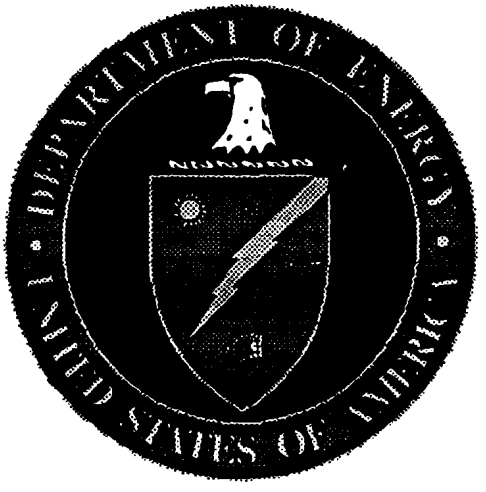
FILE COPY

DOE/EA-1175

FINAL ENVIRONMENTAL ASSESSMENT

LEASE OF LAND AND FACILITIES WITHIN THE EAST TENNESSEE TECHNOLOGY PARK, OAK RIDGE, TENNESSEE



NOVEMBER 1997

U.S. DEPARTMENT OF ENERGY
OAK RIDGE OPERATIONS OFFICE
OAK RIDGE, TENNESSEE

CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

AADT	annual average daily traffic
ACHP	Advisory Council on Historic Preservation
AECA	Atomic Energy Community Act
ALARA	as low as reasonably achievable
ARA	aquatic Reference Area
BEMR	Baseline Environmental Management Report
CEQ	President's Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
CMA	Cooperative Management Area
CNF	Central Neutralization Facility
CO	carbon monoxide
COE	U.S. Army Corps of Engineers
COR	City of Oak Ridge
CRK	Clinch River kilometer
CRM	Clinch River mile
CRMP	Cultural Resource Management Plan
CROET	Community Reuse Organization of East Tennessee
CROU	Clinch River Operable Unit
CTCC	Coors Technical Ceramics Company
CX	Categorical Exclusion
dB(A)	Decibels on an A-weighted scale
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EA	environmental assessment
EDE	effective dose equivalent
EERC	Energy and Environmental Response Center
EFPC	East Fork Poplar Creek
EIS	environmental impact statement
EM	DOE's Office of Environmental Management
EPA	U. S. Environmental Protection Agency
EPCRA	Emergency Preparedness and Community Right-to-Know Act
ER	environmental restoration
ESA	Endangered Species Act
ETTP	East Tennessee Technology Park
FFA	Federal Facilities Agreement
FHWA	Federal Highway Administration
FONSI	finding of no significant impact
FR	Federal Register
FWS	U.S. Fish and Wildlife Service
FY	fiscal year
GDP	gaseous diffusion plant
gpd	gallons per day
ha	hectare

HEU	highly enriched uranium
HF	hydrogen fluoride
HI	hazard index
HQ	hazard quotient
HSWA	Hazardous and Solid Waste Amendments
in.	inch(es)
km	kilometer
LLW	low-level radioactive waste
L_{eq}	equivalent noise level
LMES	Lockheed Martin Energy Systems
LEU	low enriched uranium
LOS	level of service
m	meter
mgd	million gallons per day
m^3	cubic meter
m^3/d	cubic meter per day
m^3/s	cubic meter per second
mrem	millirem
mSv	millisievert
MMES	Martin Marietta Energy Systems
MSC	Manufacturing Sciences Corporation
NAAQS	National Ambient Air Quality Standard
NCRP	National Council on Radiation Protection and Measurements
NEPA	National Environmental Policy Act of 1969
NERP	National Environmental Research Park
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NIOSH	National Institute of Occupational Safety and Health
NOAA	National Oceanic and Atmospheric Administration
NO_2	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places
ORGDP	Oak Ridge Gaseous Diffusion Plant
ORNL	Oak Ridge National Laboratory
ORO	Oak Ridge Operations Office, U.S. Department of Energy
ORR	Oak Ridge Reservation
OSHA	Occupational Safety and Health Administration
O_3	ozone
Pb	lead
PCBs	polychlorinated biphenyls
PMF	probable maximum flood
PM-2.5	fine particulate matter less than 2.5 micrometers in diameter
PM-10	particulate matter less than 10 micrometers in diameter
POTW	publicly owned treatment works
Pub. L.	Public Law
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study

ROD	Record of Decision
SAR	safety analysis report
SEG	Scientific Ecology Group
SHPO	State Historic Preservation Officer
SMP	site management planning
SO_2	sulfur dioxide
SPCC	spill prevention controls and countermeasures
SR	State Route
STP	sewage treatment plant
TDEC	Tennessee Department of Environment and Conservation
TSCA	Toxic Substances Control Act
TSI	Technical Site Information
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
UF_6	uranium hexafluoride
UO_2F_2	uranyl fluoride
UT	University of Tennessee
$\mu g/m^3$	micrograms per cubic meter

SUMMARY

This environmental assessment (EA) was prepared by the U.S. Department of Energy (DOE) to determine if the proposed expansion of its program of leasing land and facilities at the former K-25 Site in Oak Ridge, Tennessee, which has been renamed the East Tennessee Technology Park (ETTP), would result in significant impacts to the human environment. In January 1996, DOE began a "reindustrialization" program for the purpose of leasing vacant, underutilized, and/or inactive facilities at the ETTP to the Community Reuse Organization of East Tennessee (CROET), which in turn has subleased or plans to sublease these facilities to private sector firms or other organizations for industrial, commercial, office, research and development, manufacturing, and industrial applications. The proposed action is DOE's expansion of the leasing program over the next several years. DOE's environmental restoration activities at ETTP would continue concurrently with reindustrialization until site conditions meet the terms established in a 1992 Federal Facilities Agreement (FFA) signed by DOE, the Tennessee Department of Environment and Conservation (TDEC) and the U.S. Environmental Protection Agency (EPA), and until FFA milestones are met.

In the past few years, federal funds to support environmental restoration activities on the DOE Oak Ridge Reservation (ORR) have decreased, and this trend is likely to continue. The proposed action is intended to assist DOE in meeting FFA objectives by reducing the costs to DOE of surveillance and maintenance by leasing facilities, and in some instances by having lessees decontaminate facilities. In either case, DOE realizes cost savings which further FFA activities and enhance its ability to accelerate cleanup. As a result, DOE expenditures for environmental restoration may be reduced by substituting private expenditures, and cost savings may be redirected to additional environmental restoration actions. Whether or not a lessee assists in decontamination or remediation, DOE would still benefit from decreased expenditures for federal surveillance and maintenance at ETTP. As a secondary benefit, the proposed program would populate ETTP with environmentally acceptable industries that would offer local employment opportunities.

The impacts analysis in the EA addresses leases for property and/or facilities in the heavily industrialized portions of ETTP and in adjacent areas that are part of the ETTP Area of Responsibility. In addition to the proposed action, impacts were also evaluated for the no-action alternative. If no action is taken, vacant or underutilized land and facilities at ETTP would not be leased by DOE for commercial or business uses. Ongoing and planned environmental restoration; waste management; technology demonstration, development and transfer activities; and occupational training and development would continue at ETTP until projects are completed or transferred to another site and until agreements in the FFA are met (i.e., the site meets agreed upon regulatory standards). Two alternatives dismissed from further consideration were (1) sale of ETTP land and facilities to a non-federal buyer and (2) transfer of ETTP land and facilities to another federal

agency. Neither of these alternatives would achieve the objective of the proposed action: to accelerate environmental restoration at the ETTP.

Based on the analysis reported in this EA, the following impacts would result from the no-action and proposed action alternatives.

No Action

Environmental restoration and waste management activities at ETTP would continue regardless of whether the proposed action is implemented. The potential impacts of proposed restoration actions, which would be implemented according to a schedule prioritized on the basis of risk, would continue to be evaluated during the CERCLA environmental review process before they are implemented. The potential effects of newly proposed waste management facilities would continued to be evaluated in accordance with either the CERCLA or NEPA environmental review process before they are implemented.

Land Use. Facility and land uses at ETTP would remain unchanged if no action is taken. Environmental restoration activities would continue until the site meets the conditions specified in the decision documents prepared pursuant to the FFA. Thus, previously contaminated areas of the site may become suitable for reuse.

Air Quality. The TSCA Incinerator would continue to treat mixed wastes whether or not the proposed action is implemented. Thus, there would be no net change in air quality impacts for either no action or the proposed action as a result of TSCA Incinerator operation. Annual site environmental monitoring reports for the ORR have reported minimal air quality impacts from ORR activities and facility operations. Airborne particulates (fugitive dust) from remediation activities would be the same whether or not the proposed action is implemented.

Water Resources. Disturbance of soils during environmental restoration and waste management activities increases the potential for erosion and sediment suspension in precipitation runoff to surface waters and percolation to groundwater. Use of best management practices, such as runoff barriers and detention basins, minimizes adverse impacts from sedimentation. Remediation of contaminated soils and groundwater at ETTP may ultimately improve the quality of soils and water resources at the site.

Ecological Resources. With no action and continued environmental restoration at ETTP, remediation of contaminated soils and groundwater may restore previously disturbed habitat to a condition suitable to support native flora and fauna. If no action is taken, three parcels of presently unoccupied land in the K-25 Area of Responsibility would not be available for lease. As a result, ecological succession would progress in these areas until they eventually return to a natural state, similar to other undisturbed areas on the ORR, which may increase habitat and foraging area in this portion of the ETTP.

Socioeconomics. Under no action, the workforce engaged in environmental restoration, waste management, and other miscellaneous DOE activities at ETTP would be dependent upon federal funds available for these programs. With no action, however, leased facilities would not offer potential employment opportunities for displaced federal and federal contractor workers. If recent and project federal downsizing continues, local workers may move out of the Oak Ridge area. If so, the local economy would experience a decline in the purchase of goods and services and sales tax revenue. If the workforce at ETTP remains stable through the completion of environmental restoration at ETTP, the traffic load in the commuting area and related noise impacts would not change.

Cultural Resources. If no action is taken, structures in the ETTP that are scheduled to be demolished by DOE's Office of Environmental Management in accordance with the CERCLA documents prepared pursuant to the steps established in the ORR Cultural Resources Management Plan, as practicable, would be removed from productive use. However, cost savings would be realized by DOE from decreased surveillance and maintenance of demolished structures.

Health and Safety. Already low occupational and public radiological and chemical exposures and associated risk would continue to decline as CERCLA remediation of contaminated areas at ETTP continues. When restoration is complete and FFA goals met, exposures would be less than they are currently. No action would have no effect on the progress of remediation toward the objective of lessening occupational and public risk. The risk of accidents associated with current conditions (e.g., spills, uranium hexafluoride cylinder storage) would remain.

Proposed Action

Land Use. If the proposed action is implemented, leased facilities and/or land would continue to be used for industrial and/or business purposes, which is compatible with past uses of the site.

Air Quality. The results of air-quality modeling indicate that violations of National Ambient Air Quality Standards (NAAQS) would not be expected from potential tenant operations at ETTP. The modeling analysis was based on a bounding scenario that assumed pollutant emissions would arise from 10 stacks of varying height and other dimensions that served the combined industrial operations of two waste and metal recycling and treatment facilities, a ceramic parts manufacturing facility, and a nuclear fuel fabrication facility at ETTP. For this scenario, the greatest increase expected would be in the ambient 24-hour average for SO_2, which would increase by 6% of the NAAQS.

With regard to Clean Air Act Prevention of Significant Deterioration standards, estimated 24-hour incremental emissions of NO_2 and PM-10 from ETTP at the location where concentrations would be greatest were 10% or less of those allowed for Class II areas and 1% or less of those

allowed for the Great Smoky Mountains National Park, a Class I area. The 24-hour increment for SO_2 at the point of maximum concentration increase was estimated to be 24% of the total allowable Class II PSD increment. When this is multiplied by 3 to provide a conservative estimate of increments that would result from much heavier industrialization than planned, 72% of the allowable 24-hour Class II increment for SO_2 would be consumed. Plumes from other area sources that could contribute to cumulative Class II PSD SO_2 increments are located such that they are unlikely to substantially intersect a plume from ETTP moving north or northwest toward those receptor(s) where the contribution to SO_2 concentration is highest. Therefore, the cumulative effect of all PSD sources (as defined in 40 CFR 51.166) would be unlikely to result in exceedances of the total allowable 24-hour Class II PSD increment for SO_2. Results indicated that the highest percentage of an allowable Class I PSD increment was related to the 3-hour SO_2 concentration. For the Great Smoky Mountains National Park, 12% of the allowable 3-hour Class I PSD increment for SO_2 would be consumed.

Water resources. Sediment runoff from erosion during land disturbance and contaminants in stormwater runoff could degrade surface water quality, unless properly controlled. Tenants at ETTP would be required by TDEC to implement Best Management Practices and if necessary, to construct stormwater runoff control structures (e.g., retention basins). State stormwater runoff permits may be required for certain types of facilities or activities.

Domestic and industrial wastewater, both of which are regulated by TDEC in National Pollutant Discharge Elimination System (NPDES) effluent permits, would probably be generated from tenant operations at ETTP. Industrial facilities would be required by state permits to incorporate design features to minimize contaminants in effluent discharges to surface waters. At ETTP, TDEC permits may allow effluent discharges to Poplar Creek or the Clinch River within pre-established limitations for physical, chemical, and biological parameters. The ETTP Sewage Treatment Plant could be used to handle some of the domestic wastewater effluents. Some of the industrial wastewater generated from tenants may be handled by the ETTP Central Neutralization Facility; however, modifications to the NPDES permit would be required. Production of industrial wastewater is process-specific, but with proper containment and treatment techniques, the environmental impact would be minimal.

With the exception of potential contamination from chemical spills, groundwater at ETTP would not be adversely affected by tenant operations. Potable water is already provided to the site, and wells would not be drilled for groundwater use or wastewater disposal.

Ecological resources. Impacts from operation of commercial and industrial facilities at ETTP would likely be minimal to terrestrial and aquatic ecosystems, provided air and water permit limits are consistently met and solid wastes are properly managed. Construction would have limited adverse impacts on terrestrial habitats within the ETTP and the surrounding ETTP Area of Responsibility, which comprises a buffer area around the site. The use of native species for revegetating disturbed areas after construction would have a positive impact on the terrestrial

ecosystem. Osprey (state-listed threatened species) currently nest on one building at the K-25 Site. If new buildings were erected near the nest site, the Tennessee Wildlife Resources Agency would be consulted to determine restrictions that may be needed to preclude or minimize impacts to the birds.

Major habitat alteration would not be expected in any aquatic ecosystems. Leases would require that wetlands be avoided completely wherever possible and/or that mitigation measures be effected to prevent or minimize direct and indirect adverse impacts. In addition, future actions by DOE or tenants in floodplains and wetlands must comply with DOE or other agency (e.g., Army Corps of Engineers) requirements for evaluating impacts of their activities on floodplains and wetlands.

Socioeconomics and environmental justice. For this analysis, it was assumed that 2,500 job opportunities would be created by tenant operations, based on the types of industries that may locate at ETTP. However, new employment would be offset by recent and projected downsizing at ETTP and other DOE Oak Ridge facilities. Thus, a net increase in direct employment in the impact area is not anticipated, and in-migration, population growth, and demands for public services and housing would be negligible. Conversely, the proposed action may benefit the community because new tax revenues would be generated in the form of sales and use taxes paid by businesses and industries for items purchased or used within the impact area. In addition, DOE intends to continue its payments-in-lieu-of-taxes to local governments, even if land and buildings are leased to other tenants.

As adverse impacts are not expected for any resource area, disproportionate adverse impacts on minority or economically disadvantaged populations in the Oak Ridge area would not result from the proposed action.

Transportation. The proposed action would have minimal impact on the traffic on most roads surrounding ETTP. Traffic volume on State Route (SR) 95 would increase slightly above an acceptable level of service. Future improvements would need to be made to alleviate the traffic introduced by the proposed action. Although the volume of truck traffic may increase from activities associated with ETTP, most of it would be distributed throughout the day and would not be concentrated during peak hour commuter traffic periods. Thus, future truck trips are not expected to have a major impact on future traffic.

Noise. Noise from construction and operation would be confined to the ETTP and surrounding ORR areas and would not be expected to interfere with daily activities of nearby residents, the closest of which is about 0.8 mile away. Traffic noise would not exceed the Federal Highway Administration limit, and no appreciable traffic noise impact would result from the associated future traffic within the study area.

Cultural resources. Each lease undertaking would require a DOE-Oak Ridge Operations determination of effect on identified *National Register of Historic Places* (NRHP)-included or -eligible properties. If an adverse impact is determined, procedures involving agreement with the

State Historic Preservation Officer (SHPO) and review by the Advisory Council on Historic Preservation (ACHP), including any required mitigation measures needed to address the adverse impacts, would be conducted. To ensure that the potential effects of the individual leases are thoroughly considered, consultation with the SHPO would be conducted on a lease-by-lease basis, as necessary, for those structures that are listed in or eligible for inclusion in the NRHP.

Health and Safety. Tenant industries would be required by state and federal regulators to have appropriate environmental permits with limitations designed to protect public and worker health and safety. Lessees' workers have been defined by DOE as "co-located workers" as they are physically present at a DOE site with DOE and contractor personnel. As such, they are appropriately trained before entering the site and are protected through appropriate controls and oversight. These workers are not considered members of the general public. Individuals working in leased space at ETTP are and will continue to be afforded the same level of safety and health protection found at any other industrial park. It is the lessee's responsibility to operate in a safe and protective manner. However, under certain scenarios, additional controls are maintained by DOE as a part of its ongoing operations at ETTP.

Operations of industries such as those evaluated in this EA may have radiological and chemical releases. Estimated radiological doses to the public would only be a small fraction of DOE's public exposure limit and would not be considered a health concern. Radiation doses to workers would be well below the Nuclear Regulatory Commission's occupational limit and also below the DOE's more stringent public limit. No unique chemical exposures would be anticipated. All activities would comply with applicable Occupational Safety and Health Administration regulations. Therefore, the proposed action would not have major impacts on occupational health and safety.

Accidents. Tenants would be subjected to consequences of potential accidents from hazards currently found at the site, such as stored uranium hexafluoride cylinders, and typical industrial accidents (e.g, falls, spills, vehicle accidents). No major changes in the frequency and nature of accidents at ETTP and the potentially exposed population size would not be anticipated.

Cumulative Impacts. Cumulative impacts are those of the proposed action in combination with impacts of other reasonably foreseeable actions near ETTP and in the region. DOE reviewed the following actions as to their potential interaction with reindustrialization actions: (1) development of Parcel ED-1 as an industrial park, (2) construction of a Knoxville Bypass (interstate highway) that would connect Interstate (I)-75 with I-40, (3) widening of SR 58, (4) continuation of the Sewage Sludge Land Application Program at specific locations on the ORR, (5) development of a CERCLA waste disposal facility on the ORR, (6) development of other nearby industrial parks, and (7) dredging for improved use of the ETTP barge terminal.

The latter three actions were dismissed from consideration in the analysis of cumulative impacts for the following reasons. DOE has not made a decision about the feasibility of developing a

CERCLA waste disposal facility on the ORR nor where it would be located. Because of these unknowns, it was not included in the analysis. Development of other industrial or commercial sites in the region were not included in the cumulative impacts analysis because most potentially developable sites are sufficiently distant from ETTP that cumulative interactions are unlikely. Finally, development of Parcel ED-1, construction of a Knoxville Bypass, widening of SR 58, and activities of the sewage sludge program are not likely to impact the Clinch River and Watts Bar Reservoir, with the exception of Knoxville Bypass bridge crossings, which would be downstream of ETTP. Likewise, no reindustrialization actions other than dredging for improved barge terminal use have the potential to adversely affect the Clinch River or Watts Bar Reservoir. Thus, in combination with other actions, there is little potential for cumulative impacts to the river. The impacts of future dredging will be considered in a future NEPA review when lessees' apply for a Section 404, Clean Water Act, permit from the COE and approval by TVA and other agencies that comprise the interagency task force that reviews proposed permitting actions that may affect Watts Bar.

Construction of the Knoxville Bypass and freeway interchanges and widening of SR 58 would produce particulate matter emissions during disturbance of soils. These would be temporary and easily minimized by application of wetting agents during dry periods. If bypass construction occurs concurrently with construction or excavation at ETTP, ambient concentrations of particulates may increase in the immediate vicinity. Mobile source emissions would be expected to increase after the beltway is constructed. Operation of industries at Parcel ED-1 were included in the background values for the air quality analysis presented in Sect. 4.2.2.2, with the conclusion that the addition of Parcel ED-1 industries would have little consequence on air quality.

Very little construction-related disturbance of natural soils would occur at ETTP except for clearing of existing vegetation and grading on Parcels 1, 2 and 4. Use of best management practices and erosion/sedimentation controls during construction would minimize siltation in onsite surface waters. Discharges of sanitary and industrial wastewaters from ETTP and Parcel ED-1 would be required by TDEC to comply with NPDES permit requirements. Thus, no major adverse cumulative impacts from routine discharges on surface water quality are anticipated. Reindustrialization of ETTP may contribute to future land application of sewage sludge. Sludge from the ETTP sewage treatment plant may be transported to the city of Oak Ridge sewage treatment plant. Impacts of this program are evaluated in a separate NEPA review, which examined the incremental impacts from ETTP and found them to be minor. Because groundwater will be not be used by ETTP or ED-1 tenants for industrial consumption or waste disposal, cumulative impacts would not be anticipated.

The loss of habitat attributed to reindustrialization and that associated with development of Parcel ED-1 may continue to reduce the biological diversity of the ORR and the conservation value of this area.

The cumulative number of jobs created by reindustrialization and the other actions considered could result in in-migration of workers, with a subsequent increase in demand for housing

and public services in the Oak Ridge and surrounding counties. In particular, commercial development along the Knoxville Bypass and SR 58 is likely to increase with road improvements, creating additional jobs. These would, in turn, create indirect jobs in the community. It would be incumbent upon local planning agencies to carefully consider approval of development proposals and requests for zoning changes to allow for expansion of services and housing to meet increased demands.

Development of Parcel ED-1 in the immediate vicinity of ETTP would require additional highway capacity improvements on SR 95 from the junction with SR 58 to Wisconsin Avenue in Oak Ridge. However, it is very unlikely that both projects would reach 100% of their anticipated employment potential by 2010. The proposal to widen SR 58 to four lanes from Gallaher Bridge to its intersection with I-40 may have a beneficial impact on traffic flow. Development of the Blue Route of the Knoxville Bypass would reduce the local surface street truck traffic in the vicinity of ETTP rather than increase local traffic, because the proposed Knoxville Bypass would provide a better link between I-40 and I-75.

Cumulative impacts from other actions are not anticipated to adversely affect cultural resources at ETTP, on the ORR, and regionally. All federal actions on the ORR would be subject to prior DOE, SHPO, and, possibly, ACHP review and approval in accordance with the provisions of the DOE-ORO Cultural Resources Management Plan.

During state and federal permitting processes for new facilities, cumulative impacts of pollutant emissions on worker and public health would be considered. The combination of emissions from ETTP and nearby facilities (e.g., Parcel ED-1) would not be allowed to exceed permissible limits that are intended to protect human health and the environment. With the future development of Parcel ED-1 or other facilities near ETTP, workers would be at increased risk for exposure to accidental chemical releases. Standard industrial accidents would increase proportionally to the increase in industries or facilities in the area. Further development of surrounding land could cause an increase in the number of people that could be exposed to off-site releases from large accidents. However, the accidents from existing conditions (e.g., cylinder yards) are unlikely and other, more common accidents would not have large consequences.

1. INTRODUCTION

This environmental assessment (EA) was prepared by the U.S. Department of Energy (DOE) in accordance with the President's Council on Environmental Quality (CEQ) regulations [40 Code of Federal Regulations (CFR) 1500-1508] implementing the National Environmental Policy Act (NEPA) of 1969 [Public Law (Pub. L.) 91-190, as amended by Pub. L. 94-52 and Pub. L. 94-83] and DOE NEPA Implementing Procedures (10 CFR 1021). The purpose of the EA is to determine if the proposed DOE action to expand its program of leasing land and facilities at the former K-25 Site, which has been renamed the East Tennessee Technology Park (ETTP), would result in significant impacts to the human environment. For the purposes of this EA, the East Tennessee Technology Park (ETTP) is considered to be the majority of the area within the former K-25 Site security fence and three adjacent parcels of land (see Fig. 1-1).

The EA (1) describes the baseline environmental conditions at ETTP relevant to potential impacts of the proposed action, (2) analyzes potential environmental impacts from a range of specific industrial uses of the site, and (3) identifies and characterizes cumulative impacts that could result from specific industrial uses of ETTP. In addition, the EA provides DOE with environmental information for use in prescribing lease restrictions to protect and preserve the human environment and natural ecosystems.

A Draft EA was released for public and agency review and distributed to interested parties in March 1997. Comments were reviewed by DOE and the EA was revised accordingly.

1.1 BACKGROUND

In 1996, as part of its Vision 2010 initiative, DOE began a program (reindustrialization) of leasing vacant, underutilized, and/or inactive facilities and equipment at ETTP in Oak Ridge, Tennessee, for use by, but not limited to, private sector businesses and industries. The general location of ETTP on the DOE-owned ORR is shown in Fig. 1-2. Specific areas under consideration for leasing are highlighted in Fig. 1-1. A full description of facilities and land areas being considered for lease is provided in Sect. 2.1.1.

For the most part, leases to date have been executed for reuse of ETTP facilities for the same purpose as used in the recent past (i.e., since 1987 when gaseous diffusion operations were discontinued at K-25). Such leasing actions have been categorically excluded from NEPA review because they met the criteria outlined in Categorical Exclusion (CX) A7 (10 CFR 1021). In addition to facilities, DOE has leased a 387-hectare (ha) (957-acre) property on the ORR in close proximity to the ETTP site (Parcel ED-1; Fig. 1-3) to the Community Reuse Organization of East Tennessee (CROET) for development of an industrial park. An EA was prepared to evaluate the lease of Parcel ED-1 (DOE/EA-1113), and a Mitigated Finding of No Significant Impact (FONSI) and Mitigation Action Plan were issued in April 1996 (DOE 1996a).

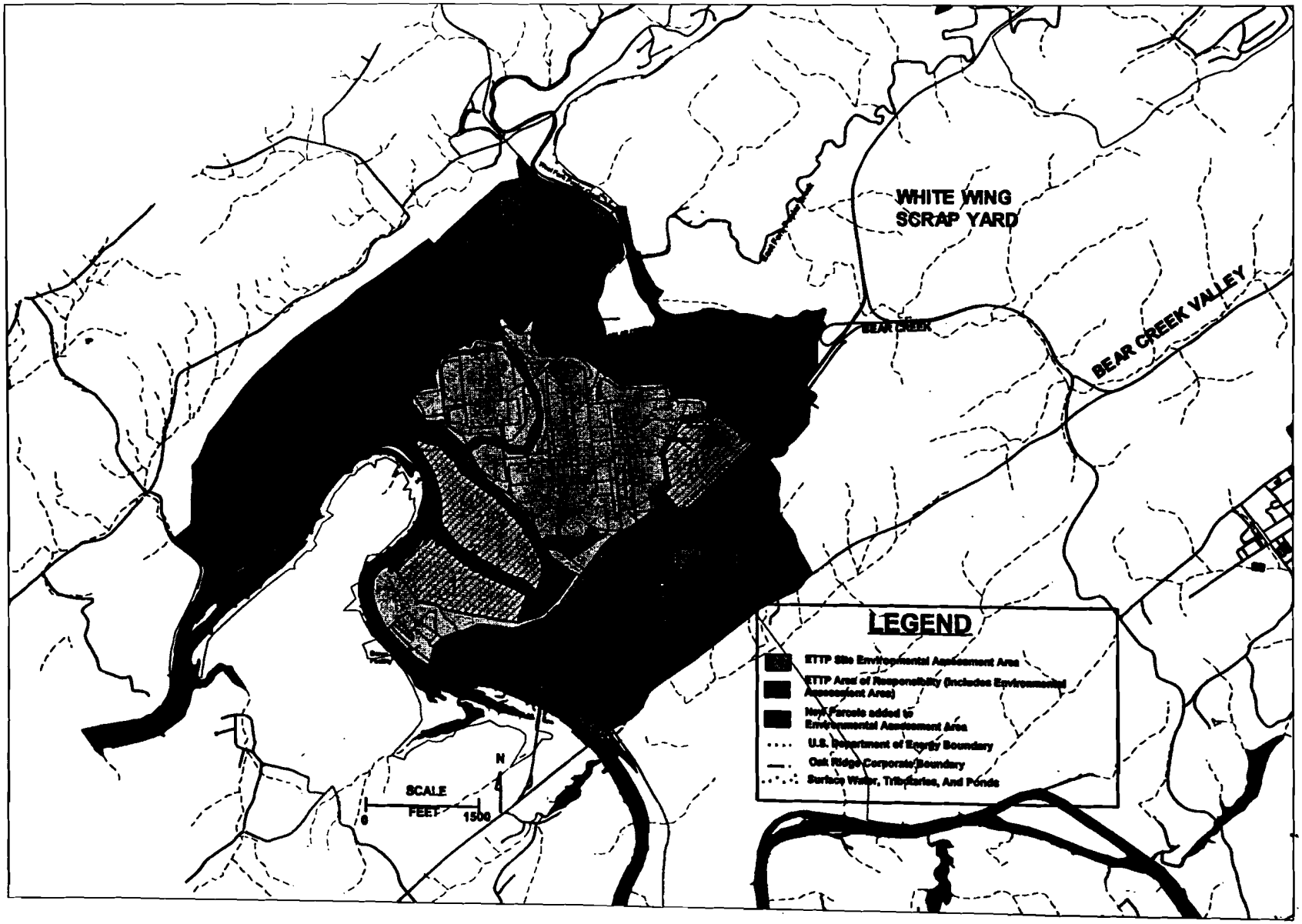


Fig. 1-1. The East Tennessee Technology Park environmental assessment area.

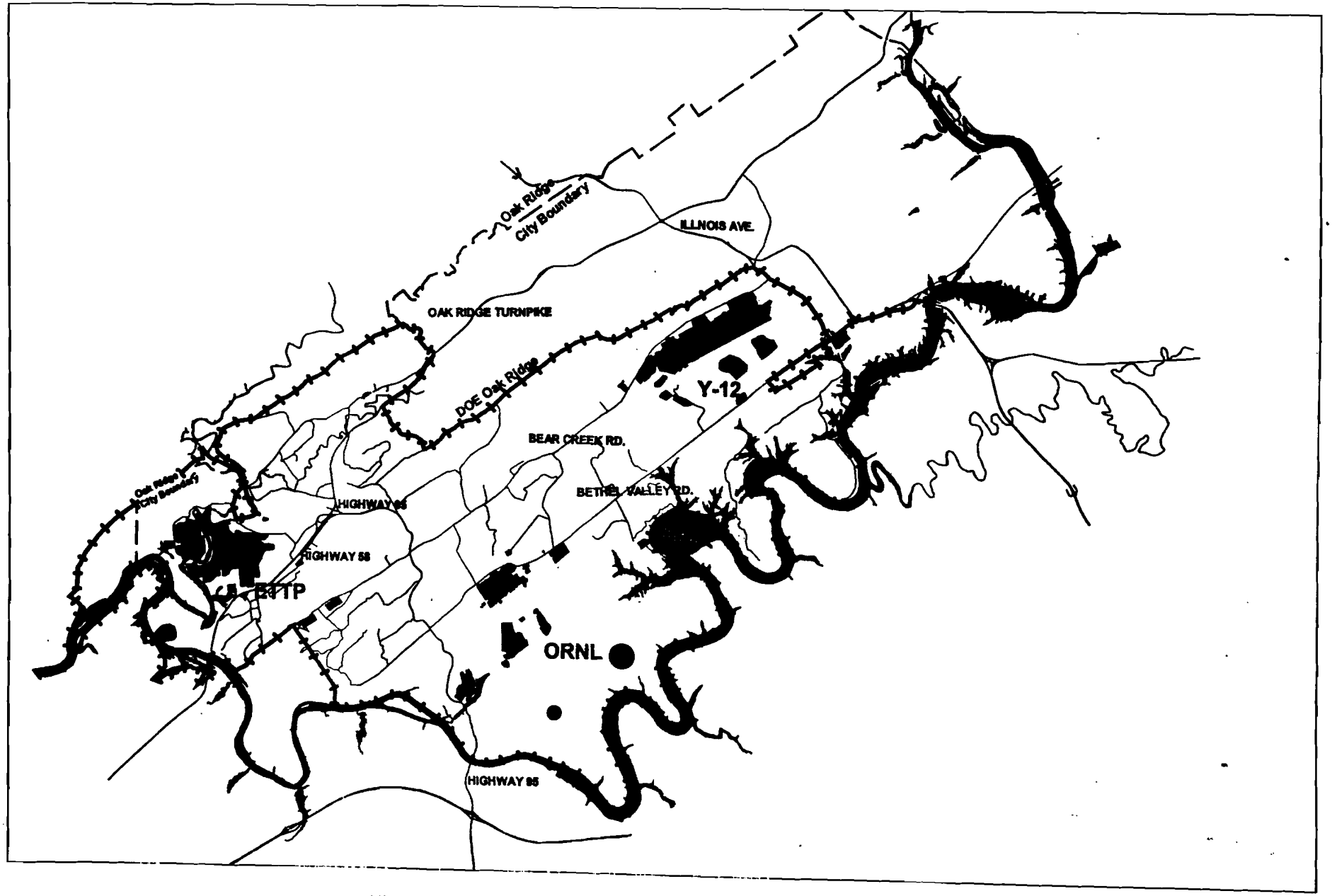


Fig. 1-2. The three DOE plants on the Oak Ridge Reservation.

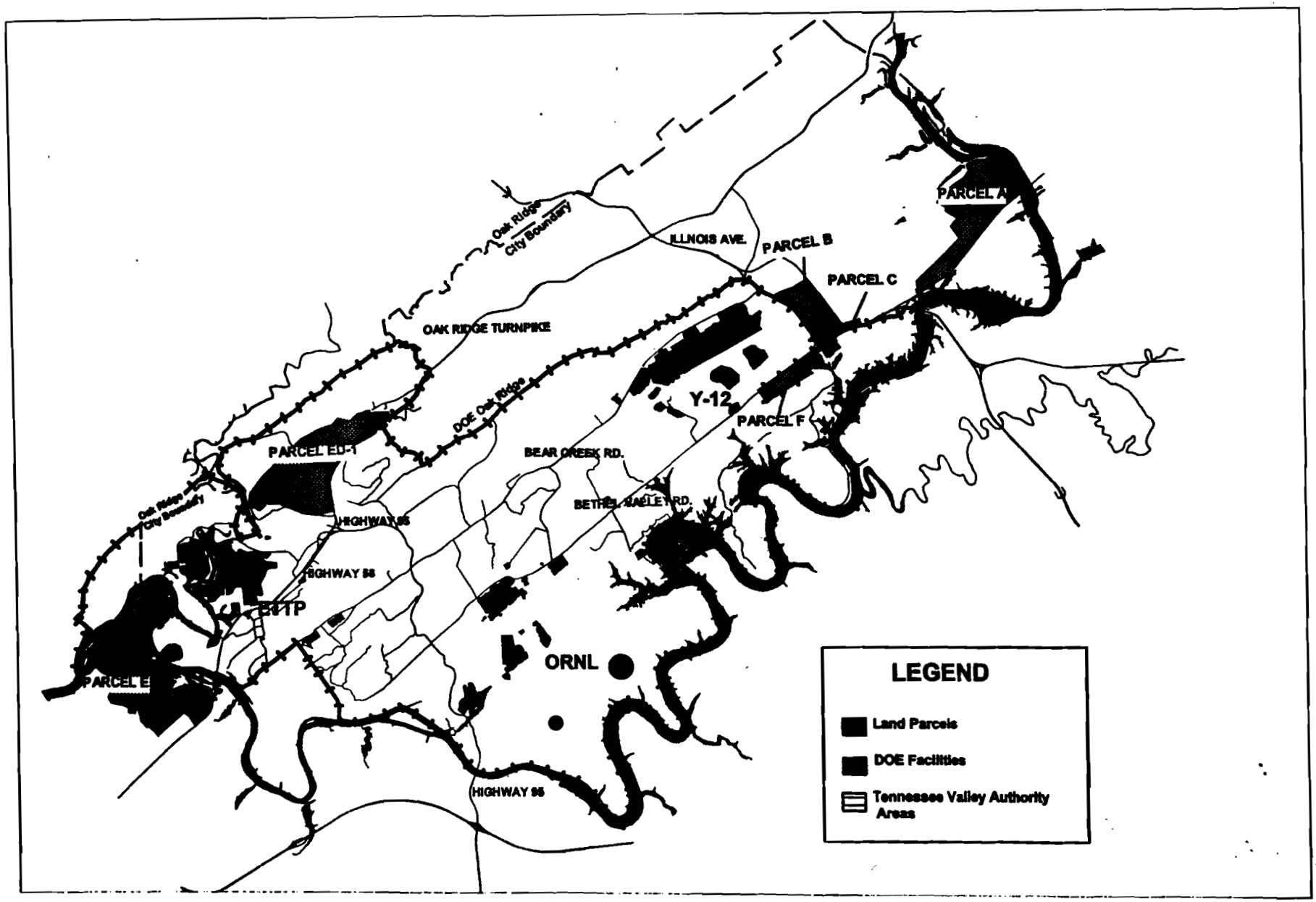


Fig. 1-3. Parcels of Oak Ridge Reservation land transferred to the City of Oak Ridge and CROET (1983–1995).

DOE's Reindustrialization Program is in the process of negotiating future leases with various clients. The proposed action that is the subject of this EA is DOE's expansion of the leasing program over the next several years.

1.1.1 Evolution of Oak Ridge Facilities

Small farming and coal mining communities dominated the Oak Ridge area until 1942, when Oak Ridge experienced a dramatic change. At that time the Clinch River Valley was chosen by the federal government—Manhattan District of the Army Corps of Engineers—as the future location of a large-scale development and production facility for the world's first nuclear weapon. For over 50 years, federal activities conducted on the ORR have influenced the social, economic, and environmental characteristics of Oak Ridge and the region.

Construction of the first buildings of the Oak Ridge Gaseous Diffusion Plant (ORGDP) at the K-25 Site began in 1942, when gaseous diffusion technology was developed for the Manhattan Project to enrich uranium for use in a nuclear weapon. The ORGDP had five primary process buildings (i.e., K-25, K-27, K-29, K-31, and K-33) where highly enriched uranium (HEU) was produced. In 1964, military production of HEU at ORGDP was discontinued, and this function was transferred to another federal gaseous diffusion plant at Portsmouth, Ohio. At that time, the K-25 and K-27 process buildings were shut down.

For the next 20 years, the primary mission of ORGDP was the production of low-enrichment uranium (LEU) for fabrication into fuel elements for commercial and research nuclear reactors. Secondary missions in the mid-1980s included research on new technologies for uranium enrichment, such as gas centrifuge and laser isotope separation. In 1985, because of a decline in the demand for enriched uranium, DOE placed ORGDP in a stand-by mode. The decision to permanently shut down diffusion operations was announced in late 1987, and the name of the facility was changed to the K-25 Site.

Currently, DOE activities at ETTP include environmental restoration; waste treatment, storage and management; technology development and demonstration; and occupational training development. These functions are expected to be completed, relocated, and/or discontinued within the next 10 to 15 years (ORO 1996). Many industrial facilities at ETTP are unoccupied and/or unused—some because they are radiologically contaminated, while others because they are no longer needed by DOE or are unsuitable for current missions.

1.1.2 DOE Facility and Land-Use Policy

As DOE's mission has changed and facilities have become inactive or underutilized, its facility and land-use policy has also changed. In December 1993, DOE directed agency officials at each of its major sites to "implement a site-specific process to identify future-use options based on the unique characteristics of the site and stakeholder needs" (Pearman and Grumbly 1993). Subsequent to this directive, DOE Secretary Hazel

O'Leary issued a *Land and Facility Use Policy* for returning lands to public use, stimulating local economies, ensuring public participation, and protecting natural resources. According to this policy,

> It is Department of Energy policy to manage all of its land and facilities as valuable national resources. Our stewardship will be based on the principles of ecosystem management and sustainable development. We will integrate mission, economic, ecologic, social, and cultural factors in a comprehensive plan for each site that will guide land and facility use decisions. Each comprehensive plan will consider the site's larger regional development context and be developed with stakeholder participation. This policy will result in land and facility uses which support the Department's critical missions, stimulate the economy, and protect the environment. (Memorandum from Hazel O'Leary to Secretarial Officers and Operations Office Managers, Land and Facility Use Policy, December 21, 1994).

This policy statement reiterated a commitment to integrating agency and community interests, as has been practiced in Oak Ridge for at least 40 years. Since the 1950s, DOE and its predecessor agencies (the Atomic Energy Commission and the Energy Research and Development Administration) have sold or transferred approximately 9,700 ha (24,000 acres) of land from the ORR to the local community (Fig. 1-3). These land transactions involved about 41% of the 23,700 ha (58,600 acres) of Oak Ridge lands obtained by the federal government for the Manhattan Project, and more than half of these transfers were to private parties for housing, churches, businesses, and other community needs.

Over the past few years, DOE developed a strategy for future use of the ORR (including ETTP) through several initiatives that involved community leaders, citizens, civic organizations, government agencies, and other stakeholders. Future land-use options were identified during these efforts, with consideration of pre-existing agreements among DOE, the U.S. Environmental Protection Agency (EPA), and Tennessee Department of Environment and Conservation (TDEC), especially those established by Records of Decision (ROD) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Through these processes, the future land use recommended for the previously industrialized areas of ETTP was *industrial* (DOE 1995d).

1.2 PURPOSE OF AND NEED FOR DOE ACTION

DOE proposes to expand its leasing program for several purposes. In the past few years, federal funds to support environmental restoration activities at ETTP have decreased, and this trend is likely to continue. At the same time, DOE is striving to meet the milestones of its 1992 Federal Facilities Agreement (FFA) with TDEC and EPA for environmental cleanup at ETTP. DOE hopes to accelerate environmental cleanup by leasing facilities to tenants who will be required to decontaminate and remediate, at their expense,

as part of the lease agreement. Whether or not a lessee performs cleanup activities, cost savings would also result from a decreased need for federal surveillance and maintenance at ETTP, and thus; will accelerate cleanup.

In some cases, lessees may use ETTP facilities for the same function as they were previously used by DOE. In others, facilities may be modified or demolished and new facilities constructed to support different uses. In either case, some lessees may agree to decontaminate facilities, equipment, or land which they lease to meet established regulatory limits consistent with future use, as specified in the lease. In this way, DOE expenditures for environmental restoration would be reduced by private expenditures.

As a secondary benefit, the proposed program would populate ETTP with environmentally acceptable industries that would offer local employment opportunities. This would help offset the downsizing of DOE Oak Ridge Operations (ORO) workforce due to decreased budget allocations and changes in ORO mission.

1.3 SCOPE OF THIS EA

1.3.1 Impacts Analysis

The impacts analysis in the Draft EA addressed leases for property and/or facilities in the heavily industrialized portions of ETTP. Since the Draft EA was issued, DOE clients have expressed interest in leasing land parcels immediately adjacent to the heavily industrialized areas of ETTP. The scope of the EA has therefore been expanded to include three additional parcels (Parcels 1, 2, and 4 in Fig. 1-1). A description of these parcels is provided in Sect. 2.1.

The impacts analysis focuses on implementation of the proposed action and on the no-action alternative, the latter being required by DOE NEPA Regulation 10 CFR 1021. 321(c). Two alternatives are dismissed from evaluation because they do not meet the purpose of and need for DOE action: sale of ETTP land and facilities to a non-federal buyer, and sale/transfer of ETTP land and facilities to another federal entity. Reasons for dismissal are given in Sect. 2.3.

DOE, EPA, and TDEC have made a joint decision that DOE will use its authority under the Atomic Energy Act to address preparation of buildings for reuse. Therefore, certain actions which may be necessary to prepare facilities for leasing, such as removal of equipment and routine decontamination and decommissioning, are considered in this EA.

Continued operation of the Toxic Substances Control Act (TSCA) incinerator at ETTP is not evaluated in the EA, except for its contribution to cumulative impacts. Construction and operation of the TSCA incinerator was evaluated previously and results reported in an environmental impact statement

(DOE 1982) and documented in a Record of Decision. Any subsequent actions proposed for the TSCA incinerator would be subject to NEPA review prior to their implementation.

In 1996, DOE signed a lease of the former Barge Terminal (K-710) at ETTP with CROET, and a lease of approximately 7 ha (18 acres) adjacent to the Barge Terminal (K-700 area; see Fig. 1-1) for use as a laydown or staging area for barge-related activities is pending with CROET. Both of these actions were categorically excluded from further NEPA review (CX A7 and CX B1.24, respectively; 10 CFR 1021).

Dredging of the Clinch River to improve conditions for barge access is not evaluated in this EA. If dredging of the Clinch River is proposed by CROET or a sublessee, a dredge-and-fill permit under Section 404 of the Clean Water Act would be required. A permit application would be filed with the U.S. Army Corps of Engineers (COE), and this would trigger a NEPA review. Additionally, because the barge terminal is located within the Clinch River/Poplar Creek Operable Unit (OU), a CERCLA area of contamination, an interagency task force comprised of DOE, TDEC, EPA, the Tennessee Valley Authority (TVA), and COE would review the proposal for potential effects on the OU, per the CERCLA ROD (DOE 1997c). Handling and disposal of dredged spoils would be addressed during the COE permitting process and NEPA review.

In the interim, CROET or whoever is responsible for new barge traffic would request that TVA elevate the river level to allow barge traffic through the terminal. TVA regularly manipulates the river elevation by intermittent power production at the Melton Hill Dam. Pool levels would not exceed TVA peak levels; otherwise, vessels would not be able to access the barge slips.

1.3.2 Bounding Scenarios

Because the future uses of land and facilities at ETTP are undefined, a "*bounding*" analysis was used to estimate potential impacts. First, after consideration of the types of industries currently operating in local and regional industrial parks in East Tennessee, specific industrial and business uses of ETTP facilities were identified for analysis. Then, based on discussions with operators of such facilities, realistic assumptions were made, and an upper bound scenario was defined, where possible, for potential emissions, effluents, waste streams, services and infrastructure, and project activities (see Sect. 2.1.3). Finally, technical experts analyzed the potential for adverse impacts from a bounding scenario and defined measures that could be used to mitigate impacts.

Source terms (e.g., emission rates) of actions taken by future tenants and project activities may differ from those characterized and analyzed in this EA. Prior to implementation of each lease, DOE will review each action to be undertaken by a proposed tenant and all source terms associated with a proposed use to determine whether or not they fall within the bounding scenarios evaluated in this EA. If they do, the impacts analysis of this EA will apply, and no further NEPA review will be necessary. If they do not, DOE will determine the appropriate level of NEPA documentation to evaluate impacts and will conduct such a review.

1.3.3 Level of Detail

Certain aspects of the proposed action have a greater potential for creating adverse environmental impacts than others. For this reason, CEQ regulations (40 CFR 1502.1 and 1502.2) recommend that they be discussed in greater detail in NEPA documents than those aspects of the action that have little potential for impact, an approach often referred to as a "sliding-scale" analysis. As an example, because most land and facilities available to be leased are located in previously disturbed areas, the description of affected terrestrial habitat and species in these areas in the EA is brief. On the other hand, emissions from certain industrial facilities may increase the total atmospheric emissions of regulated pollutants from ETTP, which may, in turn, adversely affect local and/or regional air quality. Thus, the description of local and regional meteorology and air quality is comprehensive and serves as the basis for air quality impacts analysis.

Cumulative impacts, or those that would result from the impacts contributed by the proposed action in combination with impacts from other local and/or regional sources, are considered and evaluated in Sect. 4.3 to the extent available information allows.

THIS PAGE LEFT INTENTIONALLY BLANK

2. DESCRIPTION OF ALTERNATIVES

2.1 PROPOSED ACTION

In January 1996, DOE began to lease vacant, underutilized, and/or inactive facilities at the ETTP to CROET, which in turn has subleased or plans to sublease these facilities to private sector commercial firms for a range of industrial, commercial, office, research and development, manufacturing and industrial uses. The proposed action is DOE's expansion of the leasing program over the next several years. DOE's current activities at ETTP would continue concurrently with reindustrialization until the site is restored to the condition specified in the Federal Facilities Agreement (FFA) in accordance with FFA milestones (See Sect. 2.2.1).

2.1.1 Location of Land and Facilities Available for Lease

The ETTP site, located in the northwest quadrant of the ORR (see Figs. 1-1 and 1-2), is adjacent to the Clinch River in Roane County and is approximately 21 km (13 miles) west of downtown Oak Ridge. The facilities and land area available for leasing, which cover approximately 509 ha (1,259 acres), are shown in Fig. 1-1. This includes most of the area within the security fence [293 ha (725 acres)], with the exception of archaeological sites, wetlands, and past, present, or future waste disposal sites.

Since the Draft EA was issued in March 1997, DOE has received inquiries about leasing specific areas of vacant land in the ETTP which were not considered in the impacts analysis reported in the Draft EA (Fig. 1-1). In response, DOE has included the following three parcels of land to the impacts analysis presented in this Final EA: (1) Parcel 1, which is a 52-ha (128-acre) tract adjacent to the former power house site (K-700 area); (2) Parcel 2, which is a 50-ha (123-acre) tract on Duct Island [which is actually a peninsula in a bend of Poplar Creek]; and (3) Parcel 4, which consists of a 39-ha (97-acre) tract south of the TSCA Incinerator. Development would be restricted to those areas having less than 15% slope in order to minimize cut-and-fill operations, erosion potential, and general construction costs. With this restriction, the maximum additional area available for development would be approximately 36 ha (90 acres), 40 ha (100 acres), and 16.5 ha (41 acres) for the Parcels 1, 2, and 4, respectively. Other constraints, such as the presence of transmission line rights-of-way, may place additional restrictions on development in some of these areas.

Appendix B describes buildings and current facilities available for lease and gives examples of facilities having a potential for leasing (e.g., the K-1401 machine shop, the 1200 complex, and the K-1037 building).

2.1.2 Leasing Process

In general, the DOE leasing process for reindustrialization consists of the following steps. After successfully marketing an ETTP property, CROET and DOE sign a Memorandum of Understanding (MOU), which states that all parties agree to the objective of leasing a specific piece of property for a defined use by the client. Although proposed uses that are compatible with past and ongoing uses of land and facilities at ETTP are preferred, all reasonable proposals may be considered. Prior to leasing, DOE assesses the condition of a building and/or land and determines if any classification issues exist. This building condition assessment document may become an attachment to the lease. DOE and/or CROET may, as part of the lease, agree to modify a facility to accommodate requests of the sublessee. However, DOE and/or CROET prefer to lease the buildings "as is" in exchange for the tenant making modifications in lieu of lease payments.

After an MOU is signed, DOE reindustrialization staff prepare a Baseline Environmental Analysis Report that is modeled after the requirements in CERCLA Section 120(h). This report establishes a baseline condition of the facility and identifies hazardous materials (per 40 CFR 373) that are present, stored, or have been released at the facility or land area proposed to be leased. This is accompanied by an environmental baseline summary and, when appropriate, a screening level human health risk assessment. DOE submits this report to TDEC and EPA. In parallel with this, the client completes an environmental review checklist, which records details about construction/demolition/operation proposed by the lessee/sublessee; potential emissions, effluents, and wastes expected to be generated by these activities; pollution prevention, recycling and waste minimization plans; proposed handling, treatment, transport and disposal of wastes; materials to be stored and used onsite; utility and infrastructure requirements; and other relevant information. DOE uses this information in its review of the proposal and documents the level of NEPA analysis that will be needed. Proposed uses similar to those assumed in this EA and their potential impacts will be examined relative to the bounding scenarios evaluated in this EA. Proposals for uses other than those addressed in this EA or those that exceed the bounds of the impacts analysis in this EA would require separate NEPA review before the lease can be consummated.

Each lease will define lessee/sublessee responsibilities, including compliance with federal, state, and local laws, regulations, and ordinances; decontamination requirements; access to utilities and services at ETTP; and security measures . Decontamination of facilities, either by DOE or its designee or by a prospective tenant or its designee would vary in degree, depending on the proposed use of a facility and contractual and regulatory requirements. Leases would not be effective until all NEPA and other statutory and regulatory requirements are met.

2.1.3 ETTP Use Scenarios and Assumptions

Specific commercial, industrial, or business uses of land and facilities at ETTP would not be known until proposals have been reviewed and leases developed. A lessee may choose to use ETTP buildings "as is," modify them for other purposes, and/or construct new facilities on land within the area available for

leasing. Regardless, the terms of each lease will ensure that private uses are compatible with the long-term goals of ORR management, which include fulfilling stewardship responsibilities and promoting sustainable development within the region. Environmental and socioeconomic factors will be considered during review of commercial-use proposals and development plans.

DOE is seeking to lease facilities and land for commercial uses specified in the city of Oak Ridge Zoning Ordinance (Chapter 7, Sect. 6-713 IND-2) (Appendix A). These uses currently include metals recycling and fabrication; industrial services (e.g., laundry); administrative support services; laboratory services; warehousing; technology research, testing and demonstration; waste management, including recycling, waste treatment, and waste packaging; metals smelting and machining; manufacturing (including the use of uranium enrichment technology); and general office space.

In the absence of detailed information, DOE has developed reasonably foreseeable scenarios to bound the impacts analysis (see Sect. 1.3.3). Scenarios identify potential tenants, utilities and infrastructure, areas to be excluded from development, and a range of emissions, effluents, and wastes that would result from industrial activities. Facilities in the Oak Ridge area representative of industries that conform to city of Oak Ridge zoning requirements were contacted by DOE to gather information about their emissions, effluents, and wastes; their environmental permits and licenses; and environmental concerns and issues that are associated with their operation. In addition, DOE conducted telephone interviews to obtain similar information from potential industrial clients who have expressed an interest in locating in East Tennessee. The results of these inquires are summarized in Table 2-1. The table is intended to provide generic information on characteristics of typical industries that may occupy the ETTP site. Thus, detailed information as to the type of permits held, the sources of permits, receiving waters for effluent discharge, locations of waste disposal facilities, and other related characteristics, is not given. Further information on specific industries can be obtained from the sources cited.

With regard to land and facilities available for lease, details of infrastructure and services at ETTP, and protection of biota and sensitive environmental resources, DOE has based the impacts analysis in this EA on the following assumptions :

- Future tenants may use land and/or facilities for the following purposes: metals recycling, tool fabrication, commercial laundry services, office space, administrative support services, laboratory services, and waste management facilities, including recycling, waste treatment, and waste packaging.

