DOE/EA-1575

Environmental Assessment for the Oak Ridge Science and Technology Project at the Oak Ridge National Laboratory, Oak Ridge, Tennessee

February 2008

U. S. Department of Energy
Oak Ridge Office

06-281(E)/020508

CONTENTS

FIGURES

TABLES

ACRONYMS

ACM	asbestos-containing material
AURP	Association of University Research Parks
BA	biological assessment
BJC	Bechtel Jacobs Company LLC
BSL	biosafety level
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	*Code of Federal Regulations*
CO	carbon monoxide
CRK	Clinch River kilometer
CROET	Community Reuse Organization of East Tennessee
D&D	decontamination and decommissioning
DOE	U. S. Department of Energy
EA	Environmental Assessment
EDE	effective dose equivalent
EIS	Environmental Impact Statement
EM	Environmental Management
EPA	U. S. Environmental Protection Agency
ETTP	East Tennessee Technology Park
FFA	Federal Facility Agreement
FONSI	finding of no significant impact
FTE	full-time equivalent
FWENC	Foster-Wheeler Environmental Corporation
FY	fiscal year
gpd	gallons per day
HDPE	high-density polyethylene
HI	hazard index
HQ	hazard quotient
HVAC	heating, ventilating, and air conditioning
IFDP	Integrated Facility Disposition Project
LLLW	liquid low-level waste
LLW	low-level waste
LWS	Laboratory Waste Services
MVST	Melton Valley Storage Tanks
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NERP	National Environmental Research Park
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
O_3	ozone
ORNL	Oak Ridge National Laboratory
ORO	Oak Ridge Office
ORR	Oak Ridge Reservation
ORSTP	Oak Ridge Science and Technology Project

OSHA	Occupational Safety and Health Administration
Pb	lead
PCB	polychlorinated biphenyl
PILT	payment-in-lieu-of-tax
ppm	parts per million
PSD	prevention-of-significant-deterioration
psi	pounds per square inch
psig	pounds per square inch gage
PWTC	Process Wastewater Treatment Complex
R&D	research and development
RCRA	Resource Conservation and Recovery Act of 1976
ROD	Record of Decision
ROI	region of influence
SHPO	State Historic Preservation Office
SNS	Spallation Neutron Source
SO_2	sulfur dioxide
SR	State Route
STP	sewage treatment plant
TDEC	Tennessee Department of Environment and Conservation
TDOT	Tennessee Department of Transportation
TRU	transuranic
TSCA	Toxic Substances Control Act of 1976
TVA	Tennessee Valley Authority
VOC	volatile organic compound
WAC	waste acceptance criteria
WOC	White Oak Creek
Y-12 Complex	Y-12 National Security Complex

1. INTRODUCTION

1.1 PURPOSE AND NEED FOR ACTION

The purpose of the proposed action evaluated in this Environmental Assessment (EA) is to advance technology transfer and other missions of the U. S. Department of Energy (DOE) Office of Science at the Oak Ridge National Laboratory (ORNL) through the establishment of the Oak Ridge Science and Technology Project (ORSTP). The ORSTP would support technology commercialization, facilitate the creation of new companies, and stimulate technology-based recruitment as a part of its core purpose. Funding would primarily be from private, other federal, and state sources. As a part of the ORSTP, DOE would also establish the Oak Ridge Science and Technology Park, which would be the primary area for development. The general area being considered for the ORSTP and the Park is shown on Fig. 1.1.

DOE action is needed to support the commercialization and technology transfer efforts at ORNL. The ORSTP responds to a recognized need for accelerated science and technology development and for the commercialization of advanced technologies. The proposed action would also support the space needs of ORNL's University-based research partners. In addition, it is anticipated that the ORSTP would further the overall modernization of the ORNL campus in broad support of DOE's missions and purposes. The activities planned in the ORSTP are consistent with the types of research activities already underway at ORNL.

1.2 BACKGROUND

DOE has leased approximately 12 acres of underutilized property (property with or without improvements that has a current but non-primary use under a DOE mission) to Halcyon LLC, a subsidiary of the Community Reuse Organization of East Tennessee (CROET). The leased property is located along Bethel Valley Road near First Street (Fig. 1.1). The leased property was identified and impacts of its development were assessed in the *Final Environmental Assessment for the Oak Ridge National Laboratory Facilities Revitalization Project* (DOE/EA-1362); a Finding of No Significant Impact (FONSI) was issued in 2001. It is expected that development of the area will include approximately 150,000 ft^2 of new research/office space. If DOE establishes the ORSTP, development of this leased property would become part of the Oak Ridge Science and Technology Park, which would be the primary area for development under the ORSTP.

The DOE Office of Environmental Management (EM), as part of its environmental cleanup strategic planning, is developing an Integrated Facility Disposition Project (IFDP). The IFDP would be conducted under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as specified by the Federal Facility Agreement (FFA) and the Records of Decision (RODs) for ORNL. The scope of the IFDP includes regulatory document preparation, legacy material and facility characterization, decontamination and decommissioning (D&D) [including deactivation, decontamination, decommissioning, and demolition], waste and equipment disposition, remediation of underlying contaminated soil and groundwater, and capping and closure of active and inactive landfills. It is anticipated that most of the environmental cleanup activities and excess facility disposition within the ORNL Central Campus would take place under the IFDP. The ORSTP would be coordinated and integrated with environmental cleanup activities in the same general area and those areas could potentially be leased as part of the ORSTP.

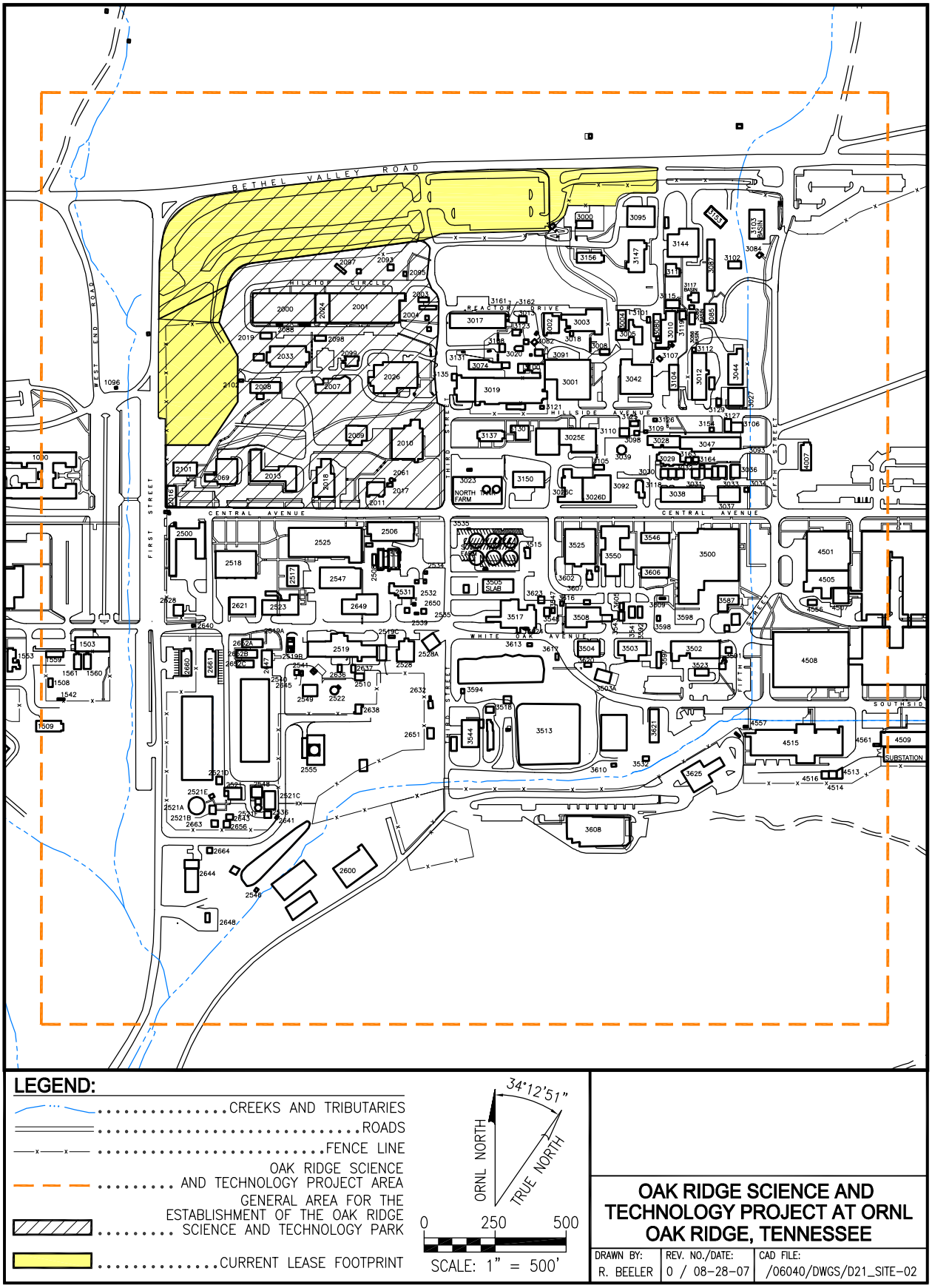

Fig. 1.1. General area being considered for the Oak Ridge Science and Technology Project.

As part of the public involvement process for this EA, DOE published a Notice of Intent (NOI) in September 2006 announcing its plans to begin the preparation of the EA. The NOI was published in the *Knoxville News Sentinel*, *The Oak Ridger*, *Roane County News*, and the *Oak Ridge Observer*. A Notice of Availability announcing the release of the Draft EA for public comment was published in the same newspapers in September 2007. On October 11, 2007, DOE held an informal information meeting on the Draft EA at the DOE Information Center in Oak Ridge. Four people attended the meeting. Comments received during the 30-day comment period and DOE's responses are provided in Appendix A.

1.3 SCOPE OF THIS ENVIRONMENTAL ASSESSMENT

This EA presents information on the potential impacts associated with the ORSTP at ORNL. DOE has prepared this EA to assess the potential consequences of its activities on the human environment in accordance with the Council on Environmental Quality (CEQ) regulations [40 *Code of Federal Regulations* (*CFR*) Parts 1500–1508] implementing National Environmental Policy Act of 1969 (NEPA) and DOE NEPA Implementing Procedures (10 *CFR* 1021). If the impacts associated with the proposed action are not identified as significant as a result of this EA, DOE shall issue a FONSI and will proceed with the action. If impacts are identified as potentially significant, an Environmental Impact Statement (EIS) will be prepared.

