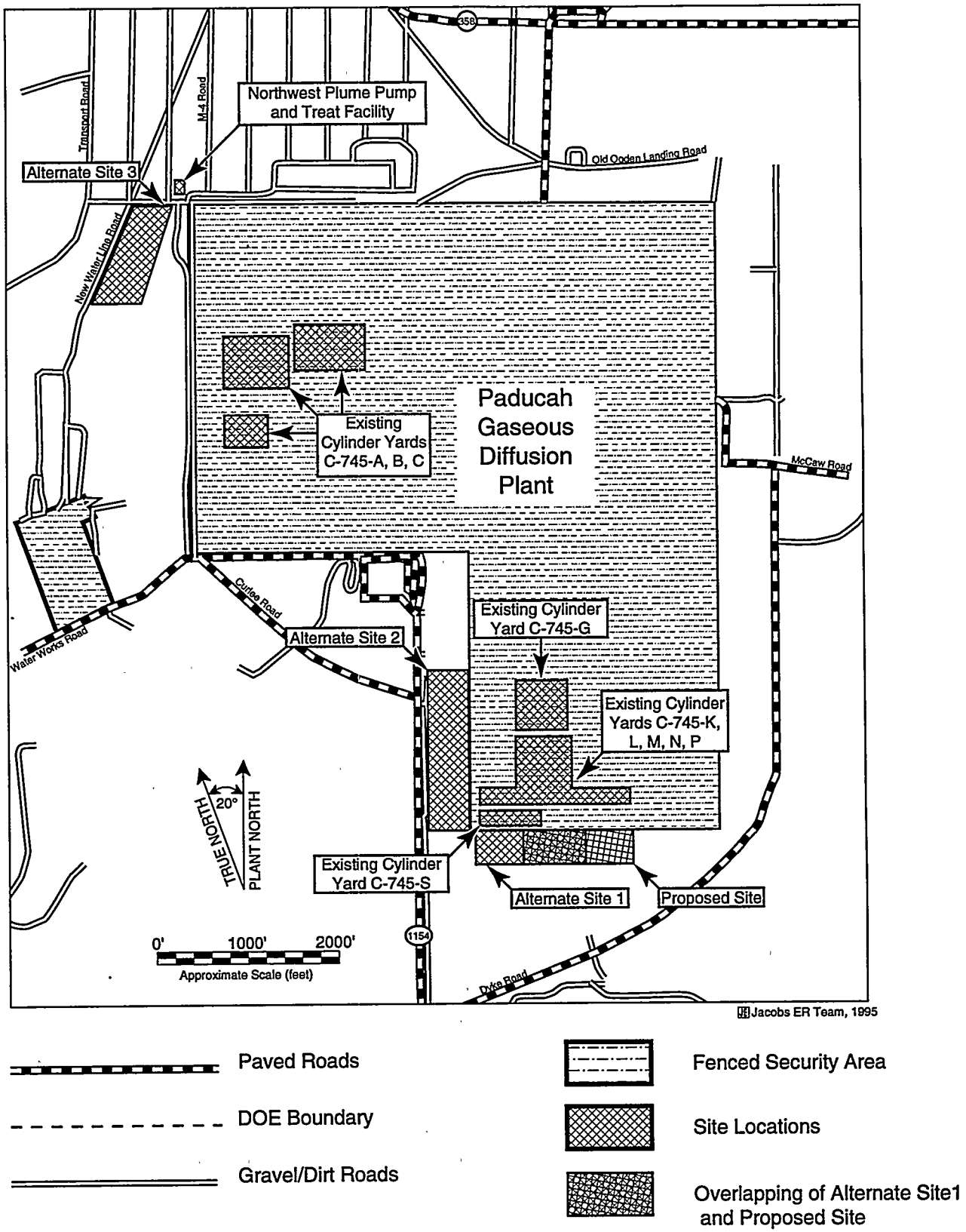


Figure 4-2. Locations of Current, Proposed, and Alternate Sites for Storage of Uranium Hexafluoride Cylinders in Relation to Other Applicable Ongoing Projects at the Paducah Gaseous Diffusion Plant

located adjacent to the C-745-K, L, M, N, and P cylinder yards (Figure 4-2). These projects are confined within the security fence and are not associated with this project.

4.4.1 Water Resources

The following are potential cumulative surface water and ground water impacts identified with the proposed action.

4.4.1.1 Surface water

The addition of a concrete pad at the proposed C-745-T Yard would increase precipitation runoff to Outfall 017. Concrete pads at existing cylinder yards, C-745-K, L, M, N, and P, as well as a concrete pad added during the phases VII and VIII cylinder yard expansions would also increase precipitation runoff flow through Outfall 017. The increased outfall flow from these multiple actions would need some controls in place to prevent adverse effects to water quality or biota. The velocity and amount of flow entering Ditch 017 during a major storm event as a result of these multiple actions are a potential source of concern. Since each cylinder yard would be constructed with a 1% grade downward toward three center line drain grates, storm water would be allowed to back up in the cylinder yards temporarily to a depth of 1 ft during a major storm event. This design limits velocity of flow to some extent, but riprap would still be necessary to further reduce flow velocity at the pipe exit and reduce ditch erosion. Also, since some sediment would be carried through the pipes with the water, the ditches would need occasional maintenance to prevent siltation over a long period of time. With these controls and maintenance, adverse effects to water quality and biota would be minimized or eliminated.

At Alternate Site 3, increased precipitation runoff flow to Outfall 001, resulting from the proposed action, would be additive with the flow already directed to this outfall from Northwest Plume pump and treat operations. The increase in outfall flow would be minimal, and no adverse cumulative impacts are expected.

4.4.1.2 Ground water

The addition of a concrete pad and a concrete drainage system at any of the sites located on the terrace would reduce recharge in the Terrace Gravels and could potentially reduce ground water flow off the terrace in the vicinity of the site. Also, construction of concrete pads on existing cylinder yards, C-745-K, L, M, N, and P, as well as the construction of a concrete pad for the Phase VIII cylinder yard expansion would further reduce flow to the Terrace Gravels. However, change in recharge would be minimal and would not adversely affect ground water in quantity or quality.

Alternate Site 3 is located approximately 137.2 m (450 ft) from the Northwest Plume Pump and Treat Facility. The presence of a storage area concrete pad and drainage system would reduce ground water recharge beneath the site to sand and gravel lenses within the UCRS. Also, decreased infiltration and recharge to the RGA may lower the ground water

level in the vicinity. Small, localized changes to the depth to the surface of the RGA may be caused by reduced recharge to the aquifer, and would be additional to those caused by the Northwest Plume pumping wells.

4.4.1.3 Wetlands

A possible wetland impact has been identified as a result of redirecting surface flow from the cylinder yards. A small drainage to the west of the C-745-S Yard currently receives surface flow from this yard. If flow is redirected away from this drainage, dewatering and subsequent wetland loss may occur. At most, 0.06 hectare (0.15 acre) of wetland may be lost. However, it is likely that overland flow would be sufficient to maintain wetland conditions within this drainage area.

4.4.2 Sensitive Resources

The proposed action would result in negligible impacts to floodplains, biota, T&E species, soils and prime farmland, and cultural resources. Thus, it would not incrementally affect these resources in combination with other projects.

4.4.3 Air Quality

A worst-case scenario would be for the proposed action to occur simultaneously with other construction activities scheduled for the PGDP. The fugitive dust emissions from all construction activities could lead to a short-term degradation of air quality. However, due to dispersion and the widely spaced nature of the activities, the impact on air quality would likely not be notable during these activities. In addition, BMPs would be implemented for each construction activity to limit the fugitive dust emissions.

4.4.4 Noise

Because other construction activities may occur concurrently with the proposed action, there could be a short-term increase in on-site noise; however, this combined amount of noise would not affect off-site receptors.

4.4.5 Socioeconomics

If many projects occurred simultaneously, labor requirements would be met by the local labor pool. Consequently, cumulative effects would be minor.

4.4.6 Land Use

If future expansion continues into the buffer zone, the perimeter of the plant would move closer to the WKWMA and ultimately closer to public thoroughfares. This may present long-term security issues associated with increased public contact (e.g., recreational activities and residences closer to the plant). Also, should a minimum buffer zone be

maintained between the security fence and public thoroughfares, a loss of land in the WKWMA may occur, thus resulting in a loss in recreational use of this land. However, most actions associated with the PGDP are within the security fence.

4.4.7 Transportation

A short-term increase in on-site traffic would result from multiple projects occurring simultaneously.

4.4.8 Health and Safety

The total radiological dose that a worker at the PGDP may receive is administratively set by the Radiation Protection Plan (MMES, 1995g). The limits set forth by this plan are in compliance with DOE and Nuclear Regulatory Commission (NRC) requirements. Workers at the PGDP may be involved in numerous activities at several locations around the plant. Some of these activities or locations may involve work with toxic or radioactive material resulting in occupational exposure. Workers who receive a dose while in the cylinder storage yards may also receive additional doses elsewhere at the PGDP. However, the limits of the plan are conservatively set such that the cumulative dose would not result in adverse health effects. Because the UF_6 cylinder yards are inaccessible to members of the public, it would not contribute to any cumulative health impacts on the general public.

4.4.9 Waste Management

Excavation and land disturbance during construction would generate DGA and soil. These would be spread over the project site after completion of the cylinder storage yard; thus, waste storage and/or disposal would not be necessary. Because of this, there would be no cumulative effects on waste storage or disposal facilities at PGDP.

5. COMPLIANCE WITH REGULATORY REQUIREMENTS

All activities associated with the proposed action would comply with applicable regulatory requirements as indicated in the aforementioned sections. Those requirements will not be reiterated here (e.g., the regulatory requirements for fugitive dust emissions and open burning are in the section discussing impacts to air). This section documents regulatory requirements that would apply if any of the alternate sites were selected. Selection of any of the alternate sites could, at a minimum, require a wetland assessment, T&E species survey, cultural resources survey, and consultation with applicable agencies regarding the specific site selected. Additionally, any modifications to construction plans would require an impact assessment associated with the new plans.

Under Executive Order 11990, *Protection of Wetlands*, all federal agencies must show that there are no practicable alternatives to the proposed action and that all practicable measures to minimize harm to wetlands which may result from such use have been incorporated. Pursuant to the requirements of Executive Order 11990 and DOE regulation 10 CFR 1022, a Notice of Wetlands Involvement was published in the *Federal Register* on May 3, 1996 and a wetlands assessment was conducted for the proposed action. DOE concluded that the loss of less than one acre of wetlands at the project site would not be an important adverse impact and that there were no practicable alternatives to locating the action in a wetland.

If Alternate Site 1 was selected, additional regulatory requirements pertaining to wetlands, discussed below, would be triggered. Alternate Site 1 was originally the preferred site for the C-745-T Yard; however, to comply with Executive Order 11990, the DOE selected the proposed C-745-T Yard.

Section 404 (b)(1) guidelines allow that an NWP may be issued for minor activities not representing major adverse impacts to waters of the United States Specific activities covered by an NWP are outlined in 33 C.F.R. § 330. Each NWP has specific requirements (e.g., avoidance, minimization, and BMPs) that must be complied with. If an NWP is applicable, the applicant needs to comply with its terms, and no further action is necessary. Nationwide Permit 26 is applicable to this project and allows fills up to 4 hectares (10 acres) in headwaters (waters with less than 5 ft^3 per second mean annual flow) and isolated waters provided the COE district engineer (DE) is notified of fills greater than 0.4 hectare (1 acre) [33 C.F.R. § 330 (Appendix A)]. Procedures applicable to NWP 26 include, but are not limited to, the following: submittal of a wetland delineation report, submittal of consultation correspondences to agencies (e.g., USFWS, SHPO, and NRCS), and mitigation measures to compensate for the wetland loss. Mitigation would be in the form of wetland creation at a 2:1 or 3:1 ratio, depending on the site selected for creation. A formal mitigation report would be required as outlined in Wetland Compensatory Mitigation and Monitoring Plan Guidelines For Kentucky (Kanzinger, 1993).

On January 21, 1992, the Kentucky Department for Environmental Protection (KDEP) Division of Water placed conditions on COE NWP 26 that require applicants to have a Section 401 Water Quality Certification (WQC) prior to COE approval of the NWP. State WQC must be obtained for all projects proposing impacts to wetlands greater than 0.4 hectare (1 acre) and NWP 26 cannot be utilized without it. The WQC application process is typically initiated by the DE upon request for any general or NWP. However, if the impacts are less than 0.4 hectare (1 acre), state WQC need not be obtained.

6. AGENCY CONSULTATION

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This environmental assessment was prepared by the Jacobs ER Team under contract to the DOE. The following personnel contributed to the preparation of this document.

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APPENDIX A

Wetlands Assessment

Federal Register: May 3, 1996 (Volume 61, Number 87, 19917).

Section: Notices

Agency: DEPARTMENT OF ENERGY

Title: *Notice of Wetlands Involvement for Refurbishment of Uranium Hexafluoride Cylinder Storage Yards C-745-K, L, M, N, and P and Construction of a New Uranium Hexafluoride Cylinder Storage Yard (C-745-T) at the Paducah Gaseous Diffusion Plant Near Paducah, KY*

Action: Notice of wetlands involvement.

DEPARTMENT OF ENERGY

Notice of Wetlands Involvement for Refurbishment of Uranium Hexafluoride Cylinder Storage Yards C-745-K, L, M, N, and P and Construction of a New Uranium Hexafluoride Cylinder Storage Yard (C-745-T) at the Paducah Gaseous Diffusion Plant Near Paducah, KY

SUMMARY: DOE proposes to renovate existing storage yards and construct a new storage yard to accommodate restacking of approximately 19,000 steel cylinders containing uranium hexafluoride at the Paducah Gaseous Diffusion Plant (PGDP) in McCracken County, Kentucky. Construction of the new storage yard would result in the loss (filling) of less than one acre of wetlands. In accordance with 10 CFR Part 1022, DOE will prepare a wetlands assessment and will perform the proposed action in a manner so as to avoid or minimize potential harm to or within the affected wetlands.

DATES: Comments are due to the address below no later than May 20, 1996.

ADDRESSES: Comments should be addressed to: Mr. Jimmie C. Hodges, Paducah Site Manager, U. S. Department of Energy, 5600 Hobbs Road, Paducah, KY 42001. Phone (502) 441-6800.

FOR FURTHER INFORMATION CONTACT: Further information on the proposed action and wetlands assessment can be obtained from Mr. Jimmie C. Hodges, Paducah Site Manager (see ADDRESSES above). Information on general DOE wetlands environmental review requirements is available from: Ms. Carol M. Borgstrom, Director, Office of NEPA Policy and Assistance (EH-25), U. S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585. Phone (202) 586-4600 or (800) 472-2756.

SUPPLEMENTARY INFORMATION: PGDP is an operational uranium enrichment facility owned by DOE and operated by the United States Enrichment Corporation. A consequence of the uranium enrichment process is the accumulation of depleted uranium hexafluoride (UF6). Depleted UF6, a solid at ambient temperatures, is stored in large steel cylinders weighing up to 14 tons each. DOE is responsible for approximately 32,200 cylinders of UF6 stored at PGDP. Storage conditions are suboptimal and have resulted in accelerated corrosion of cylinders and have increased the potential for a release of hazardous substances. Consequently, DOE has proposed refurbishment of certain existing yards and construction of a

new storage yard (C-745-T).

The C-745-T yard would consist of a concrete pad occupying approximately 43,200 m[2] (450,000 ft[2]). The initial construction activities in the storage yard would consist of clearing and grubbing the area and stripping the topsoil. After this excavation, a storm water drainage system would be installed. The excavated area would be filled with soil and gravel to achieve the desired design elevation. A concrete pad would be constructed on top of the fill.

The proposed site for the C-745-T cylinder storage yard is immediately south of existing cylinder yards at the southern end of the plant. Of available sites, DOE considers the proposed site to best meet siting criteria. A different site was initially proposed but was discovered to encompass approximately 1.8 hectares (4.5 acres) of wetlands. In order to minimize impacts to wetlands in accordance with Executive Order 11990, "Protection of Wetlands," and 10 CFR Part 1022, DOE's "Compliance With Floodplain/Wetlands Environmental Review Requirements," DOE selected the current proposed site.

Six small, isolated wetlands are present at the proposed C-745-T yard site. These wetlands are classified as palustrine emergent, palustrine scrub/shrub, and palustrine forested, according to the U.S. Fish and Wildlife Service wetland classification system. Palustrine wetlands in the vicinity of PGDP are those less than 8 hectares (20 acres) in surface area with a water depth less than 2 m (6.6 ft) during low water. Emergent vegetation is erect, rooted, non-woody; scrub/shrub vegetation is woody not exceeding 6 m (20 ft) in height; and forested vegetation is woody, exceeding 6 m (20 ft) in height.

The total area of wetlands directly impacted by the proposed action would be 0.32 hectare (0.8 acre). Under the worst case scenario, an additional 0.12 hectare (0.3 acre) of wetlands could be impacted by (1) construction equipment accessing the area or materials and equipment staged in wetland areas, if proper precautions (best management practices) are not followed, or (2) diversion of flow away from a man- made drainage ditch which contains wetlands.

In accordance with 10 CFR Part 1022, DOE will prepare a wetlands assessment for the proposed action. The wetlands assessment will be included in the environmental assessment (EA) being prepared for the proposed action in accordance with the requirements of the National Environmental Policy Act.

Issued in Oak Ridge, Tennessee on April 1, 1996.

James L. Elmore,

Alternate NEPA Compliance Officer.

[FR Doc. **96-11033** Filed 5-2-96; 8:45 am]

BILLING CODE 6450-01-P

U.S.Department
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Federal Highway
Administration

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330 West Broadway
Frankfort, Ky 40601
PH: (502) 223-6720
FAX (502) 223-6735

May 16, 1996

Mr. Jimmie C. Hodges
Paducah Site Manager
U.S. Department of Energy
5600 Hobbs Road
Paducah, KY 42001

Dear Mr. Hodges:

Subject: Comments on Wetland Involvement for the Refurbishing of Uranium Hexafluoride Cylinder Storage Yards near Paducah, Kentucky

As per the notice in the May 3, 1996, Federal Register/Vol. 61, No. 87, regarding the above, we do not think that this is a reasonable and prudent act on the part of DOE. The potential for contamination of the surrounding area, ground water, and water table in the event of a spill would be very high risk in this case. The use of a wetland of any size for the storage of contaminated materials would not be acceptable in our preview.

We recommend that you give this issue further consideration.

Sincerely yours,

A. Olivia Michael

A. Olivia Michael
Environmental Officer
FHWA--Kentucky Division

Department of Energy
Oak Ridge Operations
Paducah Site Office
P.O. Box 1410
Paducah, KY 42001

June 10, 1996

Ms. A. Olivia Michael
Environmental Officer
Federal Highway Administration
U. S. Department of Transportation
330 West Broadway
Frankfort, Kentucky 40601

RESPONSE TO COMMENTS ON WETLANDS INVOLVEMENT FOR THE REFURBISHMENT AND CONSTRUCTION OF URANIUM HEXAFLUORIDE CYLINDER STORAGE YARDS AT THE PADUCAH GASEOUS DIFFUSION PLANT (PGDP)

Dear Ms. Michael:

Thank you for your correspondence of May 16, 1996, offering comments on the Department of Energy (DOE) Notice of Wetlands Involvement for the subject action at PGDP, which was published in the May 3, 1996, Federal Register. I hope that your May 21, 1996, conversation with Mr. Brian Bowers (PGDP) has answered most of your questions and concerns regarding the potential for contamination of wetlands due to a depleted uranium hexafluoride release. As a follow-up to that conversation, we have enclosed copies of the Wetlands Assessment, the Executive Summary from the draft Environmental Assessment (EA), a plant location map, and information on our current and long-term program for managing depleted uranium hexafluoride.

The potential for contamination of wetlands and water resources in the event of a spill has been adequately addressed in the EA which is available for public review. The proposed action is part of our ongoing cylinder management program aimed at providing continued storage of the cylinders in a safe, suitable, and practical manner.

We would be glad to discuss the proposed action with you or send additional information. If you have any questions or require additional information, please call Carlos R. Alvarado at (502) 441-6804.

Sincerely,

Jimmie C. Hodges, Site Manager
Paducah Site Office

EF-22:Alvarado

Enclosure

cc: B. A. Bowers, LMES/Kevil
P. A. Gourieux, LMES/Kevil
C. A. Hudson, LMES/Kevil
P. W. Phillips, SE-31
D. J. Wilkes, JEG/Kevil

KY/EM-149

FINAL

WETLAND ASSESSMENT FOR THE PROPOSED UF_6 CYLINDER STORAGE YARDS, PHASE IX

Issued—April 1996

Prepared by
CDM Federal Programs Corporation
Kevil, Kentucky
under subcontract 96B-99052C
Document Control Number 7914-287-FR-BDGD

Prepared for
Lockheed Martin Energy Systems, Inc.
Paducah Gaseous Diffusion Plant
Paducah Kentucky 42001
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-76OR00001

CONTENTS

FIGURES

TABLE

ACRONYMS

BMP	Best Management Practice
CDM Federal	CDM Federal Programs Corporation
COE	U.S. Corps of Engineers
DOE	Department of Energy
Energy Systems	Lockheed Martin Energy Systems, Inc.
FAC	facultative
FACW	facultative wetland
NWP	nationwide permit
OBL	obligate wetland
PGDP	Paducah Gaseous Diffusion Plant
SCS	Soil Conservation Service
UF_6	uranium hexafluoride

1. INTRODUCTION

A wetlands assessment was conducted in support of the Paducah Gaseous Diffusion Plant (PGDP) National Environmental Policy Act compliance program. This assessment was prepared to meet the requirements of 10 CFR 1022, *Compliance With Floodplain/Wetlands Environmental Review Requirements*. This wetlands assessment addresses construction of the proposed C-745-T cylinder storage yard and the renovation of cylinder storage yards C-745-K, -L, -M, -N, and -P (Fig. 1).

