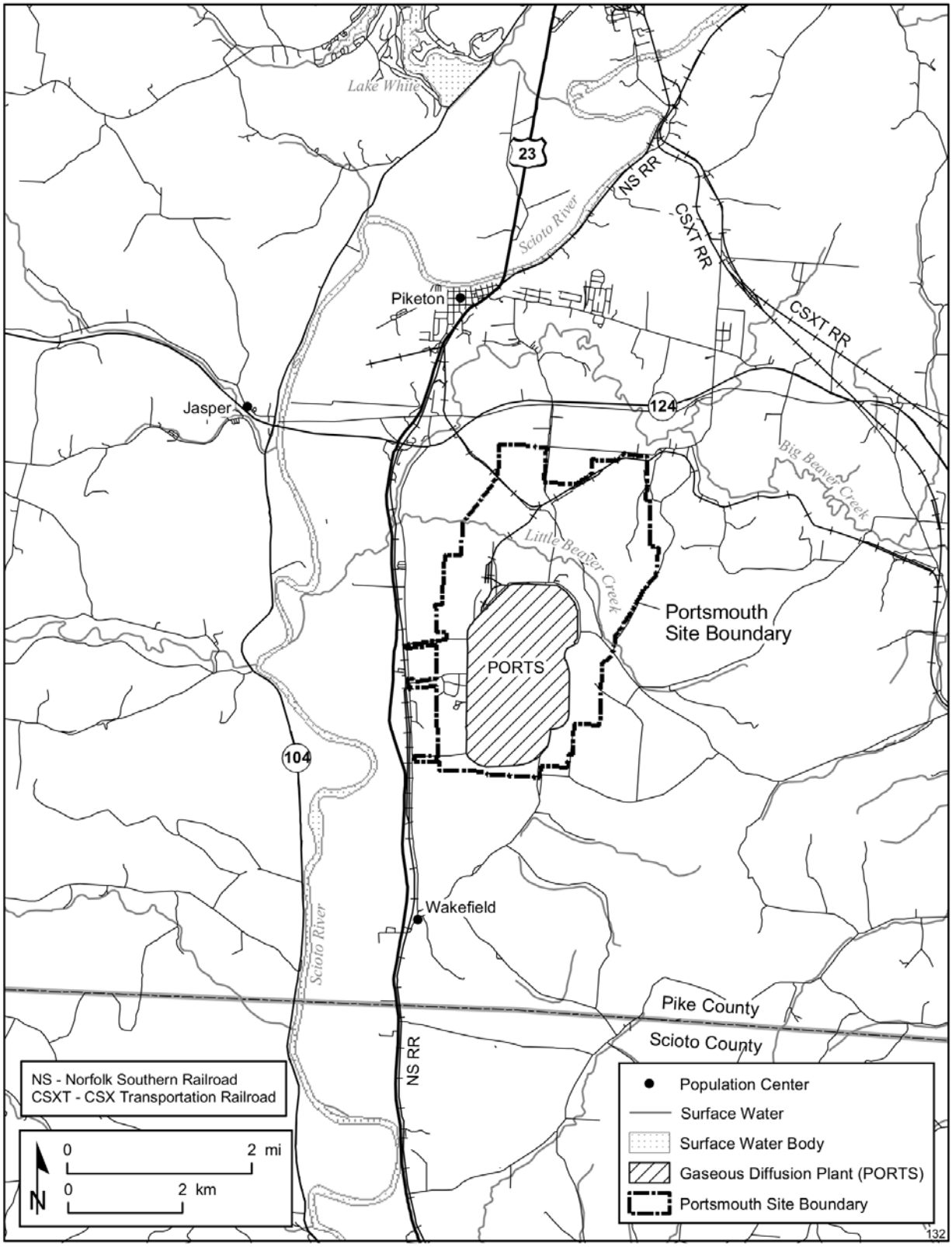

FIGURE S-1 Regional Map of the Portsmouth, Ohio, Site Vicinity

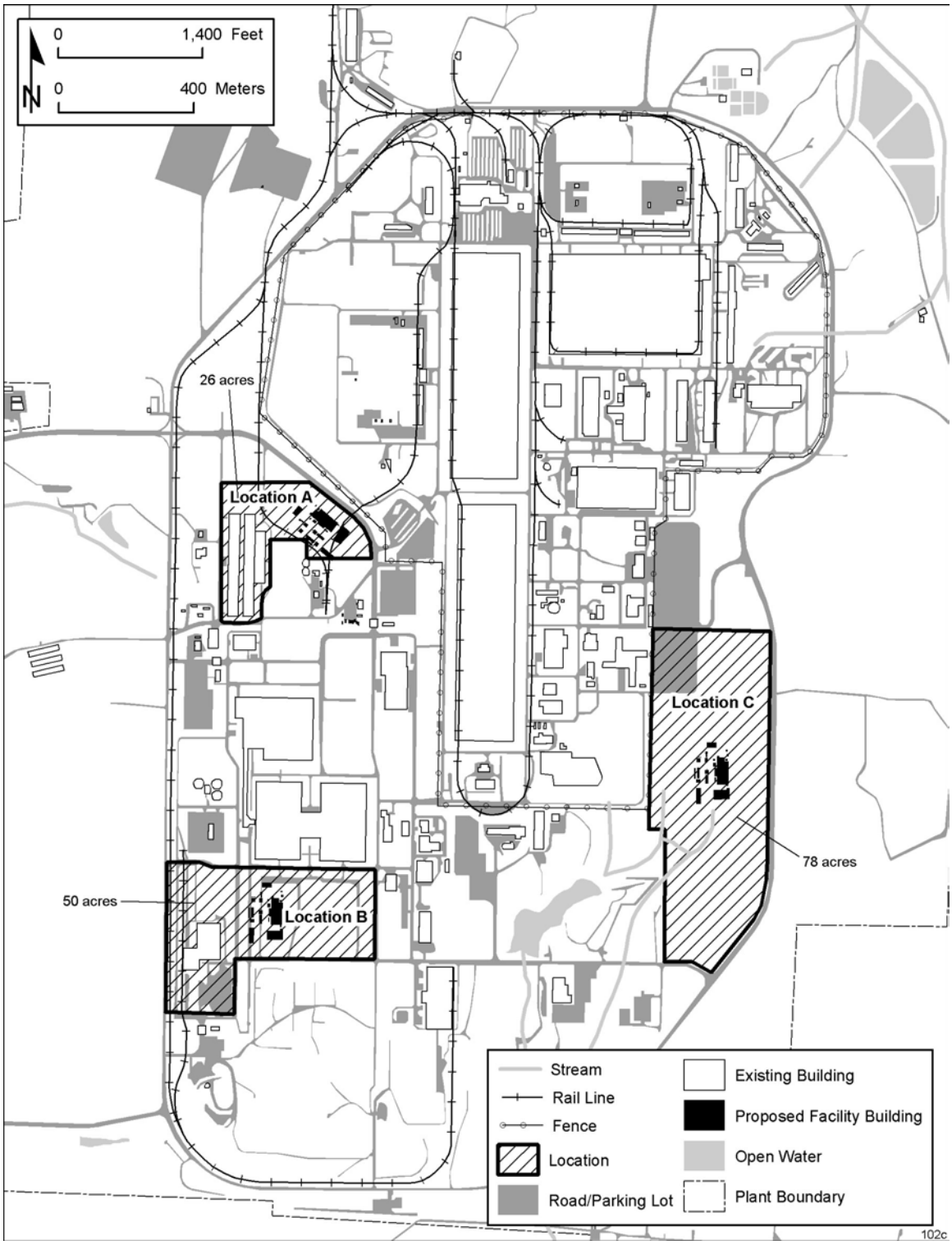

FIGURE S-3 Three Alternative Conversion Facility Locations within the Portsmouth Site, with Location A Being the Preferred Alternative (A representative conversion facility footprint is shown within each location.)

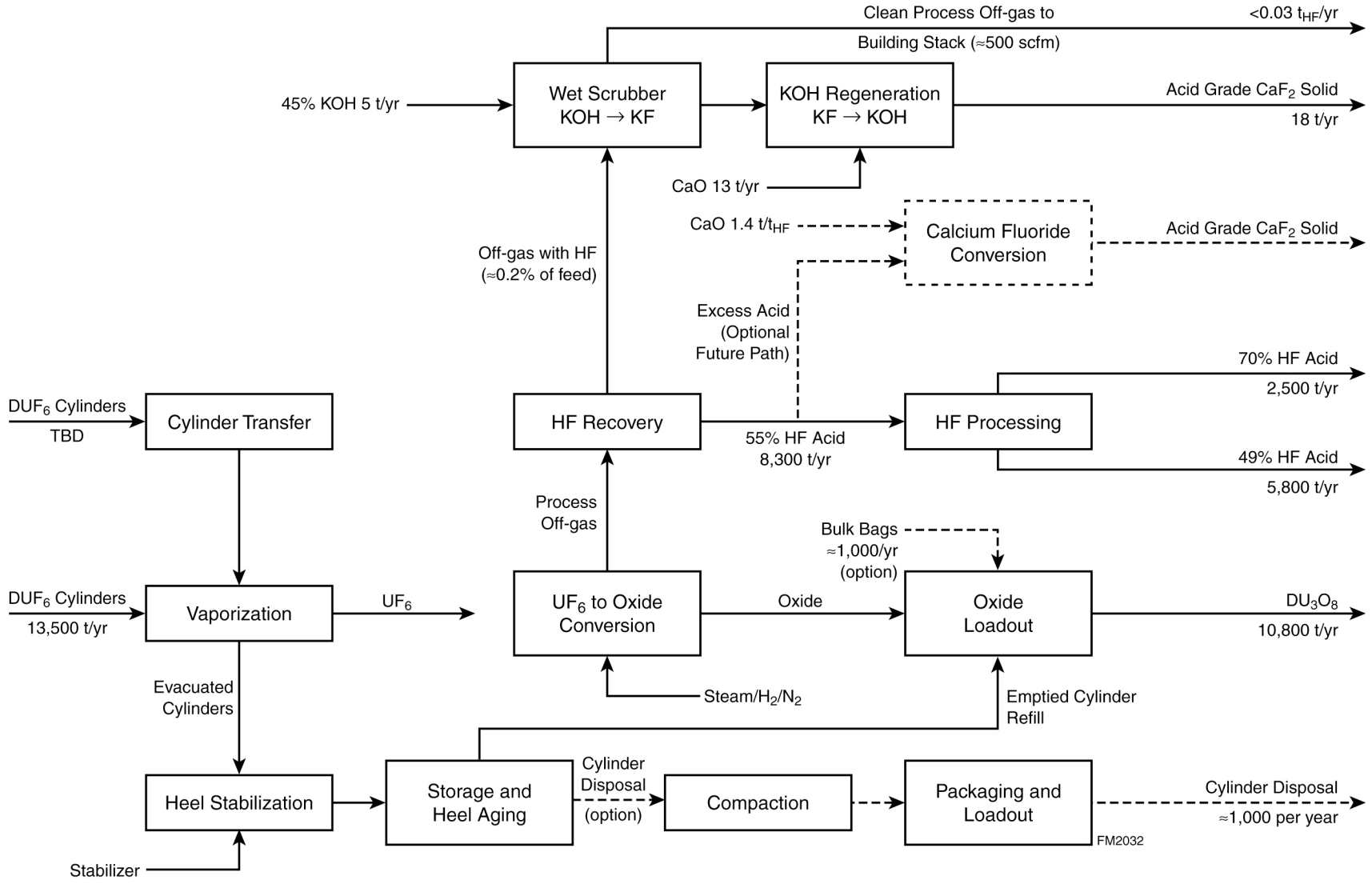

FIGURE S-4 Conceptual Overall Material Flow Diagram for the Portsmouth Conversion Facility