- Land and facilities available to be leased occupy approximately 509 ha (1,259 acres) or about 25% of the 1,961 ha (4,845 acres) of the ETTP, not including the land available for industrial development on Parcel ED-1 (see Fig. 1-1). For the most part, this area is comprised of previously industrialized areas, infrastructure corridors, roads, loading and parking areas. Unless there is a change in DOE mission, the non-leased areas of the ETTP would remain in their present state.

Table 2-1. Characteristics of typical industries that may lease land or facilities at ETTP.

Industry	Emissions	Effluents	Wastes	Comments
Industrial laundry	Natural gas combustion releases, sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOCs); air permit is not required.	Discharges wastewater to city sewer after chlorine concentration meets limit.	Domestic waste is sent to permitted county landfill.	Uses potable city water. Does not launder materials containing organics (solvents, gasoline, etc.)
Manufacturer of spectrum analyzers	None.	Discharges sanitary wastes to sewer.	Radioactive cadmium wastes returned to the manufacturer.	Analyzers measure lead concentrations in soils.
Metals decontamination for reuse; manufacturer of containers for radioactive waste	Emissions include NO_x, SO_2, CO, lead, particulate matter, VOCs, depleted uranium (mostly ^{238}U).	Discharges wastewater to city sewer after monitoring for metals, cyanide, and organics.	Radioactive and nonradioactive wastes sent to permitted commercial disposal facilities.	Uses low-level radioactive scrap metal.
Nuclear fuel fabrication; purification of highly enriched uranium	State air permit for release of SO_2, particulate matter, CO, NO_x, ozone (O_3), gaseous fluoride (F) and airborne radionuclides (^{235}U and ^{235}U).	Radioactive and hazardous effluent streams treated onsite, and residues are sent to licensed disposal facilities. Sanitary stream goes to onsite state-permitted treatment facility, and effluent is discharged to a river. Waste oil stream (nonradioactive, nonhazardous) is burned in state-licensed incinerator.	Recycles nonradioactive and nonhazardous wastes and materials. Low-level, mixed low-level, hazardous wastes sent to permitted commercial disposal.	None.

Table 2-1 (cont.)

Industry	Emissions	Effluents	Wastes	Comments
Manufacturer of ceramic parts	State permit to release NO_x, SO_2, CO, VOCs from natural gas combustion.	Discharges wastewater to city sewer in accordance with state NPDES permit (city).	Waste oil is burned. Industrial oil is collected for disposal. Non-recyclables are landfilled.	Stormwater runoff is directed to a sump per state permit. No PCBs generated. Degreasers are inorganics; no hazardous organics.
Manufacturer of vacuum equipment	None.	None.	Sanitary wastes to sewer.	Stormwater runoff to sump. Must meet industrial park requirements.
Manufacturer of computer parts (not computer chips)	None.	None.	Recycle 85 tons of cardboard and Styrofoam annually. Small quantity (state permit) hazardous wastes to off-site disposal.	None.
Waste and metal treatment and recycling facility	Radionuclides; state permit.	Sanitary waste to city plant, then to stream under NPDES permit. Liquid wastes recycled.	Sanitary sludge to city municipal plant for landfarming application. Treated radioactive waste to commercial disposal. No RCRA-hazardous or mixed waste.	Stormwater to basin, then to stream in accordance with NPDES permit. Comprehensive monitoring program for air, water, and soil.
Manufacturer of high-tech filtration, separation, and purification systems	State air permits for individual process areas having their own stacks. Emissions include mineral acid mists and particulates from oils, paints, and petroleum distillates	Process wastewater treated to meet release criteria before effluent discharge to city sewer.	Hazardous wastes stored and removed by licensed handler for treatment and disposal. Scrap and nontoxic solids to landfill. Metal turnings are recycled.	No stormwater NPDES permit is required per the state.

Table 2-1 (cont.)

Industry	Emissions	Effluents	Wastes	Comments
Recycler of radioactively contaminated materials	Process buildings have HEPA filters on ventilation systems. Large ovens remove volatile compounds. Facilities have air permits, and the air emissions meet state and federal (NESHAPS) guidelines. Emissions include particulates, VOCs, and radionuclides.	Process wastewater is treated for release to maintain the water quality well above the criteria specified in the water discharge permit. After testing, effluent is released to sewer.	Hazardous wastes created during processing are stabilized, tested, and sent to a licensed off-site disposal facility. Radioactively contaminated compactible materials are accepted from customers and, after volume has been minimized, are shipped to licensed facility. Ion exchange resins and soils are surveyed; those with sufficiently small levels of radioactivity are sent to a sanitary landfill; the rest go to a licensed facility.	Facility has an NPDES stormwater permit and monitors stormwater periodically, as required.
Hazardous and mixed waste treatment for shipment to off-site repository	No permit for air emissions (dust and fumes); extensive filtration systems with as few emissions as possible. Operation occurs within a building. Building operator controls emissions and holds air permit.	Treats wastewater to meet NPDES permit criteria. Effluent that meets criteria for release directed to sewer system. Effluent that doesn't meet criteria used as process water in concrete preparation.	Secondary wastes generated during waste treatment operations are treated and sent to an off-site repository if possible. If the secondary wastes cannot be satisfactorily treated, they are sent to the primary waste generator.	Not responsible for stormwater.

Source: Personal communication from Bart Howell, Howell Industrial Services (Knoxville, TN), June 1996; Scott Chapin, Niton Corporation (North Kingstown, RI), June 1996; Erin Simms, Manufacturing Sciences Corporation (Oak Ridge, TN), July 1996; Don Roy, Babcock and Wilcox Naval Nuclear Fuel Division (Lynchburg, VA), June 1996; Chris Nelson, Coors Technical Ceramic Co.(CTCC); George Solomon (Vacuum Technologies); Bob Cooney (ELO Touch Systems); and Les Cole, Scientific Ecology Group (SEG), August 1996 to Helen Braunstein, Oak Ridge National Laboratory (TN). Personal communication from Nancy Swarts, Pall Trinity Micro (Cortland, NY), August 1997; Tom Gilman, American Ecology (Oak Ridge, TN); and Martin Markowicz, Performance Development Corporation (Oak Ridge, TN), a subcontractor to Perma-Fix Environmental Services, Inc. (Oak Ridge, TN), August 1997 to James Terry, Oak Ridge National Laboratory (TN).

- Habitat and populations of threatened and endangered species listed or proposed for listing by the U.S. Fish and Wildlife Service (FWS) would be protected from the effects of leasing and development. Habitat and populations of state-listed plant species would be avoided to the extent practicable.

- Construction in floodplains and wetlands may be allowed if (1) permits are obtained from regulatory authorities; (2) appropriate floodplain/wetlands environmental review regulations are satisfied, and (3) mitigation measures are implemented in accordance with permit conditions.

- Historic structures at the ETTP would be reused, preserved, and/or avoided as advised by the Tennessee State Historic Preservation Officer (SHPO). Compliance with the National Historic Preservation Act (NHPA), Section 106, shall be undertaken during individual lease negotiations as future tenant needs for building modification, proposed uses, etc. become known.

- Buildings not designated for near-term demolition would be reused to the greatest extent practicable, and decontamination measures would be completed prior to occupancy, or as otherwise agreed, to ensure worker health and safety, in accordance with regulatory guidance.

- Disposal areas containing classified and/or contaminated materials, equipment, and wastes would be excluded from development or reuse. These areas include the K-1070-A Contaminated Burial Ground; the K-1070 C/D Classified Burial Ground; the K-901 North Waste Disposal Area Burial Ground (refer to Sect. 3.1, Fig. 3.1-1).

- ETTP utilities would be the responsibility of a DOE contractor or a lessee, who would provide these services to ETTP tenants and DOE as part of a lease agreement. These services may include the water distribution system; the electrical power system; the steam plant; the nitrogen and air plant; the sewage treatment plant; the fire protection system; the communication system; the onsite railroad spur; onsite roads; and truck scales. An environmental review would be conducted before utility or transportation system development, including new construction, facility modifications, and/or operational changes to existing systems that would affect the quality and/or quantity of emissions, effluents, and wastes from these systems, would be allowed.

- Earthwork would be conducted incrementally so as not to disturb the entire site at one time. For the purpose of air quality analysis, it was assumed that about 8 ha (20 acres) of land would be under construction at a given time.

- Air emissions from tenant operations would be treated and released in accordance with TDEC permits (Tennessee Division of Air Pollution Control, Chapter 1200-3).

- Industrial and wastewater effluents would be pretreated, treated, and discharged in accordance with state and local permits (State of Tennessee Rules, Chapter 1200-4-1).

- State and federal stormwater regulations (State of Tennessee Rules, Chapter 1200-4-1) would be met to minimize erosion and sedimentation.

To accommodate or otherwise prepare land and facilities for occupancy by tenants, a variety of activities may be undertaken by DOE, DOE contractors, and/or subcontractors, as well as tenants themselves. Where licenses or permits are needed, the parties taking the action will be appropriately licensed or permitted to conduct the work, and will be bound by the requirements of the regulation that covers their activities. Preparatory activities may include, but are not limited to, the following: equipment and material removal and/or relocation; general housekeeping and maintenance actions needed to prepare a facility or area for occupancy and occupant operations; internal facility reconfiguration to optimize the use of space; facility upgrades to improve health, safety, emergency preparedness and alerting capabilities and general working conditions; routine radiological and other surveys, sample collection from various media; routine decontamination of equipment, materials and facilities; infrastructure improvements to enhance facility operations and utility; and the associated waste management activities that may result from these actions.

2.1.4 Workforce and Schedule

Occupancy of the ETTP by tenants under the expanded leasing program would begin in 1997 and continue through 2010, when DOE expects all of ETTP to be available for lease. DOE anticipates that approximately 2,500 new jobs would be created at the site by 2010. DOE's and CROET's success in industrial recruitment and the compatibility of jobs created with local workforce skills and expertise will ultimately determine the number of new employment opportunities at the ETTP. For the purpose of impacts analysis in this EA, DOE considers an estimate of 2,500 new jobs to be plausible and adequately conservative for this analysis.

New jobs created by ETTP reindustrialization are expected to be offset by job losses resulting from DOE and LMES downsizing in Oak Ridge . During FY 1993 and FY 1994, approximately 1,700 workers were displaced from employment at DOE' s Oak Ridge facilities. On November 20, 1996, DOE announced a reduction of up to 1,680 jobs at the DOE Oak Ridge facilities through FY 1997. Thus, a total of 4,280 jobs would be lost from FY 1993 through the end of FY 1997. Furthermore, through 2010, DOE projects that recent and projected job losses combined with the 2,500 new jobs created by reuse of the ETTP site would

result in no net increases in the community. With this in mind, DOE and CROET encourage tenants to offer job opportunities to displaced workers to the maximum extent practicable.

2.2 THE NO-ACTION ALTERNATIVE

The no-action alternative provides an environmental baseline with which impacts of the proposed action and alternatives can be compared. Per 10 CFR 1021.321(c), it must be considered even if DOE is under a court order or legislative command to act. If no action is taken to lease facilities and land at ETTP, DOE would not benefit from expenditures by private firms to decontaminate and restore the environment at the site, nor would DOE realize the savings from the reduction in surveillance and maintenance costs. DOE would still be obligated, however, to meet the milestones and cleanup requirements specified for the ETTP in the FFA .

If no action is taken, underutilized land and facilities at ETTP would not be leased by DOE for commercial or business uses . Ongoing and planned environmental restoration; waste management; occupational training and development; and technology demonstration, development and transfer activities would continue at ETTP until projects are completed or transferred to another site and until agreements in the FFA are met (i.e., the site meets regulatory standards). The following sections describe environmental restoration and waste and materials management activities at the ETTP, which would continue if no action is taken and adequate funding is available.

2.2.1 Environmental Restoration at ETTP

In December 1991, DOE, EPA Region IV, and TDEC signed an FFA that defined an approach to and responsibilities for environmental remediation of the ORR in accordance with CERCLA and the Resource Conservation and Recovery Act (RCRA). The goal of the FFA, which became effective in February 1992, is to ensure that releases of hazardous substances to the environment from past waste management and operations on the ORR are adequately investigated. The FFA also requires that appropriate action be taken to protect human health and the environment. In its Accelerated Cleanup Plan (ACP) (DOE 1997d), DOE outlined a schedule to accomplish remediation; the strategy for restoration is contained in the Oak Ridge Site Management Plan for the Environmental Restoration Program (DOE 1995c).

With the former gaseous diffusion facilities in a safe shutdown condition, DOE began full-scale decommissioning and decontamination (D&D) of some structures at the K-25 Site, such as the demolition of cooling towers and a large powerhouse structure. Contamination in soils, groundwater, surface waters, and inactive waste disposal areas is also being addressed. Unless there is an immediate threat to the environment, safety, and/or health, contaminants are managed in place; those that present a greater risk to the public are the first to undergo remedial actions. While CERCLA response actions are specific to contaminated areas at

ETTP, D&D and surveillance and maintenance are site-wide activities. Although there is some overlap in the geography of all the aforementioned activities, the work scope does not overlap. Details of the environmental restoration program strategy are available in the ACP (DOE 1997d), the Oak Ridge Site Management Plan for the Environmental Restoration Program (DOE 1995c), and the Management Action Process (DOE 1996c).

2.2.2 Waste and Materials Management at ETTP

ORR waste management (generation, handling, treatment, storage, disposal and transportation) is discussed in detail in the ACP (DOE 1997d). For the most part, treatment and storage facilities at ETTP handle wastes generated by ORR operations and CERCLA wastes from environmental restoration actions. Wastes regulated under the TSCA are incinerated in the TSCA Incinerator at K-25, ORR low-level and mixed low-level wastes are stored at ETTP pending disposition, and wastewater is treated at the ETTP Central Neutralization Facility (CNF). With regulatory approval, stored and newly generated wastes are packaged and loaded for transport to off-site treatment and/or disposal facilities. Mixed low-level waste stored at ETTP is managed in accordance with the terms and conditions of a TDEC Commissioner's Order issued in October 1995, which approved the use of specific technologies and schedules proposed by DOE for the treatment of all mixed low-level and transuranic waste. As planned by DOE, management of ORR mixed wastes may include any or all of the following: (1) treatment in existing facilities, (2) private sector treatment, (3) disposal in lieu of treatment for wastes with treatment variances, (4) limited development of new on-site facilities, and (5) treatment at other DOE facilities, if required.

ETTP facilities are scheduled for D&D through FY 2006, and specific out-year actions are specified in the ACP. Beginning in 1998, newly generated, non-CERCLA wastes would be limited to solid, sanitary, and industrial wastes from support activities, solid residuals and wastewater effluent from operation of the TSCA Incinerator, groundwater collection, and utilities operations. A five-year inventory workoff for stored non-CERCLA wastes is needed to facilitate D&D. All stored low-level and mixed low-level waste must be removed from K-29, K-31, and K-33.

Other materials managed at ETTP include (1) scrap metals, (2) enriched and natural uranium, (3) lithium, (4) sodium, (5) chemicals, (6) Nuclear Materials Management Safeguards System-tracked materials, and (7) lead.

2.2.3 Workforce and Schedule

About 3,000 employees (DOE and contractor) are physically located at the ETTP site. This workforce would decline as remedial actions are completed. A small workforce (probably < 50) would remain after FFA requirements are met to maintain institutional controls required by CERCLA . As stated in Sect. 2.1.4 above, between now and 2010, it is estimated that a substantial number of existing jobs could be

eliminated at ETTP (W. A. Truex, DOE, Human Resources, personal communication with L. W. Clark, DOE 2010 Task Team, August 1997).

2.3 ALTERNATIVES DISMISSED FROM CONSIDERATION

Two alternatives were dismissed from analysis: (1) sale of ETTP land and facilities to a non-federal buyer and (2) transfer of ETTP land and facilities to another federal agency. Sale of the land and/or transfer to another agency would require that the ETTP be declared "excess" real property and that it be transferred from DOE to the General Services Administration for disposal. ETTP land and facilities are essential to future opportunities that may include lease transfer or other adaptive reuse, as well as potential future missions. Thus, ETTP land and facilities have not been determined to be excess, and these alternatives were dismissed from detailed consideration.

THIS PAGE LEFT INTENTIONALLY BLANK

3. AFFECTED ENVIRONMENT

3.1 LAND AND FACILITY USE

The 509 ha (1,259 acres) of land available for leasing evaluated in this EA consists mostly of existing buildings and previously disturbed areas. Most undeveloped areas within the ETTP Area of Responsibility (Fig. 1-1) are excluded from the scope of this analysis. The K-25 Technical Site Information (TSI) report (MMES 1994) detailed land and facility uses. Facilities (buildings and structures) occupy a large portion of the land within the area assessed. These facilities and their adjacent support or service property are classified as follows: (1) office; (2) laboratory; (3) site support (e.g., maintenance, shipping and receiving, materials management, fire and guard functions, food services, medical services, operational safety, industrial hygiene, power and utility supply); (4) multiprogram (e.g., decontamination and decommissioning operations, technology development and demonstration); (5) waste handling; (6) waste storage; (7) parking; and (8) open space. Fig. 3.1-1 shows the general location of existing facilities and roads on ETTP.

3.2 ATMOSPHERIC RESOURCES

3.2.1 Climate

The climate of eastern Tennessee may be broadly classified as humid continental, although it is very near the region of temperate continental climate to the north. The Cumberland Mountains to the northwest and the Great Smoky Mountains to the southeast influence the patterns of temperature and precipitation over the region, with cooler temperatures and greater precipitation generally occurring at the higher elevations. The rugged terrain is not conducive to the buildup of large and violent tornados, and the distance from the coast combined with the presence of the Great Smoky Mountains keeps the region from being much affected by hurricanes. Average annual temperature in Oak Ridge, based on the 30-year period from 1961 to 1990 is 13.7°C (56.6°F) (U.S. Department of Commerce 1995). Precipitation in Oak Ridge averages about 1366 mm (53.8 in.) per year. Precipitation is evenly distributed throughout most of the year.

Wind speeds and directions 10 m (33 ft) above ground at ETTP are summarized in the wind rose shown in Fig. 3.2-1. The data are from instruments mounted on meteorological tower MT7. The average wind speed is 1.8 m/s (4.0 mph). Wind speeds tend to be fastest during the spring (March-April) and slowest during late summer and early fall (August-October). The fastest wind recorded in the area was a 1-second average of 35 m/s (79 mph), associated with a tornado in Bear Creek Valley during the afternoon of February 21, 1993. The anemometer was at an elevation of 15 m (50 feet) above ground at the National

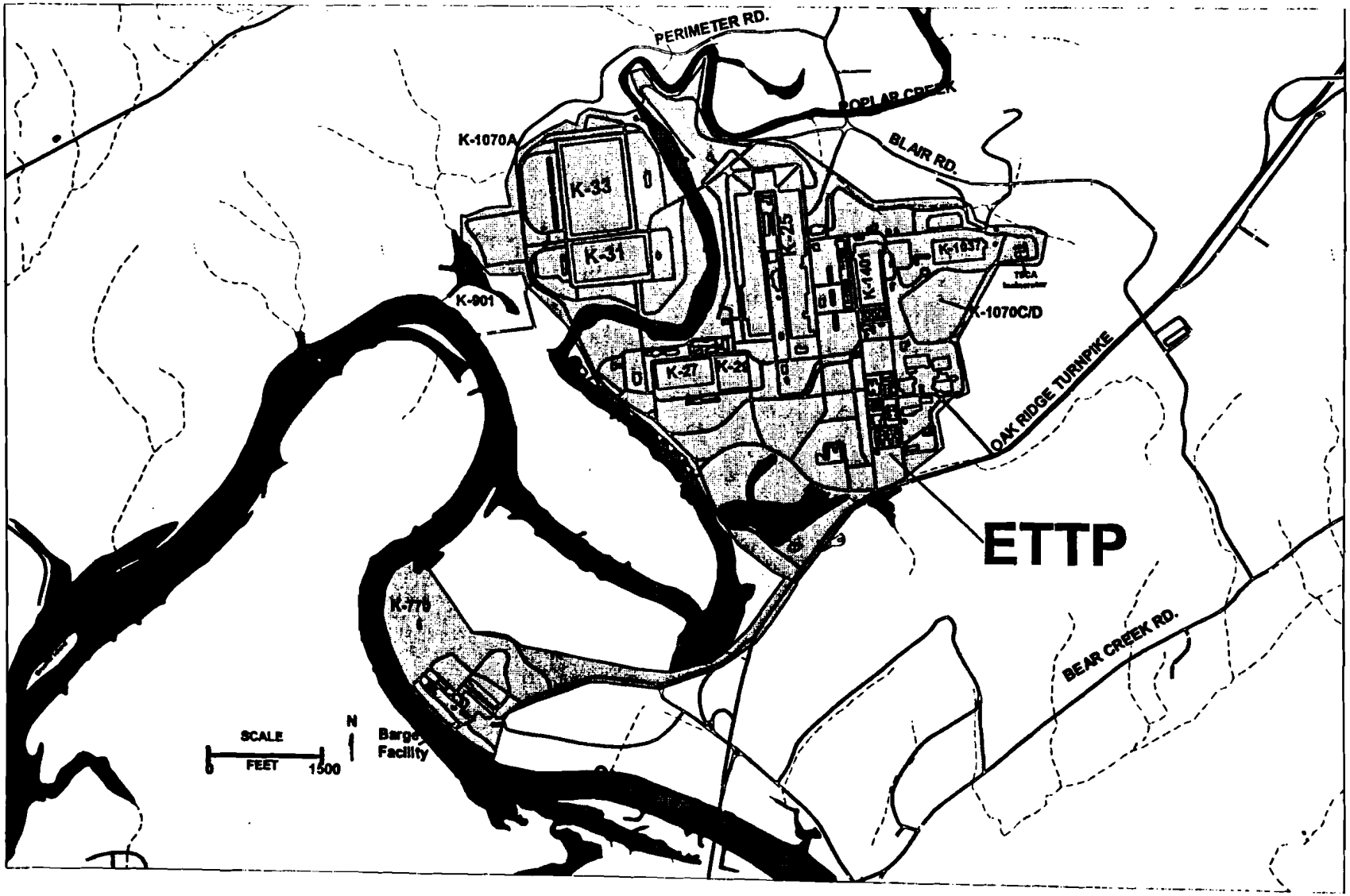


Fig. 3.1-1. Existing facilities on ETTP.

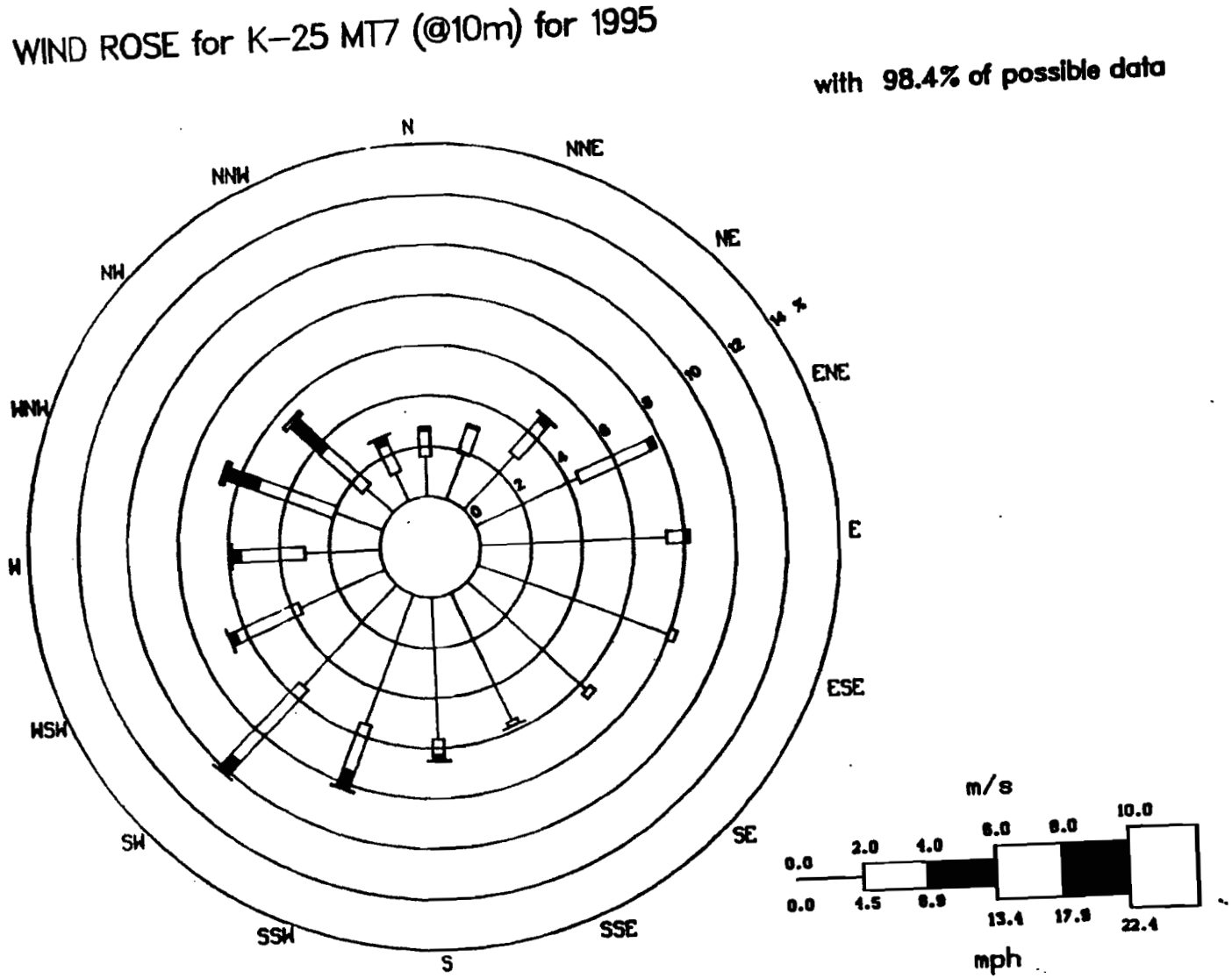


Fig. 3.2-1. Wind rose for 1995 at 10 m (33 ft) from tower MT7, near the Oak Ridge Turnpike just west of the visitor overlook. The frequency of winds from each direction is plotted as a series of bar segments extending from the center of the circular diagram toward the direction *from which* the corresponding winds come. Wind speed classes are denoted by bar width and shading as shown at the bottom right. The frequency of wind from each direction in each speed class is indicated by the length of the corresponding bar.

Oceanic and Atmospheric Administration (NOAA) weather station, just across Pine Ridge from the tornado path. Wind speeds nearer the tornado would be expected to be greater. However, this tornado and others that have occurred in the area are small compared to those that can occur in the flat terrain of the Great Plains.

Prevailing wind directions are from the northeast and southwest, reflecting the channeling of winds parallel to the ridges and valleys in the area. The topography also causes a diurnal component of the wind pattern. Cold air near the ground at night tends to move toward lower elevations, or downhill. During the day, when rising warm air along the hillsides is replaced by rising warm air from the valleys below, the flow tends to be uphill. On a larger scale, the effect is to influence the flow of air toward the lower elevations of the valley, to the southwest at night, and toward the higher elevations to the northeast during the day. The relatively high. frequency of westerly winds evident in the wind rose indicates the influence of the general west-to-east flow pattern that is characteristic of middle latitudes (the prevailing westerlies). The rugged terrain serves to reduce wind speeds in the area. One effect of decreased wind speed is decreased risk of wind damage to structures. Another effect is a higher frequency of calm winds, which leads to reduced emissions of fugitive dust and associated pollutants but which also leads to reduced dispersion of pollutants emitted from sources such as vehicles and industrial stacks.

3.2.2 Air Quality

3.2.2.1 Air quality standards

Ambient-air standards. National Ambient Air Quality Standards (NAAQS) exist for sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), carbon monoxide (CO), lead (Pb), and particulate matter small enough to pass easily into the lower respiratory tract (particles less than 10 micrometers in aerodynamic diameter, designated PM-10). Primary NAAQS are designated to protect human health; secondary NAAQS are designated to protect human welfare by safeguarding environmental resources (such as soils, water, plants, and animals) and manufactured materials. The NAAQS (Table 3.2-1) are expressed as pollutant concentrations in the ambient air—that is, in the outdoor air to which the general public has access [40 CFR 50.1(e)], averaged over time periods ranging from 1-hour to 1-year. The NAAQS for short-term (24-hour or less) averaging periods may be exceeded once per year for SO_2 and CO, and for an average 1 day/year over a 3-year period for O_3 and PM-10.

States may set standards that are more stringent than the NAAQS or that address specific pollutants not covered by the NAAQS. Tennessee has adopted the NAAQS and, in addition, has adopted secondary standards for fluoride, expressed as hydrogen fluoride (HF) (Tennessee Environmental Regulations Section 1200-3-3-.03). These standards are summarized along with the NAAQS in Table 3.2-1.

Prevention of significant deterioration. In addition to ambient air quality standards, which represent an upper bound on allowable pollutant concentrations, there are national standards for the prevention of significant deterioration (PSD) of air quality (40 CFR 51.166). The PSD standards differ from

Table 3.2-1. Air quality standards

Pollutant	Averaging time	NAAQS ($\mu g/m^3$)		Allowable PSD increment ($\mu g/m^3$)[a]	
		Primary	Secondary	Class I	Class II
Sulfur dioxide	3-hour[b]		1,300	25	512
	24-hour[b]	365		5	91
	annual	80		2	20
Nitrogen dioxide	annual	100	100	2.5	25
Ozone	1-hour[c]	235	235		
	8-hour[d]	157	157		
Carbon monoxide	1-hour[b]	10,000			
	8-hour[b]	40,000			
PM-10[e]	24-hour[c]	150	150	8	30
	annual	50	50	4	17
PM-2.5[f]	24-hour	65	65		
	annual	15	15		
Lead	3-month[g]	1.5	1.5		

State of Tennessee Standards

Pollutant	Averaging time	Standard ($\mu g/m^3$)
Fluorides[h]	12-hour[b]	3.7
	24-hour[b]	2.9
	7-day[b]	1.6
	30-day[b]	1.2

Note: Where no value is listed, there is no corresponding standard.

[a]Class I areas are specifically designated areas in which degradation of air quality is severely restricted; Class II areas have a less stringent set of allowable increments.

[b]Not to be exceeded more than once per year.

[c]Not to be exceeded more than 1 day per year on the average over 3 years.

[d]A new standard became effective September 16, 1997 (62 FR 38856, Friday, July 18, 1997). This standard applies to a 3-year average of the annual 4th-highest daily maximum 8-hour average concentrations.

[e]Particulate matter less than 10 μm in diameter.

[f]Particulate matter less than 2.5 micrometers in diameter. The annual standard applies to the average of the annual arithmetic means over a 3-year period; the 24-hour standard applies to the average of the 98th percentile values of 24-hour average concentrations over a 3-year period. This standard became effective September 16, 1997 (62 FR 38652, Friday, July 18, 1997)

[g]Calendar quarter.

[h]Gaseous fluorides expressed as HF.

the NAAQS in that the NAAQS provide maximum allowable *concentrations* of pollutants, while PSD requirements provide maximum allowable *increases in concentrations* of pollutants for areas already in compliance with the NAAQS. PSD standards are therefore expressed as allowable *increments* in the atmospheric concentrations of specific pollutants. PSD increments are particularly relevant when a major proposed action (involving a new source or a major modification to an existing source) may degrade air quality without exceeding the NAAQS, as would be the case, for example, in an area where the ambient air is very clean. Allowable PSD increments currently exist for three pollutants (NO_2, SO_2, and PM-10). One set of allowable increments exists for Class II areas, which cover most of the United States, and a much more stringent set of allowable increments exists for Class I areas, which are specifically designated areas where the degradation of ambient air quality is to be severely restricted. Class I areas include national parks that exceed 2,430 ha (6,000 acres) in size and other areas (e.g., national parks, monuments, wilderness areas) as specified in 40 CFR 51.166(e). Allowable PSD increments for Class I and Class II areas are given in Table 3.2-1.

The nearest PSD Class I area to ETTP is the Great Smoky Mountains National Park. The nearest boundary of this area is about 55 km (35 miles) southeast of ETTP. The Joyce Kilmer Wilderness Area (also Class I) is just south of the western end of the Great Smoky Mountains National Park, about 55 km (35 miles) southeast of ETTP.

Currently, federal land managers must be notified of any new permit applications for major sources or major modifications to existing sources (as defined in 40 CFR 52.21) that may affect air quality related values (including visibility) in a Class I area. A federal land manager may conclude that a proposed project would have an adverse affect on air quality related values in a Class I area, and therefore recommend to the permitting authority that a permit not be granted. If the permitting authority agrees, a permit would not be granted. If the permitting authority disagrees, then it must, in the notice of public hearing on the permit application, either explain its position or give notice as to where the explanation can be obtained (40 CFR 52.21). The federal land manager for the Great Smoky Mountains National Park is the National Park Service, which has issued guidelines to clarify its position on permit applications (Bunyak 1993), although details of the procedures are currently being revised. Generally, the permitting authority should notify the federal land manager of any major facility (one having the potential to emit 100 tons or more per year of any regulated pollutant) planning to locate within 100 km (62 miles) of a Class I area (Bunyak 1993). As noted above, there are two Class I areas within 100 km (62 miles) of ETTP.

3.2.2.2 Air quality monitoring

Table 3.2-2 shows pollutant concentrations at the monitoring stations nearest to ETTP for pollutants covered by the NAAQS. O_3, CO, and PM-10 are monitored in Knoxville, about 45 km (28 miles) east of ETTP. SO_2 is monitored near the Bull Run Steam Plant, about 25 km (15 miles) east-northeast of ETTP.

Table 3.2-2. Monitored pollutant concentrations in the region around ETTP

Pollutant	Averaging time	Location	Year	Annual average or maximum concentration ($\mu g/m^3$)	Percent of standard
Sulfur dioxide	annual	Anderson County	1991	12	15
			1992	10	13
			1993	11	14
			1994	10	13
			1995	12	15
	24-hour		1991	98	27
			1992	51	14
			1993	92	25
			1994	243	66
			1995	61	17
	3-hour		1991	297	23
			1992	244	19
			1993	400	31
			1994	484	37
			1995	316	24
Nitrogen dioxide	annual	McMinn County	1991	26	26
			1992	24	24
			1993	28	28
			1994	26	26
			1995	24	24
Ozone	1-hour	Knoxville	1991	231	98
			1992	220	94
			1993	239	102
			1994	218	93
			1995	243	103
	8-hour[a]				
Carbon monoxide	8-hour	Knoxville	1991	5,980	60
			1992	6,210	62
			1993	6,095	61
			1994	5,520	55
			1995	5,060	51
	1-hour		1991	13,800	35
			1992	10,350	26
			1993	12,075	30
			1994	8,280	21
			1995	8,625	22
PM-10	annual	Knoxville[b]	1991	42	84
			1992	38	76
			1993	40	80
			1994	39	78
			1995	37	74

Table 3.2-2 (cont.)

Pollutant	Averaging time	Location	Year	Annual average or maximum concentration ($\mu g/m^3$)	Percent of standard
	24-hour		1991	79	53
			1992	79	53
			1993	88	59
			1994	76	51
			1995	71	47
PM-2.5[a]	annual[c]				
	24-hour[c]				
Lead	3-month[d]	Nashville	1991	0.11	7
		Nashville	1992	0.11	7
		Rockwood[e]	1993	0.08	5
		Rockwood	1994	0.05	3
		Rockwood	1995	0.05	3
		Rockwood[e]	1993	0.44	29
		Rockwood	1994	0.32	21
		Rockwood	1995	0.19	13
	annual[f]	ETTP[g]	1991	0.014	1
	3-month[d]	ETTP[g]	1992	<0.054[h]	<4
	3-month[d]	ETTP[g]	1993	0.025	2
	3-month[d]	ETTP[g]	1994	0.007	<1
	3-month[d]	ETTP[g]	1995	0.003	<1

[a]Sufficient data are not available to compare with the new standard which became effective on September 16, 1997.

[b]The highest concentration reported at the four Knoxville monitoring stations is given.

[c]Particulate matter less than 2.5 micrometers in diameter, for which new standards became effective September 16, 1997; these standards are being phased in, but a year set of data is not yet available.

[d]The highest value for the four calendar quarters is listed.

[e]Two monitoring stations in Rockwood, about 25 km (61 mi) west of ETTP (much closer than Nashville), became fully operational by 1993. These stations are near the Horsehead metal recovery facility.

[f]Only annual data from ETTP were given for 1991.

[g]Data from ETTP, while not part of the EPA QUICKLOOK monitoring network, are believed to be generally representative of conditions near ETTP.

[h]A change in analytical method increased the minimum detection limits in 1992, so only an upper bound is given.

NO_2 is monitored in McMinn County, about 100 km (62 miles) south of ETTP. Particulate matter concentrations are monitored at ETTP, and three years of data are now available in Annual Site Environmental Reports for the Oak Ridge Reservation. Although the ETTP monitoring is not part of the EPA network, the monitoring is considered accurate. Concentrations are typically about 80% of those measured at the Vermont Avenue monitor in downtown Knoxville, which usually provides higher concentration values than other Knoxville monitors. Concentration values from the other monitors in Knoxville were closer to the values from ETTP. Complete data on Pb concentration in Rockwood, about 27 km (17 miles) west-southwest of ETTP, are available for 1993 and thereafter. The two Pb monitors in Rockwood are within 1 km (0.6 mile)

of the Horsehead metal recycling facility, which extracts usable metals from fine particles that would otherwise be waste byproducts of other metal processing facilities. The Pb monitors in Rockwood are part of the EPA monitoring network, and they provide an indication of the effects of the Horsehead facility on air quality in the immediate area. Atmospheric Pb concentrations are also monitored at ETTP. Although the ETTP Pb monitoring is not part of the EPA monitoring network, the measurements there are generally consistent with measurements outside large cities and away from metal processing facilities, and are believed to be generally indicative of conditions in and around ETTP. The ETTP Pb measurements are included in Table 3.2-2.

Roane County and all surrounding counties are in attainment of all NAAQS (40 CFR 81.343). The nearest nonattainment area is Polk County, about 72 km (45 miles) south of ETTP, which is not in attainment of the standards for SO_2. Comparison of measured values in Table 3.2-2 with the standards in Table 3.2-1 shows that air quality in the region is generally good. An anomalous 24-hour average SO_2 concentration (243 $\mu g/m^3$) occurred during 1994 (Table 3.2-2), although it was only about two-thirds of the corresponding NAAQS. The second-highest 24-hour average SO_2 concentration during 1994 was 69 $\mu g/m^3$, or less than one third of the anomalous value. Frequent causes of such anomalies include an unusually persistent wind from the direction of a large SO_2 source toward the SO_2 monitor, or an unusual release of SO_2 near the monitor. The O_3 standard is still occasionally exceeded in Knoxville. Knox County is in attainment of the O_3 standard because one exceedance per year, on average over a 3-year period, is allowed.

Because state standards are often set to deal with particular industrial operations, monitoring may be very localized. The Tennessee standard for fluorides arose primarily from operations at the ORGDP on ETTP, which ceased operation in the mid-1980s. The amount of monitoring for fluorides has correspondingly declined. Some sampling for fluorides is still conducted at the Y-12 plant, about 15 km (9 miles) east of ETTP. Estimates based on Y-12 samples indicate that 7-day fluoride concentrations are less than 2% of the Tennessee standard (Frazier et al. 1995). Currently, about 7,100 cylinders containing UF_6 are stored at ETTP.

Leaking cylinders could release UF_6 into the air and fluorides [i.e., HF and UO_2F_2 (uranyl fluoride)] are formed when UF_6 reacts with moisture in the air. Accidents associated with these cylinders could also release fluorides (see Sect. 3.11).

3.2.2.3 Current emissions

Emissions data from ETTP are presented in the ORR Annual Site Environmental Reports (e.g., Hamilton et al., 1996, Frazier et al. 1995). For radiological pollutants, emissions are variable and emanate mostly from the TSCA incinerator. These pollutants are regulated under DOE Order 5400.5, *Radiation Protection of the Public and the Environment* and 40 CFR 61 Subpart H, *National Emission Standards for Hazardous Air Pollutants (NESHAP)*. Measurements at the perimeter of the ORR (Frazier et al. 1995) indicate ambient air concentrations of radionuclides are less than 1% of their respective derived concentration guides given in DOE Order 5400.5.

The most recently published data on nonradiological emissions from ETTP are listed in Table 3.2-3.[1]

Table 3.2-3. Emissions from ETTP during 1994 and 1995

Pollutant	1994 Quantity	1995 Quantity
Nitrogen oxides	13.7 Mg (15.1 tons)	22.9 Mg (25.2 tons)
Particulate matter	2.2 Mg (2.4 tons)	3.1 Mg (3.4 tons)
Sulfur dioxide	4.7 Mg (5.2 tons)	2.8 Mg (3.1 tons)
Carbon monoxide	18.6 Mg (20.5 tons)	22.4 Mg (3.1 tons)
Lead	0.29 kg (0.65 lb)	0.6 kg (1.3 lbs)
from the TSCA incinerator		
Beryllium	0.007 kg (0.015 lb)	1.7 g (0.004 lbs)
Chlorine	25.4 kg (56 lb)	15.5 kg (34 lbs)
Fluorine	0.3 kg (0.66 lb)	77.2 g (0.2 lbs)
Mercury	3.9 kg (8.6 lb)	1.2 kg (2.6 lbs)

Emissions of pollutants regulated by the NAAQS are relatively small for industrial sources. For example, 1993 emissions of nitrogen oxides (which are here assumed to consist entirely of NO_2) from ETTP were 13.7 Mg (15 tons), or about 0.04% of the total NO_2 emissions from Roane County. Where comparisons are available for other pollutants, emissions from ETTP were also less than 1% of the Roane County totals. For other pollutants emitted from ETTP that are regulated by the NAAQS (SO_2, CO, Pb, and PM-10) emissions per unit area are less than the U.S. averages. Estimated emissions from the ETTP Steam Plant are generally less than 20% of the permitted amounts for the corresponding pollutants, and estimated pollutant emissions from the TSCA incinerator have been less than 5% (and in most cases less than 1%) of their respective permitted amounts. Annual summaries of nonradiological emissions from ETTP can be found in the ORR Annual Site Environmental Reports. Airborne radionuclides from ETTP currently result in a dose of about 0.004 mSv/yr (0.4 mrem/yr) to the maximally exposed individual (Frazier et al. 1995). This is 4% of the NESHAP standard [0.1 mSv (10 mrem)] given in 40 CFR 61.92.

[1]The 1996 data were not available at the time this EA was prepared.

3.2.3 Visibility

The nearest visibility data in the area come from the Great Smoky Mountains National Park. The median visual range at the park is 39 km (24 miles), with a median summer value of 19 km (12 miles) (Shaver et al. 1994). Visibility is specifically mentioned in 40 CFR 52.21(p)(2) as an air quality related value to be protected by federal land managers of Class I areas. No visibility data are available for the ORR or ETTP.

3.3 GEOLOGY AND SOILS

In general, ETTP is underlain by bedrock that can be broadly characterized as carbonate (Chickamauga and Knox Group) or clastic (Rome Formation). Figure 3.3.1 presents a geologic map of the ETTP site. The carbonates underlie the majority of the Main Plant area including the Duct Island Peninsula (Parcel 2) and the Powerhouse area (Parcel 1). The eastern portion of the site, including Parcel 4 addressed in this EA, is underlain by clastic bedrock of the Cambrian Rome Formation (listed as "Cr" on Fig. 3.3-1) on the hanging wall of the K-25 Fault. The carbonate bedrock can be further subdivided into Chickamauga and Knox bedrock with the 7 formations of the Chickamauga Group underlying the bulk of the Main Plant area addressed in this EA and the Knox Group underlying Black Oak Ridge. The contact between these two is highlighted on Fig. 3.3-1. Each of these three broad geologic units can be further distinguished based on structural complexity.

The structural geology of the ETTP site is complex and includes map scale folds and faults, as shown on Fig. 3.3-1, as well as outcrop scale fractures, folds and faults. The principal faults in this area include the White Oak Mountain Fault, a major regional thrust fault located along the south side of the ETTP which places Rome formation clastic rocks underlying Pine Ridge over Chickamauga carbonates. Given the position of this fault, it is of little consequence to actions considered in this EA. The K-25 Fault trends north northwest through the eastern part of the ETTP and also places Rome clastics over Chickamauga carbonates. Parcel 4 addressed in this EA is situated on the hanging wall of the K-25 Fault and thus is underlain by the Rome formation. Based upon available outcrop and subsurface data, the Rome bedrock on the hanging wall of the fault is extremely contorted. Rome bedrock weathers to shale and siltstone saprolite which extends to the surface. This saprolite retains the structural complexity of the underlying competent bedrock.

In the Main Plant area, the Chickamauga Group carbonates have been folded into a broad anticline and syncline pair that trend across the site extending from the K-25 Fault to the Clinch River. Other smaller scale faults and folds have been noted along these features. The structural style of the Knox group carbonates underlying Black Oak Ridge is relatively simple by contrast, dipping to the southeast.

There is abundant evidence of karst features in the carbonates at ETTP (as well as carbonate units in the lower Rome formation), but the degree and style of karstification varies between the Knox and

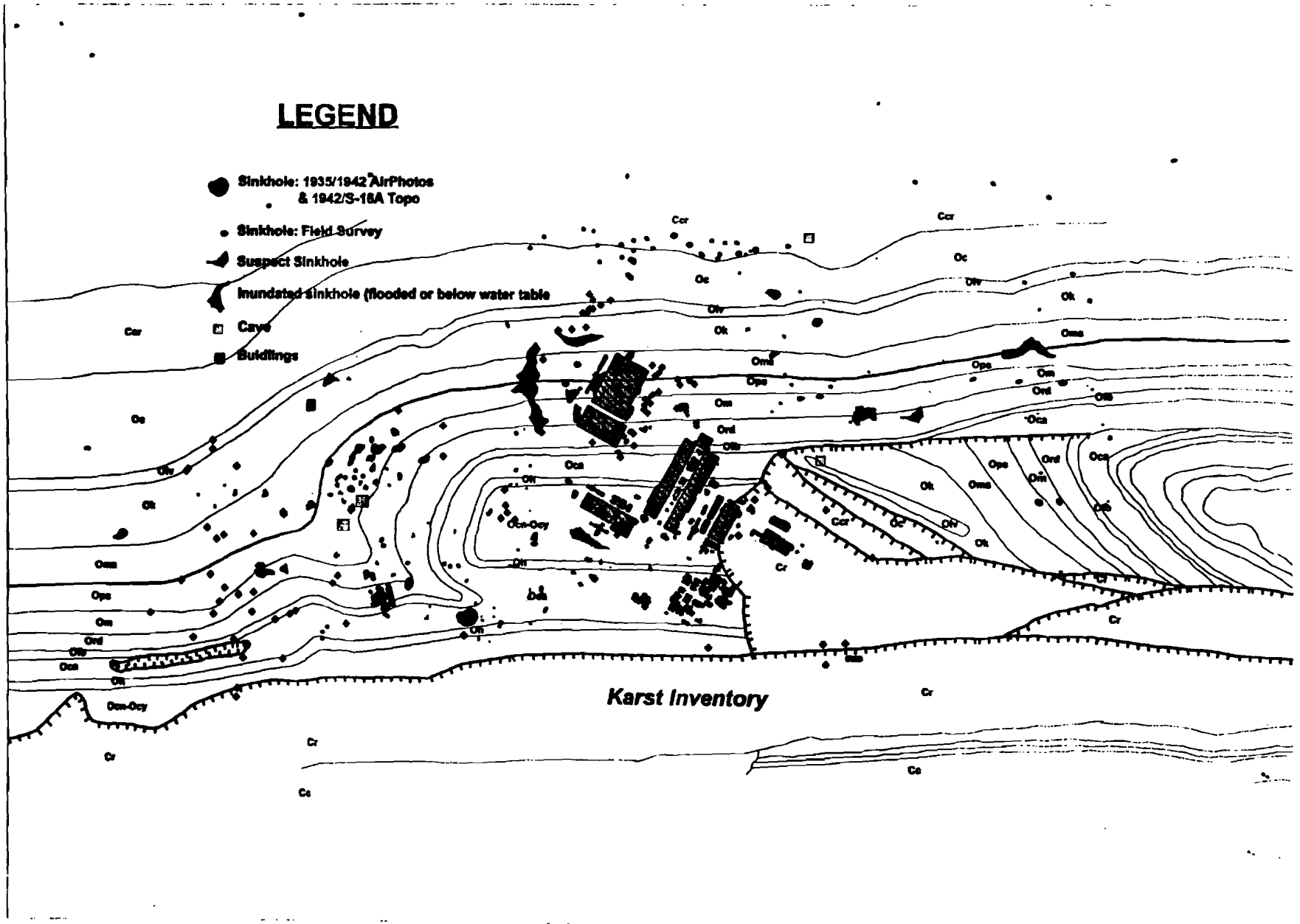


Fig 1. Geologic map of the ITP area with karst features.

Chickamauga group bedrock, as a function of physical nature of each unit as well structural features and topographic position within the East Fork Valley. Karst features (caves, sinkholes, and subsurface cavities) at the ETTP are summarized graphically on Fig. 3.3-1. Cavities have been encountered in nearly 40% of all subsurface penetrations in carbonates at ETTP, although 60% of these are described as mud-filled. Typically cavities appear more developed in the Knox Group bedrock along Black Oak Ridge than in the Chickamauga carbonates underlying the Main Plant area. Knox cavities range in height up to 6.7 m (22 ft). Based upon recent dye tracing at the K-1070A site, these cavities appear to be well connected and indicative of conduit-dominated flow. Further, a dominant trend of large sinkholes is observed paralleling the Knox-Chickamauga contact near the base of Black Oak Ridge. This trend, supported by geophysical anomalies, extends from the city of Oak Ridge past ETTP and beyond on the opposite side of the Clinch River, and indicates a more pervasive network of karst features. In contrast, sinkholes within the Chickamauga bedrock underlying the Main Plant are typically small and sparse. However, a number of small, open sinkholes have been observed in Parcels 1 and 2 and serve as active drains of runoff to the subsurface.

With a few exceptions, bedrock at ETTP is overlain by unconsolidated overburden materials that range up to 21 m (70 feet) thick. Bedrock exposures occur along the Clinch River and Poplar Creek but are limited within the Main Plant area. Bedrock is exposed in much of the area of Parcels 1 and 2, and, where exposed, is seen to consist of open fractures, some solutionally enlarged, that allow for rapid drainage to groundwater. In general, the majority of the overburden in the Main Plant area has been severely reworked during initial site construction to the extent that little of the overburden in this area can be considered undisturbed. Conversely, there is little evidence of reworking in more isolated portions of the facility including Parcels 1 and 2.

3.4 WATER RESOURCES

3.4.1 Surface Water

The ETTP is directly adjacent to the Clinch River along the northwest boundary of the ORR. Poplar Creek is a moderately wide [approximately 10 to 20 m (33 to 66 ft)] stream that enters the north side of ETTP about 0.5 km (0.3 miles) downstream from the confluence of the east and west forks of Poplar Creek (Fig. 1-3). The lower reach of Poplar Creek meanders sharply along the southwest side of ETTP and enters the Clinch River at River Mile 12.

ETTP is unique among the facilities on the ORR due to its proximity to the Clinch River and Poplar Creek. The Clinch River adjacent to ETTP is a run-of-the-river impoundment portion of Watts Bar Reservoir, is approximately 150 m (500 feet) wide, and ranges from about 7–10 m (25-35 feet) deep along the main channel. The river enters East Fork Valley through a water gap in Pine Ridge and flows across the valley, across the geologic strike, before turning southwest to flow along the axis of the valley towards Watts Bar

Dam. The Clinch River occupies the lowest topographic position in the valley and thus represents the lowest possible hydraulic heads from the point of entering the valley as well as downstream in the area above the dam. This implies that the river serves as a discharge boundary for groundwater flow from ETTP. The potable water supply for the ETTP is currently obtained from the Clinch River, with the water intake located upstream of the ETTP facility.

Poplar Creek meanders for approximately 9 km (5.5 miles) through ETTP from the upstream confluence with East Fork Poplar Creek to the downstream confluence with the Clinch River. At high pool stage, Poplar Creek is up to 88 m (290 feet) wide. As a result of the meandering course of Poplar Creek, Parcels 1 (Powerhouse area) and 2 (Duct Island) being addressed in this EA are nearly surrounded by water but are connected to the main plant area by bridges.

The Clinch River and Poplar Creek stage fluctuates up to 1.5 m (5 feet) on diurnal, weekly, and seasonal cycles in response to TVA reservoir operations at upstream Melton Hill and downstream Watts Bar and Fort Loudoun dams. This fluctuation influences the hydraulic gradients in groundwater for some distance inland. As a result of power generation schedules at the three dams, there are periods in each day when flow in the Clinch River is reversed. Such reversals can be observed in Poplar Creek upstream to above the confluence with East Fork Poplar Creek. The transient condition in Poplar Creek and the Clinch River have a profound impact on groundwater flow from ETTP.

Tributary streams to Poplar Creek on the ETTP site include Mitchell Branch, which originates on McKinney Ridge above ETTP and flows through the northeastern, industrialized portion of the plant to discharge to Poplar Creek. A second unnamed stream flows along the south border of the site to discharge into the K-1007 Pond prior to discharging to Poplar Creek.

Currently the K-1007 Pond, a 10-ha (25-acre) impoundment in the southwest corner of the ETTP Main Plant area, and the K-901A Pond, a 4.2 ha (10.3 acre) impoundment, are scheduled to undergo a CERCLA response action that may result in their drainage and transformation to wetlands. Draining of these ponds, if that alternative is selected, would be expected to increase local groundwater gradients and thus accelerate groundwater flows in this portion of the plant.

The Tennessee Valley Authority (TVA 1959) performed an analysis of floods on the Clinch River and Poplar Creek. TVA concluded that most of ETTP is above the probable maximum flood (PMF). The only facilities identified as at risk during major floods were the K-25 power plant (no longer extant) and the pumping station for ETTP's water filtration plant. The source of flooding at ETTP would be backwater from the Clinch River (Watts Bar Reservoir) rather than from Poplar Creek. A recent report (TVA 1995) provides 25-year to PMF elevations and Norris Dam failure scenarios for the Clinch River near the confluence of Poplar Creek. The PMF is controlled by flooding on the Tennessee River above Watts Bar Dam which is designated to pass the PMF. All other floods are controlled by flooding on the Clinch River watershed. Areas within the 500-year floodplain and the PMF floodplain are subject to severe and moderate development constraints, respectively. Figures 3.4-1 and 3.4-2 show the extent of the 500-year floodplain and the PMF in the ETTP area.