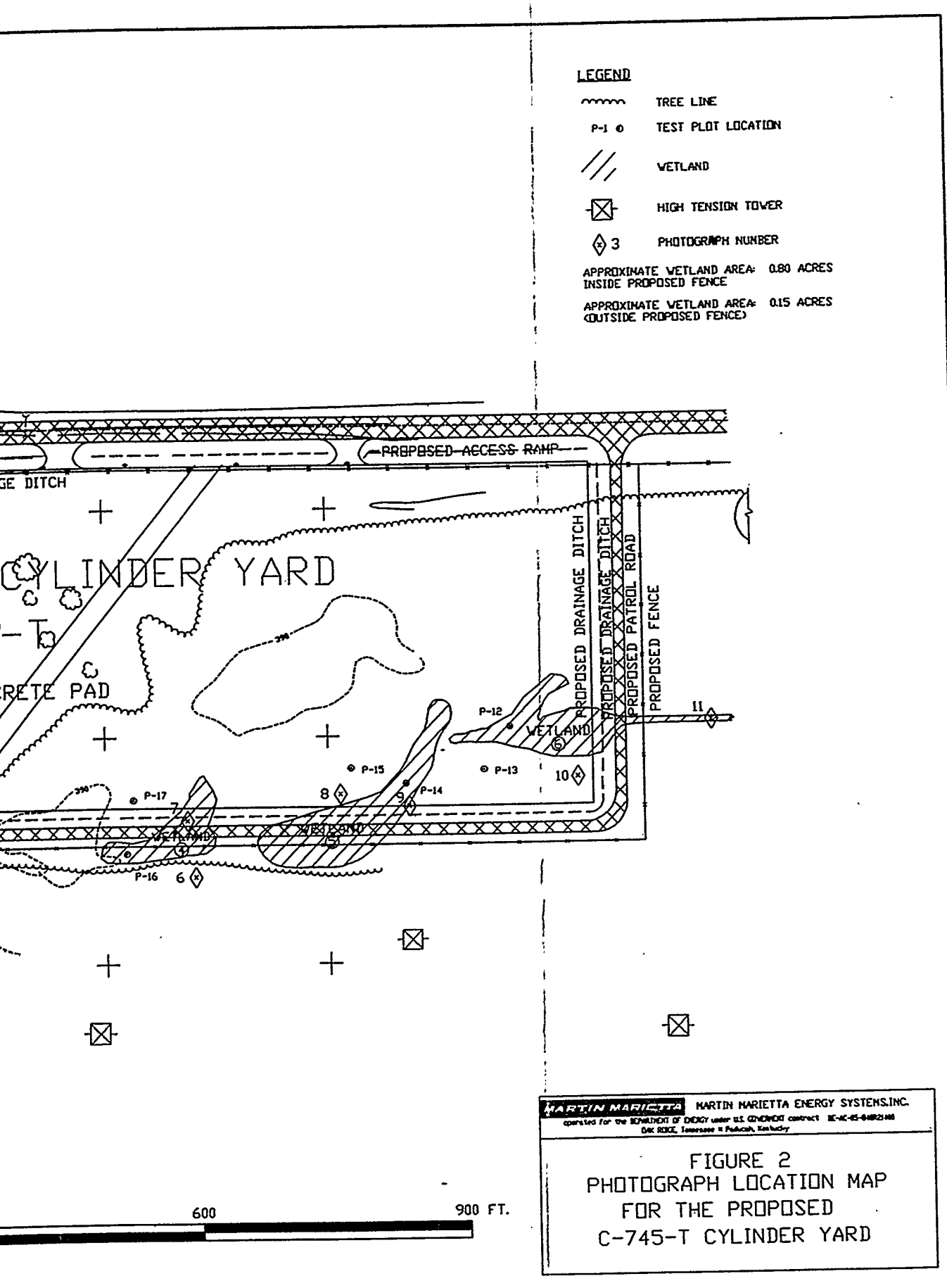
PGDP requires large parcels of land to store cylinders containing depleted uranium hexafluoride (UF_6). The substandard condition of the present cylinder storage yards is contributing to accelerated corrosion of the steel cylinders and increasing the potential for a release of hazardous substances (hydrogen fluoride and uranium compounds). In addition, many of the cylinders are currently stacked too closely together to allow for adequate inspection. U.S. Department Of Energy (DOE) proposes to address these problems by renovating the existing cylinder yards, constructing and operating a new cylinder yard (C-745-T), and restacking cylinders to meet current DOE requirements [Martin Marietta Energy Systems, Inc. (Energy Systems) 1995].

Surveys of the study area were conducted in August and September 1995 to identify, classify, and delineate wetlands. This wetlands assessment describes the proposed action (Sect. 2.), methods used for the evaluation of the wetlands (Sect. 3), the results (Sect. 4), wetland functions and values (Sect. 5), the effects of the proposed project on these resources (Sect. 6), regulatory requirements (Sect. 7), and alternatives (Sect. 8).

2. DESCRIPTION OF THE PROPOSED ACTION

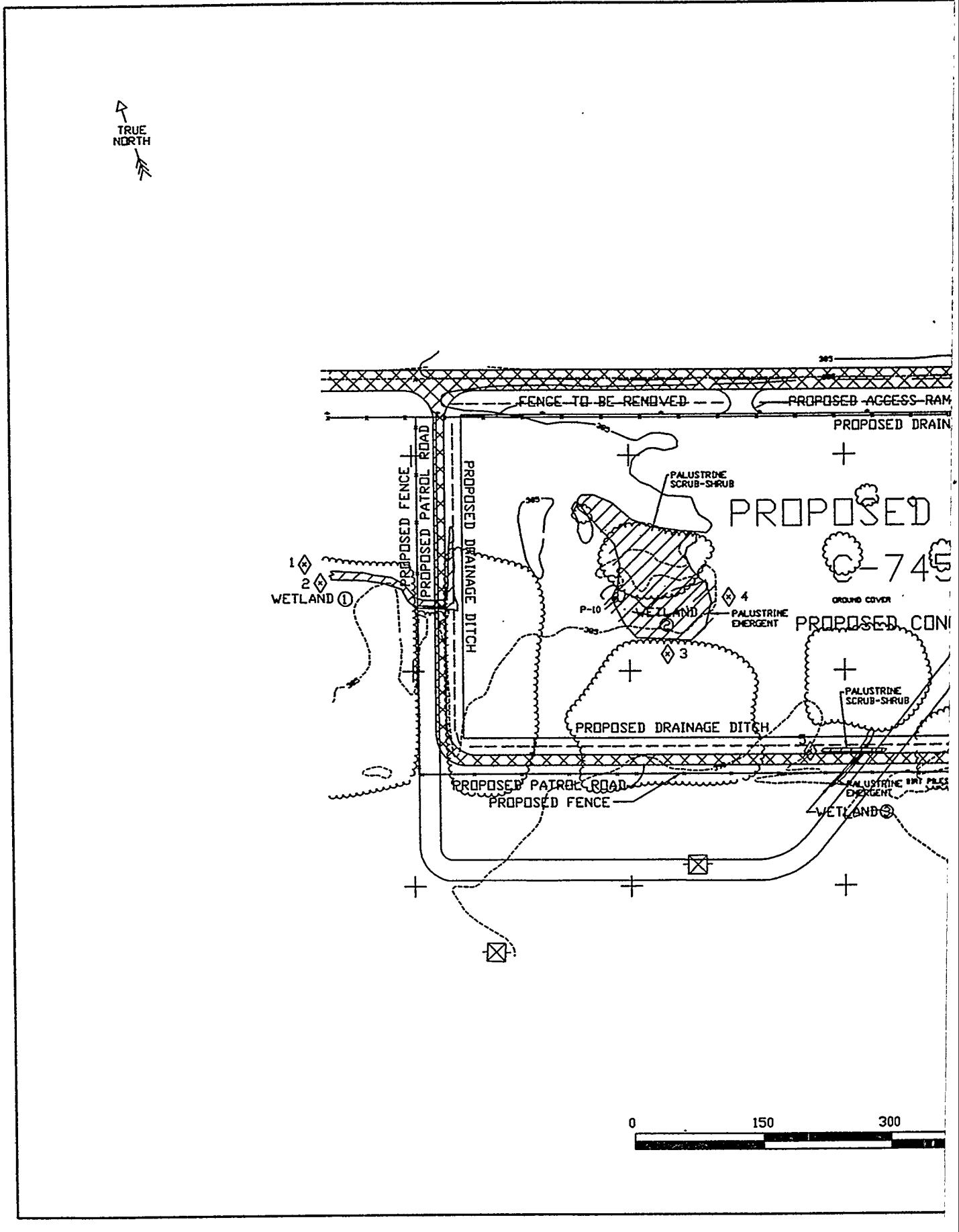
The proposed site for the C-745-T cylinder storage yard is south of the existing C-745 cylinder storage areas at the southern end of the plant (Fig. 1). The C-745-T yard will consist of a concrete pad occupying approximately 450,000 ft^2. The initial construction activities in the storage yard will consist of clearing and grubbing the area and stripping the top soil. After this excavation, a storm water drainage system will be installed which includes detention ponds and an emergency spillway (Energy Systems 1995). The excavated area will be filled with soil and gravel to achieve the desired design elevation. The concrete pad for the cylinder storage yard will be constructed of 11-in.-thick unreinforced concrete on top of the fill. The PGDP patrol road will be extended from its present location to encompass the new area. The road will be constructed of dense, graded aggregate as the base with concrete asphalt for the surface. The security fence on the northern side of the proposed site will be demolished and a new fence will be constructed to encompass the entire site (Fig. 2) (Energy Systems 1995).

The renovation portion of this project will include the C-745-K, -L, -M, -N, and -P cylinder storage yards located on the southern side of PGDP (Fig. 1). Renovation of these yards will include installing a storm water drainage system consisting of reinforced concrete pipe, precast concrete catch basins, and a concrete ditch around the perimeter of each concrete pad. These existing storage yards will be filled with soil and gravel to achieve the desired design elevation. An 11-in.-thick unreinforced concrete pad will be constructed on top of the fill (Energy Systems 1995).



MARTIN MARIETTA ENERGY SYSTEMS, INC.
operated for the DEPARTMENT OF ENERGY under U.S. GOVERNMENT contract
OAK RIDGE, Tennessee • Paducah, Kentucky

FIGURE 2
PHOTOGRAPH LOCATION MAP
FOR THE PROPOSED
C-745-T CYLINDER YARD


TRUE NORTH
FENCE TO BE REMOVED
PROPOSED ACCESS RAM
PROPOSED DRAIN
PROPOSED FENCE
PROPOSED PATROL ROAD
PROPOSED DRAINAGE DITCH
PALUSTRINE SCRUB-SHRUB
PROPOSED
C-74
1
2
WETLAND ①
P-10
WETLAND ②
4
PALUSTRINE EMERGENT
GROUND COVER
PROPOSED CON
3
PALUSTRINE SCRUB-SHRUB
PROPOSED DRAINAGE DITCH
PROPOSED PATROL ROAD
PROPOSED FENCE
PALUSTRINE EMERGENT
WETLAND ③
0
150
300

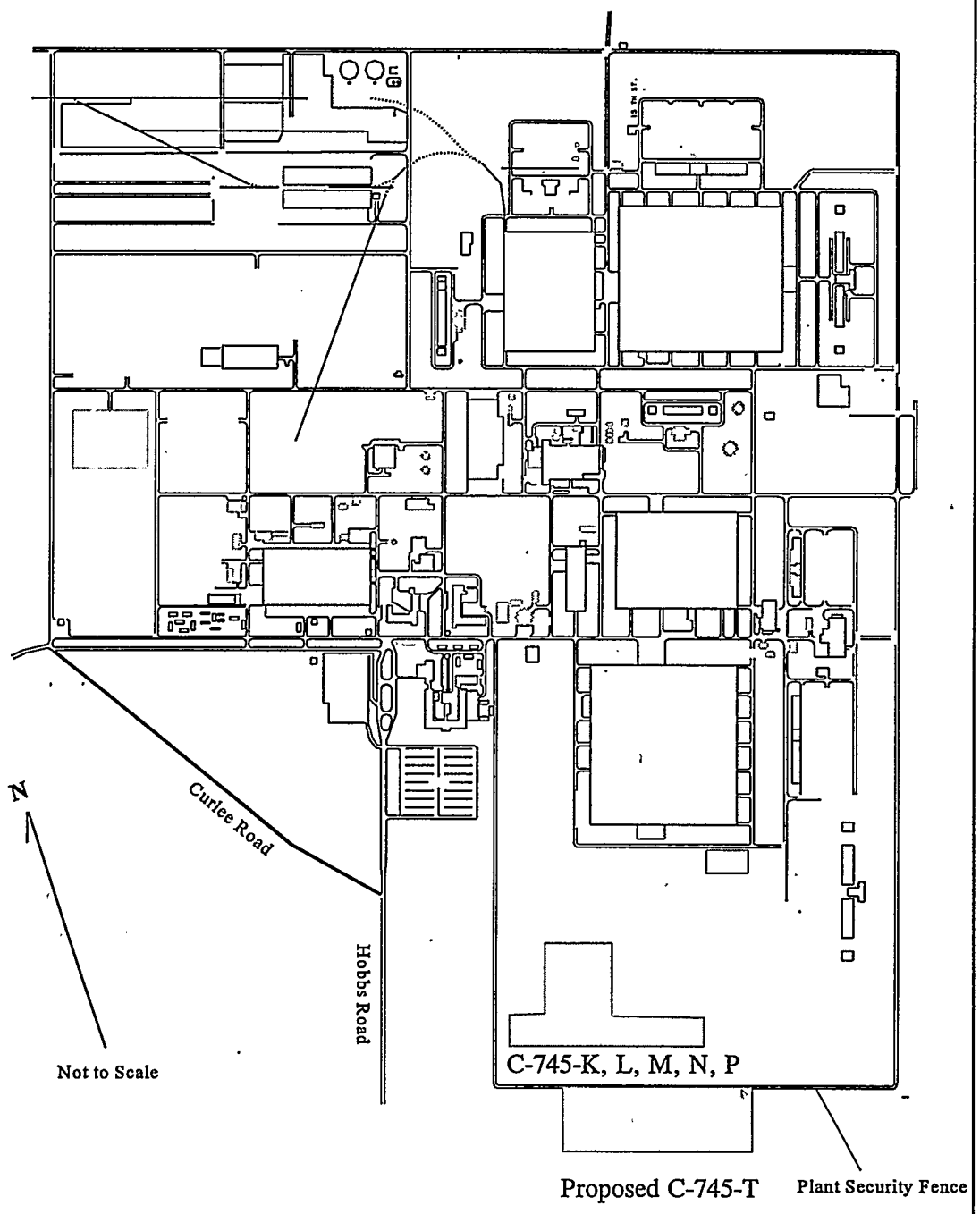


Fig. 1.
Location of UF_6 Cylinder Storage Yards, Phase IX

3. FIELD DELINEATION METHODS

Wetlands are lands transitional between terrestrial and aquatic systems that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (Federal Register (FR) 11982, 1980). Wetland determinations were based on guidelines established in the Corps of Engineers (COE) *Wetland Delineation Manual* (Environmental Laboratory 1987), hereafter referred to as the COE Manual.

Potential wetland areas were screened before the detailed field survey using U.S. Geological Survey topographic maps, aerial photographs, the CDM Federal Programs Corporation (CDM Federal) report, *Investigation of Sensitive Ecological Resources Inside the Paducah Gaseous Diffusion Plant* (CDM Federal, 1994), and the COE report *Environmental Investigations at the Paducah Gaseous Diffusion Plant and Surrounding Area, McCracken County, Kentucky* (COE 1994). The field evaluation was conducted in accordance with the COE Manual from June 5 through June 10, 1995 and from August 22 through September 5, 1995. The COE Manual specifies that the characteristics and indicators of hydrophytic vegetation, hydric soils, and wetland hydrology must be present for an area to be regulated as a wetland.

3.1 HYDROPHYTIC VEGETATION DETERMINATION

An area is considered to have hydrophytic vegetation when, under normal circumstances, more than 50% of the dominant plant species in all strata are considered wetland plant species (i.e., hydrophytes). The percentage of cover is determined by visual estimation at specific sample plots. During the PGDP survey, each plant species was identified and classified according to moisture tolerance and placed into one of the indicator categories specified in Table 1. The *National List of Plant Species that Occur in Wetlands: Northeast (Region 1)* (Reed 1988) was referenced to determine plant indicator status.

Table 1. Plant species indicator category definitions[a]

Category	Definition
Obligate Wetland: (OBL)	Plants that almost always occur in wetlands (estimated probability > 99%) under natural conditions
Facultative Wetland: (FACW)	Plants that usually occur in wetlands (estimated probability 67-99%), but are occasionally found in non-wetland areas
Facultative: (FAC)	Plants that are equally likely to occur in wetlands or non-wetlands (estimated probability 35-67%
Facultative Upland: (FACU)	Plants that usually occur in non-wetlands (estimated probability 67-99%)
Upland: (UPL)	Plants that almost always occur in non-wetlands (estimated probability > 99%) under natural conditions.

[a] Environmental Laboratory 1987. *Corps of Engineers Wetland Delineation Manual*, Technical Report Y-87-1, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi.

3.2 HYDRIC SOILS DETERMINATION

The COE Manual provides technical criteria for the identification of hydric soils. The Soil Conservation Service (SCS) published the *General Soil Map for Ballard and McCracken Counties, Kentucky* (SCS 1976) that was used during the field investigation. Soil maps in this SCS publication were compared to the National Hydric Soils List to determine if soils identified within the study areas were considered hydric. The determination was supplemented by the observation of various field indicators of hydric soil. Observation of soils requires that a soil pit be dug to a depth of approximately 16 in. Visual observations can be made by observing a cross section from the pit. Indicators of hydric soil most commonly used include: gleyed or low chroma (lack of color); concretions; histols; sulfidic odor; reducing conditions; all dominant plant species having obligate indicator status; aquic or peraquic moisture regimes (soil saturated for significant periods during the growing season); and inclusion on the National Hydric Soils List.

3.3 IDENTIFICATION OF WETLAND HYDROLOGY

The COE Manual provides guidelines and technical criteria for determining the presence of wetland hydrology. Technical criteria state that a wetland area must be inundated either permanently or periodically, or the soil must be saturated in the surface soils at some time (the period of inundation or soil saturation varies according to the hydrologic/soil moisture regime) during the growing season. In addition to technical criteria, the COE Manual lists hydrologic indicators that can be used to confirm the occurrence of wetland hydrology at a site. These indicators include visual observation of inundation, visual observation of soil saturation, water marks, sediment deposits, drift lines, and wetland drainage patterns. Saturation is determined by means of direct observations in the 16-in. soil pit dug for the determination of the presence of hydric soils.

3.4 WETLAND INVENTORY

The initial screening field survey identified areas where potential wetlands may exist based on observations of hydrologic patterns and vegetation. Survey plots were selected based on vegetation changes in the herbaceous layer. Typically, a wetland survey plot and an adjacent upland plot were selected. In accordance with Sections 3.1 - 3.3, field data were collected from a total of 10 survey plots located throughout the study area.

Field data from the sample plots were recorded on standard 1987 COE wetland delineation forms (Appendix A). Determinations were made in the field concerning wetland hydrology, hydrophytic vegetation, and the presence of hydric soils. If all three criteria were met, the area was identified as a wetland. The wetlands identified were classified according to the U.S. Fish and Wildlife Service wetland classification system (Cowardin et al..1979). The wetland boundaries were flagged with blue surveyor's ribbon and numbered sequentially. The wetland boundaries shown in Fig. 2 are based on field observation estimates and were not surveyed. Estimated wetland acreage was calculated using AutoCAD mapping software. Photographs were taken at each wetland location and are included as Appendix B.

4. FIELD RESULTS

A total of six separate wetland systems were identified in the proposed C-745-T Cylinder storage yard study area (Fig. 2). The wetlands are described in the sections that follow. No wetlands were identified in the C-745-K, -L, -M, -N, or -P cylinder storage yards.

4.1 WETLAND 1

Wetland 1 is located along a portion of the western boundary of the proposed project area. Only a small portion of this wetland system is located in the proposed project area. This wetland system contains two wetland classes including a palustrine-emergent wetland located in the grassy field on the northern edge and a palustrine-forested wetland located in the tree line (Fig. 2). The portion of this system that would likely be affected by construction activities totals 1800 ft^2 in size. Data were collected from a total of seven test plots in this wetland system. Test plots P-1, P-2, and P-4 are located within the wetland boundary. Test plots P-12, P-3, and P-5 are located in the upland adjacent to this wetland boundary. The wetland was flagged using blue surveyor's flagging numbered W1-1 through W1-118 and U1-1 through U1-16 (an upland inclusion).