This EA (1) describes the affected environment relevant to potential impacts of the proposed action and alternatives; (2) analyzes potential environmental impacts that could result from the proposed action; (3) identifies and characterizes cumulative impacts that could result from the proposed action in relation to other ongoing or proposed activities within the surrounding area; and (4) provides DOE with environmental information for use in prescribing restrictions to protect, preserve, and enhance the human environment and natural ecosystems.

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 a "sliding-scale" approach so that those actions with greater potential effect can be discussed in greater detail in NEPA documents than those that have little potential for impact.

In this EA, reasonably foreseeable use scenarios and their associated environmental effects are addressed. The analysis of the proposed action focuses on the lease of existing facilities or land parcels for the construction of new facilities to enhance and expand the existing technology transfer mission at ORNL. It is assumed that facility operations under the ORSTP would not differ substantially from ongoing research missions and process operations at ORNL.

Because the actual future uses under the ORSTP are not currently known, a "bounding" analysis was used to estimate potential impacts. In this EA, reasonably foreseeable use scenarios and their associated environmental effects are addressed. The bounding analysis is based on several assumptions. First, reasonably foreseeable uses were identified as compatible with the existing technology transfer mission at ORNL. Based on information about these uses, realistic assumptions were developed regarding potential emissions, effluents, waste streams, services, and infrastructure. Finally, technical experts analyzed the potential for adverse impacts and defined commonly used measures that could be used to reduce or mitigate potential impacts.

2. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

To establish the ORSTP, DOE would lease underutilized facilities and land parcels at ORNL. The study area for the ORSTP is the ORNL Central Campus area, which is located in the western portion of the Laboratory (Fig. 1.1). As part of the ORSTP, DOE is also establishing the Oak Ridge Science and Technology Park, which along with the existing leased area would become the primary areas of development for the ORSTP. The general location for the Oak Ridge Science and Technology Park would be within the Central Campus quadrant bounded by Bethel Valley Road, First Street, Central Avenue, and Third Street. As land or additional facilities within the Central Campus are determined to be underutilized they could be included in the ORSTP. DOE would only identify land and facilities for lease where it has been determined that they are not needed for current or future mission-related activities. For example, Bldgs. 2007 and 2008 are within the Central Campus and are necessary for in vitro dosimetry services and radiation survey/monitoring equipment maintenance and calibration. Under the proposed action, these facilities would remain as ORNL-controlled buildings.

Development under the ORSTP would be implemented using a phased build-out approach, and a master land-use plan would guide a campus-like environment of facilities consistent with other new development occurring at ORNL. New buildings would be constructed but existing facilities could also be modified or renovated to accommodate new users. Funding would primarily be from private, other federal, and/or state sources. The design and uses of the Oak Ridge Science and Technology Park are expected to be modeled consistent with the standards found in the Association of University Research Parks (AURP). Currently, there are 140 AURP research parks located in the United States in various stages of development. The Oak Ridge Science and Technology Park would be the first AURP in East Tennessee. The ORSTP would be intended primarily for research and development (R&D) facilities, high-technology and science-based companies, engineering support services, technology commercialization incubation space, and prototype manufacturing facilities. The ORSTP would primarily include private sector companies, but could also include other federal (e.g., Department of Defense and Department of Homeland Security) and state [e.g., University of Tennessee and the Tennessee Department of Environment and Conservation (TDEC)] users. Specific uses would not be known until proposals are developed and reviewed by DOE. Therefore, reasonably foreseeable uses have been developed to bound the analysis in this EA. These uses could include, but are not limited to, the following:

- Energy R&D – research, development, and commercialization of technologies such as: (1) new fuels development (e.g., biofuels, coal conversion, etc.), (2) advanced power production/distribution, (3) alternative and renewable energy (solar, hybrid lighting, wind, water, etc.), (4) energy efficiency technology such as building materials (roofs, windows, insulation, glazing, coatings, etc.) and building systems [heating, ventilating, and air conditioning (HVAC), lighting research], (5) fuel-efficient transportation technology (vehicle manufacturers, trains, Maglev, aircraft, etc.), and (6) fossil fuels recovery research (e.g., extraction of oil from shale, deep natural gas reserves, etc.).

- Environmental R&D – research, development, and commercialization of technologies such as: (1) advanced agricultural technologies to improve crop yields, crop disease resistance, etc.; (2) weather and climate change research; (3) water quality and purification technologies (e.g., desalination, ultra-purification, etc.); and (4) air quality and atmospheric research.

- Computational R&D – research, development, and commercialization of technologies such as: (1) advanced computer and semiconductor systems, (2) advanced computational services (high-tech networking/communications, data processing, and data storage), and (3) satellite and other wireless communications technology development.

- Materials and chemistry R&D – research, development, and commercialization of technologies such as: (1) advanced ceramics and other composites parts development and manufacturing, (2) advanced materials and chemical development, and (3) nuclear/radiological materials/ fuels/isotopes development.

- Biological systems and genetics/genomes R&D – research, development, and commercialization of technologies such as: (1) genetically modified, disease-resistant crops; (2) disease diagnosis and treatment; (3) countermeasures to harmful biological agents; and (4) biosafety level laboratory research [federally regulated select agents and toxins limited to Biosafety Level 2 (BSL-2) and below].

- Medical/pharmacological R&D – research, development, and commercialization of technologies such as: (1) medical/surgical/diagnostics instruments/devices, and (2) new pharmacological products.

- Nanotechnology R&D – research, development, and commercialization of technologies such as advanced, high-strength carbon structures, nanofibers, nanotubules, nanopowders, magnetic nano materials, fullerenes, polymeric nanocomposites, emerging polymer photonic components, etc.

- National security R&D – research, development, and either commercialization or military deployment of (1) technologies such as advanced military and defense weapons systems, anti-weapons systems, and related technologies; and (2) security and communications technologies such as space-based systems.

The bounding analysis used in this EA assumes that the potential types of research and light/ prototype manufacturing uses are compatible with the ORSTP objectives for technology transfer and are based on the types of activities already ongoing at ORNL. The proposed uses would also be commensurate and compatible with the other ongoing missions and activities being performed by ORNL.

Source terms (e.g., emission rates of gases from an industrial process) of activities associated with a potential use may differ from those characterized and analyzed in this EA. To ensure that proposed activities fall within the bounding analysis in this EA, DOE would review each proposal. If the proposed uses and their potential impacts were not consistent with the uses and bounding analysis evaluated in the EA, DOE would determine the appropriate level of additional review that would be required prior to implementation.

DOE has also based the bounding analysis in this EA on the following assumptions:

- Uses would be compatible with the city of Oak Ridge IND-1, Industrial District zoning ordinance (Article VIII, Sect. 8.01).

- Construction activities involving ground disturbance would be conducted incrementally to limit the potential for soil erosion. It was assumed that the amount of land under construction at any one time would not exceed 10 acres.

- Habitat and populations of federal- or state-listed threatened and endangered species would be protected from the effects of ORSTP development.

- Construction in floodplains and wetlands would be avoided to the extent practicable. Wetland boundaries would be surveyed prior to new construction and appropriate buffer zones would be required. Construction activities would employ best management practices and appropriate mitigation measures to prevent and/or minimize adverse impacts.

- Lease proposals would be reviewed for National Historic Preservation Act (NHPA) compliance. Prior to any ORSTP actions that might impact the ORNL Historic District, DOE would consult with the Tennessee State Historic Preservation Office (SHPO).

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

- Commercial users would be responsible for seeking and obtaining any applicable federal, state, and/or local permits and licenses for activities at their facilities. Work with select agents or toxins defined by 42 *CFR* 73, 9 *CFR* 121, or 7 *CFR* 331 would require registration with the Center for Disease Control and Prevention or the U. S. Department of Agriculture Animal and Plant Health Inspection Service, as appropriate.

- State and federal stormwater regulations to minimize erosion and sedimentation would be met. As applicable, notification of any disturbance would be made to the appropriate authorities prior to construction activities.

2.1.1 Leasing Process

Facilities and land parcels that are identified as underutilized and where it has been determined that there are no mission-related needs would be marketed and leased. For leased facilities and land parcels, portions would be subleased as suitable tenants are identified. The decision to lease would be made by DOE on a case-by-case basis.

Relevant information regarding proposed construction and operations for new initiatives under the ORSTP would be evaluated by DOE to determine whether or not additional NEPA analysis would be needed prior to implementation. Proposals for uses that exceed the bounds of the impact analysis in this EA or that substantially differ from existing ORNL research missions or ongoing process operations would require separate NEPA review before the lease could be completed.

2.1.2 CERCLA Compliance

In accordance with the FFA between the DOE-Oak Ridge Office (ORO), EPA, and TDEC, leases would have to comply with the requirements of CERCLA Sect. 120(h). Documentation is prepared, which details the baseline condition of the facility or land parcel and includes information on prior property ownership, past and present property use, as well as past and present activities on adjacent properties. Depending upon the review of historic records, environmental sampling may be conducted, including radiological surveys, if needed. The resultant data may be used in a risk analysis, if appropriate. The information collected provides the environmental risk management basis for DOE's lease decision, notwithstanding the policy-level decision-making that is achieved via the NEPA process.

2.2 NO ACTION ALTERNATIVE

The no action alternative provides an environmental baseline with which impacts of the proposed action and alternatives can be compared and is required by the DOE NEPA Regulations.

Under the no action alternative, the ORSTP would not be established at ORNL. This could result in fewer opportunities to support the technology transfer mission. It could also impact the space needs of ORNL's University-based research partners and have a negative impact on long-term staff recruitment. However, it is possible that DOE could choose to construct new facilities in the area for its use. Ongoing operations (including R&D activities), projects with completed NEPA reviews, general maintenance, repairs, and other types of "landlord" projects would continue. Employees would continue their research in the facilities they now occupy. Ongoing surveillance and maintenance on buildings that have already been deactivated would be conducted. Occupied buildings would be repaired, as funds are available. Utility and other infrastructure needs, including some upgrades, would be met to the extent required to maintain systems in good working order and ensure worker health and safety. Environmental cleanup and facility disposition activities in the Central Campus area would be expected to continue primarily under the IFDP.