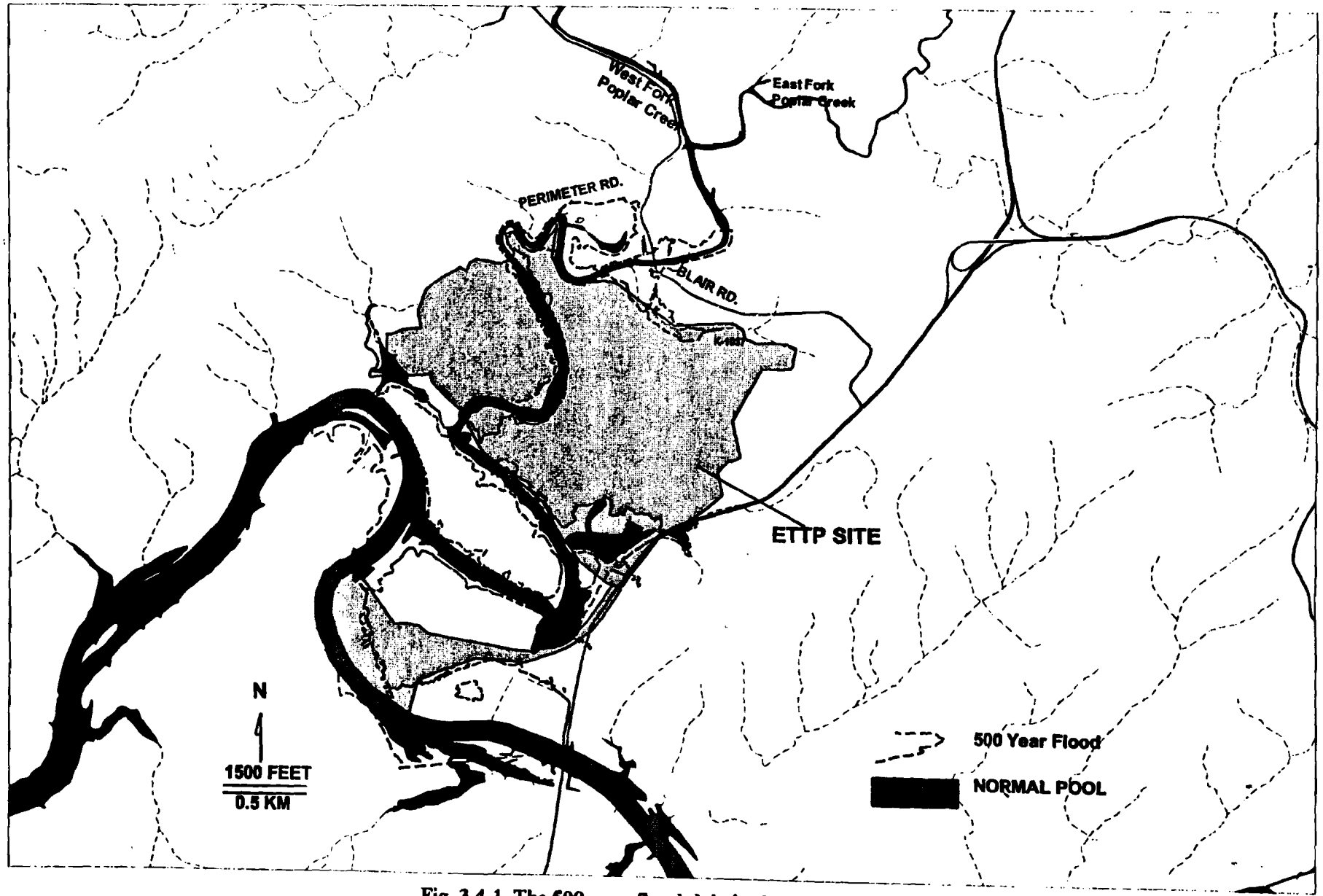


Fig. 3.4-1. The 500-year floodplain in the ETTP area.

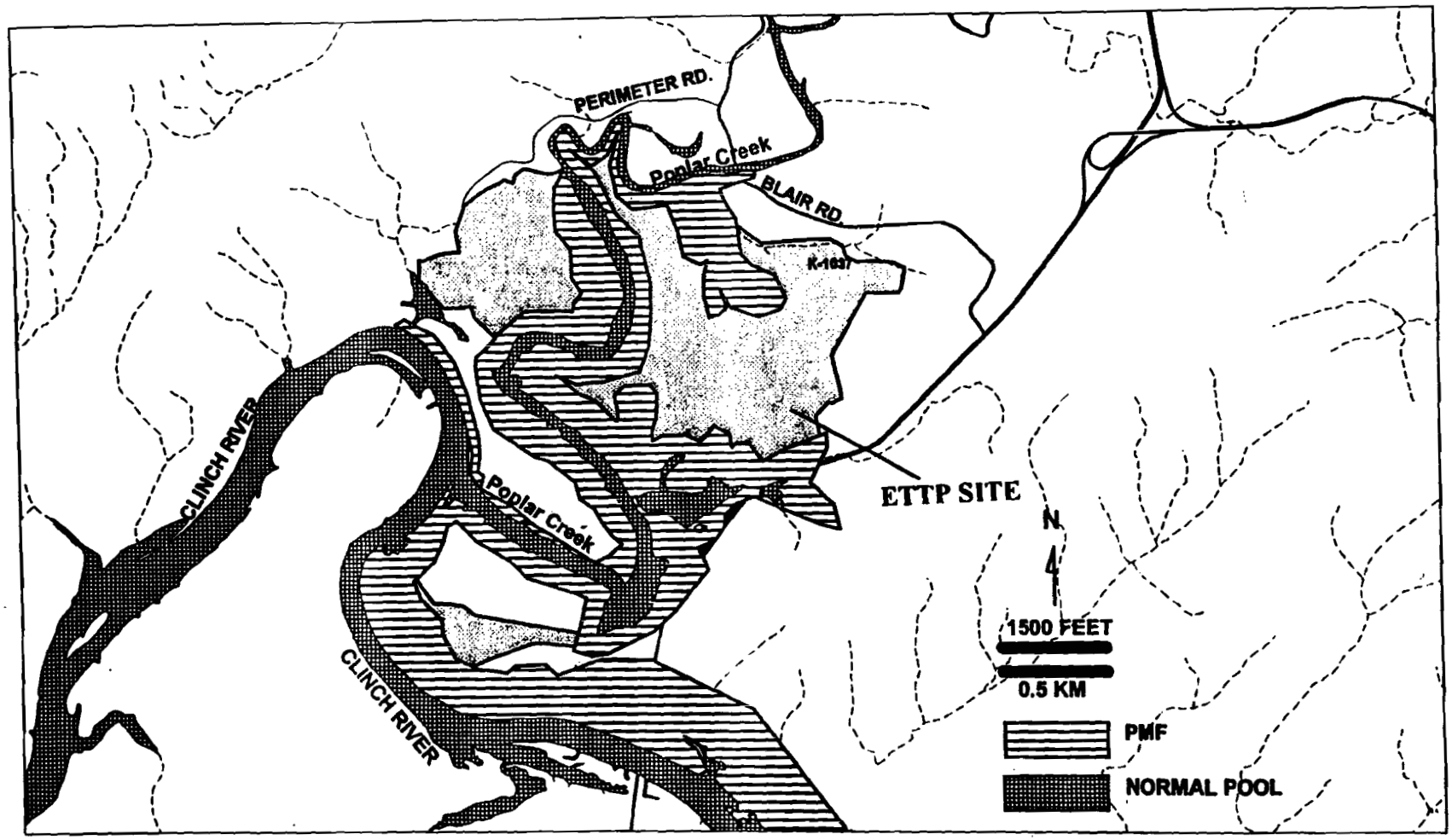


Fig. 3.4-2. The probable maximum flood in the ETTP area.

3.4.2 Groundwater

Groundwater occurs at the ETTP in both the unconsolidated overburden and underlying bedrock as a single, unconfined water table aquifer. With few exceptions, the water table occurs in the overburden overlying bedrock with the saturated overburden ranging up to 21 m (70 feet). In higher topographic areas of the site, such as Parcels 1, 2, and 4, the water table occurs below the top of bedrock which as described earlier occurs very near the surface in many parts of these tracts. In general the water table is encountered within several feet of the surface adjacent to major water features and in incised ravines.

A map of the water table surface representing winter high base conditions in February 1995 is shown as Fig. 3.4-3. This figure shows that the water table is a subdued replica of the surface topography and implies radial flow from the higher elevation areas of the site to Poplar Creek and the Clinch River. Groundwater flow paths in the unconsolidated overburden are expected to follow mapped hydraulic gradients. However, because bedrock is exposed along Poplar Creek and the Clinch River (in fact the entire Clinch River bottom in the vicinity of ETTP is bedrock), groundwater flow paths in the saturated overburden terminate at these features. Groundwater flows in bedrock are controlled by hydraulic gradients, fracture networks, and karst solution features. Typically, bedrock flow paths tend to follow geologic strike. In the Rome bedrock underlying Parcel 4, strike and dip are extremely variable, and thus flow paths can not be predicted with any certainty.

As described in Section 3.3 and shown on Fig. 3.3-1, karst features are present in the bedrock at ETTP site, but conduit-dominated flow has been confirmed only in portions of the site underlain by Knox group carbonates along Black Oak Ridge. Within the Main Plant area, a number of small, mostly mud-filled cavities has been documented in the bedrock, but there is no evidence of conduit-dominated flow.

The nearest domestic water supply wells are located approximately 3.2 km (2 miles) southwest of ETTP on the opposite side of the Clinch River, most located along Lawnville and Roberts Roads. Available information suggests the majority of these are shallow wells, completed at total depths well above the Clinch River. Since the water table typically reflects local topographic relief, it appears that groundwater recharge areas for these wells is local. The local groundwater flow direction is assumed to be eastward, towards the Clinch River. Furthermore, because these wells are completed above the Clinch River stage elevation, it is unlikely that they could be affected by groundwater flow paths from ETTP, should such pathways exist at all.

Additionally, there are nearly a dozen domestic wells located along Black Oak Ridge, west of the DOE boundary. Many of these are deeper wells completed in the Knox, though not directly along strike with the ETTP site. Four of these wells were recently sampled and were found to be uncontaminated.

3.4.3 Wastewater Treatment Facilities

The treatment of domestic wastewater is performed locally at the ETTP Sewage Treatment Plant (STP), which is currently operating within its National Pollutant Discharge Elimination System (NPDES)

Fig. 3.4-3. Contour map of the shallow water table at ETTP.

permit. The last permit exceedance was in 1994. The operating capacity of the ETTP STP is about 2300 m^3/d (600,000 gpd), with current load of about half that capacity (Norman Bowman, ETTP Site, personal communication to John Tauxe, ORNL, August 25, 1997). This plant discharges directly to Poplar Creek.

Industrial wastewater treatment facilities are available for DOE waste streams at the ETTP Central Neutralization Facility (CNF). This plant has an volumetric operating capacity of 820 m^3/d (150 gpm), or 300,000 m^3 (80 million gallons) annually, and discharges to the Clinch River via a pipeline located in Poplar Creek. Projected throughput for FY 1997 is 98,000 m^3 (26 million gallons), and for FY 1998 is 106,000 m^3 (28 million gallons). An additional 330 m^3/d (60 gpm) or 121,000 m^3 (32 million gallons) per year is planned to be added from the treatment of groundwater. This proposed addition is in the form of rerouted hard piping from basement sumps of buildings K-1401 and K-1420 (DOE 1997a), and from the Mitchell Branch collection trench with a connector to the K-1070 C/D burial grounds. While the addition of these volumes will not push CNF's volumetric capacity, it is likely to absorb the remaining treatment capacity. Air emissions are permitted to 1 lb/h for volatile organic carbon (VOC) compounds, and the CNF is working close to that limit now. With the addition of the contaminated groundwater, it is likely that either a more lenient permit will need to be sought, or upgrades to the air stripping equipment will be required to achieve more effective removal of VOCs from the airborne waste stream (Mo Beeler, ETTP Site, personal communication to John Tauxe, ORNL, August 22, 1997).

The current NPDES permit for the CNF allows for treatment of waste streams from DOE facilities alone. Before the plant could provide services to non-DOE clients (i.e. lessees at ETTP), a new NPDES permit would need to be obtained, or a modification to the present one sought.

3.4.4 Water Treatment Facilities

The ETTP water treatment plant is currently producing 3000 to 5300 m^3/d (800,000 gpd to 1.4 mgd) of potable water, with an average production of about 4200 m^3/d (1.1 mgd). Its capacity is estimated at 16,000 m^3/d (4.2 mgd) (Norman Bowman, ETTP, personal communication to John Tauxe, ORNL, August 25, 1997). Because the water distribution system is unmetered, its distribution efficiency is unknown.

3.5 ECOLOGICAL RESOURCES

3.5.1 Terrestrial

3.5.1.1 Vegetation

The ORR consists of diverse habitats and supports a rich variety of flora (Mann et al. 1996), with vegetation characteristic of that found in the intermountain regions of central and southern Appalachia

(Cunningham et al. 1993, Braun 1950). Figs. 3.5-1 and 3.5-2 show where the types of plant communities, natural and planted, are located on the area covered by this EA and the ETTP Area of Responsibility, respectively. The ETTP proper and the adjacent undeveloped parcels are the focus areas for the proposed action, and the rest of the ETTP Area of Responsibility is described for the analysis of cumulative impacts. Rare, threatened, and endangered species are discussed in Sect. 3.5.5 of this EA.

Vegetation around the buildings within the fenced area on ETTP proper is a mixture of mowed grasses with a few shrubs and trees (Fig. 3.5-1) (MMES 1994). Small areas have mixed tree/shrub/grass associations or mixed evergreen-deciduous vegetation. Many of the shrubs and trees have been planted as landscaping, although some native species are found in unmowed areas around ponds and along waterways. The areas outside the security fence that are covered by the proposed action (Fig. 1-1) include planted pine trees, second growth mixed coniferous-deciduous vegetation, and open areas, particularly under transmission lines.

Because of the presence of the industrialized ETTP Site, much of the vegetation in the ETTP Area of Responsibility not covered by this EA is fragmented compared with areas elsewhere on the ORR. The most widespread vegetation type on the ETTP Area of Responsibility is hardwood forest [587 ha (1451 acres) or 60% of the total forested area of the ETTP Area of Responsibility] (MMES 1994). Almost all of the hardwoods are naturally occurring, with only about 1% having been planted. The second most common vegetation type in the ETTP Area of Responsibility is native and non-native coniferous forest [92 ha (969 acres)] (MMES 1994). Approximately 66% of the total area of conifer stands are pines planted in formerly open fields.

3.5.1.2 Wildlife

The diverse vegetational communities of the ORR create a number of favorable habitats for a wide variety of animal species typical of eastern Tennessee (Parr and Evans 1992). Most of the birds and mammals found on the ORR can tolerate and adapt to a variety of habitats and, therefore, may be found in places other than those which are considered typical for a particular species. Rare, threatened, and endangered species are discussed in Sect. 3.5.5 of this EA.

Since ETTP proper is primarily planted in non-native grasses, it has very little habitat available for native animals except along Poplar Creek. The majority of the animal species found within ETTP's boundaries are species that adapt well to disturbance and the presence of humans, including small rodents, birds such as starlings and pigeons, reptiles, and waterfowl, especially Canada geese (MMES 1994). Larger animals and many smaller native animals are not found because of a lack of suitable habitat.

The ETTP Area of Responsibility includes some areas that have suitable habitat for native animals (Parr and Evans 1992, Mitchell et al. 1996), including parts of Parcels 1, 2, and 4 which are included within the area proposed for leasing. Species found in those areas would be similar to those found elsewhere on the ORR in areas of similar habitat and are discussed in more detail below.

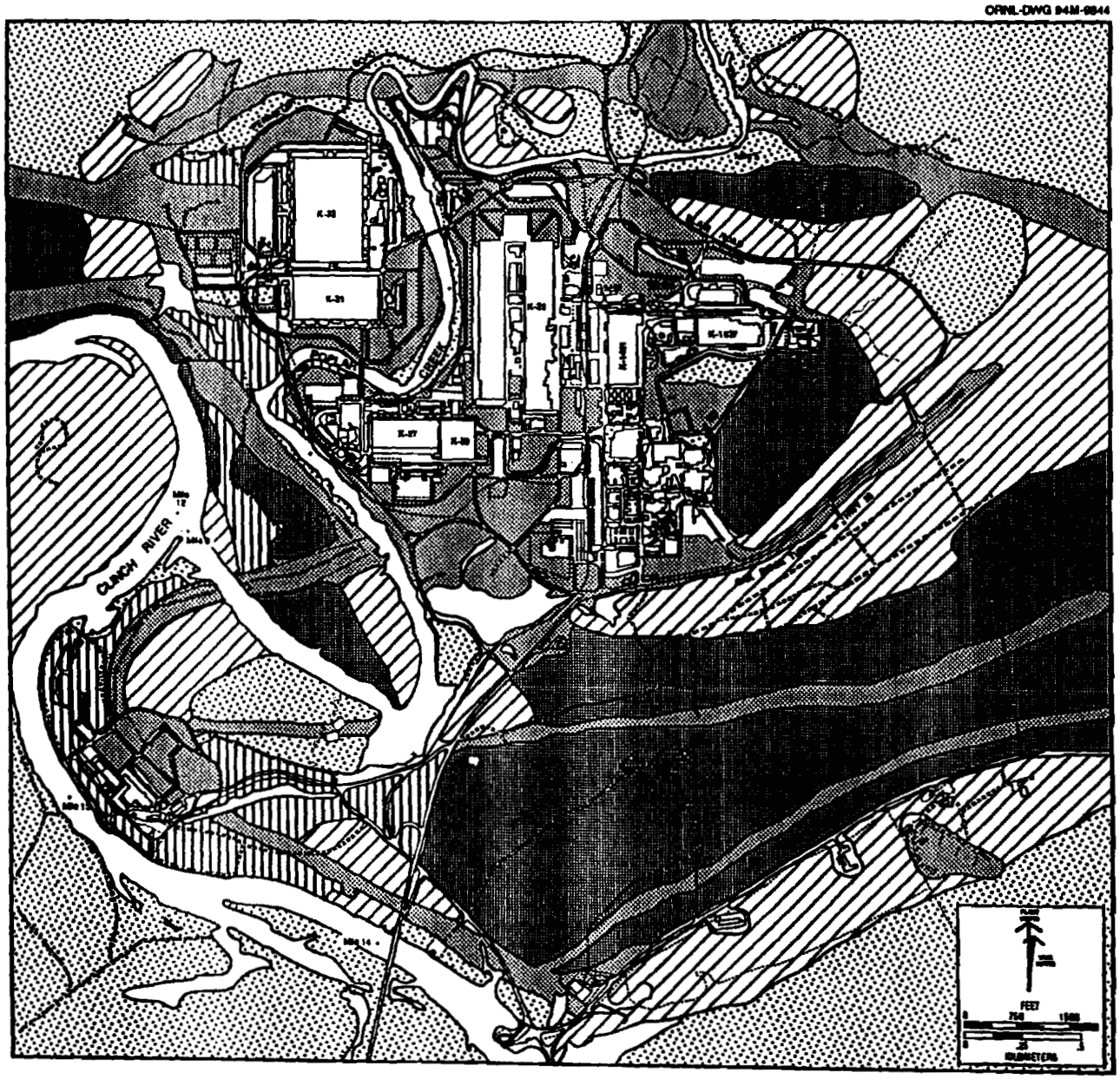


Fig. 3.5-1. Plant communities found on ETTP.

Breeding birds. One route for the national breeding bird survey follows Poplar Creek through the middle of ETTP, while another one is in the Dyllis Orchard area at the west end of the ETTP Area of Responsibility (Mitchell et al. 1996). Birds were identified during a 1995 survey along those routes and also at other places near ETTP. Many different species of birds are found there because of the varied habitats in the ETTP Area of Responsibility.

Game species. Much of the land in the ETTP Area of Responsibility surrounding ETTP is part of a wildlife management area and is open annually to white-tailed deer and wild turkey hunting on specified dates (MMES 1994; J. Warren Webb, ORNL, Oak Ridge, Tenn., personal communication with M. S. Salk, ORNL, Oak Ridge, Tenn., June 20, 1996, and August 18, 1997). Of the areas outside the ETTP fence included in the proposed action, the only place where hunting is currently allowed is the northern part of Parcel 1 (Fig. 1-1). Although only the hunting of deer and turkey is presently allowed, some other game species known or likely to be present (e.g., Canada geese, gray squirrels, cottontail rabbits, raccoons, beavers, minks, muskrats, wood ducks, woodcocks, quail, common snipes) could also be harvested if permitted.

3.5.2 Aquatic

Aquatic habitats on the ORR include undisturbed small streams, liquid-waste disposal ponds, and the Clinch River (Parr and Evans 1992) and contain fish and invertebrate populations. Rare, threatened, and endangered species are discussed in Sect. 3.5.5 of this EA.

As described in Sect. 3.4.1, Poplar Creek flows through the center of ETTP and into the Clinch River (MMES 1994). The water level of Poplar Creek is dependent upon the level of Watts Bar Lake (i.e., the Clinch River). A biological monitoring program designed to document the effects on stream biota of operation of major new pollution-abatement facilities on ETTP has been developed (Loar et al. 1992; Kszos et al. 1993).

Aquatic habitat on or near the ETTP Area of Responsibility consists of streams, ponds, and the Clinch River, which forms its southeast boundary. Five major biotic communities occur in waters adjacent to ETTP: phytoplankton, periphyton, zooplankton, benthic macroinvertebrates, and fish. Specific information on those aquatic species in the ETTP Area of Responsibility is found in Saylor et al. (1990).

3.5.3 Wetlands

Wetlands are areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to, and that under normal circumstances do, support a prevalence of vegetation typically adapted for life in saturated soil conditions (USACE 1987). Wetlands include swamps, marshes, bogs, and similar areas and perform a variety of important functions in ecosystems (Rosensteel and Awl 1995).

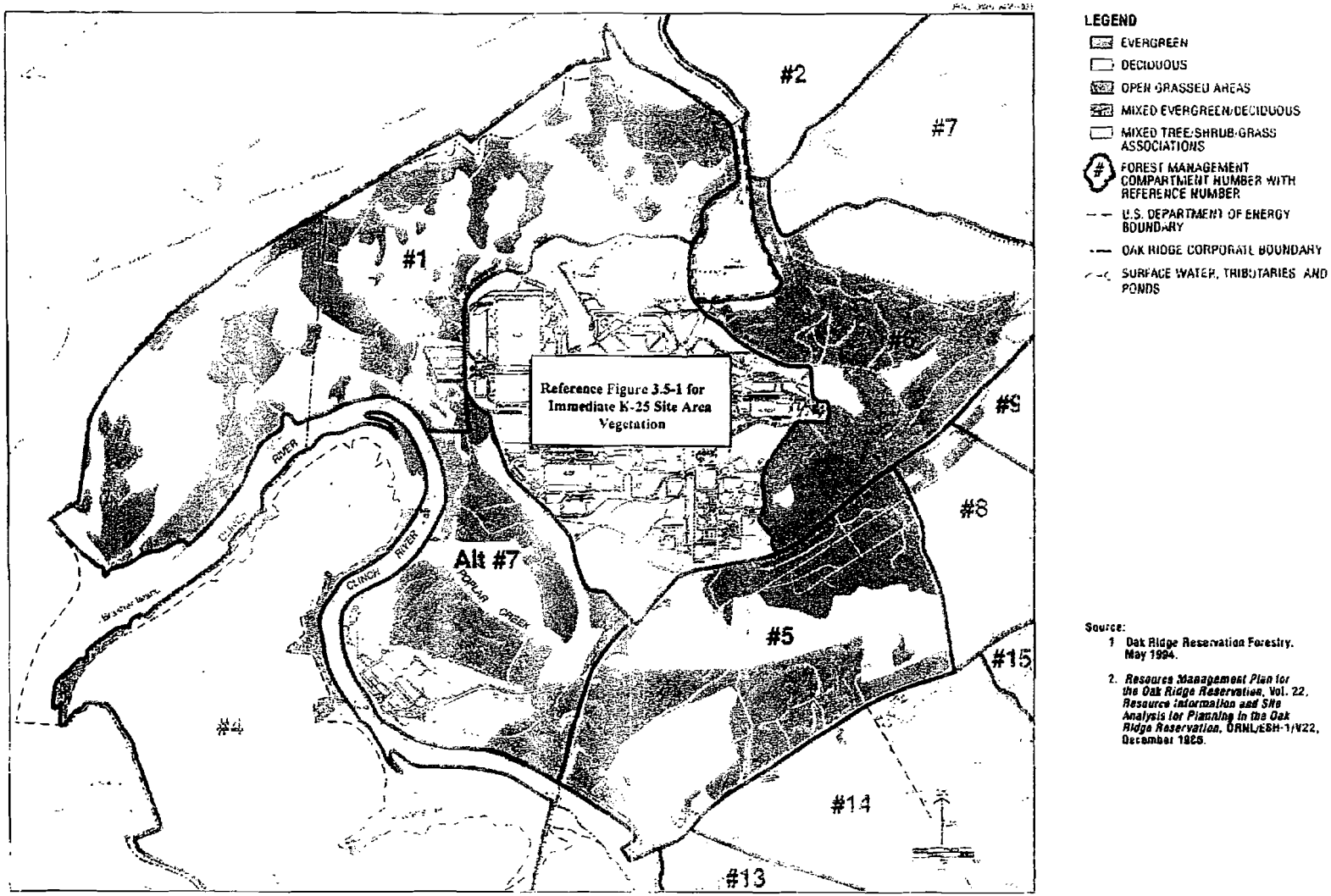


Fig. 3.5-2. Vegetation on the ETTP area of responsibility.

[blank page]

A few small wetland areas have been identified on ETTP associated with Mitchell Branch, Poplar Creek, the K-770 Scrap Yard, and the K-1007-P1 pond (Rosensteel and Awl 1995; Barbara Rosensteel, JAYCOR, personal communication with M. S. Salk, ORNL, September 25, 1996). Also, one small wetland is included within Parcel 4 in an area generally unsuitable for development because of the steepness of its slope. These wetlands total about 3.5 ha (8.6 acres). The wetlands along Poplar Creek are the most natural and least disturbed of those on ETTP and are strongly influenced by fluctuations in Watts Bar Lake. The Mitchell Branch wetlands occur in a narrow strip along the bank and are all in highly disturbed areas. The K-1007-P1 pond-related wetland developed due to construction of the pond and compaction of soil there. One wetland, a man-made pond on the northern end of the site, is found in the K-770 Scrap Yard area. Also, a highly degraded stream flows through the eastern half of that area. Although the narrow fringe along that stream could possibly be classified as wetland, aquatic and/or wetland functions are probably occurring at a minimal level, if at all. Thus, that area has not been mapped as a wetland. The wetland on Parcel 4 is in a formerly disturbed area along a seasonal stream located adjacent to State Route (SR) 58. The wetlands in disturbed areas can provide valuable fish and wildlife habitat. There are not likely to be other wetlands in the detailed study area of the EA.

Surveys in selected areas of the ETTP Area of Responsibility identified 38 other wetland areas, ranging in size from 0.13 to 4.23 ha (0.32 to 10.5 acres) and totaling about 32.6 ha (80.6 acres) (Fig. 3.5-3) (Rosensteel and Awl 1995; Barbara Rosensteel, JAYCOR, personal communication with M. S. Salk, ORNL, June 24, 1996). These wetlands occur in association with springs and seeps along stream bottomlands, in areas of seasonally high groundwater tables and surface water levels on the alluvial islands and floodplains of Poplar Creek and the Clinch River, in association with a beaver dam, and in and adjacent to areas of human impact (including utility line rights-of-way and channelized streams). Plant species identified during the wetland surveys and their wetland indicator classifications are listed in Rosensteel and Awl (1995). Some of the wetland areas outside ETTP are designated as National Research Environmental Park (NERP) Natural Areas or Reference Areas (see Sect. 3.5.4) and support several species of rare or threatened plants and animals (see Sect. 3.5.5) (Cunningham et al. 1993, Mitchell et al. 1996). Other wetlands may occur in the sections of the ETTP Area of Responsibility that have not been completely surveyed.

3.5.4 Environmentally Sensitive Areas

The Lower Poplar Creek Rookery is the only environmentally sensitive area within the ETTP. It is just over 2.5 ha (almost 6.5 acres) in size and is located on the north bank of Poplar Creek in the middle of the main plant site (Fig. 3.5-4 and Appendix C). It contains a great blue heron rookery with heron nests in a forested wetland. The Nature Conservancy has given this area a biological significance ranking of high significance (TNC 1995).

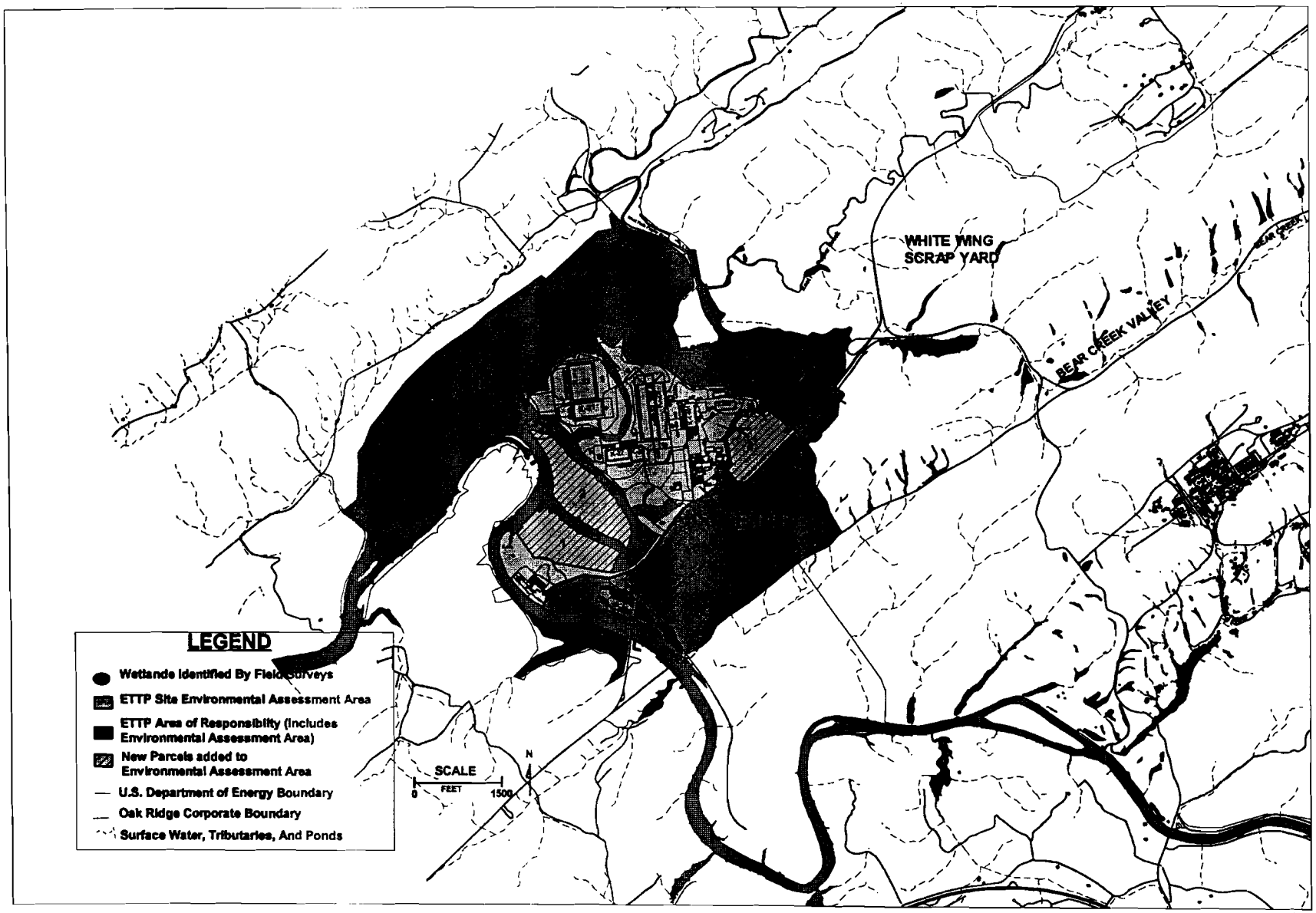


Fig. 3.5-3. Wetlands in the ETTP Area of Responsibility.

Three other environmentally sensitive areas are found near the boundaries of the parcels outside the security fence: the Duct Island Road Bluffs, the ETTP Beaver Pond Complex, and the Upper Mitchell Branch aquatic reference area. The Duct Island Road Bluffs are located just west of Parcel 2 and cover almost 5 ha (just over 12 acres). This area is ranked as having very high biological significance because of the known populations of two rare plant species, spreading false foxglove and branching whitlow-grass (see Sect. 3.5.5), and also the diverse community types found there (TNC 1995). The ETTP Beaver Pond Complex lies just south of the southeast edge of Parcel 1. It is just under 7 ha (almost 17 acres) in size and provides habitat for wetland wildlife (e.g, herons, muskrats, mink, beaver, raccoons). This pond complex may be affected as part of a CERCLA response action. The Upper Mitchell Branch site is located northeast of Parcel 4. It is an aquatic reference area containing about 9 ha (almost 22.5 acres) of land and is the ETTP wetland mitigation area. It is ranked as having high biological significance (TNC 1995). DOE received a Notice of Violation (NOV) for disturbing this area during forestry clearing in early 1996 and is currently mitigating the impact.

Parts of the ETTP Area of Responsibility are within the DOE Oak Ridge NERP, the Southern Appalachian Biosphere Reserve, and the Oak Ridge Wildlife Management Area and contain a number of additional environmentally sensitive areas (Fig. 3.5-4). A list of these areas is found in Appendix C.

3.5.5 Threatened/Endangered/Special Concern Species

Most of the area of the proposed action is an industrial site that does not provide suitable habitat for sensitive species. State and federally listed sensitive species known to be present on the ORR are given in Table D.1 in Appendix D. Consultation with the Fish and Wildlife Service (FWS) to comply with Section 7 of the Endangered Species Act (ESA) is also documented in that appendix.

Sixteen plant species that are considered rare, threatened, or endangered have been identified on or near the ETTP Area of Responsibility (MMES 1994, Awl et al. 1996). None of these species are known to occur in the area of the proposed action in this EA. However, two rare species, spreading false foxglove, a federal species of concern and a state threatened species, and branching whitlow-grass, a state special concern species, occur along the Clinch River on the west edge of Parcel 2.

Eighteen wildlife species that are considered rare, threatened, or endangered have been found on or near the ETTP Area of Responsibility (MMES 1994). At least two pairs of osprey, a state threatened species, occur on the ETTP Area of Responsibility. One pair is currently nesting on top of a building in the area of the proposed action. Some habitat suitable for bald eagle is found on Melton Hill Reservoir and the Clinch River (Buehler 1994). Although no bald eagles are currently known to nest on the ORR, they continue to winter there, and unverified summer occurrences have also been reported (J. Warren Webb, ORNL, personal communication with M. S. Salk, ORNL, June 24, 1996, and August 18, 1997). Because of the proximity of developed areas, most of the ETTP Area of Responsibility is unsuitable habitat for bald eagles (Buehler 1994), although there has been one unverified eagle sighting near ETTP (J. Warren Webb, ORNL, personal

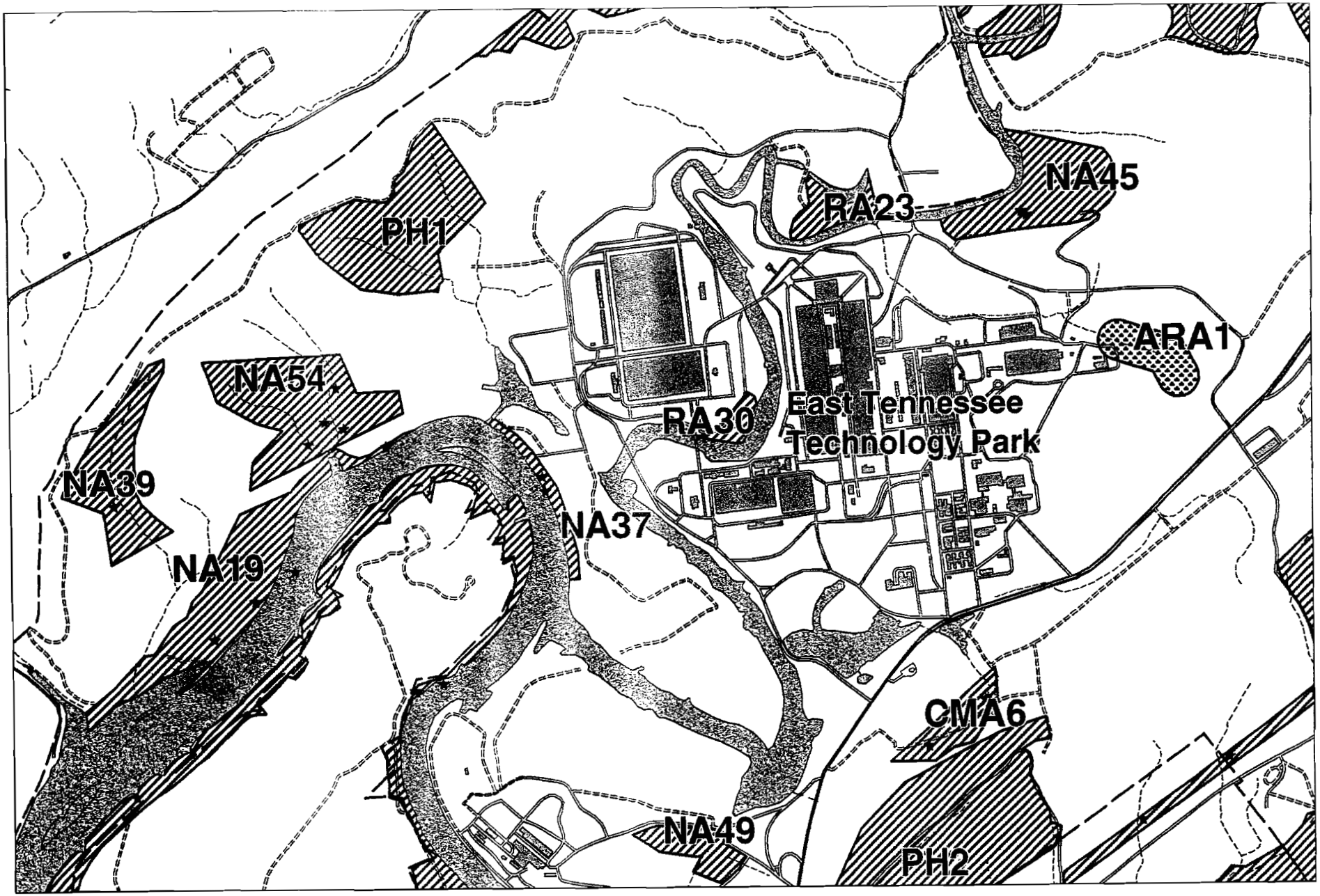


Fig. 3.5-4. Ecologically sensitive areas on the ETTP Area of Responsibility. (See Appendix C for definition of sensitive area designations.)

communication with M. S. Salk, August 22, 1997). No amphibians or reptiles that are federally listed as endangered or threatened are known to be present within 8 km (5 miles) of the site. However, several species listed by Tennessee Wildlife Resources Agency (TWRA) are present within this distance. Specific information is available in Mitchell et al. (1996). In addition, gray bats forage over the Clinch River, but no colonies are known to occur in caves on or near the ORR, and no caves are known to exist on the three parcels. Also, although several endangered species of mussels were historically found in the Clinch River, the damming of the river and subsequent development of large reservoirs have now replaced the free flowing, riverine ecosystem, thus, eliminating any suitable habitat for the mussels in the vicinity of ETTP. Slender and spotfin chub also require faster flowing, silt-free habitats and so are unlikely to be found near ETTP or the outside parcels. The yellowfin madtom is more flexible in the habitats it will occupy, but it is not normally found in reservoirs. Although this species might occur in Poplar Creek, it is very sensitive to pollution and the silt load in a waterbody and has never been found in the vicinity of ETTP (M. G. Ryon, ORNL, personal communication with M. S. Salk, August 20, 1997).

3.6 SOCIOECONOMICS

The impact area is defined as Anderson, Knox, Loudon, Morgan, and Roane Counties, Tennessee (Fig. 3.6-1). These five counties were selected because they are geographically close to ETTP and over 80% of ORR employees (Table 3.6-1) reside in them. This concentration of workers in the five-county region is expected to continue with any future employment at ETTP. Accordingly, the bulk of any project-induced impacts would occur in these five counties. In particular, the socioeconomic analysis focuses on the City of Oak Ridge, which includes portions of both Anderson and Roane counties. Oak Ridge, in which the ETTP is located, would derive much of the employment and income benefits associated with the creation of new jobs at ETTP and would also be responsible for providing public services for the sizable segment of the new work force that is likely to reside within the city limits.

3.6.1 Population

3.6.1.1 General information

The total population of the impact area was 517,158 in 1992. Of this total, 347,583 resided in Knox County, 70,525 in Anderson County, 48,094 in Roane County, 33,242 in Loudon County, and 17,714 in Morgan County. Between 1980 and 1992, the population of the five-county impact area grew by 7.6%. Loudon County experienced the highest growth rate (16.4%), while Knox, Morgan, and Anderson Counties grew by 8.7%, 6.7%, and 4.7%, respectively. During that same period, Roane County experienced a population decrease of 0.6% (UT 1994).

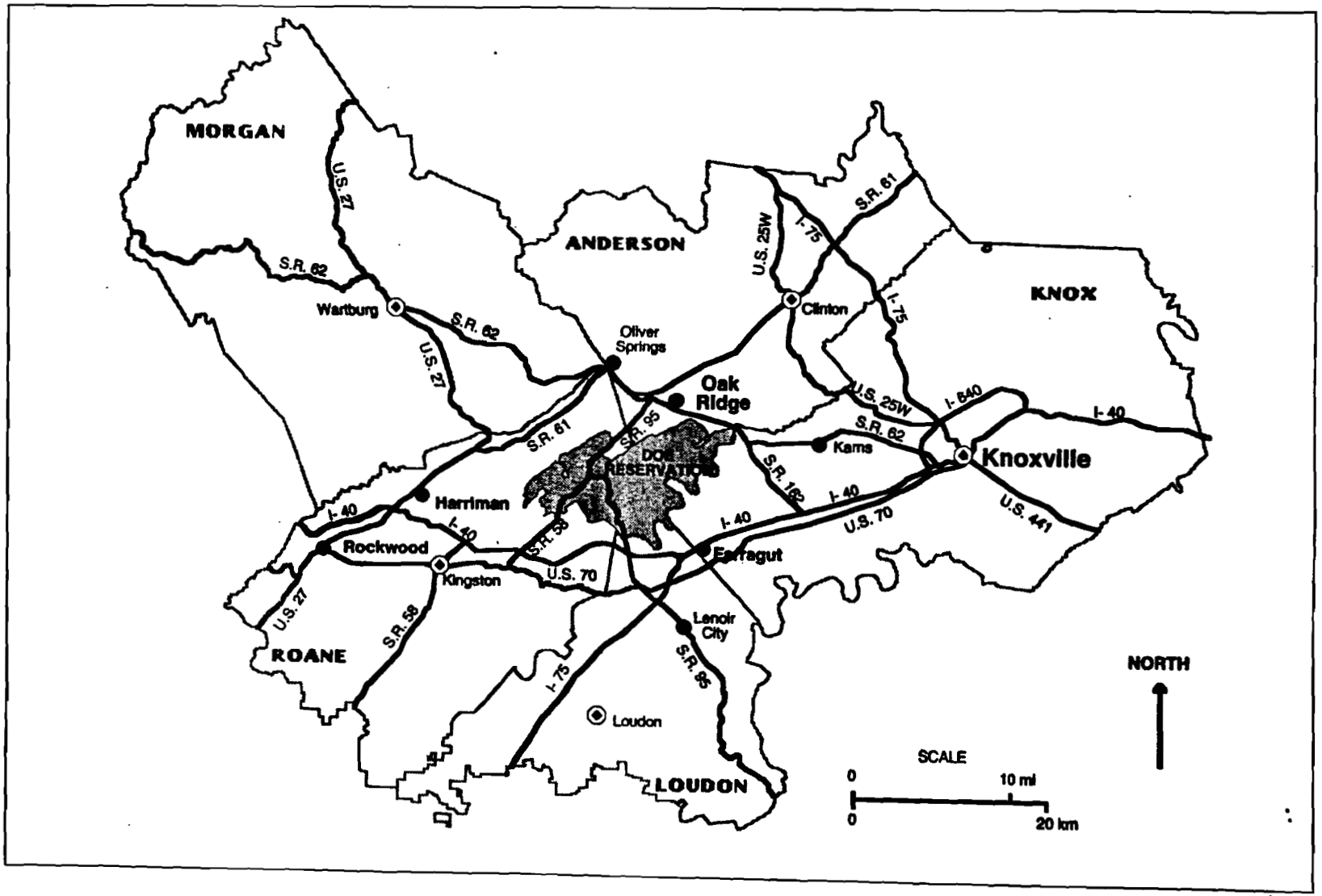


Fig. 3.6-1. Five-county impact area.

Table 3.6-1. ORR employees residing within the five-county region

County	Number of ORR employees[a]	Percent of ORR employees
Anderson	5,301	27
Knox	6,126	33
Loudon	899	5
Morgan	270	2
Roane	2,546	15
Five-county area	15,142	82

[a] Includes all DOE and prime contractor employees, but not subcontractors
Source: MMES 1994. *The Oak Ridge K-25 Site, Technical Site Information.*

In 1992, the city of Knoxville had 167,287 residents, accounting for nearly one-third (32.3%) of the population within the five-county impact area. The next largest city in the impact area was Oak Ridge (population 27,976), which was home to 5.4% of the impact area's residents (U.S. Department of Commerce 1994). Recent growth projections performed by the city of Oak Ridge show the city growing at an annual rate of approximately 0.9 percent from 1997 through 2012 (Gentry 1997).

3.6.1.2 Distribution of minority and economically disadvantaged populations

Table 3.6-2 shows the 1990 racial composition for each census tract in the City of Oak Ridge. By far the greatest concentration of minority residents was in census tract 201, where 34.4% of the population was black and another 7.1% was classified as "other non-white". In all other nearby tracts, the black population ranged from 2.8% to 6.5% and the "other non-white" population was between 1.3 % and 7.1%. The Hispanic population ranged from 0.7% to 2.6% of each census tract's population. The physical location of each census tract is shown in Fig. 3.6-2.

According to 1990 U.S. Census data, the percentage of impact area families living below the poverty level ranged from a low of 10.2% in Knox County to a high of 15.8% in Morgan County. Loudon County (10.7%), Anderson County (11.5%), and Roane County (12.2%) all had a lower percentage of poor families than did the state of Tennessee as a whole (12.4%). The City of Knoxville had 15.3 % of its families below the poverty line, while only 7.0% of Oak Ridge's families were classified as living in poverty. However, when Oak Ridge is broken into its seven census tracts, clear geographic patterns of poverty emerge (Table 3.6-3). The percentage of families below the poverty line was three times the city average in Tract 201 and 2.5 times the city average in Tract 205. In all other census tracts, the proportion of poor families was substantially lower than the city average, with the lowest percentages being found in tracts 301 (1.1%) and 206 (0%).

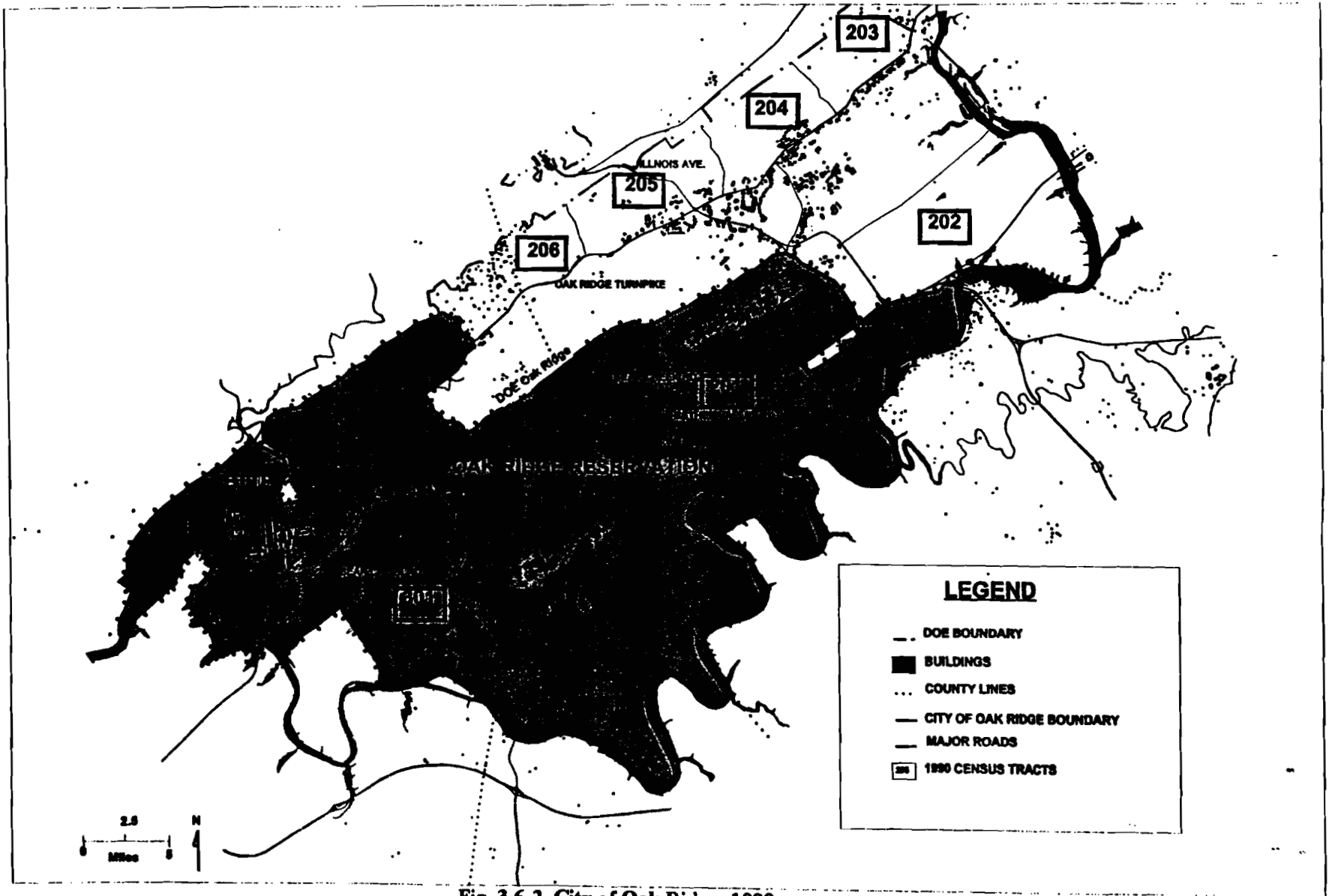


Fig. 3.6-2. City of Oak Ridge, 1990 census tracts.

Table 3.6-2. 1990 Population distribution by race in Oak Ridge census tracts

Tract	Total population	White		Black		Other non-white		Hispanic[a]	
		Total	%	Total	%	Total	%	Total	%
201	2,767	1,620	58.5	951	34.4	196	7.1	19	0.7
202	6,260	5,820	93.0	228	3.6	212	3.4	124	2.0
203	4,395	4,107	93.4	232	5.3	56	1.3	39	0.9
204	4,544	4,231	93.1	251	5.5	62	1.4	93	2.0
205	3,932	3,625	92.2	257	6.5	50	1.3	26	0.7
206	2,735	2,478	90.6	158	5.8	99	3.6	72	2.6
301	2,567	2,438	95.0	71	2.8	58	2.3	64	2.5
Total	27,200	24,319	89.4	2,148	7.9	733	2.7	437	1.6

[a]Hispanic origin may be any race and is included in other totals.
Source: U.S. Bureau of the Census, Census of Population and Housing, 1990.

Table 3.6-3. Oak Ridge families living below poverty level, by census tract (1989)

Census Tract	Number of families	Percentage of total families
201	142	20.9
202	68	3.8
203	59	4.4
204	95	7.0
205	195	17.6
206	0	0
301	9	1.1

Source: U.S. Bureau of the Census, *Census of Population and Housing, 1990.*

3.6.2 Employment and Income

The total labor force in the impact area was 290,170 in 1996, with an unemployment rate of 3.8%. This unemployment rate was lower than that of Tennessee (5.2%) and the United States (5.4%) for the same year (Tennessee Department of Employment Security 1997). The total labor force in Oak Ridge in 1996 was 15,265, with an unemployment rate of 3.6% (Herron 1997).

The availability of high-quality professional and technical positions in the Knoxville-Oak Ridge area has helped create a diversified work force in the region. Of the 246,999 persons employed in the impact area in 1990, the majority worked in the professional/specialist (15.2%), administrative support/clerical (14.4%), sales (13.2%), precision production/craft and repair (11.7%), and service (11.5%) sectors (UT 1994). Approximately 6% of the 1990 work force within the impact area was employed on the ORR, making it the largest single source of regional employment (DOE 1994).

In 1992, the average per capita income for the five counties in the impact area was $16,290, while the Tennessee average was $17,674. Per capita income in the impact area ranged from $19,601 in Knox County to $11,675 in Morgan County. Anderson County's per capita income ($18,587) was higher than the state average, while both Roane County ($16,016) and Loudon County ($15,569) fell slightly below the average income for the state. Per capita income is typically higher in the city of Oak Ridge than in the surrounding counties, reflecting the higher level of education in Oak Ridge and the concentration of residents employed by DOE and its contractors (DOE 1992)

3.6.3 Housing

There were 212,612 housing units in the impact area in 1990, of which 197,472 (92.9%) were occupied and 15,140 (7.1%) were vacant. Of the 197,472 occupied units, 67.4% were owner-occupied and 32.6% were renter-occupied. Of the 15,140 vacant units, the vast majority were in Knox County (9,943 or 65.7%), Anderson County (1,939 or 12.8%), and Roane County (1,881 or 12.4%) (UT 1994).