The palustrine-forested portion of this wetland consists of dominants in the tree layer including red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua*), various oaks (*Quercus* sp.), and various hickories (*Carya* sp.). The shrub/sapling layer is dominated by red maple, American elm (*Ulmus americana*), green ash (*Fraxinus pennsylvanica*), and white ash (*Fraxinus americana*). Dominant vines identified in the area are the Virginia creeper (*Parthenocissus quinquefolia*) and poison ivy (*Toxicodendron radicans*). The herbaceous layer in the forested wetland is dominated by stiff marsh bedstraw (*Galium tinctorium*), blunt broom sedge (*Carex tribuloides*), cat tail sedge (*Carex typhina*), and water parsnip (*Sium suave*). Test plots P-2 and P-4 contained 100% and 88% dominant species, respectively, that are obligate (OBL), facultative wetland (FACW), or facultative (FAC). This portion of the wetland meets the hydrophytic vegetation criteria.

The palustrine-emergent portion of the wetlands is dominated by the following species in the herbaceous layer: green bulrush (*Scirpus atrovirens*), needle-pod rush (*Juncus scirpoides*), fowl manna grass (*Glyceria striata*), and spikerush (*Eleocharis* sp.). In the test plot, 100% of the vegetation was either OBL, FACW, or FAC, which meets the hydrophytic vegetation criteria.

The soils throughout this area are classified as Henry silt loam (SCS 1976). Soils observed in test plots were classified as gleyed or low-chroma colors with bright mottles and are listed on the National Hydric Soils List (SCS 1991); therefore, hydric soils are present.

Various hydrologic indicators were present throughout Wetland 1. Consistently there was saturation in the upper 12 in. of the soils. In addition, wetland indicators including drainage patterns in the wetlands, oxidized root channels in the upper 12 in. of the soil, water-stained leaves, and water marks were identified. This wetland met the wetland hydrology criteria.

4.2 WETLAND 2

Wetland 2 is a combination palustrine-emergent and palustrine-scrub-shrub wetland located in the west-central portion of the study area (Fig. 2). Data were collected from a test plot in the wetland (P-10). This area has been significantly disturbed in the past as evidenced by two separate layers of fill on the surface soils as well as remnant piles of dirt and gravel scattered throughout. Due to the disturbances, the area is considered a "problem area" by the COE Manual. Problem areas can be delineated without the presence of all three wetland criteria. In this case, soils were not able to be evaluated due to the presence of fill material. This wetland encompasses approximately 15,000 ft^2. The wetland was flagged using blue surveyor's flagging numbered W5-1 through W5-11.

The palustrine-emergent portion of this wetland is located on the southern end outside the shrub line. This portion of the wetland is dominated by *Eleocharis* sp. in the herbaceous layer. Eleocharis species range from OBL to FACW for all species found in this region. The palustrine scrub-shrub portion of the wetland is dominated in the shrub/sapling and tree layer by black willow (*Salix nigra*) in association with a few scattered eastern cottonwood (*Populus deltoides*) trees. The herbaceous layer is not totally representative of the original wetland habitat because of the amount of fill material in this area. The tree roots, for the most part, are able to penetrate through the sand and gravel fill and sit in the hydric Henry soils. Rain water quickly will penetrate the filled areas and sit on the fragipan located in the Henry soils below. The herbaceous species, however, typically will not sink roots deep enough to get below the fill material; therefore, the herbaceous layer does not demonstrate hydrophytic vegetation. The filled areas in this wetland are dominated by *Festuca paradoxa* in this layer. Other herbaceous species scattered throughout the filled area include honeysuckle (*Lonicera* sp.) and milkweeds (*Asclepias syriace, Asclepias* sp.). The dominant species identified in this area are 100% OBL, FACW, or FAC; therefore, hydrophytic vegetation criteria were met.

Attempts were made to shovel through the fill material at test plot P-10. The surface layer revealed a sand layer of approximately 3 in. Below this was a layer of large gravel fill to a depth of at least 8 in. Attempts were made to dig further using a 16-in. sharpshooter shovel, but these attempts were unsuccessful. The presence of hydric soils could not be confirmed at this location because of previous disturbances.

Various hydrologic indicators were present throughout this wetland area. The palustrine-emergent portion of the wetland demonstrated water marks and scouring as well as a definite vegetative boundary where water had pooled. In addition, the scrub-shrub portion of the wetland contained depressions in the fill that had standing water and saturation to the surface.

4.3 WETLAND 3

Wetland 3 is located in the south-central portion of the study area (Fig. 2). There are palustrine-scrub-shrub and palustrine-emergent portions of this wetland totaling 800 ft^2 in size. The scrub-shrub area is in a depression that is holding water. A common wetland plant, black willow, dominates the vegetation growing along and in this wetland. Along both the northern and southern sides of this wetland are two palustrine-emergent wetlands. The emergent portion on the

northern side contains fill material similar to the emergent portion of Wetland W-2. The dominant herbaceous species is *Eleocharis* sp. The southern emergent portion extends into the power line cut. The vegetation at this location is not thick because of the presence of standing water. *Eleocharis* sp. and a few *Juncus* sp. are the dominant species at this location. No data forms were completed at this location because of the direct similarity of vegetation, hydrology, and fill material when compared to Wetland W-2. Information collected from Wetland W-2 were used to delineate this wetland. These wetlands were flagged and numbered W7-1 through W7-7. The portion in the power line cut was not flagged because of mowing practices.

4.4 WETLAND 4

Wetland 4 is a palustrine-forested wetland located directly west of Wetland 5 (Fig. 2). This wetland is approximately 4000 ft^2 in size. Data were collected from a test plot in the wetland (P-16) and in the adjacent upland (P-17). The wetland was flagged using blue surveyor's flagging numbered W10-1 through W10-24.

Dominant vegetation in the tree layer of this palustrine-forested wetland consists of red maple, eastern cottonwood *(Populus deltoides)*, black willow (*Salix nigra*), and green ash. The shrub/sapling layer is dominated by green ash. The herbaceous layer was dominated by buttercup (*Ranunculus* sp.), fox sedge, cutleaf grapefern, and creeping manna grass (*Glyceria acutiflora*). The test plot demonstrated that 78% of the dominant species were either OBL, FACW, or FAC; therefore, hydrophytic vegetation criteria were met.

The soils observed in test plots contained low-chroma matrix colors with bright mottles and are listed on the National Hydric Soils List (SCS 1991); therefore, the presence of hydric soils was confirmed.

Hydrologic indicators identified in this area include water marks on the trees, drainage patterns in the wetland, oxidized root channels in the upper 12 in. of soil, water-stained leaves, and trees with shallow root systems. These are all indicators of the presence of wetland hydrology.

4.5 WETLAND 5

Wetland 5 is a palustrine-forested wetland located in the southeastern portion of the eastern woods (Fig. 2). This wetland is approximately 12,000 ft^2 in size. Data were collected from a test plot in the wetland (P-14) and in the adjacent upland (P-15). The wetland was flagged using blue surveyor's flagging numbered W9-1 through W9-30.

Dominant vegetation in the tree layer of this palustrine-forested wetland consists of red maple, river birch *(Betula nigra)*, and swamp white oak. The shrub/sapling layer is dominated by red maple and green ash. The herbaceous layer is dominated by *Juncus* sp and *Carex typhina*. The test plot demonstrated that 100% of the dominant species were either OBL, FACW, or FAC; therefore, hydrophytic vegetation criteria were met.

The soils are mapped Henry silt loam (SCS 1976). The soils in this wetland contain gleyed or low-chroma colors with bright mottles and are listed on the National Hydric Soils List (SCS 1991); therefore, hydric soils are present.

Hydrologic indicators identified in this wetland included water marks on the trees, water-stained leaves, drainage patterns into the wetland, and oxidized root channels in the upper 12 in. of soil. This wetland met the wetland hydrology criteria.

4.6 WETLAND 6

Wetland 6 is located near the of the eastern boundary of the proposed project area. Only a small portion of this wetland system is located in the proposed project area. The portion of the wetland system located in the study area is classified as a palustrine-forested wetland (Fig. 2). The portion of this system that would likely be affected by construction activities totals 9000 ft^2 in size. Data were collected from two test plots. Test plot P-12 is located within the wetland boundary, and test plot P-13 is located in the upland adjacent to this wetland boundary. The wetland was flagged using blue surveyor's flags numbered W8-1 through W8-22.

This palustrine-forested wetland consists of dominants in the tree layer including red maple, sweet gum, swamp white oak (*Quercus bicolor*), and green ash (*Fraxinus pennsylvanica*). The shrub/sapling layer is dominated by red maple, green ash, and sassafras (*Sassafras albidum*). Dominant vines identified in the area are Virginia creeper and poison ivy (*Toxicodendron radicans*). The herbaceous layer in the forested wetland is sparse. Evidence of scouring exists where water has been standing. The dominant plant in the herbaceous layer was a *Carex* sp. Test plot P-12 contained 86% dominant species that are OBL, FACW, or FAC. This wetland meets the hydrophytic vegetation criteria.

The soils throughout this wetlands are classified as Henry silt loam (SCS 1976). Soils observed in test plots were classified as gleyed or low-chroma colors with bright mottles and are listed on the National Hydric Soils List (SCS 1991) therefore, hydric soils are present.

Various hydrologic indicators were present throughout Wetland 8. Indicators identified included drainage patterns in the wetlands, oxidized root channels in the upper 12 in. of the soil, water-stained leaves, and water marks. In addition, many of the trees identified in this wetland had very shallow root systems. This wetland met the wetland hydrology criteria.

5. WETLAND FUNCTION AND VALUES

Wetland functions and values are defined as the physical, chemical, and biological processes or attributes of wetlands that are vital to the integrity of the wetland system (Adamus et al. 1987). The determination of wetland functions and values for each wetland system was based on *Wetland Evaluation Technique* (Adamus et al. 1987) and *Environmental Investigation at the Paducah Gaseous Diffusion Plant and Surrounding Area, McCracken County, Kentucky* (COE 1994). For the purposes of this report, functions and values are discussed in relation to the three wetland classifications found in the study area rather than individual wetlands.

5.1 PALUSTRINE-FORESTED WETLANDS

Groundwater recharge and discharge typically are functions associated with the pooled areas (referred to in the 1994 COE report as "vernal pools") that are found scattered throughout the forested wetlands in the study area. Recharge is the movement (usually downward) of surface water, whereas groundwater discharge is the movement (usually laterally or upward) of groundwater into the surface water. Flood flow alteration is a function of the these pooled areas as well. This is the process by which peak flows from run off, surface flow, groundwater interflow and discharge, and precipitation enter a wetlands and are stored or delayed in their down slope journey. This alteration helps prevent downslope flooding. The forested wetlands also provide nutrient removal and transformation, including the storage of nutrients within the sediment or plant substrate, the transformation of inorganic nutrients to their organic forms, and the transformation and subsequent removal of one nutrient (nitrogen) as a gas. These wetland areas support significant diversity and/or an abundance of wetland-dependent animals. Without the presence of wetlands, water would rapidly leave the area as surface water. This would increase potential downslope flooding and decrease the amount of water infiltrating into the aquifer. Wetlands retain water allowing it to infiltrate slowly downward, recharging the aquifer with water purified by the natural wetland processes associated with nutrient transformation in wetland sediments. Chemicals applied as fertilizer such as nitrates can contaminate groundwater. Wetlands convert the nitrates to forms that are volatilized, taken up by plants, or leached downward as nitrogen. These are some examples of the specific values the wetland provides.

5.2 PALUSTRINE-EMERGENT AND PALUSTRINE-SCRUB-SHRUB WETLANDS

The palustrine-emergent and -scrub/shrub wetlands identified in the study area provide groundwater recharge and discharge. In addition, these wetlands provide flood flow alteration—the process by which peak flows from runoff, surface flow, groundwater interflow and discharge, and precipitation enter a wetlands and are stored or delayed in their downslope journey. An explanation of the some of the values of these functions is given in Section 5.1.

6. EFFECTS OF THE PROPOSED ACTION

The initial construction activities in the C-745-T storage yard will consist of clearing vegetation from the area and stripping the topsoil. These activities will directly destroy approximately 35,000 ft^2 (0.80 acre) of wetlands located on the proposed area. In addition, wetlands located on the fringes of the site (portions of W-1, W-4, W-5, and W-6) and not destroyed by the construction activities, could potentially be affected as a result of the proposed action. Approximatley 6,000 ft^2 of fringe wetlands could be impacted if best management practices (BMPs) are not initially identified and incorporated to protect these areas. Impacts to these fringe wetland areas could include draining the wetlands, damming them, filling them through siltation, or creating new drainage or flow patterns within the wetlands. Such alteration would result from the buildup of soils and gravel required for the base of the concrete pad and patrol road. The long-term effects

on the wetlands destroyed by the construction of the C-745-T storage yard will cause permanent alteration of the existing functions and values. Wildlife habitat will be lost, surface water flow during storm events that is presently captured in the wetlands will be discharged as surface water, and groundwater recharge from these wetlands will cease.

Construction activities could adversely affect fringe wetlands in the short term if proper sediment control devices and BMPs are not put into effect. It should be noted that a large drainage in located within 200 ft east of the proposed security fence. It will be imperative to employ BMPs to avoid impacts to this drainage as well as impacts to the fringe wetlands. BMPs should include keeping construction equipment out of the fringe wetlands and installing storm water runoff and erosion control devices along the edges of these wetlands and drainages.

7. REGULATORY REQUIREMENTS

Pursuant to Sect. 404 of the Clean Water Act, discharges of fill material into waters of the U.S. (including wetlands) generally require a permit. The permit that would be applicable to this project is COE Nationwide Permit (NWP) 26, *Headwaters and Isolated Waters Discharges* (33 CFR 330, Appendix A). Under this permit, the permittee notifies the COE district engineer if the discharge of fill would cause loss of waters of the United States greater than 1 acre and less than 10 acres. The affected wetlands at PGDP are less than one acre and therefore, no formal COE notification nor mitigation required for this project (33 CFR 330, Appendix A, NWP 26). However, requirements and conditions identified in 33 CFR 330, Appendix A must be implemented. Requirements and conditions that are applicable to the activities proposed for this project include the following:

- wetland impacts shall be kept under one acre
- drainage from the cylinder yard shall not be directed into adjacent wetlands
- BMPs must be in place to ensure that no siltation of adjacent wetlands takes place
- construction should be completed during dry portions of the year
- heavy equipment shall not be stored in the adjacent wetlands
- fill material must be free from toxic pollutants in toxic amounts
- the resultant cylinder yard shall be properly maintained
- applicable state water quality certification shall be obtained
- heavy equipment working in wetlands shall be placed on mats
- all temporary fills shall be removed in their entirety

8. ALTERNATIVES

8.1 ALTERNATIVE 1–NO ACTION

Under the no-action alternative, the construction of the proposed C-745-T cylinder storage yard would not take place at PGDP. Therefore, no disturbances of natural functions and values of the wetlands identified in the study area would take place. However, as discussed further in the

Environmental Assessment for the UF_6 Cylinder Storage Yards, Phase IX at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, the no-action alternative is not feasible at this time.

8.2 ALTERNATIVE 2–PROPOSED ACTION

Under this alternative, the proposed action would proceed as described in Section 2. Approximately 0.80 acre of wetland was identified in the proposed project area. The total wetland impact from construction activities would be less than one acre, and therefore, would not require formal COE notification (33 CFR 330, Appendix A, NWP 26 b). This action could adversely affect the function and values of a total of approximately 0.95 acres of wetland.

8.3 ALTERNATIVE 3-RELOCATE THE PROJECT AREA

Under this alternative, the proposed action would be moved to an alternate site. This would result in the action not impacting the wetlands identified in the proposed location. Evaluation of potential impacts to the alternate sites is provided in the *Environmental Assessment for the UF_6 Cylinder Storage Yards, Phase IX at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*.

9. REFERENCES

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9.2 BIBLIOGRAPHY

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APPENDIX A
FIELD FORMS

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

P-12

Project/Site: Proposed Cylinder Storage Yard / PGDP Applicant/Owner: Department of Energy Investigator: J. Anderberg / Patty Painter	Date: 9-1-95 County: Mccracken State: KY
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Fraxinus pennsylvanica	S/T	FACW	9.		
2. Liquidambar styraciflua	S	FAC	10.		
3. Sassafras albidum	S	FACU-	11.		
4. Quercus bicolor	T	FACW+	12.		
5. Acer rubrum	T	FAC	13.		
6. Carex sp.	H	FAC-OBL	14.		
7. Toxicodendron radicans	H	FAC	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 86%

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

✓ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: NA (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ✓ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ✓ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ✓ Oxidized Root Channels in Upper 12 Inches
- ✓ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ✓ Other (Explain in Remarks)

Remarks: · Field work was conducted in Sept. during a drought - No recorded rain for over 6 weeks
· Trees have shallow root systems

SOILS

Map Unit Name (Series and Phase): Henry

Drainage Class: PD

Taxonomy (Subgroup): Typic Fragiaquults

Field Observations Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-6"		10YR 7/1	10YR 6/8 7.5YR 5/2	20% 10%	silt loam
6"-16"+		10YR 5/2	10YR 6/8	25%	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- X Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Circle) (Yes) No

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

P-13

Project/Site: Proposed Cylinder Storage Yard / PGDP Applicant/Owner: Department of Energy Investigator: J Anne Bellinger ; Patty Poyner	Date: 9-1-95 County: McCracken State: KY
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Malus ioensis	T	UPL	9.		
2. Quercus sp	T		10.		
3. Acer rubrum	T	FAC	11.		
4. Sassafras albidum	S	FACU-	12.		
5. (grass)			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). _____

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

✓ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: NA (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: No indication of saturation or water stained leaves, etc.

SOILS

Map Unit Name (Series and Phase): Henry — Drainage Class: PD

Taxonomy (Subgroup): Typic fragiaqualfs — Field Observations Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-16"+		10YR6/2	7.5YR5/8	25%	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- X Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes (No) (Circle)
Wetland Hydrology Present? Yes (No)
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? Yes (No) (Circle)

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

P-14

Project/Site: Proposed Cylinder Storage Yard / PGDP Applicant/Owner: Department of Energy Investigator: Anne Belling / Patty Poyner	Date: 9-1-95 County: McCracken State: KY
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Betula nigra	T	FACW	9.		
2. Acer rubrum	T	FAC	10.		
3. Acer rubrum	S	FAC	11.		
4. Crataegus ~~succulenta~~ virginis	T	FACW	12.		
5. Carex typhina	H	FACW+	13.		
6. Juncus sp	H	FAC-OBL	14.		
7. Fraxinus pennsylvanica	T	FACW	15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

✓ No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: NA (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- X Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- X Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- X Oxidized Root Channels in Upper 12 Inches
- X Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks: Survey was conducted in Sept. during drought - ~6 weeks without rain

SOILS

Map Unit Name (Series and Phase): Henry

Drainage Class: PD

Taxonomy (Subgroup): Typic Fragiaqualfs

Field Observations Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-16"+		10YR7/1	10YR5/8	25%	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- X Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Circle) (Yes) No

Remarks:

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual) P-15

Project/Site: Proposed Cylinder Storage Yard/PGDP Applicant/Owner: Department of Energy Investigator: Anne Belling / Patty Pegher	Date: 9-1-95 County: McCracken State: KY
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Toxicodendron radicans	H	FAC
2. Lonicera japonica	S	FAC-
3. Fraxinus pennsylvanica	S	FACW
4. Fraxinus pennsylvanica	T	FACW
5. Acer rubrum	T	FAC
6. Quercus cubes	T	FACU-
7 (yellow flower)		
8. (rose)		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). _____

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

✓ No Recorded Data Available

Field Observations:

Depth of Surface Water: N/A (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: NA (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name (Series and Phase): Henry

Drainage Class: PD

Field Observations Confirm Mapped Type? Yes No

Taxonomy (Subgroup): Typic Fragiaqualfs

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-16+"		10YR 7/2	10YR 6/6	10%	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- X Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present?	Yes No (Circle)	Is this Sampling Point Within a Wetland? (Circle) Yes No
Wetland Hydrology Present?	Yes (No)	
Hydric Soils Present?	(Yes) No	

Remarks:

Approved by HQUSACE 3/92

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

P-16

Project/Site: Proposed Cylinder Storage Yard / PGDP Applicant/Owner: Department of Energy Investigator: Anne Belling / Patty Pegher	Date: 9-1-95 County: McCracken State: KY
Do Normal Circumstances exist on the site? (Yes) No Is the site significantly disturbed (Atypical Situation)? Yes (No) Is the area a potential Problem Area? Yes (No) (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Populus deltoides	T	FAC	9.		
2. Salix nigra	T	FACW+	10.		
3. Fraxinus pennsylvanica	T	FACW	11.		
4. Fraxinus pennsylvanica	S	FACW	12.		
5. Quercus palustris	S	FACW	13.		
6. Carex sp	H		14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

X No Recorded Data Available

Field Observations:

Depth of Surface Water:	NA	(in.)
Depth to Free Water in Pit:	NA	(in.)
Depth to Saturated Soil:	NA	(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- X Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- X Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- X Oxidized Root Channels in Upper 12 Inches
- X Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- X Other (Explain in Remarks)

Remarks: Shallow root system
Survey was conducted in September during a drought - no rain for over 6 weeks

P-16

SOILS

Map Unit Name (Series and Phase): Henry

Drainage Class: PD

Taxonomy (Subgroup): Typic Fragiaquults

Field Observations Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-1"		10YR 2/2			silt loam
1-6"		10YR 6/2	7.5YR 4/6	50%	silt loam
6-16"		2.5YR 5/2	5YR 4/6	15%	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- ☒ Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? (Yes) No (Circle)
Wetland Hydrology Present? (Yes) No
Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Yes) No (Circle)

Remarks:

P-17

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Proposed Cylinder Yard / PGDP
Applicant/Owner: Department of Energy
Investigator: Anne Bolling / Patty Poyner

Date: 9-1-95
County: Mccracken
State: KY

Do Normal Circumstances exist on the site? (Yes) No
Is the site significantly disturbed (Atypical Situation)? Yes (No)
Is the area a potential Problem Area? Yes (No)
(If needed, explain on reverse.)