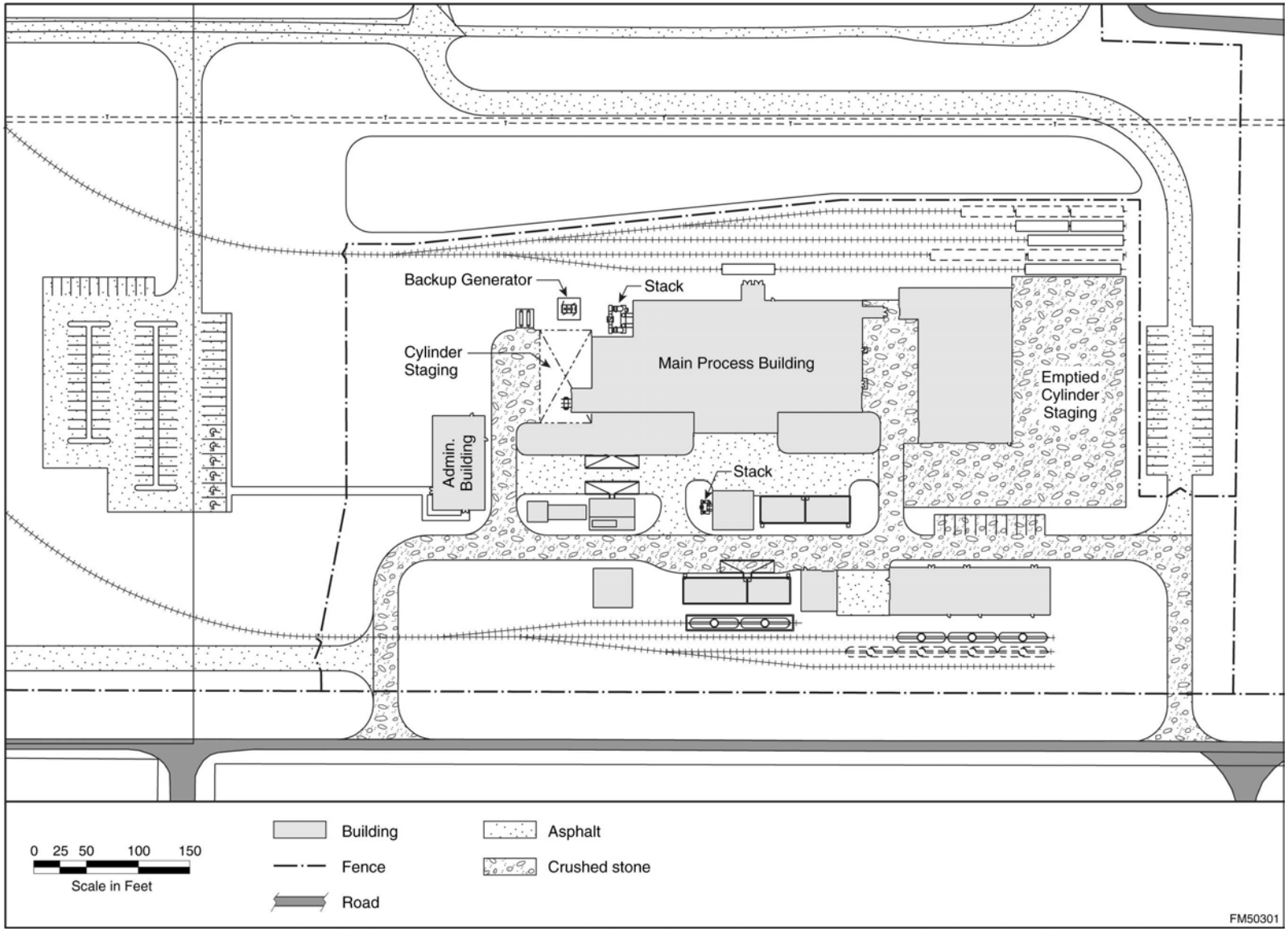

FIGURE S-5 Conceptual Conversion Facility Site Layout for Portsmouth

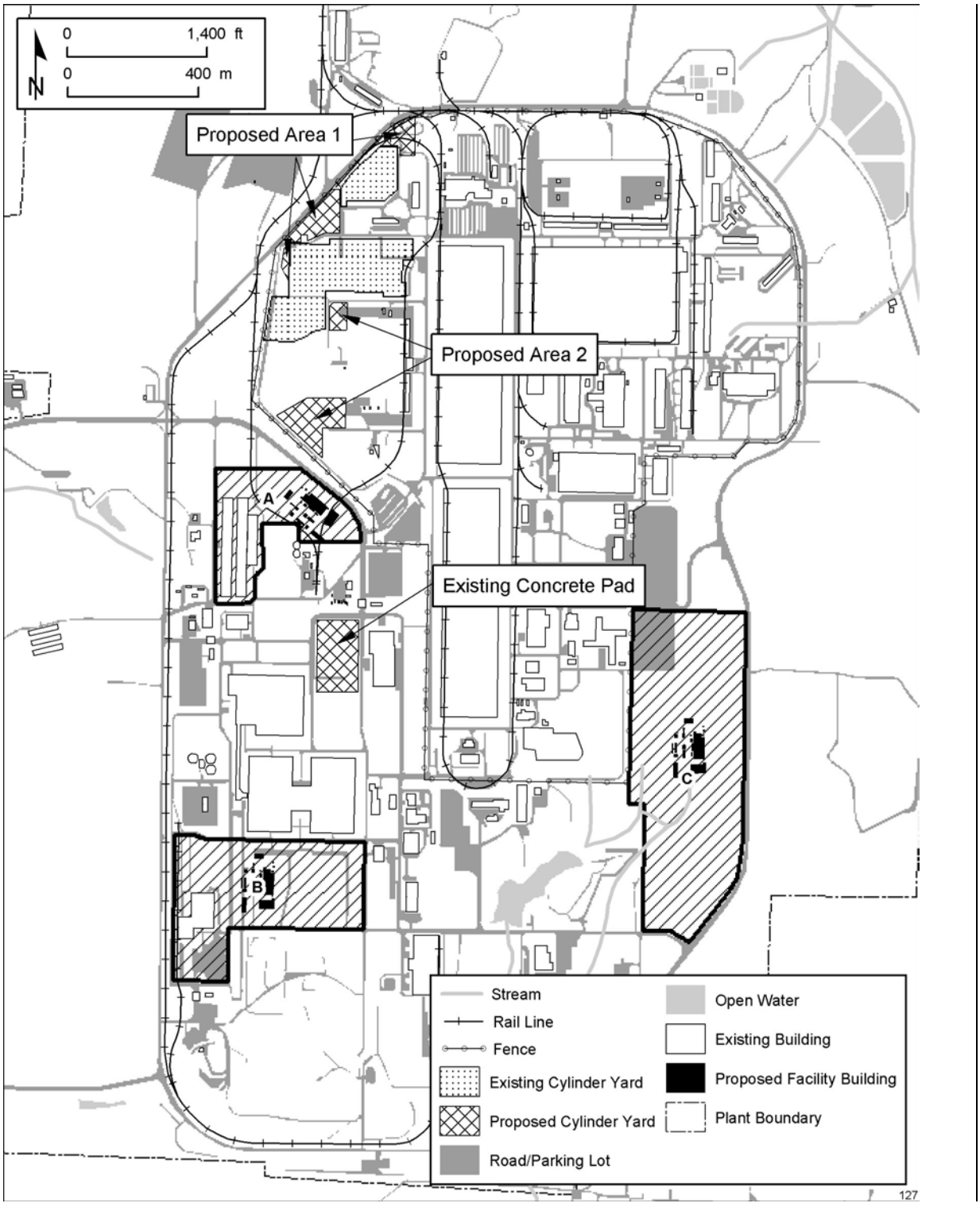

FIGURE S-6 Potential Locations for Construction of a New Cylinder Storage Yard at Portsmouth

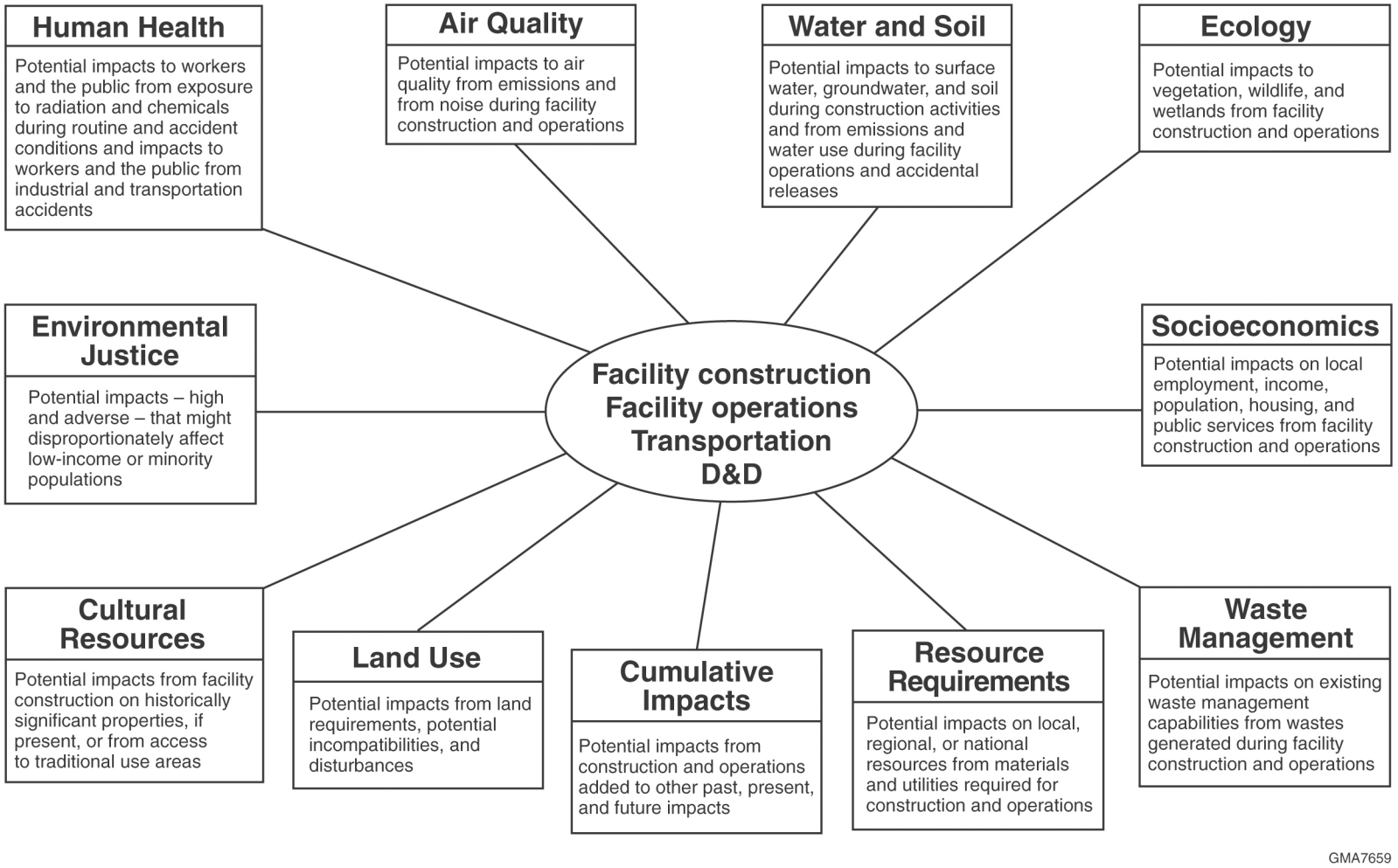

FIGURE S-7 Areas of Potential Impact Evaluated for Each Alternative

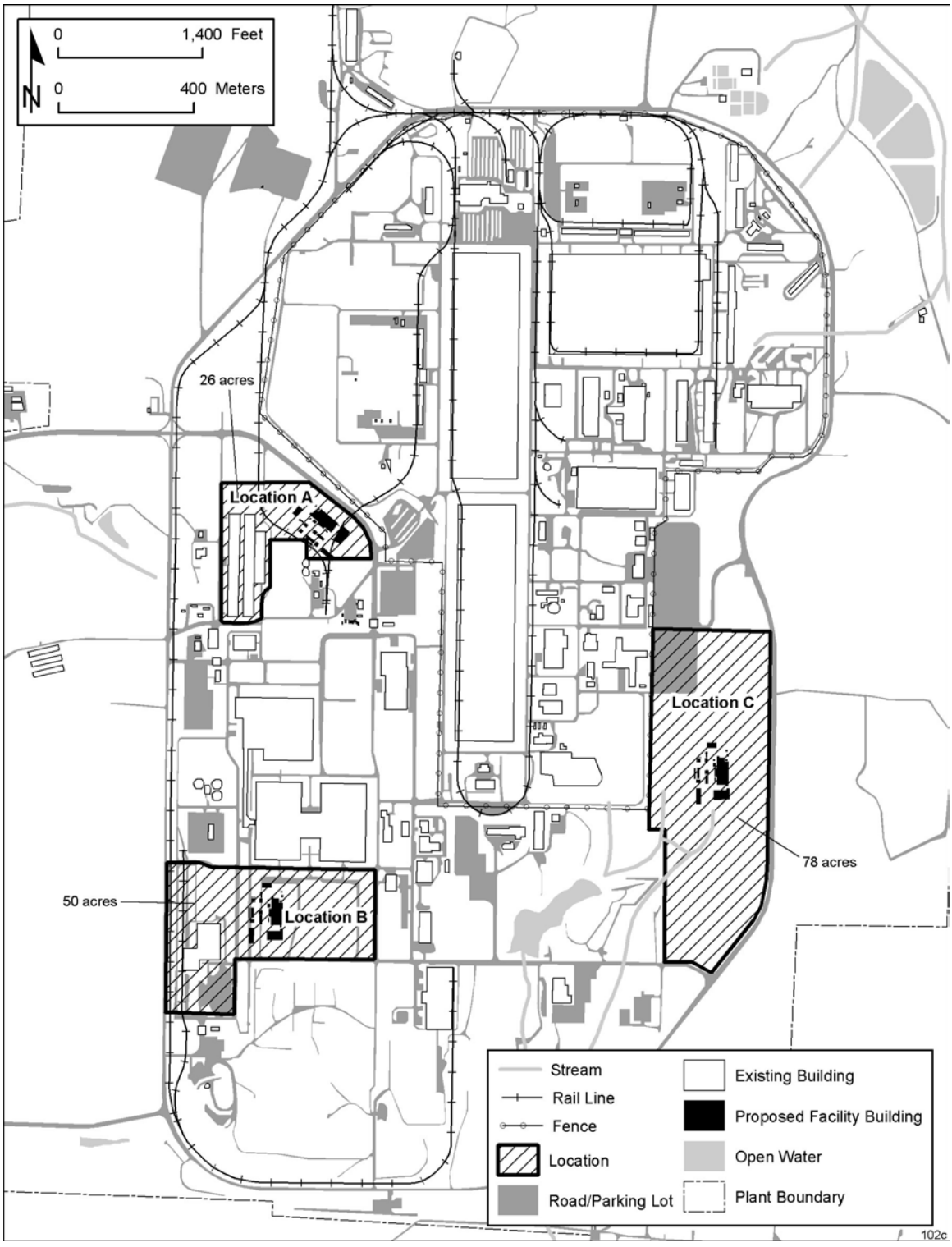

FIGURE 2.2-1 Three Alternative Conversion Facility Locations within the Portsmouth Site, with Location A Being the Preferred Alternative (A representative conversion facility footprint is shown within each location.)

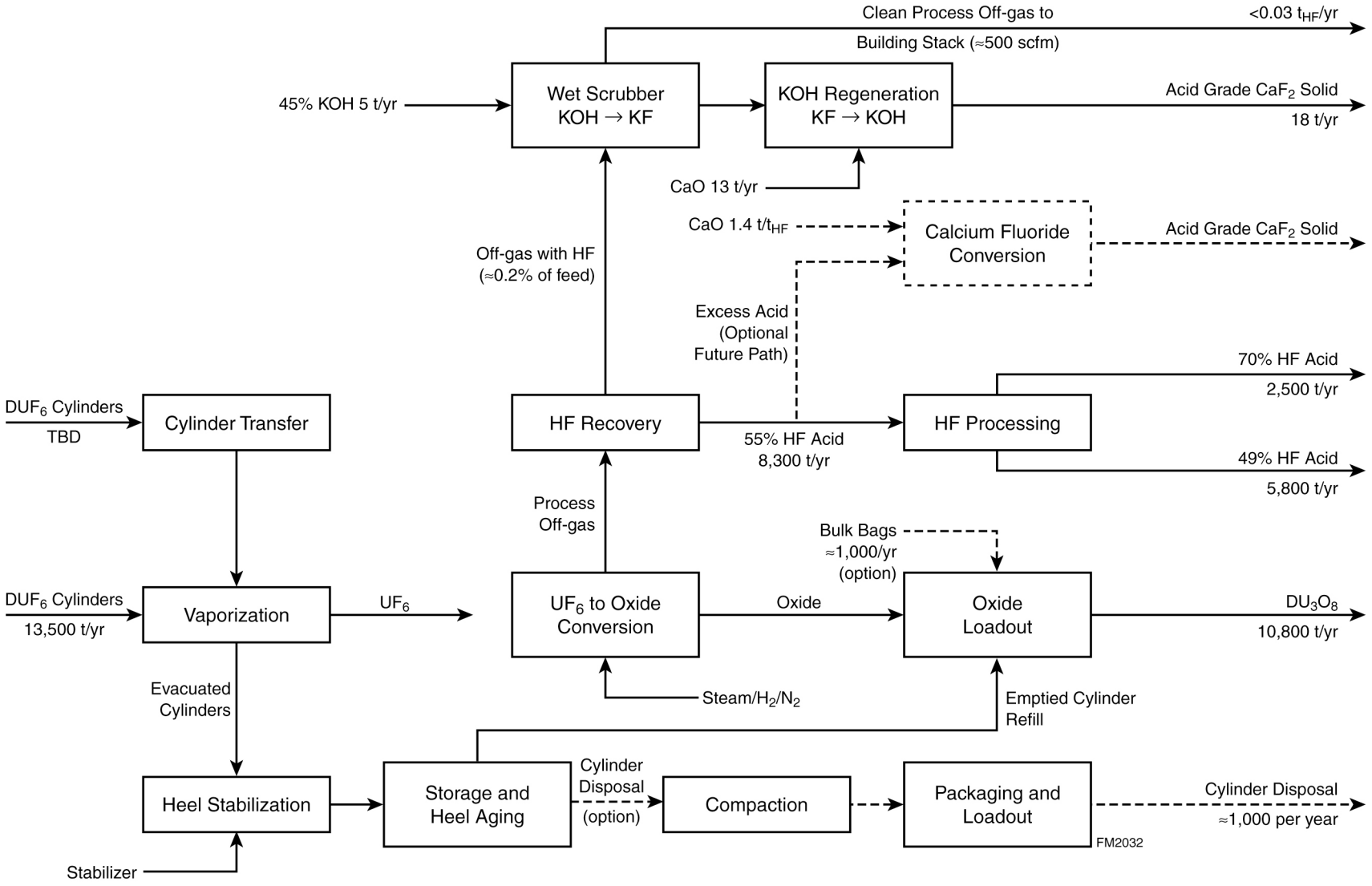

FIGURE 2.2-2 Conceptual Overall Material Flow Diagram for the Portsmouth Conversion Facility (Source: UDS 2003b)