In 1990, there were 12,694 housing units in Oak Ridge, of which 11,763 (92.7%) were occupied and 931 (7.3%) were vacant. Of the 11,763 occupied units, 66.5% were owner-occupied and 33.5% were renter-occupied (UT 1994). The 1990 homeowner vacancy rate for Oak Ridge was 1.3%, while the rental vacancy rate was 13.2% (DOE 1992).

Housing prices vary widely among the five counties in the impact area. In 1992, the mean price of a single-family unit in the five county region was $65,953, with mean prices ranging from $88,295 in Knox County to $39,445 in Morgan County. In 1990, the median rent for renter-occupied units in the impact area was $217 per month, with median rents ranging from $272 in Knox County to $165 in Morgan County. The median value of a single-family unit in Oak Ridge in 1990 was $64,100, while the median rent for renter-occupied units was $307 (UT 1994).

3.6.4 Public Services and Local Government Expenditures

Existing worker residential patterns (Table 3.6-1) indicate that the cities of Oak Ridge and Knoxville are likely to receive a much larger share of any potential worker inmigration that could result from the creation of new jobs at ETTP than would other municipalities. Because an influx of workers would be much more significant to Oak Ridge than to Knoxville (because of their relative populations), the following subsections focus on public services and local government expenditures for the City of Oak Ridge.

3.6.4.1 Education

The Oak Ridge school system has a preschool, four elementary schools, two middle schools, one high school, and one special education facility. Total enrollment at the start of the 1995-1996 school year was approximately 5,300 (Pat Farrell, Oak Ridge City Schools Superintendent's Office, personal communication to J. W. Saulsbury, ORNL, September 5, 1995). The $32.4 million allocated to education represents the largest single item (34.4% of the total) in the city's FY 1996 budget (City of Oak Ridge 1995).

3.6.4.2 Utility services

The city owns and operates its own water distribution system but purchases treated water from DOE (City of Oak Ridge 1995). The DOE water treatment and filtration system has a capacity of 1.2 to 1.3 m^3/s (28 to 30 mgd) but typically processes only about half the maximum amount (DOE 1992).

The city also owns and operates a sewage collection system, a wastewater treatment plant (in the west end of Oak Ridge), and a package treatment plant located in the Clinch River Industrial Park (City of Oak Ridge 1995). The sewer system typically operates at about half of its 0.35 m^3/s (8 mgd) peak capacity (DOE 1992).

The city of Oak Ridge operates its own electric utility, providing electricity to 15,000 metered customers. The city utility has no generating capacity, buying all its electricity wholesale from the Tennessee Valley Authority and servicing customers through its own distribution network. Peak system demand in the city is approximately 120 megavolt amps (MVA), while the system's base capacity is just over 200 MVA. With some modifications, the system could be made to handle as much as 300 MVA (Wilder 1997).

3.6.4.3 Police and fire protection

In 1992 the Oak Ridge Police Department had 46 full-time police officers and 9 civilian officers, for a citizen/officer ratio of about 509:1 (UT 1994). The $3 million allocated to the police department is the fourth largest item in the city's FY 1996 budget (City of Oak Ridge 1995).

The Oak Ridge Fire Department has three stations, which are located in the east, west, and central areas of the city. Over the past several years, the fire department's fleet of vehicles has been significantly improved, including replacement and restoration of older vehicles. Due in part to these improvements, the city of Oak Ridge has maintained a Class 3 fire rating (an independent rating used by insurance companies to set fire insurance rates) since 1989, which results in relatively low fire insurance rates for Oak Ridge homeowners (DOE 1992).

3.6.4.4 Local government expenditures

The city of Oak Ridge FY 1996 budget included total expenditures of approximately $94.1 million. Of this amount, over two-thirds was budgeted for two items: education ($32.4 million or 34.4%) and utility operation ($30.9 million or 32.8%). Other major budget items included capital outlay ($13.4 million), police ($3.0 million), debt service ($3.0 million), other activities ($2.5 million), fire ($2.4 million), public works ($1.8 million), and recreation and parks ($1.6 million). For FY 1996, the city projected that its total expenditures ($94.1 million) would exceed its revenues ($85.0 million) by $9.1 million. However, because the city had an estimated fund balance of approximately $36.8 million at the beginning of the fiscal year, the $9.1 million deficit leaves the city with a fund balance of $27.7 million (City of Oak Ridge 1995).

3.6.5 Local government revenues

Over two-thirds of the city's projected FY 1996 revenues of $85.0 million come from charges for services ($33.8 million or 39.8%) and intergovernmental transfers ($26.9 million or 31.6%). Other major revenue sources include taxes ($18.1 million) and other transfers ($11.9 million). As discussed in Sect. 3.6.4.4 above, the city's projected FY 1996 expenditures exceed total revenues by $9.1 million (City of Oak Ridge 1995).

A Sales and Use Tax is levied on all tangible items sold in the state of Tennessee or shipped from another state for use in Tennessee. The state taxes these items at the rate of 6%, and local governments add their own assessment to this. The city of Oak Ridge has a local tax rate of 2.75%, while the unincorporated portions of Roane and Anderson Counties—the counties in which Oak Ridge is located—have local rates of 2.5% and 2.25%, respectively (University of Tennessee 1996). The local portion of the Sales and Use Tax is collected by the state and distributed to the appropriate city or county government, based on the point of purchase or use (Schutt 1997). The Sales and Use Tax currently is paid by DOE on all items purchased or used in Tennessee, and the appropriate local jurisdictions receive their share of these revenues. Any new tenants of the ETTP would likewise be subject to the Sales and Use Tax.

Because Oak Ridge is located in both Anderson and Roane counties, different parts of the city are subject to different property tax rates. In 1993, the Roane County portion of Oak Ridge, in which the ETTP is located, had a property tax rate of 4.78% (a city tax rate of 1.73% plus a county tax rate of 3.04%). While the

DOE facilities are exempt from local property taxes, the federal government traditionally made annual in-lieu-of-tax payments as well as financial assistance payments to the city. In FY 1986, the City of Oak Ridge accepted a one-time payment of $22.4 million from DOE, which was intended to end the financial assistance payments permanently and to cover the next 10 years of in-lieu-of-tax payments. In-lieu-of-tax payments began again in FY 1996 and are calculated based on the value of the ORR as agricultural land, with an appraised value of $4,000/acre. In Fiscal Year 1997, the city received approximately $740,000 from this source (Anita Dunn, City of Oak Ridge Finance Department, personal communication to M. Schweitzer, ORNL, August 29, 1997). Current plans are for DOE to continue these payments.

3.7 TRANSPORTATION

3.7.1 Existing Traffic Conditions

The traffic induced by the proposed action could have an immediate impact on the following four roadway segments:

- State Route (SR) 95 (Oak Ridge Turnpike) from the junction with SR 58 to Wisconsin Avenue,
- SR 95 (White Wing Road) from the junction with SR 58 to Bear Creek Road,
- Blair Road from Poplar Creek Road to SR 58 , and
- SR 58 from Gallaher Road to the junction with SR 95.

Annual average daily traffic (AADT) for surrounding roadways has been obtained from the Tennessee Department of Transportation (1995) and is presented in Fig. 3.7-1. The traffic within the study area, ranging from 3,280 to 15,130 vehicles a day, is considered light compared to traffic on other roadways in Oak Ridge (ranging from 17,040 to 30,360 vehicles a day).

Roadway operational conditions such as the delay, congestion, and conflicting movements experienced by the roadway users are often described in terms of level of service (LOS). A LOS definition generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, convenience, and safety. Six LOS, A through F, are used to represent a continuum of operating conditions, where level A is the most desirable and level F is the most undesirable (Table 3.7-1). During the 1960s, most highways were designed for LOS C. However, as a result of higher highway construction costs and rapid increases in traffic volumes, many state and city traffic agencies currently consider LOS D acceptable.

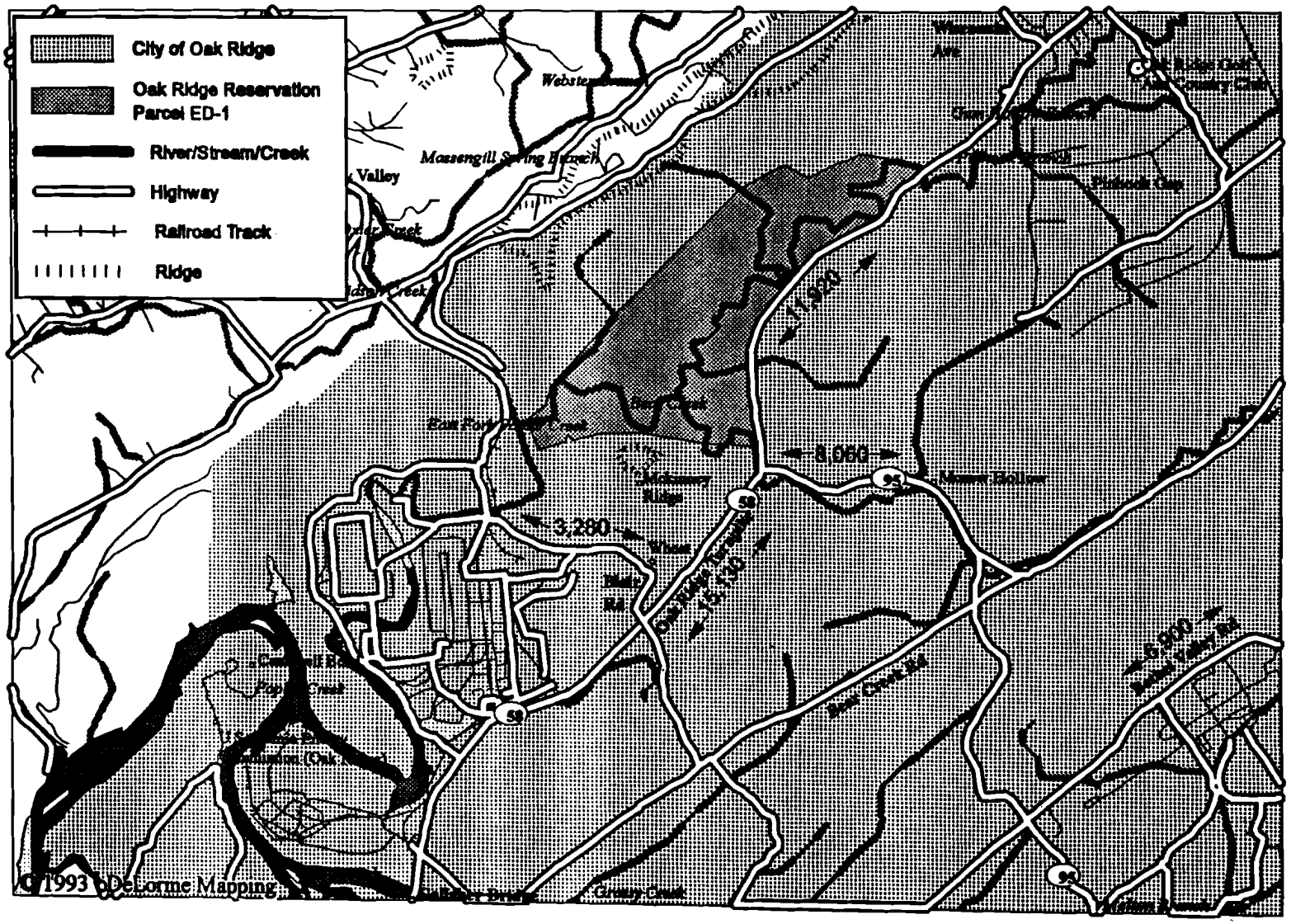


Fig. 3.7-1. Annual average daily traffic for Oak Ridge, 1996.

Table 3.7-1. Level of service criteria for roadway segments

Level	Criteria
A	Traffic flows freely with low volumes and high speeds.
B	Traffic flow is stable, but operating speeds and maneuverability are somewhat restricted because of increased volume.
C	Traffic flow is still stable, but most drivers are restricted in their freedom to select their own speed, change lanes, or pass.
D	Traffic flow approaches instability; tolerable operating speeds are maintained but may drop because of fluctuations in volume and temporary restrictions to flow. Maneuverability is limited.
E	Volumes are at or near the capacity of the roadway. Flow is unstable; speeds are low; and momentary stoppages may occur.
F	Volumes exceed roadway capacity; speeds are very low; and stoppages occur for long or short periods.

LOS analysis has been performed for the surrounding roadways using the available traffic volume information and the procedure suggested by the *Highway Capacity Manual* (TRB 1985). The existing LOS for these four roadway segments range from A to D and are, therefore, considered acceptable (Table 3.7-2).

Table 3.7-2. Existing Levels of Service and Traffic During the Peak Traffic Hour

Roadway segment	Peak traffic volume (vehicles per hour)	Level of service
Blair Road	395	C
SR 95 from junction with SR 58 to Wisconsin Avenue	955	D
SR 95 from junction with SR 58 to Bear Creek Road	970	D
SR 58 from Gallaher Bridge to junction with SR 95	1,210	A

3.7.2 Traffic Safety

Traffic safety is of major concern to the public, and, anytime there is an increase in traffic volume, there is the potential for more accidents. Accident information in the area for the past three years has been obtained from the Oak Ridge Police Department (Gary W. Ogle, Lieutenant, Oak Ridge Police Department, personal communication with S. M. Chin, ORNL, July 1996) and is presented in Table 3.7-3. These

data—which are basically a list of accidents that indicates the date, street location, and type for each accident—were combined with AADT data to calculate accident rates (accidents per million vehicle-miles of travel). Accident rates are commonly considered better measures of risk than accident frequencies alone since they account for differences in traffic flows.

Table 3.7-3 Historical Traffic Accident Information

Roadway Segment	Number of accidents			Accident rates (Accidents/1,000,000 vehicle-miles)		
	1993	1994	1995	1993	1994	1995
Blair Road	4	1	4	1.01	0.23	1.08
SR 95 from junction with SR 58 to Wisconsin Avenue	9	12	11	0.68	0.99	0.84
SR 95 from junction with SR 58 to Bear Creek Road	5	7	10	1.04	1.49	1.89
SR 58 from Gallaher Bridge to junction with SR 95	20	10	14	0.85	0.50	0.62

The accident rates for the past three years (1992-1994) were calculated for two highway types, rural two-lane highways and rural four-lane undivided highways (Table 3.7-3). The three-year state-wide average traffic accident rates are 1.68 and 1.60 accidents per million vehicle-miles for rural two-lane and rural four-lane undivided highways respectively. Compared to the three-year state-wide average accident rates, most of the roadway segments accident rates within the study area are well below the state-wide average rates over the three-year period. Only SR 95 from the junction with SR 58 to Bear Creek Road had an accident rate (1.89) above the three-year state-wide average rate (1.68) in 1995. Thus, based on the historical accident rate information within the study area, currently there is no major traffic safety problem associated with the four roadway segments.

3.7.3 Existing Commuting Traffic Pattern

Because conducting a detailed origin and destination study was beyond the scope of the present analysis, information collected for another study (Tennessee Transportation Assistance Program 1993) is used. Although traffic volumes may have changed to some extent since this study was done, it represents the most current information on traffic patterns. The commuting pattern for ETTP is presented in Fig. 3.7-2. Most of the ETTP commuting traffic (88%) comes from the east side of SR 58, and the remaining 12% comes from the west side. Of the east side traffic, 62% comes from the Oak Ridge Turnpike; 8% comes from Blair Road; and 18% comes from SR 95 (White Wing Road).

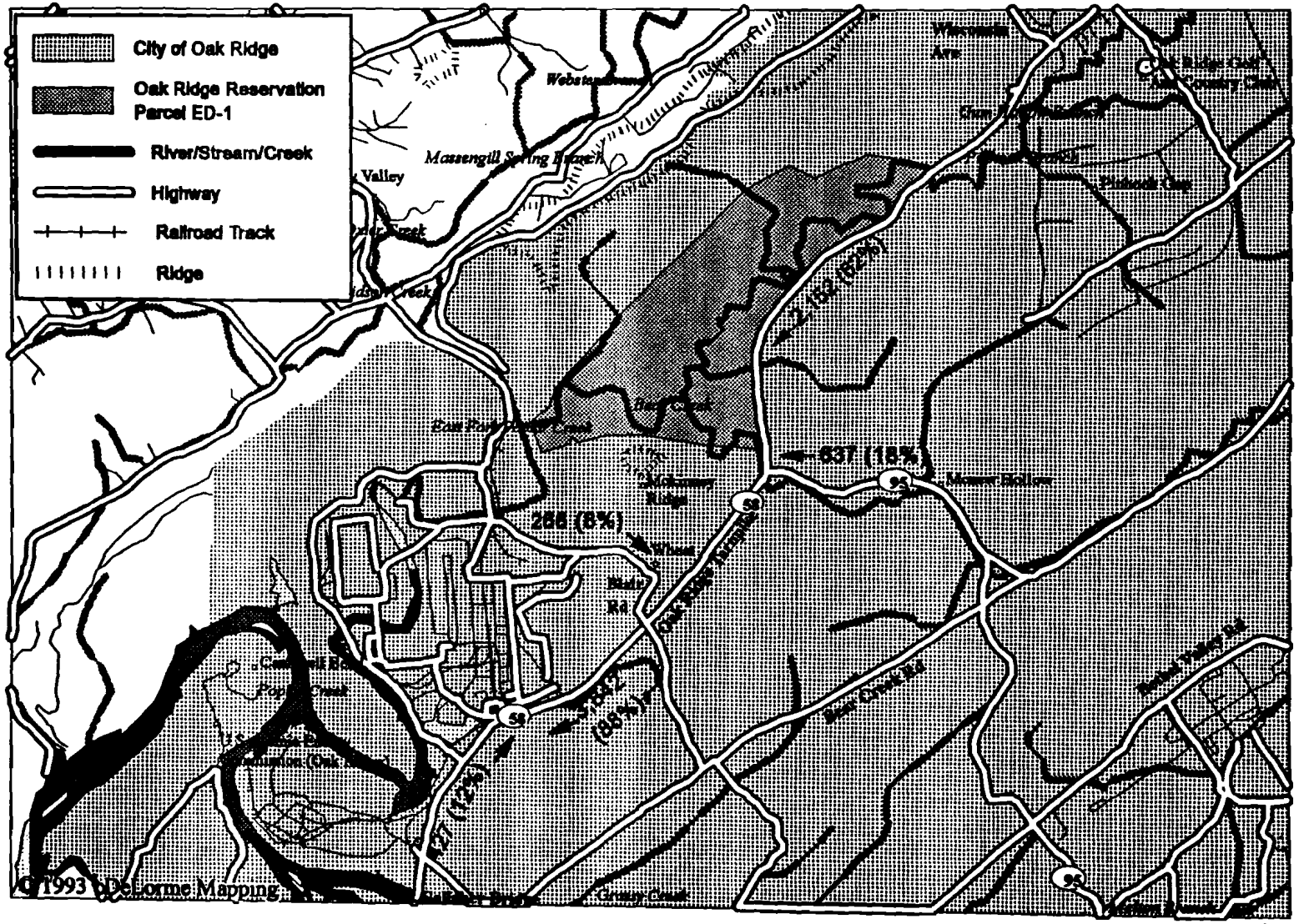


Fig. 3.7-2. ETTP commuter traffic pattern.

3.8 NOISE

Background noise levels at ETTP are mostly from local traffic, and are comparable to noise levels in an urban residential area. Noise levels 60 m (200 ft) from main thoroughfares serving ETTP have been estimated from traffic counts during rush hour to be between 55 and 60 dBA. Noise levels at relatively isolated sites within the plant area may be lower than 55 dBA.

Two noise level measures are commonly used in traffic-related noise studies: L_{10} and L_{eq}. L_{10} is the 10th percentage point or the 90th percentile of the sound pressure level probability distribution function. In other words, L_{10} is the noise level that is exceeded 10% of the time at a specific location. The equivalent noise level, L_{eq}, is the average noise level expressed in decibels. In field data collection, L_{eq} may be approximated as the logarithmic sum of a series of discrete noise level samples. In general, the L_{eq} noise level reading is about 3 dBA lower than the L_{10} reading for the same sound source over a period of time.

The L_{10} noise level is not additive. The L_{eq} noise level is additive but is not linearly proportional to the traffic volume. In general, doubling the traffic volume will only add 3 dBA to the original L_{eq} noise level.

There are no sensitive receptor sites such as picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, or hotels within the study area. However, a newly developed subdivision, Southwood Estate, is situated on the south side of SR 95 (Oak Ridge Turnpike). Some lots within the subdivision are close to SR 95, and other houses built in the future might experience high traffic noise.

Because no sensitive receptors occur in the study area, no ambient noise level data were collected. Instead, traffic noise levels for four roadway segments within the study area have been estimated based on the Federal Highway Administration (FHWA) traffic noise prediction procedure (FHWA 1977). Estimates have been generated for locations at 30 and 60 m (100 and 200 ft) away from the center line of the selected roadway segments during the peak traffic hour. The noise level estimates for the four roadway segments within the study area are presented in Table 3.8-1.

As shown in Table 3.8-1, locations 328 m (100 ft) or more from the center line of these roadways do not experience noise levels exceeding the FHWA's L_{eq} limit of 67 dB(A) (FHWA 1985). Therefore, there is no significant traffic noise associated with the existing traffic on the four roadway segments within the study area.

3.9 CULTURAL RESOURCES

The K-25 Site was established as part of the Manhattan Project to develop and produce highly enriched uranium nuclear material for the atomic bomb used in World War II. The Manhattan Project was the first industrial process for separating the ^{235}U isotope by the gaseous diffusion method and precipitated extraordinary innovations in science, engineering, and building construction needed to build and operate these

Table 3.8-1. Estimated noise levels during peak traffic hour

Roadway segment	Estimated noise level (L_{eq})	
	30 m (100 ft) from center line of the roadway	60 m (200 ft) from center line of the roadway
Blair Road	59 dB(A)	55 dB(A)
SR 95 from junction with SR 58 to Wisconsin Avenue	63 dB(A)	59 dB(A)
S R 95 from junction with SR 58 to Bear Creek Road	63 dB(A)	58 dB(A)
SR 58 from Gallaher Bridge to junction with SR 95	64 dB(A)	60 dB(A)

industrial facilities. A summer 1994 cultural resources survey of the former K-25 Site identified it as a "Main Plant Historic District" with 120 "contributing" buildings eligible for inclusion on the *National Register of Historic Places* (NRHP). A listing of these buildings, some no longer extant, is included in the K-25 Cultural Resources Survey (JERT 1996).

3.10 EXISTING RADIATION AND CHEMICAL EXPOSURES

Past and present activities at the ETTP have resulted in releases of radionuclides and chemicals to the environment. Such releases can be sources of exposure to humans both on and off site. In general, human exposure pathways include direct contact, inhalation, and ingestion. Radiation exposure is commonly categorized as either external (direct contact with penetrating radiation) or internal (ingestion and inhalation). Ingestion of radionuclides can be through the intake of water or foodstuffs (e.g., vegetation and fish). The *Oak Ridge Reservation Annual Site Environmental Report for 1994* (Frazier et al. 1995) summarizes releases or environmental contamination levels of chemicals and radiation and resulting exposures for 1994. This section summarizes existing public and occupational radiation and chemical exposures. Co-located workers, are currently considered to be site workers who have access to the site, receive applicable site-specific training, and are provided a level of protection through appropriate DOE controls and oversight. Co-located workers are not considered visitors or members of the general public. Thus, public radiation dose is considered to be an off-site dose calculation.

3.10.1 Public Radiation Dose

The average annual background radiological effective dose equivalent (EDE) from natural and manmade sources to an individual residing in the United States is approximately 3.6 mSv/y (360 mrem/y). Approximately 3.0 mSv/y (300 mrem/y) of the 3.6 mSv are from natural sources (e.g., radon, cosmic radiation); about 0.55 mSv/y (55 mrem/y) of which are from natural external radiation sources (i.e., cosmic and terrestrial radiation) (NCRP 1987). External radiation exposure rates from background sources have been measured in Tennessee. The measured rates are equivalent to an average EDE of 0.42 mSv/y (42 mrem/y), ranging between 0.19 and 0.72 mSv/y (19 and 72 mrem/y) (Myrick et al. 1981). This average is less than the U.S. average of 0.55 mSv/y (55 mrem/y).

Frazier et al. (1995) provide estimates of radiological doses from the ETTP. Information from this report is summarized here. Storage areas within the ETTP containing radioactive materials that contribute to a slight increase in external exposure rates are located along some parts of Poplar Creek. The section of the creek affected by these areas runs through the plant and is used at times by fishermen. The estimated annual EDE to the hypothetical maximally exposed individual resulting from external radiation, assuming 250-h of exposure, is 0.01 mSv (1 mrem), which is about 2.4% of the natural external radiation background EDE to an average Tennessee resident. The maximum calculated internal radiation dose (inhalation and ingestion) to an off-site individual from airborne releases at ETTP is 0.001 mSv (0.1 mrem) EDE. The maximally exposed individual is assumed to be located 5.2 km (3.2 miles) west-southwest of the TSCA incinerator stack (located just east of the K-1037 building; see Fig. 3.1-1). This is greater than 2 km (1.2 miles) from the nearest ETTP border. The maximum estimated individual exposure from all pathways (e.g., ingestion of water and fish), resulting from waterborne releases from the ORR, is 0.022 mSv (2.2 mrem) to the highest exposed individual. The total estimated dose to an individual from external exposure, airborne releases, and waterborne releases (each listed above) equals 0.01 mSv + 0.001 mSv + 0.022 mSv, or 0.03 mSv (3 mrem). DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, limits the EDE that an off-site individual may receive from all exposure pathways and all radionuclides released from ORR during 1 year to no more than 1.0 mSv (100 mrem). The 1994 exposures resulting from operations at the former K-25 Site represent 3% of this DOE limit. Frazier et al. (1995) also estimated that the 1994 maximum EDE for all pathways for the entire ORR could have been about 0.05 mSv (5 mrem), which is about 5% of the DOE public limit.

3.10.2 Occupational Radiation Dose

DOE regulations (10 CFR 835, *Occupational Radiation Protection*) establish radiation protection standards and program requirements for DOE and DOE contractor operations with respect to the protection of workers from ionizing radiation. DOE's limiting administrative control value for a worker's radiation dose is 50 mSv/y (5000 mrem/y) (annual EDE) from combined internal and external sources received in any year

for the whole body. The *K-25 Site Radiation Control Program Manual* (DOE 1995a) sets an annual facility administrative control level of 15 mSv/y (1500 mrem/y) for all activities. Exceeding this control level requires approval of the ETTP Site Manager. This is consistent with DOE's policy that requires exposures to be as low as reasonably achievable (ALARA), and is more stringent than DOE's administrative control level (DOE 1995a).

The primary source of radiation exposure at ETTP is uranium, which emits mostly alpha particles. Alpha particles do not penetrate clothing or skin; therefore, internal exposure (e.g., inhalation) is the primary exposure route of concern. Potential exposures occur from activities such as decontamination, metal recycling, and uranium deposit removal. The three most used decontamination methods at ETTP include wet wiping surfaces, vacuuming with high efficiency particulate air (HEPA) filters, and shot-blasting (with the resulting dust captured on HEPA filters). Deposit removal activities include, for example, vacuum operations in the deposit removal room, change out of HEPA filters, sampling, glovebox loading and unloading, and loading of deposit waste for transport.

Representative doses measured for radiological workers at ETTP in the 3rd Quarter 1995 and 2nd Quarter 1996 were tabulated by the ETTP Dosimetry department (Patricia Lowe, Lockheed Martin Energy Systems (LMES), personal communication with Maria Socolof, ORNL, July 24, 1996). Radiological workers are those who are assigned to work in areas that contain potential radiation exposure hazards. The average external whole body dose to the 1408 radiological workers at ETTP (including DOE contractors and subcontractors) for a year was <0.01 mSv (<1 mrem). This dose is a small fraction (2%) of the natural external background dose of 0.42 mSv/y (42 mrem/y) measured in Tennessee. Preliminary results on internal dosimetry indicate that the average dose to all radiological workers at ETTP is <0.1 mSv (<10 mrem). The total internal and external average dose of all radiological workers is therefore about 0.11 mSv (11 mrem). This is only 0.2% of DOE's annual administrative control limit of 50 mSv (5000 mrem). Maximum individual doses are generally below about 1 mSv (100 mrem).

The annual average EDE to radiological workers in the United States (e.g., medicine, industry, nuclear fuel cycle, government) is approximately 2.2 mSv/y (220 mrem/y) (NCRP 1987). Therefore, occupational radiological doses at ETTP are well below those of other radiological workers in the United States, and far below DOE's control level. DOE also requires that members of the public who are exposed to radiation and/or radioactive material during direct on-site access at a DOE site or facility not exceed 1 mSv (100 mrem) total EDE in a year (10 CFR 835.208). The average occupational doses at ETTP are also below this on-site visitor limit.

3.10.3 Public Chemical Exposures

The Oak Ridge Annual Site Environmental Report for 1994 (Frazier et al. 1995) estimates the human health risks from chemicals found in the environs of the ORR. The primary exposure pathways considered are ingestion of drinking water and fish. The Clinch River Remedial Investigation/Feasibility

Study (RI/FS) (DOE 1996b) also analyzes these pathways in a more recent risk assessment of contaminants in the Clinch River and Poplar Creek. The results of the Clinch River RI/FS risk assessment for the hypothetical maximally exposed individual are presented here.

Health effects attributed to chemical exposures can be categorized as either carcinogenic or noncarcinogenic. Chemical carcinogenic risks are reported here as a lifetime probability of developing an excess cancer. The EPA defines a target cancer risk range of 1×10^{-4} to $1 \times 10\text{-}6^{-6}$, which is when to consider cleanup actions under CERCLA. In the risk assessment for the Clinch River and Poplar Creek (DOE 1996b), an exposure *pathway* of concern is defined as one causing greater than a 1×10^{-4} cancer risk. This exposure pathway risk is the sum of the risks from all the chemicals sampled. When the cancer risk for an individual *chemical* exceeds 1×10^{-6}, that chemical is defined as one of concern. Noncarcinogenic hazards are reported as hazard quotients (HQ) where unity (1) or greater represents a potential for adverse health effects. An HQ less than unity indicates an unlikely potential for adverse health effects. The sum of more than one HQ for multiple toxicants and/or multiple exposure pathways is called a hazard index (HI). Pathways of concern for noncarcinogens are defined as those with an HI > 1.

Drinking water and fish from the surrounding area have been sampled for various contaminants. Samples were taken and associated risks were calculated from various reaches (Reaches 1, 2, 4, and 7) of the Clinch River System (Table 3.10-1). Reaches 1 and 7 are upstream of ETTP and ORNL, but may have received contaminants from the Y-12 Plant. Reach 2 is upstream of ETTP but downstream of Y-12 and ORNL. Finally, Reach 4 is downstream of all ORR contaminant sources, including ETTP. For the drinking water ingestion pathway, none of the reaches evaluated exhibited a *pathway* excess cancer risk of greater than 1×10^{-4}. Further, no carcinogenic *chemicals* of concern were identified for the drinking water ingestion pathway up or downstream of ETTP on the Clinch River (i.e., Reaches 1, 2, 4, or 7). Within Poplar Creek (i.e., Reach 3, which extends from the confluence of the Clinch River, through the ETTP to the mouth of EFPC, and has historically received contamination from K-25 and Y-12), carcinogenic risks were calculated separately for the four defined subreaches. For the drinking water ingestion pathway, none of the subreaches exhibited a pathway excess cancer risk of greater than 1×10^{-4}. Therefore, no carcinogenic chemicals of concern were identified.

Noncarcinogenic HIs were calculated for both an adult and a child for the drinking water ingestion pathway. No noncarcinogenic HIs were >1.0 for the adult water ingestion pathway for the Clinch River reaches. However, the HIs for the child water ingestion pathway for the Clinch River reaches was >1.0 for each of the Clinch River reaches. Several contributing inorganic contaminants (arsenic, antimony, manganese, and nitrate) were identified as contaminants of concern for this pathway. Individually, however, none of these contaminants had an HQ > 1.0 and the HIs for each reach range from 1.0 to 1.5. The chemical that contributes more than 50% of the total HI for each reach is manganese. However, the risk from manganese is overestimated since the risk assessment assumed that an individual drinks 2 L/day of unprocessed surface water. Manganese has a relatively high affinity to partition from water to soil or particles; it would therefore

be substantially reduced in concentration during standard drinking water treatment, resulting in less exposure through ingestion than the above estimate suggests. Since water samples both upstream and downstream of

Table 3.10-1. River reaches used in the Clinch River RI/FS[a]

Reach number	Reach name (description)	River mile[b]
1	Melton Hill Reservoir (from the Oak Ridge Marina to Melton Hill Dam)	CRM 23.1 - 52.0
2	Clinch (Clinch River from Melton Hill Dam to Poplar Creek)	CRM 12.1 - 23.0
3	Poplar Creek embayment (Poplar Creek below the confluence of the East Fork)	PCM 0.0 - 5.5
4	Poplar Creek Clinch (the Clinch River from the mouth of Poplar Creek to the confluence with the Tennessee River)	CRM 0.0 - 12.0
5	Watts Bar Reservoir (the Tennessee River from the confluence of the Clinch River to Watts Bar Dam)	TRM 530.0 - 567.5
6	Emory River	ERM 0.0 - 14.0
7	McCoy Branch embayment	CRM 37.4

[a]Source: Phase 2 *Sampling and Analysis Plan, Quality Assurance Project Plan, and Health and Safety Plan for the Clinch River Remedial Investigation*, DOE/OR/01-1111&D3.
[b]CRM=Clinch River mile, PCM=Poplar Creek mile, TRM=Tennessee River mile, ERM=Emory River mile

ETTP had pathway HIs > 1, the source of contamination of manganese or any other chemicals of concern is unknown. The specific noncarcinogenic health effects of these chemicals of concern vary for each constituent. Details on the toxicology of these chemicals can be found in *Casarett and Doull's Toxicology* (Klaassen, Amdur, and Doull 1986).

Noncarcinogenic contaminants were also assessed for adults and children for the water ingestion pathway for the subreaches of Poplar Creek. For example, in subreach 3.04 (within the ETTP Area of Responsibility and downstream of the ETTP Site), the HI=1.0 for adults, with manganese contributing about 50% of the total hazard. For the child drinking water ingestion pathway, the HI>1. Based on the findings for the subreaches, arsenic, antimony, manganese, nitrate, and PCB-1254 are considered to be chemicals of concern for Poplar Creek surface water.

Fish consumption is another potential human exposure route examined in the Clinch River RI/FS (DOE 1996b). Nine contaminants detected in fish fillets produced cancer risks of $>1 \times 10^{-6}$. All species of fish for which Aroclor–1260, a PCB, was analyzed had calculated cancer risks $>1 \times 10^{-4}$. The excess lifetime cancer risks for this PCB in catfish and striped bass were $>1 \times 10^{-3}$. The pesticides (aldrin, chlordane, and 4,4'-DDT) are carcinogenic chemicals of concern with cancer risks $>1 \times 10^{-6}$. In addition, the excess cancer risk for 4,4'-DDE, a chemical compound found only in the environment as a degradation product of 4,4'-DDT was also $>1 \times 10^{-6}$. At one time, these pesticides were commonly used in residential, farming, and industrial

areas; therefore, they are not unique to the ORR but are ubiquitous contaminants in eastern Tennessee streams and reservoirs. The remaining carcinogenic contaminants of concern for fish include two inorganics (arsenic and beryllium) and two radionuclides (cesium-137 and strontium-90). The highest concentrations of the inorganics are found in largemouth bass and catfish. The radionuclides are associated with the ingestion of catfish.

Noncarcinogenic chemicals of concern that contributed to a pathway HI > 1.0 from ingestion of fish found in the Clinch River and Poplar Creek included three inorganic contaminants (arsenic, mercury, and selenium), two pesticides (chlordane and 4,4-'DDT), and PCB-1254. The highest HQs for the fish pathway were for the ingestion by a child of PCB-1254. Contaminants found in fish in the Clinch River and Poplar Creek indicate a potential existing health concern to a hypothetical maximally exposed individual.

Air permits are issued for the ETTP by the TDEC. The major sources of criteria air pollutants at ETTP are the four boilers in operation at the K-1501 Steam Plant; emissions are 15% or less than the allowable quantities (Frazier et al. 1995). The TSCA Incinerator is also a source of air emissions from ETTP. Emissions from the incinerator are controlled by extensive off-gas treatment. Emissions from the incinerator are significantly less than the permitted allowable emissions. Estimates of cancer risk from all airborne emissions are much less than the 1×10^{-6} target.

3.10.4 Occupational Health and Safety

Typical industrial health and safety hazards associated with current plant activities include electrical, confined space, chemical, mechanical and construction related hazards. Control of occupational chemical exposures at ETTP fall under the responsibility of the Industrial Hygiene department who must ensure compliance with the provisions of DOE Order 440.1, *Worker Protection Management for DOE Contract Employees*. This order includes a requirement that contractors comply with federal Occupational Safety and Health Administration (OSHA) regulations. Workers follow standard industrial practices in the use of protective engineering practices and equipment as specified in OSHA regulations (29 CFR 1910, *Occupational Safety and Health Standards* and 29 CFR 1926, *Safety and Health Regulations for Construction*). Radiological hazards are controlled using both engineering and administrative controls and are discussed in Sect. 3.10.2. Occupational hazards are specific to the various activities conducted at the site. Currently, industrial scale processes are limited since the diffusion operations ceased in 1985. Most of the Industrial Hygiene Department's activities are related to the operation of the TSCA incinerator. Other activities may include, for example, general maintenance, painting, some limited metal welding and fabrication activities, laboratory analysis functions, environmental restoration, and decontamination and decommissioning. Potential chemical hazards could include, for example, exposure to asbestos, Pb, PCBs, RCRA hazardous materials (e.g., trichloroethylene and other solvents), and carcinogens. Respiratory protection and administrative controls (e.g., exhaust hoods, remote operations) are employed to ensure exposures are controlled within applicable OSHA and DOE requirements. The Industrial Hygiene department

will sample areas to ensure that administrative and respiratory protection are adequate to control exposures; no unusual exposures occur at the site. In cases where subcontractors conduct work on site, the subcontractor companies are responsible for monitoring their own workers for occupational health and safety hazards. For example, construction-related work for remedial actions are carried out by subcontractors.

Other current projects, such as recycling metal from the gaseous diffusion buildings, involve working in areas that may still contain residual UF_6. When UF_6 is exposed to moisture in the air, toxic compounds (HF and UO_2F_2) are formed. Workers conducting these activities are equipped with respirators to avoid inhaling these compounds and with other personal protective equipment to avoid dermal contact. UF_6 is of concern for its radiologically and chemically toxic characteristics. Chemically, the uranium in UF_6 is toxic to the kidney. HF is an acid that can cause acid burns on the skin or lungs if it is concentrated. Massive exposure to HF in air can cause destruction of the bronchial mucous membrane and swelling of lung tissue, which can be fatal. The fluoride ion in both HF and UO_2F_2 is also toxic and can penetrate the skin, destroy tissue under the skin, and cause inhibition of vital enzymes and dangerous disturbances in metabolism (McGuire 1991).

Conceivably, there are other hidden sources of potential exposures from the various past activities at ETTP. Recent complaints of health effects in workers, that have sparked public interest at ETTP have led to the suggestion of possible cyanide exposures. The National Institutes of Occupational Safety and Health (NIOSH) conducted an investigation into this possibility and found no occupational source of hydrogen cyanide at the site. The NIOSH results corroborated ETTP Industrial Hygiene testing which also found no occupational source of hydrogen cyanide. Therefore, the source of these complaints of health effects experienced by the workers is unknown (Blade and Worthington 1996), and investigations into the reasons underlying the health complaints are continuing.

3.11 ACCIDENTS

Potential accidents at ETTP that may be of particular concern to prospective tenants are associated with the 7100 cylinders primarily containing depleted UF_6 stored at ETTP, operation of the TSCA incinerator, and storage of certain uranium materials. Potential accidents related to the ETTP cylinder yards have recently been analyzed in a Final Safety Analysis Report (FSAR, LMES 1997). Identified hazards include UF_6 (radioactive and chemical toxicity) and its hydrolysis products, and HF (chemical toxicity). Other hazards include electrical energy hazards from power lines. The FSAR identified two significant hazards associated with confinement failures that could result in the release of UF_6—a release of solid or gaseous UF_6 to the atmosphere from cylinder failure and a cylinder yard fire. In the first case, a large spill of solid material was considered to bound all of the smaller releases that could occur. The conclusions of the FSAR were that cylinder failure does not pose a severe health risk beyond approximately 2,300 feet (700 m). In this case both uranium intake and the HF exposure were estimated to be below the guideline threshold values of 10 mg uranium intake and 2.3 mg/m^3 HF exposure at the site boundary.

In the case of the cylinder yard fire, the event was not expected to occur during the life of the facility but was postulated as a worst case scenario. The conclusions for the cylinder yard fire showed that the threshold values designed to protect public health of 30 mg U intake and 23.2 mg/m^3 HF exposure could be exceeded beyond the site boundary under Class D meteorological conditions. This scenario is estimated to have an extremely unlikely frequency. Primary controls to minimize the likelihood of a cylinder yard fire include preventive measures (e.g., inspection of cylinders before welding and the Fire Protrection Program and its established controls). Although the cylinder yard fire case exceeds the guidelines for distances beyond the site boundary, the combination of stingent controls to prevent a cylinder yard fire and a well-prepared emergency response plan limit the associated risk.

The disposition of the cylinders (at ETTP and the gaseous diffusion plants in Kentucky and Ohio) is currently being addressed by DOE in an Environmental Impact Statement (EIS) (61 *FR* 2239). Alternatives being considered include converting UF_6 to an oxide or metal form and either continuing to store the material or transporting the material to a fabrication plant where uranium shielding components could be manufactured. The final decision concerning their disposition could affect the probabilities and impacts of potential accidents.

Safety documentation for the TSCA incinerator (LMES 1995) concluded that significant impacts on the health and safety of incinerator facility personnel, other ETTP personnel, or the public are not expected from the incinerator facility during routine operations with the use of engineering controls and administrative procedures currently in force. Based on the accident analysis of the facility and past operation (LMES 1995), it was concluded that the incinerator facility poses no undue threat to employee or public safety and health. Three hypothetical accidents have been considered that are deemed "possible" (i.e., greater than 10^{-4} annual occurrence) with potentially significant adverse consequences. These were associated with worker exposures to high concentrations (>1000 μg/m^3) of PCBs (e.g., due to a spill) (DOE 1992). However, no situation was identified that could not be controlled adequately by facility features or by implementation of existing safety and health policies and procedures (LMES 1995).

A nuclear criticality hazard also exists with some materials at ETTP (e.g., uranium deposits and stored enriched uranium materials), and an associated nuclear criticality accident is considered "credible" (i.e., 10^{-6} annual probability of occurrence). Nuclear criticality occurs when a sufficient mass of fissionable material exists such that a chain reaction is sustained. DOE Order 5480.24, *Nuclear Criticality Safety* and various American National Standards Institute standards related to criticality safety are the basis of requirements followed by ETTP to establish nuclear criticality control. Nuclear criticality is not considered to be a credible accident for the ETTP UF_6 cylinder yards because of the limited quantities of ^{235}U stored in individual cylinders.

4. ENVIRONMENTAL CONSEQUENCES

This chapter presents an evaluation of the environmental consequences associated with the no-action alternative (Sect. 4.1) and the proposed-action alternative (Sect. 4.2). The no-action alternative consequences serve as a baseline for comparison with the proposed action. Sect. 4.3 of this chapter addresses the cumulative impacts of the proposed action when considered additively with impacts of past, present, and reasonably foreseeable future actions.

4.1 NO ACTION

Under the no-action alternative, activities at ETTP would continue under the current mission. Currently planned environmental management and decontamination and decommissioning activities would be carried out further and continue into the future. The no-action alternative would ultimately result in the cleanup of the ETTP to levels consistent with state and federal requirements (Sect. 2.1). However, even after remediation is completed, at least parts of the site would still require institutional controls because low disposal mounds present at sites of former structures, waste burial grounds, and waste disposal areas would remain, leaving waste in place. Under the no-action alternative, the ETTP site would remain under DOE institutional control, and much of the area would return to more natural conditions due to ecological succession. Further, based on an overall reduction of facility activities, the workforce would be reduced. Without reuse of ETTP facilities and land, job losses due to downsizing at DOE's Oak Ridge facilities would likely have an adverse effect on communities in the impact region. Impacts to each resource area from the no-action alternative are evaluated in the following sections.

4.1.1 Facility Use

During continued cleanup of ETTP, facility and land uses of ETTP would remain the same as they are at present. Once cleanup activities were completed, fewer facilities (only those required to maintain institutional control or surveillance and maintenance for wastes left in place) would be used and others would have been demolished. The impact of the no-action alternative would be further underutilization of remaining facilities, and a less industrialized site.

4.1.2 Air Quality

Operation of the TSCA incinerator, remediation, and D&D activities would continue under the no-action alternative. Impacts of these operations are discussed in detail in annual environmental reports (e.g.,

Frazier et al. 1995, Hamilton et al. 1996). In summary, air quality impacts are relatively small and the radiological dose via the air pathway is about 1% of the NESHAP standard given in 40 CFR,61.102. Construction-related impacts from remedial actions could increase PM-10 concentrations somewhat, but they would be within acceptable limits. Construction impacts under no action would be expected to be less than that modeled for the proposed action (see Sect. 4.2.2), and would not be expected to violate any air quality standards.

4.1.3 Soil and Water Resources

Planned cleanup activities include, for example, groundwater pumping and treatment, soil remediation, and the installation of french drains around contaminated plumes. The extent of these activities has not been determined, and environmental restoration actions are assessed in CERCLA review and documentation (e.g., remedial investigations or engineering evaluations/cost analyses). Disturbance of the soils could result in an increase in runoff, which would increase sedimentation and turbidity of receiving streams around the site from erosion and transport of the disturbed soils. A portion of the rain that falls on contaminated soils will infiltrate to groundwater. Contamination of surface and groundwater from ongoing activities at ETTP, as described in Sect. 3.4, is expected to be similar for future remedial actions. After cleanup is completed, contaminants at ETTP would be either removed or reduced, in turn reducing impacts on water resources.

Also part of the no-action alternative is the possibility of future construction and operation of a CERCLA waste management facility. While this facility is still conceptual in nature, it would accommodate wastes generated from ORR environmental restoration activities. Candidate sites for such a CERCLA waste management facility that have been considered during planning are the White Wing Scrapyard and two sites in Bear Creek Valley (Fig 1-1). A proposed plan will be announced in the near future. Uncontrolled storm water runoff from the construction site of such a facility would increase the turbidity and sedimentation in EFPC or Bear Creek from erosion and transport of disturbed soil. An effective erosion and sedimentation control plan (ESCP) would be necessary to reduce turbidity and sedimentation in Bear Creek to acceptable levels. Installation of diversion ditches would help to reduce runoff from this site due to on-site precipitation during construction. Direct runoff would be diverted to a sediment detention basin during construction. No decisions have been made at this time concerning the development of any of these sites.

Runoff would be unlikely to come in contact with contaminated waste during such future waste disposal operations. Facility design (e.g., concrete structure) and waste handling and packaging procedures would minimize contact during normal operations. Diversion ditches would be maintained throughout operations and into the post-closure period. Impacts from the CERCLA waste management facility would be analyzed in detail before a decision is made to construct and operate such a facility.

4.1.4 Ecological Resources

There could be some adverse impacts from the no-action alternative during cleanup at ETTP. If contaminated media (e.g., soil, water, building rubble) were moved to an off-site location, adverse impacts could occur at the disposal site. Such impacts could result, for example, from land disturbing activities to construct storage and/or disposal facilities. Since neither the amount of materials to be disposed of, the disposal locations, nor the final options for managing most waste from specific environmental restoration projects have been identified, it is not possible at this time to estimate specific impacts. These impacts would be considered in future CERCLA documents (with NEPA values incorporated) that would be prepared when cleanup actions were being planned. The eventual cleanup of ETTP could also result in positive impacts due to pollutants having been removed or otherwise addressed.

Two of the three parcels outside the ETTP fenced area (Parcels 2 and 4) would not be affected under the no-action alternative. Part of the land in the 700 Area of Parcel 1, the 770 Operable Unit, is the contaminated scrap metal yard, which would be subject to a CERCLA action under either the proposed action or the no action alternatives. Except for areas under transmission lines or on or near roads, much of these areas would undergo ecosystem succession and would eventually return to a more natural state similar to many other relatively undisturbed areas on the ORR. Thus, under the no-action alternative there would be no negative impacts from construction or operation of new industrial facilities on these parcels, and there would likely be positive changes due to natural succession, which would provide more suitable habitats for native plants and animals.

Osprey currently nest on one building at ETTP. If they continue nesting on site, substantive compliance with TWRA requirements would occur to plan cleanup operations so as to minimize disturbance to the birds (e.g., restrictions on time or area for construction, noise abatement).

After cleanup, low disposal mounds could remain where former structures stood. These mounds would be covered with soil and revegetated, as much as possible, with native species per E.O. 11987, "Exotic Organisms," and DOE 5400.1/AI-1 which restrict the introduction of exotic species into natural ecosystems on federally owned land, and recommendation of the TDEC (see consultation letter, September 21, 1996, Appendix D). While most of ETTP consists of pavement, rubble, grasses, and buildings, a small amount of natural habitat does occur, primarily along Poplar Creek. The use of native species for revegetation of currently disturbed areas would have a positive impact as it could enhance regional biotic and ecosystem diversity. Leaving a cleaned up ETTP site with institutional controls would allow the site to return to nearly natural condition through ecological succession. This change would help protect biota on the ORR and enhance regional biotic and ecosystem diversity (Mann et al. 1996).

A number of wetlands have been identified within ETTP and the ETTP Area of Responsibility (see Sect. 3.5.3). The standard practice for DOE activities on the ORR is to avoid construction in wetlands and/or to mitigate possible damage to nearby wetlands . Similar constraints would be applied to CERCLA cleanup activities at ETTP. To prevent the loss of wetlands on the site, the 100-year floodplain has been determined,

and wetland boundaries would be precisely determined prior to cleanup and avoided, as practicable. Cleanup activities on upland sites would employ appropriate mitigation measures to prevent the transport of eroded soil into wetland areas. If floodplains or wetlands could not be avoided, measures would be employed to minimize or mitigate any negative impacts, as practicable. Review as required by DOE or other agency (e.g., Army Corps of Engineers) regulations for evaluating impacts on floodplains and wetlands would be completed during the CERCLA process.

4.1.5 Socioeconomics and Environmental Justice

Under this no-action alternative, the work force required for continued clean-up of the ETTP is already in place. Without reuse of the ETTP land and facilities for commercial and industrial purposes (the proposed action), recent and projected job losses due to downsizing at DOE's Oak Ridge facilities are likely to have negative effects on the communities in the impact area. Specifically, local employment would decline, which could lead to out-migration of some current residents, a decline in local purchases of goods and services, and reductions in the sales tax revenues received by local governments.

4.1.6 Transportation

Within the study area, the peak-hour traffic consists mostly of work-related trips. Thus, without any prospect for future DOE budget increases or new DOE-related contracting opportunities, traffic within the study area should not increase in the future. In fact, if downsizing and strategic realignment efforts continue, traffic within the study area would be expected to decrease. For the purpose of this study, it is assumed that the future traffic in the study area would remain the same if the land and facilities within the ETTP are not leased. It should be noted that during the demolition and remediation work at ETTP, there will be added heavy equipment traffic and waste/debris shipments. However, the full extent and the detailed schedule for the demolition and remediation work at the site has not been established. Details of this type will be included in the regulatory documentation prepared for the demolition or the remediation activities. No quantitative analysis for such added traffic is provided in this EA.

4.1.7 Noise

As described in Sect. 3.8, noise in the area is dominated by traffic noise. With a decrease in workforce, traffic noise would decrease. Temporary effects of noise from construction would be minor.

4.1.8 Cultural Resources

The no-action alternative would lead to substantive compliance with the NHPA and the provisions of the DOE ORO Cultural Resources Management Plan (CRMP) to permit response actions under the CERCLA process to occur. The no-action alternative would deny potential productive use of the facilities because the facilities would not be leased, and in some instances the facilities would be demolished.

4.1.9 Human Health

Any activities at ETTP conducted by DOE that could impact the public are subject to DOE Orders 5400.1 and 5400.5 for chemical and radiological protection of the public, respectively (see Sect. 3.10). Current radiological and chemical exposures would likely continue at low levels as they currently exist (see Sects. 3.10.1 and 3.10.3). It is unlikely that additional environmental management or decontamination and decommissioning activities would have additional impacts on the public because such activities (e.g., soil excavation, installing French drains around contaminated groundwater plumes, HEPA vacuuming, building demolition) are not expected to cause major off-site releases. Moreover, for extensive CERCLA remediation actions, risk assessments are required prior to remediation. These assessments evaluate potential public exposures from the remediation activities in detail, and provide a forum for public involvement. Once cleanup of the ETTP is completed, the impacts to the public would be reduced, presumably because contamination would be removed or reduced. Some waste areas would remain (with continued institutional control to limit public access), but public exposures would be expected to be smaller than those already existing.

DOE and contractor workers would be required to follow the requirements of DOE Order 440.1 for control of chemical and safety hazards and 10 CFR 835 for radiological activities (see Sect. 3.10). Future cleanup activities under the no-action alternative would result in additional occupational exposures. These would be expected to result from a combination of continuation of current activities (e.g., deposit removal, see Sects. 3.10.2 and 3.10.4), as well as more difficult and dangerous operations. To date, in an effort to provide lease space, early decontamination has focused on more easily achievable activities. High-risk buildings are yet to be addressed. Thus, exposures would continue throughout the duration of cleanup or decontamination and decommissioning activities, and these may increase as more difficult situations are encountered. Once cleanup is completed, occupational exposures would be reduced because the number of workers needed to maintain institutional control would be reduced. Any cleanup activities, beyond the scope of current activities, would be evaluated in separate CERCLA or NEPA documentation. Standard industrial accidents (falls, electrical accidents, fires, etc.) remain the most important class of accidents with respect to frequency and impact.

4.1.10 Accidents

During remedial actions, accidental spills of liquids might cause contamination of localized areas of soil and could kill or injure terrestrial and aquatic plants and animals. In accordance with EPA-approved spill prevention controls and countermeasures (SPCC) plans, soils contaminated by any spills would be collected and taken to appropriate waste disposal facilities or remediated in place. Under the Superfund Amendment Reauthorization Act (SARA), Title III, industrial facilities are required to report releases of "reportable quantities" of hazardous substances [CERCLA- and Emergency Preparedness and Community Right-To-Know Act (EPCRA)-listed] to state and local emergency response personnel. DOE, LMES, and the city of Oak Ridge would mobilize an emergency preparedness plan if a release to any environmental medium (i.e., air, surface water, groundwater, or soil) of hazardous material occurred at ETTP. Other accidents associated with existing hazards (e.g., cylinder yards) would be the same as described in Sect. 3.11.