Community ID: _____
Transect ID: _____
Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator
1. Acer negundo	T	FACt
2. Lathyrus japonicus	V	FACU
3. Eupatorium perfoliatum	H	FACW+
4. Sassafras albium	S	FACU-
5. Symphoricarpos orbiculatus	H	UPL
6. Festuca sp.	H	
7. Solidago canadensis	H	FACU
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 4490

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

X No Recorded Data Available

Field Observations:

Depth of Surface Water: NA (in.)

Depth to Free Water in Pit: NA (in.)

Depth to Saturated Soil: NA (in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

P-17

SOILS

Map Unit Name (Series and Phase): Henry

Drainage Class: PD

Field Observations Confirm Mapped Type? Yes No

Taxonomy (Subgroup): Typic Fragiaquults

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/Contrast	Texture, Concretions, Structure, etc.
0-16+		10YR 6/2	10YR 6/6	10%	silt loam

Hydric Soil Indicators:

- ___ Histosol
- ___ Histic Epipedon
- ___ Sulfidic Odor
- ___ Aquic Moisture Regime
- ___ Reducing Conditions
- X Gleyed or Low-Chroma Colors
- ___ Concretions
- ___ High Organic Content in Surface Layer in Sandy Soils
- ___ Organic Streaking in Sandy Soils
- ___ Listed on Local Hydric Soils List
- X Listed on National Hydric Soils List
- ___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes (No) (Circle)

Wetland Hydrology Present? Yes (No)

Hydric Soils Present? (Yes) No

Is this Sampling Point Within a Wetland? (Circle) Yes (No)

Remarks:

APPENDIX B
PHOTOGRAPHS

LEGEND

TREE LINE

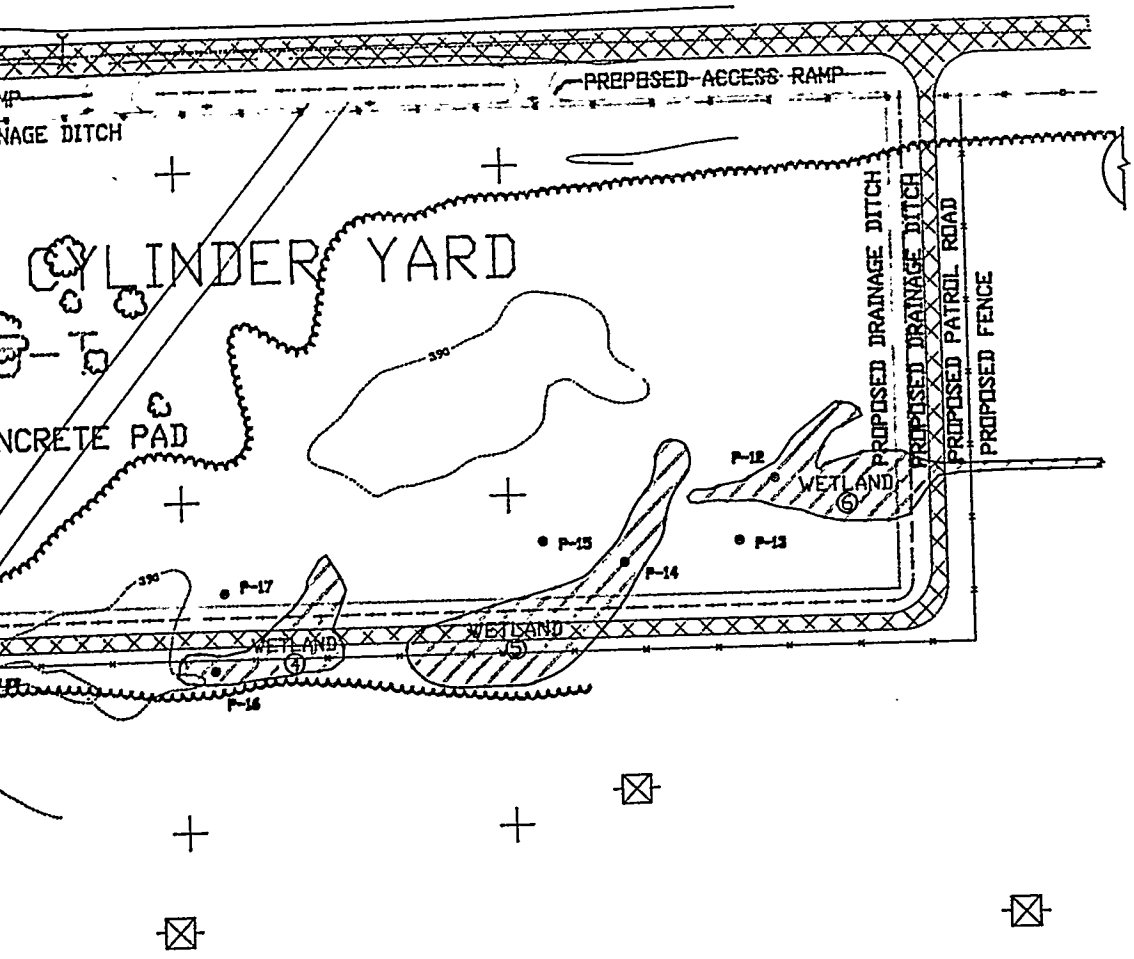
P-1 TEST PLOT LOCATION

WETLAND

HIGH TENSION TOWER

APPROXIMATE WETLAND AREA INSIDE PROPOSED FENCE 0.80 ACRES

APPROXIMATE WETLAND AREA OUTSIDE PROPOSED FENCE 0.15 ACRES



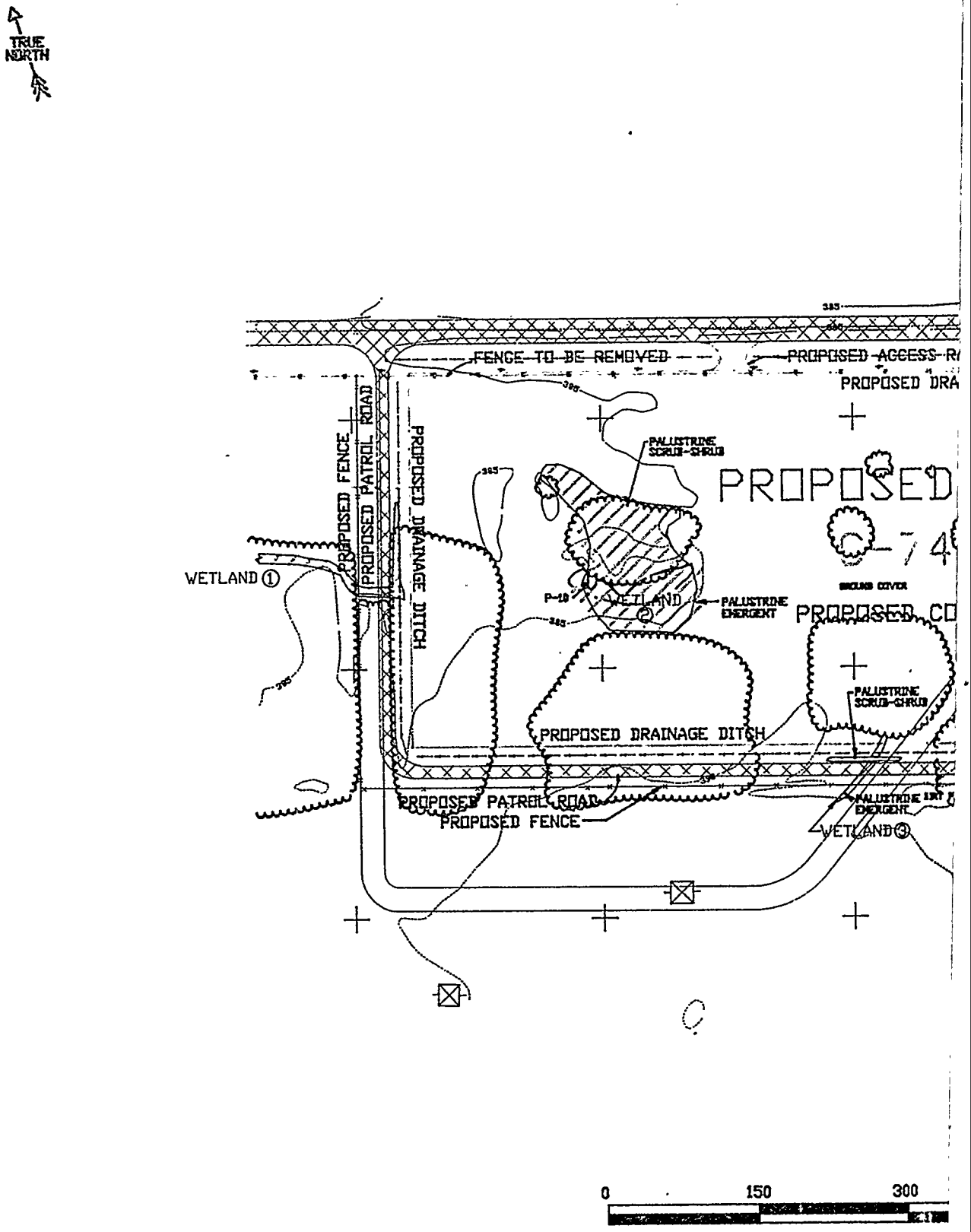
600 900 FT.

MARTIN MARIETTA ENERGY SYSTEMS, INC.

operated for the [illegible] of ENERGY under U.S. GOVERNMENT contract [illegible]

[illegible], Tennessee & Paducah, Kentucky

FIGURE 2
WETLAND LOCATION MAP
FOR THE PROPOSED
C-745-T CYLINDER YARD


TRUE NORTH
FENCE TO BE REMOVED
PROPOSED ACCESS R
PROPOSED DRA
PROPOSED FENCE
PROPOSED PATROL ROAD
PROPOSED DRAINAGE DITCH
PALUSTRINE SCRUB-SHRUB
PROPOSED
WETLAND ①
P-19
WETLAND ②
PALUSTRINE EMERGENT
PROPOSED CO
PALUSTRINE SCRUB-SHRUB
PROPOSED DRAINAGE DITCH
PROPOSED PATROL ROAD
PROPOSED FENCE
PALUSTRINE EMERGENT
WETLAND ③
0
150
300

Project UF, Cylinder Storage Yards, Phase IX
Location Wetland 1
Photo No. 1 Direction Facing East
Date 6-5-95 Photo taken by Ronnie Poyner

Project UF, Cylinder Storage Yards, Phase IX
Location Wetland 1
Photo No. 2 Direction Facing East
Date 6-5-95 Photo taken by Ronnie Poyner

Project UF$_6$ Cylinder Storage Yards, Phase IX
Location Wetland 2
Photo No. 3 Direction Facing North
Date 6-5-95 Photo taken by Ronnie Poyner

Project UF$_6$ Cylinder Storage Yards, Phase IX
Location Wetland 2
Photo No. 4 Direction Facing west
Date 6-5-95 Photo taken by Ronnie Poyner

Project UF, Cylinder Storage Yards, Phase IX
Location Wetland 3
Photo No. 5 Direction Facing East
Date 6-5-95 Photo taken by Ronnie Poyner

Project UF, Cylinder Storage Yards, Phase IX
Location Wetland 4
Photo No. 6 Direction Facing North
Date 9-5-95 Photo taken by Patty Poyner

Project UF, Cylinder Storage Yards, Phase IX
Location Wetland 4
Photo No. 7 Direction Facing North
Date 9-5-95 Photo taken by Patty Poyner

Project UF_6 cylinder storage yards, Phase IX
Location Wetland 5
Photo No. 8 Direction Facing West
Date 9-5-95 Photo taken by Patty Poyner

Project UF_6 cylinder storage yards, Phase IX
Location Wetland 5
Photo No. 9 Direction Facing west
Date 9-5-95 Photo taken by Patty Poyner

Project UF_6 cylinder storage yards, Phase IX
Location Wetland 6
Photo No. 10 Direction Facing north
Date 9-5-95 Photo taken by Patty Poyner

Project UF$_6$ cylinder storage yards, Phase IX
Location Wetland 6
Photo No. 11 Direction Facing west
Date 9-5-95 Photo taken by Patty Poyner

APPENDIX C
QUALIFICATIONS SUMMARIES

J. ANNE BOLLING
Biologist/Environmental Scientist
CDM Federal Programs Corporation

EDUCATION: Environmental Studies/Biology, BA. Rollins College, 1989
English. Minor

HONORS:
Outstanding Academic Achievement in Environmental Studies
Algernon Sydney Sullivan Medallion Recipient
Omicron Delta Kappa Honor Society Scholar Leadership Award
Algernon Sydney Sullivan Scholar
Whitehead Scholarship
Eckerd Scholarship
Nancy Parker Memorial Scholarship

CLEARANCE: DOE "L"

QUALIFICATIONS SUMMARY:

As a biologist/environmental scientist, Ms. Bolling has five years of professional experience in the hazardous waste field. She has conducted wetland delineations and wetland assessments, conducted ecological field studies, produced ecological risk assessments, and has managed pre-remedial and oversight of remedial investigations (RIs). In addition, Ms. Bolling has managed and co-managed Remedial Investigation field activities at two NPL sites. She also served as the sample coordinator on a large-scale RCRA Facility Investigation (RFI).

EXPERIENCE:

As a biologist/environmental scientist for CDM Federal Programs Corporation (CDM, Federal), Ms. Bolling provides technical support of various investigations for the Environmental Protection Agency (EPA), Department of Energy (DOE), and Department of Defense (DOD) contracts. Areas of ecological expertise include wetland delineations (1987 Corps Manual); wetland assessments; Wetland Evaluation Technique (WET); ecological surveys; endangered and threatened species habitat surveys; management of fish, macrobenthic and herp sampling; and significant receptor population evaluations. This work is conducted in support of various EPA, DOD, and DOE investigations, including risk assessments, ecological RIs, Superfund RI/feasibility studies (FS), environmental assessments (EAs), NEPA support, and various wetland projects.

Ms. Bolling's remedial experience includes management and technical support of projects for EPA, DOD, and DOE enforcement activities. She manages and conducts oversight of remedial design and remedial action projects. She has assisted in the design of and served as a field leader on RIs. She has conducted oversight of borehole and monitor-well drilling.

Ms. Bolling has extensive hazardous waste field sampling experience specializing in EPA Region IV Standard Operating Procedures (monitor well, soil, surface water, sediment, temporary well, air, and ecological sampling). Ms. Bolling is also proficient in EPA Contract Lab Program (CLP) paperwork procedures.

Ms. Bolling's pre-remedial experience includes acting as technical assistant and field team leader for a HAZWRAP expanded preliminary assessment (PA) involving the assessment of 74 potential sites located on an abandoned WWII military training facility. In addition, Ms. Bolling has managed individual PAs, screening site inspections (Phase I and II), listing site inspection evaluations, and site inspection preliminary scorings (SIPS) all from design to report production. These investigations included such duties as developing sampling and safety plans, managing field sampling, evaluation of site information and analytical data, and report production. Ms. Bolling has valuable experience in hazard ranking scoring (HRS). Ms. Bolling completed seven PA HRS score packages, four SI preliminary score packages, and two listing/site inspection evaluations. She completed the December 1990 Revised HRS Orientation Course and was the team leader for PA HRS scoring at NUS Corporation.

PROFESSIONAL HISTORY:

CDM FEDERAL PROGRAMS CORPORATION, BIOLOGIST/ENVIRONMENTAL SCIENTIST, 1991 - PRESENT

Ms. Bolling manages projects and provides technical direction in support of a variety of DOE, DOD, and EPA projects. Biological support projects include ecological evaluations, wetland delineations, floodplain assessments, floodplain/wetland statement of findings, wetland functional assessments (using the Army Corps Wetland Evaluation Technique (WET) 2.0 Model), terrestrial habitat surveys, endangered and threatened species surveys, ecological sampling activities, and ecological risk assessments. Ms. Bolling managed a Remedial Design/Remedial Action (RD/RA) oversight project and a PRP Search/Title Search project for EPA. Ms. Bolling also serves as field task leader on RIs, and has conducted oversight on numerous RI/FS and RD/RA assignments. In addition, Ms. Bolling served as the sample coordinator on an eight-month RFI field project and is presently assisting in the RFI report preparation.

ECOLOGICAL INVESTIGATIONS

Wetland Assessment and Terrestrial Habitat Mapping, Cecil Field NAS, Jacksonville, Florida: ABB-ES-Navy Clean, Task Order Manager/Applied Biologist - Ms. Bolling managed the wetland assessment and terrestrial habitat mapping for Cecil Field NAS, a Naval facility undergoing remedial activities. She prepared the proposal and coordinated all field activities. She led the field investigation which included conducting wetland characterizations and wetland functional assessments (WET 2.0) of seven potential source of contamination (PSC) areas, conducted wetland delineations (1987 Army Corps Manual), and identified and mapped terrestrial wildlife habitats in the seven PSC areas. Eight separate reports were produced based on the findings. The period of performance was four months with a budget of approximately $100,000.

Northwest Plume Pilot Plant Wetland Corrective Action Plan, Paducah Gaseous Diffusion Plant (PGDP), Paducah, Kentucky: Department of Energy - Project Manager - Ms. Bolling was responsible for developing a wetland corrective action plan that identified impacts and outlined mitigation measures for eight palustrine emergent wetlands located in the Western Kentucky Wildlife Management Area. Impacts to the wetland vegetation, hydrology, and hydric soils were assessed at each impact location. Regulatory drivers were identified including Executive Order 11990, 33 CFR 330, Section 404 of the Clean Water Act, and general nationwide permit requirements. Mitigation measures were outlines for each

impact area that addressed hydrology, vegetation, and the soils. A monitoring commitment was also presented.

Wetland Assessment for the Cylinder Yard Phase Ix Construction and Refurbishment, Paducah Gaseous Diffusion Plant (PGDP), Paducah, Kentucky: Department of Energy - Project Manager - Ms. Bolling served as project manager for the NEPA Cylinder Yard Wetland Assessment. Ms. Bolling identified, classified, and delineated wetlands in the field using the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual and the U.S. Fish and Wildlife Service Cowardin Classification System. Ms. Bolling wrote a report that discussed the functions and values of the wetlands identified, a description of field methods, discussed potential impacts, recommendation for mitigative measures, and discussed regulatory requirements. This report met the requirements for a wetland assessment in accordance with 10 CFR 1022 and DOE-Oak Ridge guidance on format and content.

Threatened and Endangered Species Survey for the Cylinder Yard Phase IX Construction and Refurbishment, Paducah Gaseous Diffusion Plant, Paducah, Kentucky: Department of Energy - Project Manager - Ms. Bolling conducted a field survey to identify any federally and state-listed (including candidate for listing) rare fauna and flora species and/or habitats present on the proposed project area. In addition, extensive literature searches were conducted to determine species known to inhabit the area and to determine listed plant, animal, and habitat descriptions. A report was written that discussed the methodology and findings from the literature searches and field survey.

Wetland Delineation and Threatened and Endangered Species Investigation, Paducah Gaseous Diffusion Plant (PGDP), Inside the Security Fence, Paducah, Kentucky: Department of Energy - Project Manager - Ms. Bolling managed a NEPA wetland delineation and threatened and endangered species investigation of the 745 acres located inside the security fence at the US DOE PGDP. The wetland investigation included wetland identification, delineation, and characterization using the 1987 US ACE Wetland Delineation Manual.

Ecological Evaluation, Paducah Gaseous Diffusion Plant (PGDP) WAG 13, Paducah, Kentucky: Department of Energy - Project Manager - Ms. Bolling served as project manager for the PGDP WAG 13 ecological evaluation. This evaluation included wetland delineation, floodplain assessments, and the production of a floodplain statement of findings. Ms. Bolling conducted all field work, produced three reports, and conducted all schedule and budget tracking. The period of performance was approximately three months with budget of approximately $16,000.

Ecological RI/FS, Robins AFB, Warner Robins, Georgia: Department of Defense - Project Assistant/Junior Ecologist - Ms. Bolling provided management assistance for the Robins AFB Zone I, Operable Unit 2 ecological RI/FS. Ms. Bolling's duties included providing technical assistance to the project team, assuring adherence to HAZWRAP project QA/QC requirements, performing weekly and monthly technical requirements including cost tracking for CDM Federal and all subcontractors, and maintaining project files. She participated in the ecological assessment including sampling and analyzing tree ring cores, taking wetland water level readings, and assisting in biota sampling.

Wetland Delineations and Wetland Assessments, K-1407-B/C Ponds, K-25 Plant, Oak Ridge, Tennessee: Department of Energy - Project Ecologist - Ms Bolling conducted two wetland delineations and two wetland assessments at the K-1407-B/C Ponds located on the K-25 Plant. The wetland assessments

included the use of the Army Corps WET model. The delineations were conducted using the 1987 Army Corps Wetland Delineation Manual.

RI/FS Ecological Survey, ByPass 601, Concord, North Carolina; U.S. EPA - Project Ecologist - Ms. Bolling performed ecological support for the ByPass 601 Superfund site. She performed a terrestrial habitat survey; endangered and threatened species data search and field verification; identified dominant species of fauna and flora to assess receptor population; and served as the site biologist during ecological sampling activity that included stream quality studies, fish tissue sampling and macrobenthic invertebrate sampling. Ms. Bolling evaluated the data collected and produced the ecological portion of the RI report.