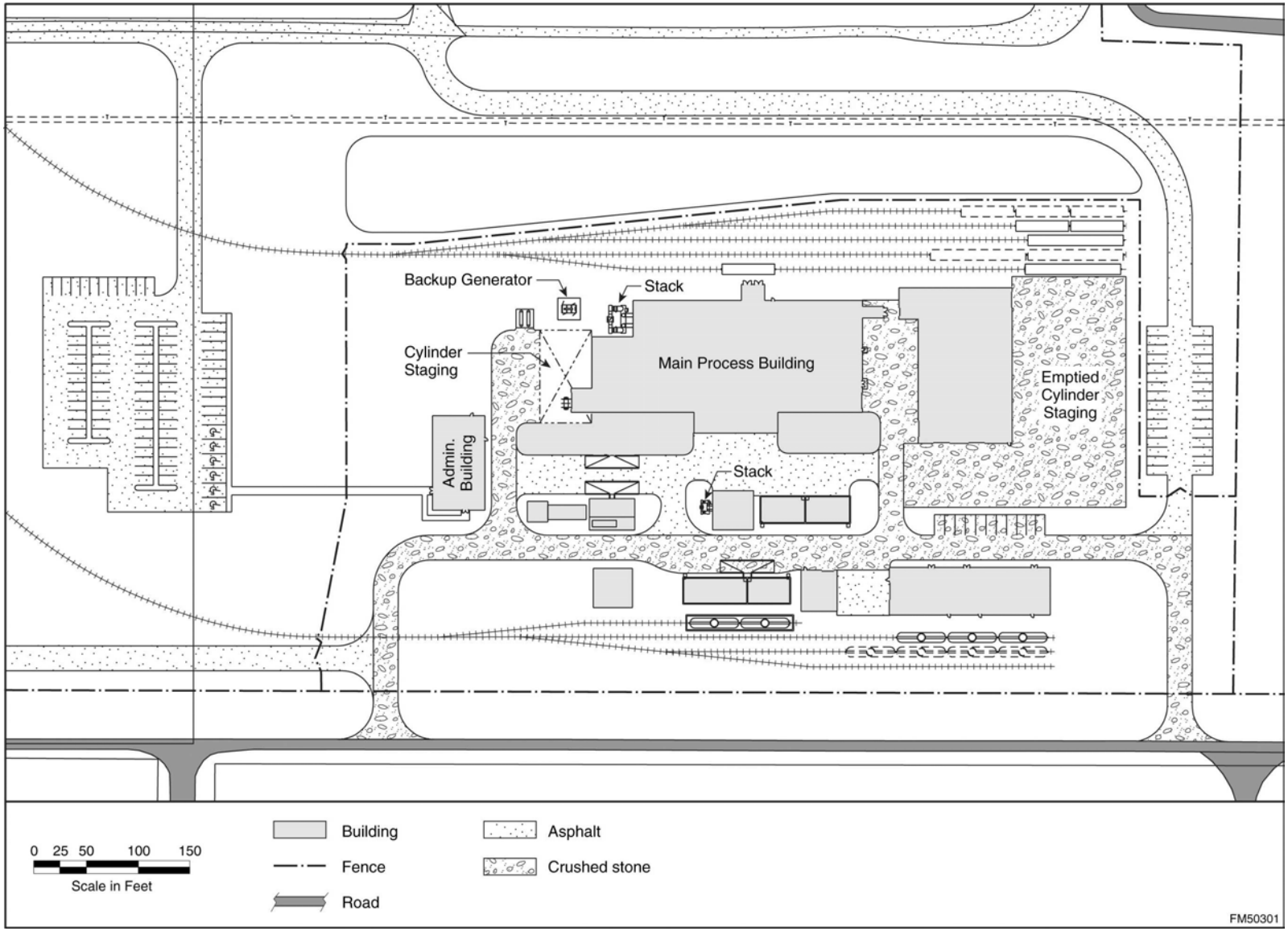

FIGURE 2.2-3 Conceptual Conversion Facility Site Layout for Portsmouth

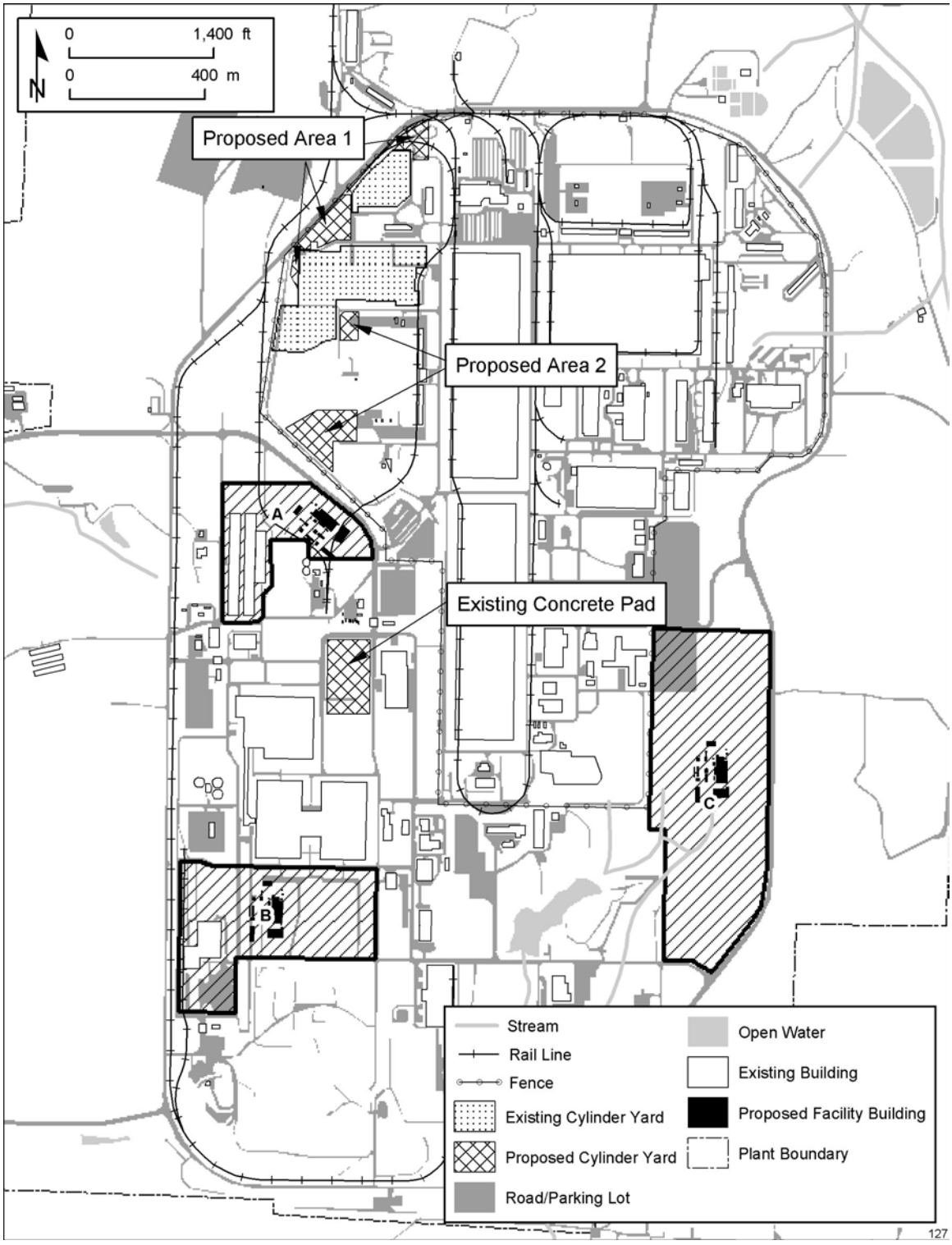

FIGURE 2.2-4 Potential Locations for Construction of a New Cylinder Storage Yard at Portsmouth

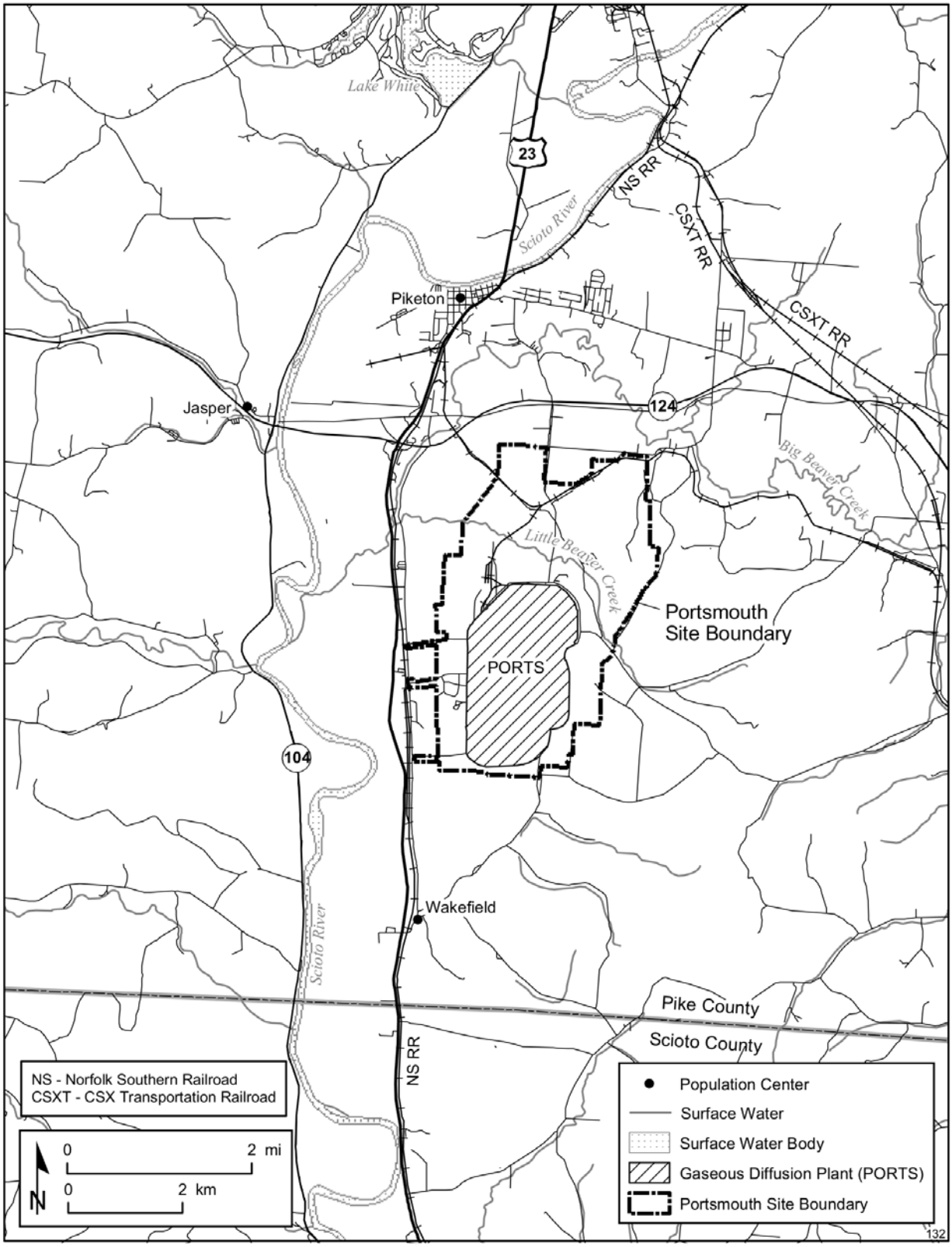

FIGURE 3.1-1 Regional Map of the Portsmouth Site Vicinity (Source: Adapted from LMES 1996a)

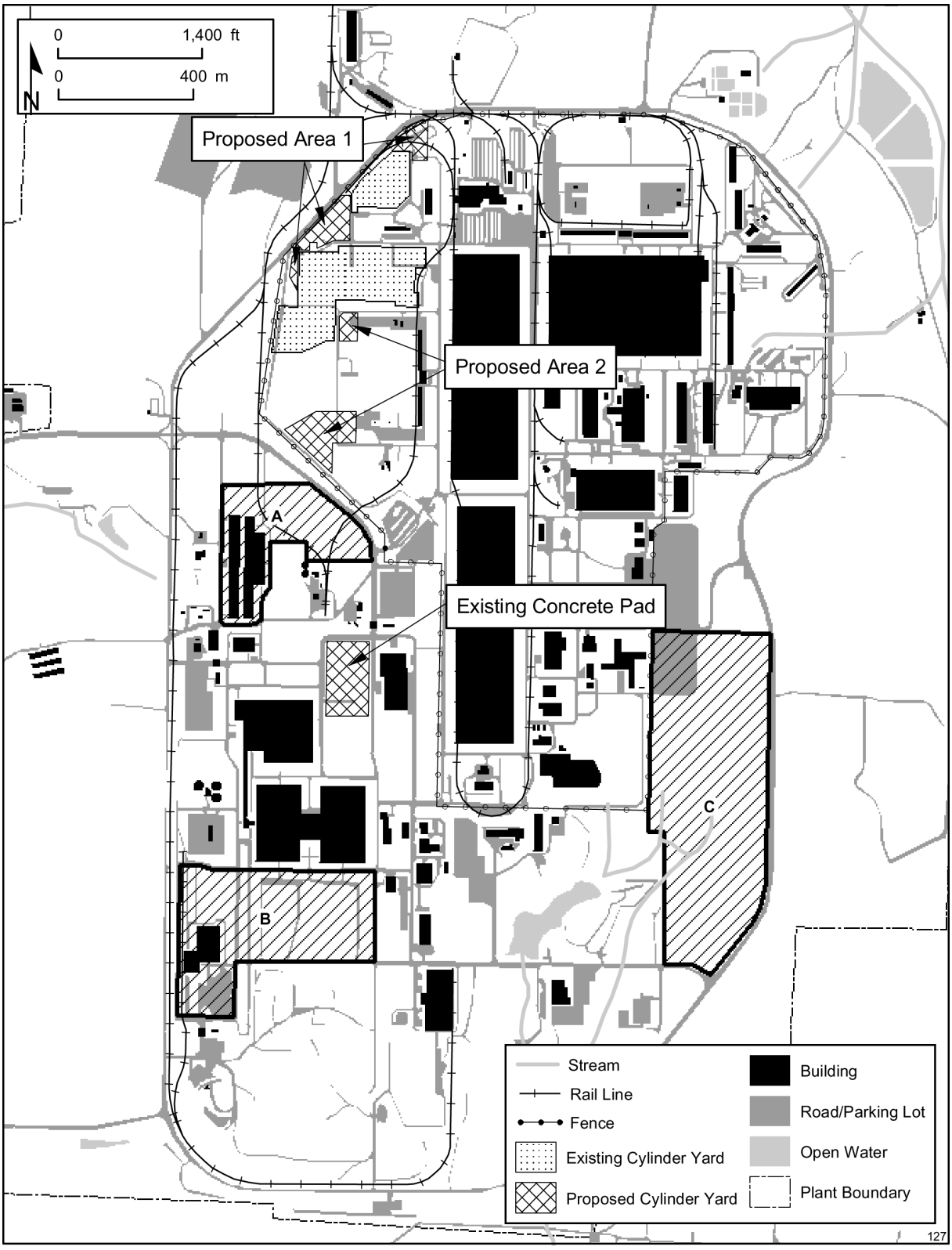

FIGURE 3.1-2 Locations of Cylinder Yards at the Portsmouth Site That Are Used to Store DOE-Managed Cylinders (Source: Adapted from DOE 1996a; MMES 1992a)