4.2 PROPOSED ACTION—LEASE OF LAND AND FACILITIES WITHIN ETTP

Impacts from cleanup or site preparation associated with the proposed action would be the same as those for the no-action alternative (see Sect. 4.1). The proposed action would result in increased use of existing facilities and lands at ETTP. Industries locating at ETTP would be required to meet all applicable environmental regulations and requirements. It is estimated that there would be no net increase in direct or indirect jobs. The proposed action would have the positive effect of generating revenue for local governments through the local portion of the sales and use taxes paid by new industries for items purchased or used within the impact area. DOE intends to continue payments in lieu of taxes to local communities, even if the land and buildings are leased to other tenants. Improvements to SR 95 would be required to maintain adequate Level of Service. Workers at ETTP would receive applicable training for the work areas and types of work conducted and would be afforded the same level of safety and health protection found at other industrial parks. This section addresses the impacts of additional activities associated with the proposed action, which include new private sector construction, building modifications, and operation of tenant industries.

4.2.1 Facility Use

Facilities and land on ETTP would be used for industrial, commercial, and business purposes as described in Sect. 2.1 and would be largely consistent with past uses of the site. Since many of the facilities on the site are not being used, and many would be abandoned or demolished under the no-action alternative, the proposed action would result in an increased use of existing facilities and land within ETTP.

4.2.2 Air Quality

4.2.2.1 Construction

Local air quality could be affected by emissions from vehicle and equipment exhaust and fugitive dust from vehicle traffic and disturbance of soils. These emissions would include CO, NO_2, SO_2, inhalable particulate matter (particles less than 10 micrometers in diameter), designated PM-10, and hydrocarbons. Emissions of particulate matter would consist primarily of airborne soil. Emissions from site preparation and construction would be short-term, sporadic, and localized for individual facilities/areas on ETTP (except for minor emissions associated with the personal vehicles of construction workers and vehicles transporting construction materials and equipment to the site). Dispersion would decrease concentrations of pollutants in the ambient air as distance from the site increases. Increments of pollutants due to workers' vehicles and construction vehicles and equipment would not be expected to cause any exceedances of primary or secondary NAAQS (Table 3.2-1).

It is estimated that construction activities on ETTP would employ a maximum of 170 workers at any one time. This estimate was based on the assumption that the maximum number of construction workers on ETTP at any one time would be about twice the sum of the maximum number of workers involved in construction of two surrogate facilities in Oak Ridge, namely the waste and metal treating and recycling facility and the ceramic parts facility (Table 2-1). That is, it was assumed that four facilities could be under construction at ETTP at any one time. It should be emphasized that this is an unlikely situation in view of current plans for ETTP (i.e., that activities would be incremental and existing facilities would be reused), but it is used here as an upper-bound to obtain maximum estimates of air pollution due to construction-worker traffic. To obtain an upper-bound estimate of the increased number of vehicle trips to and from work sites, it was further assumed that none of the workers would be driving anywhere in the area if construction jobs at ETTP were not available, and that workers on the job would each make a round trip to Oak Ridge for lunch. Under these assumptions, 680 (4 × 170) one-way trips would occur each work day. This number is small compared to current traffic in the area (traffic associated with approximately 15,000 jobs at DOE facilities on the ORR, or over 100,000 cars per day passing both ways through Knoxville on Interstate 40–75). Therefore, no appreciable increases in local ambient air concentrations are expected to result from this traffic.

Not all of the area available for construction would be under construction at any one time. Rather, earthwork would likely be undertaken in increments, with the first phase being excavation for utility installation, road construction and upgrading, and grading/contouring. Increases in PM-10 concentrations due to fugitive dust from excavation and earthwork could potentially cause an exceedance of the NAAQS. Particulate emissions from earthwork would probably be noticeable on the site and in the immediate vicinity, and ambient concentrations of particulate matter would likely rise in the short term. Sprinkling with water could mitigate fugitive dust emissions during site development.

Estimates of the largest increments in PM-10 that might result from construction of facilities at ETTP were obtained from an EPA-approved model (ISCST3) for atmospheric dispersion of pollutants (EPA 1995c). The model was run in a screening mode, with worst-case daylight-hour meteorological conditions (D stability, 1 m/s wind speed) for one hour of an 8-hour construction day. Strictly defined worst-case conditions, in which the wind is blowing directly at any particular receptor, do not persist for more than 1-hour (e.g., wind direction varies by at least a few degrees), so worst-case results for one hour were multiplied by 0.7 (EPA 1988) to obtain worst-case estimates for longer periods. It was assumed that heavy construction would proceed for 8 hours a day, 5 days a week including holidays, at precisely the same location for an entire year. Four areas of 2 ha (5 acres) each, within a larger area of 20 ha (50 acres) were assumed to be simultaneously undergoing excavation and earthwork. These areas were taken to be fairly close together so as to minimize initial dispersion, thereby maximizing estimated downwind concentrations. Further, the configuration of these areas was taken such that two of them had their outer boundaries aligned with the site boundary at a location that would tend to maximize PM-10 concentrations at the nearest residence. (For ground-level releases, the nearest residence is the location of most concern; plumes from stacks may pass over that location so that the maximum concentration is farther from the source.) The mitigating effect of sprinkling with water twice per day, reducing emissions by 50% (EPA 1985), was included. As was the case for estimating vehicle numbers, the vigorous earthwork scenario assumed above is likely to be an overestimate in view of current plans for ETTP, but it was used to obtain an upper-bound estimate of PM-10 concentrations resulting from fugitive dust emissions.

The modeling results indicated that the maximum construction-related 1-hour increase in PM-10 concentration at the nearest resident to ETTP, about 1200 m (0.75 mi) from the nearest point of the construction area, would be 161 $\mu g/m^3$. As noted above, the 1-hour maximum was multiplied by 0.7 as per EPA (1988), to obtain a worst-case 8-hour average of 113 $\mu g/m^3$. Because construction is assumed to occur for 8 hours during a 24-hour day, the maximum 24-hour-average increase in PM-10 concentrations due to construction activities was estimated to be one third of the 8-hour average, or 38 $\mu g/m^3$. The nearest official PM-10 monitoring stations in the area are in Knoxville and Rockwood (Roane County). The highest 24-hour average reported from anywhere in Knoxville during 1991–1995 was 88 $\mu g/m^3$. The highest 24-hour average reported in Rockwood during 1992-1995 was 132 $\mu g/m^3$ (monitors in Rockwood were not fully established before 1992). The single anomalous 24-hour average value from Rockwood was not replicated at the other monitors in Rockwood. No other 24-hour average concentration measured during the period 1992–1995 at any monitor in Rockwood (including the one reporting the anomalous value of 132 $\mu g/m^3$) exceeded 81 $\mu g/m^3$. The value of 81 $\mu g/m^3$ is consistent with the highest 24-hour average concentration reported during the same period at any monitor in Knoxville (88 $\mu g/m^3$) or on the ORR (74 $\mu g/m^3$). Values of PM-10 concentration on the ORR are generally less than those in Knoxville, but the ORR monitors are not part of the official EPA monitoring network so they were not used in Table 4.2-1. This makes the analysis more conservative. One exceedance per year of the 24-hour standard is allowed, on average, over a three-year period (40 CFR 50). This allowance negates the effect of temporary and localized anomalies such as the one

Table 4.2-1. Ambient air pollutant concentrations estimated by ISCST3 to result from hypothetical emissions from 10 stacks associated with industries located on ETTP, compared with National Ambient Air Quality Standards (NAAQS)

Pollutant	Averaging time	NAAQS ($\mu g/m^3$)	Modeled increase		Background ($\mu g/m^3$)	Modeled increase plus background	
			($\mu g/m^3$)	as a percentage of NAAQS		($\mu g/m^3$)	as a percentage of NAAQS
SO_2	3-hour	1,300	70	5	484 (493)[a]	554 (563)[a]	43 (43)[a]
	24-hour	365	22	6	243 (247)[a]	265 (269)[a]	73 (74)[a]
	annual	80	4	5	12 (13)[a]	16 (17)[a]	20 (21)[a]
NO_2	annual	100	2	2	26 (27)[a]	28 (29)[a]	28 (29)[a]
PM-10	24-hour	150	3	2	88[b] (92)[a]	91 (95)[a]	61 (63)[a]
	annual	50	1	2	42[c] (43)[a]	43 (44)[a]	86 (88)[a]
CO	1-hour	40,000	180	0.5	13,800 (13,829)[a]	13,980 (14,009)[a]	35 (35)[a]
	8-hour	10,000	68	1	6,210 (6,230)[a]	6,278 (6,298)[a]	63 (63)[a]
Pb	3-month[d]	1.5	0.001	0.1	0.44 (0.44)[a]	0.44 (0.44)[a]	29 (29)[a]

[a]Values in parentheses include a high-bias estimate of the effect of industrialization of Parcel ED-1, near ETTP (DOE 1996a).

[b]The 24-hour value is the second highest recorded in the general vicinity of the ORR during 1992-1994. A temporary, localized, and very unusual value (132 $\mu g/m^3$), recorded in Roane County, was not used, as explained in the text, and the second-highest value, given above, was taken as being more indicative of maximum background values near the ORR.

[c]The highest annual value from any reporting station near the ORR was from Knoxville. These data are available on the EPA Aerometric Information Retrieval System (AIRS) data base. Local data are summarized in annual reports (e.g., Frazier et al. 1995); these local values are typically less than those reported from the Knoxville urban area.

[d]The standard applies to a calendar quarter. Modeling results for Pb were averaged for one month to be conservative.

in Rockwood. When the 38 $\mu g/m^3$ from construction at ETTP is added to the 88 $\mu g/m^3$ Knoxville value, the result is 126 $\mu g/m^3$, which is well below the NAAQS (150 $\mu g/m^3$).

The estimate of the annual average increase in PM-10 concentration due to the construction scenario described above was obtained by multiplying the estimate of the maximum 24-hr average concentration by a coefficient of 0.25. This coefficient is the same as that used in the EA for Parcel ED-1 (DOE 1996a) and is believed to be generally conservative for the area around ETTP. It incorporates the assumption that operations are continuous, 365 days a year, at the same location. Because construction operations would only be expected to occur 5 days a week, the coefficient may be further reduced by a factor of 5/7, to arrive at 0.18. Multiplying the expected 24-hour maximum increase (38 $\mu g/m^3$) by 0.18 gives a value of 7 $\mu g/m^3$ for the annual average. This calculation incorporates the assumptions that no weather-related or other delays occur, and that construction continues on non-weekend holidays, at exactly the same locations, for an entire year.

The highest annual average concentration of PM-10 in Knoxville during 1991–1995 was 42 $\mu g/m^3$, and the highest value in Rockwood during 1992–1995 was 30 $\mu g/m^3$. When the highest (Knoxville) value is added to the maximum annual average estimated to result from construction at ETTP (7 $\mu g/m^3$), the result is 49 $\mu g/m^3$, which is below the corresponding NAAQS of 50 $\mu g/m^3$. Actual values are likely to be even less because background PM-10 values measured at ETTP (Frazier et al. 1995) are less than those reported in Knoxville, and also because of the assumption that heavy construction would occur in exactly the same locations for an entire year. In summary, no violations of the NAAQS are expected to result from normal construction activities at ETTP.

4.2.2.2 Operation

It is estimated that the establishment of new businesses on ETTP would create about 2,500 direct jobs; however, with recent and projected job losses, no net increase in direct jobs is anticipated (see Sect. 2.1.4). Therefore, no increase in automobile traffic to and from the site is expected due to reindustrialization, and no corresponding increase in pollutant emissions from automobile traffic is expected.

Specific details about atmospheric pollutants that may be emitted by industries locating on ETTP are not available. However, it is assumed that industrial facilities would be permitted by the state or federal agencies (e.g., EPA, NRC), and that operating emissions would be limited for all regulated pollutants.

To obtain conservative estimates (estimates biased toward high values) of increases in ambient air concentrations of pollutants that might result from industries located on ETTP, it was assumed that 10 stacks on ETTP would be emitting appreciable amounts of air pollutants as follows. Two sets of clones of four stacks from the waste and metal treating and recycling facility (eighth industry listed in Table 2-1) were assumed to make up 8 stacks, while one more was assumed to be similar to the stack at the ceramic parts facility (Table 2-1), and another stack of unknown dimensions (assumed here to have dimensions very similar to the shorter stacks of the metal treating and recycling facility) would have emissions similar to the nuclear

fuel fabrication facility (Table 2-1). These stacks were assumed to be located fairly close together near the middle of ETTP, around the existing building K-25. This scenario is believed to produce air pollution within the range of possibilities for the reindustrialization of ETTP. To estimate an upper-bound case, in terms of air pollution, that might evolve at a reindustrialized ETTP Site, results of modeling the above conditions may arbitrarily be multiplied by 3.

The EPA-approved ISCST3 model was used along with one year (1995) of hourly meteorological data from 10 meters above ground on Tower 1209 on ETTP. A year of continuous hourly data is preferred for analyzing continuous operations at a completely reindustrialized site, in contrast to construction operations for example, where an area near one corner of the site may be developed during one year and another area in the opposite corner of the site may be developed during another year. The construction analysis has to be more generic and cover more possibilities to be likely to approximate a worst-case spatial configuration of pollution source and nearest resident. This is often best accomplished by making several runs of a fast-turnaround screening model, involving construction scenarios in different configurations with respect to the nearest resident.

For the analysis of continuous operations at a reindustrialized ETTP Site, involving the stack configuration discussed above and hourly meteorological data for 1995, pollutant concentrations were estimated at several points (receptors) near ETTP, including some points around the nearest residences. Unlike the ground level releases associated with construction activities, plumes from several stacks, each containing its own combination of pollutants, will intersect the ground at different places, so that the maximum concentration of any pollutant may occur at a greater distance from the plant than the location of the nearest residence.

The highest concentration of each pollutant, for each applicable averaging period, at any receptor, is given in Table 4.2-1. This table also lists the highest background value of each pollutant, for each applicable averaging period, reported at the EPA monitoring stations nearest ETTP during the five-year period 1991–1995.

It is seen from Table 4.2-1 that the scenario considered above would not be expected to cause ambient-air concentrations of SO_2, NO_2, CO, PM-10, or Pb to exceed NAAQS. Highest projected percentages of the NAAQS occur for pollutants and averaging periods where existing background values are already a large percentage of the corresponding standard. For example, projected annual-average PM-10 concentrations are high (88% of the standard), but this projection is due mainly to a high existing background value (86% of the standard) rather than to expected increases from reindustrialization of ETTP (2% of the standard). The highest expected increase in terms of percentage of the corresponding NAAQS would involve the 24-hour average SO_2 concentration (an increase of about 6% of the standard).

The metal treating and recycling facility Table 2-1) has a metal melting furnace with an associated stack, and an incinerator furnace that also emits some Pb. The maximum 1-month average ambient-air concentration of Pb predicted by modeling to result from 2 metal melt stacks and 2 incinerator stacks located on ETTP was 0.001 $\mu g/m^3$. This 1-month average was used as a high-bias estimate of a 3-month average for

comparison with the NAAQS, and it is less than 0.1% of the NAAQS. In the past, Pb in the atmosphere was largely due to the use of leaded gasoline in internal combustion engines. Lead concentrations in the atmosphere have declined markedly in recent years, largely due to the increased use of unleaded gasoline. The highest background Pb concentration recorded at any operative station within 50 km (80 mi) of ETTP in the last five years was 0.44 $\mu g/m^3$ at Rockwood, in Roane County, near the Horsehead metal recycling facility. This concentration is less than 30% of the NAAQS.

Ozone is formed from complex photochemical reactions involving organic compounds and nitrogen oxides. Because these reactions may take hours to complete, ozone formation continues to occur as the wind transports the contributing pollutants away from their sources. Ozone formation is therefore modeled at the regional level, using complex computer programs that simulate the chemical transformations involved. However, a rough approximation to the potential contribution of facilities at the ETTP to regional ozone concentrations can be obtained by comparing the amounts of volatile organic compounds (VOCs) and NO_2 emitted by the hypothetical facilities considered above with the total amounts of the same substances emitted over a larger area. In the six counties surrounding the ETTP (Anderson, Blount, Knox, Loudon, Morgan, and Roane Counties) there were about 33,400 Mg (37,000 tons) of VOCs and about 88,000 Mg (97,000 tons) of NO_2 emitted during 1995 (Ron Redus, Tennessee Division of Air Pollution Control, personal communication with T. J. Blasing, ORNL, July 30, 1996; William Schaad, Knox County Air Pollution Control Office, personal communication with T. J. Blasing, ORNL, July 30, 1996). The hypothetical facilities considered above would emit about 100 Mg (110 tons) of VOCs, or about 0.3% of the six-county total, and about 80 Mg (88 tons) per year of NO_2, or about 0.1% of the six-county total. Based on these numbers alone, and assuming that the ozone increases are proportional to the highest of the two possible increases above, regional ozone levels would be expected to increase by 0.3%, or by less than 1 $\mu g/m^3$. As noted in Sect. 3.2.2, the appropriate Federal Land Manager of a Class I PSD area (in this case, the National Park Service) should be notified of any facility planned for construction within 100 km (62 miles) of the Class I area (Great Smoky Mountain National Park) if the facility has the potential to emit more than 91 Mg/year (100 tons/year) of any regulated pollutant. In general, the permitting process would be expected to keep VOCs and NO_2 emissions from any facilities locating on the ETTP low enough to protect public health and welfare from appreciable degradation of air quality.

New NAAQS for ozone and particulate matter became effective September 16, 1997 (62 FR 38652, Friday, July 18, 1997). These standards are based on 3-year averages; therefore their effects cannot be fully evaluated until at least year 2000. However, the new 8-hour ozone standard is expected to be effectively more stringent than the current 1-hour standard that is being phased out. The new standard could result in many counties in eastern Tennessee being declared in nonattainment of the NAAQS for ozone, so that emissions of volatile organic compounds and oxides of nitrogen (which combine chemically in the presence of sunlight to form ozone) might have to be further limited. The effect of the new standards for fine particulate matter (less than 2.5 μm in diameter) cannot be determined until at least the year 2001, when sufficient monitoring data may be available. However, recent monitoring in Knoxville has indicated that maximum 24-hour averages of

PM-10 are close to the new standard for PM-2.5, and the new standard is based on a 98th percentile value over 3 years rather than on a maximum value. Therefore, it is possible to make the optimally conservative assumption that all PM-10 is PM-2.5, and to conclude that operation of the hypothetical facilities considered in this analysis would not be expected to lead to any exceedances of the new 24-hour standards for PM-10 or PM-2.5. However, the new annual average standard for PM-2.5 is about 1/3 of the monitored annual-average PM-10 values, and one would have to assume that about 1/3 of PM-10 is PM-2.5 to conclude that the proposed action would not be expected to lead to any exceedances of the new standard for annual averages of PM-2.5.

In summary, any future exceedances of NAAQS are much more likely to be caused by verification of exceedances of the new standard, with or without the proposed action, than by the proposed action itself. Emissions of chemicals that combine to form ozone are expected to be small enough that ozone concentration in the area would not increase by more than about 0.3%. Increases in 24-hour average particle concentrations are not expected to be sufficient to cause exceedances of the new standards, and increases in annually averaged PM-2.5 concentrations are expected to be less than 1 $\mu g/m^3$.

In considering cumulative impacts of pollutants regulated by the NAAQS, potential effects of the industrialization of Parcel ED-1, located about 1 km (0.6 mi) northeast of ETTP, were also included as part of the background concentrations. Maximum concentrations expected to result from industries located on Parcel ED-1 were obtained from the corresponding EA (DOE 1996a). Industries considered for Parcel ED-1 were some of the same industries included in Table 2-1. However, the industrial development of Parcel ED-1 was expected to be much less than that of ETTP. Maximum modeled concentrations resulting from industries located on Parcel ED-1 were added to the monitored background concentrations to obtain revised estimates of the background concentrations. These revised background estimates were then added to the modeled increases in pollutant concentrations resulting from the proposed action (reindustrialization of ETTP) in Table 4.2-1, and the sums were expressed as percentages of the NAAQS. The addition process incorporates the assumption that the maximum pollutant concentrations from a reindustrialized ETTP would occur at the same place as the maximum pollutant concentrations from industries that could locate on Parcel ED-1, which adds a high bias to the results. Existing background concentrations and expected concentrations of pollutants after the reindustrialization of ETTP are shown in the last three columns of Table 4.2-1. Numbers in parentheses incorporate effects of industries that might locate on Parcel ED-1; other numbers in those columns do not incorporate such effects. It can be seen from Table 4.2-1 that the combined effects of industries that are likely to locate on Parcel ED-1 are of little consequence.

Some industries that process fluorine might locate at ETTP. While it is not possible to estimate emissions of fluorine (as hydrofluoric acid, HF), a vent stack 5 m (about 16 feet) above ground level could continuously emit about 0.05 grams per second (about 0.4 lb/hour) without violating the Tennessee standards near the ETTP boundary.

4.2.2.3. Prevention of Significant Deterioration

Standards for PSD exist for SO_2, NO_2, and PM-10. These standards are summarized in Table 4.2-2. One set of allowable increments exists for Class II PSD areas, which cover most of the United States and include the ORR and surrounding area. More stringent increments apply to Class I PSD areas (described in Sect. 3.2.2.1). The nearest Class I area is the Great Smoky Mountains National Park, located about 55 km (35 mi) southeast of the ORR.

Allowable PSD increments (described in Sect. 3.2.2.1) may be used up (consumed) by sources associated with a proposed action in conjunction with certain other sources in the surrounding area that began operating after a specified baseline date. Definitions of the area to be included, sources within that area to be considered, and the applicable baseline date are given in a somewhat complex way in 40 CFR 51.166(b)(13-15). Estimation of cumulative PSD increment consumption is a complicated process, requiring knowledge of other sources in the area, including sources that begin operating shortly before a proposed action. It is therefore not possible to perform a detailed analysis for the proposed reindustrialization of ETTP at this time. However, it should be kept in mind that total consumption of PSD increments may include effects of other sources combined with the effects of a proposed action. Calculations for this analysis include only the effects of the proposed action; *therefore the total increment consumption may be larger than the values obtained.* For reasons explained below, this is especially true for the Class I PSD increment consumption at the Great Smoky Mountain National Park.

Modeled pollutant increments from only those sources that might locate at ETTP, *at the location where those increments are greatest*, are compared to allowable PSD increments in Table 4.2-2. Estimated NO_2 and PM-10 increments are 10% or less of the corresponding allowable Class II totals, and are 1% or less of the corresponding allowable Class I totals at the Great Smoky Mountain National Park. The 24-hour increment for SO_2 at the point of maximum concentration increase was estimated to be 24% of the total allowable Class II PSD increment. All other percentages were less. If the concentrations in Table 4.2-2 are multiplied by 3 to estimate concentration increments that would result from much heavier industrialization than planned, then an estimated 72% of the allowable 24-hour Class II increment for SO_2 would be consumed. Other sources in the area that could contribute to cumulative Class II PSD SO_2 increments are located such that their plumes are unlikely to substantially intersect a plume from ETTP moving north or northwest, on its way to those receptor(s) where its contribution to SO_2 concentration is highest (i.e., to where the percentages for Class II increments in Table 4.2-2 apply). Therefore, the cumulative effect of all PSD sources (as defined in 40 CFR 51.166) is still considered unlikely to exceed the total allowable 24-hour Class II PSD increment for SO_2, even if SO_2 concentrations from ETTP are 3 times the amounts for the likely case presented in Table 4.2-2.

Table 4.2-2. Estimates of ambient air pollutant concentrations expected to result from hypothetical emissions of industries located at ETTP, compared with standards for the Prevention of Significant Deterioration (PSD)

Pollutant	Averaging time	Allowable PSD Increment ($\mu g/m^3$)		Modeled increase			
				at Class I area ($\mu g/m^3$)	near site boundary ($\mu g/m^3$)	as a percentage of allowable increments for PSD	
		Class I	Class II			Class I[a]	Class II[a]
SO_2	3-hour	25	512	2.9	70	12	14
	24-hour	5	91	0.4	22	8	24
	annual	2	20	0.02	4	1	20
NO_2	annual	2.5	25	0.01	2	<1	8
PM-10	24-hour	8	30	0.07	3	1	10
	annual	4	17	<0.01	1	<0.3	6

[a]The ETTP is in a Class II PSD area; the nearest Class I area is the Great Smoky Mountains National Park.

Before discussing the results for Class I increments relevant to the Great Smoky Mountain National Park, it is noted that the park is 55 km (35 mi) from ETTP, and the use of the ISCST3 model beyond 50 km (31 mi) is not recommended (EPA 1995c). Further, some professional modelers would contend that the 50 km (31 mi) guideline may be too great. Therefore, concentrations modeled at 55 km (35 mi) were compared to concentrations modeled as if the Great Smoky Mountain National Park were 40 km (25 mi) distant. The results for 55 km (35 mi) are given in the Table 4.2-2 because 55 km (35 mi) is closer to the actual distance to the park and, in view of the results for 40 km (25 mi), the estimates for 55 km (35 mi) are believed to be reasonable estimates of pollutant increases at the nearest park boundary. Model results for Class I PSD increments at 40 km (25 mi) can be reasonably approximated by multiplying the corresponding results in Table 4.2-2 [for 55 km (35 mi)] by 1.5, except for the 3-hour SO_2 average where 1.2 is more accurate.

Results for both distances indicated that the highest percentage of an allowable Class I PSD increment pertained to the 3-hour SO_2 concentration. Results for 55 km (35 mi) indicated that 12% of the allowable 3-hour Class I PSD increment for SO_2 would be consumed by the hypothetical, likely case, emissions scenario used as input to the modeling for this report. The corresponding upper-bound percentage (3 times the likely case) would be 36% of the allowable Class I increment. The 3-hour SO_2 concentration estimated to occur 40 km (25 mi) from ETTP (3.5 $\mu g/m^3$) was 14% of the allowable increment, and the corresponding upper-bound percentage is 42%. As noted previously, percentages for 24-hour and annual averages for SO_2 are less than those for the 3-hour averaging period discussed above, and results for NO_2 and PM-10 were unremarkable.

At distances as far as the Great Smoky Mountain National Park, pollutant plumes originating at ETTP are likely to have intersected other pollutant plumes from several widely distributed sources. Therefore, the fractional contribution of ETTP-related increments to total PSD increments at the Great Smoky Mountain National Park will tend to be less than it would near ETTP, where plumes from ETTP have less opportunity to intersect other plumes. In other words, the multiplying factor to convert an estimated pollutant increment from ETTP sources alone to an estimated cumulative increment from all relevant PSD sources is likely to be higher at the Great Smoky Mountain National Park than at locations much closer to ETTP. Therefore, even though the pollutant increments estimated to result from proposed sources at ETTP are a lower percentage of relevant Class I limits (at the Great Smoky Mountain National Park) than of the relevant Class II limits (at locations near ETTP), Class I increments may be more limiting than Class II increments are to the proposed reindustrialization.

If SO_2 emissions from sources in and around ETTP are kept low, then the proposed reindustrialization of ETTP according to current plans is not expected to cause any exceedances of allowable PSD increments. The scenario used in the modeling above would consume an estimated 12% to 14% of the 3-hour Class I PSD increment for SO_2 at the Great Smoky Mountain National Park. Corresponding percentages of other PSD limits are lower. Emissions of SO_2 from industries that would locate on ETTP could be kept lower than those used to arrive at the results presented in Tables 4.2-1 and 4.2-2. Reasonable restrictions of SO_2 emissions are considered unlikely to interfere with the proposed reindustrialization along

the general lines of current planning. In the unlikely event that several large SO_2 sources begin operation in the general area around ETTP sometime between now and the beginning of the proposed reindustrialization, then air-quality regulations involving SO_2 could be more limiting.

It is possible that a facility dealing with radionuclides might be permitted on ETTP. It is considered unlikely that sources leading to doses higher than the highest current (1994) dose attributable to any facility on the ORR (i.e., to the Y-12 plant) would be permitted at ETTP in the future. Maximum 1994 radiation dose from Y-12 gaseous effluents was estimated to be 0.017 mSv (1.7 mrem) (Frazier et al. 1995), which is 17% of the NESHAP standard given in 40 CFR 61.92. The hypothetical individual receiving this dose was located about 1.1 km (0.7 mi) north-northeast of Y-12. In the extremely unlikely case that the maximum dose from Y-12 and the maximum dose from ETTP would occur at the same location (and assuming the maximum dose from ETTP would be the same as the estimated maximum 1994 dose from Y-12), then the maximum doses from each plant could be added so that the total estimated dose to an individual at the location of maximum exposure would be 34% of the NESHAP standard. In more credible situations, where the maximum doses from Y-12 and from ETTP would occur to individuals at different locations, the maximum dose to any individual would be substantially less. For additional analysis of radiological doses, the reader is referred to Sect. 4.2.9.

4.2.2.4 General Summary

The proposed reindustrialization of ETTP along current general lines of planning is not expected to lead to any violations of air-quality regulations. Air-quality regulations most likely to be limiting to the proposed reindustrialization involve allowable PSD increments for SO_2. Reasonable attention to estimated SO_2 emissions from industries proposing to locate on ETTP should preclude any problems involving potential degradation of air quality at the Great Smoky Mountain National Park. Local air quality is not expected to be seriously affected by air emissions from the kinds of proposed industrial facilities,and discussed in this EA.

4.2.3 Water Resources

4.2.3.1 Surface water

Construction. Earthmoving activities have the potential to increase sediment transport and deposition in streams. Eroded materials have the potential to degrade water quality by increasing turbidity and sedimentation. Streams can be protected from siltation by Best Management Practices, including (1) avoiding construction near streams, (2) using siltation fences, (3) providing at least 30 m of natural vegetation recharge zone buffers with a wider buffer in steeper surroundings, and (4) revegetating bare soil

with native plants. These impacts may be mitigated with approved erosion and sedimentation control plans (ESCP) and SPCC plans.

Stormwater runoff from construction roads and cleared areas, contaminants leached from construction materials (e.g., concrete), and spoils and spills of construction liquids (e.g., oils and diesel fuels) are likely to degrade surface water quality. Facilities would be expected to obtain stormwater runoff permits from the state that may impose limitations of chemical constituents in stormwater runoff discharge. Siting of detention basins and other stormwater control structures should be done so as to avoid contaminated runoff to surface water.

Operation. The ETTP adjacent to Poplar Creek is prone to flooding from backwaters of the Clinch River (see Fig. 3.4-2), but impacts on surface water from construction of new facilities at the site would be incremental to the existing impacts from the presently developed site. Additional runoff from the new facilities would have virtually no effect on backwaters of the Clinch River.

Routine industrial operations typically generate sanitary wastes and industrial effluents. Untreated effluents could increase stream turbidity and organic content and decrease dissolved oxygen concentrations downstream. Industrial facilities would be required by state permits (i.e., NPDES permits) to incorporate design features to minimize contaminants in effluent discharges to surface waters. New industries that locate on ETTP may choose or be required to obtain their own NPDES permits. Tertiary treatment of domestic and industrial wastewater would remove excessive inorganic nutrients (nitrates and phosphates), chlorine, and organic matter; effluents could be discharged into Poplar Creek or the Clinch River in accordance with state permit limitations. Given the degraded condition of the EFPC and its Bear Creek tributary from operations at the Y-12 Plant, urban and agricultural runoff, and treatment plant effluents, further industrial discharges into Poplar Creek may be difficult to permit.

4.2.3.2 Groundwater

Industrial development characterizes most of ETTP. Renovation of buildings, roads and parking lots would more likely affect surface water than groundwater through storm water runoff as described in Sect. 4.2.3.1.

Future sewer or process line failures may affect shallow groundwater along the soil-bedrock interface. Sewer line renovations (which are currently underway) are expected to reduce the potential for failures at least in the short term. Contaminants related to sewer line failures would bypass sewage treatment facilities and emerge in Poplar Creek or Clinch River as groundwater discharges to those two water bodies.

Radioactive waste disposal sites are expected to be left in-place during reindustrialization of ETTP. Eventual exhumation of waste at these sites could have a positive impact on local groundwater; however, strict erosion and sedimentation control plans would be required to prevent contamination of soils and surface water as described in Sect. 4.2.3.1. Lined retention basins would capture storm water runoff and reduce contamination of both surface water and groundwater bodies.

Prior to 1995–96, groundwater monitoring was sporadic and localized (site-specific). Detailed sitewide evaluations of groundwater flow and quality were completed in 1996 and reported in the *Groundwater Remedial Site Evaluation Report for the Oak Ridge K-25 Site* (DOE 1996e). Since that time, groundwater sampling has been limited to compliance-related monitoring, specifically associated with post-closure monitoring for the K-1407B and C ponds. Required post-closure monitoring is limited to wells UNW-3 and UNW-9.

However, in 1997 DOE initiated the Integrated Groundwater Quality Program, under which selected wells, springs, storm drains, surface water, and building sumps have been identified for long-term monitoring using a watershed approach. Locations included in this program include exit pathway monitoring points, key site-interior locations, principal watershed integration points, the aforementioned compliance monitoring wells, and selected offsite residential wells. Monitoring is described in the *Integrated Water Quality Program Plan*, ES/ER/TM-205 (DOE 1997b).

4.2.3.3 Wastewater

Surrogate industries were selected as representative of the types of enterprises that would be likely to locate at ETTP (see Sect. 2.1). Of the surrogates, three industries have no industrial liquid effluents. Further, the industrial laundry facility discharges to the city sewer, but no permit is required for its liquid effluents. The waste and metal treating and recycling industry also has no industrial liquid effluents, since its 20 m^3/d (5000 gpd) of industrial wastewater is used for temperature control in their waste incinerator. The company treats brines (from stack scrubbers) on site by evaporation to eliminate liquid effluent, resulting in solid salts (personal communication from Les Cole, SEG, to John Tauxe, ORNL, January 2, 1996).

Domestic wastewater. The production of domestic wastewater is primarily a function of the number of employees working at a facility, plus any additional nonindustrial discharges. The waste and metal treating and recycling facility, which is located in Oak Ridge, estimates its contribution to the city of Oak Ridge's wastewater treatment plant at 11 m^3/d (3000 gpd), resulting from sanitary facilities for 700 employees and some non-contact cooling water, but anticipates that future operations may push its permitted limit of 26 m^3/d (7000 gpd) (personal communication from Les Cole, SEG, to John Tauxe, ORNL, January 2, 1996). The metals decontamination company's maximum work force exceeds 150 employees, which is small in comparison to the waste and metal treating and recycling facility's work force. It is assumed that the former company's sanitary wastewater discharge is correspondingly small. The manufacturer of ceramic parts estimates its domestic wastewater discharge at 9.0 m^3/d (2400 gpd) (personal communication from Chris Nelson, CTCC, to John Tauxe, ORNL, January 2, 1996). If the nuclear fuel fabrication facility were to locate on ETTP, there would probably be enough reserve wastewater treatment capacity to accommodate the increased demand for both domestic and industrial wastewater treatment. If the company remained on site for only one year, the combined increased demand for domestic and industrial wastewater treatment would be roughly equal to existing reserve capacity (300,000 gpd). Ten years of operations (a more likely scenario)

would lower the annual increased demand for wastewater treatment by an order of magnitude. If similar facilities were to locate at ETTP, their domestic wastewaters could easily be handled by the ETTP STP, or the tenants could permit, construct, and operate a new facility.

Industrial wastewater. Only the three remaining industries of the selected surrogates produce industrial liquid waste effluents. One (the ceramic parts manufacturer) is classified as an Industrial User by the city of Oak Ridge, defined as "A source of indirect discharge which does not constitute a 'discharge of pollutants' under regulation issued pursuant to Section 402 of the [Federal Water Pollution Control] Act" (City of Oak Ridge, 1991). This company contributes about 11 m^3/d (3000 gpd) under its Waste Water Discharge Permit, which specifies particular compliance limits for total suspended solids, oil and grease, discolored materials, and aluminum metal (personal communication from Chris Nelson, CTCC, to John Tauxe, ORNL, January 2, 1996). The metals decontamination company also has an industrial wastewater permit from the city of Oak Ridge with monthly concentration limits for selected metals, cyanide, and organics. If similar facilities were to locate at ETTP, their wastes could be handled by the CNF at ETTP. The nuclear fuel fabrication facility's industrial wastewater is potentially large compared to that of other relocated private industries. Two-thirds of their wastewater may require treatment as industrial waste. If this company remained on-site only one year (a very unlikely scenario), the existing reserve volumetric capacity would be exceeded by nearly a factor of four (200 m^3/d reserve vs 760 m^3/d additional load, based on projections for FY 1998 discussed in Sect. 3.4.3). Ten years of operations (a more likely scenario) would reduce additional treatment requirements to 80 m^3/d (roughly half of current reserve capacity). Use of the CNF by private firms, however, would require a modification to the existing NPDES Permit, and is likely to require modification of VOC limits in the air permit (Mo Beeler, ETTP, personal communication to John Tauxe, ORNL, August 22, 1997). Alternatively, a tenant could permit, construct, and operate a new facility.

Historically, the former K-25 Site operated under a single site-wide NPDES permit. In anticipation of the reindustrialization effort, a permit modification is being sought to cover legacy contamination problems. Under this modification, the STP and the CNF would be operated under new, separate permits. Industries planning to locate at ETTP could either negotiate to be covered under the STP and CNF permits or negotiate for separate NPDES permits with the TDEC Industrial Facilities Section in accordance with State of Tennessee Rules, Chapter 1200-4-1 through 1200-4-11 for surface water pollution control (Larry Bunning, TDEC Industrial Facilities Section, personal communication with John Tauxe, ORNL, September 23, 1997).

Production of industrial wastewater is strongly process-specific, but with proper containment and treatment techniques employed on site (as done by the waste and metal treating and recycling company and the metals decontamination company, and as would be expected under state and local regulatory oversight) and off site (as done by the ceramic parts manufacturer), the impact to the environment would be minimal.

4.2.4 Ecological Resources

4.2.4.1 Terrestrial

Construction. Overall, construction should not have major negative impacts on terrestrial ecosystems. Under the proposed action new facilities might be built on ETTP or on the three parcels outside the security fence. The number and location of such facilities are not currently known. However, since ETTP has been an area of heavy industrial development for the past 50 years, it lacks most native vegetation and provides only minimal habitat for wildlife except along the floodplains. Some natural habitat and some areas planted in pines are found on the three parcels outside the ETTP fence which could be cleared for construction. The most natural sections of those parcels are on slopes steeper than 15% which are considered to be unsuitable for development. The proposed action could result in the development of up to 92.5 ha (231 acres) of land and could isolate the undevelopable 47.5 ha (117 acres) of the three parcels from other areas of the ORR with more natural habitats. Natural corridors between the areas on ETTP that are unsuitable for development and other natural areas of the ORR could allow for dispersal of wildlife populations which might reduce these impacts (Mann and Plummer 1995). Construction outside the security fence if it involved clearing currently forested land would likely increase the amount of landscaped areas planted in grass. This change would increase the area suitable for Canada geese which are considered by some to be a nuisance species (J. Warren Webb, ORNL, personal communication with M. S. Salk, August 22, 1997). Revegetation with native species of grasses, forbs, and other plants would reduce the area suitable for Canada geese and thus increase the habitat for native birds and mammals.

Natural habitat that occurs in the ETTP Area of Responsibility around the area of the proposed action would be left as a buffer zone between the developed areas and other undeveloped portions of the ORR. Since standard erosion and sedimentation controls would be employed during construction, building new facilities within the proposed action area would have limited negative impacts on terrestrial habitats within the ETTP Area of Responsibility. Areas disturbed during construction but not needed for the facilities should be revegetated after construction is completed with native species as much as possible, following E.O. 11987, "Exotic Organisms" and DOE 5400.1/AI-1 which restrict the introduction of exotic species into natural ecosystems on federally owned land, and recommendation of the TDEC (see consultation letter, September 21, 1996, Appendix D). While most of ETTP consists of pavement, rubble, grasses, and buildings, a small amount of natural habitat does occur, primarily along Poplar Creek. The use of native species for revegetation of currently disturbed areas would have a positive impact as it could enhance regional biotic and ecosystem diversity.

Osprey currently nest on one building at ETTP. If new buildings were to be erected near the nest site, TWRA would be consulted to determine necessary restrictions on the construction, operation, and maintenance schedule to prevent impacts to the birds.

Only one natural area is found within the area of the proposed action. It is a heron rookery located in the floodplain of Poplar Creek in the middle of ETTP. Compliance with floodplain/wetland regulations should ensure that any potential negative impacts to it from construction and operation of new or modified facilities are mitigated. Three other environmentally sensitive areas, the Duct Island Road Bluffs, the ETTP Beaver Pond Complex, and the Upper Mitchell Branch aquatic reference area, are located near, but not within, the parcels outside the fenced area. Best management practices (e.g., erosion controls) (see also section 4.2.3.1) would mitigate any potential impacts to those areas from construction. Other natural areas occur in the ETTP Area of Responsibility. As long as the remainder of the ETTP Area of Responsibility is left, as currently planned, as a buffer around the area of the proposed action the proposed action would not have negative impacts on these natural areas due to construction.

Operation. It is assumed that operating permits for facilities located at or near ETTP would limit their emissions, effluents, and wastes to permitted levels. Light industrial facilities include buildings with associated lawns and other landscaped characteristics. Heavy industrial development generally results in complete clearing, paving or graveling, and fencing as is currently the case on most of ETTP. Furthermore, heavy industry could entail emissions of pollutants to air and water that would be within permitted levels. Industrial operations could also result in spills or other accidents involving releases of contaminants. Pollutant emissions from increased vehicular traffic could degrade wildlife habitat off-site in the ETTP Area of Responsibility. However, pollutants from traffic and industrial operations are likely to be within environmentally acceptable levels based on the analyses in the two preceding sections on air and water.

The continued and expanded presence of industrial facilities would result in the upkeep and possible expansion of lawns and other ornamental vegetation. It would favor the continued predominance of those native wildlife species that adapt most readily to human presence (e.g., deer, skunk, raccoon, rabbit, woodchuck, beaver, opossum, starling, resident Canada goose). Some or all of these species would continue to pose nuisance problems on developed areas.

In the absence of details about potential leases, it is not possible to predict such effects more specifically or to quantify them. However, it is likely that the additional impacts of operation of similar or new industrial facilities on or near ETTP would be minimal.

4.2.4.2 Aquatic

Aquatic biota can be adversely impacted by (1) physical and chemical changes in water quality as a result of construction runoff and spills as well as effluent discharges from industrial operations and (2) habitat alteration or degradation.

Fugitive particulates released during construction and operation could be dispersed and deposited in nearby aquatic habitats. To encourage rainfall to percolate to groundwater and to discourage runoff and, thus, decrease sediment loading to surface waters, appropriately sized buffer zones would be continued or established along streams. Construction would not occur in any floodplain unless permits were obtained,

floodplain/wetland environmental review requirements were satisified, and appropriate mitigation measures were employed (TDEC 1992a, 1992b, 1994). If construction in the watershed caused a significant change in the vegetation to concrete ratio, there could be a change in the rate of water discharge. However, since it is anticipated that most construction would be in areas already developed, major habitat alteration would not be expected in any aquatic ecosystems. Only in the parcels outside the fence would there be possible habitat alteration from a change in the rate of water discharge. Buffer areas left in place near streams would reduce the likelihood of major habitat alteration or other negative impacts.

Treated waters from industries would be discharged to surface water only in accordance with limitations established under state and/or other regulatory permits. If permit limits are consistently met, degradation of aquatic habitat would not be expected. To minimize impacts from thermal alterations, waste cooling water, if any, from industrial facilities would be cooled, as necessary, to comply with established water quality criteria before being discharged into streams.

4.2.4.3 Wetlands/Floodplains

A number of wetlands have been identified within ETTP and the ETTP Area of Responsibility (see Sect. 3.5.4). The standard practice for DOE activities on the ORR is to avoid construction in wetlands and/or to minimize or mitigate possible damage to nearby wetlands. For example, DOE received a Notice of Violation in late 1995 for disturbing a wetland near Parcel 4 during forestry clearing. As mitigation for that unpermitted wetland alteration, a wetland restoration plan was developed and implemented (D. A. Draper, Environmental Compliance, ETTP, personal communication with M. S. Salk, ORNL, August 21, 1997), and the first year of restoration surveying has been completed and reported (ETTP 1997). Similar constraints would be applied to industrial leases at ETTP. To prevent the loss of wetlands on the site, wetland boundaries would be precisely determined prior to construction and avoided as much as possible. Construction activities on upland sites would employ appropriate mitigation measures to prevent the transport of eroded soil into wetland areas (TDEC 1992a, 1992b, 1994). Review as required by DOE or other agency (e.g., Army Corps of Engineers) regulations for evaluating impacts on floodplains and wetlands would be completed at a later date, if any actions would occur in or might impact the floodplain or wetlands.

4.2.5 Socioeconomics and Environmental Justice

This section describes the socioeconomic impacts that could result from the reuse of ETTP for commercial and industrial purposes. We assume that new development at ETTP would be mixed, consisting of commercial and office space, research and development, and industry—both heavy and light. Any hazardous waste management activities would have to be permitted by the state to treat and store waste products. There are no plans for permanent disposal of wastes from off-site.

For this analysis, we assume that approximately 2,500 new jobs would be created at the site by 2010 (see Sect. 2.1.4). There is substantial uncertainty associated with this projection because it assumes that efforts to recruit new businesses would be successful, despite significant competition from other available commercial and industrial sites in the same area. Using an employment multiplier developed by ORNL scientists studying economic impacts in the Oak Ridge area (Vogt and Das 1996), we calculate that 2,500 new "direct" jobs would support another 3,300 "indirect" jobs. These indirect jobs would be required—at the rate of 1.3 per direct job—to provide the goods and services demanded by the new commercial/industrial workers and the enterprises that employ them.

The effects of 2,500 new direct jobs on the impact area would be countered by the job losses that have occurred in recent years and are expected to continue in the future. During FY 1993 and FY 1994, approximately 1,700 workers were displaced due to downsizing at DOE's Oak Ridge facilities. It is projected that about another 900 jobs will be lost during the FY 1995–FY 1996 time period (final number not yet official), making for a total decline of 2,600 jobs during the four-year period beginning in 1993 (DOE 1996a). The number of new direct jobs projected for ETTP almost equals the number of ORR jobs lost from 1993 to 1996. Up to another 1,680 ORR job losses are also expected for FY 1997. Between now and 2010, for the purposes of the analyses in this EA it is estimated that roughly 1,800 more jobs could be eliminated at ETTP alone (W. A. Truex, DOE, Human Resources, personal communication with L. W. Clark, DOE 2010 Task Team, October 1996). These recent and projected job losses mean that the 2,500 new jobs created by reuse of ETTP would result in no net increase in direct employment in the impact area. Accordingly, there is not likely to be any expansion in the number of *indirect* jobs, since the new direct employment at ETTP would support existing indirect jobs that would otherwise be lost due to the downsizing of the Oak Ridge work force.

4.2.5.1 Population

General Information. Because of the magnitude of the recent and projected job losses discussed above, there is likely to be a substantial local pool of available workers to fill the new jobs created by reuse of ETTP. Accordingly, we expect almost all of the direct jobs created as a result of the proposed action, and the indirect jobs supported by this direct employment, to be filled by current residents of the impact area. Therefore, worker in-migration and population growth resulting from the proposed action would be insignificant.

Minority and Economically Disadvantaged Populations. The location of Oak Ridge census tracts in relation to ETTP is shown in Fig. 3.6-2. Census tract 301, which is closest to ETTP, has a lower proportion of non-white residents (5%) than any other Oak Ridge census tract. Tract 301 also has the second lowest percentage of families living below the poverty level (1.1%). After census tract 301, the next closest tracts to ETTP are 206 and 201. In census tract 206, blacks and other non-white residents account for 5.8% and 3.6% of the population, respectively, and none of the families in that census tract are classified as living

below the poverty level. In contrast, 34.4% of the residents of census tract 201 are black, another 7.1% are classified as "other non-white," and 20.9% of the families live below the poverty line. Based on this information, which shows a broad range in the demographic characteristics of the census tracts nearest ETTP, we conclude that the proposed project would not have disproportionate impacts to low-income and minority populations.

4.2.5.2 Employment and income

As discussed above, this analysis assumes that the reuse of ETTP would create approximately 2,500 direct jobs by 2010, which in turn would support another 3,300 indirect jobs. No net increase in jobs is expected, however, because of recent and projected job losses in the area. The new direct jobs created at ETTP could provide employment and income for many of the workers displaced due to DOE downsizing at the Oak Ridge facilities. The indirect jobs supported by reuse of ETTP could provide continuing employment for many existing indirect workers in the impact area.

4.2.5.3 Housing

As explained in Sect. 4.2.5.1, little if any worker in-migration is expected as a result of the proposed action. Accordingly, any increase in the demand for housing in the impact area would be insignificant and could be accommodated by existing vacant units in the impact area, which numbered over 15,000 in 1990 (UT 1994).

4.2.5.4 Public services and local government expenditures

Because any worker in-migration that would accompany the reuse of ETTP is expected to be small, any increases in the demand for public services in the surrounding communities—education, water and sewer services, electricity, and police and fire protection—would likewise be small. At ETTP itself, water and sewer services for new tenants would initially be provided by existing on-site utilities, which currently have excess capacity available, so local government expenditures for this purpose would not be required. Fire protection and emergency response capabilities also are adequate to handle an influx of new tenants (Frounfelker 1997). DOE is currently in the process of negotiating a lease with CROET for CROET's contractors to provide services to ETTP in the near term; under this arrangement, DOE and other tenants would buy services from CROET, and the fees paid for these services would contribute to a capital improvement fund to upgrade on-site services (Meredith 1997).

Starting in Fall 1997, tenants at ETTP will buy electricity from the city of Oak Ridge's electric utility. In roughly another five years, the city might choose to assume ownership of the ETTP water and sewage treatment systems and would then sell these services to DOE and all other ETTP tenants. Operation

and maintenance of these facilities would require some local government expenditures, but would also result in additional revenues from user fees. A city acquisition of ETTP water and sewer systems would be voluntary, and would only be undertaken by the city if analyses showed the potential profitability of such an arrangement. It is uncertain at this time whether or not the city would assume responsibility for fire protection at ETTP (Meredith 1997). As long as DOE requires on-site security, it will continue to provide this itself, and DOE will also continue to provide emergency response services (Frounfelker 1997).

4.2.5.5 Local government revenues

The reuse of ETTP would have the positive effect of generating additional revenue for local governments through the local portion of the sales and use taxes paid by new industries for items purchased or used within the impact area. The amount of local sales and use tax revenue generated by new industries would depend on the amount they spend and the equipment they use in the impact area. DOE plans to continue payments in lieu of taxes to local governments. Because most of the jobs associated with ETTP reuse would likely be filled by current residents rather than in-migrants, it is not likely that additional sales tax revenues generated by purchases made by direct and indirect workers would be substantial.

4.2.6 Transportation

As stated in the preceding section (Sect. 4.2.5), there would be no net increase in jobs, based on recent and projected job losses since 1993. However, between now and 2010, it is estimated that roughly 1,800 jobs could be eliminated at ETTP and approximately 2,500 new jobs could be created at the park. Therefore, the proposed action would increase net employment at ETTP alone by approximately 700 jobs by 2010. This increase is used for this analysis since *existing* traffic data (and not that from 1993) are available for comparison (see Sect. 3.7.1).

The number of trips that would be generated by the lease of land and facilities within the ETTP has been estimated using the publication *Trip Generation* (Institute of Transportation Engineers 1991). It is estimated that, for 700 additional employees, 350 trips would be generated during the peak hour, and 2,100 would be generated over the course of a typical weekday. This estimate, along with the existing commuter traffic flow pattern at ETTP, has been used to determine the future AADT (Fig. 4.2-1) and LOSs (Table 4.2-3) for the roadway segments in the study area for the year 2010.

As shown in Table 4.2-3, the proposed action would have minimal impact on the LOS on Blair Road and SR 95 from junction with SR 58 to Wisconsin Avenue. The levels of service on these roadway segments would remain at levels C and D. The LOS on SR 58 would drop from Level A to Level B, but this would still be an acceptable LOS and would constitute no major traffic impact. However, the LOS on SR 95 would drop

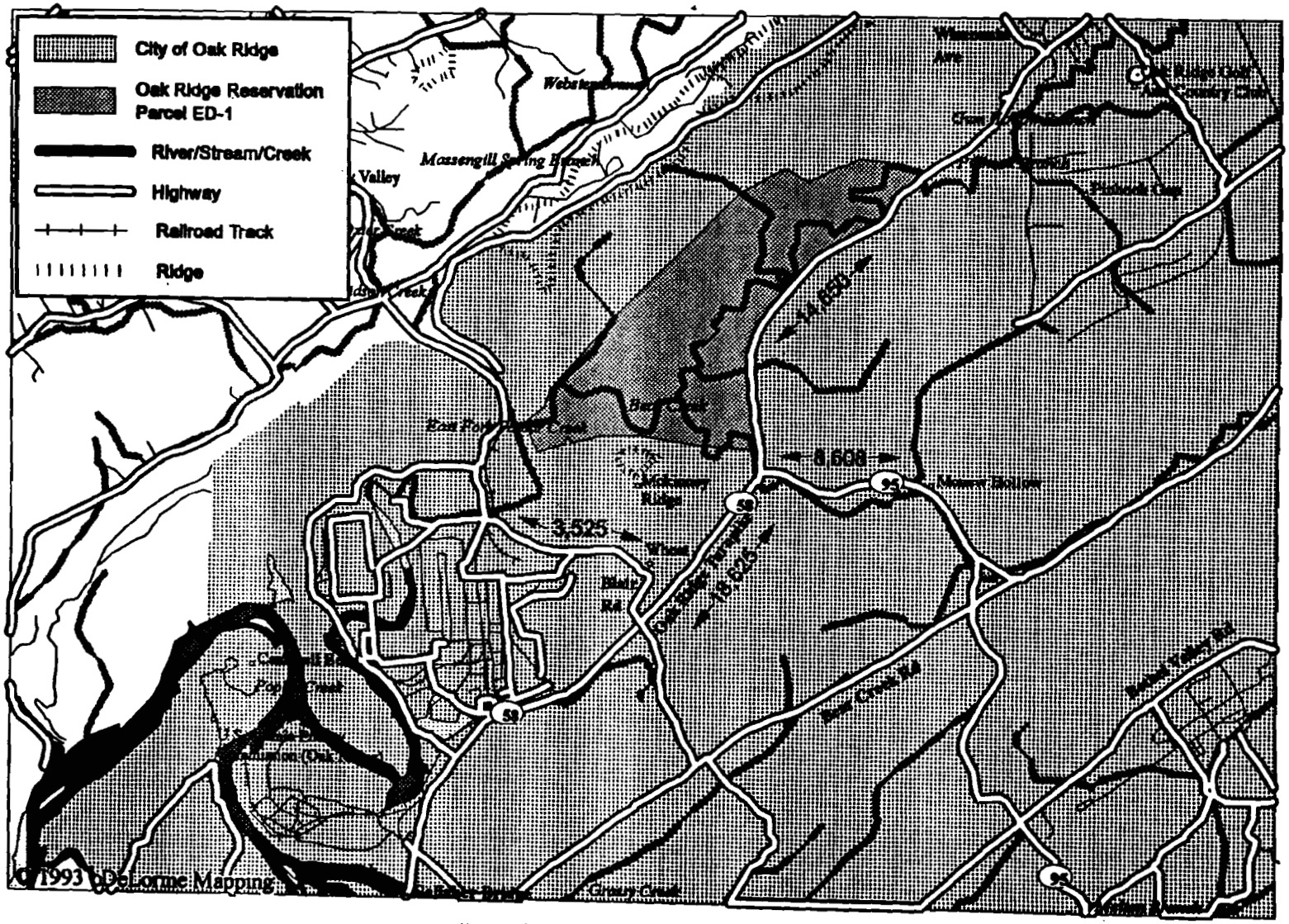


Fig. 4.2-1. Projected annual average daily traffic, 2010.

