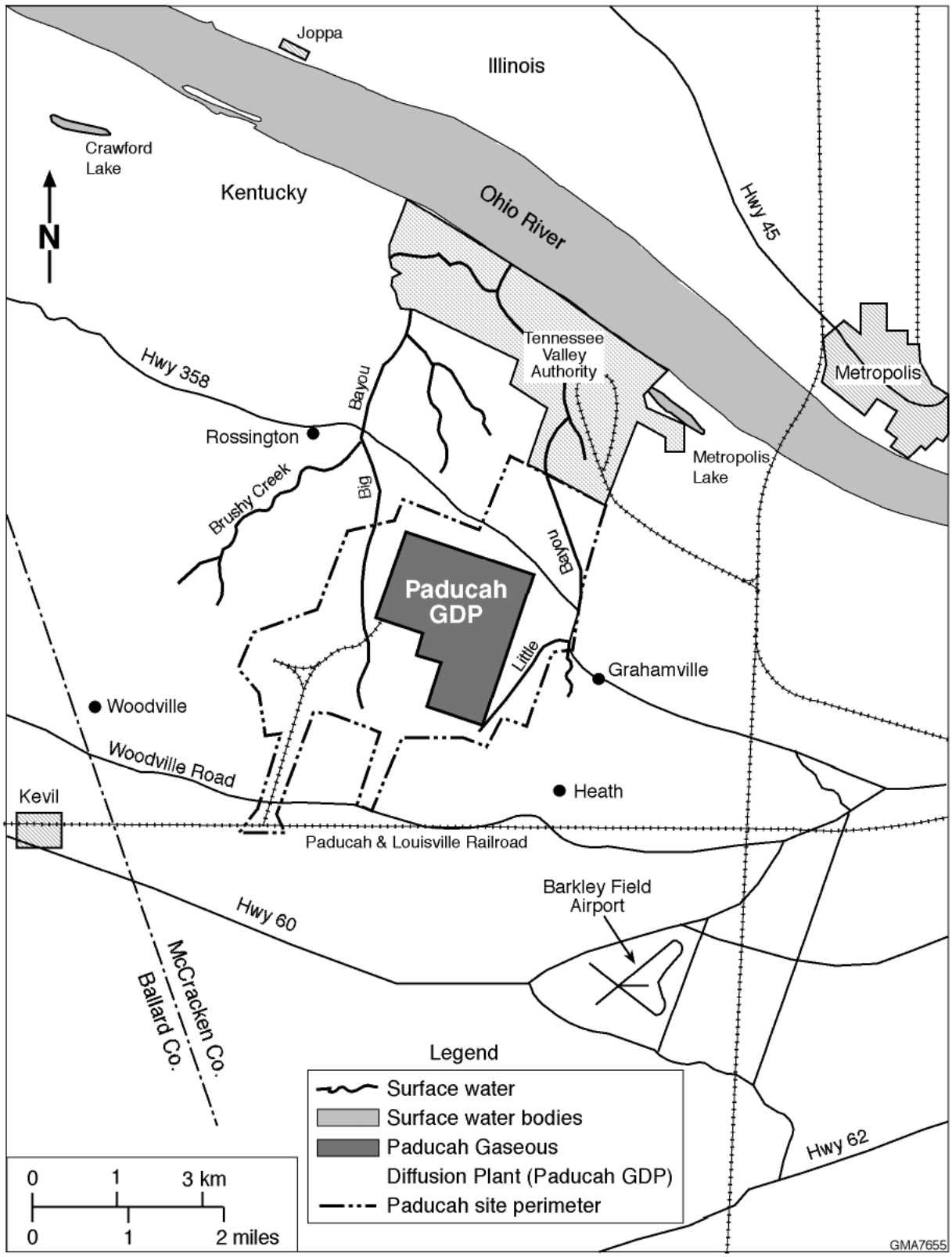

FIGURE S-1 Regional Map of the Paducah, Kentucky, Site Vicinity

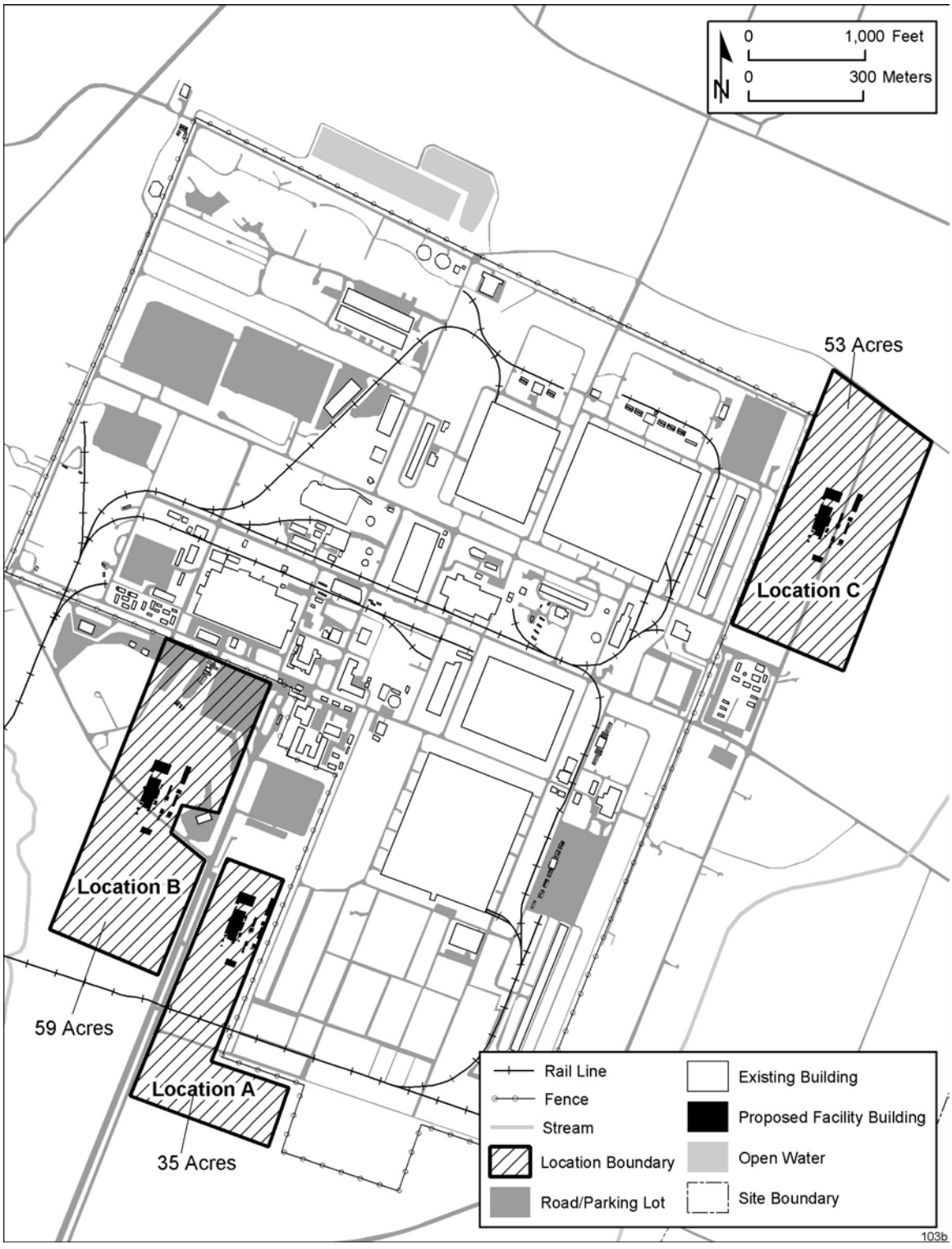

FIGURE S-3 Three Alternative Conversion Facility Locations within the Paducah Site, with Location A Being the Preferred Alternative (A representative conversion facility footprint is shown within each location.)

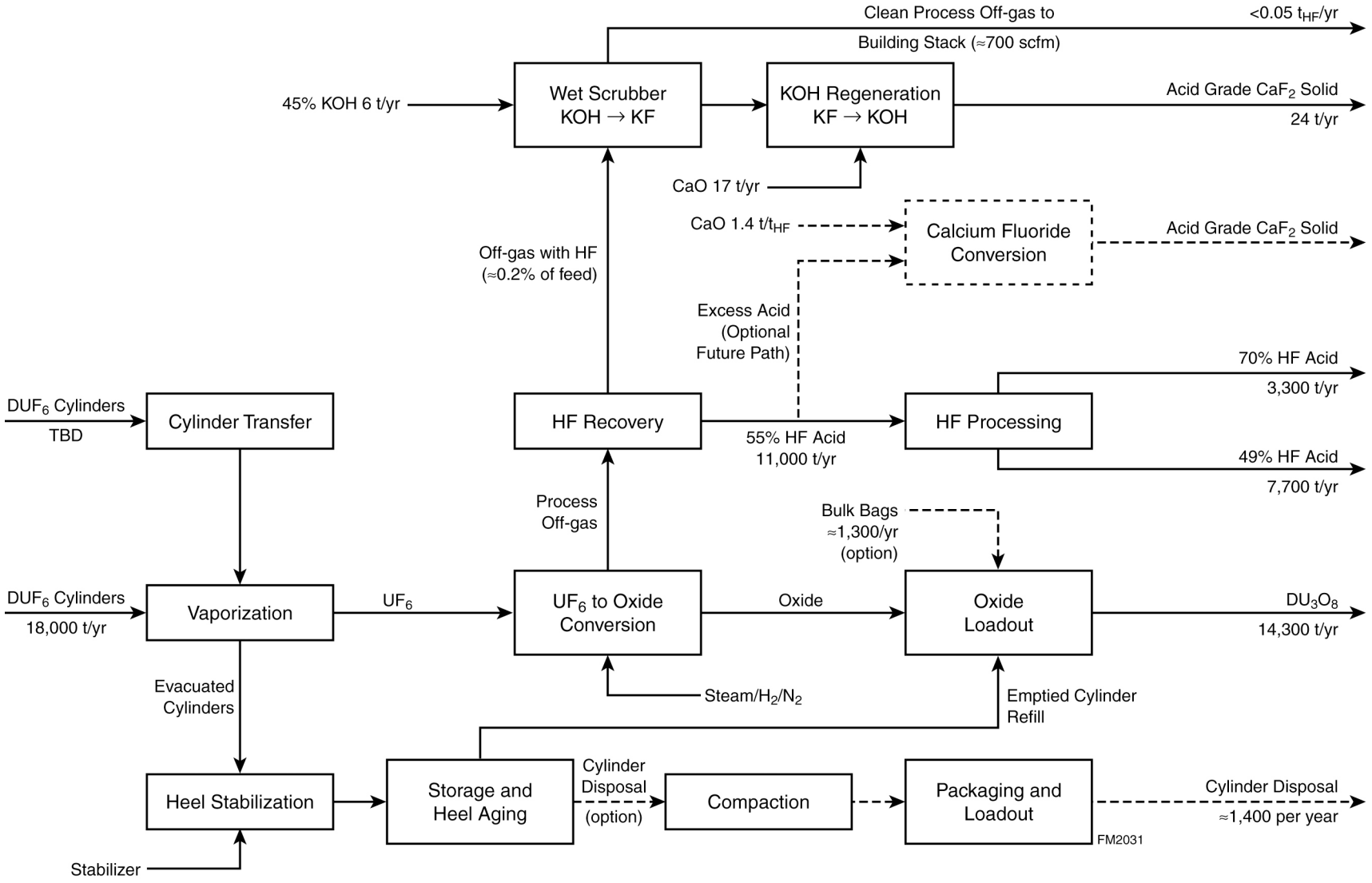

FIGURE S-4 Conceptual Overall Material Flow Diagram for the Paducah Conversion Facility