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED

Other alternatives to establishing the ORSTP in the Central Campus area of ORNL were considered. These included locating the ORSTP within another portion of the Oak Ridge Reservation (ORR) and locating it outside of the ORR but within the Oak Ridge Technology Corridor (i.e., along Pellissippi Parkway). Although these alternatives were considered, they were eliminated from further analysis primarily because they did not meet the purpose and need to advance DOE's technology transfer mission at ORNL through the use of underutilized land and facilities currently available or available in the future. Additionally, to maximize the technology transfer mission at ORNL, it is advantageous to have the ORSTP users in close proximity to the other resources of the Laboratory, including the existing research facilities and the existing utility infrastructure.

3. AFFECTED ENVIRONMENT AND CONSEQUENCES

This chapter provides background information for evaluating the potential environmental impacts of the proposed action and no action alternative. Table 3.1 provides a summary of these impacts by resource. This chapter also includes the impact analysis and discussion of project attributes that could have the potential for significant impacts.

3.1 LAND USE

3.1.1 Existing Conditions

The main ORNL site (also commonly referred to as X-10) encompasses facilities in two valleys (Bethel and Melton) on approximately 1100 acres of land within the ORR. ORNL facilities are also located on other parts of the more than 21,000 acres of the ORR for which ORNL is responsible, including some at the nearby Y-12 National Security Complex (Y-12 Complex) and field research areas. Within the main ORNL site, the DOE land use designation is "institutional and research." The site supports ORNL R&D mission activities in science and technology, energy resources, environmental quality, and national security. In addition, a number of facilities located within the developed, central areas of ORNL are currently in the EM D&D Program or planned for other non-EM surplus programs. At the northeastern end of the main ORNL site is the Spallation Neutron Source (SNS) facility site, which is located on Chestnut Ridge.

The Central Campus area of ORNL contains over 2M ft^2 of facilities centered around the buildings in the 4500 series. Facilities in the Central Campus range from offices to maintenance shops and wet chemistry laboratories. Primary facilities include the Central Research and Administration Buildings (4500N and S), the High-Temperature Materials Laboratory (Bldg. 4515), and the Metals and Ceramics Laboratory (Bldg. 4508). Other facilities include the High-Rad-Level Analytical Facility (Bldg. 2026), Chemical Technical Division Annex (Bldg. 3017), Bldg. 3019 Complex, Waste Operations Control Center (Bldg. 3130), and the Surface Sciences Laboratory (Bldg. 3137).

3.1.2 Environmental Consequences

3.1.2.1 Proposed action

The ORSTP would not have a major impact to the current land use in the Central Campus area, which is designated as "institutional and research." Although existing facilities could be remodeled or deactivated and demolished; R&D, science, technology, and engineering would be continued in a combination of ORSTP and federal facilities. Work under the ORSTP would primarily be done by the private sector, other federal, and/or state agencies instead of by DOE and its contractors. However, as noted in Sect. 2.1, DOE could choose to build new facilities in the Central Campus area and continue to use existing facilities for ongoing operations. The proposed ORSTP within the developed Central Campus area would reduce the area required for new development and would not change surrounding and existing on-site land use at ORNL. Some visual impacts would result from the proposed action because the demolition of existing facilities and construction of new ones would change the current visual landscape.

Table 3.1. Summary of impacts by resource

Environmental impact	Proposed action	No action alternative
Land use	Land use would remain institutional and research. Existing facilities would be renovated or demolished and new facilities would be constructed. Users would likely be a mix of private sector, other federal, and/or state agencies. DOE could choose to construct new facilities or continue to use existing facilities for ongoing missions.	No major land uses would occur. Planned remedial actions for the Central Campus would continue. DOE could choose to construct new facilities or continue to use existing facilities for ongoing missions.
Geology and soils	Construction techniques would be used that minimize impacts to geology. Affected soils are generally stable and acceptable for standard construction requirements. Best management practices would be implemented to minimize potential for increased soil erosion.	Cleanup activities would be conducted under CERCLA, and required studies would address any potential impacts to geology and soils.
Water resources	No impacts to surface water are anticipated from normal facility operations. No impacts to groundwater are anticipated from any construction activities or normal facility operations and groundwater use would be prohibited.	Cleanup activities would be conducted under CERCLA, and required studies would address any potential impacts to water resources.
Air quality and noise	Construction would be phased and air emissions would be short-term, sporadic, and localized. Fugitive dust would be controlled to minimize emissions. Air emissions from operations would be minor and typically controlled within the facility. External effects would be negligible. The overall balance of air emissions for operations should be approximately the same as current levels, and could be less depending on specific design features of new and remodeled facilities. No adverse noise impacts are anticipated.	Air pollutants would continue to be emitted at current rates in the vicinity of ORNL. No adverse effects to air quality are predicted assuming that existing emission control systems are efficiently maintained. No changes in existing noise levels are expected. Noise levels within the Central Campus are associated with ongoing operations, traffic, and construction activities typical of other industrial areas.
Biological resources	The proposed action would have little effect on biological resources and no impacts to wetlands or threatened and endangered species have been identified.	Cleanup activities could have a long-term beneficial impact for biological resources.
Cultural resources	Prior to any actions that might impact the ORNL Historic District, DOE would consult with the TN-SHPO.	Potential impacts to historical resources as a result of cleanup activities under CERCLA would be addressed through consultation with the TN-SHPO.

Table 3.1. Summary of impacts by resource (continued)

Environmental impact	Proposed action	No action alternative
Socioeconomics	Minor positive employment and income impacts. No impact on population. Potential positive fiscal impacts include increased revenue from real estate or sales taxes. No disproportionate adverse health or environmental impacts would occur to any low-income or minority population.	No major change is anticipated in population, employment, income, or fiscal characteristics, and no disproportionate effect on minority and low-income populations.
Infrastructure	Existing utility capacity is expected to be adequate to support the ORSTP but minor utility upgrades and modifications would be needed. Employee traffic to ORNL would likely increase to some degree over current levels, possibly resulting in longer commute times along Bethel Valley Road.	Utility repairs and upgrades would be conducted as part of ongoing research and landlord activities. Additional impacts would not occur.
Waste management	The ORSTP would produce wastes typical of standard light industrial and research operations. ORSTP users would use existing licensed and/or permitted treatment, storage, and disposal facilities. However, some on-site treatment could occur (primarily process wastewater) and would only be approved by DOE on a case-by-case basis.	There would be no change to current waste generation and handling from routine operations at ORNL.
Human health and safety	Construction workers would be subject to typical hazards and occupational exposures faced at other industrial construction sites. No unique occupational health and safety hazards would be expected from the ORSTP. Individuals working for companies that would be part of ORSTP would be classified as DOE co-located workers.	Current facility operations would continue in support of assigned missions and no major changes in worker and public exposures would be expected. Potential impacts that could result from any environmental cleanup actions would be addressed in the appropriate CERCLA documents.
Cumulative impacts	The cumulative contribution of impacts that the ORSTP would make on land use, air quality, socioeconomics, transportation, and biodiversity is minor.	No additional cumulative impacts would occur.

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980.
DOE = U. S. Department of Energy.
ORNL = Oak Ridge National Laboratory.
ORSTP = Oak Ridge Science and Technology Project.
ROI = region of influence.
TN – SHPO = Tennessee State Historic Preservation Office.

3.1.2.2 No action

There would be no major changes in land use at ORNL or the surrounding area under the no action alternative because the establishment of the ORSTP would not occur. Planned remedial actions for the Central Campus area would be expected to continue regardless of whether the ORSTP was expanded or not. Also, DOE could choose to construct new facilities or continue to use existing facilities for ongoing missions.

3.2 GEOLOGY AND SOILS

3.2.1 Existing Conditions

3.2.1.1 Geology

Most of the Central Campus area of ORNL is underlain by rocks of the Ordovician-age Chickamauga Group. Surface mapping and core drilling in the Central Campus area indicate that the geologic structure is relatively uniform, with typical bedrock strike of about N55ºE and bedding dip of about 30 to 35° to the southeast (DOE 1999). The Copper Creek fault crops out on the slope of Haw Ridge south of the Central Campus area. This thrust fault places the older Cambrian-aged Rome Formation on top of the younger Chickamauga Group rocks.

According to Hatcher et al. (1992), bedrock beneath the ORSTP area consists of the Moccasin Formation, the Witten Formation, the Bowen Formation, the Benbolt Formation, the Rockdell Formation, and the Fleanor Shale Member of the Chickamauga Group (Fig. 3.1).

The Fleanor Shale is a thick accumulation (245 to 260 ft) of maroon, calcareous, and shaley siltstone with numerous light-gray limestone beds. Vertical burrows and general bioturbation are common. The lowermost and uppermost portions of the Fleanor consist of thick, olive-gray, calcareous siltstone that characterizes the unit.

The Rockdell Formation is a thick section of limestone overlying the Fleanor. The Rockdell is 260 to 280 ft thick and underlies the continuous low ridge near the middle of Bethel Valley. The lower portion of the Rockdell contains light-gray calcarenite, dark-gray calcareous siltstone, fossiliferous nodular limestone, and birdseye micritic limestone. Small chert nodules are common, and evidence of vertical burrowing has been observed. The lower lithology grades upward to dense calcarenite, which contains subordinate amounts of birdseye micrite and nodular limestone. The common occurrence of bedded and nodular chert is distinctive of the upper portion of this formation.

The Benbolt Formation is a relatively heterogeneous formation that is 360 to 380 ft thick. The Benbolt consists of thick interbeds of fossiliferous nodular limestone; unfossiliferous, amorphous micrite within a dark-gray siltstone matrix; dark-gray siltstone; and unfossiliferous calcarenite. A pale buff color is characteristic of weathered Benbolt rock fragments that are seen in vegetatively barren areas.

The Bowen Formation is a maroon unit that overlies the lower thick limestone of the Benbolt and is a reliable marker for field and subsurface correlations. The Bowen is 16 to 30 ft thick and consists of maroon calcareous and shaley siltstone and thin beds of light-gray to olive-gray limestone and argillaceous limestone. Vertical and horizontal burrows are evident throughout the unit.