Table 4.2-3. Estimated future traffic volumes and levels of service during the peak traffic hour

Roadway segment	Peak traffic volume (vehicles per hour)	Level of service (LOS)[a]
Blair Road	423	C
SR 95 from junction with SR 58 to Wisconsin Avenue	1172	D
SR 95 from junction with SR 58 to Bear Creek Road	1033	E
SR 58 from Gallaher Bridge to junction with SR 95	1490	B

[a]Table 3.7-1 defines the LOS criteria for roadway segments.

to E, an unacceptable level of service. It should be noted that the projected volume is only slightly above an acceptable LOS. Nevertheless, future improvements would need to be made to SR 95 to alleviate the traffic introduced by the proposed industrial park.

An on-site manual traffic count was made at the intersection of Blair Road and SR 58 during a weekday (Tuesday) morning peak hour in July 1996. This traffic count indicated that only 2.6% of the traffic was attributed to trucks with three or more axles. Such data indicate that medium- and heavy-duty trucks are not currently a significant share of the vehicle mix.

The truck traffic that would be generated by the lease of land and facilities at ETTP has been projected using guidelines and estimates found in the publication *Trip Generation* (Institute of Transportation Engineers 1991). An estimated average of approximately 170 truck trips per day (ranging from 21 truck trips to 460 truck trips per day) would be generated from ETTP. Most of this truck traffic would occur throughout the day and would not be concentrated during peak hour commuter traffic periods. Thus, future truck trips are not expected to have a significant impact on future traffic.

Southern Freight Logistics (SFL), an intermodal transportation firm, has leased facilities at ETTP and currently handles commodities transported by truck and rail. Information provided by SFL indicates that the firm does not expect to operate as a major truck/rail intermodal facility in the area. The firm currently services approximately ten truckloads per week and does not expect their facility to expand significantly in the near future. Operation of such a facility at ETTP is unlikely to cause any significant impact on future traffic within the study area.

The number of accidents in the study area will increase as the vehicle-miles of travel increases. However, because the proposed action does not involve a significant modification to highway geometry, the accident rates within the study area should remain the same. Thus, there should be no significant traffic safety problem induced by the proposed action.

4.2.7 Noise

4.2.7.1 Construction

Construction and associated activities would result in generation of noise from vehicles and heavy equipment. Construction noise would be expected to be of short duration and would take place during the workday when background noise levels are higher than at night, making them less noticeable during the day. Maximum noise levels from the types of construction equipment expected on the site (trucks, tractors, scrapers, graders, backhoes, power tools) would be around 90–95 dB(A) at a distance of 15 meters. Noise levels decrease by about 6 dB for each doubling of distance from the sources (EPA 1974; Barnes et al. 1977; DOD 1979), assuming no barriers (trees, buildings, etc.) are present to impede sound propagation. At the residence nearest to a site boundary, about 1.2 km distant, the maximum noise levels would be around 51–56 dB(A). Given those maximum noise levels, the annual average would not be expected to exceed the 55 dB(A) level which, if not exceeded, would prevent activity interference and annoyance (EPA 1978).

4.2.7.2 Operation

Operation of facilities that would locate on ETTP would generate noise. Because actual noise estimates are not available, measured noise levels around an automobile assembly plant are used to estimate potential noise impacts. These noise levels are 55–60 dB(A) at about 60 m (200 ft) from the plant property line (L. S. Goodfriend and Associates 1971). These noise levels would be inaudible 500 m from the site, even with low background noise levels. It is not expected that noise levels from routine operations of industries at ETTP would ever be audible at the nearest residence. EPA has identified 55 dB(A) as a yearly average outdoor noise level which, if not exceeded, would prevent activity interference and annoyance (EPA 1978). Therefore, noise levels from plant operations would have no impact at the residence nearest to the site.

4.2.7.3 Traffic noise

ORNL used the traffic projections described above and the FHWA traffic noise prediction procedure to project future noise levels for roadway segments within the study area during peak hours. The peak-hour noise levels for the four roadway segments within the study area in 2010 are presented in Table 4.2-4.

As shown in Table 4.2-4, locations 30 m (100 ft) or more from the center line of these roadways would not experience noise levels exceeding the FHWA's L_{eq} limit of 67 dB(A). Furthermore, the traffic noise level increases due to the induced traffic from the proposed action would be less than 3 dB(A), in terms of L_{eq}. Thus, no appreciable traffic noise impact would result from the associated future traffic on the four roadway segments within the study area.

Table 4.2-4. Estimated future noise levels during the peak traffic hour.

Roadway Segment	Estimated noise level (L_{eq})	
	30 m (100 ft) from center line of roadway	60 m (200 ft) from center line of roadway
Blair Road	59 dB(A)	55 dB(A)
SR 95 from junction with SR 58 to Wisconsin Avenue	64 dB(A)	60 dB(A)
SR 95 from junction with SR 58 to Bear Creek Road	63 dB(A)	59 dB(A)
SR 58 from Gallaher Bridge to junction with SR 95	65 dB(A)	60 dB(A)

4.2.8 Cultural Resources

Each lease undertaking at ETTP would require a DOE-ORO determination of effect on identified NRHP-included or -eligible properties. In cases where a DOE review of a facility lease results in a determination that the proposed undertaking (the lease) would impact a cultural resource(s), the provisions of the DOE-ORO CRMP, Anderson and Roane Counties, Tennessee, would be applied (the CRMP is currently under SHPO review). Chapter 5, CRMP Procedures and Administration, provides guidance on DOE ORO fulfilling its responsibilities under NHPA, Executive Order 11593, *Protection and Enhancement of the Cultural Environment* and 36 CFR Parts 60, 63, 65, 79, and 800. These procedures provide a step-by-step review of an undertaking up to and including preparation of a Memorandum of Agreement with the SHPO and review by the Advisory Council on Historic Preservation that would include any required mitigation measures needed to address the adverse impacts of an undertaking. To ensure that the potential effects of the individual leases are thoroughly considered, consultation with the SHPO would be conducted on a lease-by-lease basis as necessary for those structures that are listed in or eligible for inclusion in the NRHP.

4.2.9 Human Health

4.2.9.1 Public

Most of the surrogate industries would have emissions and effluents common to other industrial sites and would be required to have appropriate environmental permits intended to protect human health and the environment. The city of Oak Ridge permits specific industrial uses in its Zoning Ordinance, and businesses that choose to locate at ETTP would be required by DOE to conform to the ordinance. Individuals working for companies that lease space at ETTP are currently defined as co-located workers in that they are co-located

with DOE personnel and DOE contractors. Co-located workers that have access to the site receive applicable training and are protected through appropriate controls and oversight; such workers are not considered members of the general public. Individuals working in leased space at ETTP are afforded the same level of safety and health protection found at any other industrial park. It is the lessee's responsibility to operate in a safe and protective manner. However, under certain scenarios, additional controls are maintained by DOE as a part of its ongoing operations at ETTP.

Issues related to public exposures to effluents and emissions from individual lessee sources will be addressed by permits and regulations under the authority of the State of Tennessee similar to any other industrial park.

Radiological effects. Most of the surrogate industry operations evaluated in this analysis would not result in radiological exposures. However, for the industries that handle radioactive material, no unique radiological emissions would be anticipated. The Nuclear Regulatory Commission or the State of Tennessee would regulate and inspect leased facilities for compliance with the terms and conditions of their radioactive materials licenses. For example, one facility conducts radioactive waste treatment and releases small quantities of radionuclides into the air. In a 1995 company environmental monitoring report (SEG 1995), the Oak Ridge company estimated that the closest off-site individual [an employee of a company located 300 m (0.2 miles) from their existing plant] had a maximum EDE of 0.0009 mSv/y (0.09 mrem/y). This is 0.025% of an individual's average background level of 3.6 mSv/y (360 mrem/y) and 0.09% of DOE's limit on public exposure of 1 mSv/y (100 mrem/y) (see Sect. 3.10.1). While the company's dose estimate only represents a dose for one year and is location specific, it is simply used as an estimate of the possible magnitude of the added impact from locating private industry at the site. At the ETTP Site, the nearest off-site resident is approximately 1.2 km (0.75 miles) from the site boundary and therefore, the dose could be even less. However, other tenants at the ETTP Site would be nearby. Any dose would be an incremental increase above background due to operations from tenant industries at ETTP, but as shown above, would be very small.

Another surrogate industry (metal decontamination/radioactive scrap metal recycling company, (see Table 2-1) also handles radioactive materials. The company reported 1.12 μCi/y of depleted uranium (mostly ^{238}U) emissions from their stack in 1995 (written communication from Bobby R. Adcock, Manufacturing Sciences Corporation, Oak Ridge, Tenn. to Peter Gross, Director Environmental Protection Division, Department of Energy, Oak Ridge, Tenn., April 16, 1996). Based on their reported average flow rate of the stack emissions (5.01×10^8 m^3/y), a stack concentration can be calculated. The concentration at the fence line of a facility is generally two to three orders of magnitude less than (one one-hundredth to one one-thousandth of) the stack gas concentration due to dilution in the air. In a very conservative estimate, if a receptor were at the fence line, constantly breathing the contaminated air at an average inhalation rate of 8400 m^3/y (ICRP 1994), and the fence line concentration were assumed to be only one one-hundredth of the stack concentration, the dose would be about 2.2×10^{-4} mSv/y (0.022 mrem/y). This is calculated using a dose conversion factor of 118 rem/μCi inhaled for ^{238}U, which converts the quantity of the radionuclide to an EDE. This highly conservative estimate is only 0.006% of the 3.6 mSv/y (360 mrem/y) average individual

background radiation exposure in the United States (see Sect. 3.10.1) and well below any level of health concern.

A third surrogate industry that would release radionuclides expects to conduct blending of highly enriched uranium operations in the future. The existing facility is in Lynchburg, Virginia, and therefore estimates of exposures and risks are specific to that site. Based on an analysis of future operations, the maximally exposed individual located at the facility boundary [i.e., 100 m (328 ft) from the source] would have an annual radiation dose of 3.7×10^{-5} mSv/y (3.7×10^{-3} mrem/y) and operations would be conducted over approximately 16 years. The associated cancer fatality risk for the annual exposure would be 1.4×10^{-9}. If the person were exposed for all 16 years the cancer risk would be 2.2×10^{-8} (DOE 1995b). These cancer risks, based on a conservative exposure model that is expected to over-estimate the risk, are far below levels generally considered of concern (e.g., 1×10^{-4} to 1×10^{-6}). Anticipated site-specific differences (e.g., meteorology or consumption rates of contaminated food) would not be expected to change the results significantly enough to cause the impact to be a public health concern.

The combined radiological doses from these three surrogates that release radioactive material would also be very small [i.e., about 1×10^{-3} mSv/y (0.1 mrem/y)]. Adding this radiological exposure to existing conditions [i.e., 0.03 mSv/y (3 mrem/y)] (see Sect. 3.10.1), results in a sum of 0.031 mSv/y (3.1 mrem/y). The incremental change due to the proposed action would be minor and the total radiological dose would still only be a small fraction of the DOE limit of 1.0 mSv/y (100 mrem/y) to the public. The cancer risk associated with public radiological exposures from the proposed action are difficult to predict since the risk models do not specifically address such low dose levels (NAS 1990). However, if one assumed a linear extrapolation to low doses, the cancer risk from the proposed action would be about a 5 in 100 million (5×10^{-8}) chance of dying of cancer.

Chemical effects. Based on the surrogate industries used for the analysis of impacts from the proposed leasing of land and buildings, no unique chemical releases are expected. For example, chemical releases from potential HEU blending operations would release CO, Pb, NO_2 and PM-10 in addition to U isotopes. An analysis of proposed HEU blending operations for the surrogate nuclear fuel fabrication company found that chemical exposures due to these operations were extremely low and associated carcinogenic risks and noncarcinogenic hazards were essentially non-existent. The cancer risk was estimated at 1×10^{-18} and the noncancer HI was 1×10^{-7} (DOE 1995b), where unity (1) indicates a health hazard (see Sect. 3.10.3). The estimated risk and HI are based on site-specific data for that company, which is not located in the Oak Ridge area. However, the impacts are so low that any difference resulting from site specific conditions would likely be overshadowed by the inconsequential risk estimates. As no unique releases are expected, and tenants would adhere to applicable permits, licenses, regulations, and ordinances; adverse health impacts from chemical releases are not anticipated. Further, none of the chemicals identified in Sect. 3.10.3 as having a potential concern for adverse health effects (e.g., manganese, PCBs) are expected to be released by the surrogate industries. Therefore, the proposed action would not exacerbate any existing hazards from specific chemicals of concern.

4.2.9.2 Occupational

Occupational health and safety impacts from any cleanup activities associated with the proposed action would be the same as those for the no-action alternative. The difference would be that private sector employees could conduct some of the work instead of DOE contractors. Workers would continue to follow standard industrial practices in the use of protective engineering practices and equipment as specified in applicable regulations. DOE and contractor workers would continue to follow the applicable DOE requirements (e.g., DOE Order 440.1 and 10 CFR 835, see Sect. 3.10), and private industry would follow applicable federal OSHA regulations (e.g., 29 CFR 1910 and 29 CFR 1926, see Sect. 3.10.4) to ensure control of chemical exposures. For proposed tenants, oversight of radiological activities would be conducted by the state radiological health division. NRC has authorized the State of Tennessee to regulate radiological activities through an approved state program that must be at least as stringent as NRC's federal guidelines (i.e., 10 CFR 20, *Standards for Protection Against Radiation*). Similar to DOE' s administrative control level (see Sect. 3.10.2), NRC also imposes an occupational dose limit of 50 mSv/y (5000 mrem/y) to protect worker's health.

Most of the surrogate industries used in the analysis would not have radiological emissions. No unique radiological emissions would be anticipated in those facilities that might handle radioactive material, and all activities would comply with applicable NRC regulations. An example of potential occupational exposures to lessee employees is an estimated average annual individual dose from HEU blending activities of 0.51 mSv/y (51 mrem/y), based on 251 involved workers and the assumption that operations occur over 16 years (DOE 1995b). The annual dose is well within the NRC annual limit of 50 mSv/y (5000 mrem/y).

Other companies such as the metal decontamination company (see Table 2-1) could release uranium through their stack. Based on the calculation of stack gas concentration in Sect. 4.2.9.1, and conservatively assuming the stack concentration is only reduced by a factor of ten to the nearest worker, the dose estimate is 5.3×10^{-4} mSv/y (0.053 mrem/y) for a worker continually breathing contaminated air for 40 hours per week for a year. This dose is a very small fraction of the HEU blending operations dose, which would likely dominate any occupational radiation exposure and which is well below NRC's limit. Therefore, radiation doses to proposed workers on the ETTP would not have major impacts on occupational health. Given the assumption that all workers at ETTP would be considered occupational workers, exposures must meet the DOE/NRC occupational exposure limit of 50 mSv/y (5000 mrem/y). However, if ETTP were not controlled as one entity and if workers within the site were considered members of the public in relation to neighboring companies, exposures would have to meet the more stringent public exposure limit of 1 mSv/y (100 mrem/y). This analysis shows that the dose of approximately 0.51 mSv/y (51 mrem/y) to the closest worker would also be below the public exposure limit.

No unique chemical exposures would be anticipated either, and all activities would comply with applicable OSHA regulations. An example of potential occupational chemical exposures from HEU blending

operations showed essentially no cancer risk or noncarcinogenic hazard from chemical releases (cancer risk of 1×10^{-14}, noncancer HI of 1×10^{-5}) (DOE 1995b).

4.2.10 Accidents

Most of the industrial activities at the site would be similar to those at other industrial areas in the Oak Ridge area, which pose no unique safety hazards. Typical industrial accidents (e.g., falls, spills, vehicle accidents, confined-space incidents and injuries from tool and machinery operation), could occur as might be expected at any similar industrial area.

Accidental spills of hazardous materials during construction or operation might cause contamination of localized areas of soil and subsequent impacts on groundwater, surface waters, and terrestrial or aquatic plants and animals. Accidental releases of high concentrations and/or large quantities of pollutants could cause standards to be exceeded and result in fish kills. In accordance with EPA-approved SPCC plans, soils contaminated by a spill would be collected and taken to appropriate waste disposal facilities or remediated in place. For groundwater, this assumes that diversion structures are in place to prevent spills from entering a sinkhole. Under SARA, Title III, industrial facilities are required to report releases of "reportable quantities" of hazardous substances (CERCLA- and EPCRA-listed) to state and local emergency response personnel. DOE, LMES, the city of Oak Ridge, and Roane County agencies would execute an emergency response plan should a release of hazardous materials (to any environmental medium – air, surface water, groundwater, soils) occur at the reindustrialized ETTP. Resources are available for response to an event such as a release off-site through mutual aid agreements between the city of Oak Ridge, the ETTP, and the surrounding communities (TEMA 1995).

Under the proposed action, tenants would also be subjected to consequences of potential accidents that currently exist at the site (e.g., those associated with the cylinder yards, see Sect. 3.11). Since the number of workers would increase over the no-action alternative, there would be a greater number of workers potentially exposed to accident-associated hazards than if no-action taken. However, because there would be no net increase in jobs from 1993 to those projected by 2010 (see Sect. 4.2.5, Socioeconomics), there would be no major change in the potentially exposed on-site population from remaining accident hazards at ETTP.

4.3 CUMULATIVE IMPACTS

Cumulative impacts are those that result from the incremental impact of an action considered additively with impacts of past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions (40 CFR 1508.7). Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. Other industrial parks, business

parks, and activities that have been identified in the general region as possibly contributing to cumulative impacts include:

- industrialization of Parcel ED-1adjacent to ETTP,
- construction and operation of the Knoxville Bypass linking I-40 and I-75,
- widening State Road 58 from I-40 into the city of Oak Ridge,
- use of the ETTP barge facility,
- application of sewage sludge on the ORR by the city of Oak Ridge,
- construction and operation of a waste disposal facility on the ORR, and
- development of the following industrial properties or business parks:
    - Clinch River Industrial Site, Oak Ridge
    - Blount County Industrial Park, Maryville
    - Pellissippi Business Park, Knoxville
    - Eastbridge Business Park, Knoxville
    - Carden Farms and Eagle Bend industrial parks, Clinton
    - Roane County Industrial Park

Direct incremental impacts of the proposed action on the development of most of the industrial properties or business parks listed above are unlikely because they are sufficiently distant from the ETTP. Although some lessees may locate at ETTP rather than other areas within the region, many of the attractions, and detriments to locating at ETTP are unique to the existing buildings and facilities at the park, and the availability of the ETTP is unlikely to significantly inhibit development of other sites. If the Clinch River Industrial Site, which is close to ETTP, were to be developed, there could be cumulative impacts on such resources as transportation systems. However, at this point in time, there are no definite proposals for development of that site, and, therefore, assessment of cumulative impacts would be speculative.

The Parcel ED-1 of undeveloped land (Fig. 4.3-1), which encompasses approximately 387 ha (957 acres) in a northwestern portion of the ORR and which is 0.8 km (0.5 miles) from the nearest boundary of the ETTP, has been leased by CROET for industrialization (DOE 1996a). Approximately 180 ha (444 acres) are available for development. Some similar industries that could potentially locate at ETTP, as described in the proposed action (Sect. 2.1), could also or alternatively locate at the ED-1 site. A proposal to widen SR 58 is currently under consideration. This proposal is to widen the entire route to a 4-lane highway from Interstate 40 past the ETTP, and into the city of Oak Ridge. Currently, a portion of the road from ETTP to the SR 58 and 95 intersection is 4 lanes. The proposal also includes adding a small clover leaf intersection at Blair Road intersection [about 0.9 km (0.6 miles) west of SR 95].

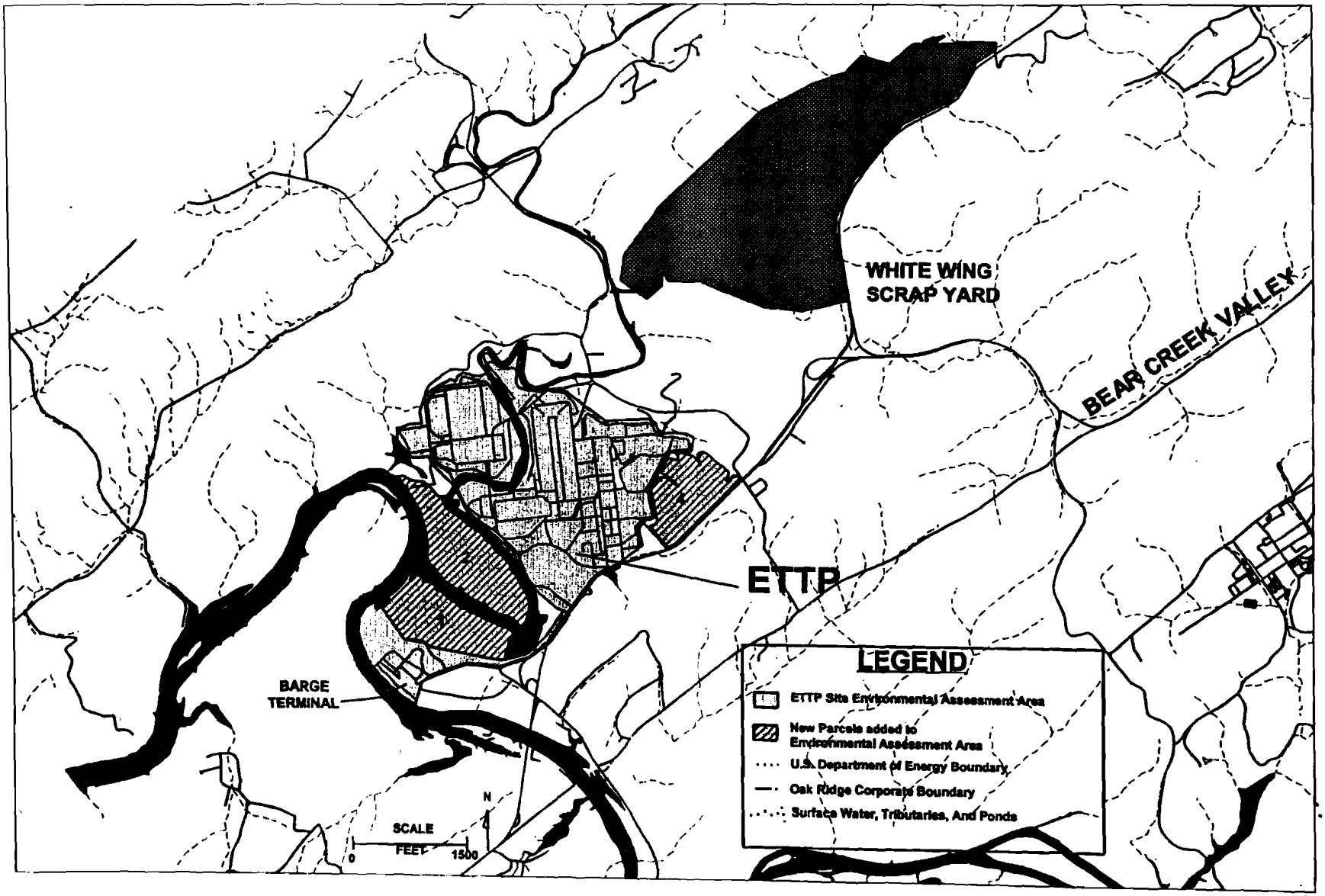


Fig. 4.3-1. Potential sites for future actions; ED-1, White Wing Scrapyard, Bear Creek Valley.

A proposal to construct a connector between I-75 and I-40, referred to here as the Knoxville Bypass, currently includes a potential route that passes just to the east of ETTP along parts of the existing Blair Road corridor. To the extent information is available, impacts of this proposed bypass are discussed for various resources in the following sections.

DOE is currently assessing potential impacts of proposed management options for the depleted UF_6 cylinders at ETTP and is preparing an EIS (DOE 1996f). Future decisions on the management of these cylinders could also have impacts on resources discussed in this EA.

As discussed in Sect. 1.3.1 of this EA, impacts of developing the barge facility (Fig. 4.3-1), which is located along the Clinch River within the ETTP Area of Responsibility, and has been leased to CROET by DOE is not evaluated in this EA. Possible dredging for the barge terminal would be considered in a separate environmental review associated with obtaining appropriate permits.

An EA and FONSI on proposed changes to the sanitary sludge land application program on the Oak Ridge Reservation were published in November 1996 (DOE 1996d). This NEPA documentation addresses changes to the existing program that has been underway since 1983 and under which the city of Oak Ridge has been applying municipal sewage sludge as a beneficial soil amendment on the ORR. The proposed changes included raising the sludge land application loading limits to the TDEC-permitted level of 110 metric tons/ha (50 tons/acre), and adding ORNL and ETTP sanitary wastewater treatment sludge to the existing sewage sludge land application program. ORNL and ETTP are subject to prescribed sanitary discharge limits and restrictions similar to those of other industrial sewage generators located in the city. The industrial discharge limits imposed on ETTP are designed to ensure that the total contaminant loading from all industrial customers allows Oak Ridge POTW to meet its NPDES permit limits. A tanker truck would transport sludge from ETTP to the Oak Ridge POTW about once per month. No new land application sites would be established, and the existing sites would be monitored appropriately.

DOE is currently evaluating options for permanent disposal of ORR wastes under a CERCLA RI/FS. Alternatives being considered include no action, off-site disposal, and on-site disposal. Consideration of on-site disposal has included one of three candidate sites southeast of ETTP—near the White Wing Scrap Yard, West Bear Creek Valley, and East Bear Creek Valley near the Y-12 Plant. A proposed plan is being developed and will be made available later in 1997. Thus, no analysis of cumulative impacts associated with this development was possible at the time this EA was prepared.

The following sections briefly describe the potential cumulative impacts that the proposed action would have on each resource area in light of the foregoing past, present, and reasonably foreseeable activities.

4.3.1 Facility Use

Cumulative impacts from other actions are not anticipated to affect the facility uses at ETTP. Development of the land on Parcel ED-1 would be available so that disturbance of natural areas on ETTP would be limited. The other reasonably foreseeable actions would not directly affect facility uses on the site.

4.3.2 Atmospheric Resources

The cumulative impacts on atmospheric resources are discussed in Sect. 4.2.2.2. The results are presented in Table 4.2-1 where the effects of the operation of industries at Parcel ED-1 are included in the background values. The conclusion states that the addition of Parcel ED-1 industries would have little consequence on air quality.

Pollutant emissions arising from the construction of the Knoxville Bypass and associated freeway interchanges mainly involve particulate matter resulting from earth disturbance. These emissions are temporary, lasting only as long as construction, and they can be controlled by watering. Additional watering could be necessary if the road construction occurs at the same time as any major new construction or excavation at ETTP. However, because the analysis in Sect. 4.2.1 assumed that four facilities were being constructed simultaneously and close to each other (which minimizes initial dispersion of dust), it appears sufficiently conservative to include any particulate matter contributions from construction of the bypass.

Pollutant emissions resulting from traffic on the proposed bypass would mainly involve carbon monoxide (CO) from idling vehicles at interchanges. Ambient air CO concentrations in downtown Knoxville have not exceeded 65% of the NAAQS in the last five years; it is unlikely that CO concentrations would approach half the NAAQS along the proposed bypass and interchanges. Because CO concentrations diminish rapidly away from roadways, members of the general public are not likely to be exposed to CO concentrations approaching half of the NAAQS.

4.3.3 Soil and Water Resources

Very little construction-related disturbance of natural soils would occur under the proposed action except in areas developed on Parcels 1, 2, and 4, where clearing of existing vegetation and site preparation would result in disturbance of specific sites and associated laydown areas. In comparison to industrial development of Parcel ED-1 or continued environmental restoration at ETTP and the Y-12 Plant, the amount of such disturbance is likely to be very small.

It is possible that the proposed action would contribute to future land application of sewage sludge. As discussed above, sludges from the ETTP sewage treatment plant may be transported to the city of Oak Ridge POTW. As noted previously, impacts of this land application program are evaluated in a separate NEPA review, and the incremental impacts from ETTP have been considered and found to be acceptable.

Should lessees not discharge their sanitary wastes to the ETTP sewage treatment facility, they would be required to dispose of their sewage treatment sludges in a manner permitted by TDEC and EPA.

4.3.4 Ecological Resources

Although the proposed action might include some new construction within the security fence on ETTP, it would primarily involve clean-up of buildings and grounds, as necessary, to ensure worker safety and/or to meet regulatory agreement requirements and allow reuse of existing facilities on ETTP. It is more likely that any new construction would take place on the parcels outside the security fence. It is not possible at this time to specify the type and location of new construction that would take place there. However, because of the size of the parcels and the constraints that would limit the land area that is developable, it is unlikely that construction would involve major new facilities. Major developments are more likely to be built on the Parcel ED-1 site which does not currently have any existing facilities. Thus, the proposed action should not add any major adverse construction impacts to the cumulative impacts posed by the other actions.

Emissions of pollutants from industries sited on ETTP or the nearby parcels would be additive to those released by industries on Parcel ED-1 and other nearby industries. During the state permitting process for new facilities, the cumulative impact of additional emissions would be considered. The combination of emissions from ETTP industries and emissions from nearby facilities would not be allowed to exceed permissible limits that protect human health and the environment.

Similarly, stormwater and effluent discharges to land or streams on ETTP would be reviewed by the state for potential effects to stream hydrology, water quality, aquatic habitat, and aquatic biota before NPDES permits would be granted. Incremental effects with discharges from other sources on the ORR and nearby areas would be considered during the permitting process so that aquatic resources would be protected.

The proposed action would probably not change the managed deer hunt on the ORR. Thus, it would not add to the cumulative impact of other actions on deer population management nor increase the probability of deer-vehicle collisions.

Leasing land and facilities at ETTP or on the parcels outside the security fence, even if it included construction of some new facilities, would not disturb or destroy rare or unique ecosystems if the heron rookery were protected and construction and operation were monitored to prevent or mitigate impacts to the natural areas that are near the parcels outside the ETTP security fence. In fact, if industry preferentially sited at or near ETTP rather than on the Parcel ED-1 site, for example, the cumulative impact would be positive since it would reduce disturbance or destruction of that more natural site. Thus, the cumulative impact on natural terrestrial and aquatic vegetation and wildlife communities would potentially be less if ETTP is reindustrialized and Parcel ED-1 is not developed (DOE 1996a).

Cumulative impacts on ecological resources located on the ORR are occurring as additional areas there are developed. Because of its many areas of native vegetation and undeveloped, natural habitats, the ORR has historically provided and continues to provide a refuge for many plants, animals, and natural

communities that are rapidly disappearing from the surrounding lands due to agricultural uses and encroaching development (TNC 1995, Mann et al. 1996). The continuing fragmentation of the ORR due to planned and reasonably foreseeable future actions could reduce its ecological importance, particularly for those species that require large blocks of nearly contiguous forest [Mann et al. 1996; July 17, 1997, letter from Susan N. McWhirter, president of the Tennessee Ornithological Society, to The Oak Ridge Environmental Quality Advisory Board (Appendix D)]. Natural corridors between the areas on ETTP that are unsuitable for development as well as other natural areas of the ORR could allow for dispersal of wildlife populations which might reduce these impacts.

Of the 23,075 ha (58,575 acres) of land originally acquired in the Oak Ridge area, about 14,048 ha (34,516 acres) remain as the ORR, of which 8,895 ha (21,980 acres) are designated as a Department of Energy National Environmental Research Park (NERP). The NERP was established to provide protected areas for environmental research and education and to demonstrate that energy technology development and pursuit of DOE missions can be compatible with a quality environment. The proposed action covered by this EA would not reduce the amount of land designated as NERP, but it could result in the development of up to 92.5 additional ha (231 acres) of land and could isolate the undevelopable 47.5 ha (117 acres) of the three parcels from other areas of the ORR with more natural habitats. The land area covered by forest on the three parcels being considered under the proposed action is small relative to the total amount of similar land on the ORR, and it does not include sensitive ecological resources. Thus, the proposed action would result in a small incremental loss of habitat that could contribute to the continuing reduction of the biological diversity of the ORR and the conservation value of this area.

4.3.5 Socioeconomics and Environmental Justice

The creation of a large number of new commercial/industrial jobs in the vicinity of ETTP could contribute to cumulative socioeconomic impacts by inducing in-migration to the area, with corresponding demands for housing and public services. However, such in-migration is not likely to result from currently-planned projects. The largest employment-generating project that is anticipated in the neighboring area—in addition to the proposed action—is the development of an industrial park on DOE's ED-1 site. It is projected that the Parcel ED-1 development would create 1,500 new direct jobs during approximately the same time that the ETTP reuse project would provide direct employment for 2,500 workers. Together, these 4,000 jobs would still be less than the 4,280 lost jobs described in Sect. 2.1.4 (i.e., from all of DOE's Oak Ridge facilities between FY 1993 and the end of FY 1997).

As noted above, the projected creation of new commercial and industrial jobs at the ETTP and ED-1 sites, coupled with recent and anticipated job loss at DOE's Oak Ridge facilities, would not lead to a net increase in direct employment in the impact area. Even so, it is possible that some new *indirect* jobs would be generated, because new direct employment would create the need for the goods and services that are provided by indirect workers, while some local residents who lose jobs due to DOE downsizing would retire and

remain in the impact area and continue to support indirect jobs. However, these new indirect jobs are not likely to stimulate in-migration and the associated need for housing and services, because nearly all new indirect positions could probably be filled by unemployed persons residing in the impact area. If, however, more *direct* jobs were created in the nearby area by additional commercial and industrial development, that could necessitate in-migration to the impact area and generate increased demand for housing and public services. Such demand would not result in adverse impacts unless the excess capacities described in Sects. 3.6.3 and 3.6.4 were exceeded. As noted above, one high profile project that has been mentioned as a possible stimulus for new development in the nearby area is the "blue route" of the proposed Knoxville Bypass, which would be routed close to the northern boundary of ETTP. This project is discussed further in Sect. 4.3.6.

4.3.6 Transportation

Of the potential projects considered for cumulative impacts, the development of an industrial park on Parcel ED-1 has the largest employment-generating potential. It is projected that this industrial park would create 1,500 jobs at the ED-1 site. This would generate approximately 1,400 trips during the peak hour and 7,000 trips during a typical weekday. However, it is improbable that both the development at Parcel ED-1 and that at ETTP would reach the same employment potential they would in isolation (i.e., if only one of the sites were approved for lease) by 2010. Because of the impacts of this contingency, two additional scenarios have been evaluated: (1) the case where both facilities realize 50% of their job-creating potential and (2) and the case where both facilities meet 100% of their projected potential.

Future traffic during the peak hour has been estimated and the LOS has been calculated for the two scenarios. The peak hour traffic and associated LOS information for the first scenario are presented in Table 4.3-1. The estimated peak-hour traffic volumes are slightly higher than those for the proposed lease of land and facilities at ETTP alone. However, the estimated LOSs are the same. Thus, for the first scenario, there is no major cumulative traffic impact. For the second scenario involving both facilities reaching 100% of their potential, the peak-hour traffic and associated LOS information is presented in Table 4.3-2. In this case, the estimated peak-hour traffic is higher than the peak-hour traffic for the proposed lease of land and facilities for the ETTP proposal alone. In addition, the estimated LOSs are worse for both Blair Road and for SR 95 from the junction with SR 58 to Wisconsin Avenue. Thus, this scenario would require additional highway capacity improvements on SR 95 from the junction with SR 58 to Wisconsin Avenue. However, it is very unlikely that both projects would reach 100% of their anticipated employment potential by 2010.

The proposal to widen SR 58 to four lanes from Gallaher Bridge to its intersection with Interstate 40 should have no adverse effect on traffic conditions and is likely to have a positive impact on traffic flow. Currently, SR 58 is four lanes from the intersection of SR 95 to about 0.4 km (0.25 miles) west of the main portal entrance to ETTP. Also, the Tennessee Department of Transportation would be adding a small clover leaf intersection at Blair Road. The peak-hour traffic within the proposed highway improvement area is

Table 4.3-1. Levels of service and traffic volumes during the peak traffic hour for the scenario in which both ETTP and ED-1 reach 50% of anticipated employment potential

Roadway segment	Peak traffic volume (vehicles per hour)	Level of service
Blair Road	465	C
SR 95 from junction with SR 58 to Wisconsin Avenue	1,497	D
SR 95 from junction with SR 58 to Bear Creek Road	1,127	E
SR 58 from Gallaher Bridge to junction with SR 95	1,434	B

Table 4.3-2. Levels of service and traffic volumes during the peak traffic hour for scenario in which both ETTP and ED-1 reach 100% of anticipated employment potential

Roadway segment	Peak traffic volume (vehicles per hour)	Level of service
Blair Road	535	D
SR 95 from junction with SR 58 to Wisconsin Avenue	2,040	E
SR 95 from junction with SR 58 to Bear Creek Road	1,285	E
SR 58 from Gallaher Bridge to junction with SR 95	1,658	B

dominated by journey-to-work trips, and there are no major work trip generators within the proposed highway improvement area except the ETTP and Parcel ED-1. Furthermore, no traffic would be "induced" by the four-lane highway itself. Thus, these proposed highway improvements would have little cumulative traffic impact during peak hours.

The Tennessee Department of Transportation currently plans to build the Knoxville Bypass, also known as the Oak Ridge Bypass, linking I-40 and I-75. The Knoxville Bypass will be a four-lane, divided, access controlled highway. Currently, there are two alternative routes, Corridor B and Corridor O, under consideration. Corridor B would extend from I-75 near Norris Tennessee, through Pine Ridge (north of Oak Ridge), and connect to I-40 and I-75 near Lenoir City, Tennessee. Part of Corridor B would coincide with Blair Road and have a interchange at the existing intersection of Blair Road and SR 58. This alternative would reduce the local surface street truck traffic in the vicinity of ETTP rather than increase local traffic, because the proposed Knoxville Bypass would provide a better link between Interstates 40 and 75.

The rest of the proposed projects are either in early planning stages—and, therefore, have no reliable on-site employment projections—or would produce too few additional work-related trips to have any cumulative traffic impact.

4.3.7 Noise

No major cumulative impact is anticipated for traffic (Sect. 4.3.6), and therefore no associated impact is anticipated from traffic noise. Furthermore, noise impacts associated with industrial operations at ETTP are not anticipated (Sect. 4.2.7.2). The incremental increase from the proposed action, added to potential activities at ED-1 would represent any cumulative impact from noise. The nearest residence to both ETTP and ED-1 is about are 1.8 km (1.1 miles) from either boundary. Using the model in the Sect. 4.2.7.2, noise from automobile assembly plants at both sites would be inaudible at the nearest residence due to the attenuation of noise with distance and terrain. Therefore, the noise from both sites combined would be inaudible and no cumulative impacts are expected from noise generation.

4.3.8 Cultural Resources

Cumulative impacts from other actions are not anticipated to adversely effect cultural resources on ETTP. All actions that could impact ETTP cultural resources would be subject to prior DOE, SHPO, and possibly Advisory Council on Historic Preservation review and approval under the provisions of the DOE-ORO CRMP.

4.3.9 Human Health

To determine the cumulative public health impacts from past and present actions, the impacts of the proposed action can be added to those from current conditions. Frazier et al. (1995) reported that 1994 radiological releases from the ORR could have resulted in a 0.05-mSv/y (5-mrem/y) dose to the maximally exposed individual. The potential incremental increase from the proposed action of 0.001 mSv/y (0.1 mrem/y) (see Sect. 4.2.9.1) would not have a major impact on the hypothetical maximally exposed individual. The sum of these doses would remain at approximately 5% of the DOE Order 5400.5 public limit of 1 mSv/y (100 mrem/y) (see Sect. 3.10.1).

The cumulative impact of chemical releases from the proposed action on public health are also expected to be minor. No chemicals of concern found in water or fish samples around ORR (e.g., manganese, PCBs) are anticipated to be released from the surrogate industries. Cumulative impacts from air emissions are discussed in Sect. 4.3.2.

With the future development of ED-1 or other facilities near ETTP, releases from the proposed action could expose additional workers in the vicinity of ETTP. However, during the state permitting process

for new facilities, the cumulative impact of additional emissions would be considered. The combination of emissions from ETTP industries and emissions from nearby facilities (e.g., those from ED-1).would not be allowed to exceed permissible limits that are intended to protect human health and the environment. The development of Parcel ED-1 is expected to attract more light industry than ETTP and fewer environmental releases are expected. Therefore, it is considered conservative to assume that the same releases would occur at Parcel ED-1 as would occur at ETTP. With this assumption doubling the impacts from ETTP to estimate the combined impact of the two actions would be conservative. Doubling the predicted exposures from the ETTP proposed action (see Sect. 4.2.9) would still be minor contributions to radiological and chemical health risks.

4.3.10 Accidents

Standard industrial accidents would increase proportionally to the increase in industries or facilities in the area. Further development of surrounding land could cause an increase in the number of people that could be exposed to off-site releases from large accidents. However, the accidents from existing conditions (e.g., cylinder yards, see Sect. 3.11) are unlikely and other, more common accidents would not have large consequences.

5. REGULATORY COMPLIANCE AND AGENCY CONSULTATIONS

During the NEPA process, DOE is required by (1) Sect. 7 of the ESA to consult with the U.S. Department of Interior, FWS, regarding the presence of T&E species and potential for adverse impacts at a proposed project site, (2) Sect. 106 of the NHPA to consult with the SHPO regarding the presence of archaeological and historic sites and potential for adverse impacts at a proposed project site, and (3) the Farmland Protection Policy Act to consult with the U.S. Department of Agriculture, U.S. Natural Resources Conservation Service (NRCS), regarding the presence and future use of prime farmland soils at a proposed project site. Some soils on the site are "prime farmland," which is protected under the Farmland Protection Policy Act. DOE has been advised by the NCRS (formerly Soil Conservation Service) that because the ETTP lies wholly within the city of Oak Ridge, the prime farmland designation is waived, and other uses of the land, such as industrial development, are permitted. Appendix D describes the ESA consultation requirements and procedures, and includes correspondence between DOE and both FWS and TDEC concerning the lease of land at K-25. Consultation with the SHPO is discussed in Sect. 4.2.8.

Other environmental statutes apply to the transfer of federal lands, including CERCLA and Hazardous Solid Waste Amendments to RCRA (HSWA).

- The requirements of the ORR HSWA Permit require notification of alterations at the permitted facility. To this end, DOE would provide notice to EPA and TDEC of the proposed lease of K-25.
- Sect. 120(h) of CERCLA requires a notice of any storage or known release of hazardous substances above specified thresholds, or any disposal of hazardous substances.

Private industrial developers would be responsible for seeking and obtaining federal, state, and/or local permits and licenses for activities at their facilities. Regulations implementing the Clean Air Act, Federal Water Pollution Control Act (Clean Water Act), NRC rules, RCRA, Safe Drinking Water Act, TSCA, EPCRA, and others may apply.

The following persons and agencies were contacted to meet consultation requirements:

- Allen Robison - U.S. Fish and Wildlife Service, Cookville, TN; re: threatened and/or endangered species.

- Reginald Reeves – Tennessee Department of Environment and Conservation, Division of Natural Heritage, Nashville, TN; re: threatened and/or endangered species.

THIS PAGE LEFT INTENTIONALLY BLANK

6. REFERENCES

Awl, D. J., L. R. Pounds, B. A. Rosensteel, A. L. King, and P. A. Hamlett, 1996, *Survey of Protected Vascular Plants on the Oak Ridge Reservation, Oak Ridge, Tennessee*, ES/ER.TM-194, Environmental Restoration Program, Oak Ridge, Tennessee.

Barnes, J. D., L. N. Miller, and E. W. Wood, 1977, *Power Plant Construction Noise Guide*, Report No. 3321, Bolt, Beranek and Newman, Inc., Cambridge, Massachusetts.

Blade, L. M. And K. A. Worthington, 1996, *NIOSH Health Hazard Evaluation Report*, HETA 96-0071-2584, Lockheed Martin Energy Systems, Inc., U.S. Department of Energy, Oak Ridge, K-25, Oak Ridge, Tennessee, U.S. Department of Health and Human Services, Public Health Science, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, July.

Braun, E. Lucy, 1950, *Deciduous Forests of Eastern North America*. Hafner Press. New York, 596 pp plus one map (a 1974 facsimile of the edition of 1950).

Buehler, D. A., 1994, *Bald eagle habitat suitability on Melton Hill Reservoir and the Clinch River*, ORNL/NERP-9, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Bunyak, J., 1993, *Permit Application Guidance for New Air Pollution Sources*, Natural Resources Report NPS/NRAQD/NRR-93/09, National Park Service, Denver, Colorado.

City of Oak Ridge, 1991, *Sewer Use Ordinance*, Ordinance 9-91, Code of Ordinances of the City of Oak Ridge, Tennessee.

City of Oak Ridge, 1995, *City of Oak Ridge, Tennessee, Fiscal Year 1996 Annual Budget*, March.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe, 1979, *Classification of Wetlands and Deepwater Habitats of the United States*, FWS/ORS-79/31, U. S. Fish and Wildlife Service. Washington, D.C.

Cunningham, M., L. Pounds, S. Oberholster, P. Parr, L. Edwards, B. Rosensteel, and L. Mann, 1993, *Resource Management Plan for the Oak Ridge Reservation, Vol. 29: Rare Plants on the Oak Ridge Reservation*, ORNL/NERP-7, Oak Ridge National Laboratory. Oak Ridge, Tennessee.

DOE (U.S. Department of Energy), 1982, *Final Environmental Impact Statement, Incineration Facility for Radioactively Contaminated Polychlorinated Biphenyls and Other Wastes, Oak Ridge Gaseous Diffusion Plant*, DOE/EIS-0084, Oak Ridge, Tennessee, June.

DOE (U.S. Department of Energy), 1992,. *Environmental Assessment: Proposed Sale of Parcel A2 of the Oak Ridge Reservation to the City of Oak Ridge, Tennessee*, DOE/EA-0539, Oak Ridge, Tennessee, July.

DOE (U.S. Department of Energy), 1994, *Oak Ridge Reservation Technical Site Information*, DE-AC05-84OR21400, Oak Ridge, Tennessee, August.

DOE (U.S. Department of Energy), 1995a, *Radiation Control Program Manual*, K/HS-588, Revision No. 1, Oak Ridge, Tennessee, September.

DOE (U.S. Department of Energy), 1995b, *Disposition of Surplus Highly Enriched Uranium Draft Environmental Impact Statement*, DOE/EIS-0240-D, Office of Fissile Materials Disposition, U.S. Department of Energy, Washington, D.C., October.

DOE (U.S. Department of Energy), 1995c, *Oak Ridge Site Management Plan for the Environmental Restoration Program*, DOE/OR-1001/R4, Oak Ridge, Tennessee, September.

DOE (U.S. Department of Energy), 1995d, *Environmental Restoration Program FY 1997 Management Action Process Document on the U.S. Department of Energy Oak Ridge Reservation.* DOE/OR/01-1572&D1, East Tennesseee Technology Park Technical Information Office Oak Ridge, Tennessee (May 10, 1997).

DOE (U.S. Department of Energy), 1996a, *Environmental Assessment: Lease of Parcel ED-1 of the Oak Ridge Reservation by the East Tennessee Economic Council*, DOE/EA-1113, Oak Ridge, Tennessee:

DOE (U.S. Department of Energy), 1996b, *Remedial Investigation/Feasibility Study of the Clinch River/Poplar Creek Operable Unit*, DOE/OR/01-1393/VI&D3, Oak Ridge, Tennessee.

DOE (U.S. Department of Energy), 1996c, *Environmental Restoration Program Management Action Process*, Document of the U.S. Department of Energy Oak Ridge Reservation, DOE/OR/01-1431&D1, Issued April 2, 1996.

DOE (U.S. Department of Energy), 1996d, *Environmental Assessment, Proposed Changes to the Sanitary Sludge Land Application Program on the Oak Ridge Reservation*, DOE/EA-1042, DOE-Oak Ridge Operations, Oak Ridge, Tennessee, September.

DOE (U.S. Department of Energy), 1996e *Groundwater Remedial Site Evaluation Report for the Oak Ridge K-25 Site, Oak Ridge, Tennessee*, DOE/OR-01-1468 V1&D1.

DOE (U.S. Department of Energy), 1996f, *Notice of Intent to Prepare Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluride*, DOE/EIS-0269, *Federal Register* 61: 2239 (January 25).

DOE (U.S. Department of Energy), 1997a, *Action Memorandum for Rerouting of Sump Discharges from Building K-1401 and K-1420, East Tennessee Technology Park, Oak Ridge, Tennessee* DOE/OR/02-1610&D1

DOE (U.S. Department of Energy), 1997b, *Integrated Water Quality Program Plan*, ES/ER/TM-205, Oak Ridge, Tennessee.

DOE (U.S. Department of Energy), 1997c, *Record of Decision for the Clinch River/Poplar Creek Operable Unit, Oak Ridge, Tennessee*, DOE/OR/.02-1547&D2, Prepared for U.S. Department of Energy, Office of Environmental Management by Jacobs EM Team, Oak Ridge, Tennessee.

DOE (U.S. Department of Energy), 1997d, *Accelerated Cleanup: Focus on 2005*. Discussion Draft, Office of Environmental Management (June 1997).

DOD (U.S. Department of Defense) 1979. *Environmental Protection: Planning in the Noise Environment*, AFM 19-10; TM 5-803-2; NAVFAC P-970, Departments of the Air Force, the Army, and the Navy, Available from Naval Publications and Forms Center, Philadelphia, Pennsylvania.

EPA (U.S. Environmental Protection Agency), 1974, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, EPA-550/9-74-004, U.S. Environmental Protection Agency, Washington, D.C.

EPA (U.S. Environmental Protection Agency), 1978, *Protective Noise Levels: Condensed Version of the EPA Levels Document*, EPA-550/9-79-100, U.S. Environmental Protection Agency, Office of Noise Abatement and Control, Washington, D.C.

EPA (U.S. Environmental Protection Agency), 1985, *Compilation of Air Pollutant Emission Factors*, Vol. I: Stationary Point and Area Sources, 4th ed. EPA Publication AP-42, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina.

EPA (U.S. Environmental Protection Agency), 1988, *Screening Procedures for Estimating the Air Quality Impact of Stationary Sources*, EPA-450/4-88-010, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina.

EPA (U.S. Environmental Protection Agency), 1995a, *SCREEN3 Model User's Guide*, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina.

EPA (U.S. Environmental Protection Agency), 1995b, *Supplement C to the Guideline on Air Quality Models*, (Appendix W of 40 CFR 51), EPA-450/2-78-027R-C, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina.

EPA (U.S. Environmental Protection Agency), 1995c, *User's Guide* for the Industrial Source Complex (ISC3) Dispersion Models, EPA-450/B-95, 003, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina.

ETTP (East Tennessee Technology Park), 1997, *Blair Road Wetland Monitoring Report*. K/EM-528. July.

FHWA (Federal Highway Administration), 1977, *Highway Traffic Noise Prediction Model*, Document PB-81-194227, Office of Research and Office of Environmental Policy, Washington, D.C.

Frazier, D. W., D. C. West, L. W. McMahon, L. V. Hamilton, and M. L. Coffey, 1995, *Oak Ridge Reservation Annual Site Environmental Report for 1994*, ES/ESH-57, Lockheed Martin Energy Systems, Inc., Oak Ridge, Tennessee, October.

Frounfelker, Richard, U.S. DOE Oak Ridge Operations, personal communication to Martin Schweitzer, ORNL, August 26, 1997.

Gentry, Kahla, Oak Ridge Development Implementation Department, personal communication to Martin Schweitzer, ORNL, August 27, 1997.

Hamilton, L. V., D. C. West, L. W. McMahon, L. G. Shipe, and, J. G. Rogers, 1996, *Oak Ridge Reservation Annual Site Environmental Report for 1995*, ES/ESH-69, Lockheed Martin Energy Systems, Inc. and Lockheed Martin Energy Research, Oak Ridge, Tennessee

Herron, Mark, Tennessee Department of Employment Security, personal communication to Martin Schweitzer, ORNL, August 27, 1997.

Institute of Transportation Engineers, 1991. *Trip Generation*, 5th ed., Washington, D.C.

JERT (Jacobs Environmental Restoration Team), 1996, *Cultural Resource Survey—K-25 Site, Oak Ridge, Tennessee*, February.

Klaasen, C. D., M. O. Amdur, and J. D. Doull, 1986, *Casarett and Doull's Toxicology, the Basic Science of Poisons, 3rd Ed.* Macmillan Publishing Company, New York, New York.

Kszos, L. A., S. M. Adams, T. L. Ashwood, B. G. Blaylock, M. S. Greeley, R. L. Hinzman, J. M. Loar, M. J. Peterson, M. G. Ryon, B. A. Shoemaker, J. G. Smith, and G. R. Southworth, 1993, *Biological Monitoring and Abatement Program for the Oak Ridge K-25 Site*, K/EM-24/R2, Oak Ridge K-25 Site, Oak Ridge, Tennessee.