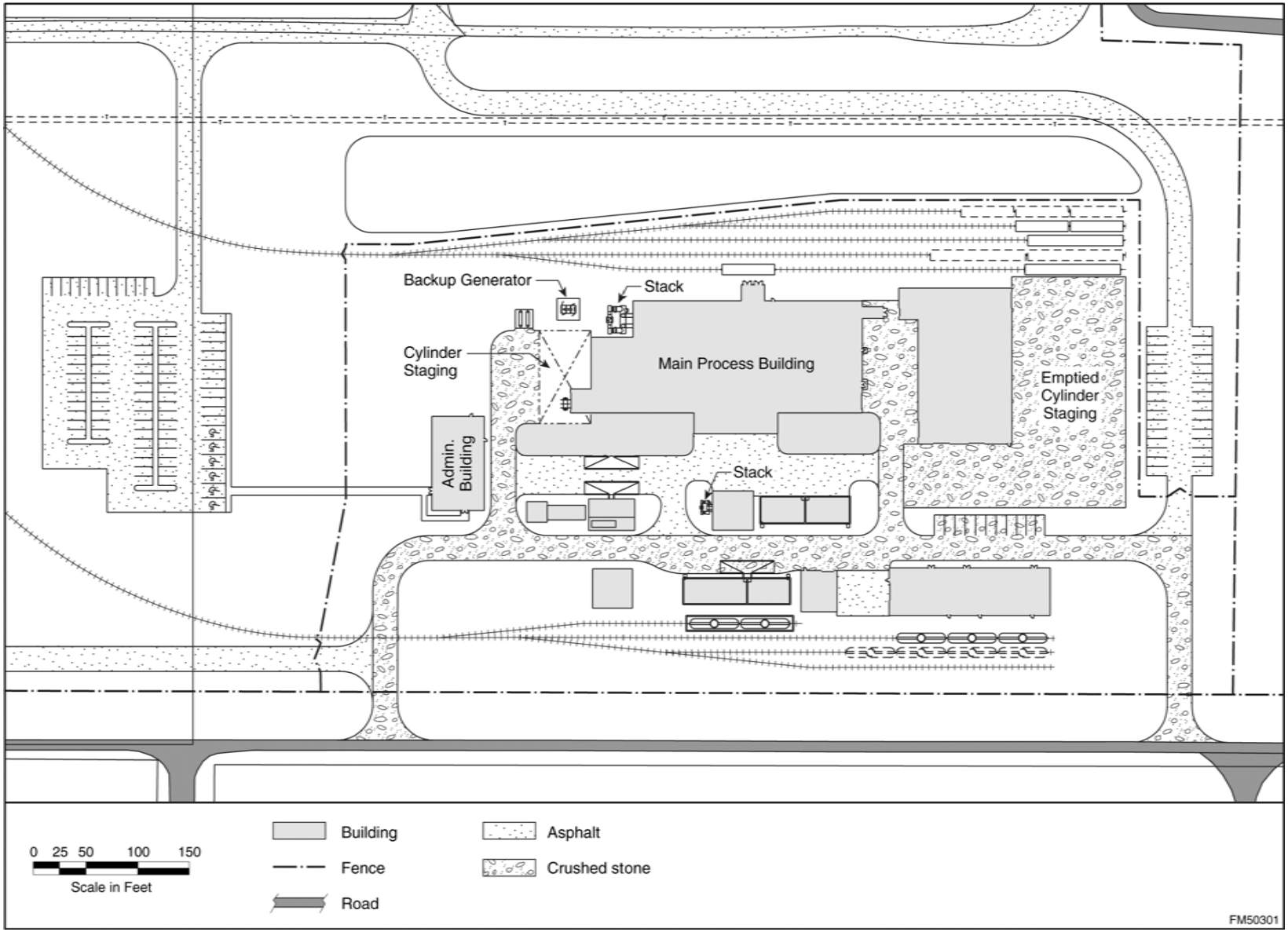

FIGURE S-5 Conceptual Conversion Facility Site Layout for Paducah

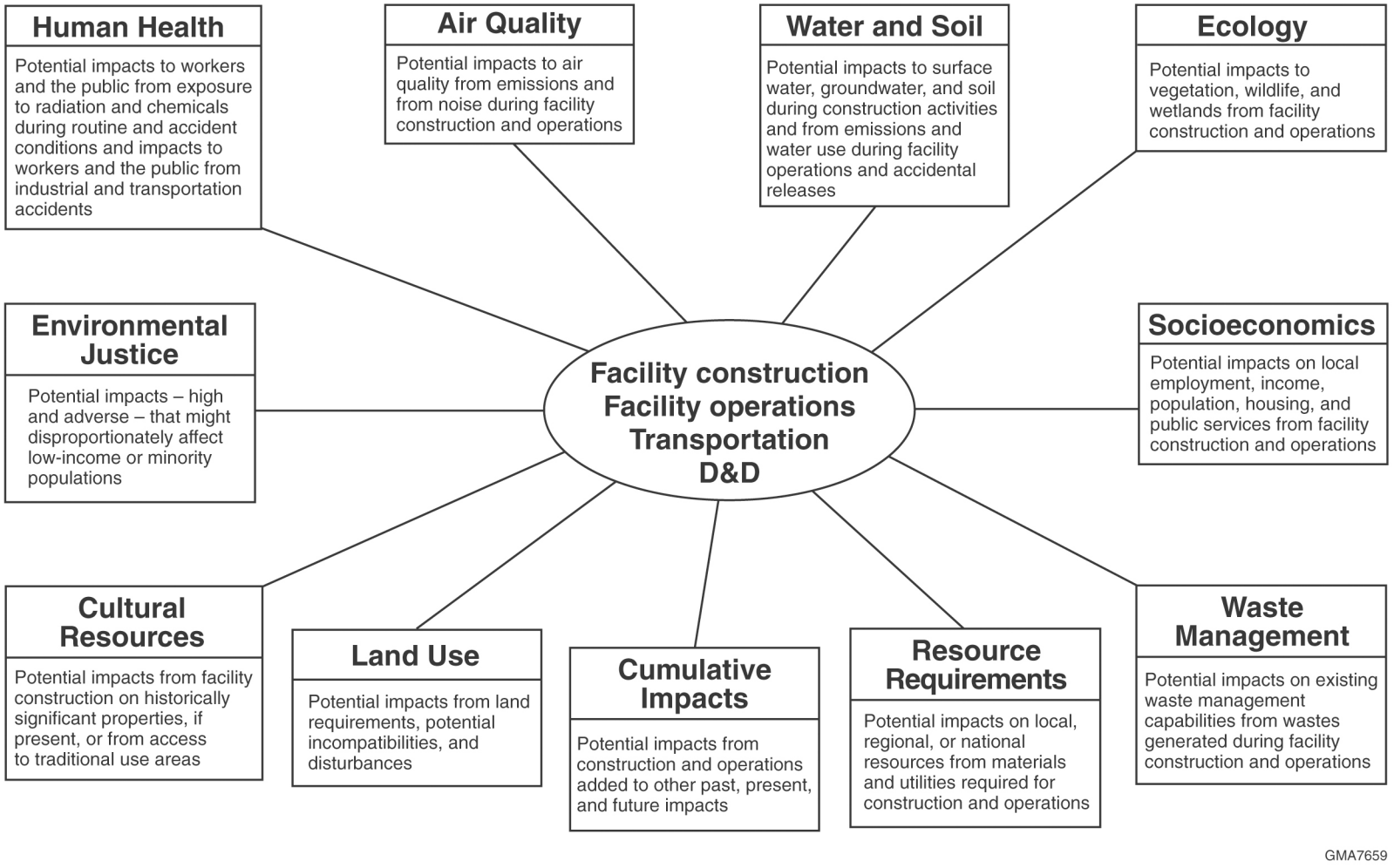

FIGURE S-6 Areas of Potential Impact Evaluated for Each Alternative

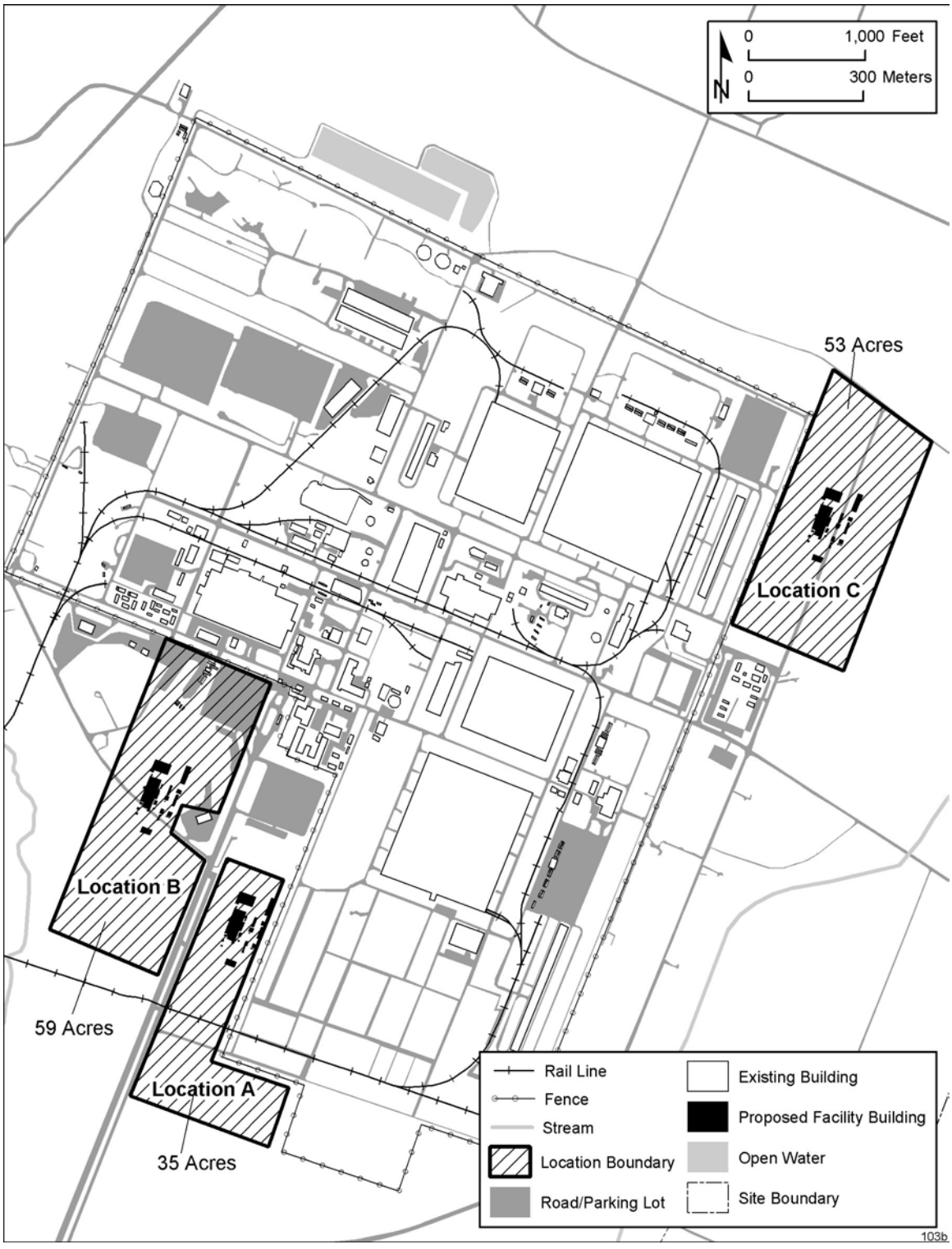

FIGURE 2.2-1 Three Alternative Conversion Facility Locations within the Paducah Site, with Location A Being the Preferred Alternative (A representative conversion facility footprint is shown within each location.)

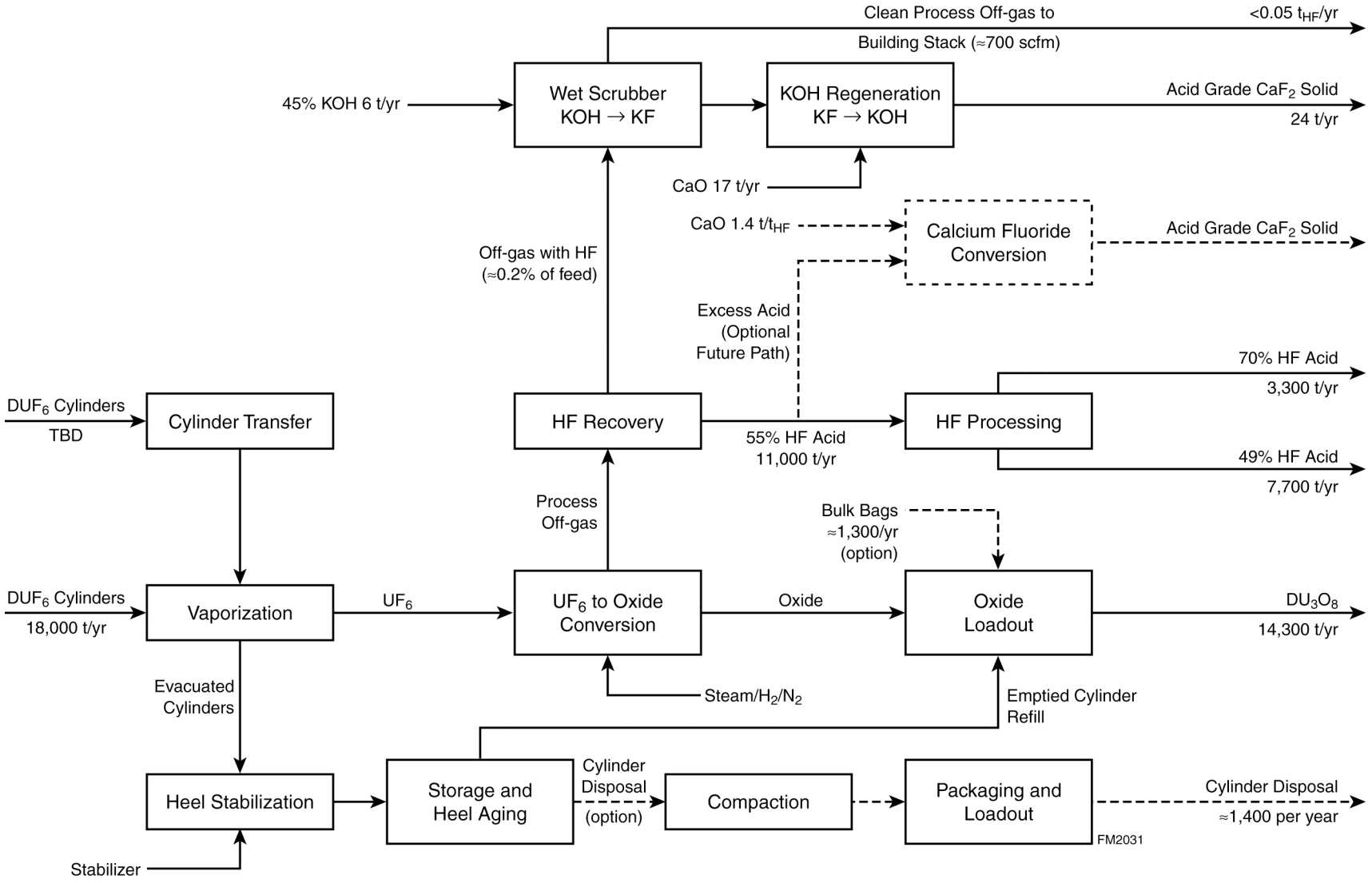

FIGURE 2.2-2 Conceptual Overall Material Flow Diagram for the Paducah Conversion Facility (Source: UDS 2003b)

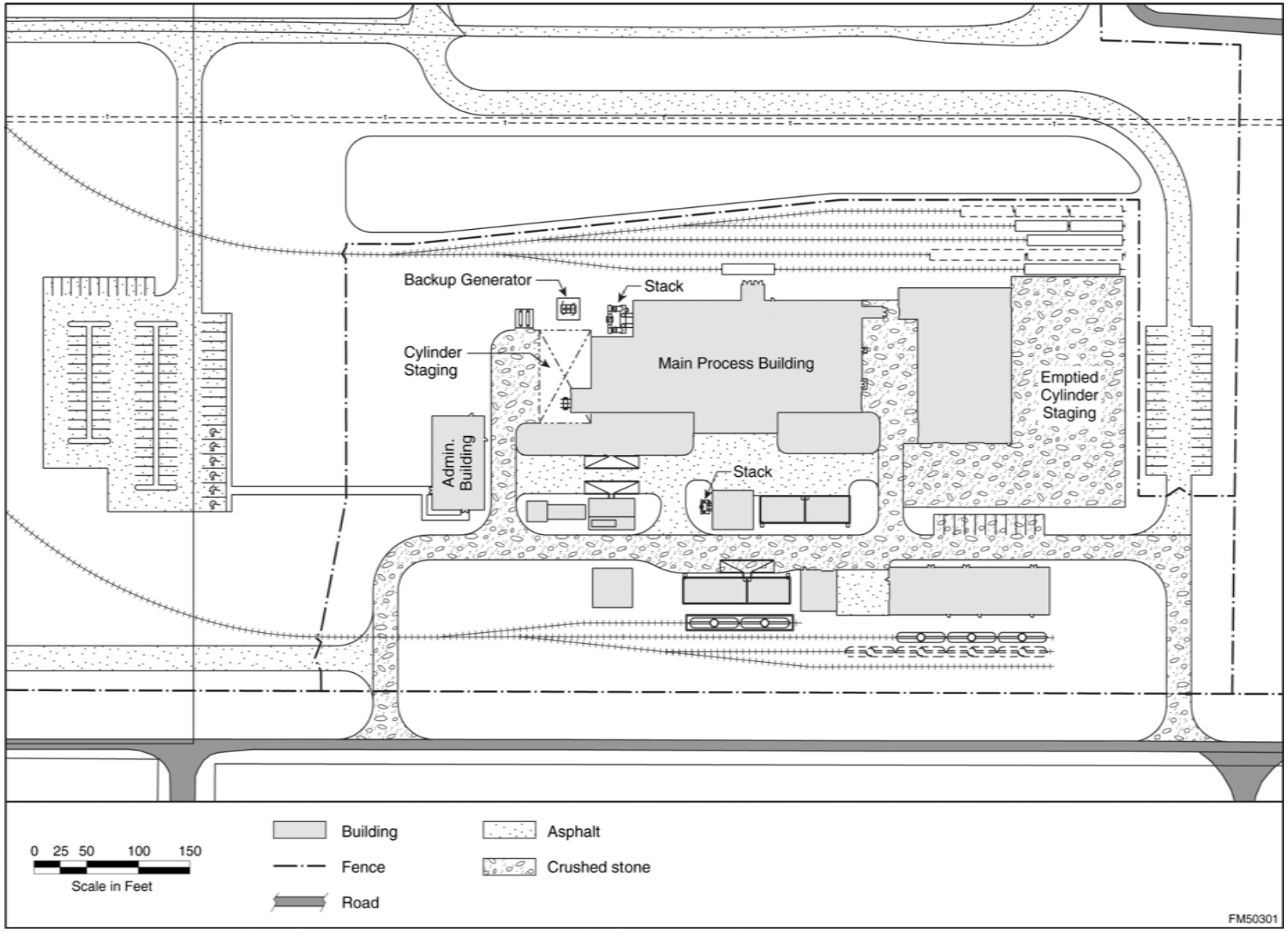

FIGURE 2.2-3 Conceptual Conversion Facility Site Layout for Paducah

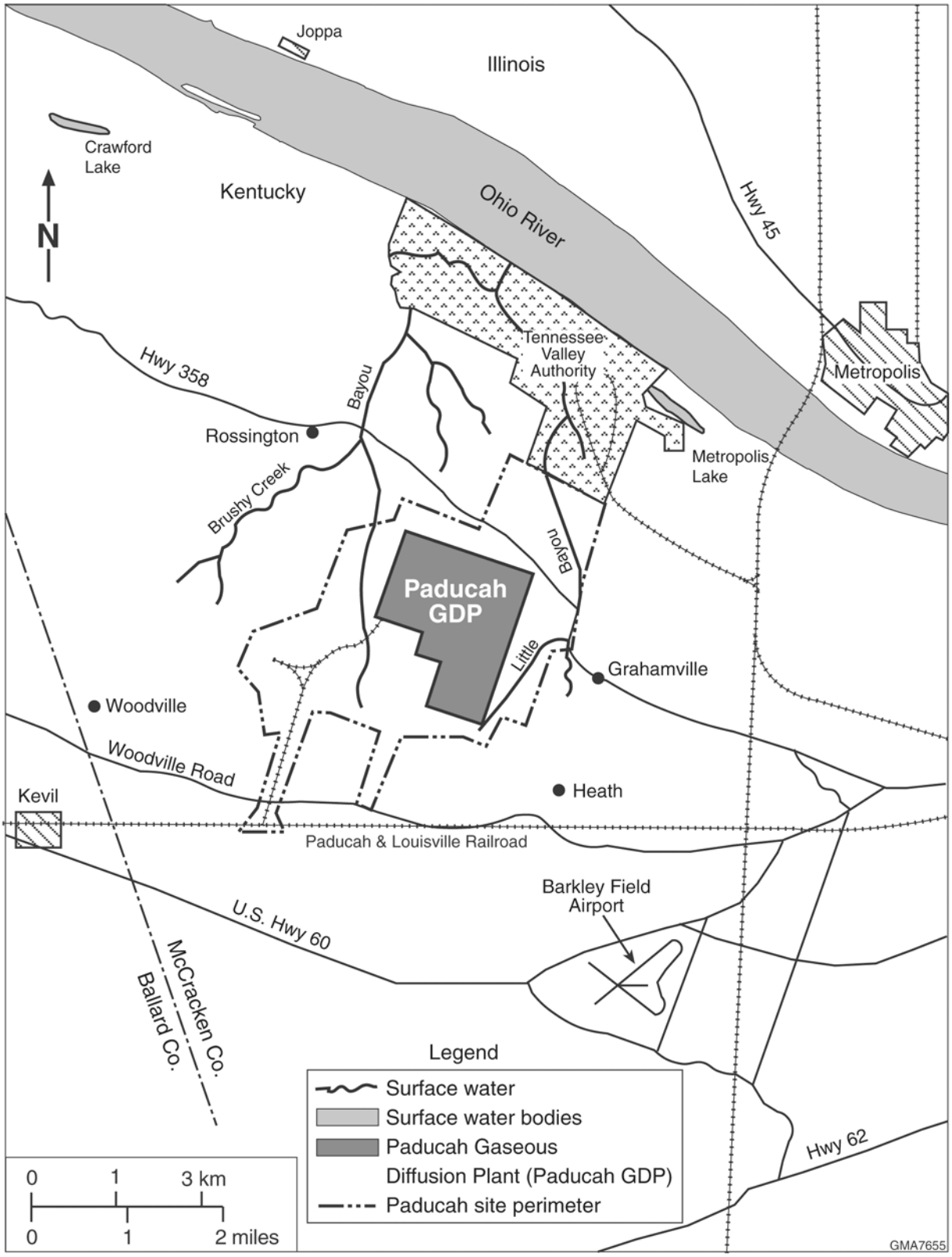

FIGURE 3.1-1 Regional Map of the Paducah Site Vicinity (Source: Adapted from LMES 1996a)