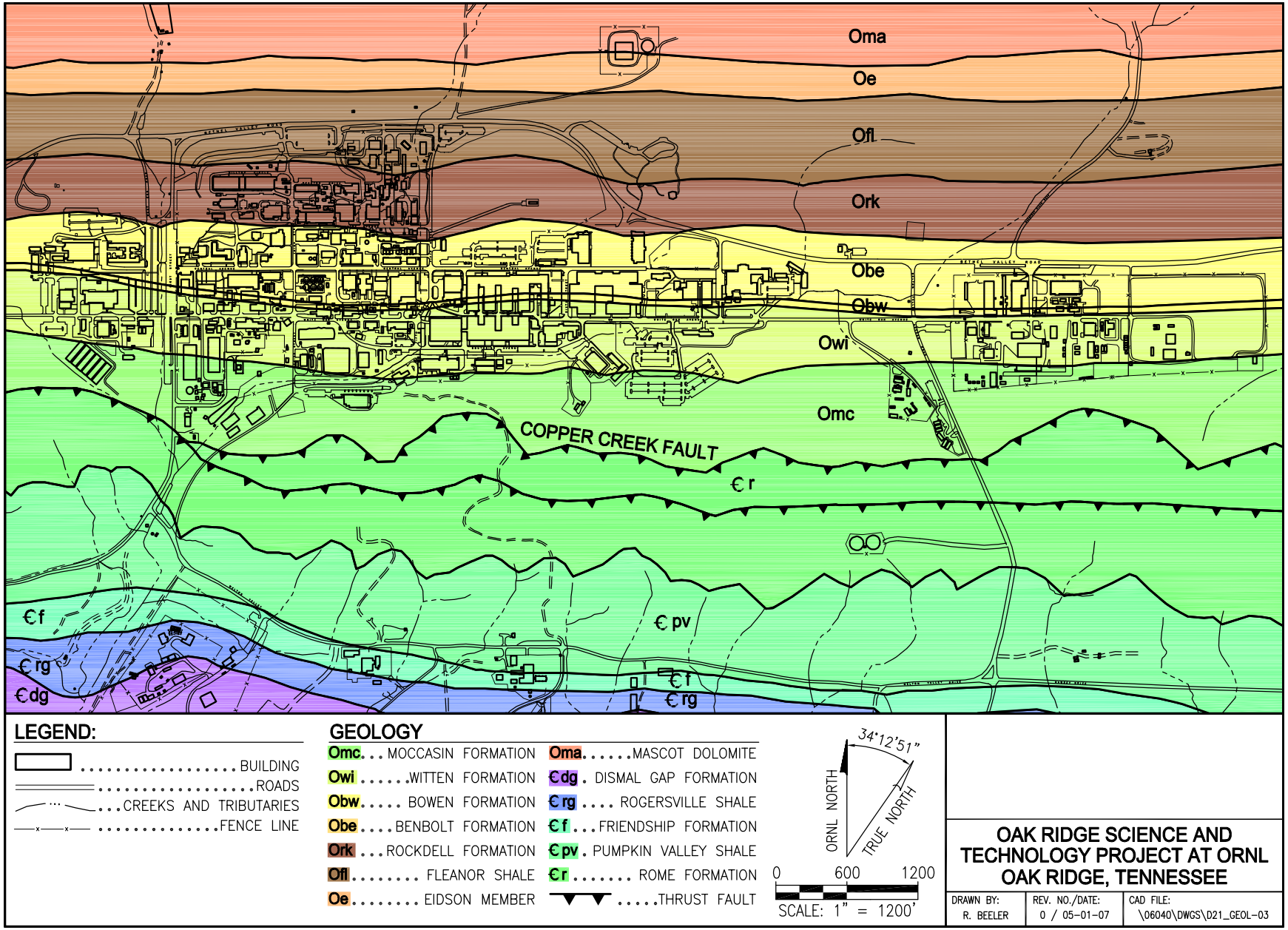

Fig. 3.1. Geologic map of the ORNL area.

The Witten Formation, which is 345 to 360 ft thick, consists of interbedded nodular limestone; calcarenite; amorphous, thin-bedded limestone and siltstone; and wavy limestone. Extensively bioturbated beds and beds with numerous bryozoa are distinctive of the upper part of the Witten Formation.

The Moccasin Formation has been largely removed by the Copper Creek fault and is not fully represented on the ORR. The Moccasin consists of olive- to light-gray and pale-maroon calcareous siltstone interbedded with light-gray, fine-grained limestone. The upper 79 ft of the Moccasin have been described as interbedded maroon-gray, calcareous siltstone; gray to maroon-gray, shaley limestone; and maroon mudstone (Haase et al., 1985).

Bedrock structure is important because it strongly influences the occurrence and movement of groundwater. Prominent fracture sets observed in rock core from Bethel Valley are bedding plane partings and joints. Bedding plane partings are the most abundant fracture features because most of the formations consist of thin-bedded limestone/shale interbeds. The more limestone-rich formations, such as the Rockdell and Witten formations, contain thicker limestone beds that tend to fracture in the strike-set and dip-set orientations. Cavities have been reported in drilling logs from the Central Campus area especially from boreholes drilled into the Rockdell Formation.

3.2.1.2 Soils

The heterogeneous soils overlying bedrock in the Central Campus area include a mixture of fill, reworked soils, and native residual soils. During construction of site facilities, soils were extensively modified by excavation and refilling of areas around waste storage tanks, underground piping, and buildings (DOE 1999).

Most of Bethel Valley is mantled by clayey residual soils derived from in-place weathering of the argillaceous limestone bedrock. A complete description of soil types is described in Hatcher et al. (1992). Soil thickness varies greatly because of the solutional weathering of the carbonate bedrock. Soils derived from the limestones are distinguishable from the soils derived from the dolomitic rocks by the presence of large, tabular chert blocks or the complete absence of chert. Soils overlying the shaley lithologies are silty and eroded with “chippy” weathering of the exposed bedrock (DOE 1999). Thicker soils weathered to deep red and yellow clay loam are found above the carbonate-rich formations, while the argillaceous rocks weather to yellow-brown sticky clay. Contacts between soil and bedrock are rather sharp at coarse-grained limestone beds, but gradational soils to saprolite occur in the shaley lithologies (DOE 1999). [Saprolite is weathered bedrock that maintains some of the original structural features (i.e., bedding and folding) of the parent material. Saprolite represents a transition zone between soil and bedrock materials.]

Natural soils that develop over the Chickamauga bedrock are generally fine grained with the predominant soil classification being a low- to high-plasticity clay and silt containing >50% fines (DOE 1998). Because much of the Central Campus area has had construction activities, most of the natural soil structure has been disturbed. Soil thicknesses generally range from 0 to >30 ft over the area.

The soils in the Central Campus area have generally been classified as either Colbert Series or Upshur Series silty clay loams based on the Soil Survey for Roane County (USDA 1942). Colbert surface soils are described as brownish-gray or olive-gray, heavy silt loam or silty clay loam. The subsoils are tough tenacious, sticky, plastic clay or silty clay that is olive yellow mottled with different proportions of red, gray, green, yellow, and brown. This layer rests on bedrock in many areas, or elsewhere an intervening layer of similar material, but more mottled with gray and green. External drainage is generally good, but internal drainage is rather poor due to the heavy plastic and impervious character of the subsoils. Soils of the Upshur Series are characterized by purple color, heavy texture, and shallowness over

bedrock. The Upshur silty clay loam has a purplish-brown friable silty clay loam surface soil. The subsoil consists of purplish-red or purplish-brown, tight, sticky, plastic clay or silty clay. The subsoil layer generally rests on partly disintegrated purplish-red shaley limestone. Surface drainage is usually good, but internal drainage is somewhat retarded (USDA 1942). Soils of the Roane Series occupy strips of bottomland along the streams. The material giving rise to these soils is derived chiefly from the upland areas. The most conspicuous character of these soils is a semi-cemented layer of angular chert fragments occurring from 15 to 30 in. below the surface. This soil is fairly well-drained and has a moderate content of organic matter and a rather low water-holding capacity.

Soil contamination, consistent with use as a radiochemical development and processing laboratory, has been identified in the ORSTP area. Remediation of contaminated soils in Bethel Valley has been addressed in the ROD for Interim Actions in Bethel Valley (DOE 2002). The remedial action objectives for Bethel Valley are protection of human health for controlled industrial use in the 2000 – 3000 area and unrestricted industrial use in the remainder of the developed areas of ORNL. In the controlled industrial areas, industrial uses of the upper 2 ft are allowed, and use of the subsurface below this depth is restricted. In the unrestricted industrial areas, industrial uses are allowed in the upper 10 ft and use below this depth is typically restricted. The primary controls used to limit unauthorized activities in the remediation areas include signs and administration of an excavation/penetration permit program (DOE 2002).

3.2.2 Environmental Consequences

3.2.2.1 Proposed action

Under the proposed action, minimal effects to underlying geological resources would be anticipated as a result of construction and operation of facilities within the ORSTP because low geological impact foundations (e.g., shallow footings, micro piles, etc.) would typically be used to minimize excavation. Activities associated with the proposed project would occur within previously disturbed areas, which are currently used for industrial applications. Hazards posed by geological conditions are expected to be minor. Bedrock at ORNL is adequate to support structures using standard construction techniques.

Potentially affected soils are generally stable and acceptable for standard construction requirements. Because the soils are predominantly residual clays with fair to hard consistencies, which generally are not susceptible to liquefaction during a seismic event, soil-supported foundations should remain stable against liquefaction during and after a seismic event.

An increased potential for soil erosion and compaction would occur if large equipment is used for construction of new facilities. To minimize the potential for adverse impacts, any ground disturbance would be conducted incrementally to limit the potential for soil erosion and best management practices (i.e., erosion prevention and sediment control) would be implemented.

3.2.2.2 No action

Under the no action alternative, the ORSTP would not take place at ORNL. However, environmental cleanup activities planned for the Central Campus area, as part of EM's proposed IFDP, would be conducted irrespective of whether the proposed action or no action occurs. These cleanup activities would be conducted under CERCLA, and the required studies would address any potential impacts to geology and soils. In addition, the area would continue to be part of the ORNL campus and would be used to support appropriate activities consistent with ORNL's mission. Thus, there would be no difference from a geology and soils perspective.

3.3 WATER RESOURCES

3.3.1 Existing Conditions

3.3.1.1 Surface hydrology

ORR surface water drainage eventually reaches the Tennessee River via the Clinch River, which forms the southern and western boundaries of the ORR. The Central Campus area is located in the Bethel Valley Watershed. White Oak Creek (WOC) is the main receiving surface water body in Bethel Valley. Its watershed comprises approximately 2100 acres of Bethel Valley and includes the following tributaries: Northwest Tributary (runs along the west side of the West Campus area); First Creek (divides the West Campus of ORNL from the Central Campus and receives drainage from both); and Fifth Creek (runs along the eastern portion of the Central Campus) in Bethel Valley. Flow from WOC in Bethel Valley flows downstream to White Oak Lake, and eventually discharges to the Clinch River (DOE 1999). Surface runoff from the impervious surfaces throughout the Central Campus area is primarily routed to First Creek and Fifth Creek via storm drains. The southern portion of the Central Campus area drains directly to WOC. Flow data for fiscal year (FY) 2005 for First Creek indicate average flows of approximately 23M gallons per month for this stream.