RI/FS Ecological Survey, FCX-Washington, Washington, North Carolina; U.S. EPA - Project Ecologist - Ms. Bolling performed ecological support for the FCX-Washington Site which is a former pesticide packaging facility. Her duties included terrestrial habitat surveys, endangered and threatened species surveys, receptor population surveys, fish sampling, and macrobenthic invertebrate sampling. The study area included approximately a 20-acre wetland where much of the sampling and surveys were conducted. All information collected was incorporated into the ecological section of the RI report.

Environmental Assessment for the Construction, Operation, and Closure of the Solid Waste Landfill at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky; Department of Energy - Project Ecologist - Ms. Bolling performed ecological support both in the field and in report production for this EA. The field work included habitat, fauna, flora, wetland, and archaeological surveys for approximately 300 acres of potential landfill locations. The information collected in the field was combined with a literature search for report production.

Environmental Assessment for the Construction and Operation of the UF, Tails Cylinder Storage Yards at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky and Piketon, Ohio; Department of Energy - Project Ecologist - Ms. Bolling performed ecological support both in the field and during the report production for site selected at both the Paducah and Portsmouth facilities. The work conducted in the field included habitat, fauna, flora, and wetland surveys. Ms Bolling used information gathered from literature searches as well as field data to produce the ecological resource sections of the report.

Ecological Risk Assessment, FCX Washington, Washington, North Carolina; US EPA - Project Ecologist - Ms. Bolling analyzed ecological data collected at the FCX-Washington site and developed the ecological portion of the Baseline Risk Assessment. The project involved the characterization of risks to aquatic and terrestrial receptors exposed to pesticides and metals in soils, sediments, and surface water.

Ecological Risk Assessment, ByPass 601, Concord, North Carolina; US EPA - Project Ecologist - Ms. Bolling developed the ecological portion of the ByPass 601 baseline risk assessment. Ms. Bolling used data she collected during the ecological study at the site to determine receptor population and exposure pathways for terrestrial and aquatic organisms. The presence of metals in the soils and sediments was evaluated in relation to the receptor populations identified.

Ecological Risk Assessment, Wilson Concepts, Fort Lauderdale, Florida; U.S. EPA - Project Ecologist - Ms. Bolling conducted a site survey at the Wilson Concepts site in Fort Lauderdale, Florida, to identify the receptor populations and exposure pathways to be evaluated in the ecological portion of the Baseline Risk Assessment. She then analyzed the information collected and produced a report based on the findings.

Ecological Risk Assessment, Red Penn Landfill, Peewee Valley, Kentucky: U.S. EPA - Project Ecologist - Ms. Bolling analyzed ecological data previously collected at the Red Penn Landfill site to support the ecological portion of the baseline risk assessment. Receptor population and exposure pathway were evaluated. Soil, surface water, and sediment contamination levels were analyzed and compared to existing criteria to determine exceedance.

REMEDIAL INVESTIGATION/RCRA FACILITY INVESTIGATION

RCRA Facility Investigation, Paducah Gaseous Diffusion Plant (PGDP) WAGS 1 and 7 and KOW, Paducah, Kentucky - Sample Coordinator - Ms. Bolling coordinated all sampling activities for the PGDP WAGs 1 and 7 and KOW RFI. She was responsible for the collection, data management, and laboratory coordination for approximately 3,500 environmental samples at this DOE facility.

Ms. Bolling's responsibilities included coordinating sample collection for as many as four teams of samplers (three drill rigs), determining daily sampling and QC requirements, maintaining a high-level of Quality Assurance and Quality Control to meet DOE and EPA specifications, and conducting all sample coordination for six separate laboratories. She is presently writing appropriate sections of the RFI report. Ms. Bolling spent eight months conducting the field work. The budget for this project is approximately $5,100,000.

Remedial Investigation/Feasibility Study, Palmetto Recycling, Columbia, South Carolina: US EPA-Field Task Manager - Ms. Bolling managed a two-month field sampling activity including the installation of 12 monitoring wells, collection of surface and subsurface soil samples as well as sediment, surface water, and groundwater samples.

Ms. Bolling coordinated the analysis of volatile organic compounds, pesticides, and metals with the US EPA CLP laboratories.

Remedial Investigation/Feasibility Study, FCX Washington, Washington, North Carolina: U.S. EPA - Deputy Field Task Manager - Ms. Bolling co-managed a three-month field sampling activity that included the collection of over 400 soil samples for select pesticide mobile laboratory screening. In addition, soil, surface water, sediment, and groundwater samples were collected for full scan TCL/TAL CLP laboratory analysis.

REMEDIAL DESIGN/REMEDIAL ACTION

RD/RA Oversight, Hipps Road Landfill, Jacksonville, Florida: U.S. EPA - Project Manager - Ms. Bolling serves as project manager of a remedial design, remedial action oversight at the Hipps Road Landfill Superfund Site. Acting in an oversight capacity for EPA Region IV, Ms. Bolling is responsible for arranging technical review of all PRP design and remedial action documents, as well as arranging for oversight during all remedial action implementation activities. The project has a five-year period of performance and a budget of $170,000.

PRE-REMEDIAL

Expanded Preliminary Assessment, Arnold Air Force Base, Tullahoma, Tennessee: Department of Defense - Technical Assistant/Field Team Leader - Ms. Bolling served as technical assistant and field team leader for an expanded preliminary assessment at the former Arnold Air Force Base, Camp Forrest facility. This facility was a WWII military training facility which was dismantled in the 1950s. An expanded preliminary assessment was conducted, following the EPA guidance, on 74 potential sites.

HALLIBURTON NUS ENVIRONMENTAL CORPORATION, ENVIRONMENTAL SCIENTIST, 1990 - 1991

Ms. Bolling managed pre-remedial investigations from design to report production. Projects included preliminary assessments, site investigation (Phase I and II), listing site inspection evaluations, preliminary assessment HRS scoring, and site inspection preliminary scoring.

Responsibilities included the preparation of work plans, sampling plans, and health and safety plans; supervising field investigations; performing sample collection; serving as health and safety officer; evaluation of site information and analytical data; and the production of technical reports.

DUVAL COUNTY SCHOOL BOARD, FLORIDA, - SUBSTITUTE TEACHER, 1989 - 1990

Ms. Bolling began substitute teaching at elementary school level but later taught high school courses including biology, chemistry, physics, and english. She taught a high school honors biology class for half a year. She judged environmental section of the Regional Science Fair.

PROFESSIONAL SOCIETIES: Society of Wetland Scientists

TRAINING:

40-hr Training Course - OSHA 29 CFR 1910.120 Hazardous Waste Training, July 1990
Revised HRS Orientation Course, December 1990
EPA Contractor SOP and Overview Course, January 1990
RAD I Training, November 1992
RAD Worker II Training, May 1993
GET and GERT Training at the Paducah Gaseous Diffusion Plant, May 1993
Wetland Training Institute Basic Wetland Delineation Training, May 1993
Wetland Training Institute Wetland Practicum, May 1993
Army Corps of Engineers Wetland Delineation Certification Training, January 1995
Conduct of Operations training, December 1994
NEPA Workshop at PGDP, February 1994
Data Quality objective (DQO) Workshop, February 1995
Streamline Approach for Environmental Restoration (SAFER) Workshop, February 1995
DNAPL Mobilization and Solubilization Workshop, February 1995

BRENDA L. BEATTY
Ecologist/Environmental Scientist
CDM Federal Programs Corporation

EDUCATION:

Botany/Plant Ecology, M.S. Ohio University, 1976
Environmental Science, B.A.,
California State College of Pennsylvania, 1974
Botany/Biosystematics, Ph.D. Program, Ohio University, 1976 to 1979.
Full-time Ph.D. candidate for three years.
Satisfied all course requirements, and passed all comprehensive exams.

PROFESSIONAL SOCIETIES:

Society for Risk Analysis
Colorado Native Plant Society

QUALIFICATIONS SUMMARY:

Ms. Beatty is an ecologist/environmental scientist providing technical support for both ecological and human health risk assessment projects under CERCLA. Ms. Beatty has over 15 years of professional experience pertaining to site investigations, risk assessments, and litigation support for hazardous waste sites. She has conducted risk and exposure assessments for federal facilities, conducted ecological field studies, managed litigation support projects for the EPA, and conducted numerous field and laboratory audits. Ms. Beatty had directed project design, monitored project progress, conducted quality control reviews, reviewed and approved final work products, written procedures, and trained personnel. Ms. Beatty's experience in ecology has been use to characterize biotic communities, conduct habitat assessments, identify sensitive ecosystems, estimate wildlife use areas, and identify potential habitat for threatened and endangered species.

EXPERIENCE:

As an Ecologist/Environmental Scientist for CDM Federal Programs Corporation, Ms. Beatty provides technical support for both ecological and human health risk assessment projects under CERCLA.

As a Risk Assessor, Ms. Beatty prepares risk assessment reports and coordinates and oversees risk assessment projects using resources from numerous FPC offices. She developed an ecological risk assessment for an operable unit at the Silver Bow Creek Superfund Site in Butte, Montana, and wrote portions of the associated Action Memorandum to support an expedited response action at the site. She conducts document reviews and provides comments for position papers, procedures, and reports submitted to the U.S. EPA, Region 8, by the Army, regarding both human health and ecological risks at the Rocky Mountain Arsenal (RMA). Some of these comments have led to dispute resolution negotiation meetings among parties. These risk characterizations will be used to develop remediation criteria for cleanup of the site. She also conducted field ecological surveys in support of an ecological risk assessment prepared for the Robins AFB, in Georgia, and is developing a Natural Resources Management Plan for Luke AFB, located in southern Arizona. She is currently managing an ecological risk assessment for the Anaconda Smelter Site, covering 200 square miles in western Montana, and for the Norton AFB, located in southern California. Other ecological project experience includes completion of wetland delineations for Cecil Field NAS located in northern Florida, a wetland delineation in the area of a proposed groundwater pump and treat system at Palmetto Wood Preserving Site in South Carolina, and threatened and endangered plant survey near Santa Fe, New Mexico.

Ms. Beatty was technical lead for several Rocky Mountain Arsenal (RMA) Interim Response Action Risk Assessments, as an environmental scientist for EBASCO. Other projects have included revising toxicological profiles for contaminants found at RMA (including the full range of common hazardous materials, as well as munitions and Army agent-related chemicals); developing toxicological profiles for hazardous materials found at the McChord Air Force Base; and participating in the development of input parameters for a model designed to predict the bioaccumulation of contaminants within selected foodwebs at RMA. Ms. Beatty was also responsible for the development and implementation of the QA/QC field audit program for the RMA Comprehensive Monitoring Biota Program.

As a regional project coordinator at Techlaw, Ms. Beatty managed and supervised personnel and litigation support projects for four USEPA regions. As a project leader, she conducted evidence audit and litigation support activities for Superfund sites, and conducted audits of EPA Contract Laboratory Program (CPL) laboratories and FIR field activities.

PROFESSIONAL HISTORY:

CDM FEDERAL PROGRAMS CORPORATION, DENVER, CO; ECOLOGIST/ENVIRONMENTAL SCIENTIST 1991 - PRESENT

RISK ASSESSMENTS

Human Health/Ecological Integrated Endangerment Assessment, Rocky Mountain Arsenal; Denver, Colorado, USEPA - Ms. Beatty provides technical support for human health and ecological risk assessments and other ecological projects. Currently involved in the review of numerous position papers, procedures, risk characterization models, and reports for conducting both human health and ecological assessments at RMA. Review includes evaluation of data used to develop model input parameter distributions, evaluation of consistency among various position papers and final products, preparation of comments on all work products, determination of the adequacy of responses to comments, performance of sensitivity and importance analysis of both models, management of a national expert subcontractor providing support in the review of the ecological foodweb model, and participation in dispute resolution negotiation meetings. These risk characterizations will be used to develop remediation criteria for cleanup of the Arsenal.

Ecological Risk Assessment, Silver Bow Creek, Butte, MT; USEPA - Developed an ecological risk assessment for Lower Area One of the Priority Soils Operable Unit at Silver Bow Creek, in Butte, Montana. Project involved characterization of risks to aquatic receptors exposed to metals in surface water, based on exceedances of EPA Ambient Water Quality Criteria. Provided oversight for final document completion by coordinating and compiling sections prepared by a team of risk assessors.

Ecological Risk Assessment, Anaconda Smelter, Anaconda, MT; USEPA - Developing an ecological risk assessment to assess risk to terrestrial, riparian, wetland, and aquatic habitats as a result of exposure to widespread emissions from a copper smelter. Includes evaluation of existing data in the development of a preliminary baseline risk assessment, to be followed by identification.of data gaps and recommendations for additional sampling.

Ecological Risk Assessment, Norton AFB, San Bernardino, CA; HAZWRAP - Developing an ecological risk assessment to assess risks resulting from exposure to basewide contaminants, as

documented at numerous Installation Restoration Program sites. This base has been closed, and numerous parcels scheduled for re-use. Both re-use options and proposed remedial alternatives must consider impacts on an existing population of the Santa Ana River Wooly Star, a threatened and endangered plant species listed at both the Federal and State levels.

Vegetation Survey, Jasper County, MD; USEPA - Conducted vegetation community surveys in areas affected by mining-related contaminants, and in control areas. Information provided to the State of Missouri in support of an ecological risk assessment. Survey results were used to assess potential risk to vegetation as a result of exposure to metals in soil.

ECOLOGICAL STUDIES

Vegetation Survey; Boulder County Open Space, Boulder, CO - Conducted a vegetation survey of a remnant tall-grass prairie in Boulder, Colorado. This information is used by the Boulder County Open Space to monitor the success of this unique ecosystem.

Breeding Bird Survey; Robins AFB, Macon, GA; HAZWRAP - Conducted a bird and wildlife field survey in support of the ecological risk assessment for Robins AFB under the Hazwrap Program.

Wetlands Delineation NAS Cecil Field, Jacksonville, FL, ABB Environmental - Conducted wetlands delineations for wetlands associated with six potential sources of contamination on the base. Included a functional assessment of each wetland using the Wetland Evaluation Technique (WET). This information will be used to assess the impacts of site remediation on nearby wetlands.

EPA, ARCS, Palmetto Wood Preserver Site, Dixiana, SC - Mr. Beatty conducted both a preliminary screening for the potential location of wetlands, and a detailed wetlands delineation for this site. The purpose of this investigation was to determine if the location of proposed groundwater extraction wells occurs within wetlands adjacent to the site.

Threatened and Endangered Species Survey, Santa Fe Landfill Site, Santa Fe, NM; CDM Inc. - Conducted a threatened and endangered plant survey on 136 acres proposed to be developed as a landfill by Santa Fe County.

Natural Resource Management Plan, Luke AFB, Phoenix, AZ; Omaha ACOE - Developing a natural resource management plan for Luke AFB, located near Phoenix, AZ. Included site surveys and documented research to identify natural resources associated with the base and development of a plan for managing those resources in the future.

EBASCO ENVIRONMENTAL SERVICES, DENVER, CO; ENVIRONMENTAL SCIENTIST, 1988 - 1991

RISK/ENDANGERMENT ASSESSMENTS

Rocky Mountain Arsenal, Denver, CO; US Army - Ms. Beatty served as technical lead for Interim Response Action Risk Assessments at RMA. Participated in development of human health and ecological risk assessments for various remedial alternatives at RMA and responded to comments from the Army, Shell Corporation, EPA, USFWS, and State of Colorado.

OTHER PROJECTS

Risk Assessment/Other Responsibilities

Developed toxicological profiles for hazardous materials found at the McChord Air Force Base in Washington.

Assisted in development of input parameters for a model designed to predict the bioaccumulation of contaminants within selected foodwebs at RMA. She also participated in a risk assessment for current and future land use options for a Superfund site under the USEPA REM III contract and contributed to development of a human health and ecological risk assessment work plan for Warren AFB in Wyoming. Participated in development of a draft exposure assessment for an operable unit at Warren AFB.

Ms. Beatty developed and implemented a comprehensive field auditing program for all biota samples collected by EBASCO. She has experience in the use of LOTUS 123, WordPerfect, dBASE IV, INFO, IRIS, MEDLINE, TOXLINE, CHEMLINE, RTECS, and HSDB.

TECHLAW, INC., DENVER, CO; REGIONAL PROJECT COORDINATOR AND GROUP ADMINISTRATOR, 1980 - 1985

LITIGATION SUPPORT

Ms. Beatty served as Group Administrator for the Contract Evidence Audit Team (CEAT) providing nationwide litigation support and case preparation assistance to the U.S. Environmental Protection Agency (EPA) for numerous sites under the authority of CERCLA. She supervised and coordinated activities for all projects originating in four regional EPA offices (Regions IV, V, VI, and VII). Ms. Beatty directed project design, monitored project progress, conducted quality control reviews, reviewed and approved final work products, wrote procedures, and trained personnel. She served as liaison between corporate management, government attorneys, technical staff, and contractors.

PROJECT LEADER

Ms. Beatty designed, conducted, and managed nationwide evidence audit activities related to Superfund (CERCLA/SARA), RCRA, and Clean Air Act enforcement investigations and information management activities. Specific project activities included the development of databases such as bibliographic and key work document inventories in Clean Air Act, Superfund, and RCRA

enforcement actions; sample evidence profiles used to demonstrate proper chain-of-custody of samples from collection through analysis; summaries of analytical results for samples collected at hazardous waste sites; waste transaction databases; and summaries of CERCLA Section 104(e) notice letters and responses from potentially responsible parties.

Ms. Beatty developed, implemented, and improved the procedures used to audit field investigation teams (FIT) and CLP laboratories. She planned and conducted chain-of-custody, document control, and standard operating procedure (SOP) audits of EPA FIT investigations at hazardous waste sites.

Ms. Beatty planned and conducted over 100 chain-of-custody, document control, and SOP audits at CLP laboratories, as well as state, hazardous materials, and EPA research and development laboratories. She trained new auditors in conducting field audits, follow-up laboratory audits, and litigation support activities.

An environmental baseline study was conducted by Ms. Beatty near Alcova, Wyoming, to provide biological data for an area that would be affected by the construction of a pump storage facility and forebay reservoir. The study included estimates of ungulate use of the area, evaluation of potential habitat for the endangered black-footed ferret, estimates of sage grouse use, vegetation surveys, and raptor nest site surveys.

U.S. ENVIRONMENTAL PROTECTION AGENCY, NATIONAL ENFORCEMENT INVESTIGATIONS CENTER, DENVER, CO; CHEMISTRY TECHNICIAN

LABORATORY ASSISTANT

Ms. Beatty served as a technician in the Inorganics Laboratory where her duties included analysis of total phosphorous and total kjeldahl nitrogen by colorimetry, and the use of atomics adsorption spectrometry to analyze for the presence of lead in gasoline, in support of EPA's Mobil Source Enforcement Division. She also participated in procedure development for detecting the presence of cyanide in samples collected at hazardous waste sites.

OHIO UNIVERSITY, SUMMER QUARTERS; INSTRUCTOR

Ms. Beatty was hired by the Botany Department as the instructor for a field identification course in Botany 248, Trees and Shrubs. Course included both lecture and field work.

GRADUATE TEACHING ASSISTANT

Ms. Beatty assisted in or taught several laboratory and field classes, including Botany 101 and 102, graduated Plant Morphology, Trees and Shrubs, Ohio Flora, Plant Ecology, and Basic Horticulture.

PROFESSIONAL SOCIETIES:

Member - Society for Risk Analysis
Member - Society of Environmental Toxicology and Chemistry
Member - Colorado Native Plant Society

PUBLICATIONS:

Barcus, B.L., and W.A. Wistendahl 1978. Vegetational Changes on an Oldfield in Southeastern Ohio. Ohio Journal of Science 78(5):255-258.

JAMES DEE
Senior Environmental Scientist
CDM Federal Programs Corporation

EDUCATION: Environmental Health Science, M.S.P.H. University of South Carolina, 1988
Biology and Environmental Science, B.S. The American University, 1977

QUALIFICATIONS SUMMARY:

Mr. Dee has is a Senior Environmental Scientist with particular expertise in ecological and health based risk assessment. He has more than 12 years of experience in the environmental field and has advanced training in environmental toxicology, analytical chemistry, and environmental risk analysis. Mr. Dee also has a broad base of experience in environmental science and regulatory compliance. He has worked as a Risk Assessment Specialist at numerous Comprehensive Environmental Response, Comprehension, and Liability (CERCLA) and Resource Conservation and Recovery Act (RCRA) sites across the country, including sites at both Department of Energy (DOE) and Department of Defense (DOD) facilities.

EXPERIENCE:

Mr. Dee functions as a Technical Resource and/or Project Manager for numerous projects. His experience includes CERCLA and state superfund Remedial Investigation/Feasibility Studies (RI/FS), RCRA Facility Investigations (RFIs), RCRA facility closure studies, National Pollution Discharge Elimination System (NPDES) permitting under the Clean Water Act (CWA), incinerator siting and permitting, and property transfers. He has performed risk assessments at DOD sites across the country for Martin Marietta Energy Systems, Inc. (MMES), the Hazardous Waste Remedial Actions Program (HAZWRAP), the U.S. Navy, and the U.S. Army Corps of Engineers.

Mr. Dee conducted and/or directed the ecological and human health risk assessments at the following CERCLA sites: Bluff Road Superfund Site (Columbia, SC), Hercules Landfill (New Brunswick, GA), and Madison County Landfill (Madison, FL). Risk assessments evaluated potential impact upon human health and the evaluation of the potential risks to aquatic and terrestrial populations.