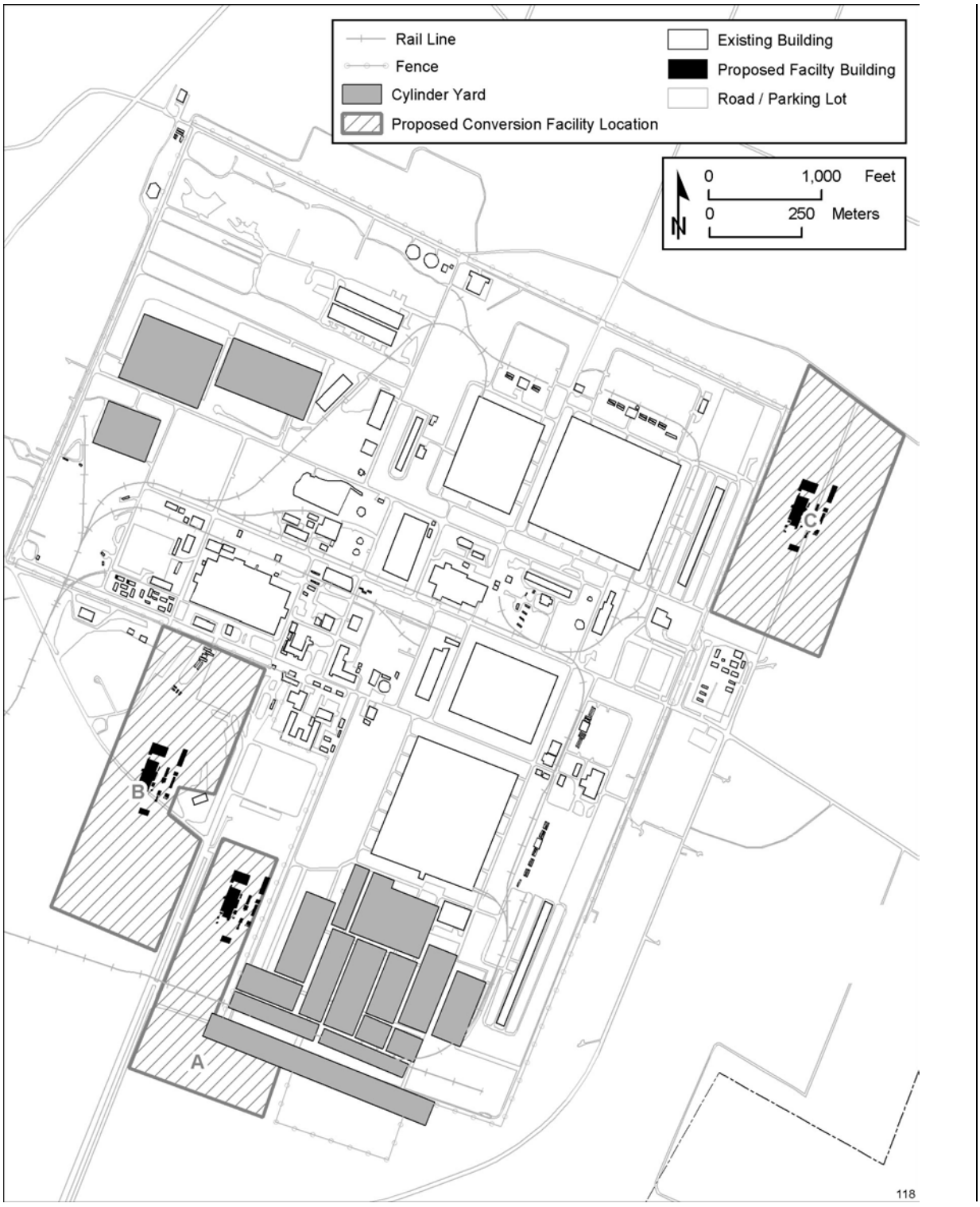

FIGURE 3.1-2 Locations of Cylinder Yards at the Paducah Site That Are Used to Store DOE-Managed Cylinders (Source: Adapted from DOE 1999a)

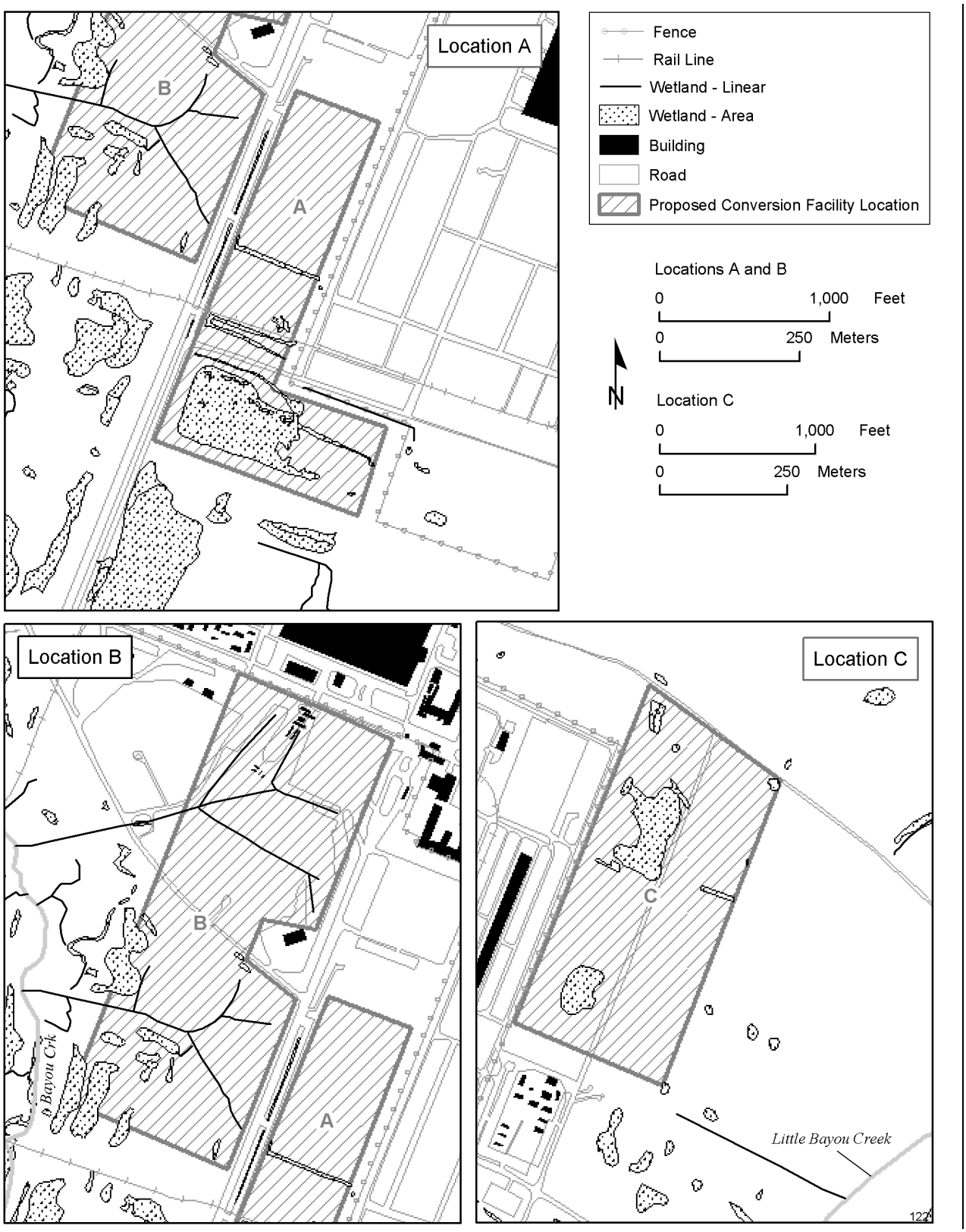

FIGURE 3.1-4 Wetlands in the Vicinity of the Three Candidate Locations for the Paducah Conversion Facility

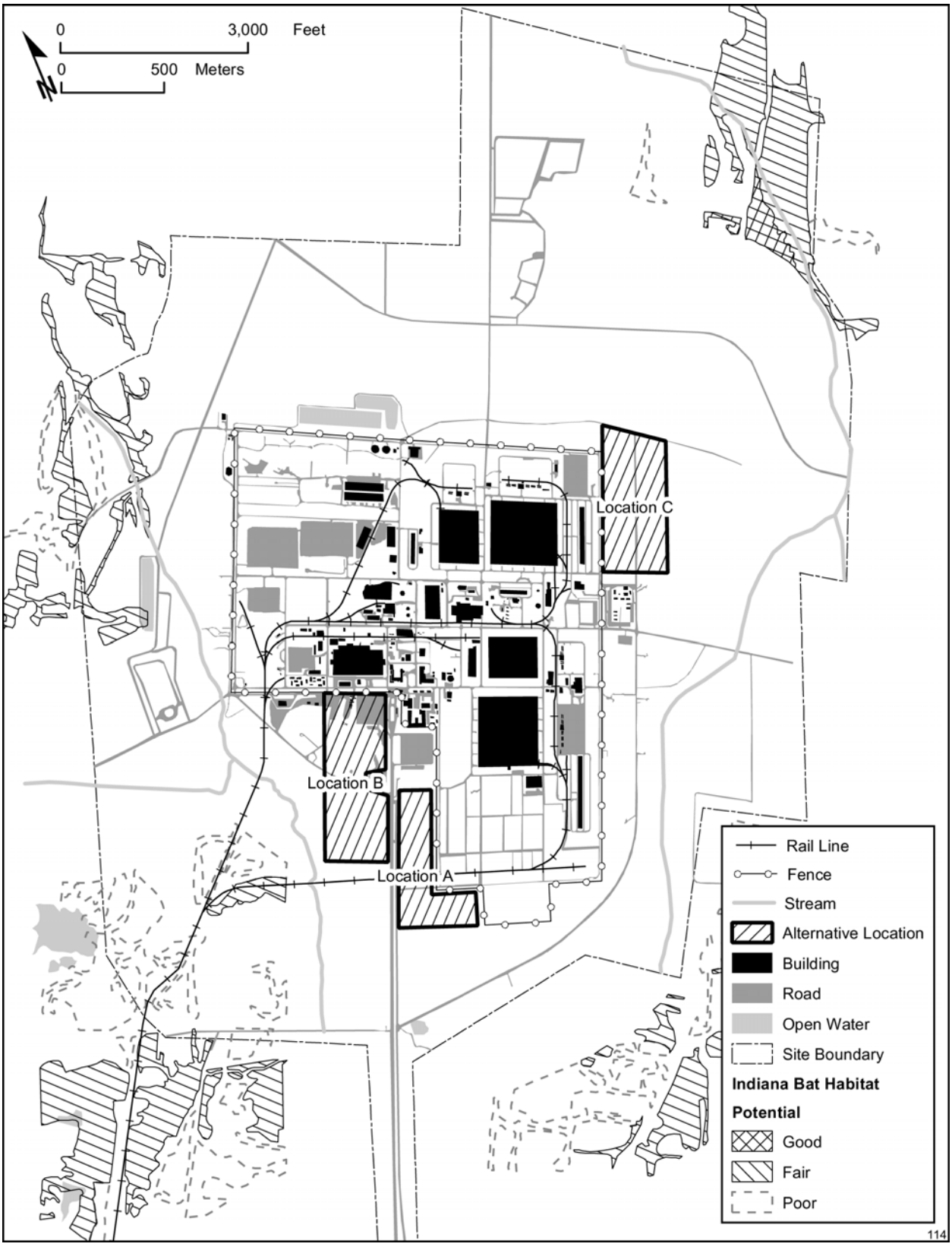

FIGURE 3.1-5 Areas of Potential Indiana Bat Habitat at the Paducah Site

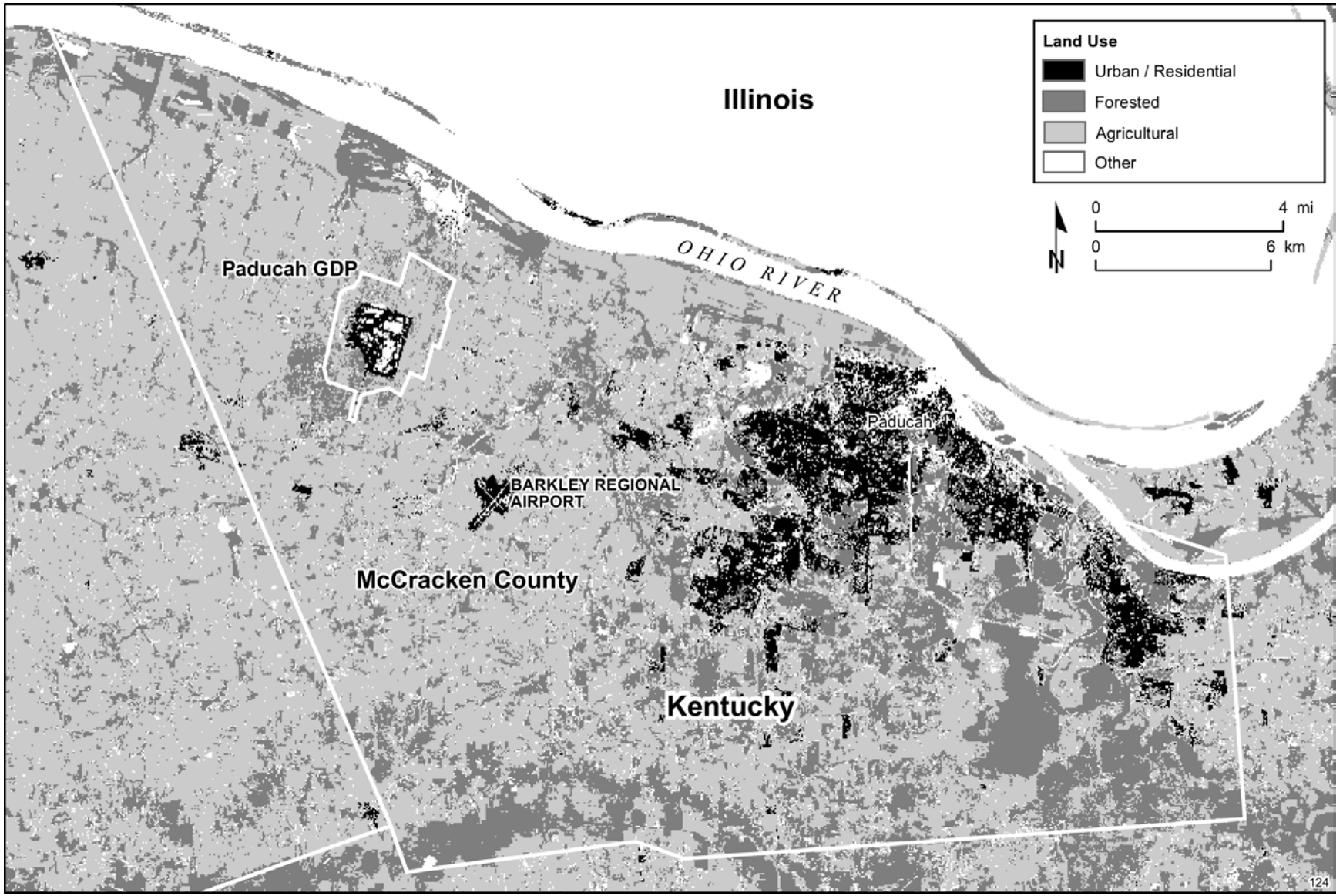

FIGURE 3.1-6 Land Cover in McCracken County, Kentucky (Data Source: USGS 2002)

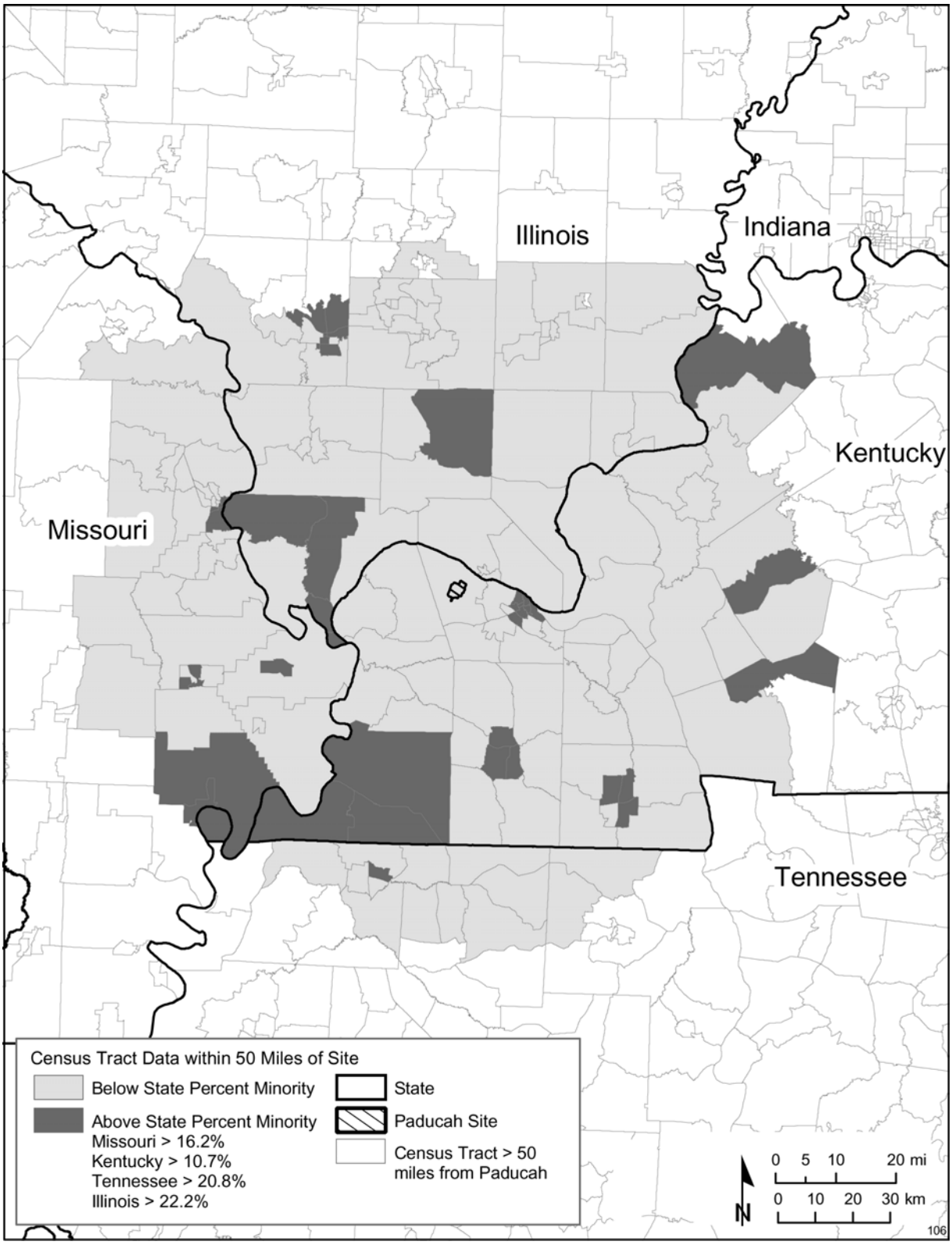

FIGURE 3.1-7 Census Tracts within 50 mi (80 km) of the Conversion Facility at the Paducah Site with Minority Populations in Excess of State-Specific Thresholds (Source: Based on data from U.S. Bureau of the Census 2002c)