Water quality in the vicinity of ORNL has been adversely impacted by past activities. However, DOE has been addressing water quality problems through its ongoing waste control and minimization efforts via the EM program. The predominant mechanisms for surface water contamination in the Central Campus area are diffuse discharges of contaminated groundwater and point source discharge from ORNL outfalls. The primary contaminants found in surface water are radionuclides (^{90}Sr, ^{3}H, and ^{137}Cs) and mercury. Samples are collected from First Creek, Fifth Creek, and WOC within the Central Campus area and analyzed for radiological parameters under the ORNL surface water surveillance monitoring program. Wetlands field surveys (Rosensteel 1996) have identified a narrow band of wetlands along First Creek in the western portion of the Central Campus and within the WOC floodplain in the southern portion of the Central Campus.

Water for use as potable and process water for ORNL is taken from the Clinch River south of the intersection of Scarboro Road and Bethel Valley Road and pumped to the city of Oak Ridge-operated water treatment plant located on the ridge northeast of the Y-12 Plant. The treatment facility can supply water at a potential rate of 24M gal/day to two storage reservoirs with a combined capacity of 7M gal. Water to ORNL is provided via a single 24-in. line extending from the water treatment plant into the ORNL site.

3.3.1.2 Groundwater

Bedrock underlying the Central Campus area of ORNL is Ordovician carbonate strata of the Chickamauga Group, which consists of limestones that typically have low porosity. The geologic units of the ORR are assigned to two broad hydrologic groups: (1) the Knox Aquifer – formed by the Knox Group and the Maynardville Limestone and (2) the ORR aquitards, which includes the Chickamauga Group and the remaining formations on the ORR. Groundwater flow in the Knox Aquifer is dominated by solution conduits, which store and transmit relatively large volumes of water, while flow in the aquitards is controlled by fractures and may store fairly large volumes of water but transmit only limited amounts (Solomon 1992). Groundwater movement in the Central Campus area occurs primarily within secondary porosity features such as fractures, joints, and solution (karst) cavities. Fractures on ORR are well developed in all stratigraphic units and are the most pervasive Mesoscopic structure (Hatcher et al., 1992). Most fracture networks tend to develop systematic orientations over a particular area (Solomon et al., 1992).

Groundwater flow in Bethel Valley is generally from the northeast to the southwest (i.e., parallel to the strike direction). Some of the limestone bedrock underlying the area is subject to chemical weathering and dissolution resulting in karst features, including cavities and conduits, which strongly influence groundwater flow and transport of contaminants. In addition, extensive modification of the soils profile has altered the soil hydrology and created numerous seepage pathways, which provides a preferred pathway for groundwater flow and contaminant transport in the shallow groundwater zone (DOE 1999).

Depending on local lithologic characteristics, groundwater within bedrock may be under water table, semi-confined, or confined conditions. The average hydraulic conductivity of saturated shallow bedrock within the Central Campus area is 8.8×10^{-6} cm/sec (Bechtel et al., 1992). Overall decreases in hydraulic conductivity with depth observed in wells throughout the ORR are probably due to a decrease in the number and size of open secondary porosity features with depth (Bechtel et al., 1992).

Water levels in the unconsolidated zone and upper bedrock within the Central Campus area indicate that the water table/potentiometric surface generally mimics site topography, although local influences cause many undulations. This shallow groundwater system generally occurs under unconfined conditions, although locally semi-confined conditions may occur, particularly where the water table is below the top of bedrock. In general, the horizontal hydraulic gradient is to the south; however, groundwater flow paths in bedrock are strongly controlled by secondary porosity and in places may be perpendicular to, or even opposite to, flow paths inferred from equipotential lines. Observations made in well pairs near First Creek indicate that a slight upward vertical gradient is present in shallow bedrock. This upward component of the hydraulic gradient suggests that First Creek is a potential area of groundwater discharge, provided the bedrock is sufficiently transmissive. Observations made at First Creek indicate that the creek bed consists of exposed bedrock, as evidenced by outcrops with strikes and dips consistent with regional trends.

Historic processes, programs, and waste management practices associated with laboratory operations have led to areas of groundwater contamination in Bethel Valley and the Central Campus area. Groundwater quality in the Central Campus area has been characterized during CERCLA investigations. The primary groundwater contaminants in the Central Campus area include ^{90}Sr and ^{3}H. The most significant groundwater contaminant plume is the Core Hole 8 plume, which originates from the North Tank Farm and migrates across the 2000 Area and discharges to First Creek. Strontium-90 is the primary constituent of this plume. Other radionuclides are also present in groundwater in the Central Campus area, as are several metals, including arsenic, antimony, mercury, and vanadium. Volatile organic compounds (VOCs) are also present in groundwater in this area, but generally not as a defined contaminant plume (DOE 2002).

There are no Class I sole-source aquifers, as designated by the state of Tennessee, beneath the ORR. All aquifers are considered Class II aquifers, which are designated as current potential sources of drinking water. Because of the abundance of surface water and its proximity to the points of use, groundwater is not a source of drinking water on the ORR.

3.3.2 Environmental Consequences

3.3.2.1 Proposed action

Surface Hydrology

Existing potable and process water systems would likely be used and/or modified as part of any ORSTP development to support existing and new facilities. Sanitary wastewater from potential new

facilities would be discharged to the ORNL Sewage Treatment Plant (STP). Therefore, no impacts to surface water are anticipated from normal facility operations.

Some stormwater collection systems in the ORNL Central Campus may require minor changes to accommodate the design of new facilities; but no net effect is expected in the downstream watershed because the fundamental land use would remain the same. Water discharged into the ORNL stormwater collection system ultimately discharges into WOC via National Permit Discharge Elimination System (NPDES)-permitted stormwater outfalls. Concentrations of toxic and conventional pollutants and radionuclides would be expected to remain within the existing permit limits.

Erosion prevention and sediment control practices would be implemented to minimize potential adverse impacts to surface waters from construction activities requiring ground disturbance. State and federal stormwater regulation to minimize erosion and sedimentation would be met. As applicable, notification of any disturbance would be made to the appropriate authorities prior to construction activities.

Groundwater

No impacts to groundwater are anticipated from any construction activities or normal facility operations. Use of groundwater would be prohibited via a condition of the lease. Building sumps in existing facilities may continue to operate for collecting groundwater intrusion. Sanitary wastewater from new or existing facilities would be discharged to the ORNL STP and would be required to meet STP flow and waste acceptance criteria (WAC). Process wastewater would be contained and either transported off-site to a commercial treatment facility or possibly to the ORNL Process Wastewater Treatment Complex (PWTC) in which case the PWTC WAC would be required to be met. Therefore, no impacts to groundwater are anticipated from normal facility operations.

3.3.2.2 No action

The ORSTP would not take place under the no action alternative. However, environmental cleanup activities planned for the Central Campus area, as part of EM's proposed IFDP, would be conducted irrespective of whether the proposed action or no action occurs. These cleanup activities would be conducted under CERCLA, and the required studies would address any potential impacts to water resources at ORNL. In addition, the area would continue to be part of the ORNL Campus and would be used to support appropriate activities consistent with ORNL's mission. Thus, there would be no difference from a water resources perspective.

3.4 AIR QUALITY AND NOISE

3.4.1 Existing Conditions

The state of Tennessee has adopted the National Ambient Air Quality Standards (NAAQS) set by the EPA for six principal pollutants considered harmful to public health and the environment. These pollutants include particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM_{10}) and 2.5 microns ($PM_{2.5}$) in diameter, sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), lead (Pb), and ozone (O_3). Based on the ambient (outdoor) levels of the criteria pollutants, EPA evaluates individual Air Quality Control Regions to establish whether or not they meet NAAQS. Areas that meet NAAQS are classified as attainment areas; areas that exceed NAAQS for a particular pollutant(s) are classified as non-attainment areas for the pollutant(s).

Air quality surrounding the Oak Ridge area is relatively good. However, Anderson County has been designated as a non-attainment area for the 8-hr ground level O_3 standard, as part of the larger Knoxville non-attainment area. Also, Anderson County and a portion of Roane County have been designated as non-attainment for the new, stricter federal fine particulate matter ($PM_{2.5}$) air quality standard. For all other criteria pollutants for which EPA has made attainment designations, existing air quality in the greater Knoxville and Oak Ridge areas is in attainment with NAAQS.

Oak Ridge is located in a Class II prevention-of-significant-deterioration (PSD) area. One set of allowable increments exists for Class II PSD areas, and more stringent increments apply to Class I PSD areas, which include national parks that exceed 6000 acres and some other national parks, monuments, wilderness areas, and other areas specified in 40 *CFR* 51.166. The nearest Class I PSD is the Great Smoky Mountains National Park, located about 35 miles southeast of Oak Ridge. Class I PSD standards exist for SO_2, NO_2, and PM-10.

Noise sources at ORNL can be categorized into two major groups: transportation and stationary. Transportation noise sources are associated with moving vehicles that generally result in fluctuating noise levels above ambient noise levels for a short period of time. Stationary noise sources are those that do not move or that move relatively short distances. Stationary noise sources in the Central Campus area include ventilation systems, air compressors, generators, power transformers, and construction equipment. During peak hours, traffic along Bethel Valley Road, which bounds the proposed location of the ORSTP to the north, is a major contributor to traffic noise levels in the area.

3.4.2 Environmental Consequences

3.4.2.1 Proposed action

Emissions from vehicle and equipment exhaust and fugitive dust from vehicle traffic and disturbance of soils are not expected to adversely affect local air quality. Emissions of particulate matter would consist primarily of airborne soil. Emissions from site preparation and construction would be short-term, sporadic, and localized (except for emissions associated with the personal vehicles of construction workers and vehicles transporting construction materials and equipment to the site). Based on commonly observed emissions from similar construction activities, these emissions would likely include CO, NO_2, SO_2, PM-10 (inhalable particulate matter with particles less than 10 μm in diameter), and hydrocarbons. Dispersion would decrease concentrations of pollutants in the ambient air as distance from the construction site increased. 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.

Not all of the area available for construction would be under construction at any one time. Rather, earthwork would likely be undertaken in increments. Increases in PM-10 concentrations due to fugitive dust from excavation and 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. However, control measures for lowering fugitive dust emissions (i.e., covers and water or chemical dust suppressants) would minimize these emissions.