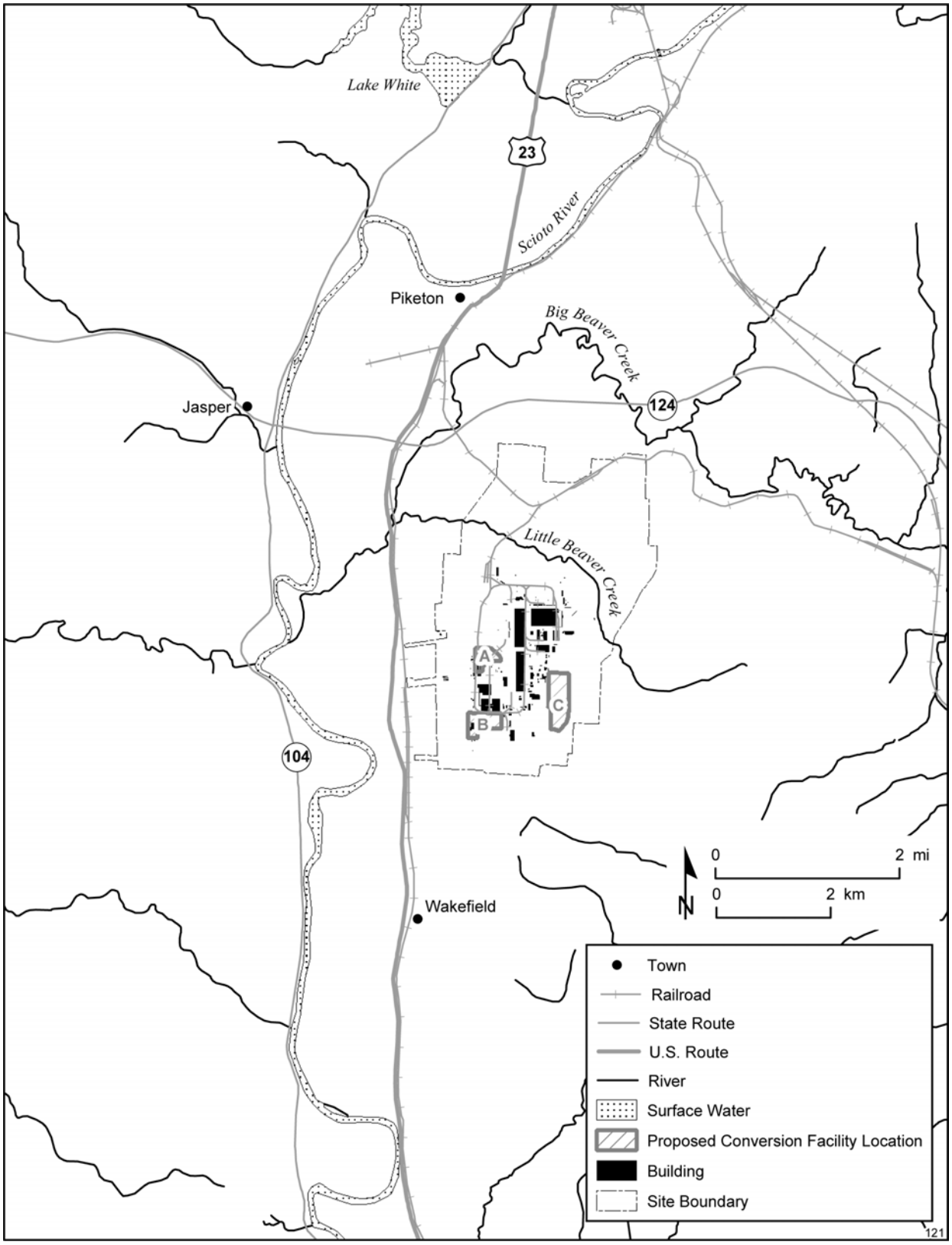

FIGURE 3.1-4 Portsmouth Site Drainage Features

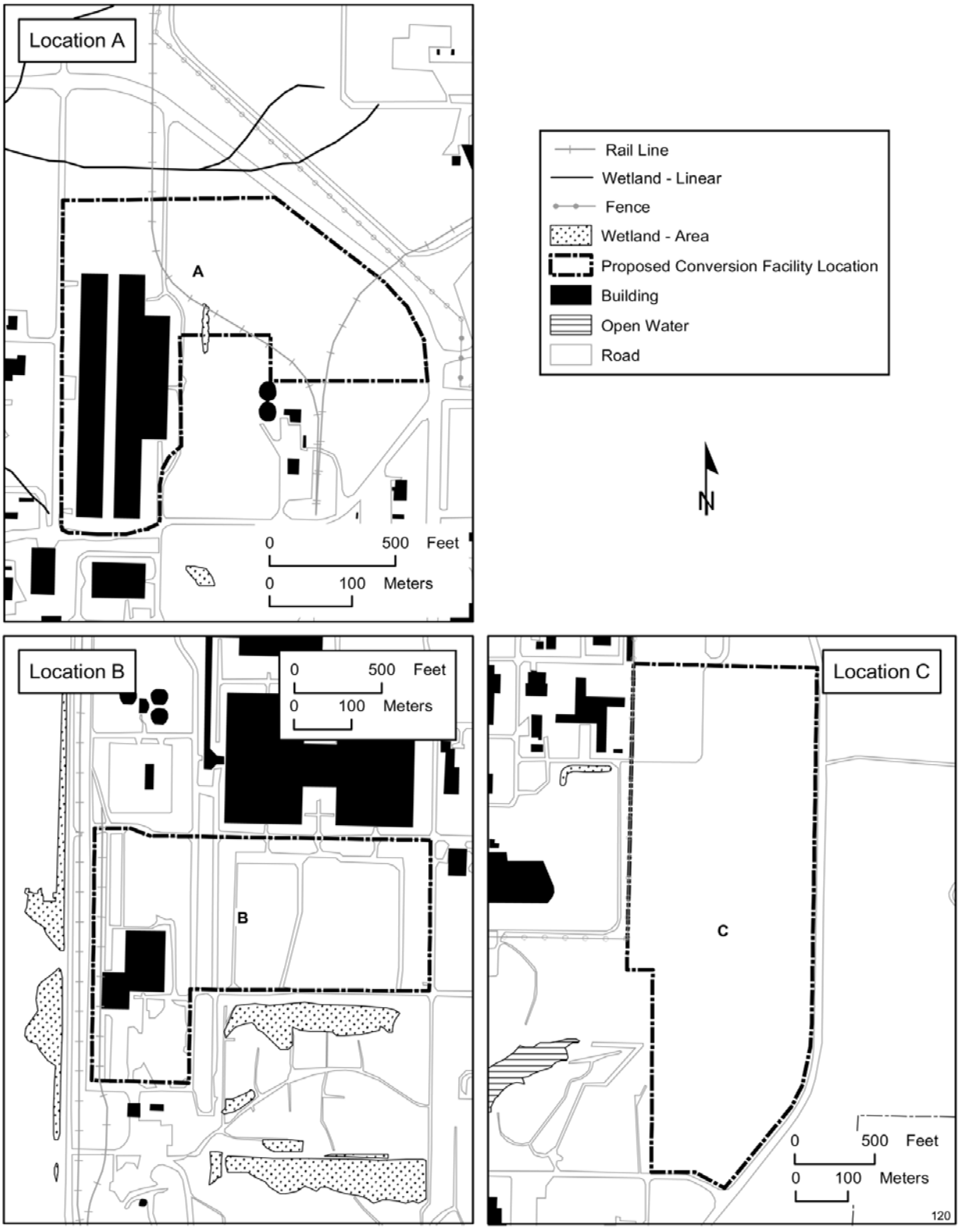

FIGURE 3.1-5 Wetlands in the Vicinity of the Three Candidate Locations for the Portsmouth Conversion Facility

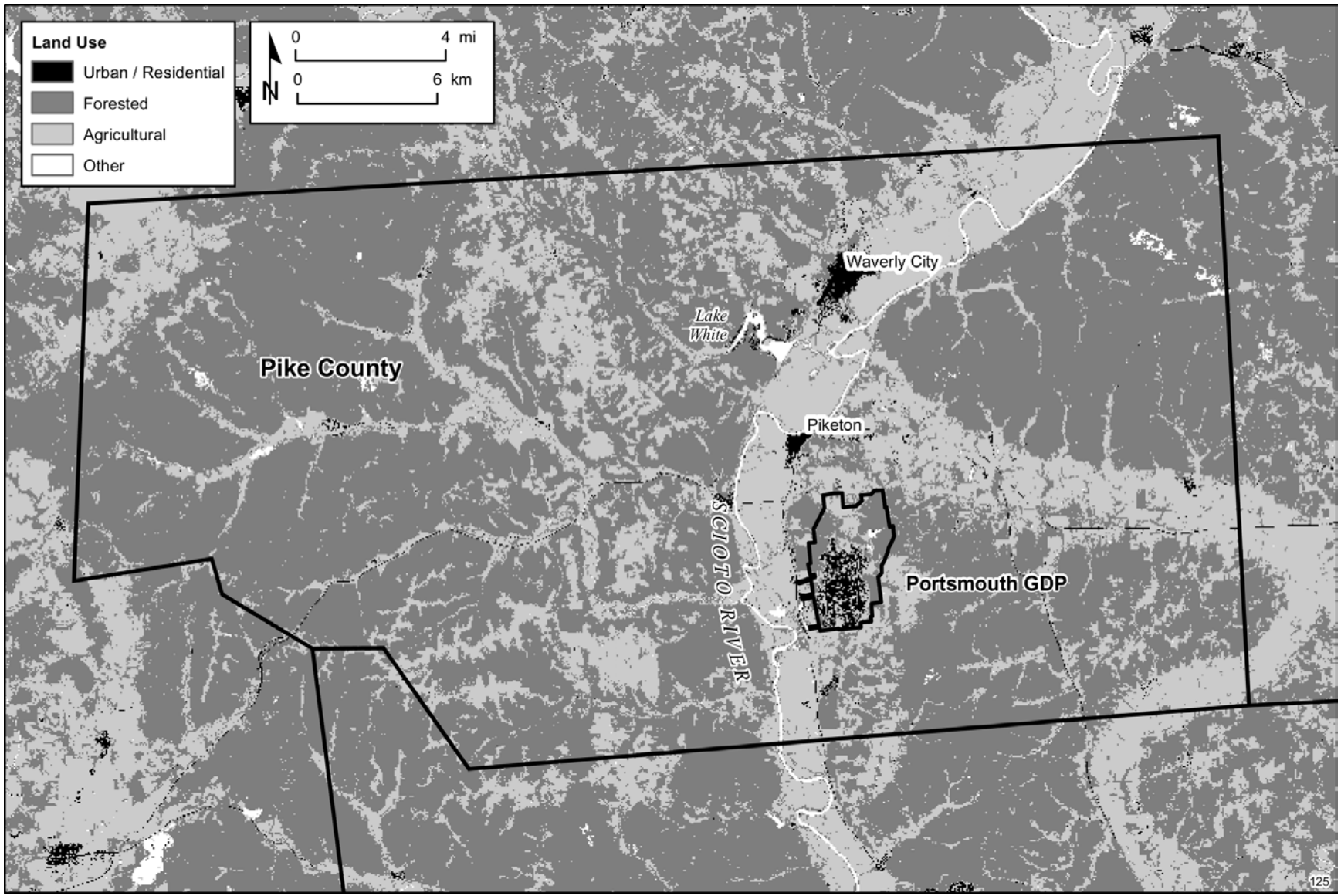

FIGURE 3.1-6 Land Cover in Pike County, Ohio (Data Source: USGS 2002)

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

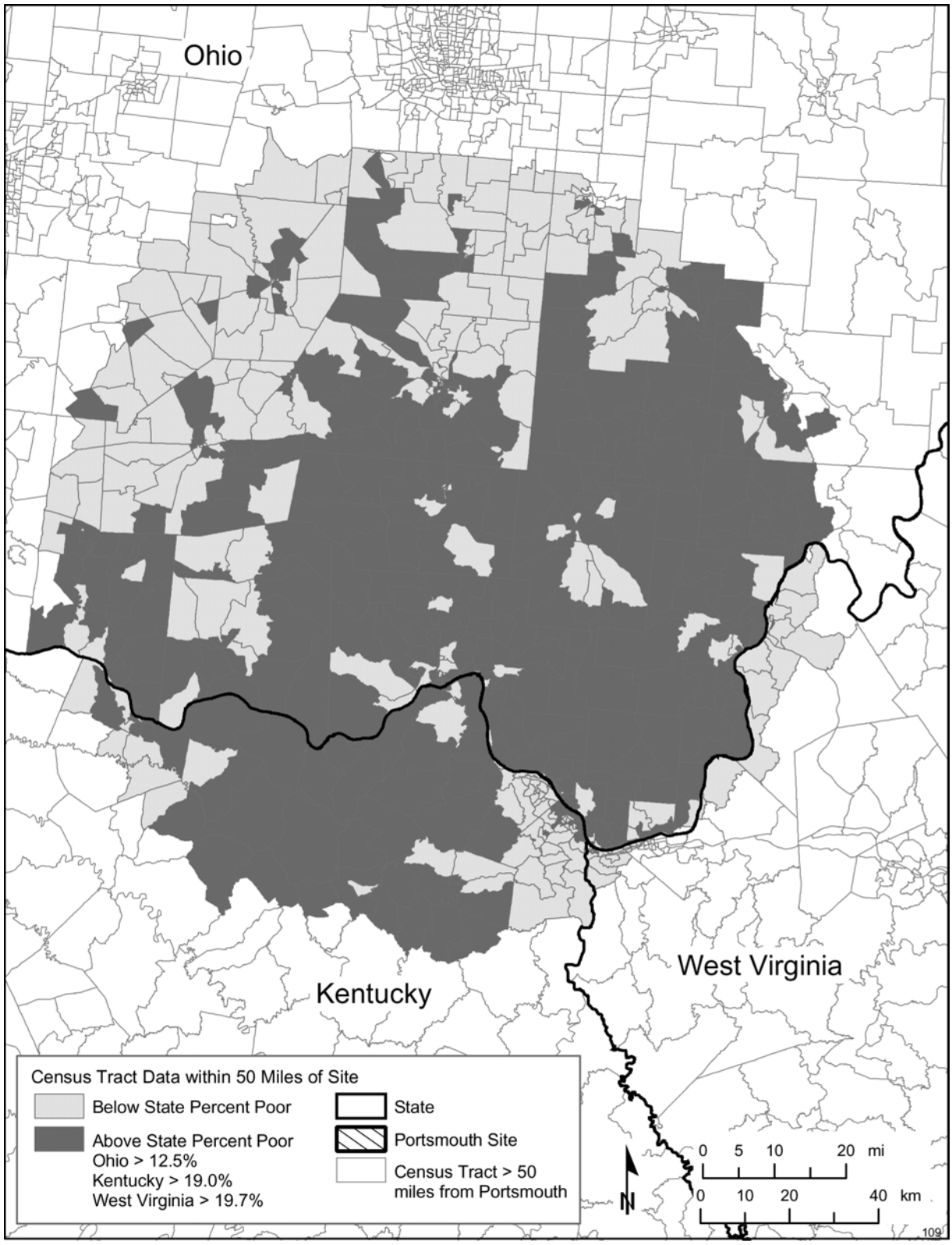

FIGURE 3.1-8 Census Tracts within 50 mi (80 km) of the Conversion Facility at the Portsmouth Site with Low-Income Populations in Excess of State-Specific Thresholds (Source: Based on data from U.S. Bureau of the Census 2002d)