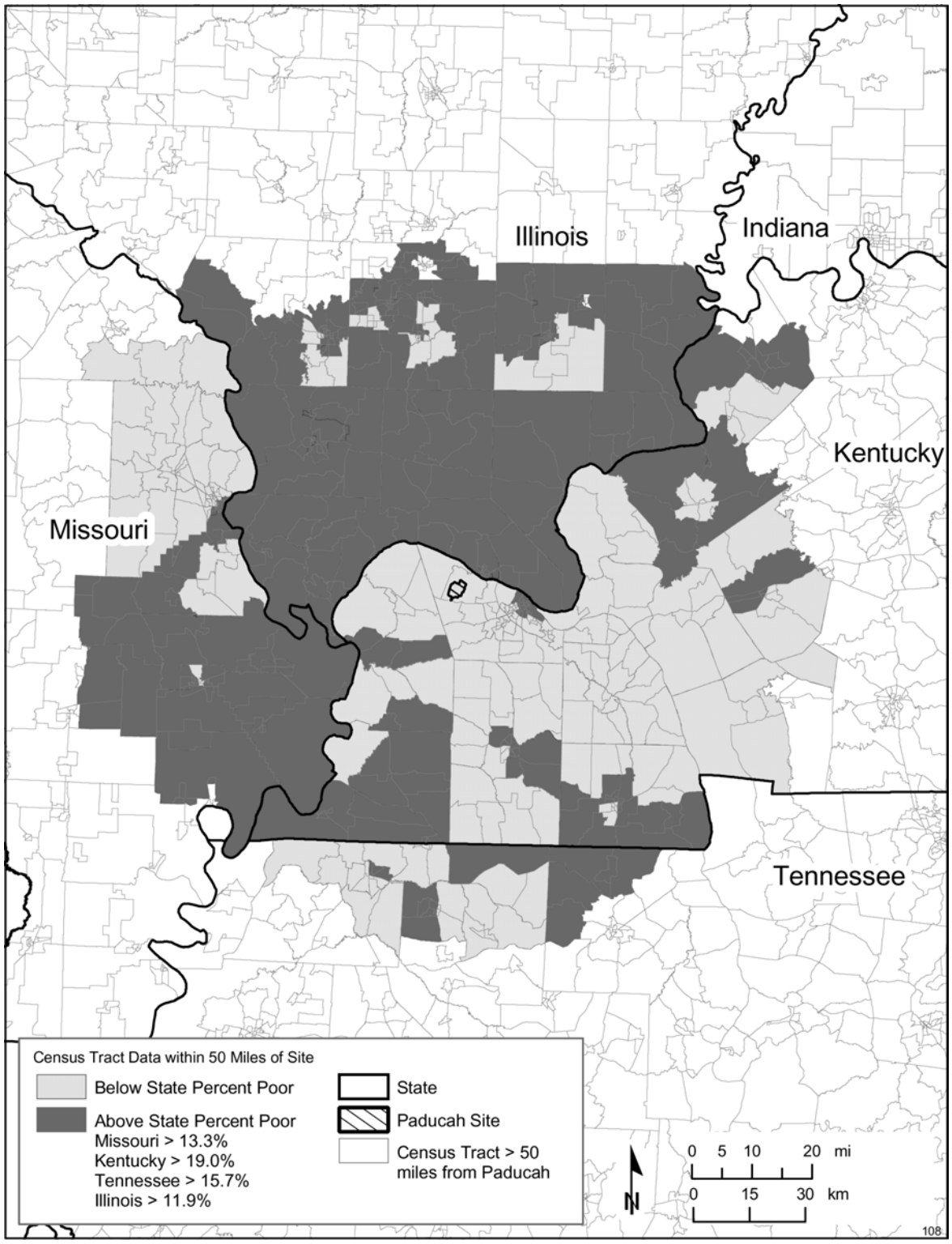

FIGURE 3.1-8 Census Tracts within 50 mi (80 km) of the Conversion Facility at the Paducah Site with Low-Income Populations in Excess of State-Specific Thresholds (Source: Based on data from U.S. Bureau of the Census 2002c)

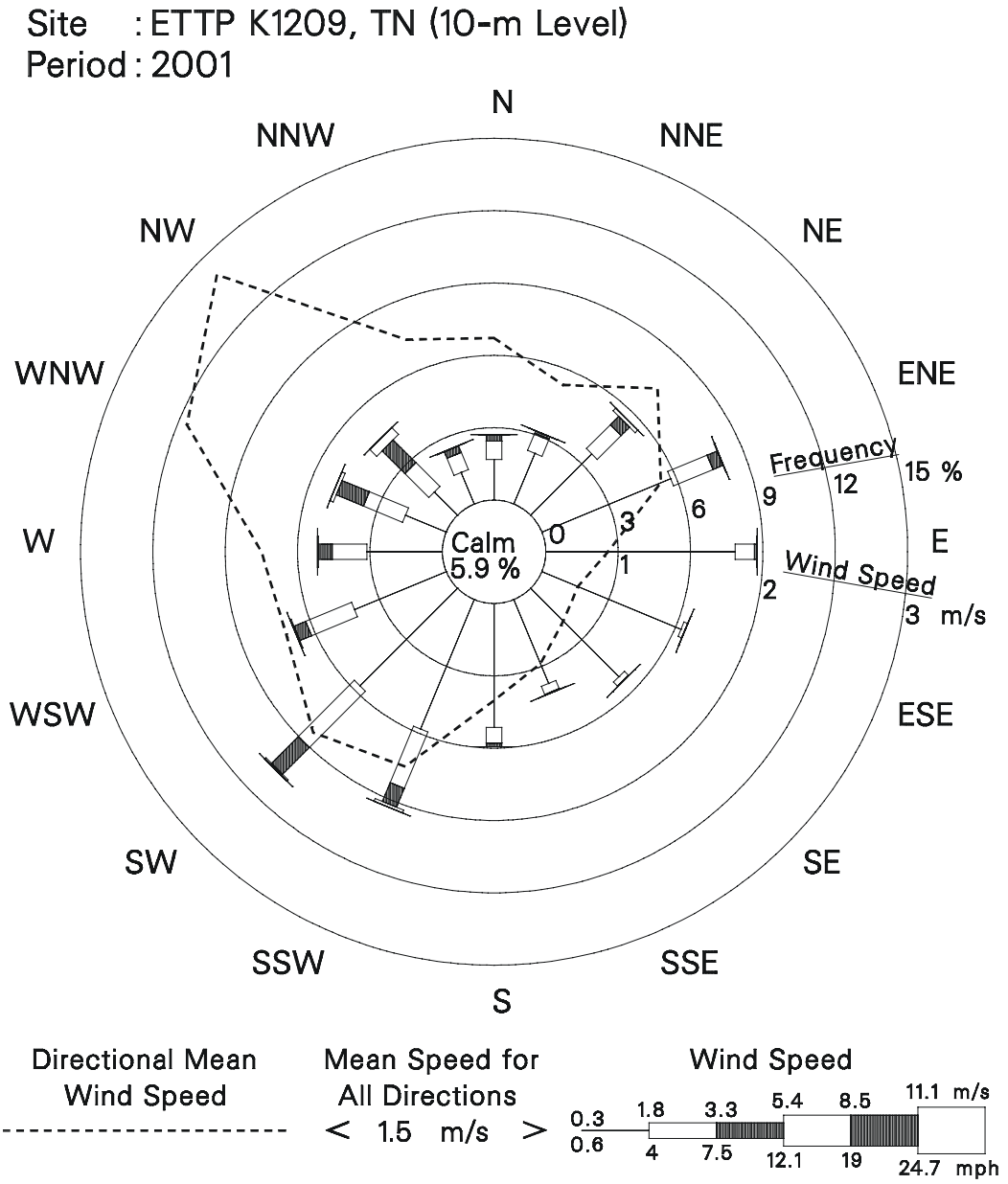

FIGURE 3.2-3 Wind Rose for the ETTP K1209 Meteorological Tower (10-m [33-ft] level), 2001 (Source: ORNL 2002)

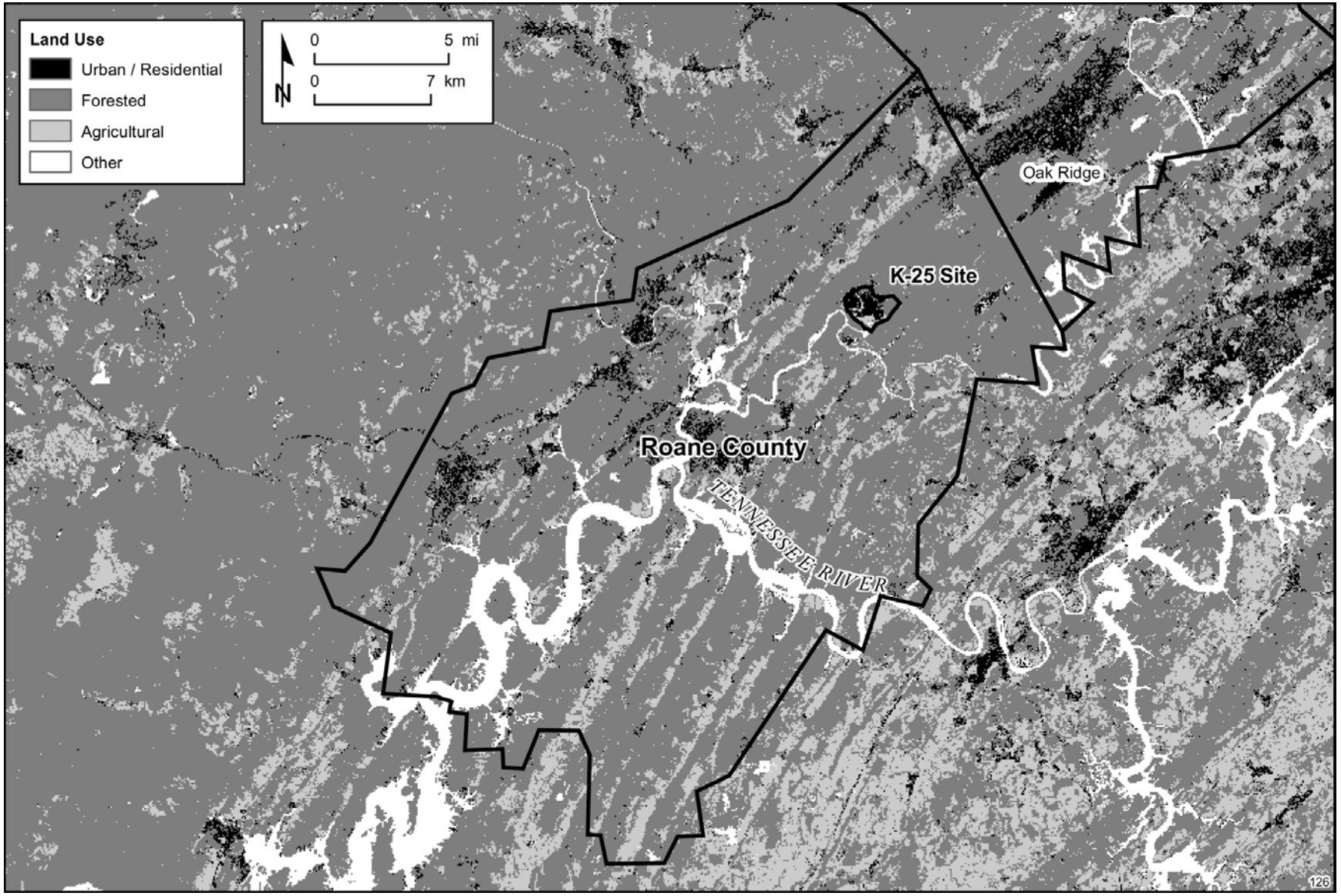

FIGURE 3.2-5 Land Cover in Roane County, Tennessee (Data Source: USGS 2002)

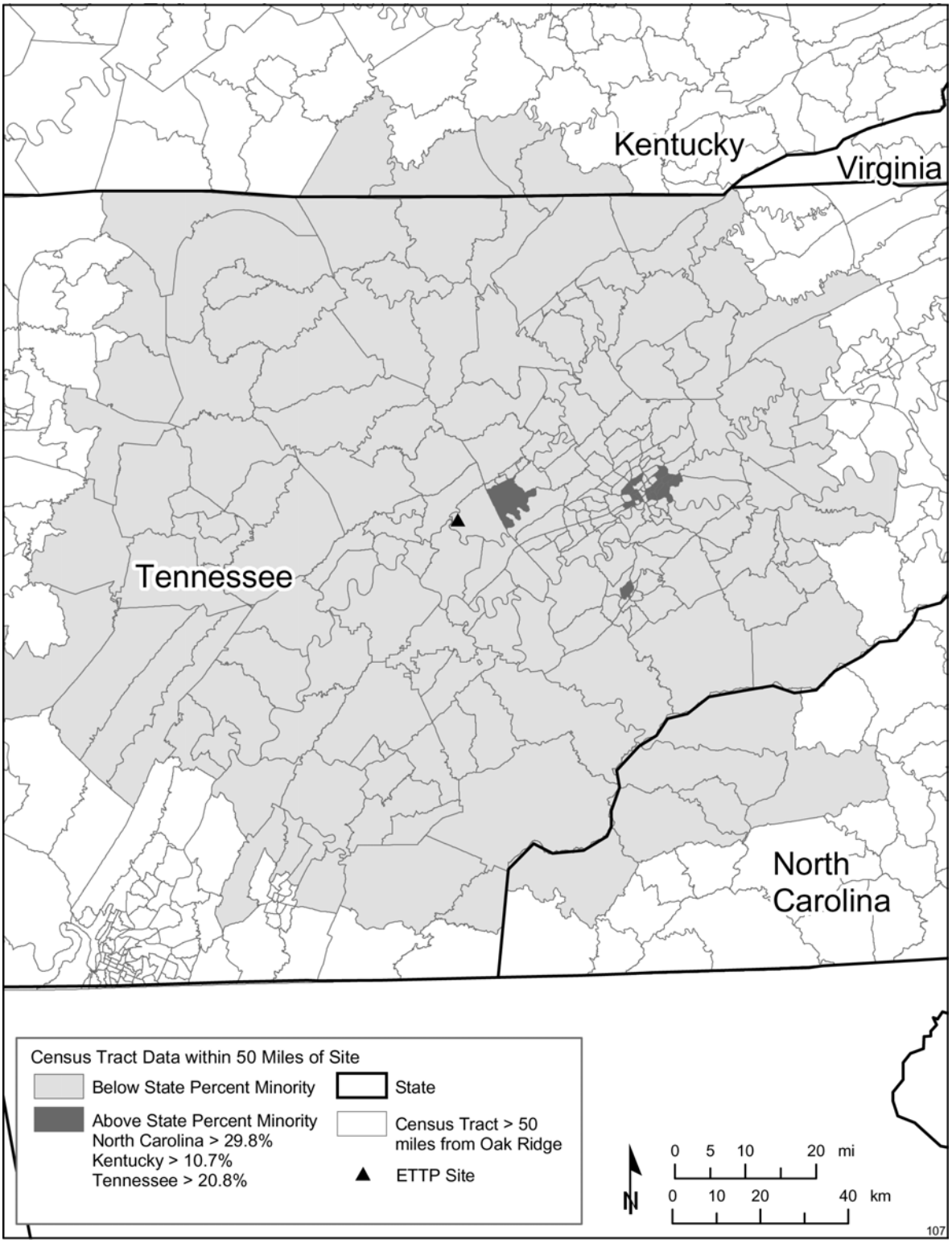

FIGURE 3.2-6 Census Tracts within 50 mi (80 km) of the Storage Facility at ETTP with Minority Populations in Excess of State-Specific Thresholds (Source: Based on data from U.S. Bureau of the Census 2002e)

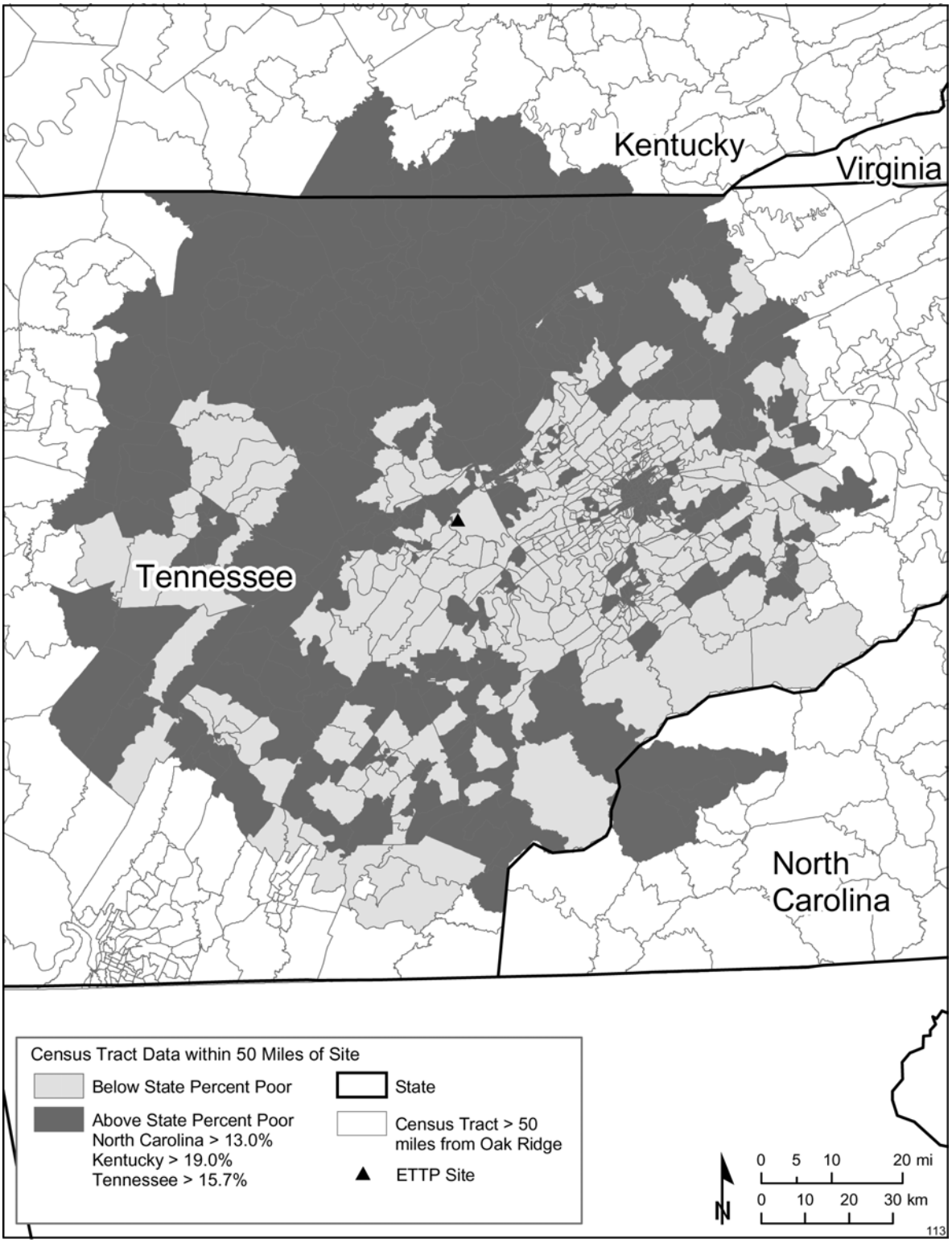

FIGURE 3.2-7 Census Tracts within 50 mi (80 km) of the Storage Facility at ETTP with Low-Income Populations in Excess of State-Specific Thresholds (Source: Based on data from U.S. Bureau of the Census 2002e)

TABLE S-2 Summary of Alternatives Considered for the Paducah Conversion Facility EIS

Alternative	Description	Options Considered
No Action	Continued storage of the DUF_6 cylinders indefinitely at the Paducah site, with continued cylinder surveillance and maintenance.	None.
Proposed Action	Construction and operation of a conversion facility at the Paducah site for conversion of the Paducah DUF_6 inventory into depleted uranium oxide (primarily U_3O_8) and other conversion products. This EIS assesses the potential environmental impacts from the following proposed activities: • Construction, operation, maintenance, and D&D of the proposed DUF_6 conversion facility at the Paducah site; • Conversion to depleted U_3O_8 based on the proposed UDS technology; • Transportation of uranium conversion products and waste materials to a disposal facility; • Transportation and sale of the HF conversion product; and • Neutralization of HF to CaF_2 and its sale or disposal in the event that the HF product is not sold.	*ETTP Cylinders:* This EIS considers an option of shipping DUF_6 and non-DUF_6 cylinders at ETTP to Paducah. *Transportation:* This EIS evaluates the shipment of cylinders and conversion products by both truck and rail. *Expanded Operations:* This EIS discusses the impacts associated with potential expansion of plant operations by extending the operational period and by increasing throughput through efficiency improvements.
Alternative Location A (Preferred)	Construction of the conversion facility at Location A, an area that encompasses 35 acres (14 ha) located south of the administration building and its parking lot, immediately west of and next to the primary location of the DOE cylinder yards and east of the main plant access road.	
Alternative Location B	Construction of the conversion facility at Location B, an area that encompasses 59 acres (23 ha) directly south of the Paducah maintenance building and west of the main plant access road.	
Alternative Location C	Construction of the conversion facility at Location C, an area that encompasses 53 acres (21 ha) east of the Paducah pump house and cooling towers.	