Specific details about atmospheric pollutants that may be emitted by companies locating within the ORSTP are not available. However, the types of commercial uses proposed for the ORSTP could produce air emissions (e.g., VOCs, particulates, etc.) typical of standard light industrial and research operations. However, these minor emissions are typically controlled within the facility and external effects are negligible. Major sources of air emissions typical of heavy industries would not occur. New commercial businesses under the ORSTP would be required to evaluate their potential to produce air emissions and meet any applicable federal and state air quality and permitting requirements. If required, the appropriate

permits would be obtained prior to construction and operations. Conventional treatment technologies like scrubber systems and particulate filters could be required. Therefore, due to this regulatory process, no violations of air quality standards, and no adverse impacts to air quality are predicted.

Construction noise would be anticipated to be of short duration and minor. Detailed development plans have not been generated for the proposed ORSTP; however, construction of buildings and related structures would occur over a period of several years and would be typical of industrial construction in the general area. Workers associated with construction activities would be expected to wear hearing protection, as appropriate, or as required by the Occupational Safety and Health Act of 1970. Because the Central Campus area is located within an active industrialized area of ORNL and because no sensitive noise resources are located in the immediate vicinity, no adverse impacts would occur.

3.4.2.2 No action

Under the no action alternative, air pollutants would continue to be emitted at current rates in the vicinity of ORNL. Because current emissions comply with permitting regulations, conform to DOE and EPA standards, and do not result in a violation of air quality standards, no adverse effects to air quality are predicted assuming that existing emission control systems are efficiently maintained. Vehicle emissions at the baseline level have been known to have a negligible adverse impact on air quality in the area.

Noise levels at ORNL around the Central Campus area are typical of other industrial areas and are primarily associated with ongoing operations, traffic, and construction activities. Under the no action alternative, current facility operations within the Central Campus area would continue in support of assigned missions for the near term, and no changes in existing noise levels would result.

3.5 BIOLOGICAL RESOURCES

3.5.1 Existing Conditions

Vegetation in the majority of the Central Campus area of ORNL is limited, highly disturbed, and mostly maintained by mowing. Grasses and herbaceous vegetation dominate the vegetative cover except for some deciduous hardwoods located to the south of WOC and a mix of hardwood and Virginia pines scattered throughout the area that are mainly used for landscaping near buildings.

Located in the southern portion of the Central Campus, WOC and its riparian area provide shelter and food for aquatic and terrestrial species. Fifth Creek to the west and First Creek to the east also provide limited habitat for certain species within their respective riparian corridors. The large area of deciduous hardwoods to the south of WOC provides habitat for additional mammal, bird, and reptile species that may include a portion of the Central Campus for part of their home range.

Due to the limited habitat available for native animals, the majority of the animals present in the Central Campus area are species that adapt well to disturbance and the presence of humans. These include small rodents, groundhogs, birds such as starlings, pigeons, and Canada geese, and small reptiles. Larger animals and many smaller native animals are not found because of a lack of suitable habitat and human disturbances. However, white-tailed deer and turkey are frequently seen in the vicinity.

The presence of rare, threatened, and endangered plant and animal species occurring within the Central Campus is unlikely because of the lack of suitable habitat. However, WOC may attract some

sensitive wildlife species, including migratory birds, due to its riparian coverage and nearby deciduous forest.

The U. S. Fish and Wildlife Service has indicated that the gray bat (*Myotis grisescens*) and Indiana bat (*Myotis sodalis*), federally listed endangered species, may occur near the proposed project. During the preparation of the ORNL Facilities Revitalization Project EA (DOE 2001a), DOE prepared a Biological Assessment (BA) that assessed potential impacts on the two bat species. Based on the BA, DOE determined that the proposed upgrade of old facilities and construction of new facilities on the ORNL property designated for the revitalization project would not adversely affect either of the listed species. However, DOE committed to survey buildings for potential usage by bats prior to their demolition. The bat surveys were only to be performed for buildings proposed to be demolished between April 1 and October 15. To date, neither of the listed species has been observed in any building surveys that have been completed within ORNL.

3.5.2 Environmental Consequences

3.5.2.1 Proposed action

Adverse environmental impacts to existing habitat or wildlife, as a result of implementing the proposed action, would be limited. Development under the ORSTP would primarily occur within previously disturbed areas used for industrial operations and research. Measures would be incorporated into development plans to protect the riparian areas associated with WOC, First Creek, and Fifth Creek because these areas may provide some limited habitat for migratory birds. Some new development could occur in previously undisturbed areas, but this would be limited and would be evaluated prior to development. Any air emissions and liquid effluent discharges from facilities associated with the ORSTP are expected to be minor and controlled and they are not expected to have any adverse impacts to wildlife or to pose any ecological risk. Because the potentially affected area is industrialized, fragmented, and disturbed, no rare, threatened, and endangered plant and animal species are known to occur and it is highly unlikely that any adverse impacts would occur.

3.5.2.2 No action

Under the no action alternative, current facility operations within the Central Campus area would continue in support of assigned missions. Environmental cleanup activities planned for the Central Campus area, as part of EM's proposed IFDP, would be conducted irrespective of whether the proposed action or no action occurs. These cleanup activities would be conducted under CERCLA, and the required studies would address any potential impacts to ecological resources at ORNL. In addition, the area would continue to be part of the ORNL campus and would be used to support appropriate activities consistent with ORNL's mission. Thus, there would be no difference from an ecological perspective.

3.6 CULTURAL RESOURCES

3.6.1 Existing Conditions

Because the Central Campus area of ORNL has been severely disturbed from past construction and operation activities, no known prehistoric cultural resources exist. However, the area contains 59 properties that contribute to the ORNL Historic District (Table 3.2 and Fig. 3.2). One of the properties, the Graphite Reactor (Bldg. 3001), is included in the National Register of Historic Places (NRHP) and it is also identified as a National Historic Landmark. The remaining properties are eligible for inclusion in the NRHP.

Table 3.2. ORNL properties within the Central Campus included or eligible for inclusion in the NRHP

Bldg. no.	Building name	Year built	NRHP status
--	ORNL Historic District	--	E
Properties within ORNL Historic District included or eligible for inclusion in NRHP			
2000	Solid State Laboratory Annex	1948	C
2001	Information Center Complex	1948	C
2003	Process Water Control System	1947	C
2019	Solar Energy Laboratory	1951	C
2624	Solid Waste Storage Area 1	1943	C
3000	13.8-kV Substation	1952	C
3001	Graphite Reactor	1943	I, C
3002	Filter House for 3001	1948	C
3005	Low Intensity Testing Reactor	1948	C
3008	Source & Special Material Vault	1943	C
3009	Pump House for 3010	1950	C
3010	Bulk Shielding Reactor Facility	1950	C
3012	Rolling Mill	1947	C
3017	Chemical Technology Division Annex	1952	C
3018	Exhaust Stack for 3003	1943	C
3019	(A) Radiochemical Processing Pilot Plant	1943	C
3019	(B) High Level Radiation Analytical Laboratory	1954	C
3020	Exhaust Stack for 3019	1943	C
3021	Turbine House for 3019	1943	C
3025	(E) Physical Examination-Hot Cells A	1951	C
3025	(M) Solid State Division Laboratory	1951	C
3026	(C) Radioisotope Development; Laboratory B	1943	C
3027	(D) Dismantling & Examination Hot Cells	1945	C
3028	Radioisotope Production Laboratory A	1951	C
3029	Radioisotope Production Laboratory B	1951	C
3030	Radioisotope Production Laboratory C	1951	C
3031	Radioisotope Production Laboratory D	1951	C

Table 3.2. ORNL properties within the Central Campus included or eligible for inclusion in the NRHP (continued)

Bldg. no.	Building name	Year built	NRHP status
3032	Radioisotope Production Laboratory E	1951	C
3033	Radioisotope Production Laboratory F	1951	C
3034	Radioisotope Area Services	1951	C
3036	Isotope Area Storage & Service	1951	C
3037	Operations Divisions Offices	1951	C
3038	Radioisotope Laboratory	1951	C
3039	Central Radioactive Gas Disposal Facility	1951	C
3042	Oak Ridge Research Reactor	1955	C
3044	Special Materials Machine Shop	1955	C
3074	Interim Manipulator Repair Facility	1951	C
3080	Reactor Experiment Control Room	1953	C
3091	Filters for 3019	1950	C
3092	Off-gas Facility	1956	C
3500	Instrumentation & Controls Division	1951	C
3501	Sewage Pumping Station	1949	C
3502	East Research Service Center	1950	C
3503	High Radiation Level Engineering	1948	C
3504	Geosciences Laboratory	1951	C
3508	Chemical Technology Alpha Laboratory	1944	C
3515	Fission Product Pilot Plant	1948	C
3518	Process Waste Treatment Plant	1957	C
3523	Storage	1954	C
3550	Research Laboratory Annex	1943	C
3587	Instrument Laboratory Annex	1950	C
3592	Coal Conversion Facility	1952	C

C = contributing to historic district; E = eligible for inclusion in NRHP; I = included in NRHP.
NRHP = National Register of Historic Places.
ORNL = Oak Ridge National Laboratory.