LMES (Lockheed Martin Energy Systems), 1995, *Auditable Safety Analysis, Compliance with the Toxic Substances Control Act (TSCA) Incinerator Facility at the Oak Ridge K-25 Site*, ASA/TSCA/25/R0, TSCA-ACS-RQT-2001, Rev. 0, U.S. Department of Energy, September.

LMES (Lockheed Martin Energy Systems), 1997, *K-25 Site UF_6 Cylinder Storage Yards, Final Safety Analysis Report*, K/D-SAR-29, Prepared for U.S. Department of Energy, Oak Ridge, Tennessee, March.

Loar, J. M., S. M. Adams, L. A. Kszos, M. G. Ryon, J. G. Smith, G. R. Southworth, and A. J. Stewart, 1992, *Oak Ridge Gaseous diffusion Plant Biological Monitoring and Abatement Program for Mitchell Branch*, ORNL/TM-11965, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Mann, C. C., and M. L. Plummer, 1995, "Are Wildlife Corridors the Right Path?" *Science*, 270, 1428-1430.

Mann, L. K., P. D. Parr, L. R. Pounds, and R. L. Graham, 1996, "Protection of Biota on Nonpark Public Lands: Examples from the US Department of Energy Oak Ridge Reservation," *Environmental Management*, 20, 207-218.

Meredith, John, U.S. DOE Oak Ridge Operations, personal communication to Martin Schweitzer, ORNL, August 27, 1997.

MMES (Martin Marietta Energy Systems), 1994, *The Oak Ridge K-25 Site, Technical Site Information*, K/EN/SFP-11, Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee, September.

McGuire, S. A., 1991, *Chemical Toxicity of Uranium Hexafluoride Compared to Acute Effects of Radiation*, Final Report, NUREG-1391, U.S. Nuclear Regulatory Commission, Office of Nuclear Regulatory Research, February.

Mitchell, Jason M., E. R. Vail, J. Warren Webb, J. W. Evans, A. L. King, and Pamela A. Hamlett, 1996, *Survey of Protected Terrestrial Vertebrates on the Oak Ridge Reservation*, ES/ER/TM-188/R1, Environmental Restoration Program, Oak Ridge, Tennessee, June.

Myrick, T. et al., 1981, *State Background Radiation Levels of Measurements Taken During 1975-1979*, Union Carbide Corporation, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

NAS (National Academy of Sciences), 1990, *Health Effects of Exposure to Low Levels of Ionizing Radiation*, BEIR V Report, National Academy Press, Washington, D.C.

NCRP (National Council on Radiation Protection and Measurements), 1987, *Ionizing Radiation Exposure of the Population of the United States*, NCRP Report No. 93, Bethesda, Maryland, September.

ORO (DOE Oak Ridge Operations Office), 1996, *Oak Ridge Operations Office Environmental Management Ten Year Plan*, Oak Ridge, Tennessee (Draft), July 31, 1996.

Parr, P. D., and J. W. Evans, 1992, Resource Management Plan for the Oak Ridge Reservation, Volume 27: Wildlife Management Plan,. ORNL/NERP-6, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Pearman, D. M., and T. P. Grumbly, 1993, *Forging the Missing Link: a Resource Document for Identifying Future Use Options*, Transmittal of Final Draft, U. S. Department of Energy, Washigton, D.C., December.

Rosensteel, B. A., and D. J. Awl, 1995, *Wetland Survey of Selected Areas in the K-25 Site Area of Responsibility*, ORNL/TM-13033, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Saylor, R. E., D. G. Jernigan, B. D. Lasley, M. A. Mitckes, L. K. Mann, S. M. Schexnayder, M. Schweitzer, W. P. Staub, V. R. Tolbert, J. W. Van Dyke, J. P. Witherspoon, and A. K. Wolfe, 1990, *Data Package for the Atomic Vapor Laser Isotope Separation (AVLIS) Plant Environmental Impact Statement*, ORNL/TM-11482, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Schutt, Sherry, Tennessee Department of Revenue, personal communication to Martin Schweitzer, ORNL, August 27, 1997.

SEG (Scientific Ecology Group, Inc.), 1995, *Report on Compliance with the Clean Air Act Limits for Radionuclide Emissions from the COMPLY Code, Version 1.5d*, Scientific Ecology Group, Inc., Oak Ridge, Tennessee.

Shaver, C. L., K. A. Tonnessen, and T. G. Maniero, 1994, "Clearing the Air at Great Smoky Mountains National Park," *Ecological Applications*, 4(4), 690-701.

TDEC (Tennessee Department of Environment and Conservation), 1992a. *Reducing Nonpoint Source Water Pollution by Preventing Soil Erosion and Controlling Sediment on Construction Sites, Nashville, Tennessee*, March.

TDEC (Tennessee Department of Environment and Conservation), 1992b, *Tennessee Erosion Control Handbook*, Nashville, Tennessee, July.

TDEC (Tennessee Department of Environment and Conservation), 1994, *Riparian Restoration and Streamside Erosion Control Handbook*, Nashville, Tennessee, November.

TDES (Tennessee Department of Employment Security), 1997, *Annual Averages, 1992–1996*, Nashville, Tennessee.

TDOT (Tennessee Department of Transportation), *1995 Traffic Map—Oak Ridge, Tennessee*, State of Tennessee, Department of Transportation, Nashville, Tennessee.

TEMA (Tennessee Emergency Management Agency), 1995, *The State of Tennessee Multi-Jurisdictional Emergency Response Plan for the United States Department of Energy, Oak Ridge K-25 Site*, Tennessee Emergency Management Agency, April.

TNC (The Nature Conservancy), 1995, *Oak Ridge Reservation, Biodiversity, and the Common Ground Process. Preliminary Biodiversity Report on the Oak Ridge Reservation*, 67 pages.

TRB (Transportation Research Board), 1985, *Highway Capacity Manual*, TRB Special Report 209, National Research Council, Washington, D.C.

TVA (Tennessee Valley Authority), 1959, *Floods on Clinch River & East Fork Poplar Creek*, TVA-0-592, Tennessee Valley Authority, Knoxville, Tennessee.

TVA (Tennessee Valley Authority), 1995, *Flood Analyses for Department of Energy, Y-12, ORNL, and K-25 Plants*, ES/CNPE-95/1, Tennessee Valley Authority, Knoxville, Tennessee.

Tennessee Transportation Assistance Program, 1993, *K-25 Employee Commuter Routes—1993* (map), Knoxville, Tennessee.

USACE (U.S. Army Corps of Engineers), 1987, *Wetlands Delineation Manual*, Technical Report Y-87-1, Waterways Experiment Station, Vicksburg, Mississippi.

U.S. Department of Commerce, 1994, *County and City Data Book 1994*, Bureau of the Census, 12th Edition, August.

U.S. Department of Commerce, 1995, *Local Climatological Data, Annual Summary with Comparative Data, 1994, Oak Ridge, Tennessee*. National Climatic Data Center, Asheville, North Carolina

UT (University of Tennessee), 1994, *Tennessee Statistical Abstract 1994/95*, Center for Business and Economic Research, College of Business Administration, The University of Tennessee, Knoxville, November.

UT (University of Tennessee), 1996, *Tennessee Statistical Abstract 1996/97*, Center for Business and Economic Research, College of Business Administration, The University of Tennessee, Knoxville.

Vogt, D. P. and S. Das, 1996, *Estimation of Indirect Local Economic Impacts of Alternative Clean-up Options for K-25*, Working Paper, Energy and Global Change Analysis Section, Oak Ridge National Laboratory, Oak Ridge,.

Wilder, Ginger, Oak Ridge Electric Department, personal communication to Martin Schweitzer, ORNL, August 27 and 28, 1997.

Zoback, M. L., and M. D. Zoback,1989, "Tectonic Stress Field of the Continental United States," in *Geophysical Framework of the Continental United States*, Pakiser, L. C., and Mooney, W. D., Geological Society of America Memoir 172, Boulder, Colorado.

THIS PAGE LEFT INTENTIONALLY BLANK

APPENDIX A

CITY OF OAK RIDGE ZONING REGULATIONS, CHAPTER 7, SECT. 6-713

6-713 IND-2. Industrial Districts

The following regulations shall apply in IND-2. Industrial Districts.

(a) Permitted Principal Uses:

1. Light and heavy manufacturing and processing plants, research and development facilities, and facilities such as processing of radioisotopes, lumber and wood products, food and food products, furniture and fixtures, chemicals, plastics, primary and fabricated metals, metal products, machinery, stone, clay and glass products, and other miscellaneous manufacturing plants.

2. Warehousing and wholesaling facilities, including truck and rail service terminals and related facilities, and tank storage of bulk oil and gasoline and the mixture or bulk storage of illuminating or heating gas, subject to the proper precautions as to locations and otherwise, to prevent fire and explosion hazards.

3. Public and semipublic uses, including any municipal use, state or federal use, public utility structure, or related use.

4. Dwelling units are expressly prohibited except for quarters for watchman, caretaker, or custodian on the premises and housed in a separate building. Such housing may be provided in the same building with Board of Appeals approval.

5. Airport.

6. Office uses resulting from information processing, industrial training, engineering, drafting or graphic arts services and computer hardware or software development.

(Ord. No. 3-88 Revised Effective 1/28/88)

7. Family day care home, child care center, private education institution.

(Ord. No. 16-90 Revised Effective 7/5/90)

APPENDIX B

B.1 DESCRIPTIVE INFORMATION ON AVAILABLE BUILDINGS AND FACILITIES

ETTP Facilities for Reuse

Facility	# Bldgs	Name	Gross Area(Ft2)
K-0031 (602)	1	K-31 Process Building (6 Units)	1,659,628
K-0033 (902)	1	K-33 Process Building (8 Units)	2,780,104
K-0101	1	Research Building	6,013
K-0601	1	Utilities Offices	17,157
K-0708-E	1	Scale House & Pit	96
K-0731	1	K-27 & K-29 Switchhouse	69,328
K-0733-A	1	Oil Filter & Handling Building	225
K-0733-D&E	2	Sprinkler Valve Houses	575
K-0733-J	1	Storage Building	200
K-0797	1	K-1004-J Electrical Switchgear Room	2,750
K-0798	1	K-1023 Electrical Switchgear Room	1,968
K-0802	1	Fire Water & RCW Pump House	11,175
K-0802-A & B	2	Sprinkler Valve Houses	204
K-0822	1	Pump House (behind K-1037)	903
K-1000	1	Visitor's Center	1,695
K-1001	1	Administration Building	93,703
K-1002	1	Cafeteria	42,219
K-1003	1	Dispensary	15,782
K-1004-A	1	Laboratory	18,659
K-1004-B	1	Laboratory	17,942
K-1004-C	1	Laboratory	17,785
K-1004-D	1	Laboratory	24,870
K-1004-E & F	2	Laboratory Storage Buildings	894
K-1004-H	1	Liquid Gas Storage Shed	1,122
K-1004-J	1	Laboratory - Development	7,250
K-1004-L	1	Pilot Plant	42,266
K-1004-M	1	L Lab Electrical Switchgear Room	441
K-1004-N1	1	Cooling Tower	
K-1004-N2	1	Cooling Tower	
K-1004-P	1	Test Facility	375
K-1004-Q	1	Centrifuge Laboratory	1,760
K-1004-R	1	Laboratory	2,232
K-1004-S	1	Laboratory	1,860
K-1004-T	1	Laboratory	3,750
K-1004-U	1	Laboratory	2,295
K-1005	1	Laboratory	
K-1006	1	Laboratory	22,850
K-1006-C	1	Chiller Building	400
K-1007	1	Computer Science Building	132,168
K-1007-C	1	Chiller Building	2,100
K-1008-E	1	Laboratory	3,000
K-1008-F	1	Laboratory/Offices	3,070

ETTP Facilities for Reuse

Facility	# Bldgs	Name	Gross Area(Ft2)
K-1008-G	1	Lab Support Building	144
K-1009	0	Laboratory-part of K-1023	
K-1010	1	Receiving Facility	200
K-1010-A	1	Receiving Facility	4,832
K-1018	1	Emergency Generator Building	98
K-1019-1A - 9A	12	Bus Shelters	1,768
K-1020	1	Environmental Division Building	20,416
K-1020-A	1	Valve House	80
K-1023	1	Laboratory	16,800
K-1028-40 - 73	17	Guard Portals (17)	6,512
K-1030	1	Classified Office Building	18,278
K-1034-A	1	Plant Records Vault	8,374
K-1035	1	Maintenance Office Building	47,724
K-1035-A	1	Waste Storage	288
K-1036	1	Central Materials Management	80,122
K-1037	1	Industrial Research Building	334,115
K-1037-C	1	Smelter House	3,100
K-1039	1	Telephone Building	2,378
K-1045	1	Valve Shop	800
K-1045-A	1	Fire Training Facility	2,640
K-1045-C	1	Steam Plant Operations Office	700
K-1052	1	Advanced Machine Development Lab	7,000
K-1052-B	1	Component Test	4,200
K-1052-D	1	Paint Storage	108
K-1055	1	Gas Cylinder Storage Shed	5,033
K-1055-A	1	Chlorine Storage Shed	100
K-1056	1	Materials Warehouse	12,048
K-1058	1	Materials Warehouse	12,048
K-1059	1	Materials Warehouse	12,510
K-1061	1	Oil Storage Building	1,200
K-1065-A - E	5	Waste Storage Buildings	224,960
K-1095	1	Paint Shop	12,067
K-1098	1	Cement Storage House	1,280
K-1098-E	1	Heat Treat Facility	
K-1098-F	1	Sand Blast Facility	3,568
K-1101	1	Nitrogen Building & Air Plant	29,873
K-1102,A,B	3	Fan & Transfer Buildings	2,031
K-1200	1	Centrifuge Preparation Lab	70,791
K-1200N	0	Centrifuge Office Area-N Bay	8,000
K-1201	1	Compressor Building	6,906
K-1203-4	1	Chlorination Control+Drying Beds	264
K-1207	1	Air Humidity Condenser Building	624

ETTP Facilities for Reuse

Facility	# Bldgs	Name	Gross Area(Ft2)
K-1210	1	Centrifuge Test Facility	34,120
K-1210-A	1	Advanced Engineering Test Facility	9,852
K-1210-B	1	Addition to AETF	2,025
K-1211	1	CTF Storage	782
K-1216	1	Scale House (Blair)	306
K-1220	1	CPDF 1&2 Centr. Plant Demo Facil	49,680
K-1220 Offices	0	Office complex	22,800
K-1225	1	ER Office Building	30,720
K-1320	1	Engineering Offices	9,440
K-1320-A	1	Engineering Offices	3,830
K-1330	1	ER Office Building	14,400
K-1400	1	WM Office Building	13,104
K-1401	1	Maintenance Building	473,181
K-1402	1	Electrical Control House	3,583
K-1405-6	1	High Temperature Lab	3,293
K-1407	1	Laboratory & Storage	4,315
K-1407-H	1	Neutralization Facility	4,000
K-1407-J	1	Settling Basins	5,704
K-1407-K	1	Building	1,456
K-1407-P	1	Frisker Station	96
K-1414	1	Garage & Gas Station	15,001
K-1414-B	1	Vehicle Wash Facility	1,280
K-1414-C	1	Storage	192
K-1415	1	Storage Shed	12,670
K-1416	1	Chemical Storage Warehouse	6,930
K-1423	1	Toll Enrichment Facility	29,075
K-1423-A	1	Maintenance Facility	1,648
K-1435-A	1	Office, Lab, Control Building	3,450
K-1435-B	1	Drum Storage & Unloading Facility	4,950
K-1435-B1	1	Fire Water Riser Building	48
K-1435-C	1	Storage Tank Farm	16,500
K-1435-D	1	Incinerator Facility	4,950
K-1435-D1	1	Battery Charging Station	288
K-1435-D2	1	Fire Water Riser Building	48
K-1435-E - Z	22	Trailers/Tents/ Port. Buildings (22)	22,192
K-1501	1	Steam Plant	24,166
K-1501-C	1	Foam House	96
K-1501-H	1	Maintenance Facility	1,860
K-1501-Q	1	Electrical Storage Building	480
K-1513	1	Pump House (On Clinch River)	
K-1515	1	Water Filtration Plant	6,500
K-1515-D	1	CRBR Valve House	120

ETTP Facilities for Reuse

Facility	# Bldgs	Name	Gross Area(Ft2)
K-1515-E	1	Production Support Building	576
K-1515-H	1	Chlorine Feed Building	200
K-1517	1	Valve Pit	200
K-1547	1	Visitor's Overlook	288
K-1580	1	Engineering Office Building	38,211
K-1600	1	Technology Test Facility	39,700
K-1600-A	1	TTF - Office Addition	4,000
K-1650	1	Central Control Facility	21,120
K-1650-A	1	EOC Mobile Emergency Trailer	550
K-1652	1	Plant Protection Headquarters	23,232

ETTP Facilities for Demolition

Facility	# Bldgs	Name	Gross Area(Ft2)
K-0025 (300)	1	K-25 Process Building (54 Units)	4,755,724
K-0027 (402)	1	K-27 Process Building (9 Units)	1,114,386
K-0029 (502)	1	K-29 Process Building (3 Units)	582,400
K-0131	1	Feed Vaporization/Field Maintenance	44,242
K-025/K-27	0	Outdoor Process Tielines	
K-027/K-1131	0	Outdoor Process Tielines	
K-027/K-131	0	Outdoor Process Tielines	
K-027/K-413	0	Outdoor Process Tielines	
K-027/K-631	0	Outdoor Process Tielines	
K-027/K-633	0	Outdoor Process Tielines	
K-0300-C	1	Coolant Storage Area	
K-0300-C1	1	Coolant Unloading Building	
K-0300-C2	1	Coolant Pump Building	
K-0300-C3	1	Coolant Drying System	
K-031/K-631	0	Outdoor Process Tielines	
K-033/K-31	0	Outdoor Process Tielines	
K-0413	1	Product Withdrawal	15,848
K-0631	1	Process Tails	39,040
K-0633	1	Test Loop	19,021
K-0633-D	1	Equipment Trailer	840
K-0700-A39/A40	0	Substations	-
K-0701	1	Boiler House - Fabrication Shop	38,395
K-0702	1	Turbine Room & Discharge	96,126
K-0703	1	Fabrication Shop & Separations Lab	21,285
K-0704	1	Main Switch House	76,872
K-0705-B	1	Crib House	1,814
K-0706	1	Pump House	4,464
K-0707	1	Auxiliary Switch House	6,540
K-0709	0	Switchyard (powerhouse)	91,476
K-0709-A,B	1	Oil Filtering & Handling (incl. oil tank)	256
K-0709-C	1	Sprinkler Valve House	293
K-0710-A	1	Sewage Treatment Pump House	476
K-0711	1	Storage Warehouse	6,194
K-0712	1	Fairchild Substation	1,944
K-0715	1	Water Treatment System	700
K-0719	1	Old Paymaster Pay Point	144
K-0722	1	Storage Warehouse	12,699
K-0723	1	Storage Warehouse	10,452
K-0724	1	Storage Warehouse	8,280
K-0725	1	Beryllium/Storage Warehouse	21,614
K-0726	1	Storage Building	2,738
K-0734	1	Storage Building	1,254

ETTP Facilities for Demolition

Facility	# Bldgs	Name	Gross Area(Ft2)
K-0735	1	Storage Building	4,086
K-0736	1	Storage Building	300
K-0738	1	Chlorinator House	360
K-0740	1	Paint Storage	200
K-0761	1	K-31 Switchhouse	40,819
K-0762	0	Switchyard (K-31)	139,392
K-0762-1,2	0	Valve Vaults	-
K-0763-A	1	Oil Filter House	248
K-0763-D&E	2	Sprinkler Houses	496
K-0766	1	Storage Shed	400
K-0791	1	K-33 Switch House Control Room	16,080
K-0791-N	1	K-33 North Switch House	30,398
K-0791-S	1	K-33 South Switch House	30,398
K-0792	0	Switchyard (K-33)	326,700
K-0794	1	Oil Pump House	560
K-0795-A - D	4	Sprinkler Valve Houses	2,084
K-0796-A	1	Maintenance Repair Shop	2,784
K-0801	1	Intake Water Pump House	984
K-0801-A	1	Water Treatment Facility	1,801
K-0801-C -E	3	Sprinkler Valve Houses	160
K-0801AA,BB	2	Valve Vaults	-
K-0801B	0	Water Treatment Clarifier	-
K-0803 & K-804	2	Valve Houses	212
K-0832	1	Recirculating Water Pump House	11,097
K-0832 A&B	2	Sprinkler Valve Houses	182
K-0832-H	1	Cooling Tower	
K-0833	1	Cooling Water Return Pump House	225
K-0834	1	Valve House	150
K-0861	1	Cooling Tower (K-31)	
K-0861-A & B	2	Sprinkler Valve Houses	160
K-0861-J	1	CUP Cooling Tower Addition	
K-0862 (incl S)	1	K-31 RC Water Pump House (incl S)	6,864
K-0863 - K-874	17	RCW Valve Vaults	1,320
K-0891	1	Raw Water Pumphouse	1,558
K-0892	1	Recirculating Water Pump House	23,202
K-0892-D,E,K,M,P	5	Sprinkler Valve Houses	360
K-0892-G	1	Cooling Tower & basin	
K-0892-H	1	Cooling Tower & basin	
K-0892-J	1	Cooling Tower & basin	
K-0892-N	1	HCL Pumphouse	367
K-0892-Y (X)	1	RCW Sludge Softener Facility	1,350
K-0892A,B,C	0	Clarifiers	-

ETTP Facilities for Demolition

Facility	# Bldgs	Name	Gross Area(Ft2)
K-0892Q	0	HCL Storage Tank	-
K-0892R	0	Zinc Storage Tank	-
K-0892S	0	Chromate Storage Tank	-
K-0892T	0	Phosphate Storage Tank	-
K-0892U,V,W	3	Valve Houses (3)	-
K-0893-A - FF	30	RCW Valve Vaults	2,456
K-0894	1	Acid Unloading Station	-
K-0894A	1	Rail Car Transfer Station	330
K-0895	1	Waste Management Storage	120
K-0896	1	Cooling Water Blow Down	530
K-0896A,B	0	Clarifier Tanks	-
K-0896C	1	Pumphouse	80
K-0901	1	Clinch River Pumping Station	795
K-1004-N	1	Lab Cooling Tower	
K-1007-B	1	Trailer	1,440
K-1008-A	1	Changehouse	10,045
K-1008-B	1	Changehouse	10,045
K-1008-C	1	Changehouse	10,045
K-1008-D	1	Medical Therapy Building	11,125
K-1015	1	Laundry	8,039
K-1021	1	Old Fire House	2,193
K-1021-A	1	Old Tower	265
K-1024	1	Offices, HEPA Test	24,500
K-1024-A,B,C,D	4	Storage Buildings	1,009
K-1025-A - D	4	Warehouses	3,280
K-1025-E	1	Warehouses	820
K-1031	1	Paint Equipment Warehouse (incl A)	2,902
K-1040	1	Maintenance Shop	1,684
K-1064-B	1	Salvage Material Yard Office	640
K-1064-E	1	Salvage Yard Shop	210
K-1064-H,J,K	3	Storage Sheds	3,350
K-1092	0	Tank Foundation	-
K-1098-D	1	Maintenance Offices	2,603
K-1098-G	1	Heavy Equipment Storage Shed	2,436
K-1131	1	Feed & Tails Building	55,754
K-1131-C&D	2	Sprinkler Valve Houses	122
K-1132	1	HF Storage	144
K-1133	1	HF Storage	144
K-1134	1	HF Storage Shed	144
K-1135	1	HF Storage Control Building	144
K-1206E	0	Fire Water Tank	-
K-1231	1	Process Building	12,168

ETTP Facilities for Demolition

Facility	# Bldgs	Name	Gross Area(Ft2)
K-1231A,B	0	Propane & Caustic Tanks	-
K-1232	1	Chemical Recovery Facility	9,300
K-1233	1	Collection Facility	3,300
K-1233-A	1	Drum Cleaning Facility	624
K-1300	1	Brick Stack	
K-1301	1	Vacant Facility	9,831
K-1302	1	Fluorine Storage	3,256
K-1303	1	Air Model Test Facility	13,198
K-1310-A - EH	114	Trailers/Pre-Fab Buildings (114)	57,082
K-1313-A - E	5	Rubb Tents	28,608
K-1314-A - E	5	Storage Buildings	2,100
K-1408-A	1	Pyrofax Heating Unit	125
K-1410	1	Nickel Plating Facility	8,844
K-1413	1	Laboratory - Engineering	8,512
K-1417	1	Concrete Block Casting Facility	2,700
K-1419	1	Sludge Fixation Facility	3,800
K-1420	1	Decon & Uranium Recovery Facility	94,549
K-1420-B	1	Flammable Liquid Storage	400
K-1420-C	1	Gas Cylinder Storage	60
K-1420-D	1	Valve Sprinkler House	30
K-1421	1	Incinerator House	586
K-1422	1	Storage Building	322
K-1423-D	1	Trailer	2,160
K-1423-E	1	Trailer	1,440
K-1423-F	1	Trailer	2,160
K-1423-I	1	Trailer	1,440
K-1425	1	Waste Oil Storage Facility	2,700
K-1430	1	Construction Offices (est. size)	600
K-1430-A & B	2	Portable Buildings	1,920
K-1501-E	1	Crusher Transfer Building	2,145
K-1545-A	1	Trailer	384
K-1546-C	1	Trailer	1,248
K-1548	1	Canteen Trailer	432
K-1550	1	Restroom Facility	432
K-1550-A - W	18	Engineering Trailers (18)	25,848
K-1556	1	Trailer	7,207

APPENDIX B

B.2 FACT SHEETS ON SELECTED FACILITIES AVAILABLE FOR LEASE AT THE K-25 SITE

K-1037 Production-Development (Barrier/Atomic Vapor Laser Isotope Separation [AVLIS]) Building

(click here for external view of building)

Building Number:	K-1037
Building Name:	Production-Development (Barrier/AVLIS Facility)
Gross Building Area:	334, 115 square feet
Year Built:	1953
Construction:	Steel frame, masonry block/metal panel exterior, and flat built up/sloping metal clad roof
Utilities:	Electrical service (17.8 megawatts power); nitrogen; plant air; steam and chilled water; sanitary water, fire water, sprinklers; natural gas available; recirculating cooling water (1000 ton system); and uninterruptible power supply
Special Features:	Specially designed equipment for the AVLIS Product Conversion Facility. Large high temperature oxidation ovens, large grit blast facility with HEPA filter capabilities, various sizes of vacuum vessels, clean room with HEPA filter system, complete active metallography, material test and stress laboratories, large power supplies, demineralized water system, two 15-ton cranes with 24-ft hook height, rail spur at large loading dock, several isolation optic pads available, walk-in hoods with HEPA filter system, and other specialized equipment.
General Comments:	Relatively small areas of the building have been exposed to radioactive materials. Portions of the building were designed and built in accordance with the prevalent uniform building code seismic requirements. Adjacent to TSCA Incinerator and Central Neutralization Facility. Easy access to outside perimeter of the K-25 site.

K-1401 Maintenance Building

(click here for external view of building)

Building Number:	K-1401
Building Name:	Maintenance Building
Gross Building Area:	473,181 square feet
Year Built:	1944 with additions/improvements made through the 1970's
Construction:	Masonry structure, masonry block/transite siding exterior, and flat built up roof
Utilities:	Electrical service and emergency diesel generator; argon, nitrogen, and oxygen supply systems; natural gas; plant air; steam and chilled water; and sanitary water, fire water, and sprinklers
Special Features:	Over 400 major machine tools, 48,000 sq ft operational machine shop, 30,360 sq ft jig and fixture shop, plus sheet metal , welding, tool repair and maintenance shops; degreasing tanks; five 680 x40 ft bays with 2 5-ton, 4 10-ton, 2 15-ton, and 5 20-ton cranes with 20ft hook height; five 747 x 40 ft bays with 2 5-ton, 6 1 0-ton, 1 14-ton, 2 20-ton, 1 31-ton, and 1 50-ton cranes with 20 ft hook height; Four 320 x 40 ft bays with 1 5-ton, 1 10-ton, and 2 14-ton cranes with 20 ft hook height; five 253 x 40 ft bays with 2 5-ton, 1 10 ton, 2 14-ton, 1 15-ton, and 1 20-ton crane s with 20 ft hook height; One 220 x 40 ft bay with 1 2-ton and 1 6-ton crane with 20 ft hook height; One 75 x 40 ft bay with 1 40-ton crane with 25 ft hook height; and one 400 x 40 ft open exterior bay with 1 20-ton crane with 30 ft hook height.
General Comments:	Some areas of the building and equipment have been exposed to radioactive materials.
Miscellaneous Equipment:	Wells Cut-Off Saw, Burn Table, Atmosphere Controlled Electric Furnances

K-1200 N Centrifuge Prep Laboratory

(click here for external view of building)

Building Number:	K-1200 North Bay
Building Name:	Centrifuge Prep Laboratory
Gross Building Area:	22,800 square feet
Year Built:	1972
Construction:	Steel frame, masonry block/metal panel exterior, and sloping metal clad roof
Utilities:	Electrical service and emergency diesel generator; nitrogen; plant air; steam and chilled water; and sanitary water, fire water, and sprinklers
Special Features:	Air conditioned throughout 300 x 60 ft bay serviced by a 5-ton crane with 14-ft hook height, 11 x 12 ft high truck door with adjacent 5-ton lift, and two clean rooms
General Comments:	This building was designed and built in accordance with the prevalent uniform building code seismic requirements. The building has been decontaminated for industrial/office use.

Return to the Home Page

The information owner and the server administrators are listed below if you have questions, comments, or suggestions. An e-mail form is provided with the appropriate links for your convenience. Please include title, URL, or other document descriptor in your message.

Nancy Owens (information owner) info_servers (server administrators) Search

Posted 1/05/96 (kxq)

K-1200 C Centrifuge Prep Laboratory

(click here for external view of building)

Building Number:	K-1200 Center Bay
Building Name:	Centrifuge Prep Laboratory
Gross Building Area:	15,834 square feet
Year Built:	1972
Construction:	Steel frame, masonry block/metal panel exterior, and sloping metal clad roof
Utilities:	Electrical service (uninterrupted) and emergency diesel generator; inert gas piping; nitrogen; plant air; steam and chilled water; and sanitary water, fire water, and sprinklers
Special Features:	Air conditioned 240 x 50 ft wide bay serviced by a 5-ton crane with 14-ft hook height, 80 x 60 ft bay serviced by 5-ton crane with 60-ft hook height, and two computer rooms
General Comments:	This building was designed and built in accordance with the prevalent uniform building code seismic requirements. Relatively small areas of the building have been exposed to radioactive materials.

Return to the Home Page

The information owner and the server administrators are listed below if you have questions, comments, or suggestions. An e-mail form is provided with the appropriate links for your convenience. Please include title, URL, or other document descriptor in your message.

Nancy Owens (information owner) info_servers (server administrators) Search

http://www.ornl.gov/ER/k1200ccp.htm

Posted 1/05/96 (kxq)

THIS PAGE LEFT INTENTIONALLY BLANK

APPENDIX C
SUPPLEMENTAL INFORMATION ON ECOLOGICAL RESOURCES

APPENDIX C
SUPPLEMENTAL INFORMATION ON ECOLOGICAL RESOURCES

SPECIAL TYPES OF AREAS

DOE Oak Ridge National Environmental Research Park

The Oak Ridge National Environmental Research Park (NERP) is one in a network of seven DOE research parks. The Oak Ridge Research Park, about 8,700 ha (21,500 acres), was designated in 1980. The purpose of the research parks is to provide protected land areas for research and education in the environmental sciences and to demonstrate that energy technology development can be compatible with a quality environment.

Southern Appalachian Biosphere Reserve

The Oak Ridge NERP was designated a biosphere reserve in 1988. Biosphere reserves are multi-purpose areas that are nominated by the national committee of the Man and the Biosphere (MAB) program and designated by UNESCO. Their purpose is to serve as demonstration areas for cooperation in building harmonious relationships between human activities and the conservation of ecosystems and biological diversity. US MAB utilizes biosphere reserves as sites for promoting ecosystem management by incorporating a program of ecosystem protection with sustainable human use and development; documenting global change and biological diversity through monitoring, inventorying, and scientific research; and organizing regional cooperative institutions for resolving complex issues of multi-purpose land use (US MAB Program 1995). The Oak Ridge NERP is part of the Southern Appalachian MAB (SAMAB) Cooperative, Southern Appalachian Biosphere Reserve. Objectives of the SAMAB Cooperative are to promote wise use of the region's renewable resources, increase environmental awareness, encourage environmentally safe economic development, and enable the sharing of scientific research.

Tennessee Wildlife Management Area

In November 1984 DOE-Oak Ridge and the TWRA entered into a cooperative agreement for the establishment of a Wildlife Management Area at ORR for a five-year period (Parr and Evans 1992). This agreement was extended for an additional five years on December 1, 1989, (Parr and Evans 1992) and for an additional two years on December 1, 1994 (memo from Kates to Teer, January 20, 1995). Much of the area in the K-25 Area of Responsibility surrounding the area of the proposed action in this EA is part of a wildlife management area with TWRA and is open to hunting on specified dates (Oak Ridge K-25 Site 1994; J. Warren Webb, ORNL, Oak Ridge, Tenn., personal communication with M. S. Salk, ORNL, Oak Ridge, Tenn., June 20, 1996).

APPENDIX D

COMPLIANCE WITH REGULATIONS FOR THREATENED AND ENDANGERED SPECIES

This appendix summarizes (1) endangered species regulations as they apply to the management of the Oak Ridge Reservation (ORR) by the Department of Energy (DOE), (2) recommendations of the Fish and Wildlife Service (FWS) and the state of Tennessee for endangered species activities on the ORR, and (3) DOE actions in response to these recommendations and regulations. In summary, the regulations require DOE to ensure protection of animals and plants listed under the Endangered Species Act (ESA) and animals listed by the Tennessee Wildlife Resources Commission. DOE is not required by state regulations to protect state-listed plant species on its property.

D.1 COMPLIANCE WITH FEDERAL AND STATE REGULATIONS

Federal regulations. Federal regulations to implement Section 7, Interagency Cooperation, of the ESA of 1973 (16 U.S.C. 1531 et seq.) require that DOE consider the impacts of its actions on plant and animal species listed by FWS as threatened or endangered, on species proposed to be listed as threatened or endangered, and on areas designated or proposed for designation as critical habitats. In addition, while none of the substantive or procedural provisions of the Act applies to a species that is designated as a candidate for listing (commonly known as a candidate species), the FWS advises federal agencies that it is prudent to take them in to account during environmental planning, such as in the preparation of NEPA documents. If these species are eventually listed as endangered or threatened, it may be necessary for DOE to consult with FWS to determine the impact of its actions on them.

Section 7 consultation for a "major construction activity" is initiated by DOE's contacting the FWS and asking for information on listed or proposed threatened or endangered species or designated or proposed critical habitats in the area of DOE's proposed action. "Major construction activity" is defined in 50 CFR 402.02 as "a construction project (or other undertaking having similar physical impacts) which is a major federal action significantly affecting the quality of the human environment as referred to in the National Environmental Policy Act" (NEPA). Whether a proposed project meets that definition is determined by an environmental assessment (EA) (40 CFR 1508.9) prepared in accordance with NEPA. If a threatened or endangered species would be affected by a small DOE construction project, the project might have to be defined as "significantly" (40 CFR 1508.27) affecting the environment and as a major federal action requiring an environmental impact statement (EIS) in accordance with 40 CFR 1502.3.

For other proposed actions DOE determines whether listed or proposed species are present. If DOE determines that there are no listed or proposed endangered or threatened species or any designated or proposed critical habitats present in the area of a proposed action, or that if present, they will not be affected, and if FWS agrees with that determination, then no further action is required to comply with Sect. 7.

If DOE determines that any listed species or designated critical habitats may be affected, then informal or formal consultation needs to be initiated. The purpose of informal consultation is to determine if formal consultation or a conference is required. (See 50 CFR 402.13 for details.) During informal consultation, DOE and FWS discuss the effects of the proposed project on listed species and/or critical habitats and possible alternatives that might preclude the need for formal consultation. Although informal consultation is optional, it is highly recommended by FWS as a way to resolve any potential endangered species problems.

If DOE determines that any *proposed* species or critical habitats may be affected, then a conference needs to be initiated. The purpose of a conference is to resolve potential conflicts by informal discussions. The conclusions of these discussions should be recorded in an appropriate document by DOE. If the proposal to list the species or designate the habitat is eventually finalized, DOE may be required to initiate formal consultation. The record of the conference results would then be used as the basis of information for the formal consultation.

If FWS advises DOE that listed or proposed threatened and/or endangered species or designated or proposed critical habitats may be present in the area of proposed actions which are "major construction activities" and DOE determines that they may be affected, then a biological assessment must be prepared. For DOE actions which are not "major construction activities" and for which an EIS is not being prepared, DOE must still comply with Section 7 of the ESA, but a biological assessment is not required. However, for such projects, a biological assessment may be voluntarily prepared to assist DOE in its consultation or conference with FWS. In practice, a biological assessment is normally prepared when a DOE proposed action may affect a threatened and/or endangered species or critical habitat.

If a biological assessment determines that a listed species or designated critical habitat may be affected, or if DOE determines that a proposed minor construction project may affect a listed species, DOE must request formal consultation with FWS. If a biological assessment determines that a species proposed for listing or a habitat proposed for designation as critical may be affected, DOE must confer with the FWS. If DOE determines that no impact would occur and FWS concurs, no further consultation is required.

If a proposed action requiring the preparation of a biological assessment is identical or very similar to a previous action for which a biological assessment has already been prepared, the biological assessment requirement may be fulfilled for the proposed action by incorporating by reference the earlier biological assessment, plus any pertinent supporting data from other documents. A written document should be prepared that certifies that the proposed action involves similar impacts to the same species in the same geographic area, that no new species have been listed or proposed or new critical habitat designated or proposed for the action area, and that the biological assessment has been supplemented with any relevant changes in information. This information should be included in the EA or EIS prepared on the proposed action.

During any consultation, FWS may recommend discretionary studies or surveys that may provide a better information base for assessing impacts on listed species [50 CFR 402.12(d)(2)]. Such studies are optional and not required.

Tennessee regulations. The Tennessee Code Annotated Title 70, Chapter 8, and regulations of the Tennessee Wildlife Resources Commission protect animal species listed by the state as endangered,

threatened, or in need of management. No person or agency may knowingly destroy a listed species or its habitat without a permit from the state.

Plant species listed by the Tennessee Department of Conservation are provided limited protection by the Tennessee Rare Plant Protection and Conservation Act of 1985 (Tennessee Code Annotated Title 11-26, Sects. 201-214). The act protects listed plants from indiscriminate collecting by plant collectors but does not prohibit landowners such as DOE from destroying listed plants on their own property. Thus, apart from federal requirements, DOE is not required to perform surveys for state-listed plants or to ensure that its proposed actions do not impact listed plants. Nevertheless, DOE attempts to protect all state-listed plant species occurring on ORR.

The Tennessee Wildlife Resources Agency and the Tennessee Department of Conservation have been requested to provide written descriptions of any surveys and documentation that DOE must perform or prepare to comply with state law.

D.2 DOE ACTIONS CONCERNING COMPLIANCE WITH STATE AND FEDERAL REGULATIONS

Personnel. The Resource Management Organization for ORR includes two persons designated to coordinate issues concerning threatened and endangered (T & E) species— one person for plant species and one for animal species. They serve as coordinators for consultation with state and federal agencies and for surveys for listed plants and animals on ORR. Activities on the DOE National Environmental Research Park on ORR also support studies of listed species that are known to occur on ORR. During 1994 and 1995, field surveys for T & E species were conducted throughout ORR as part of the environmental restoration project. No staff positions are designated and funded specifically for surveys or studies of listed species, and so such surveys and studies are limited.

Planning and documentation. As part of the planning process for construction projects, DOE coordinates literature reviews and conducts surveys to determine whether any listed plant or animal species would be affected. The two endangered species coordinators of the Resource Management Organization have reviewed literature and other information on the status of listed plants and animals on ORR (Kroodsma 1987; Parr 1984; Cunningham et al. 1993; Pounds et al. 1993; King et al. 1994). Field surveys are conducted as necessary, and documentation is provided in categorical exclusions, EAs, and EISs.

Surveys. There is no evidence that any FWS-listed plant species occurs on ORR (Table D.1). Nevertheless, an attempt is made to conduct plant surveys for all state-listed, FWS-listed, FWS-proposed, and FWS candidate plants at all sites with natural habitats that would be affected by construction or operation of a proposed project. Many state-listed and FWS candidate plant species occur on ORR and are sometimes found on proposed construction sites.

There is evidence that one FWS-listed animal species occurs on ORR (Table D.1). A dead gray bat was found in a facility light fixture about 4 km (2.5 miles) from Melton Valley. Additional surveys for this species are currently in progress. The Indiana bat is another FWS-listed animal species for which there was sufficient evidence to indicate potential presence on ORR. A partial field survey (limited mist netting) was

conducted in May 1992 at several sites in the floodplain of East Fork Poplar Creek in habitat that was suitable for this species, but no Indiana bats were trapped during this partial survey (Webb 1995). Also, bald eagles are occasionally seen on the ORR in winter, but none are known to nest there.

D.3 REFERENCES

Awl, D. J., L. R. Pounds, B. A. Rosensteel, A. L. King, and P. A. Hamlett, 1996, *Survey of Protected Vasular Plants on the Oak Ridge Reservation, Oak Ridge, TN*, ES/ER/TM-194, Environmental Restoration Program, Oak Ridge, Tenn.

Cunningham, M. et al., 1993, *Resource Management Plan for the Oak Ridge Reservation Vol. 29: Rare Plants on the Oak Ridge Reservation*, ORNL/NERP-7, Oak Ridge National Laboratory, Oak Ridge, Tenn.

King, A. L., D. J. Awl, and C. A. Gabrielsen, 1994, *Environmentally Sensitive Areas Surveys Program Threatened and Endangered Species Survey Progress Report*, ORNL/ES/ER/TM-130, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Kroodsma, R. L., 1987, *Resource Management Plan for the Oak Ridge Reservation, Vol. 24: Threatened and Endangered Animal Species*, ORNL/ESH-1/V24, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Mitchell, J. M., E. R. Vail, J. W. Webb, J. W. Evans, A. L. King, and P. A. Hamlett, 1996, *Survey of Protected Terrestrial Vertebrates on the Oak Ridge Reservation*, ES/ER/TM-188/R1, Environmental Restoration Program, Oak Ridge, Tenn.

Parr, P. D., 1984, *Resource Management Plan for the Oak Ridge Reservation, Vol. 4: Endangered and Threatened Plant Species*, ORNL-6026/V4, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Parr, P. D., and J. W. Evans, 1992, *Resources Management Plan for the Oak Ridge Reservation, Vol. 27: Wildlife Management Plan*, ORNL/NERP-6, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Pounds, L. R., P. D. Parr, and M. G. Ryon, 1993, *Resource Management Plan for the Oak Ridge Reservation, Vol. 30: Oak Ridge National Environmental Research Park Natural Areas and Reference Areas—Oak Ridge Reservation Environmentally Sensitive Sites Containing Special Plants, Animals, and Communities*, ORNL/NERP-8, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Webb, J. W., 1995, Environmental Sciences Division (ESD), Oak Ridge National Laboratory (ORNL), Oak Ridge, Tenn., personal communication to M. S. Salk, ESD, ORNL, July 31.

Table D.1. Status of rare species reported from the Oak Ridge Reservation[a]

Species		Legal status[b]	
		Federal	State
	Plants		
Delphinium exaltatum	tall larkspur	SC	E
Aureolaria patula	spreading false foxglove	SC	T
Cimicifuga rubifolia	Appalachian bugbane	SC	T
Juglans cinerea	butternut	SC	
Carex howei	Howe's sedge		E
Cypripedium acaule	pink lady-slipper		E
Liparis loeselii	fen orchid		E
Pycnanthemum verticillatum	whorled mountain-mint		E, possibly extirpated[c]
Diervilla lonicera	northern bush-honeysuckle		T
Fothergilla major	mountain witch-alder		T
Hydrastis canadensis	golden seal		T
Lilium canadense	Canada lily		T
Lilium michiganense	Michigan lily		T
Panax quinquifolius	ginseng		T
Platanthera flava var herbiola	tuberculed rein-orchid		T
Platanthera peramoena	purple fringeless orchid		T
Spiranthes lucida	shining ladies'-tresses		T
Elodea nuttallii	Nuttall waterweed		S
Ruellia purshiana	Pursh's wild-petunia		S
Saxifraga careyana	Carey saxifrage		S
Spiranthes ovalis	lesser lady's tresses		S
Carex gravida	heavy sedge		S
Carex oxylepis var. pubescens	hairy sharp-scaled sedge		S
Rhynchospora colorata	white-topped sedge		S
Draba ramosissima	branching whitlow-grass		S
Juncus brachycephalus	small-head sedge		S
Scirpus fluviatalis	river bulrush		S
Viola tripartita var. tripartita	three-parted violet		S
	Fish		
Polyodon spathula	paddlefish	SC	
Phoxinus tennesseensis	Tennessee dace		NM
	Amphibians and reptiles		
Aneides aeneus	green salamander	SC	
Cryptobranchus alleganiensis	hellbender	SC	NM
Hemidactylium scutatum	four-toed salamander		NM

(Table D.1. Continued)

Species		Legal status[b] Federal	State
	Birds		
Haliaeetus leucocephalus[d]	bald eagle	T	T
Falco peregrinus[d]	peregrine falcon	T	E
Dendroica cerulea[c]	cerulean warbler	SC	
Lanium ludovicianus	loggerhead shrike	SC	
Pandion haliaetus	osprey		T
Ammodramus savannarum[c]	grasshopper sparrow		NM
Accipiter striatus[c]	sharp-shinned hawk		NM
Accipiter cooperii[c]	Cooper's hawk		NM
Circus cyaneus[d]	northern harrier		NM
Anhinga anhinga[d]	anhinga		NM
Casmerodius alba[d]	great egret		NM
Contopus borealis[d]	olive-sided flycatcher		NM
Grus canadensis[d]	sandhill crane		NM
Phalacrocorax auritus[d]	double-crested cormorant		NM
Sphyrapicus varius[d]	yellow-bellied sapsucker		NM
Egretta caerulea[c]	little blue heron		NM
Egretta thula	snowy egret		NM
	Mammals		
Myotis grisescens	gray bat	E	E
Sorex longirostris	southeastern shrew		NM

[a]From Parr and Evans (1992), Cunningham et al. (1993), Kroodsma (1987), Pounds et al. (1993), King et al. (1994), Mitchell et al. (1996), Awl et al. (1996), and ongoing environmental restoration field surveys.

[b]FEDERAL: E = endangered, T = threatened, SC = species of concern (formerly C2 species); STATE: E = endangered, T= threatened, NM = in need of management, S = special concern in Tennessee.

[c]Possibly extirpated status in Tennessee may be changed because of specimens from ORR.

[d]Uncommon visitor or migrant. Not currently known to nest on the Oak Ridge Reservation.

[e]Summer.

D.4 CONSULTATION LETTERS

to protect. Therefore, we would request that this information only be used as a research tool by professional staff and not be made available to the public or anyone outside of your Division.

In order to comply with the National Environmental Policy Act consideration should be given to the comprehensive and *cumulative* impacts associated with the project actions. Based upon the information provided, it is probable that any proposed stream crossing will impact instream, aquatic, habitat and riparian habitat as part of the project implementation.

Any restoration activities should include the use of native plant species. Restoration should be accomplished by using native plant species consistent with local community types.

Techniques for sediment retention and streamside reconstruction are outlined in the following documents prepared by our Department:

1. **Tennessee Erosion Control Handbook, July 1992.**

2. **Reducing Nonpoint Source Water Pollution by Preventing Soil Erosion and Controlling Sediment on Construction Sites, March 1992.**

3. **Riparian Restoration and Streamside Erosion Control Handbook, November 1994.**

Please refer to these documents when planning measures to lessen any project or construction impacts.

In addition, to those specific comments we also offer the following general comments:

- We would like to reiterate that we support the process and findings of the *Oak Ridge Reservation, Biodiversity, and the Common Ground Process, Final Report*. We have ongoing concerns related to the loss of public lands and habitat for developing industrial use, especially when there are no plans for replacement of these tracts.

- The leasing of this parcel has the potential for impact to several species, there is no description of species-specific protection strategies. Any leasing plan should address the loss of parcels that may be adjacent to or integrated with more sensitive habitat.

DIVISION OF NATURAL HERITAGE 401 Church Street 8th Floor L&C Tower Nashville TN 37243-0443 Telephone 615/532-0431

- Should restoration of construction sites be included as an alternative, we would suggest that restoration activities include the use of native plant species. Restoration should be accomplished by using native plant species consistent with local community types.

We appreciate the opportunity to assist you with your pre-project planning. If we can be of further assistance with your project please contact our office in Nashville, telephone 615/532-0431.