TABLE S-3 Summary of Paducah Conversion Facility Parameters

Parameter/Characteristic	Value
Construction start	2004
Construction period	2 years
Start of operations	2006
Operational period	25 years
Facility footprint	10 acres (4 ha)
Facility throughput	18,000 t/yr (20,000 tons/yr) DUF_6 (≈1,400 cylinders/yr)
Conversion products	
Depleted U_3O_8	14,300 t/yr (15,800 tons/yr)
CaF_2	24 t/yr (26 tons/yr)
70% HF acid	3,300 t/yr (3,600 tons/yr)
49% HF acid	7,700 t/yr (8,500 tons/yr)
Steel (emptied cylinders, if not used as disposal containers)	1,980 t/yr (2,200 tons/yr)

TABLE S-4 Summary of Proposed Conversion Product Treatment and Disposition

Conversion Product	Packaging/Storage	Proposed Disposition	Optional Disposition
Depleted U_3O_8	Packaged in emptied cylinders for disposal (bulk bags are an option).	Disposal at Envirocare of Utah, Inc.[a]	Disposal at Nevada Test Site (NTS).[a]
CaF_2	Packaged for sale or disposal.	Commercial sale pending DOE approval of authorized release limits, as appropriate.	Disposal at Envirocare of Utah, Inc.[a]
HF acid (70% and 49%)	HF would be commercial grade and stored on site until loaded into rail tank cars.	Sale to commercial HF acid supplier pending DOE approval of authorized release limits, as appropriate.	Neutralization of HF to CaF_2 for use or disposal.
Steel (emptied cylinders)	If bulk bags were used for U_3O_8 disposal, emptied cylinders would be processed for disposal; otherwise used for disposal of U_3O_8.	Disposal at Envirocare of Utah, Inc.[a]	Disposal at NTS.[a]

[a] DOE plans to decide the specific disposal location(s) for the depleted U_3O_8 conversion product after additional appropriate NEPA review. Accordingly, DOE will continue to evaluate its disposal options and will consider any further information or comments relevant to that decision. DOE will give a minimum 45-day notice before making the specific disposal decision and will provide any supplemental NEPA analysis for public review and comment.

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Steel (emptied cylinders)	If bulk bags were used for U_3O_8 disposal, emptied cylinders would be processed for disposal; otherwise used for disposal of U_3O_8.	Disposal at Envirocare of Utah, Inc.[a]	Disposal at NTS.[a]

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TABLE S-5 Summary of Major EIS Data and Assumptions

Parameter/Characteristic	Data/Assumption
General	
Paducah DUF_6 inventory	36,191 cylinders; 436,400 t (484,000 tons)
Paducah non-DUF_6 inventory	1,667 cylinders; 17,600 t (19,400 tons)
ETTP DUF_6 inventory	4,822 cylinders; 54,300 t (60,000 tons)
ETTP non-DUF_6 cylinder inventory	1,102 cylinders; 26 t (27 tons)
No Action Alternative	No conversion facility constructed; continued long-term storage of DUF_6 and non-DUF_6 in cylinders at Paducah.
Assessment period	Through 2039, plus long-term impacts
Construction	3 storage yards reconstructed
Cylinder management	Continued surveillance and maintenance activities consistent with current plans and procedures.
Assumed total number of future cylinder breaches:	
Controlled-corrosion case	36
Uncontrolled-corrosion case	444
Action Alternatives	Build and operate a conversion facility at the Paducah site for conversion of the Paducah DUF_6 inventory.
Construction start	2004
Construction period	≈2 years
Start of operations	2006
Operational period	25 years (28 years if ETTP cylinders are converted at Paducah)
Facility footprint	10 acres (4 ha)
Facility throughput	18,000 t/yr (20,000 tons/yr) DUF_6
Conversion products	
Depleted U_3O_8	14,300 t/yr (15,800 tons/yr)
CaF_2	24 t/yr (26 tons/yr)
70% HF acid	3,300 t/yr (3,600 tons/yr)
49% HF acid	7,700 t/yr (8,500 tons/yr)
Steel (empty cylinders, if not used as disposal containers)	1,980 t/yr (2,200 tons/yr)

TABLE S-6 Summary Comparison of Potential Environmental Consequences of the Alternatives[a]

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Human Health and Safety — Normal Facility Operations				
Radiation exposure				
Construction				
Involved workers	Potential external radiation exposures (above background) because of proximity to cylinder storage yards. Estimated maximum annual individual worker dose of 35 mrem/yr over a 2-year construction period.	Background	Potential external radiation exposures (above background) because of proximity to cylinder storage yards. Estimated maximum annual individual worker dose of 40 mrem/yr over a 2-year construction period.	Potential external radiation exposures (above background) to construction workers for yard reconstruction because of proximity to cylinder storage yards. Estimated maximum total individual worker dose is 230 mrem/yr.
Operations				
Involved workers				
Average dose to individual involved workers	Conversion facility: 75 mrem/yr Cylinder yards: 430–690 mrem/yr	Same as Location A	Same as Location A	740 mrem/yr
Collective dose to involved workers	Conversion facility: 10.7 person-rem/yr Cylinder yards: 3–6 person-rem/yr	Same as Location A	Same as Location A	33 person-rem/yr

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action
	Location A (Preferred)	Location B	Location C	
Total health effects among involved workers for the life of the project (through 2039 for no action)	1 in 7 chance of 1 latent cancer fatality (LCF)	Same as Location A	Same as Location A	1 in 2 chance of 1 LCF
Noninvolved workers				
Maximum dose to noninvolved worker maximally exposed individual (MEI)	1×10^{-5} mrem/yr	Same as Location A	Same as Location A	0.15 mrem/yr
Collective dose to noninvolved workers	$<1.9 \times 10^{-5}$ person-rem/yr	Same as Location A	Same as Location A	0.003 person-rem/yr
Total health effects among noninvolved workers for the life of the project (through 2039 for no action)	<1 in 1 million chance of 1 LCF	Same as Location A	Same as Location A	<1 in 100,000 chance of 1 LCF
General public				
Maximum dose to the general public MEI	$<3.9 \times 10^{-5}$ mrem/yr	Same as Location A	Same as Location A	<0.1 mrem/yr (during storage) <0.5 mrem/yr (long-term)
Collective dose to the general public within 50 mi (80 km)	4.7×10^{-5} person-rem/yr	Same as Location A	Same as Location A	0.008 person-rem/yr
Total health effects among members of the public over the life of the project (through 2039 for no action)	<1 chance in 1 million of 1 LCF	Same as Location A	Same as Location A	1 chance in 7,000 of 1 LCF

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Chemical exposure of concern[b] (concern = hazard index >1)				
Noninvolved worker MEI	Well below levels expected to cause health effects (hazard index <0.1).	Same as Location A	Same as Location A	Well below levels expected to cause health effects (hazard index <0.1).
General public MEI	Well below levels expected to cause health effects (hazard index <0.1).	Same as Location A	Same as Location A	Well below levels expected to cause health effects (hazard index <0.1).
Human Health and Safety — Facility Accidents[c]				
Physical hazards (involved and noninvolved workers)				
Construction: on-the-job fatalities and injuries	0 fatalities; 11 injuries	Same as Location A	Same as Location A	0 fatalities; 2 injuries
Operations: on-the-job fatalities and injuries	0 fatalities/yr; 8 injuries/yr	Same as Location A	Same as Location A	0 fatalities/yr; 2 injuries/yr

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Accidents involving chemical or radiation releases, low frequency-high consequence accidents				
Bounding chemical accident	Anhydrous ammonia (NH_3) tank rupture	Same as Location A	Same as Location A	Cylinder ruptures – fire (high for adverse effects); corroded cylinder spill, wet conditions (high for irreversible adverse effects).
Release amount	29,500 lb (13,400 kg) of NH_3	Same as Location A	Same as Location A	24,000 lb (11,000 kg) of DUF_6 (fire); 96 lb (44 kg) of HF (spill, wet conditions)
Estimated frequency	<1 time in 1,000,000 years	Same as Location A	Same as Location A	≈1 time in 100,000 years (both accidents)
Probability – life of the project (through 2039 for no action)	<1 chance in 40,000	Same as Location A	Same as Location A	≈1 chance in 2,500
Consequences (per accident)[d]				
Chemical exposure – public				
Adverse effects	26–4,800 persons	14–4,900 persons	17–6,700 persons	0–2,000 persons
Irreversible adverse effects	2–370 persons	0–320 persons	1–220 persons	0–1 person
Fatalities	0–7 persons	0–6 persons	0–4 persons	0 persons

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Chemical exposure – noninvolved workers[e]				
Adverse effects	1,100–1,600 persons	1,100–1,400 persons	1,400–1,600 persons	4–910 persons
Irreversible adverse effects	600–1,600 persons	730–1,400 persons	130–1,600 persons	1–300 persons
Fatalities	0–30 persons	0–30 persons	0–30 persons	0–3 persons
Accident risk (consequence × probability)				
General public	0 fatalities	Same as Location A	Same as Location A	0 fatalities
Noninvolved workers[e]	0 fatalities	Same as Location A	Same as Location A	0 fatalities
Bounding radiological accident	Earthquake accident damages U_3O_8 storage building containing 6 months' of product.	Same as Location A	Same as Location A	Cylinder ruptures – fire
Release amount	180 lb (82 kg) of depleted U_3O_8	Same as Location A	Same as Location A	24,000 lb (11,000 kg) of UF_6
Estimated frequency	≈1 time in 100,000 years	Same as Location A	Same as Location A	≈1 time in 100,000 years
Probability – life of the project (through 2039 for no action)	≈1 chance in 4000	Same as Location A	Same as Location A	≈1 chance in 2,500
Consequences (per accident)				
Radiation exposure – public				
Dose to MEI	2–40 rem	Same as Location A	Same as Location A	15 mrem
Risk of LCF	1 chance in 50	Same as Location A	Same as Location A	7 in 1 million
Total dose to population	13–73 person-rem	Same as Location A	Same as Location A	29 person-rem
Total LCFs	1 chance in 40 of 1 LCF	Same as Location A	Same as Location A	1 chance in 70 of 1 LCF

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Radiation exposure – noninvolved workers[e]				
Dose to MEI	2–40 rem	Same as Location A	Same as Location A	20 mrem
Risk of LCF	1 chance in 50	Same as Location A	Same as Location A	8 in 1 million
Total dose to workers	0.2–530 person-rem	0.5–1,300 person-rem	0.1–300 person-rem	15 person-rem
Total LCFs	1 chance in 5 of 1 LCF	1 chance in 2 of 1 LCF	1 chance in 8 of 1 LCF	1 chance in 170 of 1 LCF
Accident risk (consequence × probability)				
General public	0 LCFs	Same as Location A	Same as Location A	0 LCFs
Noninvolved workers[e]	0 LCFs	Same as Location A	Same as Location A	0 LCFs
Human Health and Safety — Transportation				
Transportation impacts during normal operations				Negligible impacts due to small number of shipments (1 shipment/yr) and low concentration of expected contamination.
Total fatalities from exposure to vehicle exhaust emissions				
Maximum use of truck	20 (30 if hydrogen fluoride [HF] is neutralized to calcium fluoride [CaF_2] for disposal)	Same as Location A	Same as Location A	Negligible
Maximum use of rail	<1 (1 if HF is neutralized to CaF_2)	Same as Location A	Same as Location A	Negligible

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Total fatalities from exposure to external radiation				
Maximum use of truck	<1	Same as Location A	Same as Location A	Negligible
Maximum use of rail	<1	Same as Location A	Same as Location A	Negligible
Maximum radiation exposure to a person along a route (MEI)	Negligible (<0.045 mrem)	Same as Location A	Same as Location A	Negligible
Traffic accident fatalities (life of the project); (physical hazards, unrelated to cargo)				
Maximum use of truck	2 (4 if CaF_2 shipped for disposal)	Same as Location A	Same as Location A	Negligible
Maximum use of rail	1 (including CaF_2)	Same as Location A	Same as Location A	Negligible
Traffic accidents involving radiation or chemical releases				
Low frequency-high consequence cylinder accidents				NA[f]
Bounding accident scenario	Urban rail accident involving DUF_6 cylinders (only if East Tennessee Technology Park [ETTP] cylinders are shipped to Paducah by rail).	Same as Location A	Same as Location A	NA
Release	Uranium, HF	Same as Location A	Same as Location A	NA

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Probability – life of the project	≈1 chance in 120,000	Same as Location A	Same as Location A	NA
Consequences (per accident)				
Chemical exposure – all workers and members of general public				
Irreversible adverse effects	4	Same as Location A	Same as Location A	NA
Fatalities	0	Same as Location A	Same as Location A	NA
Radiation exposure – all workers and members of the general public				
Total LCFs	60	Same as Location A	Same as Location A	NA
Accident risk (consequence × probability)				
Workers and the general public	0 fatalities	Same as Location A	Same as Location A	NA
Low frequency-high consequence accidents with all other materials				NA
Bounding accident scenario	Urban rail accident involving anhydrous NH_3	Same as Location A	Same as Location A	NA
Release	Anhydrous NH_3	Same as Location A	Same as Location A	NA
Probability – life of project	≈1 chance in 200,000	Same as Location A	Same as Location A	NA
Consequences (per accident)				
Chemical exposure – all workers and members of the general public				
Irreversible adverse effects	5,000	Same as Location A	Same as Location A	NA

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Fatalities	100	Same as Location A	Same as Location A	NA
Accident risk (consequence × probability)				
Irreversible adverse effects	0	Same as Location A	Same as Location A	NA
Fatalities	0	Same as Location A	Same as Location A	NA
Air Quality and Noise				
Pollutant emissions during conversion facility construction	Total (modeled plus background) concentrations for particulate matter (PM) with an aerodynamic diameter of less than or equal to 10 and 2.5 μm, respectively (PM_{10} and $PM_{2.5}$), would exceed standards at the construction site boundary because of the high background concentrations; construction-related concentrations would be negligible at the nearest residence. Other criteria pollutants are well within standards.	Same as Location A	Same as Location A	For yard reconstruction, the maximum 24-hour PM_{10} concentration is up to 90% of the standard; other criteria pollutants are well within standards.

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action
	Location A (Preferred)	Location B	Location C	
Pollutant emissions during conversion facility operations	Average-annual $PM_{2.5}$ concentrations close to standards because of high background concentrations; operations-related concentrations would be negligible at the nearest residence. Other criteria pollutants would be well within standards. No concentration increment would exceed applicable prevention of significant deterioration (PSD) increments at the site boundary (for Class II area), and all increments would well below the PSD increment for the nearest Class I area.	Same as Location A	Same as Location A	Under the controlled cylinder corrosion scenario, the maximum 24-hour HF concentration would be less than 3% of the Commonwealth of Kentucky secondary standard; criteria pollutants would be well within standards. Under the uncontrolled cylinder corrosion scenario, the maximum 24-hour HF concentration at the site boundary could be up to 69% of the Commonwealth of Kentucky secondary standard.

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Estimated noise levels at the nearest residence	Below the U.S. Environmental Protection Agency (EPA) guideline of 55 dB(A) as day-night average sound level (DNL) during construction and operation.	Same as Location A	Same as Location A	Below the EPA guideline of 55 dB(A) as DNL during construction and operation.
	Water and Soil			
Surface water				
Construction	Negligible impacts from changes to runoff, from floodplains, or from water use and discharge.	Same as Location A	Same as Location A	Negligible impacts from changes to runoff, from floodplains, or from water use and discharge.
Operations	Negligible impacts from water use and discharge.	Same as Location A	Same as Location A	Negligible impacts from water use and discharge.
Groundwater				
Construction	No direct impacts to groundwater recharge, depth, or flow direction; impacts to groundwater quality unlikely.	Same as Location A	Same as Location A	No direct impacts to groundwater recharge, depth, or flow direction; impacts to groundwater quality unlikely.

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Operations	No direct impacts to groundwater recharge, depth, or flow direction; impacts to groundwater quality unlikely.	Same as Location A	Same as Location A	Under the controlled corrosion case, maximum uranium groundwater concentration (occurring in around 2070) of 6 μg/L, below the guideline of 20 μg/L.[g] Under the uncontrolled corrosion case, cylinder breaches occurring before 2020 could result in groundwater concentrations exceeding the guideline sometime after 2100.
Soils				
Construction	Local and temporary increase in erosion; impacts to soil quality unlikely. Potentially contaminated soil associated with solid waste management unit (SWMU) 194 could be excavated.	Same as Location A	Local and temporary increase in erosion; impacts to soil quality unlikely.	Local and temporary increase in erosion; impacts to soil quality unlikely.
Operations	No direct impacts to soil.	Same as Location A	Same as Location A	Negligible impacts to soils.