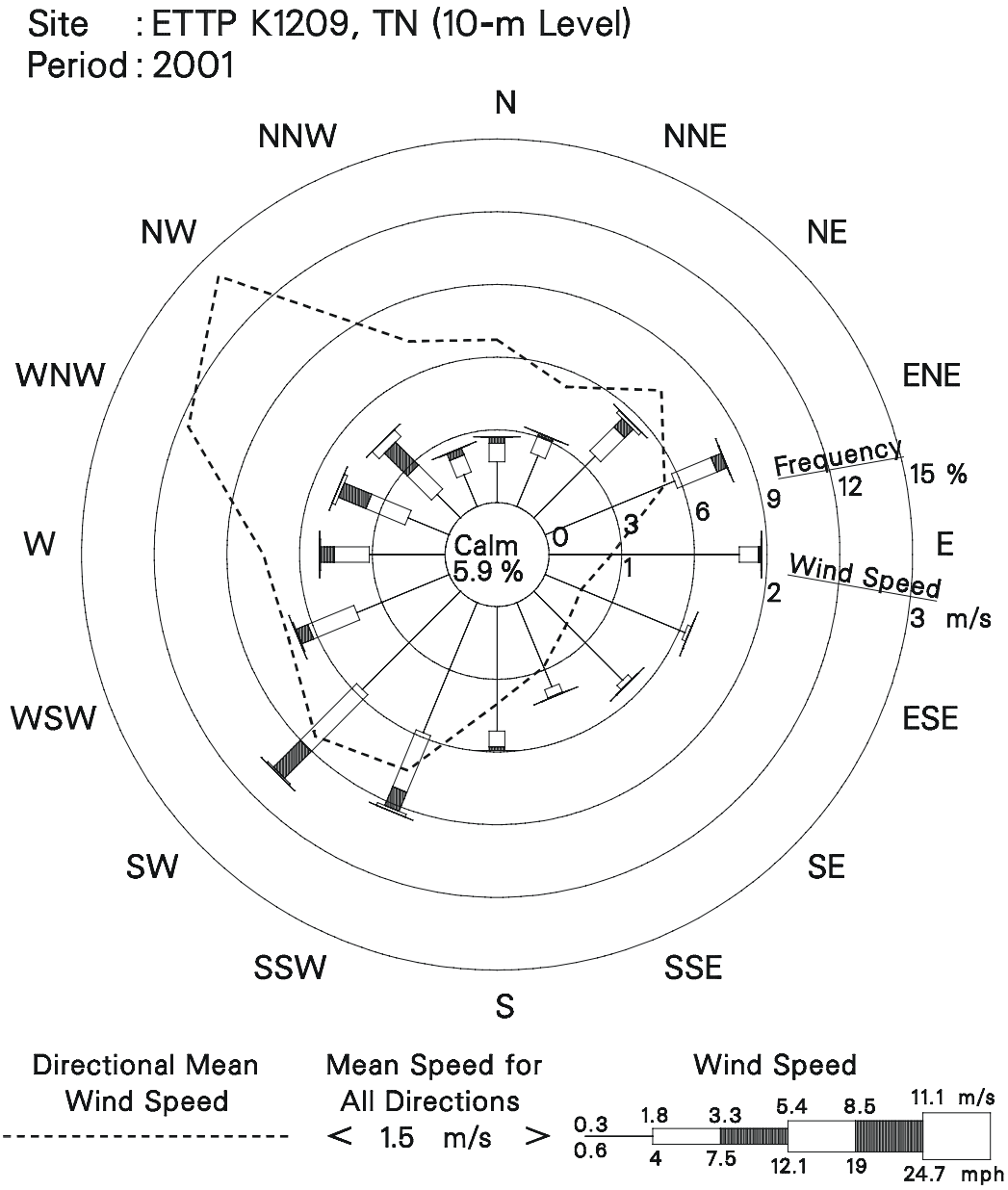

FIGURE 3.2-3 Wind Rose for the ETTP K1209 Meteorological Tower (10-m [33-ft] level), 2001 (Source: ORNL 2002)

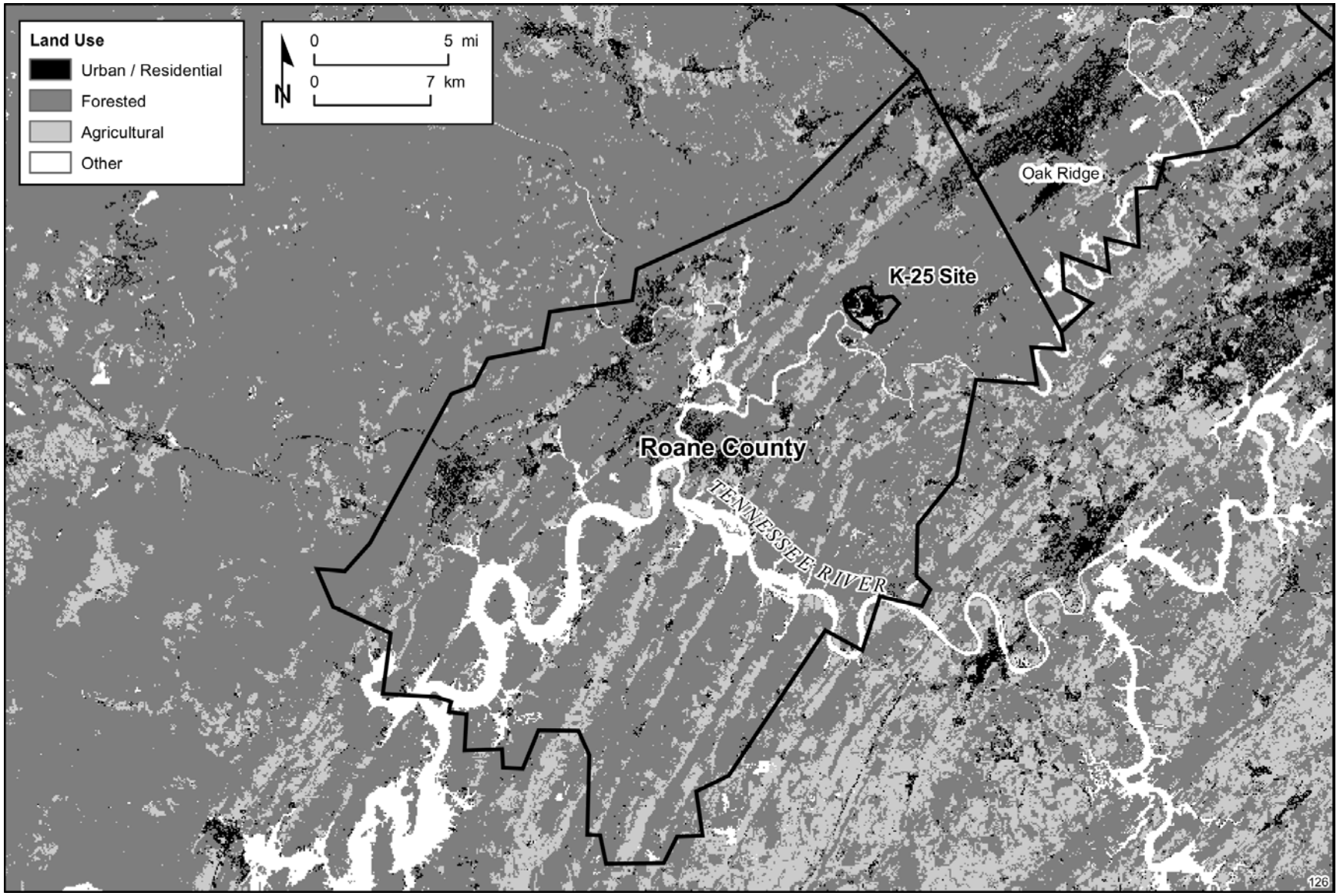

FIGURE 3.2-5 Land Cover in Roane County, Tennessee (Data Source: USGS 2002)

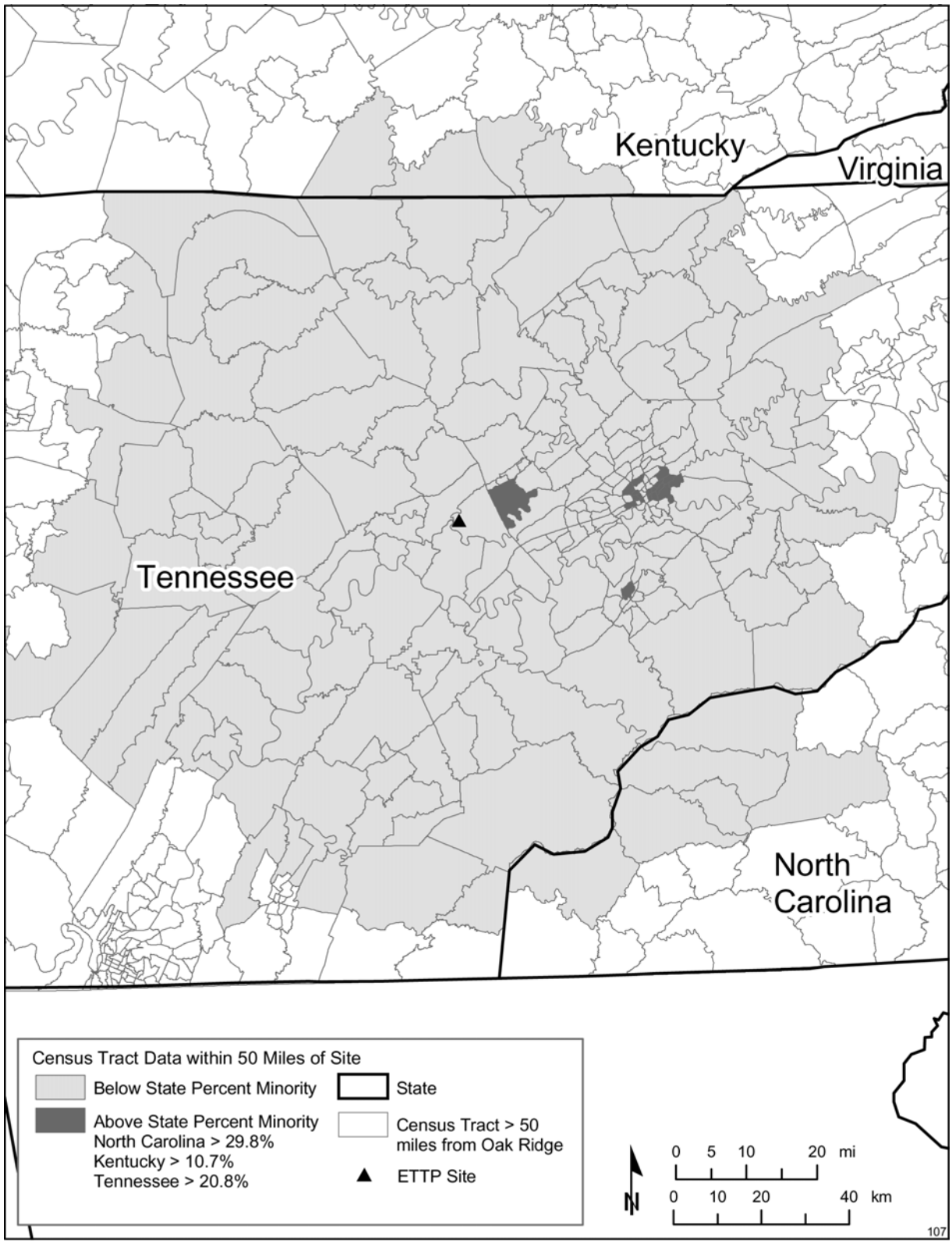

FIGURE 3.2-6 Census Tracts within 50 mi (80 km) of the Storage Facility at ETTP with Minority Populations in Excess of State-Specific Thresholds (Source: Based on data from U.S. Bureau of the Census 2002e)

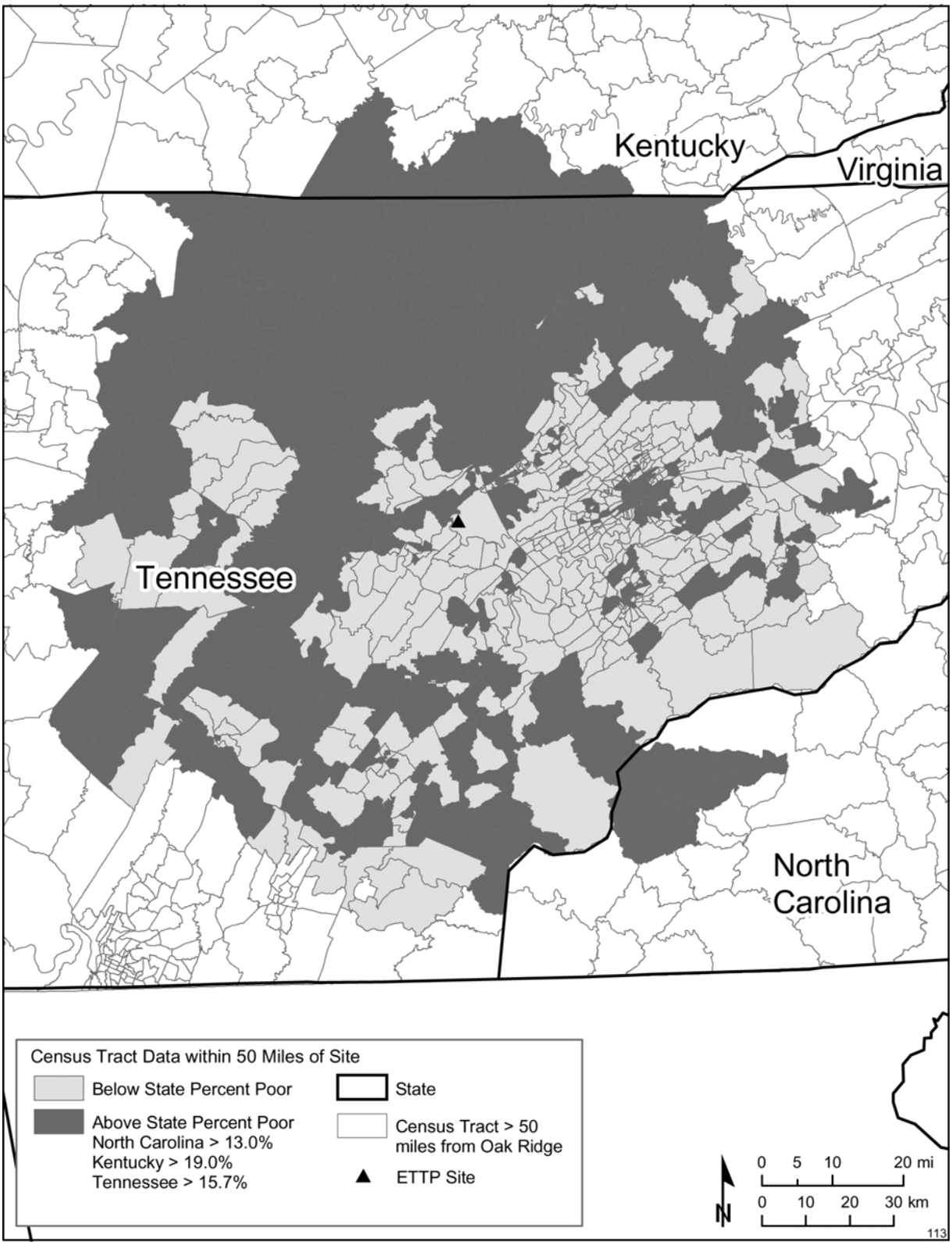

FIGURE 3.2-7 Census Tracts within 50 mi (80 km) of the Storage Facility at ETTP with Low-Income Populations in Excess of State-Specific Thresholds (Source: Based on data from U.S. Bureau of the Census 2002e)

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

Alternative	Description	Options Considered
No Action	Continued storage of the DUF_6 cylinders indefinitely at the Portsmouth and ETTP sites, with continued cylinder surveillance and maintenance.	None.
Proposed Action	Construction and operation of a conversion facility at the Portsmouth site for conversion of the Portsmouth and ETTP DUF_6 inventories 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 Portsmouth site; • Transportation of DUF_6 and non-DUF_6 cylinders from ETTP to Portsmouth; • Construction of a new cylinder storage yard (if required) for ETTP cylinders; • 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 sale or disposal in the event that the HF product is not sold.	*ETTP Cylinders:* This EIS considers an option of shipping 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 (by efficiency improvements or by adding a fourth process line).
Alternative Location A (Preferred)	Construction of the conversion facility at Location A, an area that encompasses 26 acres (10 ha) in the west-central portion of the site.	
Alternative Location B	Construction of the conversion facility at Location B, an area that encompasses 50 acres (20 ha) in the southwest portion of the site.	
Alternative Location C	Construction of the conversion facility at Location C, an area that encompasses 78 acres (31 ha) in the southeast portion of the site.	