Mr. Dee has performed risk assessments at the following DOD facilities: Douglas Air National Guard (ANG) Base, Massachusetts Military Reservation (MMR), Moffett Naval Air Station (NAS), Key West NAS, Mather Air Force Base (AFB), Mare Island Naval Storage Yard (NSY), Concord NWS, Fresno ANG, Camp Pendleton Marine Corps Base (MCB), San Diego Naval Station (NS), Williams AFB, Sky Harbor ANG Base, and the former Weldon Spring Ordnance Works. Sites include landfills, industrial operations, firefighter fields, chemicals spills, polychlorinated biphenyl (PCB) spills, leaking underground storage tanks (USTs), and drainage ditches and impoundments. Mr. Dee participated in human health risk assessments which involved the evaluation of potential exposure via inhalation, ingestion, and dermal contact. His environmental models included air dispersion, leachate, and groundwater fate and transport and bioaccumulation.

PROFESSIONAL HISTORY:

CDM FEDERAL PROGRAMS CORPORATION, OAK RIDGE, TN; SENIOR SCIENTIST, 1992 - PRESENT

Remedial Investigations/Feasibility Studies and Rcra Facility Investigations

RI, Oak Ridge National Laboratory (ORNL) Waste Area Grouping (WAG) 1, Surface Impoundments Operable Unit (OU), Oak Ridge, TN; MMES, Project Manager - Currently serving as Project Manager for the RI of the Surface Impoundments OU at WAG 1. This project is one of five DOE SAFER pilot projects being conducted across the country. Responsibilities include organizing and conducting data quality objectives workshops, reviewing historical data, determining and designing required sampling, coordinating various RI contractors, and preparing the final RI report.

RI, Gunite and Associated Tanks (GAAT) OU, WAG 1, ORNL, Oak Ridge, TN; MMES, Risk Assessment Specialist - Served as the Technical Lead for the preparation of the RI report on the GAAT OU, a site which included numerous large underground concrete tanks, stainless steel tanks, and two buildings contaminated with radionuclides which were scheduled for decontamination and decommissioning. Responsibilities included gathering and evaluating analytical data from previous studies, analysis and interpretation of the data and evaluating the sufficiency of the data for the purposes of risk analysis, and remedial design for the site.

Preliminary Risk Assessment, Douglas ANG Base, Charlotte, NC; HAZWRAP, Risk Assessment Specialist - Responsible for performing a preliminary risk assessment as part of an site investigation at Douglas ANG Base. Evaluated potential impacts to terrestrial and aquatic populations and potential risk to human health on sites which included a petroleum, oil, and lubricants (POL) area and former fire fighting facility. Work included an ecological risk assessment identifying habitats and potential ecological receptors. Also compared chemical concentrations in the various media with estimated acceptable exposure concentrations and ARARs for both ecological receptors and human populations.

Preliminary Risk Assessment, Massachusetts Military Reservation, Cape Cod, MA; HAZWRAP, Risk Assessment Specialist - Performed a preliminary risk assessment for both ecological and human receptors on sites including former vehicle maintenance shops and spill sites. Responsible for a risk assessment which involved identification of potential ecological receptors and human receptor populations; identification of potential exposure pathways; and estimating appropriate benchmark concentrations which were used as screening values to evaluate whether further investigations are required and the types of studies needed.

ENVIRONMENTAL ASSESSMENTS/ENVIRONMENTAL IMPACT STUDIES

Environmental Assessments (EAs), Paducah Gaseous Diffusion Plants (GDP), Paducah, KY; Portsmouth GDPt, Piketon, OH; MMES, Technical Lead - Provided technical support in the preparation of several EAs at the Paducah and Portsmouth GDPs within a very tight time schedule. The EAs included several types of storage facilities (i.e., RCRA, TSCA, and uranium hexafluoride) and landfills.

IT CORPORATION, KNOXVILLE, TN; PROJECT SCIENTIST, 1988 - 1992

Remedial Investigations/Feasibility Studies and Rcra Facility Investigations

Mr. Dee has over five years of experience in performing RI/FSs and RFIs at over 15 sites including three on the National Priorities List (NPL). He has performed preliminary and baseline risk assessments for both human health and ecological receptors.

Bluff Road Superfund Site, Columbia, SC; PRP, Risk Assessment Specialist - Mr. Dee performed both ecological and human health risk assessment of Bluff Road Superfund Site, Columbia, South Carolina. Performed a baseline ecological risk assessment as part of an RI. Environmental models were used to estimate potential concentrations at the points of exposure. Human health risk assessment included evaluation of health impacts associated with consumption of fish from the creek as well as consumption of groundwater.

Madison County Landfill Superfund Site, Madison, FL; Madison County, Technical Lead - Mr Dee conducted a baseline ecological risk assessment to evaluate the potential impact of chemicals present in a catchment basin in the center of the landfill. The risk assessment evaluated the potential risk to aquatic life, terrestrial mammals, and birds that may use the catchment basin as a drinking water source.

Hercules Landfill, New Brunswick, GA; Hercules Chemical Co., Technical Lead - Performed an ecological risk assessment of this Superfund site was used to evaluate the potential impact of toxaphene leeching from the landfill on an adjacent stream. Aquatic bioassays were used to evaluate the potential toxicity of sediments and surface waters to aquatic organisms.

CIBA-GEIGY Plant Closure, Cranston, RI; CIBA-GEIGY, Task Manager - Performed an ecological study was conducted as part of a RCRA facility closure at a fine chemicals manufacturing plant in New England. Studies included evaluating the impact of chemicals on a nearby stream via toxicity bioassays. In addition, terrestrial organisms and habitat identification and mapping were performed to evaluate the potential impact of site-related chemicals on terrestrial organisms.

Fresno ANG Base, Fresno, CA; HAZWRAP, Task Manager - Performed a human health and ecological risk assessment at Fresno ANG, Fresno, California. Sites included landfill, fire-fighting field, discharge impoundment and leaking underground fuel storage facility. Leachate modeling was used to determine the potential impact of fuel hydrocarbons on groundwater. Results of upgradient and downgradient groundwater samples were statistically evaluated to determine if the base was a significant contributor to groundwater contamination in the area. The risk assessment addressed potential risk from inhalation of volatile organics, dermal contact, drinking water, and inhalation of chemical-bearing wind-borne particulates.

National Starch Plant, Wilmington, NC; National Starch Plant, Task Manager - Served as Task Manager for an ecological risk assessment as part of an RFI at National Starch in North Carolina. The study included evaluation of potentially impacted stream using the EPA's Rapid Bioassessment Protocol (RBP).

OTHER STUDIES:

Yellow Freight Trucking Terminal, Nashville, TN; Yellow Freight, Task Manager - Mr. Dee performed an ecological risk assessment of diesel fuel in groundwater at a trucking facility, Nashville, Tennessee. The risk assessment determined that the potential point of exposure to chemicals in groundwater was in a small creek downgradient of the site. Aquatic toxicity studies were conducted with groundwater from the site to determine the maximum acceptable concentrations of diesel fuel that would not be toxic to organisms in the creek. These data were used in conjunction with groundwater modeling to determine acceptable contaminant concentrations in the groundwater at the site, which would not have a significant impact upon aquatic life.

Schenectady Chemical Inc. Manufacturing Plant, Rotterdam Junction, NY; Task Manager - Mr. Dee assisted in obtaining a permit for a hazardous waste incinerator located at the manufacturing plant. Performed a health risk assessment as part of the permit for hazardous waste incinerator. Risk assessment involved the modeling of exposure pathways of depositioned metals and risk assessment of airborne and depositioned metals emitted from the incinerator. Risk assessments and health evaluation were also done for Tier III analysis and the Best Available Control Technology (BACT) analysis.

PROFESSIONAL SOCIETIES:

National Association of Environmental Professionals
Society of Environmental Toxicology and Chemistry
Society for Risk Analysis

PUBLICATIONS:

Dee, J. C. and A. Kahn, 1992, "Aquatic Ecology Risk Assessment at a Petroleum Hydrocarbons Contaminated Site", Presented at the Society of Environmental Toxicology and Chemistry, 13th Annual Meeting, Cincinnati, OH

Dee, James and Thomas Marshall, 1991, "Risk Assessment of Metal Emissions From an Incinerator", Proceedings of the 1991 Incineration Conference - Thermal Treatment of Radioactive, Hazardous Chemical, Mixed and Medical Wastes, Knoxville, TN.

Moore, Randall and James Dee, 1991, "Risk Assessment and Stack Sampling of Chrome Emissions from Incinerators and Industrial Boilers", Proceedings of the 1991 Incineration Conference - Thermal Treatment of Radioactive, Hazardous Chemical, Mixed and Medical Wastes, Knoxville, TN.

Dee, James C, 1991, "A Methodology for Assessing Potential Risks to Deer Populations: A Case Study at a Superfund Site" Presented at the Society of Environmental Toxicology and Chemistry, 12th Annual Meeting, Seattle, Washington.

Scott, G. I., D. S. Baughman, A. H. Trim, and J. C. Dee, 1987, "Lethal and Sublethal Effects of Insecticides Commonly Found in Nonpoint Source Agricultural Runoff to Estuarine Fish and Shellfish", In: Pollution Physiology of Estuarine Organism, (Univ. of South Carolina Press) pp. 251-274.

Dee, J.C. and G.I. Scott, 1987 "Scoliosis in Larval Fish (Fundulus Heteroclitus) as a Result of Exposure to Agricultural Insecticides", Presented at the Society of Environmental Toxicology and Chemistry, Alexandria, Virginia.

Tkacik, M. and J. Dee, 1984, Procedure Manual for Medical Emergencies involving Radioactive Contamination, Richland Memorial Hospital, Columbia South Carolina.

APPENDIX B

Agency Consultation

Department of Energy
Oak Ridge Operations
Paducah Site Office
P.O. Box 1410
Paducah, KY 42001

August 9, 1995

Mr. Daniel Evans
South Section Branch
Louisville Corps of Engineers
United States Department of Army
600 Martin Luther King Boulevard
Louisville, Kentucky 40202-2230

REQUEST FOR CORRESPONDENCE REGARDING THE PROPOSED UF_6 CYLINDERS AND STORAGE YARDS, PHASE IX

Dear Mr. Evans:

The Department of Energy (DOE) is preparing an environmental assessment (EA) for the referenced proposed project. As proposed, the project could result in permanent filling of up to 4.5 acres of isolated wetlands, less than one acre or no wetland impact. DOE requests correspondence from the Corps of Engineers (COR) regarding requirements applicable to these three scenarios.

As discussed with Mr. Frank DeGott of your office on August 8, DOE has prepared a wetlands assessment (enclosed) which discusses the wetlands, their functions and values, and anticipated impacts. Please bear in mind that the wetlands assessment was prepared to meet the requirements of DOE's Floodplain/Wetlands Environmental Review Requirements (10 CFR 1022) and does not necessarily meet all of COE's wetland delineation requirements. The wetlands assessment concludes that seven small wetlands totaling 4.5 acres would be impacted. The wetlands were classified using the U.S. Fish and Wildlife Service wetland classification system as palustrine forested, emergent, or scrub-shrub. The EA will also evaluate alternate sites involving impacts to less than one acre of wetlands or no wetlands at all.

DOE requests correspondence from COE regarding the regulatory requirements that would be applicable for the scenarios referenced above. Specifically, the following information is needed:

- specific regulatory requirements that would apply;
- specific mitigation requirements likely to be required;
- steps needed to fulfill the consultation/regulatory approval process and an approximation of how long the process would take; and
- regulatory requirements that would apply in the event less than one acre of wetlands were to be impacted.

C1 95 004241

SP 03 01

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

September 11, 1995

Operations and Readiness Division
Regulatory Branch (South)
ID No. 199501221-mkm

Mr. Jimmie C. Hodges
Department of Energy
Oak Ridge Operations
Paducah Site Office
P.O. Box 1410
Paducah, Kentucky 42001

Dear Mr. Hodges:

This is in regard to your letter dated August 9, 1995, concerning a review of the wetlands assessment for the proposed UF6 cylinders and storage yards, Phase IX, at the Paducah Gaseous Diffusion Plant. The proposed project would impact 7 small wetlands totaling approximately 4.5 acres in Paducah, McCracken County, Kentucky.

I am sending you an application packet. This will explain most of the regulatory requirements that are applicable. I will briefly explain your choices in the next few paragraphs.

If the total wetlands affected are less than 1 acre and they are above the headwaters point of any stream, a Nationwide permit would be all that is needed. The wetlands shown in your plans are not adjacent to any streams. A Nationwide permit would cover up to 1 acre and only takes a few days to process.

If greater than 1 acre of wetland is affected, a Pre-Discharge Notification is required. This notice is sent to other Federal Agencies, and they are given 30 days in which to respond. If they have concerns about the project, these concerns need to be addressed before a permit can be issued.

If the total wetland acreage disturbed is greater than 1 acre, mitigation is also required. District policy usually requires creating at least 2 acres of wetland for every acre that is affected. A mitigation plan must be submitted and several years of monitoring is required. Mitigation plans are covered in the enclosed publication "Wetland Compensatory Mitigation and Monitoring Plan Guidelines for Kentucky."

Department of Energy
Oak Ridge Operations
Paducah Site Office
P.O. Box 1410
Paducah, KY 42001

CO 95 001169

September 25, 1995

COPY

Mr. Mark Claxton
Natural Resources Conservation Service
347 Broadway
LaCenter, Kentucky 42056

FARMLAND PROTECTION POLICY ACT COMPLIANCE; ENVIRONMENTAL ASSESSMENT FOR THE UF_6 CYLINDER STORAGE YARDS, PHASE IX AT THE PADUCAH GASEOUS DIFFUSION PLANT (PGDP), PADUCAH, KENTUCKY

Dear Mr. Claxton:

The Department of Energy (DOE) is preparing an environmental assessment for the referenced action in accordance with applicable requirements of the National Environmental Policy Act (NEPA). This proposed action is located on DOE property at the Paducah Gaseous Diffusion Plant (PGDP), McCracken County, Kentucky. The purpose of this letter is to inform you of the proposed project and request concurrence that no impacts to prime farmland would result from any alternatives associated with the proposed project. As shown in the accompanying figure, no impacts to prime farmland are expected from this project because all sites are in Henry or disturbed soils which are not designated as prime farmland soils.

DOE requests a letter of reply indicating your concurrence that it is not necessary to fill out form AD 1006 because no impacts to prime farmland would result from this project. If you have any questions or require additional information, please call Carlos R. Alvarado at (502) 441-6804.

Sincerely,

Jimmie C Hodges

Jimmie C. Hodges, Site Manager
Paducah Site Office

EF-22:Lamb

Enclosure

cc: C. R. Alvarado, EF-22
B. A. Bowers, LMES/Kevil
C. E. Bradley, NE-33
C. W. Martin, USEC/Paducah
J. C. Massey, LMES/Kevil
J. W. Parks, EF-20
P. W. Phillips/A. Campbell, SE-31
S. Polston, LMUS/PGDP
L. K. Synnott, CC-10
K. L. White, LMES/Kevil
D. J. Wilkes/G. Summers, JEG/Kevil

Department of Energy
Oak Ridge Operations
Paducah Site Office
P.O. Box 1410
Paducah, KY 42001

August 9, 1995

Mr. Daniel Evans
South Section Branch
Louisville Corps of Engineers
United States Department of Army
600 Martin Luther King Boulevard
Louisville, Kentucky 40202-2230

REQUEST FOR CORRESPONDENCE REGARDING THE PROPOSED UF_6 CYLINDERS AND STORAGE YARDS, PHASE IX

Dear Mr. Evans:

The Department of Energy (DOE) is preparing an environmental assessment (EA) for the referenced proposed project. As proposed, the project could result in permanent filling of up to 4.5 acres of isolated wetlands, less than one acre or no wetland impact. DOE requests correspondence from the Corps of Engineers (COR) regarding requirements applicable to these three scenarios.

As discussed with Mr. Frank DeGott of your office on August 8, DOE has prepared a wetlands assessment (enclosed) which discusses the wetlands, their functions and values, and anticipated impacts. Please bear in mind that the wetlands assessment was prepared to meet the requirements of DOE's Floodplain/Wetlands Environmental Review Requirements (10 CFR 1022) and does not necessarily meet all of COE's wetland delineation requirements. The wetlands assessment concludes that seven small wetlands totaling 4.5 acres would be impacted. The wetlands were classified using the U.S. Fish and Wildlife Service wetland classification system as palustrine forested, emergent, or scrub-shrub. The EA will also evaluate alternate sites involving impacts to less than one acre of wetlands or no wetlands at all.

DOE requests correspondence from COE regarding the regulatory requirements that would be applicable for the scenarios referenced above. Specifically, the following information is needed:

- specific regulatory requirements that would apply;
- specific mitigation requirements likely to be required;
- steps needed to fulfill the consultation/regulatory approval process and an approximation of how long the process would take; and
- regulatory requirements that would apply in the event less than one acre of wetlands were to be impacted.

If you have any questions or require additional information, please call Carlos R. Alvarado at (502) 441-6804.

Sincerely,

for Jimmie C. Hodges, Site Manager
Paducah Site Office

EF-22:Lamb

Enclosure

cc: D. R. Guminski/B. A. Bowers, LMES/Kevil
J. E. Lamb, EASI/Paducah
P. W. Phillips/J. L. Elmore, SE-31
D. J. Wilkes/G. Summers, JEG/Kevil

CI 95 004241

SP 03 01

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

September 11, 1995

Operations and Readiness Division
Regulatory Branch (South)
ID No. 199501221-mkm

Mr. Jimmie C. Hodges
Department of Energy
Oak Ridge Operations
Paducah Site Office
P.O. Box 1410
Paducah, Kentucky 42001

Dear Mr. Hodges:

This is in regard to your letter dated August 9, 1995, concerning a review of the wetlands assessment for the proposed UF6 cylinders and storage yards, Phase IX, at the Paducah Gaseous Diffusion Plant. The proposed project would impact 7 small wetlands totaling approximately 4.5 acres in Paducah, McCracken County, Kentucky.

I am sending you an application packet. This will explain most of the regulatory requirements that are applicable. I will briefly explain your choices in the next few paragraphs.

If the total wetlands affected are less than 1 acre and they are above the headwaters point of any stream, a Nationwide permit would be all that is needed. The wetlands shown in your plans are not adjacent to any streams. A Nationwide permit would cover up to 1 acre and only takes a few days to process.

If greater than 1 acre of wetland is affected, a Pre-Discharge Notification is required. This notice is sent to other Federal Agencies, and they are given 30 days in which to respond. If they have concerns about the project, these concerns need to be addressed before a permit can be issued.

If the total wetland acreage disturbed is greater than 1 acre, mitigation is also required. District policy usually requires creating at least 2 acres of wetland for every acre that is affected. A mitigation plan must be submitted and several years of monitoring is required. Mitigation plans are covered in the enclosed publication "Wetland Compensatory Mitigation and Monitoring Plan Guidelines for Kentucky."

As you can see, the Nationwide permit is much simpler and quicker. I am including a copy of the conditions that are required for the Nationwide permit. If this would suit your needs without major modifications to your plans, it might be best for your circumstances.

If you have any questions concerning this matter, please contact this office at the above address, ATTN: CEORL-OR-FS or call Mr. Frank J. DeGott at (502) 582-5452.

Sincerely,

Daniel L. Evans

Daniel L. Evans
Chief, South Section
Regulatory Branch

Enclosures

Department of Energy
Oak Ridge Operations
Paducah Site Office
P.O. Box 1410
Paducah, KY 42001

CO 95 001169

September 25, 1995

COPY

Mr. Mark Claxton
Natural Resources Conservation Service
347 Broadway
LaCenter, Kentucky 42056

FARMLAND PROTECTION POLICY ACT COMPLIANCE; ENVIRONMENTAL ASSESSMENT FOR THE UF_6 CYLINDER STORAGE YARDS, PHASE IX AT THE PADUCAH GASEOUS DIFFUSION PLANT (PGDP), PADUCAH, KENTUCKY

Dear Mr. Claxton:

The Department of Energy (DOE) is preparing an environmental assessment for the referenced action in accordance with applicable requirements of the National Environmental Policy Act (NEPA). This proposed action is located on DOE property at the Paducah Gaseous Diffusion Plant (PGDP), McCracken County, Kentucky. The purpose of this letter is to inform you of the proposed project and request concurrence that no impacts to prime farmland would result from any alternatives associated with the proposed project. As shown in the accompanying figure, no impacts to prime farmland are expected from this project because all sites are in Henry or disturbed soils which are not designated as prime farmland soils.

DOE requests a letter of reply indicating your concurrence that it is not necessary to fill out form AD 1006 because no impacts to prime farmland would result from this project. If you have any questions or require additional information, please call Carlos R. Alvarado at (502) 441-6804.