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
		Socioeconomics		
Construction	Direct employment of 190 people in peak year; 290 total jobs in the region of influence (ROI); total personal income of $9.5 million in peak year; marginal impacts on public services. Two-year duration of impacts.	Same as Location A	Same as Location A	Direct employment of 30 people; 110 total jobs in ROI; total personal income of $3.2 million; no significant impacts on public services.
Operations	Direct employment of 160 people; 330 total jobs in ROI; total personal income of $13 million per year; no significant impacts on public services.	Same as Location A	Same as Location A	Direct employment of 90 people; 130 total jobs in ROI; total personal income of $3.8 million per year through 2039; no significant impacts on public services.

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
		Ecology		
Ecological resources (habitat loss, vegetation, wildlife)	Total area disturbed during construction: 45 acres (18 ha). Vegetation and wildlife communities impacted and potential loss of habitat; impacts could be minimized by facility placement.	Same as Location A	Same as Location A	Negligible impact to ecological resources; all activities would occur in previously developed areas; however, there is a potential for impacts to aquatic biota from cylinder yard runoff during painting activities.
Concentrations of chemical or radioactive materials	Well below harmful levels; negligible impacts on vegetation and wildlife.	Same as Location A	Same as Location A	Potential for adverse impacts to aquatic biota associated with cylinder painting.
Wetlands	Potential direct and indirect impacts to wetlands from facility construction; impacts could be minimized by facility placement.	Same as Location A	Same as Location A	Negligible impacts

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Threatened or endangered species	No direct impacts from construction or operations; destruction of trees with exfoliating bark could indirectly impact the Indiana bat by destroying roosting habitat.	Same as Location A	Same as Location A; in addition; construction in the eastern portion of Location C could impact potential habitat for wild indigo and compass plant.	Negligible impacts
	Waste Management			
Construction	Minimal impacts to site waste management capabilities from construction-generated waste. Potentially contaminated soil associated with SWMU 194 could be excavated and require management and disposal.	Same as Location A	Same as Location A, except contaminated soil unlikely.	Negligible impacts from yard reconstruction.

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action
	Location A (Preferred)	Location B	Location C	
Operations	Negligible impacts to site management capabilities from low-level radioactive waste (LLW) and hazardous waste generation. The triuranium octaoxide (U_3O_8) produced would generate about 7,850 yd^3 (6,000 m^3)/yr of LLW. This is 83% of Paducah's annual projected volume; potentially large impact on site LLW management. If HF is neutralized to CaF_2, generation of about 4,900 yd^3/yr (3,800 m^3/yr) of CaF_2. Generation of transuranic (TRU) waste unlikely under current proposals.	Same as Location A	Same as Location A	No impacts from LLW generation; less than 1% of annual site totals for each. Low-level radioactive mixed waste (LLMW) generated from cylinder stripping and painting operations could generate less than a 1% increase in site LLMW, resulting in a negligible impact to on-site waste operations.

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
		Resource Requirements [h]		
Construction and operations	No effects on local, regional, or national availability of materials required are expected.	Same as Location A	Same as Location A	No effects on local, regional, or national availability of materials required are expected.
		Land Use		
Construction and operations	Up to 45 acres (18 ha) would be disturbed, with 10 acres (4 ha) permanently altered, representing about 1% of available land already developed for industrial purposes, resulting in negligible impacts to land use.	Same as Location A	Same as Location A	Reconstruction of one existing cylinder storage yard within the boundaries of existing yards is planned; negligible impacts to land use.
		Cultural Resources		
Construction and operations	Impacts to cultural resources are possible; archaeological and architectural surveys have not been completed and must be initiated prior to initiation of the proposed action.	Same as Location A	Same as Location A	Impacts would be unlikely because the storage yards are located in previously disturbed areas already dedicated to cylinder storage.

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
		Environmental Justice		
Construction and operations	No disproportionately high and adverse impacts to minority or low-income populations in the general public during normal operations or from accidents.	Same as Location A	Same as Location A	No disproportionately high and adverse impacts to minority or low-income populations in the general public during normal operations or from accidents.
		Conversion of ETTP Cylinders at Paducah (option)		
Cylinder preparation				
Location of cylinder preparation activities	ETTP: approximately 5,900 ETTP cylinders prepared for shipment to Paducah.	Same as Location A	Same as Location A	NA
Impacts from using cylinder overpacks	No facility construction required; operational impacts limited to external radiation exposure of involved workers; total collective dose to the worker population of 69 to 85 person-rem at ETTP, with no LCFs expected.	Same as Location A	Same as Location A	NA

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action
	Location A (Preferred)	Location B	Location C	
Impacts from using cylinder transfer facility	Construction of a transfer facility would be required at ETTP. Operational impacts would generally be small and limited primarily to external radiation exposure of involved workers; total collective dose to the worker population of 440 to 480 person-rem at ETTP, with no LCFs expected.	Same as Location A	Same as Location A	NA
Impact of extended conversion operations	If ETTP cylinders were transported to Paducah, the operational period would extend to 28 years. Annual impacts would be the same as discussed for each technical discipline. No significant increase in overall impacts is expected.	Same as Location A	Same as Location A	NA

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
	Decontamination and Decommissioning			
Activities involved	Disassembly and removal of all radioactive and hazardous components, equipment, and structures, with the objective of completely dismantling the various buildings and achieving greenfield (unrestricted use) conditions.	Same as Location A	Same as Location A	NA
Human health and safety impacts	Decontamination and decommissioning (D&D) impacts primarily limited to external radiation exposure of involved workers; expected exposures would be a small fraction of operational doses; no LCFs expected. No fatalities from occupational accidents expected; up to 5 injuries.	Same as Location A	Same as Location A	NA

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Other impacts	Generation of LLW, LLMW, and hazardous waste; approximately 90% of D&D materials generated are expected to be clean.	Same as Location A	Same as Location A	NA
Impacts Associated with Conversion Product Sale				
Products potentially marketed	HF and/or CaF_2	Same as Location A	Same as Location A	NA
Annual Paducah production	55% HF solution: 11,000 t/yr (12,000 tons/yr)	Same as Location A	Same as Location A	NA
	CaF_2: 24 t/yr (26 tons/yr)	Same as Location A	Same as Location A	NA
CaF_2 produced if HF is neutralized	11,800 t/yr (13,000 tons/yr)	Same as Location A	Same as Location A	NA
Maximum estimated radiation dose to a worker from HF or CaF_2 use	<1mrem/yr	Same as Location A	Same as Location A	NA
Potential socioeconomic impacts from use	Negligible socioeconomic impacts	Same as Location A	Same as Location A	NA

Footnotes on next page.

TABLE S-6 (Cont.)

[a] Potential environmental impacts are summarized and compared in this table for the no action alternative and the action alternatives. For the action alternatives, impacts are presented for the three alternative locations within the site; annual impacts are based on the assumption of a 25-year operational period. For the no action alternative, annual impacts are based on the assumption of a 40-year operational period. Potential impacts associated with expanding throughput through process improvements and with extending the operational period would be similar to those presented for the base design.

[b] Chemical exposures for involved workers during normal operations were not estimated; the workplace environment would be monitored to ensure that airborne chemical concentrations were below applicable exposure limits.

[c] On the basis of calculations performed for this EIS, the accidents that are listed in this table have been found to have the highest consequences of all the accidents analyzed. In general, accidents that have lower probabilities have higher consequences.

[d] The ranges in accident impacts reflect differences in possible atmospheric conditions at the time of the accident.

[e] In addition to noninvolved worker impacts, chemical and radiological exposures for involved workers under accident conditions (workers within 100 m [328 ft] of a release) would depend in part on specific circumstances of the accident. Involved worker fatalities and injuries resulting from the accident initiator or the accident itself are possible.

[f] NA = not applicable.

[g] The guideline concentration used for comparison with estimated surface water and groundwater uranium concentrations is the former proposed EPA maximum concentration limit (MCL) of 20 μg/L; a revised value of 30 μg/L became effective in December 2003. These values are applicable for water "at the tap" of the user and are not directly applicable for surface water or groundwater (no such standard exists). The guideline concentration used for comparison with estimated soil uranium concentrations is a health-based guideline value for residential settings of 230 μg/g.

[h] Resources evaluated include construction materials (e.g., concrete, steel, special coatings), fuel, electricity, process chemicals, and containers (e.g., drums and cylinders).

TABLE 2.4-1 Summary Comparison of Potential Environmental Consequences of the Alternatives[a]

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Human Health and Safety — Normal Facility Operations				
Radiation exposure				
Construction				
Involved workers	Potential external radiation exposures (above background) because of proximity to cylinder storage yards. Estimated maximum annual individual worker dose of 35 mrem/yr over a 2-year construction period.	Background	Potential external radiation exposures (above background) because of proximity to cylinder storage yards. Estimated maximum annual individual worker dose of 40 mrem/yr over a 2-year construction period.	Potential external radiation exposures (above background) to construction workers for yard reconstruction because of proximity to cylinder storage yards. Estimated maximum total individual worker dose is 230 mrem/yr.
Operations				
Involved workers				
Average dose to individual involved workers	Conversion facility: 75 mrem/yr Cylinder yards: 430–690 mrem/yr	Same as Location A	Same as Location A	740 mrem/yr
Collective dose to involved workers	Conversion facility: 10.7 person-rem/yr Cylinder yards: 3–6 person-rem/yr	Same as Location A	Same as Location A	33 person-rem/yr

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action
	Location A (Preferred)	Location B	Location C	
Total health effects among involved workers for the life of the project (through 2039 for no action)	1 in 7 chance of 1 latent cancer fatality (LCF)	Same as Location A	Same as Location A	1 in 2 chance of 1 LCF
Noninvolved workers				
Maximum dose to noninvolved worker maximally exposed individual (MEI)	1×10^{-5} mrem/yr	Same as Location A	Same as Location A	0.15 mrem/yr
Collective dose to noninvolved workers	$<1.9 \times 10^{-5}$ person-rem/yr	Same as Location A	Same as Location A	0.003 person-rem/yr
Total health effects among noninvolved workers for the life of the project (through 2039 for no action)	<1 in 1 million chance of 1 LCF	Same as Location A	Same as Location A	<1 in 100,000 chance of 1 LCF
General public				
Maximum dose to the general public MEI	$<3.9 \times 10^{-5}$ mrem/yr	Same as Location A	Same as Location A	<0.1 mrem/yr (during storage) <0.5 mrem/yr (long-term)
Collective dose to the general public within 50 mi (80 km)	4.7×10^{-5} person-rem/yr	Same as Location A	Same as Location A	0.008 person-rem/yr
Total health effects among members of the public over the life of the project (through 2039 for no action)	<1 chance in 1 million of 1 LCF	Same as Location A	Same as Location A	1 chance in 7,000 of 1 LCF

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Chemical exposure of concern[b] (concern = hazard index >1)				
Noninvolved worker MEI	Well below levels expected to cause health effects (hazard index <0.1).	Same as Location A	Same as Location A	Well below levels expected to cause health effects (hazard index <0.1).
General public MEI	Well below levels expected to cause health effects (hazard index <0.1).	Same as Location A	Same as Location A	Well below levels expected to cause health effects (hazard index <0.1).
Human Health and Safety — Facility Accidents[c]				
Physical hazards (involved and noninvolved workers)				
Construction: on-the-job fatalities and injuries	0 fatalities; 11 injuries	Same as Location A	Same as Location A	0 fatalities; 2 injuries
Operations: on-the-job fatalities and injuries	0 fatalities/yr; 8 injuries/yr	Same as Location A	Same as Location A	0 fatalities/yr; 2 injuries/yr

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Accidents involving chemical or radiation releases, low frequency-high consequence accidents				
Bounding chemical accident	Anhydrous ammonia (NH_3) tank rupture	Same as Location A	Same as Location A	Cylinder ruptures – fire (high for adverse effects); corroded cylinder spill, wet conditions (high for irreversible adverse effects).
Release amount	29,500 lb (13,400 kg) of NH_3	Same as Location A	Same as Location A	24,000 lb (11,000 kg) of DUF_6 (fire); 96 lb (44 kg) of HF (spill, wet conditions)
Estimated frequency	<1 time in 1,000,000 years	Same as Location A	Same as Location A	≈1 time in 100,000 years (both accidents)
Probability – life of the project (through 2039 for no action)	<1 chance in 40,000	Same as Location A	Same as Location A	≈1 chance in 2,500
Consequences (per accident)[d]				
Chemical exposure – public				
Adverse effects	26–4,800 persons	14–4,900 persons	17–6,700 persons	0–2,000 persons
Irreversible adverse effects	2–370 persons	0–320 persons	1–220 persons	0–1 person
Fatalities	0–7 persons	0–6 persons	0–4 persons	0 persons

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action
	Location A (Preferred)	Location B	Location C	
Chemical exposure – noninvolved workers[e]				
Adverse effects	1,100–1,600 persons	1,100–1,400 persons	1,400–1,600 persons	4–910 persons
Irreversible adverse effects	600–1,600 persons	730–1,400 persons	130–1,600 persons	1–300 persons
Fatalities	0–30 persons	0–30 persons	0–30 persons	0–3 persons
Accident risk (consequence × probability)				
General public	0 fatalities	Same as Location A	Same as Location A	0 fatalities
Noninvolved workers[e]	0 fatalities	Same as Location A	Same as Location A	0 fatalities
Bounding radiological accident	Earthquake accident damages U_3O_8 storage building containing 6 months' of product.	Same as Location A	Same as Location A	Cylinder ruptures – fire
Release amount	180 lb (82 kg) of depleted U_3O_8	Same as Location A	Same as Location A	24,000 lb (11,000 kg) of UF_6
Estimated frequency	≈1 time in 100,000 years	Same as Location A	Same as Location A	≈1 time in 100,000 years
Probability – life of the project (through 2039 for no action)	≈1 chance in 4000	Same as Location A	Same as Location A	≈1 chance in 2,500
Consequences (per accident)				
Radiation exposure – public				
Dose to MEI	2–40 rem	Same as Location A	Same as Location A	15 mrem
Risk of LCF	1 chance in 50	Same as Location A	Same as Location A	7 in 1 million
Total dose to population	13–73 person-rem	Same as Location A	Same as Location A	29 person-rem
Total LCFs	1 chance in 40 of 1 LCF	Same as Location A	Same as Location A	1 chance in 70 of 1 LCF

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Radiation exposure – noninvolved workers[e]				
Dose to MEI	2–40 rem	Same as Location A	Same as Location A	20 mrem
Risk of LCF	1 chance in 50	Same as Location A	Same as Location A	8 in 1 million
Total dose to workers	0.2–530 person-rem	0.5–1,300 person-rem	0.1–300 person-rem	15 person-rem
Total LCFs	1 chance in 5 of 1 LCF	1 chance in 2 of 1 LCF	1 chance in 8 of 1 LCF	1 chance in 170 of 1 LCF
Accident risk (consequence × probability)				
General public	0 LCFs	Same as Location A	Same as Location A	0 LCFs
Noninvolved workers[e]	0 LCFs	Same as Location A	Same as Location A	0 LCFs
Human Health and Safety — Transportation				
Transportation impacts during normal operations				Negligible impacts due to small number of shipments (1 shipment/yr) and low concentration of expected contamination.
Total fatalities from exposure to vehicle exhaust emissions				
Maximum use of truck	20 (30 if hydrogen fluoride [HF] is neutralized to calcium fluoride [CaF_2] for disposal)	Same as Location A	Same as Location A	Negligible
Maximum use of rail	<1 (1 if HF is neutralized to CaF_2)	Same as Location A	Same as Location A	Negligible

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Total fatalities from exposure to external radiation				
Maximum use of truck	<1	Same as Location A	Same as Location A	Negligible
Maximum use of rail	<1	Same as Location A	Same as Location A	Negligible
Maximum radiation exposure to a person along a route (MEI)	Negligible (<0.045 mrem)	Same as Location A	Same as Location A	Negligible
Traffic accident fatalities (life of the project); (physical hazards, unrelated to cargo)				
Maximum use of truck	2 (4 if CaF_2 shipped for disposal)	Same as Location A	Same as Location A	Negligible
Maximum use of rail	1 (including CaF_2)	Same as Location A	Same as Location A	Negligible
Traffic accidents involving radiation or chemical releases				
Low frequency-high consequence cylinder accidents				NA[f]
Bounding accident scenario	Urban rail accident involving DUF_6 cylinders (only if East Tennessee Technology Park [ETTP] cylinders are shipped to Paducah by rail).	Same as Location A	Same as Location A	NA
Release	Uranium, HF	Same as Location A	Same as Location A	NA

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action
	Location A (Preferred)	Location B	Location C	
Probability – life of the project	≈1 chance in 120,000	Same as Location A	Same as Location A	NA
Consequences (per accident)				
Chemical exposure – all workers and members of general public				
Irreversible adverse effects	4	Same as Location A	Same as Location A	NA
Fatalities	0	Same as Location A	Same as Location A	NA
Radiation exposure – all workers and members of the general public				
Total LCFs	60	Same as Location A	Same as Location A	NA
Accident risk (consequence × probability)				
Workers and the general public	0 fatalities	Same as Location A	Same as Location A	NA
Low frequency-high consequence accidents with all other materials				NA
Bounding accident scenario	Urban rail accident involving anhydrous NH_3	Same as Location A	Same as Location A	NA
Release	Anhydrous NH_3	Same as Location A	Same as Location A	NA
Probability – life of project	≈1 chance in 200,000	Same as Location A	Same as Location A	NA
Consequences (per accident)				
Chemical exposure – all workers and members of the general public				
Irreversible adverse effects	5,000	Same as Location A	Same as Location A	NA

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Fatalities	100	Same as Location A	Same as Location A	NA
Accident risk (consequence × probability)				
Irreversible adverse effects	0	Same as Location A	Same as Location A	NA
Fatalities	0	Same as Location A	Same as Location A	NA
Air Quality and Noise				
Pollutant emissions during conversion facility construction	Total (modeled plus background) concentrations for particulate matter (PM) with an aerodynamic diameter of less than or equal to 10 and 2.5 μm, respectively (PM_{10} and $PM_{2.5}$), would exceed standards at the construction site boundary because of the high background concentrations; construction-related concentrations would be negligible at the nearest residence. Other criteria pollutants are well within standards.	Same as Location A	Same as Location A	For yard reconstruction, the maximum 24-hour PM_{10} concentration is up to 90% of the standard; other criteria pollutants are well within standards.