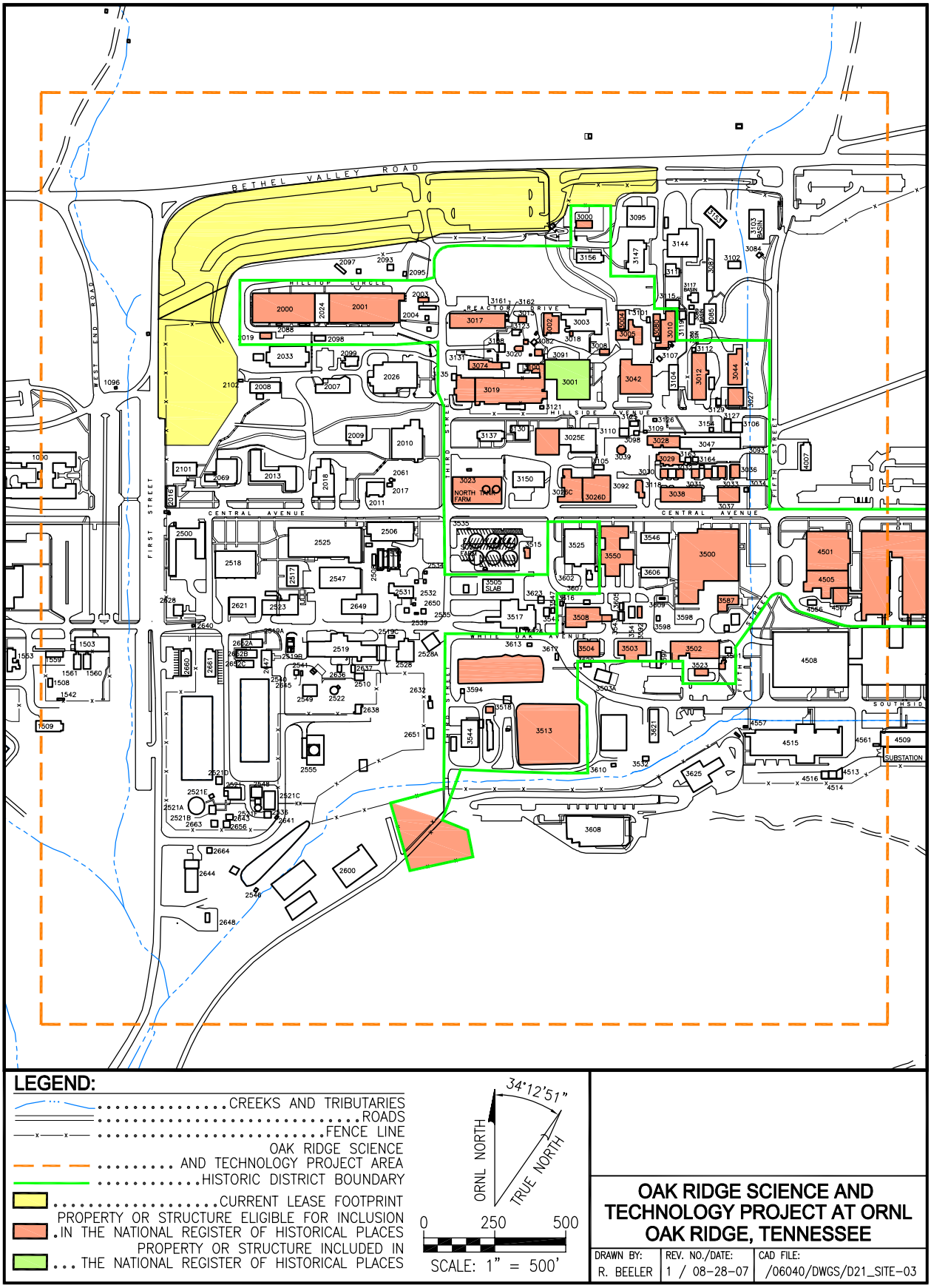

Fig. 3.2. General area being considered for the Oak Ridge Science and Technology Project.

3.6.2 Environmental Consequences

3.6.2.1 Proposed action

It is anticipated that the ORSTP would use existing facilities or construct new facilities in the Central Campus area of ORNL. Demolition of existing facilities could be included as part of the environmental cleanup activities planned for the Central Campus as part of EM's proposed IFDP. It is also possible that some buildings could be dismantled or renovated by potential ORSTP users. As part of the ORSTP, lease proposals would be reviewed for NHPA compliance. Prior to any actions that might impact the ORNL Historic District; DOE would consult with the Tennessee SHPO. Although actions under the ORSTP would not directly disturb or impact the Graphite Reactor, demolition of existing facilities and the construction of new buildings may impact the existing viewscape surrounding the Graphite Reactor. The Tennessee SHPO was notified by DOE about the proposed action and determined that the project as currently proposed would not adversely affect any property that is eligible for listing in the National Register of Historic Places (Appendix B).

3.6.2.2 No action

Under the no action alternative, impacts to contributing properties within the ORNL Historic District would still occur from anticipated environmental cleanup activities planned for the Central Campus area as part of EM's proposed IFDP. Environmental cleanup activities would be conducted under CERCLA and potential impacts to historical resources at ORNL would be evaluated through the Sect. 106 process including consultation with the Tennessee SHPO.

3.7 SOCIOECONOMICS

3.7.1 Existing Conditions

The economic region of influence (ROI) for this analysis includes Anderson, Knox, Loudon, and Roane counties. The region includes the cities of Clinton, Oak Ridge, Knoxville, Loudon, Lenoir City, Harriman, and Kingston.

3.7.1.1 Demographic and economic characteristics

Table 3.3 summarizes population, per capita income, and wage and salary employment from 2000 to 2005. Population has increased slightly over the 5-year period, with Knox County accounting for most of the growth. Employment for the region rose slightly from 362,538 in 2000 to 385,904 in 2005. Per capita income grew from $27,274 to $31,682 over the same period, generating a total regional income of $18.2 billion in 2005 (Bureau of Economic Analysis 2007).

Table 3.4 shows the distribution of minority populations in the city of Oak Ridge. For the purposes of this analysis, a minority population consists of any census tract in which minority representation is greater than the national average of 30.7%. Minorities include individuals classified by the U. S. Bureau of the Census as Black or African-American, American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, Hispanic or Latino, and those classified under "Two or more races." This provides a conservative estimate consistent with recent Office of Management and Budget guidance (OMB 2000). Hispanics may be of any race and are excluded from the totals for individual races to avoid double counting.

Table 3.3. Demographic and economic characteristics: Oak Ridge Region of Influence

County	2000	2001	2002	2003	2004	2005	Annual growth 2000–2005 (%)
Anderson							
Population	71,298	71,452	71,663	71,856	72,004	72,518	0.34%
Per capita income ($)	25,033	25,985	26,798	27,566	28,055	29,007	2.99%
Total employment	50,961	50,975	50,601	51,904	51,863	52,694	0.67%
Knox							
Population	382,835	387,184	391,462	396,559	400,174	405,355	1.15%
Per capita income ($)	28,552	29,179	29,583	30,059	31,417	32,815	2.82%
Total employment	272,030	272,556	275,868	277,453	287,987	293,069	1.50%
Loudon							
Population	39,232	39,962	40,762	41,568	42,226	43,411	2.05%
Per capita income ($)	25,397	25,717	26,377	27,528	29,554	30,538	3.76%
Total employment	15,749	15,834	16,075	17,253	18,047	18,721	3.52%
Roane							
Population	51,956	51,974	52,211	52,439	52,719	52,753	0.30%
Per capita income ($)	22,338	22,638	23,942	24,863	26,447	27,584	4.31%
Total employment	23,798	20,953	20,975	21,023	20,857	21,420	-2.08%
Region Totals							
Population	545,321	550,572	556,098	562,422	567,123	574,037	1.03%
Per capita income ($)	27,274	27,898	28,459	29,069	30,388	31,681	3.04%
Total employment	362,538	360,318	363,519	367,633	378,754	385,904	1.26%

***Source*:** Bureau of Economic Analysis 2007.

Table 3.4. Race or ethnic distribution for Oak Ridge City population: 2000

Race or ethnic group	Number	Percent
Not Hispanic or Latino		
White	23,517	85.9
Black or African American	2,229	8.1
American Indian or Alaska Native	81	0.3
Asian	568	2.1
Native Hawaiian and Other Pacific Islander	6	0.0
Some other race	30	0.1
Two or more races	427	1.6
Hispanic or Latino[a]	529	1.9
Total	27,387	100.0

[a]May be of any race. Those classified as Hispanic or Latino are excluded from other categories to avoid double counting.

Source: Bureau of the Census 2000.

As of the 2000 Census, minorities represented 14.0% of the total Oak Ridge population, compared to the national average of 30.7%. Of the Census tracts surrounding ORR, only the Scarboro Community in tract 201 included a minority population greater than the national average. African-Americans comprised 29.6% of the population in tract 201, and other minorities (including two or more races) comprised 10.5%. For all other tracts in the area, minorities comprised 20% or less of the population. For comparison, minorities represented 21.0% of the population in Tennessee (Bureau of the Census 2000). No federally recognized Native American groups live within 50 miles of the proposed site.

According to the 2000 Census, 12.4% of the U. S. population and 13.5% of the Tennessee population had incomes below the poverty level in 1999 (Census 2000). In this analysis, a low-income population consists of

any census tract in which the proportion of individuals below the poverty level exceeds the national average. Within the ROI, 13.1% of the population in Anderson County had incomes below the poverty level in 1999, while the proportion was 13.9% in Roane County, 12.6% in Knox County, and 10.0% in Loudon County. At the tract level, there were only two low-income populations located near the ORR, in census tracts 201 (15.8% below poverty level) and 205 (27.9%). Tract 201 roughly corresponds to the Scarboro community, and tract 205 includes the area between Oak Ridge Turnpike and West Outer Drive, bounded on the west by Louisiana Avenue and on the east by Highland Avenue and Robertsville Road. In other nearby census tracts, the percentages ranged from 12.1% in tract 204 to 1.9% in tract 301 (Census 2000).

3.7.1.2 Fiscal characteristics

Oak Ridge City general fund revenues and expenditures for FY 2005, projections for 2006, and budgeted revenues and expenditures for FY 2007 are presented in Table 3.5. The general fund supports the ongoing operations of local governments as well as community services, such as police protection and parks and recreation. The largest revenue sources have traditionally been local taxes (which include taxes on property, real estate, hotel/motel receipts, and sales) and intergovernmental transfers from the federal or state government. Nearly 95% of the 2005 general fund revenue came from these combined sources (City of Oak Ridge 2006). For FY 2006, the property tax rate was $2.55 per $100 of assessed value. The assessment rate is 40% for industrial and commercial property and 25% for residential property (City of Oak Ridge 2006). The city also receives a payment-in-lieu-of-tax (PILT) for ORR acreage that falls within the city limits. The payment is based on its value as farmland, and assessed at the farmland rate of 25% (City of Oak Ridge 2005). In 2006, the payment was based on a value of $6,450 per acre (Hunter 2006a).

Table 3.5. City of Oak Ridge revenues and expenditures, FY 2005, projected 2006 and budgeted FY 2007 ($)

	2005 Actual	2006 Projected	2007 Budgeted
Revenues			
Taxes	19,915,688	20,076,565	20,933,810
Licenses and permits	340,802	389,500	220,000
Intergovernmental revenues	10,574,555	11,482,459	11,771,300
Charges for services	388,577	336,500	346,000
Fines and forfeitures	238,503	265,000	289,000
Other revenues	527,689	553,000	558,500
Total revenues	31,985,814	33,103,024	34,118,610
Expenditures and other financing			
Expenditures	(14,737,841)	(17,690,181)	(16,326,766)
Other financing uses[a]	(17,503,411)	(17,931,145)	(18,997,273)
Total expenditures and other financing	(32,241,252)	(35,621,326)	(35,324,039)

[a]Includes items such as capital projects fund, solid waste fund, economic diversification fund, debt service, and schools.