Respectfully,

Andrew N. Barrass Ph. D.,
Environmental Review Coordinator
Division of Natural Heritage

Attachments: (4)
cc:
Mr. Dodd Galbreath, TEPO-TDEC
Mr. Lee Barclay, Ph. D., U.S. Fish and Wildlife Service
Mr. Dan Sherry, TWRA

THIS PAGE LEFT INTENTIONALLY BLANK

LIST OF RARE, THREATENED, AND ENDANGERED SPECIES FOR THE BETHYL VALLEY, ELVERTON,

IFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	GLOBAL RANK
PTEBRATES				
AIA CUNEOLUS	FINE-RAYED PIGTOE	LE	E	G1
AIA EDGARIANA	SHINY PIGTOE	LE	E	G1
LUVIALIS	SPINY RIVERSNAIL			G2
LIS ABRUPTA	PINK MUCKET	LE	E	G2
LIS VIRESCENS	ALABAMA LAMP MUSSEL	LE	E	G1
HOBASUS COOPERIANUS	ORANGE-FOOT PIMPLEBACK	LE	E	G1
BEMA RUBRUM	PYRAMID PIGTOE			G2G3
LA CYLINDRICA STRIGILLATA	ROUGH RABBITSFOOT PEARLY MUSSE	PE		G4T2T3
RS				
ROOKERY	HERON ROOKERY			
TS				
IS AURICULATA	EARLEAVED FALSE-FOXGLOVE		E	G2
ARIA PATULA	SPREADING FALSE-FOXGLOVE		T	G2
GRAVIDA	HEAVY SEDGE		S	G5
OXYLEPIS VAR PUBESCENS	HAIRY SHARP-SCALED SEDGE		S	G5?T1?
FUGA RUBIFOLIA	APPALACHIAN BUGBANE		T	G3
EDIUM ACAULE	PINK LADY'S-SLIPPER		E*	G5
HINIUM EXALTATUM	TALL LARKSPUR		E	G3
LLA LONICERA	NORTHERN BUSH-HONEYSUCKLE		T	G5
RAMOSISSIMA	BRANCHING WHITLOW-GRASS		S	G4
A NUTTALLII	NUTTALL'S WATERWEED		S	G5
RGILLA MAJOR	MOUNTAIN WITCH-ALDER		T	G3
LIUM HELLERI	HELLER'S CATFOOT		S	G4G5
TIS CANADENSIS	GOLDENSEAL		T	G4
NS CINEREA	BUTTERNUT		T	G3G4
BRACHYCEPHALUS	SMALL-HEADED RUSH		S	G5
S CYLINDRACEA	SLENDER BLAZING-STAR		E	G5
M CANADENSE	CANADA LILY		T	G5
IS LORSELII	FEN ORCHIS		E	G5
RA DIOICA	MOUNTAIN HONEYSUCKLE		S	G5
QUINQUEFOLIUS	AMERICAN GINSENG		T	G4
NTHERA FLAVA VAR HERBIOLA	TUBERCLED REIN-ORCHID		T	G4T4Q
THERA PERAMOENA	PURPLE FRINGELESS ORCHID		T	G5
AGA CAREYANA	CAREY'S SAXIFRAGE		S	G3
US FLUVIATILIS	RIVER BULRUSH		S	G5
AGO PTARMICOIDES	PRAIRIE GOLDENROD		E	G5
THES OVALIS	LESSER LADIES'-TRESSES		S	G5
BRATES				
TER COOPERII	COOPER'S HAWK		D	G4
TER STRIATUS	SHARP-SHINNED HAWK		D	G5
HILA AESTIVALIS	BACHMAN'S SPARROW		E	G3
TONA TALPOIDEUM	MOLE SALAMANDER		D	G5
S AENEUS	GREEN SALAMANDER			G4
LINEATUS	RED-SHOULDERED HAWK			G5
YPS ATRATUS	BLACK VULTURE			G5
BRANCHUS ALLEGANIENSIS	HELLBENDER		D	G4
ICA CERULEA	CERULEAN WARBLER			G4
CONCOLOR COUGAR	EASTERN COUGAR	LE	E	G4T4

LIST OF RARE, THREATENED, AND ENDANGERED SPECIES FOR THE BETHYL VALLEY,ELVERTO

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	G R	B X
HEMIDACTYLIUM SCUTATUM	FOUR-TOED SALAMANDER		D	G5	
HEMITREMIA FLAMMEA	FLAME CHUB		D	G	
LUTRA CANADENSIS	NORTHERN RIVER OTTER		T	G5	
NAPAEOZAPUS INSIGNIS	WOODLAND JUMPING MOUSE		D	G5	
OPHISAURUS ATTENUATUS LONGICAUDUS	EASTERN SLENDER GLASS LIZARD		D	G5	5
PANDION HALIAETUS	OSPREY		T	G5	
PHOXINUS TENNESSEENSIS	TENNESSEE DACE		D	G2G3	
PITUOPHIS MELANOLEUCUS MELANOLEUCUS	NORTHERN PINE SNAKE		T	G5T4	
POLYODON SPATHULA	PADDLEFISH			G4	
SOREX CINEREUS	COMMON SHREW		D	G5	
SOREX DISPAR	LONG-TAILED OR ROCK SHREW		D	G5	
SOREX FUMEUS	SMOKY SHREW		D	G5	
SOREX LONGIROSTRIS	SOUTHEASTERN SHREW		D	G5	
SYNAPTOMYS COOPERI	SOUTHERN BOG LEMMING		D	G5	
TRACHEMYS SCRIPTA TROOSTII	CUMBERLAND SLIDER			G5	?
ZAPUS HUDSONIUS	MEADOW JUMPING MOUSE		D	G5	

61 Records Processed

1

N ME:............	SCOMNAME:............................	SNAME:.............................. FEI
EL VALLEY	MOLE SALAMANDER	AMBYSTOMA TALPOIDEUM
I VALLEY	MOLE SALAMANDER	AMBYSTOMA TALPOIDEUM
I VALLEY	MOLE SALAMANDER	AMBYSTOMA TALPOIDEUM
EL VALLEY	MOLE SALAMANDER	AMBYSTOMA TALPOIDEUM
EL VALLEY	MOLE SALAMANDER	AMBYSTOMA TALPOIDEUM
I VALLEY	MOLE SALAMANDER	AMBYSTOMA TALPOIDEUM
L VALLEY	MOLE SALAMANDER	AMBYSTOMA TALPOIDEUM
EL VALLEY	MOLE SALAMANDER	AMBYSTOMA TALPOIDEUM
I VALLEY	HELLBENDER	CRYPTOBRANCHUS ALLEGANIENSIS
I VALLEY	GREEN SALAMANDER	ANEIDES AENEUS
EL VALLEY	GREEN SALAMANDER	ANEIDES AENEUS
F VALLEY	GREEN SALAMANDER	ANEIDES AENEUS
I VALLEY	GREEN SALAMANDER	ANEIDES AENEUS
L VALLEY	GREEN SALAMANDER	ANEIDES AENEUS
EL VALLEY	GREEN SALAMANDER	ANEIDES AENEUS
VALLEY	FOUR-TOED SALAMANDER	HEMIDACTYLIUM SCUTATUM
VALLEY	BLACK VULTURE	CORAGYPS ATRATUS
EL VALLEY	OSPREY	PANDION HALIAETUS
F VALLEY	SHARP-SHINNED HAWK	ACCIPITER STRIATUS
VALLEY	SHARP-SHINNED HAWK	ACCIPITER STRIATUS
EL VALLEY	COOPER'S HAWK	ACCIPITER COOPERII
EL VALLEY	RED-SHOULDERED HAWK	BUTEO LINEATUS
VALLEY	RED-SHOULDERED HAWK	BUTEO LINEATUS
VALLEY	CERULEAN WARBLER	DENDROICA CERULEA
EL VALLEY	BACHMAN'S SPARROW	AIMOPHILA AESTIVALIS
VALLEY	BACHMAN'S SPARROW	AIMOPHILA AESTIVALIS
VALLEY	PADDLEFISH	POLYODON SPATHULA
EL VALLEY	FLAME CHUB	HEMITREMIA FLAMMEA
EL VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
EL VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
EL VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
EL VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
EL VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
L VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
L VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
EL VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
EL VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
L VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
L VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
EL VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
L VALLEY	TENNESSEE DACE	PHOXINUS TENNESSEENSIS
L VALLEY	COMMON SHREW	SOREX CINEREUS
EL VALLEY	COMMON SHREW	SOREX CINEREUS
EL VALLEY	COMMON SHREW	SOREX CINEREUS
L VALLEY	SOUTHEASTERN SHREW	SOREX LONGIROSTRIS
L VALLEY	SOUTHEASTERN SHREW	SOREX LONGIROSTRIS
L VALLEY	SOUTHEASTERN SHREW	SOREX LONGIROSTRIS
L VALLEY	SMOKY SHREW	SOREX FUMEUS
L VALLEY	SMOKY SHREW	SOREX FUMEUS

QUADNAME:	SCOMNAME:	SNAME:
BETHEL VALLEY	SMOKY SHREW	SOREX FUMEUS
BETHEL VALLEY	LONG-TAILED OR ROCK SHREW	SOREX DISPAR
BETHEL VALLEY	LONG-TAILED OR ROCK SHREW	SOREX DISPAR
BETHEL VALLEY	SOUTHERN BOG LEMMING	SYNAPTOMYS COOPERI
BETHEL VALLEY	SOUTHERN BOG LEMMING	SYNAPTOMYS COOPERI
BETHEL VALLEY	SOUTHERN BOG LEMMING	SYNAPTOMYS COOPERI
BETHEL VALLEY	MEADOW JUMPING MOUSE	ZAPUS HUDSONIUS
BETHEL VALLEY	MEADOW JUMPING MOUSE	ZAPUS HUDSONIUS
BETHEL VALLEY	WOODLAND JUMPING MOUSE	NAPAEOZAPUS INSIGNIS
BETHEL VALLEY	NORTHERN RIVER OTTER	LUTRA CANADENSIS
BETHEL VALLEY	NORTHERN RIVER OTTER	LUTRA CANADENSIS
BETHEL VALLEY	EASTERN COUGAR	FELIS CONCOLOR COUGAR
BETHEL VALLEY	CUMBERLAND SLIDER	TRACHEMYS SCRIPTA TROOSTII
BETHEL VALLEY	CUMBERLAND SLIDER	TRACHEMYS SCRIPTA TROOSTII
BETHEL VALLEY	CUMBERLAND SLIDER	TRACHEMYS SCRIPTA TROOSTII
BETHEL VALLEY	CUMBERLAND SLIDER	TRACHEMYS SCRIPTA TROOSTII
BETHEL VALLEY	CUMBERLAND SLIDER	TRACHEMYS SCRIPTA TROOSTII
BETHEL VALLEY	CUMBERLAND SLIDER	TRACHEMYS SCRIPTA TROOSTII
BETHEL VALLEY	CUMBERLAND SLIDER	TRACHEMYS SCRIPTA TROOSTII
BETHEL VALLEY	CUMBERLAND SLIDER	TRACHEMYS SCRIPTA TROOSTII
BETHEL VALLEY	CUMBERLAND SLIDER	TRACHEMYS SCRIPTA TROOSTII
BETHEL VALLEY	EASTERN SLENDER GLASS LIZARD	OPHISAURUS ATTENUATUS LONGICAUDUS
BETHEL VALLEY	EASTERN SLENDER GLASS LIZARD	OPHISAURUS ATTENUATUS LONGICAUDUS
BETHEL VALLEY	SIX-LINED RACERUNNER	CNEMIDOPHORUS SEXLINEATUS
BETHEL VALLEY	SIX-LINED RACERUNNER	CNEMIDOPHORUS SEXLINEATUS
BETHEL VALLEY	SIX-LINED RACERUNNER	CNEMIDOPHORUS SEXLINEATUS
BETHEL VALLEY	SIX-LINED RACERUNNER	CNEMIDOPHORUS SEXLINEATUS
BETHEL VALLEY	SIX-LINED RACERUNNER	CNEMIDOPHORUS SEXLINEATUS
BETHEL VALLEY	SIX-LINED RACERUNNER	CNEMIDOPHORUS SEXLINEATUS
BETHEL VALLEY	SIX-LINED RACERUNNER	CNEMIDOPHORUS SEXLINEATUS
BETHEL VALLEY	SIX-LINED RACERUNNER	CNEMIDOPHORUS SEXLINEATUS
BETHEL VALLEY	NORTHERN PINE SNAKE	PITUOPHIS MELANOLEUCUS MELANOLEUCUS
BETHEL VALLEY	NORTHERN PINE SNAKE	PITUOPHIS MELANOLEUCUS MELANOLEUCUS
BETHEL VALLEY	NORTHERN PINE SNAKE	PITUOPHIS MELANOLEUCUS MELANOLEUCUS
BETHEL VALLEY	PINK MUCKET	LAMPSILIS ABRUPTA
BETHEL VALLEY	ORANGE-FOOT PIMPLEBACK	PLETHOBASUS COOPERIANUS
BETHEL VALLEY	ROUGH RABBITSFOOT PEARLY MUSSEL	QUADRULA CYLINDRICA STRIGILLATA
BETHEL VALLEY	SPINY RIVERSNAIL	IO FLUVIALIS
BETHEL VALLEY	SPINY RIVERSNAIL	IO FLUVIALIS
BETHEL VALLEY	SPINY RIVERSNAIL	IO FLUVIALIS
BETHEL VALLEY	HERON ROOKERY	HERON ROOKERY
BETHEL VALLEY	AMERICAN GINSENG	PANAX QUINQUEFOLIUS
BETHEL VALLEY	AMERICAN GINSENG	PANAX QUINQUEFOLIUS
BETHEL VALLEY	AMERICAN GINSENG	PANAX QUINQUEFOLIUS
BETHEL VALLEY	AMERICAN GINSENG	PANAX QUINQUEFOLIUS
BETHEL VALLEY	NORTHERN BUSH-HONEYSUCKLE	DIERVILLA LONICERA
BETHEL VALLEY	MOUNTAIN WITCH-ALDER	FOTHERGILLA MAJOR
BETHEL VALLEY	BUTTERNUT	JUGLANS CINEREA
BETHEL VALLEY	BUTTERNUT	JUGLANS CINEREA
BETHEL VALLEY	APPALACHIAN BUGBANE	CIMICIFUGA RUBIFOLIA
BETHEL VALLEY	APPALACHIAN BUGBANE	CIMICIFUGA RUBIFOLIA
BETHEL VALLEY	APPALACHIAN BUGBANE	CIMICIFUGA RUBIFOLIA
BETHEL VALLEY	APPALACHIAN BUGBANE	CIMICIFUGA RUBIFOLIA
BETHEL VALLEY	TALL LARKSPUR	DELPHINIUM EXALTATUM
BETHEL VALLEY	TALL LARKSPUR	DELPHINIUM EXALTATUM

E 3

NAME:	SCOMNAME:	SNAME:	FE
HEL VALLEY	TALL LARKSPUR	DELPHINIUM EXALTATUM	
L VALLEY	GOLDENSEAL	HYDRASTIS CANADENSIS	
L VALLEY	GOLDENSEAL	HYDRASTIS CANADENSIS	
HEL VALLEY	GOLDENSEAL	HYDRASTIS CANADENSIS	
L VALLEY	GOLDENSEAL	HYDRASTIS CANADENSIS	
L VALLEY	CAREY'S SAXIFRAGE	SAXIFRAGA CAREYANA	
EL VALLEY	CAREY'S SAXIFRAGE	SAXIFRAGA CAREYANA	
HEL VALLEY	CAREY'S SAXIFRAGE	SAXIFRAGA CAREYANA	
L VALLEY	CAREY'S SAXIFRAGE	SAXIFRAGA CAREYANA	
L VALLEY	CAREY'S SAXIFRAGE	SAXIFRAGA CAREYANA	
HEL VALLEY	SPREADING FALSE-FOXGLOVE	AUREOLARIA PATULA	
L VALLEY	SPREADING FALSE-FOXGLOVE	AUREOLARIA PATULA	
L VALLEY	SPREADING FALSE-FOXGLOVE	AUREOLARIA PATULA	
EL VALLEY	SPREADING FALSE-FOXGLOVE	AUREOLARIA PATULA	
HEL VALLEY	SPREADING FALSE-FOXGLOVE	AUREOLARIA PATULA	
L VALLEY	HEAVY SEDGE	CAREX GRAVIDA	
L VALLEY	HEAVY SEDGE	CAREX GRAVIDA	
HEL VALLEY	HAIRY SHARP-SCALED SEDGE	CAREX OXYLEPIS VAR PUBESCENS	
L VALLEY	RIVER BULRUSH	SCIRPUS FLUVIATILIS	
L VALLEY	NUTTALL'S WATERWEED	ELODEA NUTTALLII	
HEL VALLEY	NUTTALL'S WATERWEED	ELODEA NUTTALLII	
EL VALLEY	NUTTALL'S WATERWEED	ELODEA NUTTALLII	
L VALLEY	SMALL-HEADED RUSH	JUNCUS BRACHYCEPHALUS	
L VALLEY	CANADA LILY	LILIUM CANADENSE	
HEL VALLEY	CANADA LILY	LILIUM CANADENSE	
L VALLEY	CANADA LILY	LILIUM CANADENSE	
L VALLEY	CANADA LILY	LILIUM CANADENSE	
HEL VALLEY	CANADA LILY	LILIUM CANADENSE	
EL VALLEY	CANADA LILY	LILIUM CANADENSE	
L VALLEY	CANADA LILY	LILIUM CANADENSE	
L VALLEY	CANADA LILY	LILIUM CANADENSE	
HEL VALLEY	CANADA LILY	LILIUM CANADENSE	
L VALLEY	CANADA LILY	LILIUM CANADENSE	
L VALLEY	PINK LADY'S-SLIPPER	CYPRIPEDIUM ACAULE	
HEL VALLEY	PINK LADY'S-SLIPPER	CYPRIPEDIUM ACAULE	
EL VALLEY	FEN ORCHIS	LIPARIS LOESELII	
L VALLEY	TUBERCLED REIN-ORCHID	PLATANTHERA FLAVA VAR HERBIOLA	
L VALLEY	TUBERCLED REIN-ORCHID	PLATANTHERA FLAVA VAR HERBIOLA	
HEL VALLEY	TUBERCLED REIN-ORCHID	PLATANTHERA FLAVA VAR HERBIOLA	
L VALLEY	TUBERCLED REIN-ORCHID	PLATANTHERA FLAVA VAR HERBIOLA	
L VALLEY	TUBERCLED REIN-ORCHID	PLATANTHERA FLAVA VAR HERBIOLA	
HEL VALLEY	TUBERCLED REIN-ORCHID	PLATANTHERA FLAVA VAR HERBIOLA	
HEL VALLEY	PURPLE FRINGELESS ORCHID	PLATANTHERA PERAMOENA	
L VALLEY	PURPLE FRINGELESS ORCHID	PLATANTHERA PERAMOENA	
L VALLEY	PURPLE FRINGELESS ORCHID	PLATANTHERA PERAMOENA	
HEL VALLEY	LESSER LADIES'-TRESSES	SPIRANTHES OVALIS	
L VALLEY	LESSER LADIES'-TRESSES	SPIRANTHES OVALIS	
L VALLEY	LESSER LADIES'-TRESSES	SPIRANTHES OVALIS	
HEL VALLEY	LESSER LADIES'-TRESSES	SPIRANTHES OVALIS	
HEL VALLEY	LESSER LADIES'-TRESSES	SPIRANTHES OVALIS	
L VALLEY	LESSER LADIES'-TRESSES	SPIRANTHES OVALIS	
RTON	HELLBENDER	CRYPTOBRANCHUS ALLEGANIENSIS	
RTON	BLACK VULTURE	CORAGYPS ATRATUS	
RTON	OSPREY	PANDION HALIAETUS	
RTON	OSPREY	PANDION HALIAETUS	

QUADNAME:...........	SCOMNAME:......................	SNAME:...........................	
ELVERTON	SOUTHERN BOG LEMMING	SYNAPTOMYS COOPERI	
ELVERTON	MEADOW JUMPING MOUSE	ZAPUS HUDSONIUS	
ELVERTON	WOODLAND JUMPING MOUSE	NAPAEOZAPUS INSIGNIS	
ELVERTON	NORTHERN RIVER OTTER	LUTRA CANADENSIS	
ELVERTON	CUMBERLAND SLIDER	TRACHEMYS SCRIPTA TROOSTII	
ELVERTON	CUMBERLAND SLIDER	TRACHEMYS SCRIPTA TROOSTII	
ELVERTON	CUMBERLAND SLIDER	TRACHEMYS SCRIPTA TROOSTII	
ELVERTON	CUMBERLAND SLIDER	TRACHEMYS SCRIPTA TROOSTII	
ELVERTON	CUMBERLAND SLIDER	TRACHEMYS SCRIPTA TROOSTII	
ELVERTON	CUMBERLAND SLIDER	TRACHEMYS SCRIPTA TROOSTII	
ELVERTON	CUMBERLAND SLIDER	TRACHEMYS SCRIPTA TROOSTII	
ELVERTON	SHINY PIGTOE	FUSCONAIA EDGARIANA	L
ELVERTON	FINE-RAYED PIGTOE	FUSCONAIA CUNEOLUS	L
ILVERTON	ALABAMA LAMP MUSSEL	LAMPSILIS VIRESCENS	L
ILVERTON	ORANGE-FOOT PIMPLEBACK	PLETHOBASUS COOPERIANUS	L
ILVERTON	PYRAMID PIGTOE	PLEUROBEMA RUBRUM	
ILVERTON	HERON ROOKERY	HERON ROOKERY	
ILVERTON	HERON ROOKERY	HERON ROOKERY	
ILVERTON	AMERICAN GINSENG	PANAX QUINQUEFOLIUS	
ILVERTON	HELLER'S CATFOOT	GNAPHALIUM HELLERI	
ILVERTON	SLENDER BLAZING-STAR	LIATRIS CYLINDRACEA	
ILVERTON	PRAIRIE GOLDENROD	SOLIDAGO PTARMICOIDES	
ILVERTON	PRAIRIE GOLDENROD	SOLIDAGO PTARMICOIDES	
ILVERTON	BRANCHING WHITLOW-GRASS	DRABA RAMOSISSIMA	
ILVERTON	MOUNTAIN HONEYSUCKLE	LONICERA DIOICA	
ILVERTON	APPALACHIAN BUGBANE	CIMICIFUGA RUBIFOLIA	
ILVERTON	APPALACHIAN BUGBANE	CIMICIFUGA RUBIFOLIA	
ILVERTON	APPALACHIAN BUGBANE	CIMICIFUGA RUBIFOLIA	
ILVERTON	APPALACHIAN BUGBANE	CIMICIFUGA RUBIFOLIA	
LVERTON	TALL LARKSPUR	DELPHINIUM EXALTATUM	
LVERTON	TALL LARKSPUR	DELPHINIUM EXALTATUM	
LVERTON	GOLDENSEAL	HYDRASTIS CANADENSIS	
LVERTON	CAREY'S SAXIFRAGE	SAXIFRAGA CAREYANA	
LVERTON	CAREY'S SAXIFRAGE	SAXIFRAGA CAREYANA	
LVERTON	EARLEAVED FALSE-FOXGLOVE	AGALINIS AURICULATA	
LVERTON	SPREADING FALSE-FOXGLOVE	AUREOLARIA PATULA	
LVERTON	SPREADING FALSE-FOXGLOVE	AUREOLARIA PATULA	
LVERTON	SPREADING FALSE-FOXGLOVE	AUREOLARIA PATULA	
LVERTON	SPREADING FALSE-FOXGLOVE	AUREOLARIA PATULA	
LVERTON	SPREADING FALSE-FOXGLOVE	AUREOLARIA PATULA	
LVERTON	SPREADING FALSE-FOXGLOVE	AUREOLARIA PATULA	
LVERTON	SPREADING FALSE-FOXGLOVE	AUREOLARIA PATULA	
LVERTON	SPREADING FALSE-FOXGLOVE	AUREOLARIA PATULA	
LVERTON	CANADA LILY	LILIUM CANADENSE	
LVERTON	PURPLE FRINGELESS ORCHID	PLATANTHERA PERAMOENA	

10 Records Processed

Federal Status Definitions of Tennessee's Rare Plants and Animals

Federally listed species are protected by the Endangered Species Act of 1973 (as amended) and the list is administered and determined by the US Fish and Wildlife Service.

E/SA - Endangered by similarity of appearance.

LE - Listed Endangered, the taxon is threatened by extinction throughout all or a significant portion of its range.

LT - Listed Threatened, the taxon is likely to become an endangered species in the foreseeable future.

PE - Proposed Endangered, the taxon is proposed for listing as endangered.

PT - Proposed Threatened, the taxon is proposed to be listed as threatened.

Y - Synonyms

C - Candidate Species. These 'Candidate' species are not currently proposed for listing, but development and publication of proposed rules for such candidate species is anticipated. The US Fish and Wildlife Service has on file sufficient information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened species. The US Fish and Wildlife Service will determine the relative listing priority of these candidate species, and encourages other agencies, groups and individuals to give consideration to these taxa in environmental planning.

C2 - DESIGNATION DISCONTINUED
C3 - DESIGNATION DISCONTINUED
- **3A** - DESIGNATION DISCONTINUED
- **3B** - DESIGNATION DISCONTINUED
- **3C** - DESIGNATION DISCONTINUED

__NL - status varies for different populations or parts of range with at least one part not listed.

__XN - non-essential experimental population

__XE - essential experimental population

(Modified From Federal Register, 50 CFR Part 17, Feb. 28, 1996, Vol. 61, No. 40, pp. 7596 - 7613.)

Note: The taxa listed as candidate species may be added to the list of Endangered and Threatened plants and animals, and, as such, consideration should be given them in environmental planning. Taxa listed as LE, LT, PE and PT must be given consideration in environmental planning involving federal funds, lands, or permits, and should be given consideration in all non-federal activities. For further information contact the Region 4, Endangered Species Coordinator, at the US Fish and Wildlife Service, 1875 Century Boulevard, Atlanta, Georgia 30345, phone (404)679-7096; or an Endangered Species Specialist at the US Fish and Wildlife Service, 446 Neal Street, Cookeville, Tennessee 38501, phone (615)528-6481.

State Rank Definitions of Tennessee's Rare Wildlife

As a supplement to the official State and Federal status designations, the Division of Natural Heritage (Tennessee Department of Environment & Conservation) publishes this accompanying list of State Ranks as determined using methodology developed by The Nature Conservancy. Where possible, State Ranks are assigned based upon known occurrences of rare animals and published range maps. Otherwise ranks are assigned based upon the best available information, with all State Ranks being periodically reviewed and updated. Many species which have neither federal nor state protected status are tracked by the Heritage Program based upon their State Rank. In particular, these include species which are state endemics, have a narrow range in Tennessee, or which are facing particular threats, and for which neither state nor federal laws have extended legal protection. State Ranks are defined as follows:

S1 = Critically imperiled in the state because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state (Typically 5 or fewer occurrences or very few remaining individuals).

S2 = Imperiled in the state because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state (6 to 20 occurrences or few remaining individuals).

S3 = Rare and uncommon in the state (21 to 100 occurrences).

S4 = Widespread, abundant, and apparently secure in state, with many occurrences, but of long-term concern (Usually more than 100 occurrences).

S5 = Demonstrably widespread, abundant, and secure in the state, with stable and sustainable populations under present conditions.

SA = Accidental: Accidental or casual in the state (i.e., infrequent and far outside usual range).
SH = Historical: Occurred historically in the state, and suspected to be extant.
SP = Potential: Potential that the species occurs in the state, but no occurrences reported.

SR = Reported: Reported in the state but without conclusive documentation which would provide a basis for either accepting or rejecting (e.g., misidentified specimen) the report. Also includes species for which the Tennessee Divison of Natural Heritage does not have data to allow accurate mapping of the occurrence.

SSYN = Synonym: Reported from the state, but has been synonymized with another taxon.

SU = Unrankable: Possibly in peril in the state, but status uncertain; need more information.
SX = Extirpated: Believed to be extirpated from the state.

S#S# = Numeric range rank: A range between two of the numeric ranks (e.g. S1S2, Smoky Dace).
S? = Unranked: Species not yet ranked in the state.

HYB = Hybrid: Taxon represents a hybrid between species.

B = Breeding: Considered a breeding population within the state.
N = Non-breeding: Considered a non-breeding population within the state.
? = Inexact or uncertain rank.

Note: DNH has responsibility for assigning state ranks. Those species having an SRANK of S1 to S3, state endemics, and species with limited distribution in Tennessee should be given special consideration in environmental planning. For further information contact DNH at (615) 532-0431.

State Status Definitions of Tennessee's Rare Plants

State Status indicates which plants are formally listed as state Endangered, Threatened, or Special Concern under the authority of the Tennessee Department of Environment and Conservation. The Department has the valuable assistance of the State's best field botanists, twelve of whom serve on the Scientific Advisory Committee which periodically reviews the list.

E - Endangered, species now in danger of becoming extinct in Tennessee because of:
- (a) their rarity throughout their range, or
- (b) their rarity in Tennessee as a result of sensitive habitat destruction or restricted area of distribution.

E* - Taxa considered to be Endangered in Tennessee due to evidence of large numbers being taken from the wild and lack of commercial success with propagation or transplantation.

T - Threatened, species likely to become endangered in the immediately foreseeable future as a result of rapid habitat destruction or commercial exploitation.

S - Special Concern, species requiring concern because of:
- (a) their rarity in Tennessee because the State represents the limit or near-limit their geographic range, or
- (b) their status is undetermined because of insufficient information.

P - Possibly Extirpated, species that have not been seen in Tennessee for the past 20 years.

(Adapted from Somers, Paul. 1989. Revised List of the Rare Plants of Tennessee. Journal of the Tennessee Academy of Sciences, 64(3): 178-184.)

State Status Definitions of Tennessee's Rare Wildlife

State Status indicates which animals are formally listed as state endangered or threatened under the authority of the Tennessee Wildlife Resources Agency (T.C.A. 70-8-104, 70-8-105, and 70-8-107).

E - Endangered- any species or subspecies of wildlife whose prospects of survival or recruitment within the state are in jeopardy or are likely within the foreseeable future to become so due to any of the following factors:
- (a) The destruction, drastic modification, or severe curtailment of its habitat;
- (b) Its overutilization for scientific, commercial or sporting purposes;
- (c) The effect on it of disease, pollution, or predation;
- (d) Other natural or man-made factors affecting its prospects of survival or recruitment within the state; or
- (e) Any combination of the foregoing factors.

T- Threatened- any species or subspecies of wildlife which is likely to become an endangered species within the foreseeable future.

D - Deemed in Need of Management- any species or subspecies of nongame wildlife which the executive director of the TWRA believes should be investigated in order to develop information relating to population, distribution, habitat, needs, limiting factors, and other biological and ecological data to determine management measures necessary for their continued ability to sustain themselves successfully.

Note: Species with no State Status designation are considered rare in the state by the Division of Natural Heritage. Information is collected on these species in order to minimize their formal listing as Endangered or Threatened.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, Tennessee 38501

August 29, 1996

Ms. Andrea Wargo Campbell
Environmental Protection Division
Department of Energy
P.O. Box 2001
Oak Ridge, Tennessee 37831

Dear Ms. Campbell:

Thank you for your letter and enclosures of August 14, 1996, regarding the proposed leasing of the K-25 Plant site and facilities on the Oak Ridge Reservation in Roane County, Tennessee. The Fish and Wildlife Service (Service) has reviewed the information submitted and offers the following comments.

Information available to the Service indicates that wetlands exist in the vicinity of the proposed project. Enclosed is a copy of a portion of the National Wetlands Inventory's Elverton quadrangle with the referenced wetlands highlighted. This information is provided for your convenience. Our wetlands determination has been made in the absence of a field inspection and does not constitute a wetlands delineation for the purposes of Section 404 of the Clean Water Act or the wetlands conservation provisions of the Food Security Act. The Corps of Engineers or the Natural Resources Conservation Service should be contacted regarding the presence of regulatory wetlands and the requirements of wetlands protection statutes.

According to our records, the following federally listed or proposed endangered or threatened species may occur in the project impact area:

Gray bat (Myotis grisescens) (E)
Slender chub (Erimystax {=Hybopsis} cahni) (T)
Spotfin chub (=Turquoise shiner) (Cyprinella {=Hybopsis} monacha) (T)
Yellowfin madtom (Noturus flavipinnis) (T)
Red-cockaded woodpecker (Picoides borealis) (E)
American hart's tongue fern (Phyllitis scolopendrium var. americana) (T)
Virginia spiraea (Spiraea virginiana) (T)

Alabama lamp pearly mussel (Lampsilis virescens) (E)
Appalachian monkeyface pearly mussel (Quadrula sparsa) (E)
Birdwing pearly mussel (Conradilla caelata) (E)
Cumberland monkeyface pearly mussel (Quadrula intermedia) (E)
Dromedary pearly mussel (Dromus dromas) (E)
Green-blossom pearly mussel (Epioblasma torulosa gubernaculum) (E)
Orange-footed pearly mussel (Plethobasus cooperianus) (E)
Pink mucket pearly mussel (Lampsilis orbiculata) (E)
Turgid-blossom pearly mussel (Epioblasma turgidula) (E)
White wartyback pearly mussel (Plethobasus cicatricosus) (E)
Yellow-blossom pearly mussel (Epioblasma florentina florentina) (E)
Fine-rayed pigtoe pearly mussel (Fusconaia cuneolus) (E)
Rough pigtoe pearly mussel (Pleurobema plenum) (E)
Shiny pigtoe pearly mussel (Fusconaia edgariana) (E)

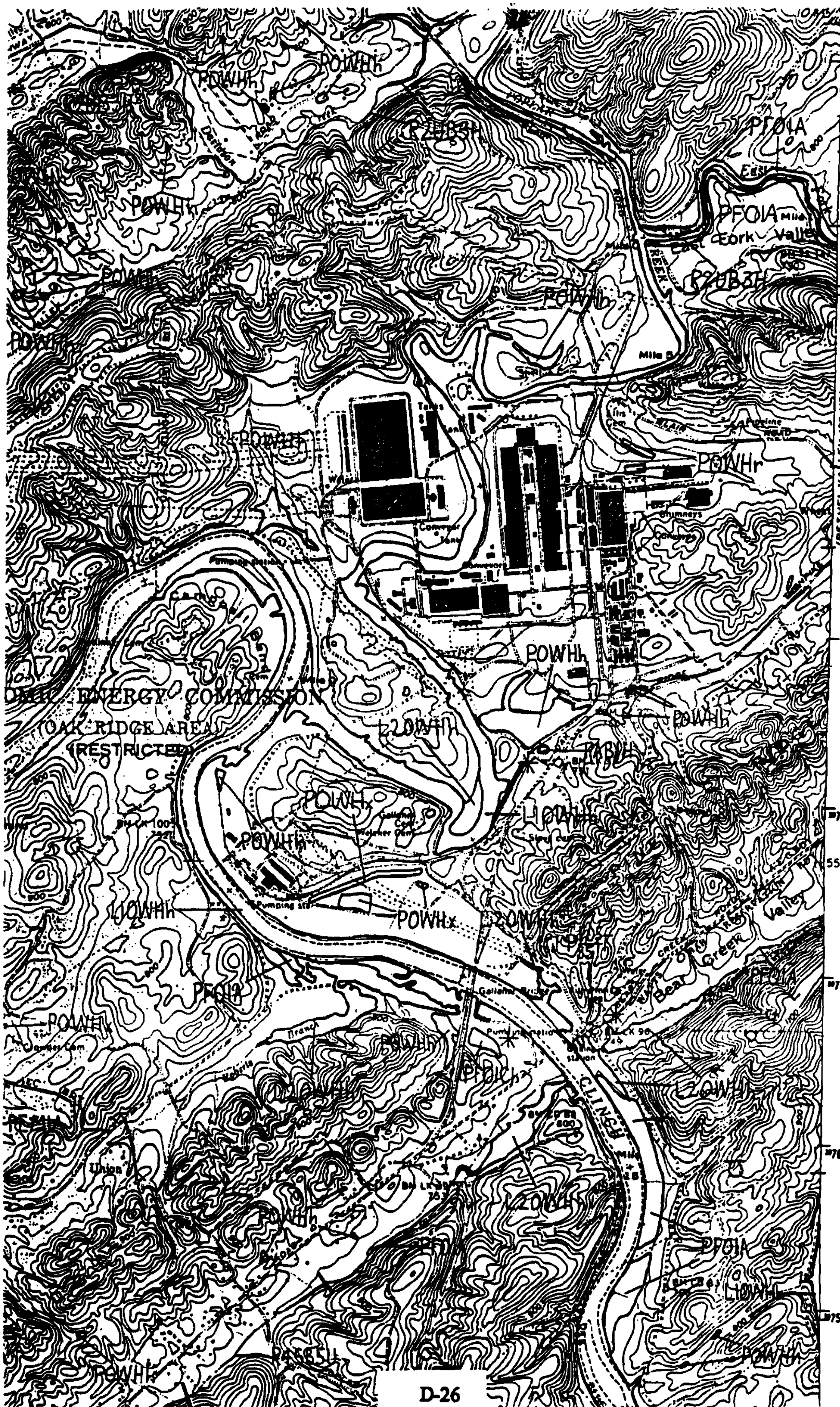
You should assess potential impacts and determine if the proposed project may affect the species. A finding of "may affect" could require initiation of formal consultation. We recommend that you submit a copy of your assessment and finding to this office for review and concurrence.

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

Sincerely,

Lee A. Barclay, Ph.D.
Field Supervisor

Enclosure


OMIC ENERGY COMMISSION
(OAK RIDGE AREA)
(RESTRICTED)
East Fork
Valley
Bear Creek
Valley
CLINCH
Gallaher Bridge
Pumping sta
Chimneys
Conveyor
Tanks
(BETHEL VALLEY (130-NE)
57'3
55'
POWHh
PFO1A
P2UB3H
POWHr
POWHx
L1OWHh
L2OWHh
PFO1Ch
R4SB5H
PABH
Union

AWC

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, Tennessee 38501

October 28, 1996

Ms. Andrea Wargo Campbell
Environmental Scientist
U.S. Department of Energy
P.O. Box 2001
Oak Ridge, Tennessee 37831

Re: Proposed Lease of the K-25 Site on the Oak Ridge Reservation

Dear Ms. Campbell:

Thank you for the letter and enclosures received on October 15, 1996, regarding the subject lease of land and existing facilities within the K-25 security fence or on the heavily developed 344-acre area near the former powerhouse site. Because of the heavily industrialized nature of the proposed lease sites, we agree that species listed or proposed as threatened or endangered by the Federal Government are not likely to be adversely affected by the proposed action. In the event that one or more such species are found, and the planned actions of the lessee(s) could impact them, then the Department of Energy should enter into Section 7 consultation with the Fish and Wildlife Service prior to granting the lease. Contingent upon your agreement with this, we concur that the proposed lease of the K-25 Site would not adversely impact federally listed or proposed species.

Should you have any questions, please contact Allen Robison of my staff at 615/528-6481.

Sincerely,

Lee A. Barclay, Ph.D.
Field Supervisor

THIS PAGE LEFT INTENTIONALLY BLANK

Department of Energy

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

August 22, 1997

Dr. Lee A. Barclay, Field Supervisor
Fish and Wildlife Service
U.S. Department of Interior
446 Neal Street
Cookeville, TN 38501

Dear Dr. Barclay:

REQUEST FOR FURTHER INFORMAL CONSULTATION UNDER SECTION 7 OF THE ENDANGERED SPECIES ACT RE: PROPOSED LEASE OF LAND AND FACILITIES AT THE FORMER K-25 SITE ON THE OAK RIDGE RESERVATION

In October 1996, I wrote you concerning the proposed lease of land and facilities at the former K-25 Site, now called the East Tennessee Technology Park (ETTP), on the Oak Ridge Reservation (ORR). On October 28, 1996, you concurred that there would be no impact on any listed or proposed threatened or endangered species (Attachment # 1).

The initial leasing plans, as described in my earlier letter and in the draft EA issued in March 1997, have been modified to include 3 additional parcels of land near ETTP but outside the fenced area of the industrialized areas of K-25 Site (Figure 1). With this letter, I am continuing our informal consultation under Section 7 of the Endangered Species Act by informing you of the new boundary of the proposed action and requesting your input as to the potential for impacts to protected species and habitat.

The ETTP is located in Oak Ridge, Tennessee, in the northwest quadrant of the ORR, adjacent to the Clinch River, and approximately 21 km (13 miles) west of downtown Oak Ridge. Initially, facilities and land available for lease were restricted to those within the boundary of the former K-25 site and covered approximately 1,028 acres (Figure 1). Of that area, 725 acres were within the existing security fence, and 303 acres were outside the security fence near the former powerhouse site. This site is, for the most part, heavily developed, but some areas are currently inactive. It is comprised of buildings, pavement, rubble, and small areas of lawns and weed-covered fields. Archaeological sites, wetlands, and waste disposal sites within the area would be excluded from consideration for leasing.

Because ETTP is a heavily industrialized facility, we reported in the draft EA that no federally listed or proposed threatened or endangered species are known or likely to occur in the area potentially affected by the proposed action, as initially defined. Moreover, recent plant and waterfowl surveys and observations by the Tennessee Wildlife Resources Agency (TWRA) Oak Ridge Wildlife Management Area (ORWMA) resident wildlife manager have reported that no protected species have been observed in these areas. Because future uses of ETTP would be similar to past industrial activities, and because significant adverse impacts to federally listed or proposed threatened and endangered species are not known to have occurred from past operations, the draft EA concluded that adverse impacts to federally listed or proposed threatened or endangered species were not expected.

The modified leasing proposal includes 3 additional parcels of land (designated Parcels #1, #2, and #4 in Figure 2), but does not change projected uses by lessees. These parcels total 348 acres, 231 acres of which have a slope less than 15 % and are presumed to be developable. The parcels were defined by DOE to exclude the following resources that would make them unsuitable for industrial development: state-designed "blueline" streams; 100-year floodplains for major rivers; wetlands; historical and archaeological sites (e.g., cemeteries or historic properties); environmentally sensitive areas; designated ecological communities for state or federal endangered, threatened, or otherwise sensitive animal or plant species; and designated contaminated areas.

In August 1997, a site visit was made to the newly added parcels by staff members of Oak Ridge National Laboratory (ORNL). On the parcels, they found a combination of planted conifers, open areas under transmission lines, roads, and second-growth, mixed-conifer-hardwood forest. Some fenced contaminated areas are near the parcels, but not within them. No protected plant species have been found during surveys of the parcels, and no protected fauna have been observed during recent waterfowl surveys and observations by the TWRA ORWMA resident wildlife manager. Bald eagles are known to frequent the ORR as winter migrants, but there have been no confirmed observations of nesting birds. Although gray bats forage over the Clinch River, no maternity colonies are known to occur in caves on or near the ORR, and no caves are known to exist on the three parcels. Also, although several endangered species of mussels have been identified in the past in the Clinch River, the damming of the river and subsequent development of large reservoirs have now replaced the free flowing, riverine ecosystem, thus eliminating suitable habitat for the mussels in the vicinity of ETTP. Slender and spotfin chub also require faster flowing, silt-free habitat; therefore, they too are unlikely to be found in waters near ETTA or these parcels. The yellowfin madtom is more plastic in the habitats it will occupy, but is not normally found in reservoirs. Although it might occur in Poplar Creek, it is very sensitive to pollution and the silt load in a water body, and it has never been found in the vicinity of ETTP.

Based on this information, DOE concludes that federally listed or proposed threatened or endangered species are unlikely to occur in the area potentially affected by the proposed action, as modified by the addition of the three parcels, and that the potential for significant adverse impacts is low. If you concur with this conclusion, please check the appropriate box, sign below, and fax your response to me at 423-576-0746. Dr. Martha Salk, ORNL, may be contacted at 423-574-7315 with questions about field surveys and impacts analysis. Questions about the proposed action may be directed to me at 423-576-9578. Because we would like to issue a final EA as soon as possible, I would appreciate your prompt response to this request.

Sincerely,

Andrea Wargo Campbell

Andrea Wargo Campbell

☐ The proposed lease of ETTP, including three newly added land parcels, would *not* be expected to adversely impact federally listed or proposed species and/or habitat. With this letter, DOE has satisfied consultation requirements of Section 7 of the Endangered Species Act.

☐ The information provided by DOE is insufficient to support the conclusion that the proposed lease of ETTP, including three newly added land parcels, would not adversely impact federally listed or proposed species and/or habitat. DOE has *not* satisfied consultation requirements of Section 7 of the Endangered Species Act. Further consultation is needed.

_____

Signature Date

Attachment:
cc w/attachment:
D. R. Allen, Acting ORO NEPA Compliance Officer
L. W. Clark, ORO Reindustrialization Program

THIS PAGE LEFT INTENTIONALLY BLANK

ATTACHMENT #1

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, Tennessee 38501

October 28, 1996

Ms. Andrea Wargo Campbell
Environmental Scientist
U.S. Department of Energy
P.O. Box 2001
Oak Ridge, Tennessee 37831

Re: Proposed Lease of the K-25 Site on the Oak Ridge Reservation

Dear Ms. Campbell:

Thank you for the letter and enclosures received on October 15, 1996, regarding the subject lease of land and existing facilities within the K-25 security fence or on the heavily developed 344-acre area near the former powerhouse site. Because of the heavily industrialized nature of the proposed lease sites, we agree that species listed or proposed as threatened or endangered by the Federal Government are not likely to be adversely affected by the proposed action. In the event that one or more such species are found, and the planned actions of the lessee(s) could impact them, then the Department of Energy should enter into Section 7 consultation with the Fish and Wildlife Service prior to granting the lease. Contingent upon your agreement with this, we concur that the proposed lease of the K-25 Site would not adversely impact federally listed or proposed species.

Should you have any questions, please contact Allen Robison of my staff at 615/528-6481.

Sincerely,

Lee A. Barclay, Ph.D.
Field Supervisor

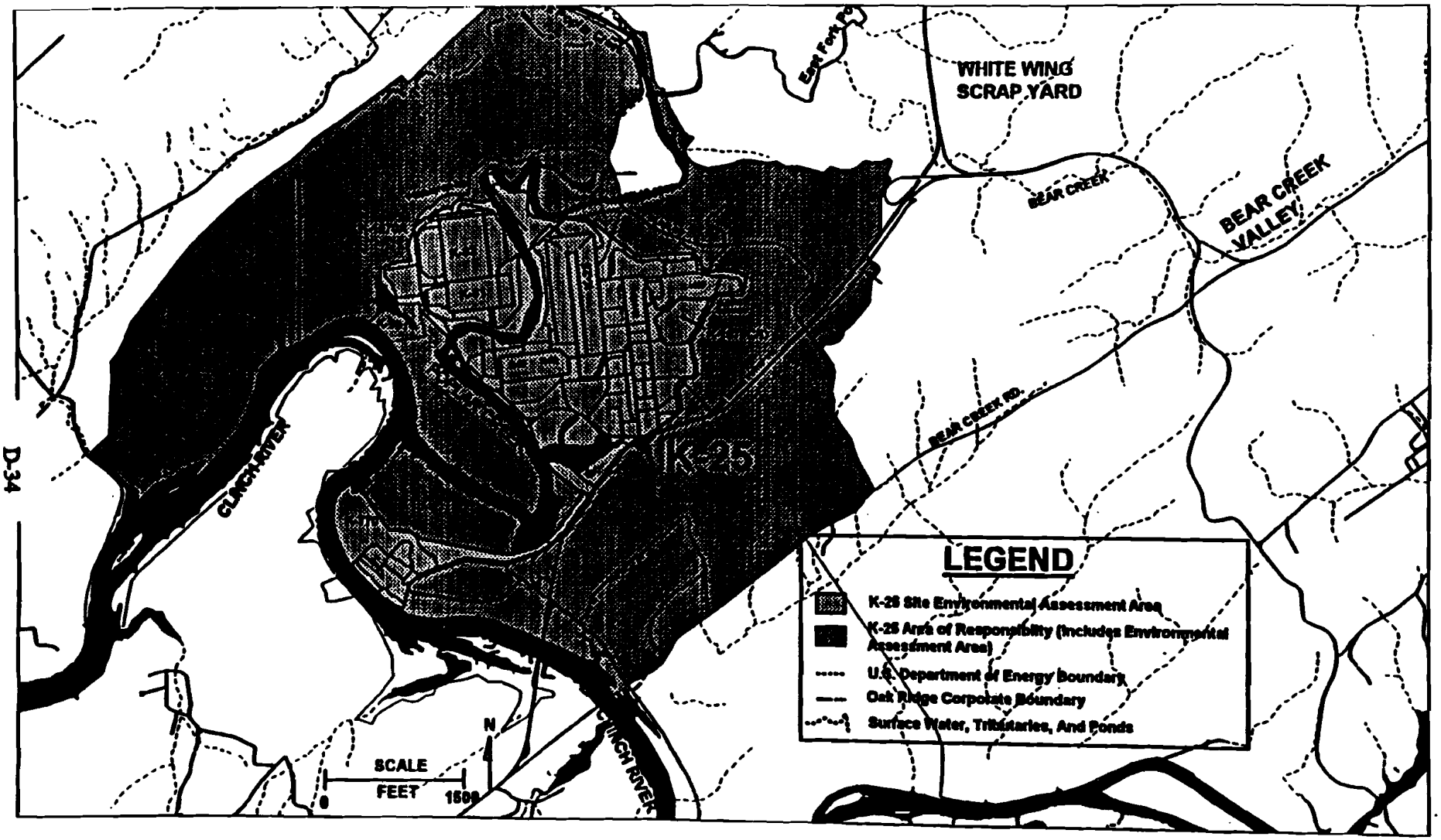
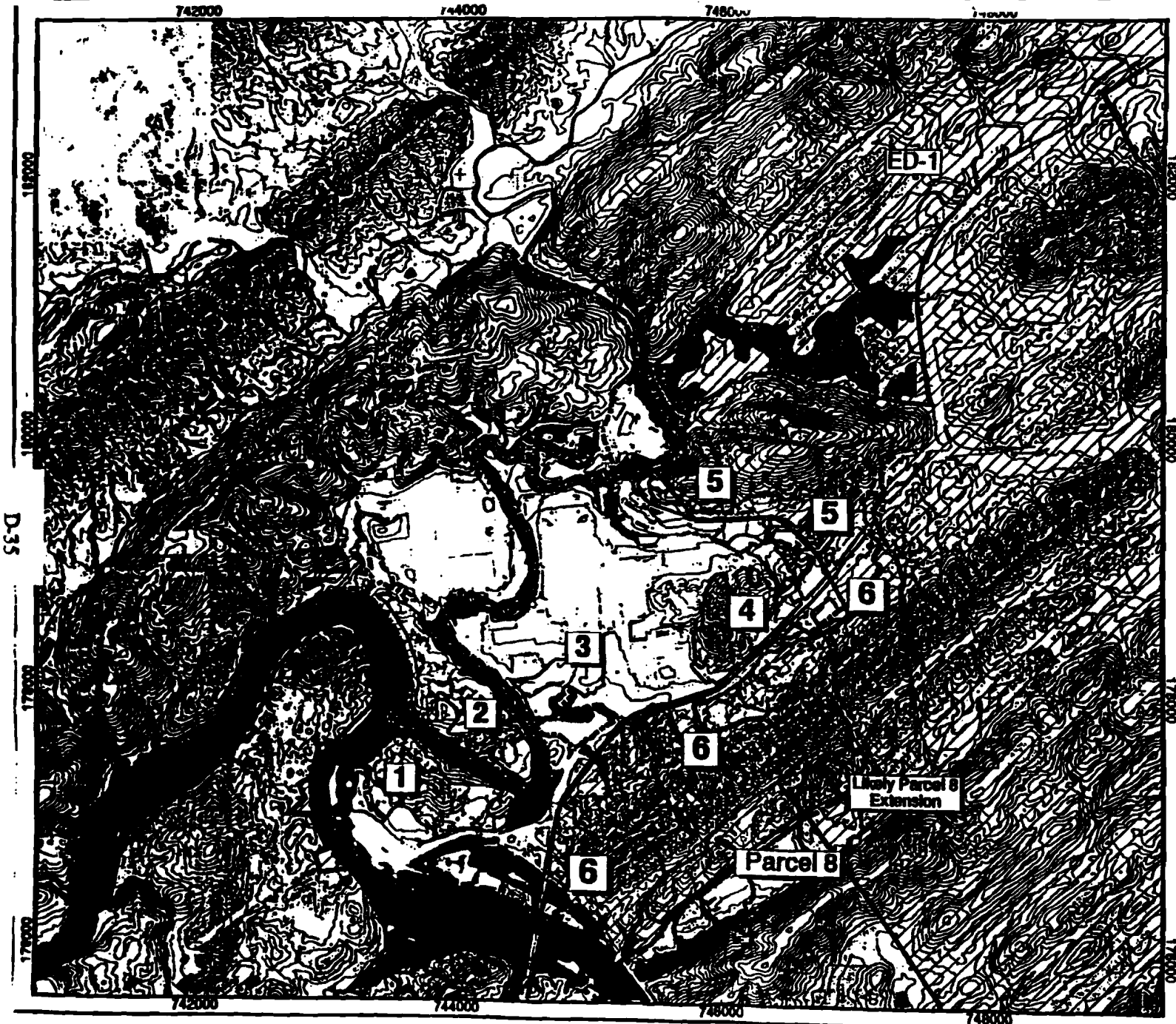


Fig. 1 . K-25 Site and Area of Responsibility.



East Tennessee Technology Park

Potential Reuse Land Parcels

Available Land Analysis

- ETTP Area of Responsibility
- ED-1 and Parcel-8 Boundaries
- 20-Foot Elevation Contours
- Parcel Boundaries
- National Environmental Research Park (NERP)
- Available Land (Less Than 15% Slope)
- Areas of Contamination
- Biodiversity Significance Ranks 2&3
- Historical/Archeological Sites
- Wetlands
- 100-Year Flood Plain and 30-Foot Stream Buffer
- Clinch River, Poplar Creek, and Streams

FIGURE 2

ORR REINDUSTRIALIZATION TEAM

ARCHITECTURE & PLANNING

Lockheed Martin Energy Systems, Inc.

0 500 1000 1500 2000 Meters

0 1000 2000 3000 4000 5000 6000 7000 Feet

Tennessee State Plane, NAD83

N

Prepared by: Geographic Information Science and Technology, ORNL

Base Source: 1998 Orthophoto Imagery and Planimetric Vectors, Basemap and Imagery Project, ESD Programs

Date prepared: May 19, 1999

THIS PAGE LEFT INTENTIONALLY BLANK

United States Department of the Interior

FISH AND WILDLIFE SERVICE
446 Neal Street
Cookeville, TN 38501

TELEPHONE 615/528-6481
FAX 615/528-7075

TAKE PRIDE IN AMERICA

FAX MESSAGE SHEET

TO: U.S. Dept of Energy - Oak Ridge Reservation

ATTENTION: Andrea Worgo Campbell

RECEIVER'S FAX NUMBER: 423-576-0746

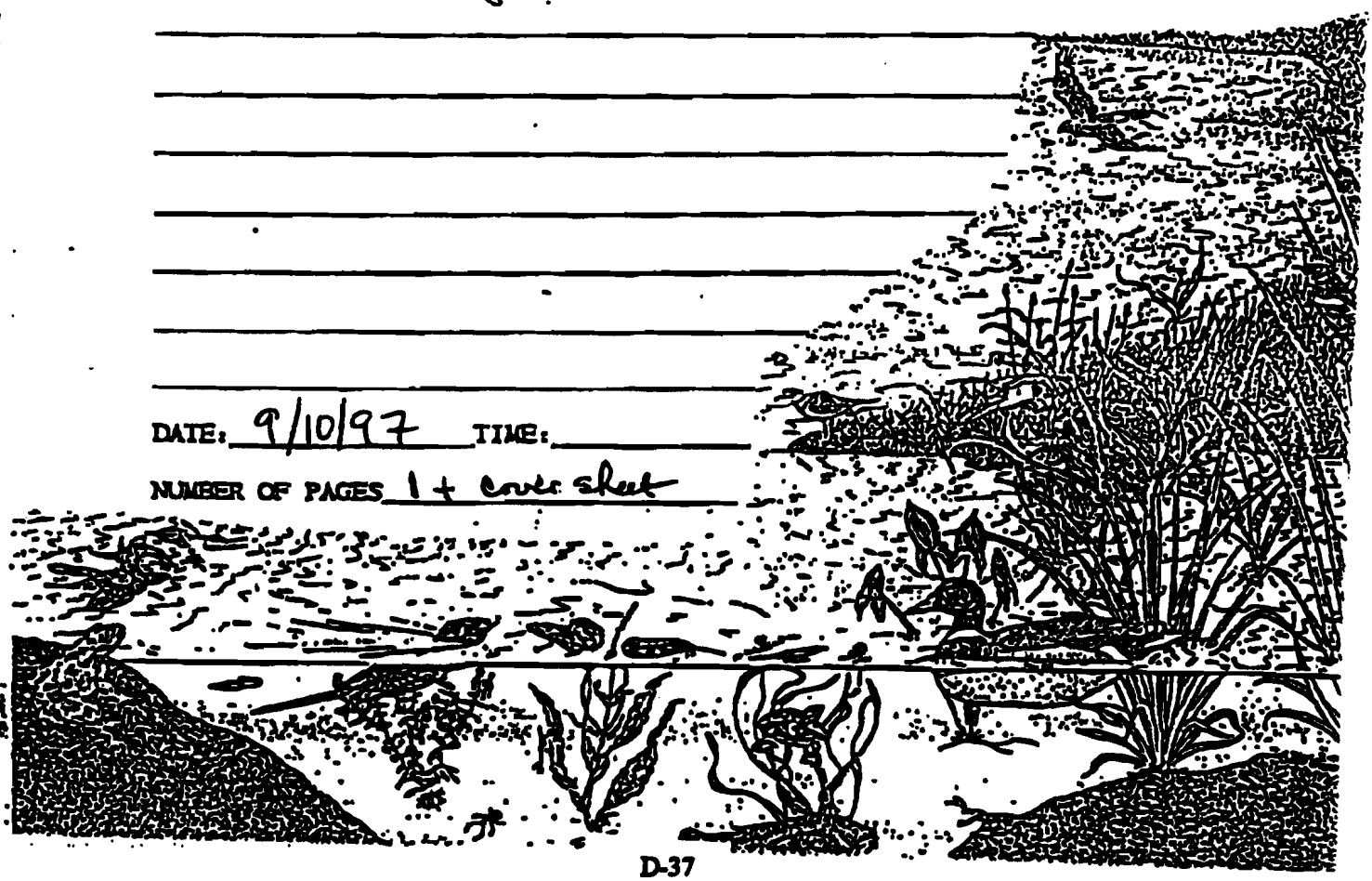
FROM: Lee Barclay

SUBJECT: Proposed Lease of Land & Facilities at Former K-25 Site

Per your letter dated 22 August 1997

DATE: 9/10/97 TIME:

NUMBER OF PAGES 1 + cover sheet



Based on this information, DOE concludes that federally listed or proposed threatened or endangered species are unlikely to occur in the area potentially affected by the proposed action, as modified by the addition of the three parcels, and that the potential for significant adverse impacts is low. If you concur with this conclusion, please check the appropriate box, sign below, and fax your response to me at 423-576-0746. Dr. Martha Salk, ORNL, may be contacted at 423-574-7315 with questions about field surveys and impacts analysis. Questions about the proposed action may be directed to me at 423-576-9578. Because we would like to issue a final EA as soon as possible, I would appreciate your prompt response to this request.

Sincerely,

Andrea Wargo Campbell

Andrea Wargo Campbell

☑ The proposed lease of ETTP, including three newly added land parcels, would *not* be expected to adversely impact federally listed or proposed species and/or habitat. With this letter, DOE has satisfied consultation requirements of Section 7 of the Endangered Species Act.

☐ The information provided by DOE is insufficient to support the conclusion that the proposed lease of ETTP, including three newly added land parcels, would not adversely impact federally listed or proposed species and/or habitat. DOE has *not* satisfied consultation requirements of Section 7 of the Endangered Species Act. Further consultation is needed.

Signature Date

Attachment:
cc w/attachment:
D. R. Allen, Acting ORO NEPA Compliance Officer
L. W. Clark, ORO Reindustrialization Program