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action
	Location A (Preferred)	Location B	Location C	
Pollutant emissions during conversion facility operations	Average-annual $PM_{2.5}$ concentrations close to standards because of high background concentrations; operations-related concentrations would be negligible at the nearest residence. Other criteria pollutants would be well within standards. No concentration increment would exceed applicable prevention of significant deterioration (PSD) increments at the site boundary (for Class II area), and all increments would well below the PSD increment for the nearest Class I area.	Same as Location A	Same as Location A	Under the controlled cylinder corrosion scenario, the maximum 24-hour HF concentration would be less than 3% of the Commonwealth of Kentucky secondary standard; criteria pollutants would be well within standards. Under the uncontrolled cylinder corrosion scenario, the maximum 24-hour HF concentration at the site boundary could be up to 69% of the Commonwealth of Kentucky secondary standard.

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action
	Location A (Preferred)	Location B	Location C	
Estimated noise levels at the nearest residence	Below the U.S. Environmental Protection Agency (EPA) guideline of 55 dB(A) as day-night average sound level (DNL) during construction and operation.	Same as Location A	Same as Location A	Below the EPA guideline of 55 dB(A) as DNL during construction and operation.
	Water and Soil			
Surface water				
Construction	Negligible impacts from changes to runoff, from floodplains, or from water use and discharge.	Same as Location A	Same as Location A	Negligible impacts from changes to runoff, from floodplains, or from water use and discharge.
Operations	Negligible impacts from water use and discharge.	Same as Location A	Same as Location A	Negligible impacts from water use and discharge.
Groundwater				
Construction	No direct impacts to groundwater recharge, depth, or flow direction; impacts to groundwater quality unlikely.	Same as Location A	Same as Location A	No direct impacts to groundwater recharge, depth, or flow direction; impacts to groundwater quality unlikely.

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action
	Location A (Preferred)	Location B	Location C	
Operations	No direct impacts to groundwater recharge, depth, or flow direction; impacts to groundwater quality unlikely.	Same as Location A	Same as Location A	Under the controlled corrosion case, maximum uranium groundwater concentration (occurring in around 2070) of 6 μg/L, below the guideline of 20 μg/L.[g] Under the uncontrolled corrosion case, cylinder breaches occurring before 2020 could result in groundwater concentrations exceeding the guideline sometime after 2100.
Soils				
Construction	Local and temporary increase in erosion; impacts to soil quality unlikely. Potentially contaminated soil associated with solid waste management unit (SWMU) 194 could be excavated.	Same as Location A	Local and temporary increase in erosion; impacts to soil quality unlikely.	Local and temporary increase in erosion; impacts to soil quality unlikely.
Operations	No direct impacts to soil.	Same as Location A	Same as Location A	Negligible impacts to soils.

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
		Socioeconomics		
Construction	Direct employment of 190 people in peak year; 290 total jobs in the region of influence (ROI); total personal income of $9.5 million in peak year; marginal impacts on public services. Two-year duration of impacts.	Same as Location A	Same as Location A	Direct employment of 30 people; 110 total jobs in ROI; total personal income of $3.2 million; no significant impacts on public services.
Operations	Direct employment of 160 people; 330 total jobs in ROI; total personal income of $13 million per year; no significant impacts on public services.	Same as Location A	Same as Location A	Direct employment of 90 people; 130 total jobs in ROI; total personal income of $3.8 million per year through 2039; no significant impacts on public services.

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
		Ecology		
Ecological resources (habitat loss, vegetation, wildlife)	Total area disturbed during construction: 45 acres (18 ha). Vegetation and wildlife communities impacted and potential loss of habitat; impacts could be minimized by facility placement.	Same as Location A	Same as Location A	Negligible impact to ecological resources; all activities would occur in previously developed areas; however, there is a potential for impacts to aquatic biota from cylinder yard runoff during painting activities.
Concentrations of chemical or radioactive materials	Well below harmful levels; negligible impacts on vegetation and wildlife.	Same as Location A	Same as Location A	Potential for adverse impacts to aquatic biota associated with cylinder painting.
Wetlands	Potential direct and indirect impacts to wetlands from facility construction; impacts could be minimized by facility placement.	Same as Location A	Same as Location A	Negligible impacts

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Threatened or endangered species	No direct impacts from construction or operations; destruction of trees with exfoliating bark could indirectly impact the Indiana bat by destroying roosting habitat.	Same as Location A	Same as Location A; in addition; construction in the eastern portion of Location C could impact potential habitat for wild indigo and compass plant.	Negligible impacts
	Waste Management			
Construction	Minimal impacts to site waste management capabilities from construction-generated waste. Potentially contaminated soil associated with SWMU 194 could be excavated and require management and disposal.	Same as Location A	Same as Location A, except contaminated soil unlikely.	Negligible impacts from yard reconstruction.

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action
	Location A (Preferred)	Location B	Location C	
Operations	Negligible impacts to site management capabilities from low-level radioactive waste (LLW) and hazardous waste generation. The triuranium octaoxide (U_3O_8) produced would generate about 7,850 yd^3 (6,000 m^3)/yr of LLW. This is 83% of Paducah's annual projected volume; potentially large impact on site LLW management. If HF is neutralized to CaF_2, generation of about 4,900 yd^3/yr (3,800 m^3/yr) of CaF_2. Generation of transuranic (TRU) waste unlikely under current proposals.	Same as Location A	Same as Location A	No impacts from LLW generation; less than 1% of annual site totals for each. Low-level radioactive mixed waste (LLMW) generated from cylinder stripping and painting operations could generate less than a 1% increase in site LLMW, resulting in a negligible impact to on-site waste operations.

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
		Resource Requirements [h]		
Construction and operations	No effects on local, regional, or national availability of materials required are expected.	Same as Location A	Same as Location A	No effects on local, regional, or national availability of materials required are expected.
		Land Use		
Construction and operations	Up to 45 acres (18 ha) would be disturbed, with 10 acres (4 ha) permanently altered, representing about 1% of available land already developed for industrial purposes, resulting in negligible impacts to land use.	Same as Location A	Same as Location A	Reconstruction of one existing cylinder storage yard within the boundaries of existing yards is planned; negligible impacts to land use.
		Cultural Resources		
Construction and operations	Impacts to cultural resources are possible; archaeological and architectural surveys have not been completed and must be initiated prior to initiation of the proposed action.	Same as Location A	Same as Location A	Impacts would be unlikely because the storage yards are located in previously disturbed areas already dedicated to cylinder storage.

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action
	Location A (Preferred)	Location B	Location C	
Environmental Justice				
Construction and operations	No disproportionately high and adverse impacts to minority or low-income populations in the general public during normal operations or from accidents.	Same as Location A	Same as Location A	No disproportionately high and adverse impacts to minority or low-income populations in the general public during normal operations or from accidents.
Conversion of ETTP Cylinders at Paducah (option)				
Cylinder preparation				
Location of cylinder preparation activities	ETTP: approximately 5,900 ETTP cylinders prepared for shipment to Paducah.	Same as Location A	Same as Location A	NA
Impacts from using cylinder overpacks	No facility construction required; operational impacts limited to external radiation exposure of involved workers; total collective dose to the worker population of 69 to 85 person-rem at ETTP, with no LCFs expected.	Same as Location A	Same as Location A	NA

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action
	Location A (Preferred)	Location B	Location C	
Impacts from using cylinder transfer facility	Construction of a transfer facility would be required at ETTP. Operational impacts would generally be small and limited primarily to external radiation exposure of involved workers; total collective dose to the worker population of 440 to 480 person-rem at ETTP, with no LCFs expected.	Same as Location A	Same as Location A	NA
Impact of extended conversion operations	If ETTP cylinders were transported to Paducah, the operational period would extend to 28 years. Annual impacts would be the same as discussed for each technical discipline. No significant increase in overall impacts is expected.	Same as Location A	Same as Location A	NA

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action
	Location A (Preferred)	Location B	Location C	
	Decontamination and Decommissioning			
Activities involved	Disassembly and removal of all radioactive and hazardous components, equipment, and structures, with the objective of completely dismantling the various buildings and achieving greenfield (unrestricted use) conditions.	Same as Location A	Same as Location A	NA
Human health and safety impacts	Decontamination and decommissioning (D&D) impacts primarily limited to external radiation exposure of involved workers; expected exposures would be a small fraction of operational doses; no LCFs expected. No fatalities from occupational accidents expected; up to 5 injuries.	Same as Location A	Same as Location A	NA

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action
Other impacts	Generation of LLW, LLMW, and hazardous waste; approximately 90% of D&D materials generated are expected to be clean.	Same as Location A	Same as Location A	NA
Impacts Associated with Conversion Product Sale				
Products potentially marketed	HF and/or CaF_2	Same as Location A	Same as Location A	NA
Annual Paducah production	55% HF solution: 11,000 t/yr (12,000 tons/yr)	Same as Location A	Same as Location A	NA
	CaF_2: 24 t/yr (26 tons/yr)	Same as Location A	Same as Location A	NA
CaF_2 produced if HF is neutralized	11,800 t/yr (13,000 tons/yr)	Same as Location A	Same as Location A	NA
Maximum estimated radiation dose to a worker from HF or CaF_2 use	<1 mrem/yr	Same as Location A	Same as Location A	NA
Potential socioeconomic impacts from use	Negligible socioeconomic impacts	Same as Location A	Same as Location A	NA

Footnotes on next page.

TABLE 2.4-1 (Cont.)

[a] Potential environmental impacts are summarized and compared in this table for the no action alternative and the action alternatives. For the action alternatives, impacts are presented for the three alternative locations within the site; annual impacts are based on the assumption of a 25-year operational period. For the no action alternative, annual impacts are based on the assumption of a 40-year operational period. Potential impacts associated with expanding throughput through process improvements and with extending the operational period would be similar to those presented for the base design.

[b] Chemical exposures for involved workers during normal operations were not estimated; the workplace environment would be monitored to ensure that airborne chemical concentrations were below applicable exposure limits.

[c] On the basis of calculations performed for this EIS, the accidents that are listed in this table have been found to have the highest consequences of all the accidents analyzed. In general, accidents that have lower probabilities have higher consequences.

[d] The ranges in accident impacts reflect differences in possible atmospheric conditions at the time of the accident.

[e] In addition to noninvolved worker impacts, chemical and radiological exposures for involved workers under accident conditions (workers within 100 m [328 ft] of a release) would depend in part on specific circumstances of the accident. Involved worker fatalities and injuries resulting from the accident initiator or the accident itself are possible.

[f] NA = not applicable.

[g] The guideline concentration used for comparison with estimated surface water and groundwater uranium concentrations is the former proposed EPA maximum concentration limit (MCL) of 20 μg/L; a revised value of 30 μg/L became effective in December 2003. These values are applicable for water "at the tap" of the user and are not directly applicable for surface water or groundwater (no such standard exists). The guideline concentration used for comparison with estimated soil uranium concentrations is a health-based guideline value for residential settings of 230 μg/g.

[h] Resources evaluated include construction materials (e.g., concrete, steel, special coatings), fuel, electricity, process chemicals, and containers (e.g., drums and cylinders).

TABLE 3.1-3 National Ambient Air Quality Standards, Kentucky State Ambient Air Quality Standards, Maximum Allowable Increments for Prevention of Significant Deterioration, and Highest Background Levels Representative of the Paducah Gaseous Diffusion Plant

Pollutant[a]	Averaging Time	NAAQS/SAAQS[b] Value	Type[c]	PSD Increment[d] (μg/m³) Class I	Class II	Highest Background Level Concentration[e]	Location (Year)
SO_2	3 hours	0.50 ppm (1,300 μg/m³)	S	25	512	0.065 ppm (13%)	Grahamville (1999)
	24 hours	0.14 ppm (365 μg/m³)	P	5	91	0.033 ppm (24%)	Grahamville (1997)
	Annual	0.03 ppm (80 μg/m³)	P	2	20	0.005 ppm (17%)	Grahamville (1999)
NO_2	Annual	0.053 ppm (100 μg/m³)	P, S	2.5	25	0.012 ppm (23%)	Paducah (1998)
CO[f]	1 hour	35 ppm (40 mg/m³)	P, S	–[g]	–	6.1 ppm (17%)	Paducah (1997)
	8 hours	9 ppm (10 mg/m³)	P, S	–	–	2.9 ppm (32%)	Paducah (1997)
O_3	1 hour	0.12 ppm (235 μg/m³)	P, S	–	–	0.110 ppm (92%)[h]	Paducah (1999)
	8 hours	0.08 ppm (157 μg/m³)	P, S	–	–	0.093 ppm (116%)[i]	Paducah (1999)
PM_{10}	24 hours	150 μg/m³	P, S	8	30	79 μg/m³ (53%)[h]	Paducah (2002)
	Annual	50 μg/m³	P, S	4	17	25 μg/m³ (50%)	Paducah (1999)
$PM_{2.5}$	24 hours	65 μg/m³	P, S	–	–	31.1 μg/m³ (48%)[h]	Paducah (2002)
	Annual	15 μg/m³	P, S	–	–	14.7 μg/m³ (98%)	Paducah (2000)
Pb	Calendar quarter	1.5 μg/m³	P, S	–	–	0.02 μg/m³ (3%)	Louisville (1997)

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TABLE 3.1-3 (Cont.)

[a] CO = carbon monoxide; NO_2 = nitrogen dioxide; O_3 = ozone; Pb = lead; $PM_{2.5}$ = particulate matter ≤2.5 μm; PM_{10} = particulate matter ≤10 μm; and SO_2 = sulfur dioxide.

[b] The SO_2 (3-hour and 24-hour) and CO standards are attained when the stated value is not exceeded more than once per year. The SO_2 (annual), NO_2, and Pb standards are attained when the stated value is not exceeded. The O_3 (1-hour) standard is attained when the stated value is not exceeded more than three times in 3 years. The O_3 (8-hour) standard is attained when the 3-year average of the annual fourth-highest daily maximum 8-hour average concentration does not exceed the stated value. The PM_{10} (annual) and $PM_{2.5}$ (annual) standards are attained when the 3-year average of the annual arithmetic means does not exceed the stated value. The PM_{10} (24-hour) standard is attained when the 3-year average of the 99th percentile values does not exceed the stated value. The $PM_{2.5}$ (24-hour) standard is attained when the 3-year average of the annual 98th percentile values does not exceed the stated value.

[c] P = primary standard whose limits were set to protect public health; S = secondary standard whose limits were set to protect public welfare.

[d] Class I areas are specifically designated areas in which degradation of air quality is severely restricted under the Clean Air Act; Class II areas have a somewhat less stringent set of allowable emissions.

[e] Values in parentheses are monitored concentrations as a percentage of NAAQS or SAAQS.

[f] The NAAQS have a primary standard only; the Kentucky SAAQS, however, have a secondary standard as well.

[g] A dash indicates that no standard exists.

[h] Second-highest value.

[i] Fourth-highest value.

Sources: 40 CFR Part 50; Kentucky Division for Air Quality (2002); 40 CFR 52.21; EPA (2003a).

TABLE 3.1-6 Estimated Radiation Doses to Members of the General Public and Cylinder Yard Workers at the Paducah Gaseous Diffusion Plant

Receptor	Radiation Source	Dose to Individual (mrem/yr)
Member of the general public (MEI)[a]	Routine site operations	
	Airborne radionuclides	0.0088[b]
	Waterborne radionuclides	0.032[c]
	Direct gamma radiation	0.17[d]
	Ingestion of drinking water	0.00055[e]
	Ingestion of wildlife	1.7[f]
Cylinder yard worker	External radiation	170–427[g]
Member of the public or worker	Natural background radiation around the Paducah site	95[h]
DOE worker limit		2,000[i]

[a] The MEI is assumed to reside at an off-site location that would yield the largest dose. An average person would receive a radiation dose much less than the values shown in this table.

[b] Radiation doses from airborne releases were estimated by using an air dispersion model and took into account exposure from external radiation, inhalation, and ingestion of foodstuffs. The MEI was assumed to be located approximately 4,003 ft (1,220 m) north of the plant site (DOE 2001b).

[c] Radiation doses would result from incidental ingestion of contaminated sediment in Little Bayou Creek every other day during the hunting season (DOE 2001b).

[d] Radiation exposure would result from frequently traveling along Dykes Road in the vicinity of the cylinder storage yards (DOE 2001b).

[e] The radiation dose was estimated on the basis of the assumption that the MEI consumes water supplied by the public water system at Cairo, Illinois, the closest water supply system that uses water downstream of Paducah GDP effluents (DOE 2001b).

[f] Radiation doses could result from ingestion of the edible portion of two average-weight deer containing the maximum detected concentrations of radionuclides (DOE 2001b).

[g] Range of annual dose in 2001 (Hicks 2002a).

[h] Average dose from natural background radiation is 105 mR/yr (DOE 2001b), which can be converted to 95 mrem/yr.

[i] DOE administrative procedures limit DOE workers to 2,000 mrem/yr (DOE 1992), whereas the regulatory dose limit for radiation workers is 5,000 mrem/yr (10 CFR Part 835).

TABLE 3.1-7 Estimated Hazard Quotients for Members of the General Public near the Paducah Site under Existing Environmental Conditions[a]

Environmental Medium	Parameter	Assumed Exposure Concentration	Estimated Chronic Intake (mg/kg-d)	Reference Level[b] (mg/kg-d)	Hazard Quotient[c]
Air[d,e]	Uranium	0.02 μg/m^3	5.7×10^{-6}	0.0003	0.019
	HF	0.096 μg/m^3	2.7×10^{-5}	0.02	0.0014
Soil[f]	Uranium	5.8 μg/g	7.7×10^{-5}	0.003	0.026
Surface water[e,g]	Uranium	17 μg/L	9.3×10^{-6}	0.003	0.003
	Fluoride	< 224 μg/L	1.2×10^{-4}	0.06	0.002
Sediment[e,h]	Uranium	360 μg/g	6.2×10^{-6}	0.003	0.033
	Aroclor® 1254	1.4 μg/g	3.8×10^{-7}	0.00002	0.019
	Aroclor 1254[i]	1.4 μg/g	5.5×10^{-8}	2 (slope factor)	1.1×10^{-7} (cancer risk)
Groundwater[j]	Uranium	600 μg/L	1.7×10^{-2}	0.003	5.7
	Fluoride	520 μg/L	1.5×10^{-2}	0.06	0.25

[a] The receptor is assumed to be a long-term resident near the site boundary or another off-site monitoring location that would have the highest concentration of the contaminant being addressed; reasonable maximum exposure conditions were assumed. Only the exposure pathway contributing the most to intake levels was considered (i.e., inhalation for air and ingestion for soil, sediment, surface water, and groundwater). Residential exposure scenarios were assumed for air, soil, and groundwater analyses; recreational exposure scenarios were assumed for surface water and sediment analyses.