Sincerely,

Jimmie C Hodges

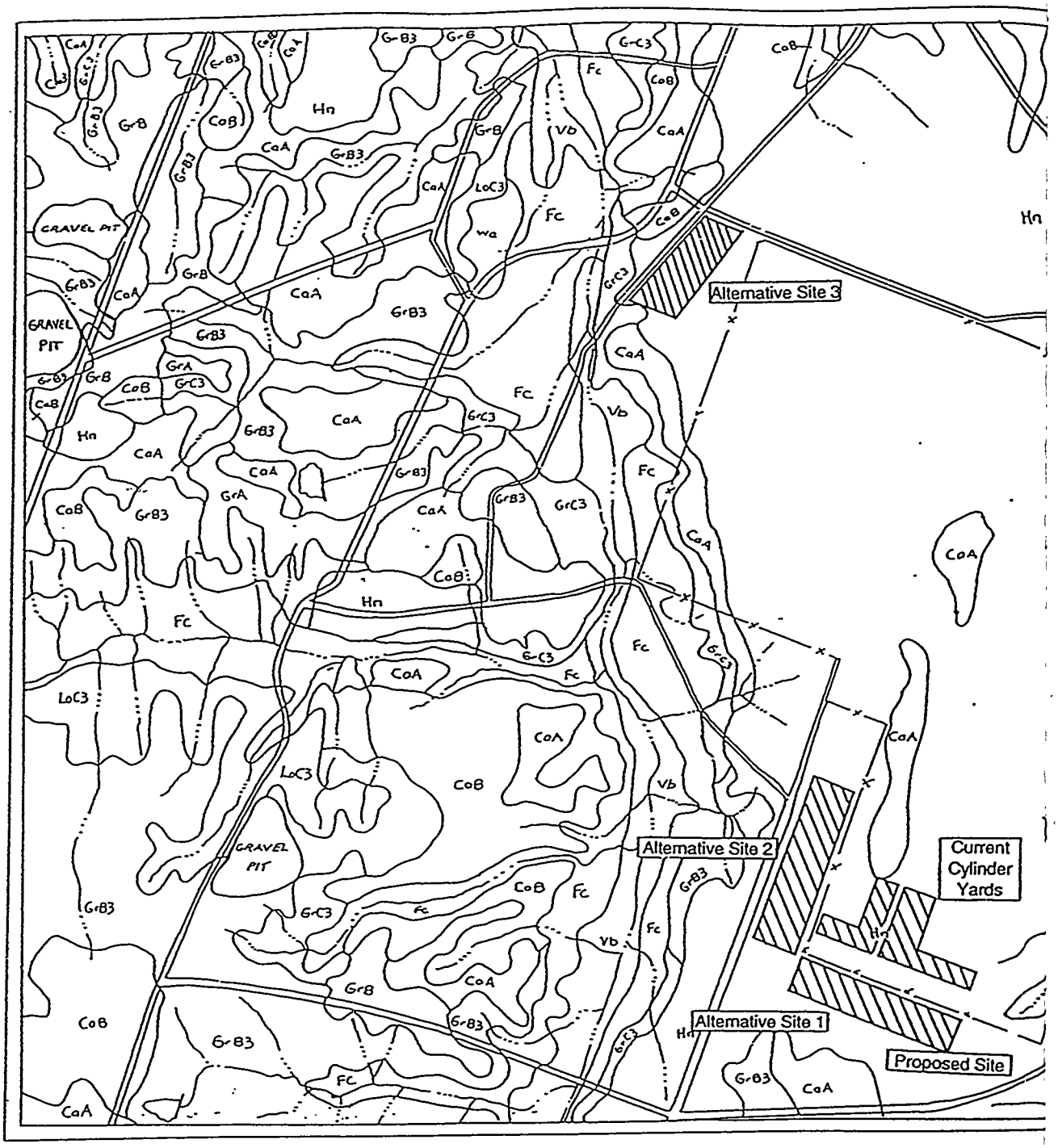
Jimmie C. Hodges, Site Manager
Paducah Site Office

EF-22:Lamb

Enclosure

cc: C. R. Alvarado, EF-22
B. A. Bowers, LMES/Kevil
C. E. Bradley, NE-33
C. W. Martin, USEC/Paducah
J. C. Massey, LMES/Kevil
J. W. Parks, EF-20
P. W. Phillips/A. Campbell, SE-31
S. Polston, LMUS/PGDP
L. K. Synnott, CC-10
K. L. White, LMES/Kevil
D. J. Wilkes/G. Summers, JEG/Kevil

Figure 1. Soils in the Vicinity of the Paducah Gaseous Diffusion Plant



Modified from the "Soil Survey of Ballard and McCracken Counties, Kentucky" (Humphrey, 1976)

Ca - Calloway silt loam
Gr - Grenada silt loam
Lo - Loring silt loam
Fc - Falaya-Collins silt loam
Vb - Vicksburg silt loam
Hn - Henry silt loam
— x— - PGDP Security Fence
▨ - Areas for possible construction

UNITED STATES
DEPARTMENT OF
AGRICULTURE

NATURAL RESOURCES
CONSERVATION
SERVICE

2715 OLIVET CHURCH ROAD
PADUCAH, KY 42001
(502) 554-5242

September 28, 1995

USDA
Natural Resources
Conservation Service
2715 Olivet Church Road
Paducah, KY 42001-9755

Jimmie C. Hodges, Site Manager
Paducah Site Office
Department of Energy
P.O. Box 1410
Paducah, KY 42001

Dear Mr. Hodges,

As requested, I have reviewed the 3 sites that you indicated in your letter to Mark Claxton on September 25, 1995.

Based on the Soil Survey of McCracken County, soil maps 8, 9, and 15 indicate the soil on these sites are Henry Silt Loam. This soil is not considered to be prime farmland in McCracken County. Activities on this soil type will not impact prime farmland; therefore, Form AD 1006 should not be needed.

If you need any further assistance in McCracken County, feel free to contact me at 554-5242.

Sincerely,

John A. Shely,
District Conservationist
McCracken County

JAS/jaj

CO 95 001155

Department of Energy
Oak Ridge Operations
Paducah Site Office
P.O. Box 1410
Paducah, KY 42001

September 25, 1995

COPY

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

NATIONAL HISTORIC PRESERVATION ACT COMPLIANCE; ENVIRONMENTAL ASSESSMENT FOR THE UF_6 CYLINDER STORAGE YARDS, PHASE IX AT THE PADUCAH GASEOUS DIFFUSION PLANT (PGDP), PADUCAH, KENTUCKY

Dear Mr. Morgan:

Enclosed is an archeological/historical review summary for the proposed action. This proposed action is located on the Department of Energy (DOE) property at the Paducah Gaseous Diffusion Plant (PGDP), McCracken County, Kentucky. The DOE Paducah Site Office has determined that no cultural resources would be impacted by the proposed action. The reasoning for this determination is given in the enclosed summary. This information will be incorporated in an environmental assessment being prepared for the proposed action.

DOE requests that a letter of reply indicating that you concur with our determination and that we have met applicable requirements of the National Historic Preservation Act. If you have any questions or require additional information, please call Carlos R. Alvarado at (502) 441-6804.

Sincerely,

Jimmie C. Hodges, Site Manager
Paducah Site Office

EF-22:Lamb

Enclosure

cc: C. R. Alvarado, EF-22
B. A. Bowers, LMES/Kevil
C. E. Bradley, NE-33
C. W. Martin, USEC/Paducah
J. C. Massey, LMES/Kevil
J. W. Parks, EF-20
P. W. Phillips/A. Campbell, SE-31
S. Polston, LMUS/PGDP
J. K. Rogers, LMES/K-25
L. K. Synnott, CC-10
K. L. White, LMES/Kevil
D. J. Wilkes/G. Summers, JEG/Kevil

COPY

NATIONAL HISTORIC PRESERVATION ACT COMPLIANCE REVIEW SUMMARY

PROPOSED ACTION: The United States Department of Energy (DOE) is proposing to refurbish current storage yards and construct a new storage yard for cylinders of depleted uranium hexafluoride (UF_6) cylinders at the Paducah Gaseous Diffusion Plant (PGDP) in McCracken County, Kentucky.

LOCATION: The accompanying figure illustrates the location of the yards to be refurbished, the proposed construction site for the new cylinder storage yard, and alternate sites that are being evaluated in an environmental assessment.

DISCUSSION: In 1993, the U.S. Army Corps of Engineers (COE) conducted an archaeological and cultural resources field survey on a 20-percent stratified random sample at the PGDP ("Environmental Investigations at the Paducah Gaseous Diffusion Plant and surrounding McCracken County, Kentucky," May 1994). Portions of the Proposed Site and Alternate Site 3 were included in the COE survey and no sites were discovered.

In addition, the existing yards to be refurbished, the Proposed Site and Alternate Site 1 (which overlaps the Proposed Site), have been assessed for cultural resources (see enclosed report). The report concludes that these areas are disturbed such that intact cultural artifacts are highly unlikely. The portion of Alternate Site 3 not surveyed by the COE and the entire Alternate Site 2 area are previously disturbed and do not contain any historic properties included or eligible for inclusion in the National Register of Historic Places (COE, 1994).

DETERMINATION: The DOE has determined that the proposed action would have no effect on historic properties included or eligible for inclusion in the National Register of Historic Places because none are present. This determination is based on the fact that all potential project areas have been surveyed or are previously disturbed areas such that it is highly unlikely any cultural resources remain. In conclusion, all applicable requirements of the National Historic Preservation Act have been met for this proposed project.

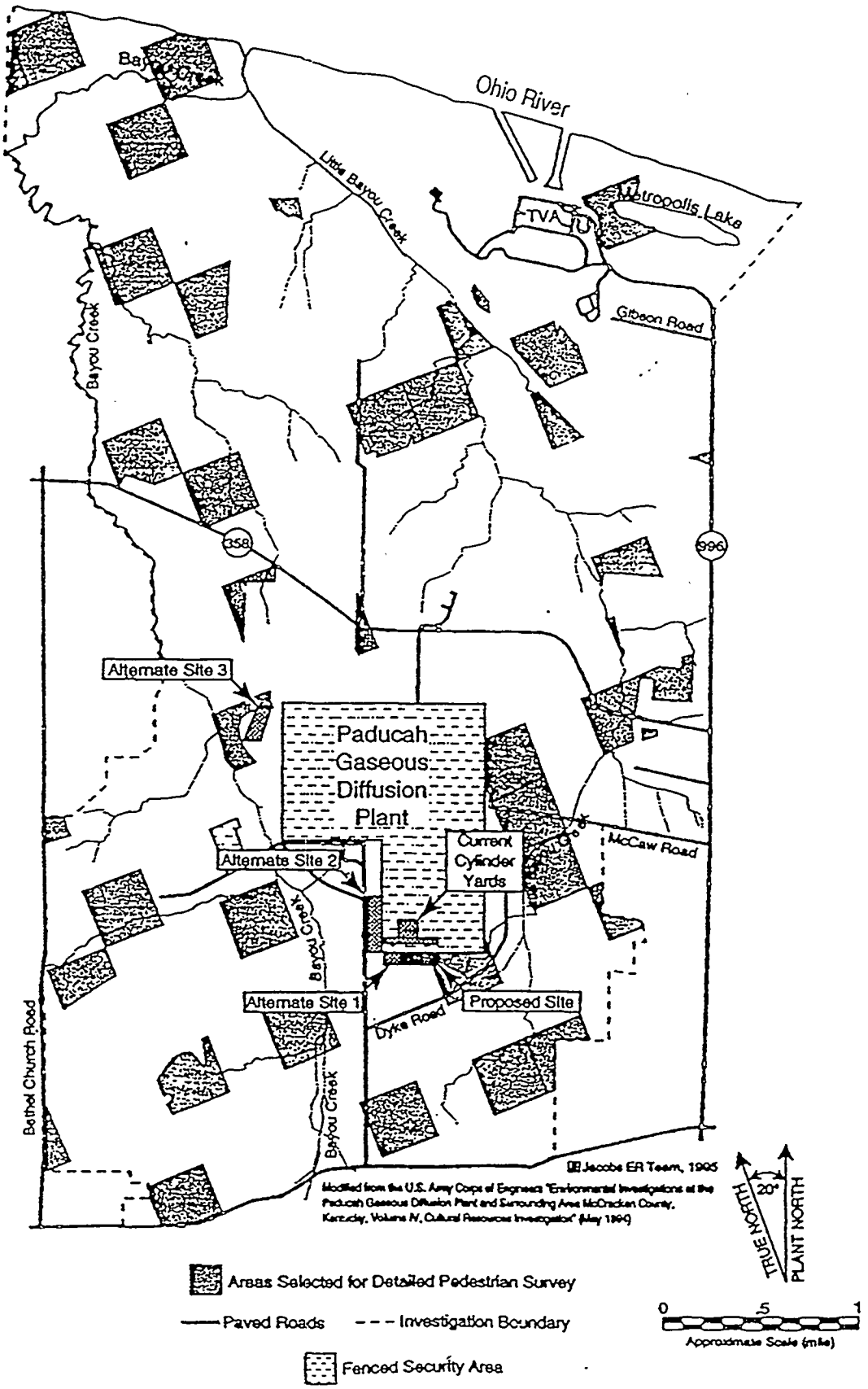


Figure 1. Cultural Resources Survey Area

CI 95 004802

10 00 01

Education, Arts and Humanities Cabinet

KENTUCKY HERITAGE COUNCIL
The State Historic Preservation Office

Brereton C. Jones
Governor
Sherry K. Jelsma
Cabinet Secretary

David L. Morgan
Executive Director
and SHPO

October 16, 1995

Mr. Jimmie C. Hodges
Site Manager
Paducah Site Office
Department of Energy
P.O. Box 1410
Paducah, Kentucky 42001

Re: **Proposed Expansion of the C-745 Cylinder Storage Yard**
Paducah Gaseous Diffusion Plant
McCracken County, Kentucky

Dear Mr. Hodges:

Thank you for your letter concerning the above referenced project. Our review of this project indicates that because the proposed cylinder storage expansion area has been disturbed by previous construction activities an archaeological survey will not be required. The proposed project will have no effect on any property listed in or eligible for listing in the National Register of Historic Places. If you have any questions 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

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

Department of Energy
Oak Ridge Operations
Paducah Site Office
P.O. Box 1410
Paducah, KY 42001

September 25, 1995

Dr. Lee A. Barclay
Field Supervisor
Fish and Wildlife Service
United States Department of Interior
446 Neal Street
Cookeville, Tennessee 38501

ENDANGERED SPECIES ACT COMPLIANCE; ENVIRONMENTAL ASSESSMENT FOR THE UF_6 CYLINDER STORAGE YARDS, PHASE IX AT THE PADUCAH GASEOUS DIFFUSION PLANT (PGDP), PADUCAH, KENTUCKY

Dear Mr. Barclay:

Enclosed is an Endangered Species Act Compliance Review Summary for the referenced proposed action. This proposed action is located on Department of Energy (DOE) property at the Paducah Gaseous Diffusion Plant (PGDP), McCracken County, Kentucky. The DOE Paducah Site Office has made preliminary determination that no federally listed or proposed threatened or endangered species, or their habitats, would be impacted by the proposed action. The reasoning for this determination is given in the enclosed summary. This information will be incorporated in an environmental assessment being prepared for the proposed action.

DOE requests a letter of reply indicating that you concur with our determination and that we have met applicable requirements of the Endangered Species Act. If you have any questions or require additional information, please call Carlos R. Alvarado at (502) 441-6804.

Sincerely,

Jimmie C Hodges

Jimmie C. Hodges, Site Manager
Paducah Site Office

EF-22:Lamb

Enclosure

cc: C. R. Alvarado, EF-22
B. A. Bowers, LMES/Kevil
C. E. Bradley, NE-33
C. W. Logsdon, WKWMA/Kevil
C. W. Martin, USEC/Paducah
J. C. Massey, LMES/Kevil
J. W. Parks, EF-20
P. W. Phillips/A. Campbell, SE-31
S. Polston, LMUS/PGDP
L. K. Synnott, CC-10
K. L. White, LMES/Kevil

ENDANGERED SPECIES ACT COMPLIANCE REVIEW SUMMARY

PROPOSED ACTION: The United States Department of Energy (DOE) is proposing to refurbish current storage yards and construct a new storage yard for cylinders of depleted uranium hexaflouride (UF_6) at the Paducah Gaseous Diffusion Plant (PGDP), McCracken County, Kentucky.

LOCATION: The accompanying figure illustrates the location of the current cylinder yards to be refurbished, the proposed construction site for the new cylinder storage yard, and alternate sites that are being evaluated in an environmental assessment.

DISCUSSION: A threatened and endangered species survey (enclosed) was completed for the Proposed Site and Alternate Site 1. The results of that survey indicate that no threatened or endangered species or habitat for any threatened or endangered species would be impacted by the proposed project. The U.S. Army Corps of Engineers (COE) conducted a threatened and endangered species investigation covering nearly 12,000 acres surrounding the PGDP ("Environmental Investigations at the Paducah Gaseous Diffusion Plant and Surrounding Area, McCracken County, Kentucky," May 1994). The COE report states that two federally listed or proposed species, the Indiana bat (*Myotis sodalis*; listed endangered) and the copperbelly water snake (*Nerodia erythrogaster neglecta*; proposed threatened), are documented as occurring in the COE study area. The COE completed a habitat survey for these two species. As shown in the enclosed figures, none of the potential project sites are close to potential habitat for these species.

DETERMINATION: The DOE Paducah Site Office has determined that the proposed action would have no effect on federally listed or proposed threatened or endangered species. This determination is based on the enclosed report and the COE report. Both reports conclude that there have been no sightings of, and there is no potential habitat for, any federally listed or proposed species at any potential project site.