TABLE S-5 Summary of Major EIS Data and Assumptions

Parameter/Characteristic	Data/Assumption
General	
Portsmouth DUF_6 cylinder inventory	16,109 cylinders; 195,800 t (216,000 tons)
Portsmouth non-DUF_6 cylinder inventory	2,693 cylinders; 13,500 t (14,900 tons)
ETTP DUF_6 cylinder 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 Portsmouth and ETTP.
Assessment period	Through 2039, plus long-term impacts
Construction	None
Cylinder management	Continued surveillance and maintenance activities consistent with current plans and procedures.
Assumed total number of future cylinder breaches:	
Controlled-corrosion case	16 at Portsmouth; 7 at ETTP
Uncontrolled-corrosion case	74 at Portsmouth; 213 at ETTP
Action Alternatives	Build and operate a conversion facility at the Portsmouth site for conversion of the Portsmouth and ETTP DUF_6 inventories; construct a new cylinder storage yard at Portsmouth for ETTP cylinders.
Construction start	2004
Construction period	≈2 years
Start of operations	2006
Operational period	18 years (14 years if ETTP cylinders are converted at Paducah)
Facility footprint	10 acres (4 ha)
Facility throughput	13,500 t/yr (15,000 tons/yr) DUF_6
Conversion products	
Depleted U_3O_8	10,800 t/yr (11,800 tons/yr)
CaF_2	18 t/yr (20 tons/yr)
70% HF acid	2,500 t/yr (2,800 tons/yr)
49% HF acid	5,800 t/yr (6,300 tons/yr)
Steel (empty cylinders, if not used as disposal containers)	1,177 t/yr (1,300 tons/yr)

TABLE S-6 Summary Comparison of Potential Environmental Consequences of the Alternatives[a] (Impacts associated with expanded operations are shown in brackets where they would differ from those presented for the proposed design.)

	Proposed Action			No Action	
Environmental Consequence	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Human Health and Safety — Normal Facility Operations					
Radiation exposure					
Construction					
New cylinder yard workers	Potential external radiation exposures (above background); estimated individual worker dose of 30 mrem/yr for either Area 1 or Area 2.	Same as Location A	Same as Location A	NA[b]	NA
Conversion facility workers	<60 mrem/yr over a 2-year construction period (if new cylinder yard is located at Area 1).	Background	Background	NA	NA
Operations					
Involved workers					
Average dose to individual involved workers	Conversion facility: 75 mrem/yr [100 mrem/yr] Cylinder yards: 510–600 mrem/yr [680–800 mrem/yr]	Same as Location A	Same as Location A	600 mrem/yr	410 mrem/yr

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Collective dose to involved workers	Conversion facility: 10 person-rem/yr [10.7 person-rem/yr] Cylinder yards: 3 person-rem/yr [4 person-rem/yr]	Same as Location A	Same as Location A	11.5 person-rem/yr	5 person-rem/yr
Total health effects among involved workers for the life of the project (through 2039 for no action)	1 in 10 chance of 1 latent cancer fatality (LCF)	Same as Location A	Same as Location A	1 in 5 chance of 1 LCF	1 in 12 chance of 1 LCF
Noninvolved workers					
Maximum dose to noninvolved worker maximally exposed individual (MEI)	$<5.5 \times 10^{-6}$ mrem/yr [$<7.3 \times 10^{-6}$ mrem/yr]	Same as Location A	Same as Location A	0.15 mrem/yr	0.048 mrem/yr
Collective dose to noninvolved workers	$<9.9 \times 10^{-6}$ person-rem/yr [$<1.3 \times 10^{-5}$ person-rem/yr]	Same as Location A	Same as Location A	0.001 person-rem/yr	0.0005 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 50,000 chance of 1 LCF	<1 in 100,000 chance of 1 LCF
General public					
Maximum dose to the general public MEI	$<2.1 \times 10^{-5}$ mrem/yr [$<2.8 \times 10^{-5}$ mrem/yr]	Same as Location A	Same as Location A	<0.1 mrem/yr (during storage) <0.4 mrem/yr (long-term)	<0.2 mrem/yr (during storage) <0.5 mrem/yr (long-term)

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Collective dose to general public within 50 mi (80 km)	6.2×10^{-5} person-rem/yr [8.2×10^{-5} person-rem/yr]	Same as Location A	Same as Location A	0.002 person-rem/yr	0.005 person-rem/yr
Total health effects among members of the public over 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 25,000 chance of 1 LCF	<1 in 10,000 chance of 1 LCF
Chemical exposure of concern[c] (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).	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).	Well below levels expected to cause health effects (hazard index <0.1).
Human Health and Safety — Facility Accidents[d]					
Physical hazards (involved and noninvolved workers)					
Construction: on-the-job fatalities and injuries	Conversion facility: 0 fatalities; 11 injuries Cylinder yards: 0 fatalities; 1 injury	Same as Location A	Same as Location A	NA	NA

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Operations: on-the-job fatalities and injuries	0 fatalities/yr 8 injuries/yr [40 fewer total injuries from reducing processing time by 5 years]	Same as Location A	Same as Location A	0 fatalities/yr; 1 injury/yr	0 fatalities/yr; 0.7 injury/yr
Accidents involving chemical or radiation releases, low frequency-high consequence accidents					
Bounding chemical accidents	Hydrogen fluoride (HF) tank rupture (high for adverse effects); anhydrous ammonia (NH_3) tank rupture (high for irreversible adverse effects).	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).	Cylinder ruptures – fire (high for adverse effects); corroded cylinder spill, wet conditions (high for irreversible adverse effects).
Release amounts	25,680 lb (11,600 kg) of HF 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)	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)	≈1 time in 100,000 years (both accidents)
Probability – life of the project (through 2039 for no action)	<1 chance in 56,000	Same as Location A	Same as Location A	≈1 in 2,500	≈1 in 2,500

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Consequences (per accident)[e]					
Chemical exposure – public					
Adverse effects	29–2,200 persons	30–2,000 persons	33–2,300 persons	4–680 persons	640 persons
Irreversible adverse effects	2–200 persons	2–210 persons	4–210 persons	0–1 person	0 persons
Fatalities	0–4 persons	0–4 persons	0–4 persons	0 persons	0 persons
Chemical exposure – noninvolved workers[f]					
Adverse effects	580–810 persons	880–1,400 persons	850–1,100 persons	160–1,000 persons	770 persons
Irreversible adverse effects	390–810 persons	370–1,400 persons	50–1,100 persons	0–110 persons	140 persons
Fatalities	0–20 persons	0–30 persons	0–20 persons	0–1 person	0-1 person
Accident risk (consequence × probability)					
General public	0 fatalities	Same as Location A	Same as Location A	0 fatalities	0 fatalities
Noninvolved workers[f]	0 fatalities	Same as Location A	Same as Location A	0 fatalities	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	Cylinder ruptures – fire
Release	135 lb (61 kg) of depleted U_3O_8 [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	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	≈1 time in 100,000 years
Probability – life of the project (through 2039 for no action)	≈1 chance in 6,000	Same as Location A	Same as Location A	≈1 chance in 2,500	≈1 chance in 2,500

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Consequences (per accident)					
Radiation exposure – public					
Dose to MEI	1–30 rem [1-40 rem]	Same as Location A	Same as Location A	13 mrem	13 mrem
Risk of LCF	1 chance in 50			7 in 1 million	7 in 1 million
Total dose to population (within 50 mi [80 km])	7–30 person-rem [9–40 person-rem]			34 person-rem	73 person-rem
Total LCFs	1 chance in 50 of 1 LCF [1 chance in 40 of 1 LCF]	Same as Location A	Same as Location A	1 chance in 50 of 1 LCF	1 chance in 30 of 1 LCF
Radiation exposure – noninvolved workers[f]					
Dose to MEI	1–30 rem [1-40 rem]	Same as Location A	Same as Location A	20 mrem	20 mrem
Risk of LCF	1 chance in 50	Same as Location A	Same as Location A	8 in 1 million	8 in 1 million
Total dose to workers	0.2–400 person-rem [0.3–530 person-rem]	0.2–530 person-rem [0.3–710 person-rem]	0.2–430 person-rem [0.3–570 person-rem]	16 person-rem	16 person-rem
Total LCFs	1 chance in 5 of 1 LCF [1 chance in 4 of 1 LCF]	1 chance in 5 of 1 LCF [1 chance in 4 of 1 LCF]	1 chance in 5 of 1 LCF [1 chance in 4 of 1 LCF]	1 chance in 100 of 1 LCF	1 chance in 100 of 1 LCF
Accident risk (consequence × probability)					
General public	0 LCFs	Same as Location A	Same as Location A	0 LCFs	0 LCFs
Noninvolved workers[f]	0 LCFs	Same as Location A	Same as Location A	0 LCFs	0 LCFs

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
	Human Health and Safety — Transportation				
Transportation impacts during normal operations					
Total fatalities from exposure to vehicle exhaust emissions					
Maximum use of truck	10 (20 if HF is neutralized to calcium fluoride [CaF_2] for disposal)	Same as Location A	Same as Location A	Negligible impacts due to small number of shipments (1 per year) and low concentration of expected contamination.	Negligible impacts due to small number of shipments (1 per year) and low concentration of expected contamination.
Maximum use of rail	<1 (1 including CaF_2)	Same as Location A	Same as Location A	Negligible	Negligible
Total fatalities from exposure to external radiation					
Maximum use of truck	<1	Same as Location A	Same as Location A	Negligible	Negligible
Maximum use of rail	<1	Same as Location A	Same as Location A	Negligible	Negligible
Maximum radiation exposure to a person along a route (MEI)	Negligible (<0.1 mrem)	Same as Location A	Same as Location A	Negligible	Negligible
Traffic accident fatalities (life of project); (physical hazards, unrelated to cargo)					
Maximum use of trucks	1 (2 if HF is neutralized to CaF_2 for disposal)	Same as Location A	Same as Location A	Negligible	Negligible
Maximum use of rail	1 (including CaF_2)	Same as Location A	Same as Location A	Negligible	Negligible

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Traffic accidents involving radiation or chemical releases					
Low frequency-high consequence cylinder accidents					
Bounding accident scenario	Urban rail accident involving DUF_6 cylinders	Same as Location A	Same as Location A	NA	NA
Release	Uranium, HF	Same as Location A	Same as Location A	NA	NA
Probability – life of the project	About 1 chance in 140,000	Same as Location A	Same as Location A	NA	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	NA
Fatalities	0	Same as Location A	Same as Location A	NA	NA
Radiation exposure – all workers and members of general public					
Total LCFs	60	Same as Location A	Same as Location A	NA	NA
Accident risk (consequence × probability) workers and general public	0 fatalities	Same as Location A	Same as Location A	NA	NA
Low frequency-high consequence accidents with all other materials				NA	NA
Bounding accident scenario	Urban rail accident involving anhydrous NH_3	Same as Location A	Same as Location A	NA	NA

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action: Location A (Preferred)	Proposed Action: Location B	Proposed Action: Location C	No Action: at Portsmouth	No Action: at ETTP
Release	Anhydrous NH_3	Same as Location A	Same as Location A	NA	NA
Probability – life of the project	About 1 chance in 400,000	Same as Location A	Same as Location A	NA	NA
Consequences (per accident)					
Chemical exposure – all workers and members of general public					NA
Irreversible adverse effects	5,000	Same as Location A	Same as Location A	NA	NA
Fatalities	100	Same as Location A	Same as Location A	NA	NA
Accident risk (consequence × probability)					NA
Irreversible adverse effects	0	Same as Location A	Same as Location A	NA	NA
Fatalities	0	Same as Location A	Same as Location A	NA	NA
Air Quality and Noise					
Pollutant emissions during new cylinder yard construction	Total (modeled plus background) concentrations for particulate matter (PM) with an aerodynamic diameter less than or equal to 2.5 μm ($PM_{2.5}$) would be close to or above standards at the construction site boundary for both candidate areas; construction-related concentrations would be negligible at the nearest residence.	Same as Location A	Same as Location A	NA	NA

TABLE S-6 (Cont.)

	Proposed Action			No Action	
Environmental Consequence	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Pollutant emissions during conversion facility construction	Total concentrations for PM (PM_{10} and $PM_{2.5}$) would be close to or above standards at the construction site boundary because of high background concentrations; construction-related concentrations would be negligible at the nearest residence. Other criteria pollutants are within standards.	Same as Location A	Same as Location A	NA	NA
Pollutant emissions during conversion facility operations	Total annual-average $PM_{2.5}$ concentration would be above the standard at the site boundary because of high background concentrations; the operations-related concentration would be less than 0.2% of the standard. Other criteria pollutants would be well within standards.	Same as Location A	Same as Location A	Under the controlled cylinder corrosion scenario, the maximum 24-hour HF concentration would be less than 4% of the Kentucky (used for comparison) secondary standard; criteria pollutants would be well within standards.	Under the controlled cylinder corrosion scenario, the maximum 24-hour HF concentration would be less than 23% of the Tennessee primary standard; criteria pollutants would be well within standards.

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
	No concentration increment would exceed applicable prevention of significant deterioration (PSD) increment at the site boundary (Class II area), and all increments would be well below the PSD increment for the nearest Class I area.	Same as Location A	Same as Location A	Under the uncontrolled cylinder corrosion scenario, the maximum 24-hour HF concentration at the site boundary would be up to 28% of the Kentucky (used for comparison) secondary standard.	Under the uncontrolled cylinder corrosion scenario, the maximum HF concentration at the site boundary would be about equal to the Tennessee primary standard (2.9 $\mu g/m^3$) around the year 2020.
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 operation.	Below the EPA guideline of 55 dB(A) as DNL during 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	NA	NA

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Operations	Negligible impacts from water use and discharge.	Same as Location A	Same as Location A	Negligible impacts from water use and discharge.	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	NA	NA
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 5 μg/L, below the guideline of 20 μg/L.[g] Under the uncontrolled corrosion case, cylinder breaches occurring before 2050 could result in groundwater concentrations exceeding the guideline sometime after 2100.	Under the controlled corrosion case, maximum uranium groundwater concentration (occurring in around 2070) of 7 μg/L, below the guideline of 20 μg/L.[g] Under the uncontrolled corrosion case, cylinder breaches occurring before 2025 could result in groundwater concentrations exceeding the guideline sometime after 2100.

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Soils					
Construction	Local and temporary increase in erosion; impacts to soil quality unlikely.	Same as Location A	Same as Location A	NA	NA
Operations	No direct impacts to soil.	Same as Location A	Same as Location A	Negligible impacts to soils.	Negligible impacts to soils.
		Socioeconomics			
New cylinder yard construction	Direct employment of 60 people; 150 total jobs in region of influence (ROI); total personal income of $5.6 million; no significant impacts on public services. Less than 1-year duration of impacts.	Same as Location A	Same as Location A	NA	NA

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Conversion facility construction	Direct employment of 190 people in peak year; 280 total jobs in ROI; total personal income of $9 million in peak year; no significant impacts on public services. Two-year duration of impacts.	Same as Location A	Same as Location A	NA	NA
Operations	Direct employment of 160 people; 320 total jobs in ROI; total personal income of $13 million per year of operations; no significant impacts on public services.	Same as Location A	Same as Location A	Direct employment of 20 people; 40 total jobs in ROI; personal income of $1.0 million per year through 2039; no significant impacts on public services.	Direct employment of 30 people; 90 total jobs in ROI; personal income of $4.2 million per year through 2039; no significant impacts on public services.