[b] The reference level is an estimate of the daily human exposure level that is likely to be without an appreciable risk of deleterious effects. The reference levels used in this assessment are defined in Appendix F. For the carcinogen Aroclor 1254, the slope factor is also given. Slope factors in units of $(mg/kg\text{-}d)^{-1}$ are multiplied by lifetime average intake to estimate excess cancer risk.

[c] The hazard quotient is the ratio of the intake of the human receptor to the reference level. A hazard quotient of less than 1 indicates that adverse health effects resulting from exposure to that chemical alone are unlikely. For carcinogens, the cancer risk (intake × slope factor) is also given. Increased cancer risks of between 10^{-6} and 10^{-4} are considered tolerable at hazardous waste sites; risks of less than 10^{-6} are considered negligible.

[d] For the uranium air concentration, the reported concentration for uranium-238 and thorium-234 combined was used (DOE 2001b). No new HF air concentration data were available; the concentration reported in MMES (1994a,b) was used.

[e] Exposure concentrations are the maximum annual averages for all monitoring locations.

[f] Maximum uranium concentration from 10 facility boundary and off-site soil monitoring locations (LMES 1996a).

[g] The uranium value is the maximum average surface water concentration from 20 sampling locations (DOE 2001b). No new fluoride concentration data were available; the concentration reported in MMES (1994a,b) was used.

[h] Uranium sediment concentration is from LMES (1997a); PCB data are from LMES (1996a). Values reported in the 2000 environmental report are lower.

[i] Parameter analyzed for carcinogenic effects; all other parameters were analyzed for noncarcinogenic effects.

[j] Data are maximum detected values for monitoring and residential wells located on or near DOE property at the Paducah site (none of the wells are currently used for drinking water). The maximum uranium concentration was observed in the upper continental recharge system; the maximum fluoride concentration was from the northwest plume, MW 237 (DOE 2001b). Several additional substances (most notably TCE and Tc-99) exceeded reference levels between 1993 and 1996; listed here are only substances of particular interest for this EIS.

TABLE 3.2-11 Employment in Anderson County by Industry in 1990 and 2000

Sector	No. of People Employed in 1990[a]	Percentage of County Total	No. of People Employed in 2000[b]	Percentage of County Total	Growth Rate (%), 1990–2000
Agriculture	577[c]	1.7	243[d]	0.6	-8.3[e]
Mining	293	0.9	60	0.2	-14.7
Construction	857	2.6	1,175	3.0	3.2
Manufacturing	11,634	34.9	10,523	26.4	-1.0
Transportation and public utilities	801	2.4	218	0.5	-12.2
Trade	5,236	15.7	4,200	10.6	-2.2
Finance, insurance, and real estate	829	2.5	1,058	2.7	2.5
Services	13,016	39.1	22,273	56.0	5.5
Total	33,299		39,797		1.8

[a] U.S. Bureau of the Census (1992).

[b] U.S. Bureau of the Census (2002b).

[c] These agricultural data are for 1992 and are taken from USDA (1994).

[d] These agricultural data are for 1997 and are taken from USDA (1999).

[e] Agricultural data are for 1992 and 1997.

TABLE 3.2-12 Employment in the ETTP Region of Influence by Industry in 1990 and 2000

Sector	No. of People Employed in 1990[a]	Percentage of ROI Total	No. of People Employed in 2000[b]	Percentage of ROI Total	Growth Rate (%), 1990–2000
Agriculture	4,528[c]	2.2	2,545[d]	1.0	-5.6[e]
Mining	1,138	0.6	407	0.2	-9.8
Construction	11,185	5.5	14,416	5.8	2.6
Manufacturing	39,633	19.3	32,706	13.2	-1.9
Transportation and public utilities	11,322	5.5	6,682	2.7	-5.1
Trade	61,583	30.1	50,387	20.3	-2.0
Finance, insurance, and real estate	8,851	4.3	12,357	5.0	3.4
Services	66,279	32.3	128,299	51.7	6.8
Total	204,922		248,003		1.9

[a] U.S. Bureau of the Census (1992).

[b] U.S. Bureau of the Census (2002b).

[c] These agricultural data are for 1992 and are taken from USDA (1994).

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[e] Agricultural data are for 1992 and 1997.

TABLE 3.2-16 Public Service Employment in the City of Knoxville, ETTP Region-of-Influence Counties, and Tennessee in 2001

	City of Knoxville		Knox County		Clinton	
Employment Category	No. of Workers	Level of Service[a]	No. of Workers	Level of Service[a]	No. of Workers	Level of Service[a]
Police	429	2.5	495	2.3	24	2.5
Fire[b]	334	1.91.91	0	0.0	18	1.9
General	907	5.2	2,505	11.8	58	6.1
Total	1,670	9.6	3,000	14.1	100	10.6

	Lake City		City of Oak Ridge		Anderson County		Tennessee[c]
Employment Category	No. of Workers	Level of Service[a]	No. of Workers	Level of Service[a]	No. of Workers	Level of Service	Level of Service
Police	7	3.8	56	2.0	93	2.8	2.4
Fire[b]	3	1.6	42	1.5	0	0.0	1.1
General	19	10.2	256	9.3	336	10.2	39.1
Total	29	15.6	354	12.9	429	13.0	52.6

[a] Level of service represents the number of employees per 1,000 persons in each jurisdiction (U.S. Bureau of the Census 2002a).

[b] Volunteers not included.

[c] 2000 data.

Sources: City of Knoxville: Hatfield (2002); Knox County: Rodgers (2002), Parolari (2002); Clinton: Shootman (2002); Lake City: Hayden (2002); City of Oak Ridge: McGinnis (2002); Anderson County: Worthington (2002); Tennessee: U.S. Bureau of the Census (2002d).

TABLE 3.2-17 Number of Physicians in Knox and Anderson Counties and Tennessee in 1997

	Knox County		Anderson County		Tennessee
Employment Category	No.	Level of Service[a]	No.	Level of Service[a]	Level of Service[a]
Physicians	1,519	4.1	209	3.0	2.6

[a] Level of service represents the number of physicians per 1,000 persons in each jurisdiction.

Source: American Medical Association (1999).

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Total	1,670	9.6	3,000	14.1	100	10.6

	Lake City		City of Oak Ridge		Anderson County		Tennessee[c]
Employment Category	No. of Workers	Level of Service[a]	No. of Workers	Level of Service[a]	No. of Workers	Level of Service	Level of Service
Police	7	3.8	56	2.0	93	2.8	2.4
Fire[b]	3	1.6	42	1.5	0	0.0	1.1
General	19	10.2	256	9.3	336	10.2	39.1
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Physicians	1,519	4.1	209	3.0	2.6

[a] Level of service represents the number of physicians per 1,000 persons in each jurisdiction.

Source: American Medical Association (1999).

TABLE 3.2-18 School District Data for Knox and Anderson Counties and Tennessee in 2001

	Knox County		Anderson County		Tennessee
Employment Category	No.	Student-to-Teacher Ratio[a]	No.	Student-to-Teacher Ratio[a]	Student-to-Teacher Ratio[a]
Teachers	3,380	15.4	488	12.5	15.8

[a] The number of students per teacher in each school district.

Source: Tennessee Department of Education (2001).

TABLE 3.2-19 Medical Facility Data for Knox and Anderson Counties in 1998

Hospital	No. of Staffed Beds	Occupancy Rate (%)[a]
Knox County		
Baptist Hospital of East Tennessee	316	66
East Tennessee Children's Hospital	103	67
County total	319	NA[b]
Anderson County		
Methodist Medical Center of Oak Ridge	250	72
Ridgeview Psychiatric Hospital and Center	20	35
County total	270	NA

[a] Percent of staffed beds occupied.

[b] NA = not available.

Source: Healthcare InfoSource, Inc. (1998).

TABLE 3.2-18 School District Data for Knox and Anderson Counties and Tennessee in 2001

	Knox County		Anderson County		Tennessee
Employment Category	No.	Student-to-Teacher Ratio[a]	No.	Student-to-Teacher Ratio[a]	Student-to-Teacher Ratio[a]
Teachers	3,380	15.4	488	12.5	15.8

[a] The number of students per teacher in each school district.

Source: Tennessee Department of Education (2001).

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Methodist Medical Center of Oak Ridge	250	72
Ridgeview Psychiatric Hospital and Center	20	35
County total	270	NA

[a] Percent of staffed beds occupied.

[b] NA = not available.

Source: Healthcare InfoSource, Inc. (1998).

TABLE 3.2-3 National Ambient Air Quality Standards, Tennessee State Ambient Air Quality Standards, Maximum Allowable Increments for Prevention of Significant Deterioration, and Highest Background Levels Representative of the ETTP Site

		NAAQS/SAAQS[b]		PSD Increments[d] ($\mu g/m^3$)		Highest Background Level	
Pollutant[a]	Averaging Time	Value	Type[c]	Class I	Class II	Concentration[e]	Location (Year)
SO_2	3 hours	0.50 ppm (1,300 $\mu g/m^3$)	S	25	512	0.109 ppm (22%)	Rockwood (1998)
	24 hours	0.14 ppm (365 $\mu g/m^3$)	P	5	91	0.031 ppm (22%)	Rockwood (2001)
	Annual	0.03 ppm (80 $\mu g/m^3$)	P	2	20	0.003 ppm (10%)	Oak Ridge (2000)
NO_2	Annual	0.053 ppm (100 $\mu g/m^3$)	P, S	2.5	25	0.008 ppm (15%)	Oak Ridge (2000)
CO[f]	1 hour	35 ppm (40 mg/m^3)	P,S	–[g]	–	11.1 ppm (32%)	Knoxville (1999)
	8 hours	9 ppm (10 mg/m^3)	P, S	–	–	4.9 ppm (54%)	Knoxville (1997)
O_3	1 hour	0.12 ppm (235 $\mu g/m^3$)	P, S	–	–	0.116 ppm (97%)[h]	Oak Ridge (1999)
	8 hours	0.08 ppm (157 $\mu g/m^3$)	P, S	–	–	0.099 ppm (124%)[i]	Anderson County (2002)
PM_{10}	24 hours	150 $\mu g/m^3$	P, S	8	30	69.9 $\mu g/m^3$ (47%)	ETTP (2000)
	Annual	50 $\mu g/m^3$	P, S	4	17	23.2 $\mu g/m^3$ (46%)	ETTP (2000)
$PM_{2.5}$	24 hours	65 $\mu g/m^3$	P, S	–	–	50.4 $\mu g/m^3$ (78%)[h]	Harriman (2000)
	Annual	15 $\mu g/m^3$	P, S	–	–	18.4 $\mu g/m^3$ (123%)	Harriman (2000)
Pb	Calendar quarter	1.5 $\mu g/m^3$	P, S	–	–	0.0063 $\mu g/m^3$ (0.4%)	ETTP (2000)

Footnotes on next page.

TABLE 3.2-3 (Cont.)

[a] CO = carbon monoxide; NO_2 = nitrogen dioxide; O_3 = ozone; Pb = lead; $PM_{2.5}$ = particulate matter ≤2.5 μm; PM_{10} = particulate matter ≤10 μm; and SO_2 = sulfur dioxide.

[b] The SO_2 (3-hour and 24-hour) and CO standards are attained when the stated value is not exceeded more than once per year. The SO_2 (annual), NO_2, and Pb standards are attained when the stated value is not exceeded. The O_3 (1-hour) standard is attained when the stated value is not exceeded more than three times in three years. The O_3 (8-hour) standard is attained when the 3-year average of the annual fourth-highest daily maximum 8-hour average concentration does not exceed the stated value. The PM_{10} (annual) and $PM_{2.5}$ (annual) standards are attained when the 3-year average of the annual arithmetic means does not exceed the stated value. The PM_{10} (24-hour) standard is attained when the 3-year average of the 99th percentile values does not exceed the stated value. The $PM_{2.5}$ (24-hour) standard is attained when the 3-year average of the annual 98th percentile values does not exceed the stated value.

[c] P = primary standard whose limits were set to protect public health; S = secondary standard whose limits were set to protect public welfare.

[d] Class I areas are specifically designated areas in which the degradation of air quality is severely restricted under the Clean Air Act; Class II areas have a somewhat less stringent set of allowable emissions.

[e] Values in parentheses are monitored concentrations as a percentage of NAAQS or SAAQS.

[f] The NAAQS have a primary standard only; the Tennessee SAAQS, however, have a secondary standard as well.

[g] A dash indicates that no standard exists.

[h] Second-highest value.

[i] Fourth-highest value.

Sources: 40 CFR 50; TDEC (1999); 40 CFR 52.21; DOE (2002c); EPA (2003a).

TABLE 3.2-6 Federal- and State-Listed Endangered, Threatened, and Special Concern Species on ORR

Scientific Name	Common Name	Federal Status	State Status
Mammals			
Myotis grisescens	Gray bat	E	E
Sorex longirostris	Southeastern shrew		NM
Birds			
Accipieter striatus	Sharp-shinned hawk		NM
Aimophila aestivalis	Bachman's sparrow		E
Anhinga anhinga	Anhinga		NM
Casmerodius alba	Great egret		NM
Circus cyaneus	Northern harrier		NM
Contopus borealis	Olive-sided flycatcher		NM
Dendroica cerulea	Cerulean warbler		NM
Egretta caerulea	Little blue heron		NM
Egretta thula	Snowy egret		NM
Falco peregrinus	Peregrine falcon		E
Heliaeetus leucocephalus	Bald eagle	T	NM
Lanius ludovicianus	Loggerhead shrike		NM
Pandion haliaetus	Osprey		E
Sphyrapicus varius	Yellow-bellied sapsucker		NM
Amphibians			
Hemidactylium scutatum	Four-toed salamander		NM
Fish			
Phoxinus tennesseensis	Tennessee dace		NM
Plants			
Aureolaria patula	Spreading false-foxglove		T
Carex gravida	Heavy sedge		S
Carex oxylepis pubescens	Hairy sharp-scaled sedge		S
Cimicifuga rubifolia	Appalachian bugbane		T
Cypripedium acaule	Pink lady's slipper		E
Delphinium exaltatum	Tall larkspur		E
Diervilla lonicera	Northern bush-honeysuckle		T
Draba ramosissima	Branching whitlow-grass		S
Elodea nuttallii	Nuttall waterweed		S
Fothergilla major	Mountain witch-alder		T
Hydrastis canadensis	Golden seal		S
Juglans cinerea	Butternut		T
Juncus brachycephalus	Small-head rush		S
Lilium canadense	Canada lily		T
Lilium michiganense	Michigan lily		T
Liparis loeselii	Fen orchid		E
Panax quinquifolius	Ginseng		S
Platanthera flava herbiola	Tuberculed rein-orchid		T
Ruellia purshiana	Pursh's wild petunia		S
Scirpus fluviatilis	River bulrush		S
Spiranthes lucida	Shining ladies-tresses		T
Thuja occidentalis	Northern white cedar		S
Viola tripartita	Three-parted violet		S

[a] Status codes: E = endangered; T = threatened; NM = in need of management; S = special concern.

Source: DOE (2001c).

TABLE 3.2-8 Estimated Hazard Quotients for Members of the Public near ETTP under Existing Environmental Conditions[a]

Environmental Medium	Parameter	Assumed Exposure Concentration	Estimated Chronic Intake (mg/kg-d)	Reference Level[b] (mg/kg-d)	Hazard Quotient[c]
Air[d]	Uranium	0.0014 μg/m^3	3.9×10^{-7}	0.0003	0.0013
Soil[e]	Uranium	6.7 μg/g	8.9×10^{-5}	0.003	0.03
Surface water[f]	Uranium	13 μg/L	7.1×10^{-6}	0.003	0.0024
	Fluoride	180 μg/L	9.9×10^{-5}	0.06	0.0016
Sediment[g]	Uranium	43 μg/g	1.2×10^{-5}	0.003	0.0039
Groundwater[h]	Uranium	25 μg/L	1.8×10^{-4}	0.003	0.24
	Fluoride	4,000 μg/L	1.1×10^{-2}	0.06	1.9

[a] The receptor was assumed to be a long-term resident near the site boundary or another off-site monitoring location that would have the highest concentration of the contaminant being addressed; reasonable maximum exposure conditions were assumed. Only the exposure pathway contributing the most to intake levels was considered (i.e., inhalation for air and ingestion for soil, sediment, surface water, and groundwater). Residential exposure scenarios were assumed for air, soil, and groundwater analyses; recreational exposure scenarios were assumed for surface water and sediment analyses. For all environmental media, only uranium and fluoride data (of particular interest for this EIS) are presented, although other substances are also measured.

[b] The reference level is an estimate of the daily human exposure level that is likely to be without an appreciable risk of deleterious effects. The reference levels used in this assessment are defined in Appendix F.

[c] The hazard quotient is the ratio of the intake of the human receptor to the reference level. A hazard quotient of less than 1 indicates that adverse health effects resulting from exposure to that chemical alone are unlikely.

[d] For the uranium air concentration, the maximum average from six monitoring locations was used (DOE 2002d). HF was not measured.

[e] Current soil sampling data were unavailable; data presented are from LMES (LMES 1996c). No data were available for fluoride.

[f] For uranium, the value is the maximum average for downstream locations (DOE 2002d). Current surface water sampling data for fluoride were unavailable; data presented are from LMES (1996c).

[g] Current sediment sampling data were unavailable; data presented are from LMES (1996c).

[h] Groundwater data are not provided in the current annual site environmental report (DOE 2002c). The concentration presented for uranium is from LMES (1996c). The value is the maximum annual average for all exit pathway monitoring locations because these are the locations where the general public could most likely be exposed in the future. Alpha activity was used as a surrogate measure of the uranium concentration. The well-specific concentration for fluoride was not available; the exposure concentration given is the drinking water standard. Several wells were stated to have fluoride levels in excess of the standard (LMES 1996b). The hazard index for fluoride could therefore exceed that presented. Several additional substances exceeded drinking water standards or guidelines in 1994 and 1995 monitoring; only substances of particular interest for this EIS are listed here.