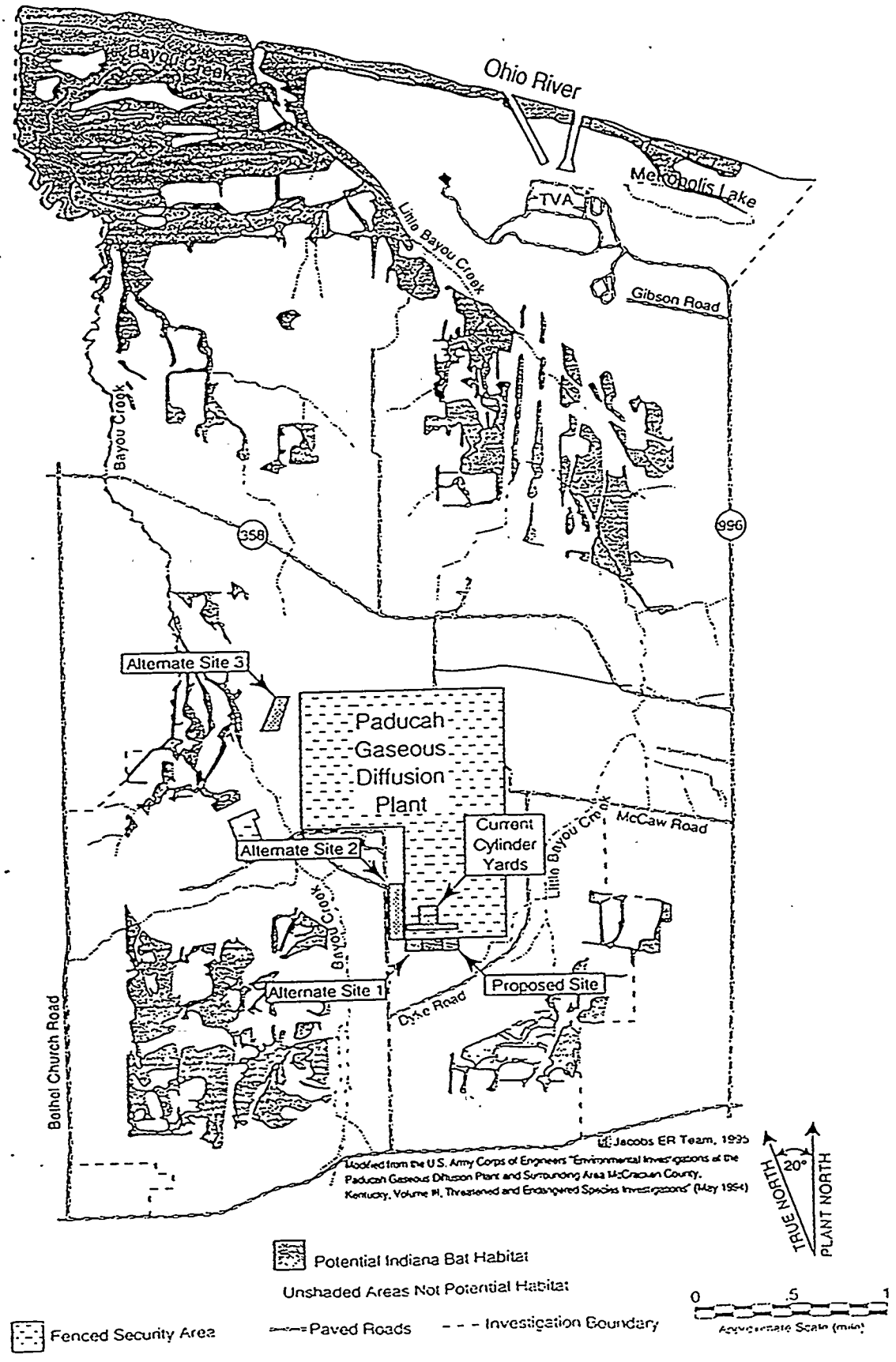


Figure 1. Potential Indiana Bat Habitat

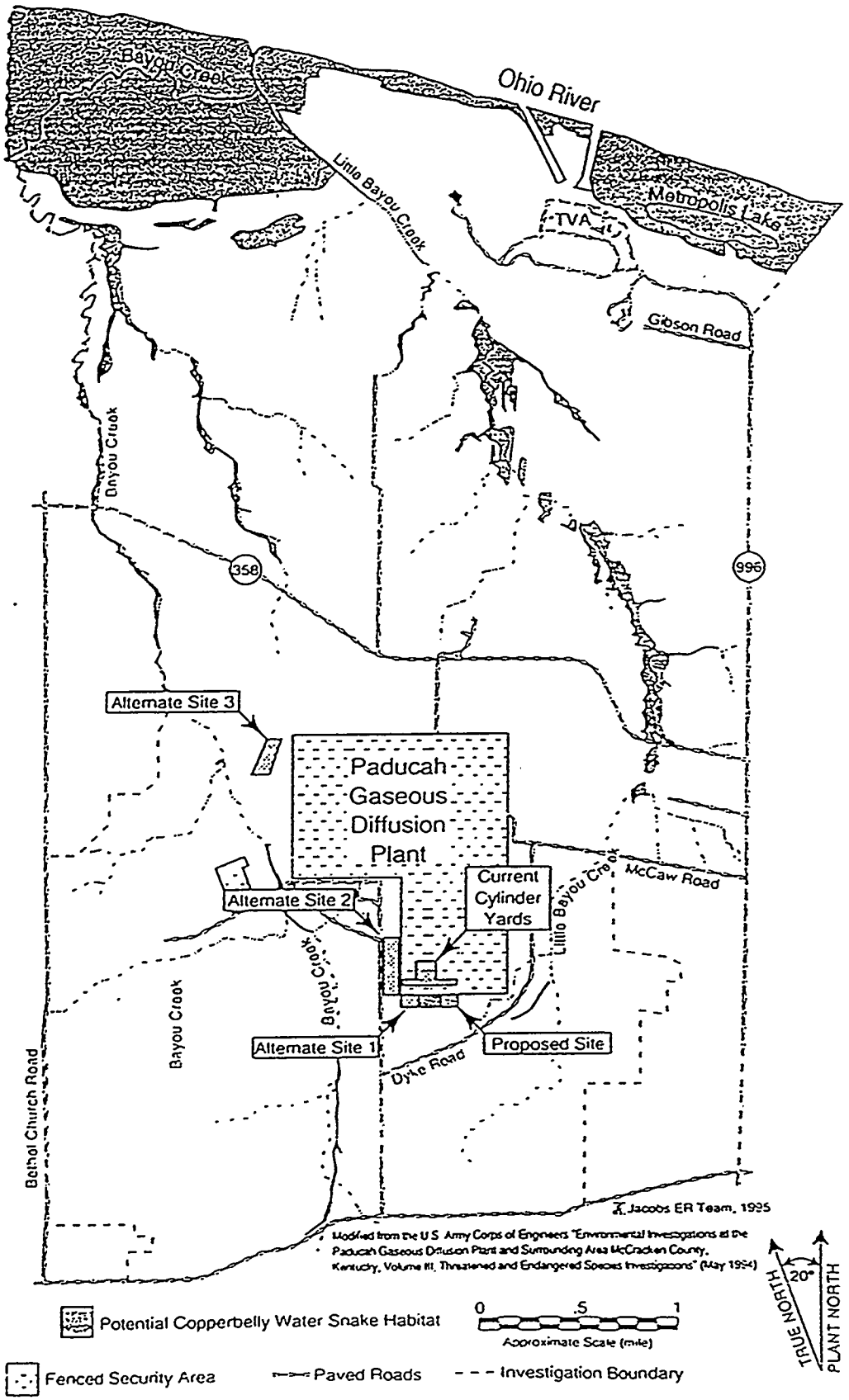


Figure 2. Potential Copperbelly Water Snake Habitat

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, Tennessee 38501

October 30, 1995

Mr. Jimmie C. Hodges
Site Manager
Department of Energy
P.O. Box 1410
Paducah, Kentucky 42001

Dear Mr. Hodges:

Thank you for your letter and enclosures of September 29, 1995, regarding the Paducah Gaseous Diffusion Plant in McCracken County, Kentucky. The Fish and Wildlife Service (Service) has reviewed the information submitted and offers the following comments.

Information available to the Service does not indicate that wetlands exist in the vicinity of the proposed project. However, our wetland determination has been made in the absence of a field inspection and does not constitute a wetland delineation for the purposes of Section 404 of the Clean Water Act or the wetland conservation provisions of the Food Security Act. The Corps of Engineers or the Natural Resources Conservation Service should be contacted if other evidence, particularly that obtained during an on-site inspection, indicates the potential presence of wetlands.

Endangered species collection records available to the Service do not indicate that federally listed or proposed endangered or threatened species occur within the impact area of the project. We note, however, that collection records available to the Service may not be all-inclusive. Our data base is a compilation of collection records made available by various individuals and resource agencies. This information is seldom based on comprehensive surveys of all potential habitat and thus does not necessarily provide conclusive evidence that protected species are present or absent at a specific locality. However, based on the best information available at this time, we believe that the requirements of Section 7 of the Endangered Species Act of 1973, as amended, are fulfilled. Obligations under Section 7 of the Act must be reconsidered if (1) new information reveals impacts of the proposed action that may affect listed species or critical habitat in a manner not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered during this consultation, or (3) new species are listed or critical habitat designated that might be affected by the proposed action.

Thank you for the opportunity to comment on this action. If you have any questions, please contact Allen Robison of my staff at 615/528-6481.

Sincerely,

Lee A. Barclay, Ph.D.
Field Supervisor

APPENDIX C

Potential Health Effects of Uranium Hexafluoride

Potential Health Effects of Uranium Hexafluoride

The adverse health effects associated with exposure to the resultant products of UF_6, primarily uranium and hydrogen fluoride, are generally related as chemical toxicity to organ systems (McGuire, 1991). The effects of the fluoride ions can be ignored because the primary risk to human health is from the uranium and hydrogen fluoride.

The major toxic effect of soluble uranium and uranium compounds is kidney damage. Exposure to high doses of uranium via ingestion or inhalation leads to kidney dysfunction, as indicated by the inability of the kidney to re-absorb urinary proteins, glucose, and other metabolic products. In addition, blood vasculature effects, such as increased capillary permeability, blood pressure, and edema may occur. Also, central nervous system effects, similar to those from poisoning by other heavy metals, may occur. The NRC regulations limit acute intake of soluble uranium by workers on a weekly basis to 9.6 mg [based on the threshold limit value of 0.2 mg/m^3 inhaled for 40 hours at a breathing rate of 1.2 m^3/hour (hr)].

Hydrogen fluoride is an extreme irritant to any part of the body that it contacts. Dermal exposures to both gaseous and liquid forms cause mild to severe chemical burns that heal poorly and may lead to gangrene. Inhalation of large amounts of hydrogen fluoride causes upper respiratory tract irritation, with prolonged exposures leading to hemorrhagic pulmonary edema and eventually death. The National Institute for Occupational Safety and Health designates a limit of 25 mg HF/m^3 air as immediately dangerous to life or health.

Under normal operation conditions in the UF_6 cylinder yards, exposure to UF_6 products by workers at concentrations exceeding those discussed above is not expected. However, situations that may lead to exposure may occur as a result of an accident, as discussed in Section 4.2.13. In addition, because the cylinder yards are not accessible by the general public, the potential for exposure to the general public is eliminated.

During refurbishment of the UF_6 cylinder yards and construction of the proposed C-745-T Yard, exposure to chemical contaminants in soil by workers or public is not expected because these sites are not considered to be contaminated. However, if chemical contaminants are found, occupational exposure would not be expected because appropriate health and safety policies and procedures are currently in place at the

PGDP to limit such exposure. Further, sufficient off-site migration of contaminants via particulates in air would not be expected because standard construction-related controls would be followed to limit particulate emissions; therefore, the potential for exposure to the general public would be mitigated. Also, because alternate sites 1, 2, and 3 are also considered not to be contaminated, the lack of potential impacts to worker health or the public would be the same as previously discussed for the proposed C-745-T Yard.

Uranium can induce cancer as a result of intake into the body through inhalation or ingestion pathways. The induction of cancer results when organs and tissues of the body are exposed to alpha particles emitted from decaying uranium atoms. Alpha particles are energetic emissions that cause molecular ionization in a very dense pattern along a short path through matter. It is this ionization which causes biological damage believed to be responsible for inducing cells to become cancerous.

The most probable radiogenic effect is an increase in bone sarcomas. Chronic inhalation of insoluble uranium has also been shown to lead to fibrosis of lung tissue and induction of malignant lung tumors. However, the chemical toxicity of uranium outweighs the radiocarcinogenicity of uranium, especially when natural or depleted uranium is the contaminant.

Under normal operations in the UF_6 cylinder yards, adverse effects to worker health is not likely. As previously mentioned, the dose rates for cylinder yard workers is between 50 to 80 mrem/yr. These levels are well below the DOE limit of 5,000 mrem/yr total body dose for radiation workers. In addition, there would be no adverse health impacts to the general public because the cylinder yards are not accessible to the public. Although exposure rates at the plant perimeter, typically in the area of UF_6 cylinder yards, have been found to be somewhat higher than background rates, these areas are not accessible and, therefore, present no exposure risk to the public.

During refurbishment of the UF_6 cylinder yards and construction at the proposed site, exposure to radioactive contaminants in soil by workers or the public is not a concern for the sites because these sites are not considered to be contaminated. However, if radioactive contaminants are found, occupational exposures to workers would be monitored so the following annual limits are not exceeded: a total effective dose equivalent of 5 rem; a lens of the eye dose equivalent of 15 rem; and a shallow dose equivalent of 50 rem to the skin or any extremity (10 C.F.R. 835). Assuming that it

would require four workers five years to relocate the UF_6 cylinders during the refurbishment project, each worker would receive an annual dose up to 150 mrem/yr (Meiners, 1995). This is slightly higher than the 50 to 80 mrem/yr a cylinder yard worker currently receives, but is still well within regulatory and administrative limits. Further, sufficient off-site migration of contaminants via particulates in air would not be expected because standard construction-related controls would be followed to limit particulate emissions. Therefore, the potential for exposure to the general public would be mitigated. Also, because alternate sites 1, 2, and 3 are also considered not to be contaminated, the lack of potential impacts to worker health or the public would apply as previously discussed above for the proposed C-745-T Yard.

APPENDIX D

Public Comments and Responses

COF II, CI 96 000832

Carlos Alverado, US DOE
PO Box 1410, Paducah, KY 4200-1410
Dennis Hill, Lockheed Martin
761 Veterans Ave.
Kevil, KY 42053

February 27, 1996

Dear Mr. Alverado & Hill,

These are the comments of the undersigned on the January 1996 Draft EA for refurbishment of the UF6 cylinder storage yards and construction of a new cylinder yard at the PGDP.

First, an EA is prepared to determine if an agency action will or will not have a significant effect on the human environment. In making this determination, the agency must consider certain factors.[1]

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[1] 1508.27 Significantly.

"Significantly, as used in NEPA, requires considerations of both context and intensity:

(a) Context. This means that the significance of an action must be analyzed in several contexts such as society as a Whole (human, national), the affected region, the affected interests and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short and long term effects are relevant.

(b) Intensity. This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:

(1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.

(2) The degree to which the proposed action affects public health or safety.

(3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, Prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

(4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.

(5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

(6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

(7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming

As can be seen by this regulation, the agency has a duty to look at the cumulative effects of this proposal with others which may be in some way be related to the proposal. This is where the plant needs to improve its NEPA compliance. It appears to the commentors that the entire range of activities currently being planned at PGDP, which are listed in the Site Management Plan, if not elsewhere, should be considered in the determination of significance of the activities at PGDP. It seems clear that if the cumulative effects are considered of all the proposals[2], the plant should have to prepare a full blown EIS on all of its proposed activities. Segmenting the cleanup, refurbishment, and operations activities into separate componenets to avoid addressing the significance of the cumulative effects appears to violate NEPA.

In regards to the cylinders, the commentors first wish to make sure that the two reports concerning the integrity of the cylinders, (1) the May 5, 1995 report of the Defense Nuclear Facilities Safety Board entitled "Integrity of Uranium Hexafluoride cylinders", and (2) the March 25, 1992 DOE report of the Independent UF6 Cylinder Assessment Team, become part of the record. There was testimony from a Mr. Hoffman, a member of the DOE independent cylinder assessment team at the scoping hearing on the EIS being prepared by DOE on what to do with the cylinders that the PGDP was not considering these reports, and that there were concerns about the integrity of the cylinders which were not being properly addressed. Therefore, it is important that these documents become part of the official record. Commentors are requesting that the DOE place copies of this document on the record.

As to the actual project of moving the cylinders and refurbishing the cylinders, commentors see some problems. The most serious problem is from the actual physical strain to the cylinders from lifting them and moving them. If the DOE is not considering all relevant information concerning the cylinders, then its conclusions concerning the potential impact from moving the cylinders cannot be trusted. We feel the potential for cylinder failure during movement is much greater than is being disclosed in the EA. How would future leaks affect air and water quality when added to all the past and present emissions of radionuclides and hazardous materials from the plant?

Also, we are concerned about the DOE concreting over contamination, leaving it to further contaminate an already seriously contaminated aquifer. The EA admits that contamination will have to be remedied before the new yards can be created, but the explanation of the contamination and the remediation of such contamination is incomplete

This all relates to the cumulative effects analysis. The agency has a duty to look at the effects of all of related actions "in combination". (see, for example, Sept. 25, 1995 opinion, Sierra Club & RACE vs. USDA, slip op, S.D. IL) This is also relevant to the statement in the EA that the "trees and shrubs" in the area of the new yard might be

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an action temporary or by breaking it down into small component parts.

(8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

(9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

(10) Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

[43 FR 56003, Nov. 29, 1978; 44 FR 874, Jan. 3, 19791

CEQ 40? NEPA FSH

2 Some Courts have determined that the agency must look past proposals to even look at "contemplations" when determining the significance of a proposed action. (see for example, Fritiosen vs. Alexander)

contaminated so bad that they would have to be stored on site. How can this even be possible if there has been no significant releases and the PGDP is being operated so safely that noone should worry? The public has a right to know the cumulative effects of all past, present, and reasonably foreseeable future actions related to radiation releases at the PGDP.

Why isn't the DOE going to reinforce the concrete pads it is building for the new cylinder yards? Surely DOE doesn't forget that we are in a severe earthquake zone? An unreinforced concrete pad will not hold up when it is needed during a significant seismic event. The result will be that at the time when the concrete pad is most needed to remain together, it will probably crack and rumble due to being non-reinforced.

Based on the above, commentors cannot support a Finding of No Significant Impact (FONSI) for the proposal. There should be a full blown EIS which discusses and discloses the cumulative effects of all of the actions and proposals at the plant. Commentors request to remain on the mailing list to receive any FONSIs, or decision documents which relate to this proposals. Thank you for considering these comments.

Sincerely,

Mark Donham
Kristi Hanson
Kristi Hanson
RR # 1
Brookport, IL 62910

Department of Energy
Oak Ridge Operations
Paducah Site Office
P.O. Box 1410
Paducah, KY 42001

June 13, 1996

Mr. Mark Donham
Ms. Kristi Hanson
Rural Route 1
Brookport, Illinois 62910

PROPOSED REFURBISHMENT AND CONSTRUCTION OF URANIUM HEXAFLUORIDE (UF_6) STORAGE YARDS AT THE PADUCAH GASEOUS DIFFUSION PLANT (PGDP), PADUCAH, KENTUCKY, ENVIRONMENTAL ASSESSMENT (EA) PUBLIC COMMENT REVIEW

Dear Mr. Donham and Ms. Hanson:

The Department of Energy (DOE) appreciates your comments dated February 27, 1996, concerning the draft *Environmental Assessment for the Refurbishment and Construction of Uranium Hexafluoride Cylinder Storage Yards at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*. Responses to your comments are enclosed. In order to address your comments as specifically as possible, our responses were prepared to coincide with the paragraphs of your correspondence.

DOE has reviewed your general comments regarding the adequacy of this EA to meet DOE's responsibilities under the National Environmental Policy Act (NEPA). All federal agencies are required to develop policy and procedures to ensure compliance with NEPA. DOE has promulgated NEPA compliance procedures and this EA has been prepared in accordance with established policy and procedure. This document meets the intent of the NEPA process; it was written to fulfill the requirements for an EA which are different from those for an Environmental Impact Statement (EIS). DOE has met the applicable requirements of the "Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act" (40 CFR § 1500 - 1508) and the DOE "National Environmental Policy Act Implementing Procedures" (10 CFR Part 1021). The EA reflects DOE's approach to analysis as discussed in "Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements" DOE Office of NEPA Oversight, May 1993.

If you would like further information on the DOE NEPA process, please contact:

Ms. Patricia W. Phillips, NEPA Compliance Officer
Department of Energy, Oak Ridge Operations Office
P. O. Box 2001
Oak Ridge, Tennessee 37831
Phone (423) 576-4200

Again, DOE appreciates your comments. We hope that our responses address your concerns with the EA. If you have any questions or require additional information, please call Carlos R. Alvarado at (502) 441-6804.

Sincerely,

Jimmie C Hodges

Jimmie C. Hodges, Site Manager
Paducah Site Office

EF-22:Alvarado

Enclosure

cc: J. Elmore, SE-311
P. Phillips, SE-311

COMMENTS ON THE DRAFT ENVIRONMENTAL ASSESSMENT FOR REFURBISHMENT AND CONSTRUCTION OF URANIUM HEXAFLUORIDE CYLINDER YARDS AT THE PADUCAH GASEOUS DIFFUSION PLANT PADUCAH, KENTUCKY

Paragraph 1:

Thank you for taking the time to comment on the Environmental Assessment (EA). Without public input we cannot ensure that public interests are represented accurately.

Paragraph 2:

No response necessary.

Paragraph 3:

The Department of Energy (DOE) agrees that "segmenting" actions to circumvent a finding of significant cumulative impacts is unacceptable. The cumulative impacts analysis in this EA considered three reasonably foreseeable actions that may impact the environment collectively with impacts of the proposed action (see Section 4.4). The emissions, effluents and wastes from other proposed projects were evaluated in combination with the timing and environmental consequences of the proposed action. All activities at the Paducah Gaseous Diffusion Plant (PGDP) will not occur coincidentally with the proposed action, nor will they affect the same environmental resources. Therefore, considering them in an cumulative impacts analysis would be inappropriate.

Paragraph 4:

On May 5, 1995, the Honorable John T. Conway, Chairman of the Defense Nuclear Facilities Safety Board (DNFSB), supplied the DOE with Recommendation 95-1 concerning improved safety of cylinders containing depleted uranium. Recommendation 95-1 was published in the *Federal Register* May 15, 1995, Vol. 60, No. 93, page 25893. This Recommendation is referenced in the draft EA as "*Conway, 1995*". The response to Recommendation 95-1, was published in the *Federal Register* July 18, 1995, Vol. 60, No. 137, page 36789. The supporting technical document for Recommendation 95-1, is the *Integrity of Uranium Hexafluoride Cylinders*, April 27, 1995. Both documents are currently part of the record and are on file in the Paducah Document Management Center located in the Lockheed Martin offices in Kevil, Kentucky. Recommendation 95-1 and DOE's response will be referenced by their respective *Federal Register* publication dates in the final EA.

Paragraph 5:

The EA states that cylinder failure and the resultant release of solid uranium hexafluoride (UF_6) is an anticipated event. This determination is based on the *Basis of Interim Operation for the UF_6 Cylinder Storage Yards Paducah Gaseous Diffusion Plant* (BIO) (MMES, 1995b in the EA). The EA analysis reports the effects of a cylinder failing in such a way that the entire contents, [12,700 kilograms (28,000 pounds or 14 tons) of UF_6 enriched to 1.9% uranium-235], are released and react with moisture in the air. This accident scenario resulted in a "low consequences" determination. Actual effects would be even lower because depleted UF^6 is below 1% ^{235}U in assay and it is very unlikely that the entire contents of a cylinder would ever fall onto the ground. Cylinders would be moved with specialized equipment created specifically for this job. While the possibility of an accident similar to that described above is real, DOE has analyzed the likelihood and consequences, anticipated the occurrence and implemented actions to reduce the potential for such an event and deal with the resulting consequences of a cylinder breach. Analysis shows that the consequences are very low for workers and even lower for the general public because of the distance to off site receptors.

Paragraph 6

Site characterization has been completed since the draft EA was issued and there is no contamination in the area proposed for construction. Consequently, there would be no contamination covered with concrete or require disposition. The final EA will be revised to reflect this.

Paragraph 7:

In the draft EA, a worst-case analysis was used because site characterization was incomplete. Now that it is known that no contamination exists, all references to possible contamination of the area will be removed from the document.

Paragraph 8:

Reinforced or unreinforced concrete will likely crack during a severe seismic event. Even without cracking, severe shaking may result in cylinders falling to the ground. Consequently, cylinder failure is of greater concern during an earthquake than failure of the foundation of the cylinders are on. The BIO evaluated the likelihood of cylinder failure during an earthquake and the analysis determined that a 0.25g earthquake (i.e., 6.0 to 6.9 on the Richter scale depending on geology) would not result in any cylinder failures.

Paragraph 9:

The purpose of this EA is to determine direct and indirect effects of the proposed action and cumulative effects of past, present, and reasonably foreseeable actions in conjunction with the proposed action. The proposed action is an interim action for the long-term management of depleted UF_6 cylinders, and would be considered as no action in the Programmatic Environmental Impact Statement (PEIS). This action would be considered as no action in the PEIS because once the cylinders are relocated, no difference in the day-to-day operations of the plant would occur as a result of implementing the proposed action. This action is being proposed to reduce the likelihood of a cylinder breach via corrosion during completion of the PEIS. If the strategy selection of the PEIS determines a change in the management of depleted UF_6 cylinders at the PGDP, subsequent NEPA documentation (i.e., EA or EIS) will be completed at that time.