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
		Ecology			
Ecological resources (habitat loss, vegetation, wildlife)	Total area disturbed during new cylinder yard construction: 5.5 acres (2.2 ha) – Area 1; 6.3 acres (2.5 ha) – Area 2. Total area disturbed during conversion facility construction: 65 acres (26 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.	Negligible impact to ecological resources; all activities would occur in previously developed areas.
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 yard runoff during painting activities.	Potential for adverse impacts to aquatic biota associated with cylinder yard runoff during painting activities.
Wetlands	Potential direct and indirect impacts to wetlands from facility construction; impacts could be minimized by facility placement.	No direct impacts to wetlands. Possible indirect impacts to nearby wetlands.	Similar to Location B	Negligible impacts	Negligible impacts

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
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.	No direct or indirect impacts from construction or operations.	Similar to Location A	Negligible impacts	Negligible impacts
			Waste Management		
Construction	Minimal impacts to site waste management capabilities from construction-generated waste.	Same as Location A	Same as Location A	NA	NA
Operations	Negligible impacts to site management capabilities from low-level radioactive waste (LLW) and hazardous waste generation.	Same as Location A	Same as Location A	No impacts from LLW or low-level radioactive mixed waste (LLMW) generation; both would generate less than 1% of annual site totals for each.	No impacts from LLW or LLMW generation; both would generate less than 1% of annual site totals for each.

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Operations (Cont.)	The U_3O_8 produced would generate about 4,700 yd^3 (3,570 m^3)/yr [6,250 yd^3 (4,750 m^3)/yr] of LLW. This is 5% [7%] of Portsmouth's annual projected volume; low impact on site LLW management. If HF is neutralized to CaF_2, generation of about 3,745 yd^3 (2,860 m^3)/yr [4,980 yd^3 (3,800 m^3)/yr] of CaF_2. Generation of TRU waste is unlikely under current proposals.				

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
			Resource Requirements [h]		
Construction and operations	No effects on local, regional, or national availability of materials required for construction or operations are expected.	Same as Location A	Same as Location A	No effects on local, regional, or national availability of materials are expected.	No effects on local, regional, or national availability of materials are expected.
			Land Use		
Construction and operations	Up to 65 acres (26 ha) would be disturbed for construction of the conversion facility, with 10 acres (4 ha) permanently altered. Up to an additional 6.3 acres (2.5 ha) would be required for construction of a new cylinder yard. The permanently altered areas represent 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	No impacts	No impacts

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Cultural Resources					
Construction and operations	Impacts to cultural resources are possible; archaeological and architectural surveys have not been finalized and must be completed prior to initiation of the proposed action.	Same as Location A	Same as Location A	Impacts would be unlikely because storage yards are located in previously disturbed areas already dedicated to cylinder storage.	Impacts would be unlikely because storage yards are located in previously disturbed areas already dedicated to cylinder storage.
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.	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 Portsmouth					
Cylinder preparation					
Location of cylinder preparation activities	ETTP: approximately 5,900 ETTP cylinders prepared for shipment to Portsmouth.	Same as Location A	Same as Location A	NA	NA

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
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	NA
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	NA

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Operations if ETTP cylinders are transported to Paducah (option)	If ETTP cylinders were transported to Paducah, the operational period of the Portsmouth conversion plant would be reduced by about 4 years. Annual impacts would be the same, as discussed for each technical discipline. No significant decrease in overall impacts.	Same as Location A	Same as Location A	NA	NA
	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	NA

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
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	NA
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	NA
	Impacts Associated with Conversion Product Sale				
Products potentially marketed	HF and/or CaF_2	Same as Location A	Same as Location A	NA	NA
Annual Portsmouth production	55% HF solution: 8,200 t/yr [9,000 tons/yr]	Same as Location A	Same as Location A	NA	NA
	CaF_2: 18 t/yr [20 tons/yr]	Same as Location A	Same as Location A	NA	NA

TABLE S-6 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
CaF_2 produced if HF is neutralized	8,800 t/yr [9,700 tons/yr]	Same as Location A	Same as Location A	NA	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	NA
Potential socioeconomic impacts from use	Negligible socioeconomic impacts	Same as Location A	Same as Location A	NA	NA

[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 an 18-year operational period. For the no action alternative, annual impacts are based on the assumption of a 40-year operational period.

[b] NA = not applicable.

[c] 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.

[d] 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.

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

[f] 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 EPA worker fatalities and injuries resulting from the accident initiator or the accident itself are possible.

[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] (Impacts associated with expanded operations are shown in brackets where they would differ from those presented for the proposed design.)

	Proposed Action			No Action	
Environmental Consequence	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Human Health and Safety — Normal Facility Operations					
Radiation exposure					
Construction					
New cylinder yard workers	Potential external radiation exposures (above background); estimated individual worker dose of 30 mrem/yr for either Area 1 or Area 2.	Same as Location A	Same as Location A	NA[b]	NA
Conversion facility workers	<60 mrem/yr over a 2-year construction period (if new cylinder yard is located at Area 1).	Background	Background	NA	NA
Operations					
Involved workers					
Average dose to individual involved workers	Conversion facility: 75 mrem/yr [100 mrem/yr] Cylinder yards: 510–600 mrem/yr [680–800 mrem/yr]	Same as Location A	Same as Location A	600 mrem/yr	410 mrem/yr

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Collective dose to involved workers	Conversion facility: 10 person-rem/yr [10.7 person-rem/yr] Cylinder yards: 3 person-rem/yr [4 person-rem/yr]	Same as Location A	Same as Location A	11.5 person-rem/yr	5 person-rem/yr
Total health effects among involved workers for the life of the project (through 2039 for no action)	1 in 10 chance of 1 latent cancer fatality (LCF)	Same as Location A	Same as Location A	1 in 5 chance of 1 LCF	1 in 12 chance of 1 LCF
Noninvolved workers					
Maximum dose to noninvolved worker maximally exposed individual (MEI)	$<5.5 \times 10^{-6}$ mrem/yr [$<7.3 \times 10^{-6}$ mrem/yr]	Same as Location A	Same as Location A	0.15 mrem/yr	0.048 mrem/yr
Collective dose to noninvolved workers	$<9.9 \times 10^{-6}$ person-rem/yr [$<1.3 \times 10^{-5}$ person-rem/yr]	Same as Location A	Same as Location A	0.001 person-rem/yr	0.0005 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 50,000 chance of 1 LCF	<1 in 100,000 chance of 1 LCF
General public					
Maximum dose to the general public MEI	$<2.1 \times 10^{-5}$ mrem/yr [$<2.8 \times 10^{-5}$ mrem/yr]	Same as Location A	Same as Location A	<0.1 mrem/yr (during storage) <0.4 mrem/yr (long-term)	<0.2 mrem/yr (during storage) <0.5 mrem/yr (long-term)

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Collective dose to general public within 50 mi (80 km)	6.2×10^{-5} person-rem/yr [8.2×10^{-5} person-rem/yr]	Same as Location A	Same as Location A	0.002 person-rem/yr	0.005 person-rem/yr
Total health effects among members of the public over 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 25,000 chance of 1 LCF	<1 in 10,000 chance of 1 LCF
Chemical exposure of concern[c] (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).	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).	Well below levels expected to cause health effects (hazard index <0.1).
Human Health and Safety — Facility Accidents[d]					
Physical hazards (involved and noninvolved workers)					
Construction: on-the-job fatalities and injuries	Conversion facility: 0 fatalities; 11 injuries Cylinder yards: 0 fatalities; 1 injury	Same as Location A	Same as Location A	NA	NA

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Operations: on-the-job fatalities and injuries	0 fatalities/yr 8 injuries/yr [40 fewer total injuries from reducing processing time by 5 years]	Same as Location A	Same as Location A	0 fatalities/yr; 1 injury/yr	0 fatalities/yr; 0.7 injury/yr
Accidents involving chemical or radiation releases, low frequency-high consequence accidents					
Bounding chemical accidents	Hydrogen fluoride (HF) tank rupture (high for adverse effects); anhydrous ammonia (NH_3) tank rupture (high for irreversible adverse effects).	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).	Cylinder ruptures – fire (high for adverse effects); corroded cylinder spill, wet conditions (high for irreversible adverse effects).
Release amounts	25,680 lb (11,600 kg) of HF 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)	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)	≈1 time in 100,000 years (both accidents)
Probability – life of the project (through 2039 for no action)	<1 chance in 56,000	Same as Location A	Same as Location A	≈1 in 2,500	≈1 in 2,500

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Consequences (per accident)[e]					
Chemical exposure – public					
Adverse effects	29–2,200 persons	30–2,000 persons	33–2,300 persons	4–680 persons	640 persons
Irreversible adverse effects	2–200 persons	2–210 persons	4–210 persons	0–1 person	0 persons
Fatalities	0–4 persons	0–4 persons	0–4 persons	0 persons	0 persons
Chemical exposure – noninvolved workers[f]					
Adverse effects	580–810 persons	880–1,400 persons	850–1,100 persons	160–1,000 persons	770 persons
Irreversible adverse effects	390–810 persons	370–1,400 persons	50–1,100 persons	0–110 persons	140 persons
Fatalities	0–20 persons	0–30 persons	0–20 persons	0–1 person	0-1 person
Accident risk (consequence × probability)					
General public	0 fatalities	Same as Location A	Same as Location A	0 fatalities	0 fatalities
Noninvolved workers[f]	0 fatalities	Same as Location A	Same as Location A	0 fatalities	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	Cylinder ruptures – fire
Release	135 lb (61 kg) of depleted U_3O_8 [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	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	≈1 time in 100,000 years
Probability – life of the project (through 2039 for no action)	≈1 chance in 6,000	Same as Location A	Same as Location A	≈1 chance in 2,500	≈1 chance in 2,500

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Consequences (per accident)					
Radiation exposure – public					
Dose to MEI	1–30 rem [1-40 rem]	Same as Location A	Same as Location A	13 mrem	13 mrem
Risk of LCF	1 chance in 50			7 in 1 million	7 in 1 million
Total dose to population (within 50 mi [80 km])	7–30 person-rem [9–40 person-rem]			34 person-rem	73 person-rem
Total LCFs	1 chance in 50 of 1 LCF [1 chance in 40 of 1 LCF]	Same as Location A	Same as Location A	1 chance in 50 of 1 LCF	1 chance in 30 of 1 LCF
Radiation exposure – noninvolved workers[f]					
Dose to MEI	1–30 rem [1-40 rem]	Same as Location A	Same as Location A	20 mrem	20 mrem
Risk of LCF	1 chance in 50	Same as Location A	Same as Location A	8 in 1 million	8 in 1 million
Total dose to workers	0.2–400 person-rem [0.3–530 person-rem]	0.2–530 person-rem [0.3–710 person-rem]	0.2–430 person-rem [0.3–570 person-rem]	16 person-rem	16 person-rem
Total LCFs	1 chance in 5 of 1 LCF [1 chance in 4 of 1 LCF]	1 chance in 5 of 1 LCF [1 chance in 4 of 1 LCF]	1 chance in 5 of 1 LCF [1 chance in 4 of 1 LCF]	1 chance in 100 of 1 LCF	1 chance in 100 of 1 LCF
Accident risk (consequence × probability)					
General public	0 LCFs	Same as Location A	Same as Location A	0 LCFs	0 LCFs
Noninvolved workers[f]	0 LCFs	Same as Location A	Same as Location A	0 LCFs	0 LCFs

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
	Human Health and Safety — Transportation				
Transportation impacts during normal operations					
Total fatalities from exposure to vehicle exhaust emissions					
Maximum use of truck	10 (20if HF is neutralized to calcium fluoride [CaF_2] for disposal)	Same as Location A	Same as Location A	Negligible impacts due to small number of shipments (1 per year) and low concentration of expected contamination.	Negligible impacts due to small number of shipments (1 per year) and low concentration of expected contamination.
Maximum use of rail	<1 (1 including CaF_2)	Same as Location A	Same as Location A	Negligible	Negligible
Total fatalities from exposure to external radiation					
Maximum use of truck	<1	Same as Location A	Same as Location A	Negligible	Negligible
Maximum use of rail	<1	Same as Location A	Same as Location A	Negligible	Negligible
Maximum radiation exposure to a person along a route (MEI)	Negligible (<0.1 mrem)	Same as Location A	Same as Location A	Negligible	Negligible
Traffic accident fatalities (life of project); (physical hazards, unrelated to cargo)					
Maximum use of trucks	1 (2 if HF is neutralized to CaF_2 for disposal)	Same as Location A	Same as Location A	Negligible	Negligible
Maximum use of rail	1 (including CaF_2)	Same as Location A	Same as Location A	Negligible	Negligible

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Traffic accidents involving radiation or chemical releases					
Low frequency-high consequence cylinder accidents					
Bounding accident scenario	Urban rail accident involving DUF_6 cylinders	Same as Location A	Same as Location A	NA	NA
Release	Uranium, HF	Same as Location A	Same as Location A	NA	NA
Probability – life of the project	About 1 chance in 140,000	Same as Location A	Same as Location A	NA	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	NA
Fatalities	0	Same as Location A	Same as Location A	NA	NA
Radiation exposure – all workers and members of general public					
Total LCFs	60	Same as Location A	Same as Location A	NA	NA
Accident risk (consequence × probability) workers and general public	0 fatalities	Same as Location A	Same as Location A	NA	NA
Low frequency-high consequence accidents with all other materials				NA	NA
Bounding accident scenario	Urban rail accident involving anhydrous NH_3	Same as Location A	Same as Location A	NA	NA

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Release	Anhydrous NH_3	Same as Location A	Same as Location A	NA	NA
Probability – life of the project	About 1 chance in 400,000	Same as Location A	Same as Location A	NA	NA
Consequences (per accident)					
Chemical exposure – all workers and members of general public					NA
Irreversible adverse effects	5,000	Same as Location A	Same as Location A	NA	NA
Fatalities	100	Same as Location A	Same as Location A	NA	NA
Accident risk (consequence × probability)					NA
Irreversible adverse effects	0	Same as Location A	Same as Location A	NA	NA
Fatalities	0	Same as Location A	Same as Location A	NA	NA
Air Quality and Noise					
Pollutant emissions during new cylinder yard construction	Total (modeled plus background) concentrations for particulate matter (PM) with an aerodynamic diameter less than or equal to 2.5 μm ($PM_{2.5}$) would be close to or above standards at the construction site boundary for both candidate areas; construction-related concentrations would be negligible at the nearest residence.	Same as Location A	Same as Location A	NA	NA

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Pollutant emissions during conversion facility construction	Total concentrations for PM (PM_{10} and $PM_{2.5}$) would be close to or above standards at the construction site boundary because of high background concentrations; construction-related concentrations would be negligible at the nearest residence. Other criteria pollutants are within standards.	Same as Location A	Same as Location A	NA	NA
Pollutant emissions during conversion facility operations	Total annual-average $PM_{2.5}$ concentration would be above the standard at the site boundary because of high background concentrations; the operations-related concentration would be less than 0.2% of the standard. Other criteria pollutants would be well within standards.	Same as Location A	Same as Location A	Under the controlled cylinder corrosion scenario, the maximum 24-hour HF concentration would be less than 4% of the Kentucky (used for comparison) secondary standard; criteria pollutants would be well within standards.	Under the controlled cylinder corrosion scenario, the maximum 24-hour HF concentration would be less than 23% of the Tennessee primary standard; criteria pollutants would be well within standards.

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
	No concentration increment would exceed applicable prevention of significant deterioration (PSD) increment at the site boundary (Class II area), and all increments would be well below the PSD increment for the nearest Class I area.	Same as Location A	Same as Location A	Under the uncontrolled cylinder corrosion scenario, the maximum 24-hour HF concentration at the site boundary would be up to 28% of the Kentucky (used for comparison) secondary standard.	Under the uncontrolled cylinder corrosion scenario, the maximum HF concentration at the site boundary would be about equal to the Tennessee primary standard (2.9 $\mu g/m^3$) around the year 2020.
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 operation.	Below the EPA guideline of 55 dB(A) as DNL during 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	NA	NA

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Operations	Negligible impacts from water use and discharge.	Same as Location A	Same as Location A	Negligible impacts from water use and discharge.	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	NA	NA
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 5 μg/L, below the guideline of 20 μg/L.[g] Under the uncontrolled corrosion case, cylinder breaches occurring before 2050 could result in groundwater concentrations exceeding the guideline sometime after 2100.	Under the controlled corrosion case, maximum uranium groundwater concentration (occurring in around 2070) of 7 μg/L, below the guideline of 20 μg/L.[g] Under the uncontrolled corrosion case, cylinder breaches occurring before 2025 could result in groundwater concentrations exceeding the guideline sometime after 2100.

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Soils					
Construction	Local and temporary increase in erosion; impacts to soil quality unlikely.	Same as Location A	Same as Location A	NA	NA
Operations	No direct impacts to soil.	Same as Location A	Same as Location A	Negligible impacts to soils.	Negligible impacts to soils.
Socioeconomics					
New cylinder yard construction	Direct employment of 60 people; 150 total jobs in region of influence (ROI); total personal income of $5.6 million; no significant impacts on public services. Less than 1-year duration of impacts.	Same as Location A	Same as Location A	NA	NA

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Conversion facility construction	Direct employment of 190 people in peak year; 280total jobs in ROI; total personal income of $9 million in peak year; no significant impacts on public services. Two-year duration of impacts.	Same as Location A	Same as Location A	NA	NA
Operations	Direct employment of 160 people; 320 total jobs in ROI; total personal income of $13 million per year of operations; no significant impacts on public services.	Same as Location A	Same as Location A	Direct employment of 20 people; 40 total jobs in ROI; personal income of $1.0 million per year through 2039; no significant impacts on public services.	Direct employment of 30 people; 90 total jobs in ROI; personal income of $4.2 million per year through 2039; no significant impacts on public services.

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
		Ecology			
Ecological resources (habitat loss, vegetation, wildlife)	Total area disturbed during new cylinder yard construction: 5.5 acres (2.2 ha) – Area 1; 6.3 acres (2.5 ha) – Area 2. Total area disturbed during conversion facility construction: 65 acres (26 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.	Negligible impact to ecological resources; all activities would occur in previously developed areas.
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 yard runoff during painting activities.	Potential for adverse impacts to aquatic biota associated with cylinder yard runoff during painting activities.
Wetlands	Potential direct and indirect impacts to wetlands from facility construction; impacts could be minimized by facility placement.	No direct impacts to wetlands. Possible indirect impacts to nearby wetlands.	Similar to Location B	Negligible impacts	Negligible impacts

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
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.	No direct or indirect impacts from construction or operations.	Similar to Location A	Negligible impacts	Negligible impacts
			Waste Management		
Construction	Minimal impacts to site waste management capabilities from construction-generated waste.	Same as Location A	Same as Location A	NA	NA
Operations	Negligible impacts to site management capabilities from low-level radioactive waste (LLW) and hazardous waste generation.	Same as Location A	Same as Location A	No impacts from LLW or low-level radioactive mixed waste (LLMW) generation; both would generate less than 1% of annual site totals for each.	No impacts from LLW or LLMW generation; both would generate less than 1% of annual site totals for each.

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Operations (Cont.)	The triuranium octaoxide (U_3O_8) produced would generate about 4,700 yd^3 (3,570 m^3)/yr [6,250 yd^3 (4,750 m^3)/yr] of LLW. This is 5% [7%] of Portsmouth's annual projected volume; low impact on site LLW management. If HF is neutralized to CaF_2, generation of about 3,745 yd^3 (2,860 m^3)/yr [4,980 yd^3 (3,800 m^3)/yr] of CaF_2. Generation of TRU waste is unlikely under current proposals.				

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
			Resource Requirements [h]		
Construction and operations	No effects on local, regional, or national availability of materials required for construction or operations are expected.	Same as Location A	Same as Location A	No effects on local, regional, or national availability of materials are expected.	No effects on local, regional, or national availability of materials are expected.
			Land Use		
Construction and operations	Up to 65 acres (26 ha) would be disturbed for construction of the conversion facility, with 10 acres (4 ha) permanently altered. Up to an additional 6.3 acres (2.5 ha) would be required for construction of a new cylinder yard. The permanently altered areas represent 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	No impacts	No impacts

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
			Cultural Resources		
Construction and operations	Impacts to cultural resources are possible; archaeological and architectural surveys have not been finalized and must be completed prior to initiation of the proposed action.	Same as Location A	Same as Location A	Impacts would be unlikely because storage yards are located in previously disturbed areas already dedicated to cylinder storage.	Impacts would be unlikely because storage yards are located in previously disturbed areas already dedicated to cylinder storage.
			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.	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 Portsmouth		
Cylinder preparation					
Location of cylinder preparation activities	ETTP: approximately 5,900 ETTP cylinders prepared for shipment to Portsmouth.	Same as Location A	Same as Location A	NA	NA

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
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	NA
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	NA

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
Operations if ETTP cylinders are transported to Paducah (option)	If ETTP cylinders were transported to Paducah, the operational period of the Portsmouth conversion plant would be reduced by about 4 years. Annual impacts would be the same, as discussed for each technical discipline. No significant decrease in overall impacts.	Same as Location A	Same as Location A	NA	NA
	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	NA

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
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	NA
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	NA
	Impacts Associated with Conversion Product Sale				
Products potentially marketed	HF and/or CaF_2	Same as Location A	Same as Location A	NA	NA
Annual Portsmouth production	55% HF solution: 8,200 t/yr [9,000 tons/yr]	Same as Location A	Same as Location A	NA	NA
	CaF_2: 18 t/yr [20 tons/yr]	Same as Location A	Same as Location A	NA	NA

TABLE 2.4-1 (Cont.)

Environmental Consequence	Proposed Action			No Action	
	Location A (Preferred)	Location B	Location C	at Portsmouth	at ETTP
CaF_2 produced if HF is neutralized	8,800 t/yr [9,700 tons/yr]	Same as Location A	Same as Location A	NA	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	NA
Potential socioeconomic impacts from use	Negligible socioeconomic impacts	Same as Location A	Same as Location A	NA	NA

[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 an 18-year operational period. For the no action alternative, annual impacts are based on the assumption of a 40-year operational period.

[b] NA = not applicable.

[c] 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.

[d] 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.

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

[f] 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 EPA worker fatalities and injuries resulting from the accident initiator or the accident itself are possible.

[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, Ohio State Ambient Air Quality Standards, Maximum Allowable Increments for Prevention of Significant Deterioration, and Highest Background Levels Representative of the Portsmouth Gaseous Diffusion Plant

		NAAQS/SAAQS[b]		PSD Increment[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	0.118 ppm (24%)	Portsmouth (1999)
	24 hours	0.14 ppm (365 $\mu g/m^3$)	P	5	91	0.042 ppm (30%)	Portsmouth (1999)
	Annual	0.03 ppm (80 $\mu g/m^3$)	P	2	20	0.007 ppm (23%)	Portsmouth (2001)
NO_2	Annual	0.053 ppm (100 $\mu g/m^3$)	P, S	2.5	25	0.029 ppm (55%)	Cincinnati (1999)
CO	1 hour	35 ppm (40 mg/m^3)	P	–[f]	–	11.7 ppm (33%)	Columbus (1999)
	8 hours	9 ppm (10 mg/m^3)	P	–	–	4.3 ppm (48%)	Columbus (1998)
O_3	1 hour	0.12 ppm (235 $\mu g/m^3$)	P, S	–	–	0.136 ppm (113%)[g]	Lawrence County (1998)
	8 hours	0.08 ppm (157 $\mu g/m^3$)	P, S	–	–	0.101 ppm (126%)[h]	Lawrence County (1998)
PM_{10}	24 hours	150 $\mu g/m^3$	P, S	8	30	64 $\mu g/m^3$ (43%)[g]	Portsmouth (1999)
	Annual	50 $\mu g/m^3$	P, S	4	17	32 $\mu g/m^3$ (64%)	Portsmouth (1999)
$PM_{2.5}$	24 hours	65 $\mu g/m^3$	P, S	–	–	57.5 $\mu g/m^3$ (88%)[g]	Portsmouth (2001)
	Annual	15 $\mu g/m^3$	P, S	–	–	24.1 $\mu g/m^3$ (161%)	Portsmouth (1999)
Pb	Calendar quarter	1.5 $\mu g/m^3$	P, S	–	–	0.05 $\mu g/m^3$ (3%)	Columbus (1999)

Footnotes on next page.

TABLE 3.1-3 (Cont.)

[a] CO = carbon monoxide; NO_2 = nitrogen dioxide; O_3 = ozone; Pb = lead; $PM_{2.5}$ = particulate matter $\leq$2.5 μm; PM_{10} = particulate matter $\leq$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] A dash indicates that no standard exists.

[g] Second-highest value.

[h] Fourth-highest value.

Sources: 40 CFR 50; OEPA (2002); 40 CFR 52.21; EPA (2003b).

TABLE 3.1-5 Estimated Radiation Doses to Members of the General Public and Cylinder Yard Workers at the Portsmouth Gaseous Diffusion Plant

Receptor	Radiation Source	Dose to Individual (mrem/yr)
Member of the general public (MEI)[a]	Routine site operations	
	Airborne radionuclides	0.060[b]
	Waterborne radionuclides	0.039[c]
	Direct gamma radiation	0.98[d]
	Ingestion	0.88[e]
Cylinder yard worker	External radiation	64[f]
On-site monitored employee	External radiation	1.85[g]
Member of the public or worker	Natural background radiation around the Portsmouth site	78[h]
DOE worker limit		2,000[i]

[a] The MEI is assumed to reside at an off-site location or undertake specific activities 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 on the basis of air concentrations calculated by an air dispersion model. For the total dose of 0.060 mrem/yr, 0.014 mrem/yr was contributed by DOE sources, and 0.046 mrem/yr was contributed by USEC sources. The radiation dose calculated from the maximum measured ambient air concentrations was approximately 0.3% of the estimated value (DOE 2002b,c).

[c] The MEI is assumed to drink water and ingest fish caught from the Scioto River. The MEI is also assumed to swim and boat in the river and use the shoreline for recreational activities (DOE 2002c). This is a very conservative assumption because actually, the Scioto River is not used for drinking water downstream of the Portsmouth facility.

[d] Radiation exposure is assumed to be incurred by a person driving slowly on Perimeter Road and passing close to the edge of the cylinder yards 2 times a day for 185 days per year. The radiation dose was estimated by using the direct radiation monitoring data taken at the cylinder yards. Radiation levels at the accessible point would be much lower (DOE 2002b). Because Perimeter Road was closed to the public after September 11, 2001, 185 days was used in the calculation rather than the previously used 260 days.

[e] Radiation doses would result from ingestion of sediment, soil, locally produced vegetation and crops, deer, and fish. They were calculated by using detected concentrations of radionuclides in different media at different locations (DOE 2002c).

[f] Average dose from monitoring data in year 2001 (DOE 2002b).

[g] Average dose from monitoring data (DOE 2002b). If cylinder yard workers were excluded, the average for the rest of the employees would be 0.84 mrem/yr.

[h] Average dose from natural background radiation; 50 mrem/yr cosmic radiation and 28 mrem/yr terrestrial radiation (DOE 2002c).

[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 3.1-6 Estimated Hazard Quotients for Members of the General Public near the Portsmouth 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]	Uranium	0.0013 μg/m^3	3.7×10^{-7}	0.0003	0.0012
	HF	0.094 μg/m^3	2.7×10^{-5}	0.02	0.0013
Soil[e]	Uranium	6.8 mg/kg	9.1×10^{-5}	0.003	0.030
Surface water[f]	Uranium	5.7 μg/L	3.1×10^{-6}	0.003	0.0010
	Fluoride	400 μg/L	2.2×10^{-4}	0.06	0.0037
Sediment[f]	Uranium	5.6 mg/kg	1.5×10^{-6}	0.003	0.0005
Groundwater[g]	Uranium	27.5 μg/L	7.9×10^{-4}	0.003	0.26

[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.

[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] Maximum concentrations from among property-line and farther off-site sampling locations were used for assessment of general public exposures. Fluoride was reported, which was used as a surrogate for HF. Air exposure concentrations are the maximum annual average reported for all property-line and off-site monitoring locations (DOE 2002c,d). Sample numbers: 12 per location for uranium; 52 per location for fluoride.

[e] The soil exposure concentration is the maximum value from 31 property-line and off-site sampling locations (DOE 2002d). Sample numbers: 2 per location.

[f] Surface water and sediment exposure concentrations are the maximum annual averages reported for all NPDES outfall locations and other off-site monitoring locations, including cylinder yard runoff locations (DOE 2002c,d).

[g] Groundwater exposure concentration is the upper-end concentration reported for all on-site monitoring wells in 2000 (DOE 2001e). These wells are not used for drinking water. Several additional substances exceeded drinking water standards or guidelines in 2000; only uranium is listed here because it is of particular interest for this EIS. Specific concentrations were not available but were stated to be similar to 2000 concentrations (DOE 2002d). Fluoride concentrations were not available.

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

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

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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 (2002e); EPA (2003b).

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; NM = in need of management; S = special concern; T = threatened.

Source: DOE (2001f).

TABLE 3.2-7 Estimated Radiation Doses to Members of the General Public and Cylinder Yard Workers at ETTP

Receptor	Radiation Source	Dose to Individual (mrem/yr)
Member of the general public (MEI)[a]	Routine site operations	
	Airborne radionuclides[b]	
	ETTP only	0.1
	Entire ORR	0.8
	Waterborne radionuclides[c]	3.7
	Direct gamma radiation	1.8[d]
	Ingestion of wildlife	0.4[e]
Cylinder yard worker	External radiation	32–92,[f] 107[g]
Member of public or worker	Average natural background radiation in the State of Tennessee	42[h]
DOE worker limit		2,000[i]

[a] The MEI is assumed to reside at an off-site location or undertake the specific activities 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 exposures from external radiation, inhalation, and ingestion of foodstuffs. Doses were estimated on the basis of the emission rate from ETTP only and from the entire ORR (DOE 2002d).

[c] The radiation dose would result from eating 21 kg/yr (46 lb/yr) of the most contaminated accessible fish, drinking 730 L/yr (193 gal/yr) of the most contaminated drinking water, and using the shoreline near the most contaminated stretch of water for 67 h/yr (DOE 2002d).

[d] Radiation doses would result from 250 hours of shoreline activity per year along the banks of Poplar Creek or near the K-1066-E cylinder yard (DOE 2002d).

[e] Radiation doses would result from ingestion of two hypothetical worst-case geese (a combination of the heaviest goose harvested and the highest measured concentrations of cesium-137 and strontium-90 found in released geese (0.3 mrem/yr) and a hypothetical worst-case turkey (0.1 mrem/yr) (DOE 2002e). Deer hunt activities were cancelled because of security concerns during the final quarter of 2001 (DOE 2002d).

[f] The range of annual average doses from 1991 through 1995 (Hodges 1996).

[g] In 1998, the maximum worker exposure from painting cylinders was 107 mrem/yr (Cain 2002b).

[h] Dose from natural background radiation ranges from 19 to 72 mrem/yr in Tennessee (DOE 2002d).

[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 3.2-8 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^{-3}	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 dose. 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 2002e). 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 2002e). 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 current annual site environmental report (DOE 2002e). The concentration presented for uranium is from LMES (1996b). 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.