Source: City of Oak Ridge 2006.
FY = Fiscal year.

3.7.2 Environmental Consequences

3.7.2.1 Proposed action

This section assesses the potential socioeconomic impacts of the ORSTP. For the purpose of this analysis, it is assumed that DOE would retain ownership of the land and would continue to make PILT on the affected land. Although the final size of the ORSTP is not known, the AURP recently collected data on the characteristics of its member parks (AURP 2006). While parks varied widely in size and value, the AURP parks surveyed reported an average of 1.1M ft^2 of building space and an average of 2,291 full-time-equivalent (FTE) employees per park (AURP 2006), and that figure is used to estimate potential employment impacts for the ORSTP. Actual employment may be larger or smaller, depending on the final size, its actual success in recruiting tenants, and the mix of industries represented.

Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations," requires agencies to identify and address disproportionately high and adverse human health or environmental effects its activities may have on minority and low-income populations. Although current assumptions suggest there would be no high and adverse human health or environmental impacts, the actual circumstances would depend on specific choices made at the time of development. As discussed in Sect. 3.7.1.1, of the census tracts near the ORR, only tract 201 includes a higher proportion of minorities in the population than the national average. Other tracts are also located near the ORR, and in the event that adverse impacts occur, they are likely to have at least as much effect on these closer populations as on the residents of tract 201.

Similarly, some low-income populations are located near the ORR. However, these populations are scattered among higher income populations. Any adverse impacts that affect the low-income tracts are also likely to affect the higher income populations. Therefore, any adverse health and environmental impacts that may occur are not expected to have a disproportionate effect on low-income and minority populations.

Employment and Income

This analysis assumes that the ORSTP would create up to 2,291 direct, FTE jobs, based on the average employment for parks of this type. This figure represents a negligible increase (0.6%) from the 2006 total employment shown in Table 3.3. While the ORSTP may also result in additional indirect employment, the size of the impacts is uncertain. Such impacts can vary widely, depending on the specific industries and companies involved and the mix of other industries within the region. Changes in regional income from the proposed development would depend on the actual compensation paid but are expected to be proportional to the number of jobs generated. Actual jobs created would depend on the eventual size of the ORSTP, its success in recruiting tenants, and the mix of industries represented. Development is also likely to be spread over a number of years, as the ORSTP gradually develops, reducing the potential impact in any 1 year.

Population

Based on the small number of estimated jobs created, no impact on population is anticipated.

Fiscal Impacts

This analysis assumes that land developed for the expanded ORSTP would remain under DOE ownership and that DOE would continue to make in-lieu-of-tax payments (Hunter 2006b). Potential

positive impacts include increased local revenue from real estate or sales taxes, but the size of the impact could vary considerably, depending on many factors. For example, in many AURP parks, building ownership is shared between private, for-profit entities, and not-for-profit organizations (AURP 2006), suggesting that the tax status of future buildings and equipment is likely to be determined on a case-by-case basis. The cost of new services, the final value of assets, and the amount subject to property tax would determine the net amount of revenue local governments actually receive.

3.7.2.2 No action

Under the no action alternative, there would be no major change in anticipated population, employment, income, or fiscal characteristics, and no disproportionate effect on minority or low-income populations within the ROI.

3.8 INFRASTRUCTURE

ORNL has its own infrastructure to support its activities and includes a dedicated fire department, a medical center, a security force, a wastewater treatment plant, and a steam plant. Utility service for electricity, natural gas, water, and telecommunications, that are required for ORNL to operate are supplied by other entities. ORNL produces steam and compressed air and operates and maintains systems for the collection and treatment of sanitary, process, and industrial-type wastes. Utilities required for ORSTP facilities would typically be comparable to those already in place for current ORNL facilities. These include steam, potable, process and fire water, electricity, plant air, storm sewer, and sanitary sewer.

The following information about the utility and transportation infrastructure serving ORNL reflects existing conditions.

3.8.1 Existing Conditions

3.8.1.1 Utilities

Electrical. Electrical power to ORNL is supplied from the Tennessee Valley Authority (TVA) Oak Ridge area 161-kV network through two 161-kV feeders via a new (161-kV/14-kV) primary substation (constructed in 2006). The new substation has a 70-megawatt (MW) capacity to serve the existing facilities and programs at ORNL. Twelve 14-kV feeders are available to distribute power to facilities throughout ORNL where transformers further reduce the voltage to useable levels. Three secondary 2.4-kV substations, a 2.4-kV distribution system, switchgear, and numerous facility transformers complete the primary distribution system. No on-site electrical power generation is conducted at ORNL; however, backup generators have been installed at specific facilities. These standby generators provide essential power to allow functions associated with environment, safety, health, security, quality, and infrastructure to continue unaffected during power outages. Design and construction of an expansion to the primary substation is underway to increase the capacity to 140 MW, provide additional distribution circuits to effectively utilize the additional capacity, and provide a third 161-kV circuit to the substation to further stabilize the TVA network. In addition, the reliability of the ORNL electric system is being improved through the replacement of obsolete equipment and through expansion and updating of the local distribution system. These actions will not only improve the reliability, but also provide the capability to meet ORNL's future power needs.

Natural Gas. The ORNL natural gas distribution system was constructed in 1948. Natural gas is currently supplied to ORNL from the main line and one of two pressure-reducing stations that make up

the supply system to ORR. The ORNL natural gas tap is at Metering Station B located North of Bethel Valley Road at the Melton Valley Access Road intersection. Natural gas from the main is reduced to 100 pounds per square inch (psi) at the metering station. A 6-in. supply line runs south from the metering station to a tee where a 2-in. line branches off to supply gas to the 7000 area reducing station. Gas pressure is reduced at the station to 10 psi for distribution to user facilities in the 7000 area. The gas supply for the remainder of ORNL runs to a pressure-reducing station at the Steam Plant. The main campus area and the steam plant are supplied gas from this station. Pressures are further reduced at each individual user facility according to the needs of that facility. In 2002, the SNS project installed a tee south of Metering Station B and routed a natural gas line to a pressure-reducing station located south of the SNS site. A 6-in. high-density polyethylene (HDPE) service line extends the 20-psi service into the SNS site providing fuel for package boilers and other operational purposes. In 2003, a new 6-in. tap was made at the ORNL Metering station B and a new 6-in. HDPE gas line was extended to the west along the north side Bethel Valley Road. This line serves the newly constructed facilities in the 4000/5000 area of the main campus.

Potable Water. Treated water to ORNL (Bethel and Melton Valleys) is supplied to ORNL by the city of Oak Ridge from the water treatment plant located across from the Y-12 Complex, on the east end of Bear Creek Road. Water to ORNL is provided via a single 24-in. gravity line from the water plant into the ORNL plant site. ORNL is responsible for compliance with the rules of TDEC Division of Water Supply and operates and maintains the water distribution system. The water line feeds the ORNL reservoir system, which consists of one 3-million-gallon concrete reservoir, a 1.5-million-gallon steel reservoir on Chestnut Ridge, and two 1.5-million-gallon steel reservoirs on HAW Ridge. From these reservoirs, water flows by gravity through the plant distribution grid. The water is used for potable, fire protection, and process purposes. In addition to the mentioned reservoirs, a 0.3-million-gallon elevated tank was constructed as part of the SNS project. Although constructed for the primary use of the SNS, it is part of the ORNL distribution grid. The potable water and process water distribution system at ORNL consists of ~212,000 ft of piping. The general condition of the system can be described as good. System breaks are sporadic and the cause of the failure is primarily due to mechanical loading and deterioration. A number of expansion and improvements to the water systems are in the planning phases.

Sanitary Wastewater. Sanitary sewage is collected from facilities in both Bethel and Melton Valleys and the SNS site. Sewage flows to an on-site treatment facility located in the southwest area of the ORNL site. The sewage collection system consists of pumping stations and over 50,000 lin. ft of gravity-flow and force sewer mains of clay, cast iron, ductile iron, and polyvinyl chloride pipe ranging in size from 4 to 12 in. There is approximately 20,000 lin. ft of building lateral piping. Access to this system is obtained through brick and concrete manholes. The ORNL STP, built in 1985, consists of a DAVCO 300,000-gallons per day (gpd) package extended aeration plant that provides primary and secondary treatment. Sand/gravel filtration and ozonation provides tertiary treatment. The Sewage Plant wastewater effluent is discharge through one of the ORNL NPDES-permitted outfalls. Permit-limit compliance is facilitated via a WAC document that must be followed for all wastewaters proposed for treatment. During 1984 and 1985, approximately 60% of the sanitary/sewage collection lines 6 in. in diameter and larger were rehabilitated thorough the placement of a joint-free liner within the pipes. A subsequent project conducted in the mid-1990's successfully upgraded the remainder, except for a few short sections of the main collection lines, as well as individual building service laterals, and sealed all manholes with polyurethane.

Process Wastewater. The process wastewater system accepts wastewater from laboratories, contaminated groundwater, and other waste treatment systems. The system is designed to treat wastewater similar to an industrial metal finishing facility with additional capability to remove radioactivity. The ORNL PWTC consists of two facilities. Building 3544, built in 1975 and upgraded in 1996, is used for treatment of radiological wastewater and Bldg. 3608, built in 1989, is used for treatment of

non-radiological wastewater. The process wastewater collection system consists of a series of underground pipes where process wastewater flows from the source facility to a pumping station for transfer to the PWTC. Process wastewater may also be bottled and transported to the PWTC. The PWTC has undergone a number of upgrades over recent years, which have significantly improved the integrity and process durability. Adequate capacity exists for the PWTC to treat projected levels of R&D-generated wastewater, but portions of the system could need to be upgraded or replaced with newer, more efficient treatment technologies or modified based on the types of R&D-generated wastes it may handle in the future.

Stormwater Collection System. The stormwater collection system consists of drainage ditches, catch basins, manholes, and collection pipes that convey stormwater, condensate, and cooling water flows to the receiving streams. WOC traverses the ORNL site and ultimately receives all the discharges from ORNL, as well as normal flows from the four tributaries that feed it. Rainfall, snowmelt, and other authorized flows are directed to the gravity-drainage system that conveys the water from buildings, parking lots, streets, and roofs to specific outfalls. Each of these outfalls must be periodically sampled and characterized to determine the makeup of the discharge stream and to ensure that it complies with NPDES permit requirements.

Fire Protection. Most ORNL facilities are protected from fire by remotely monitored fire alarm and sensing systems coupled with automatic sprinkler devices. Fire protection is provided primarily through the potable water system and is crucial to the facilities and personnel protection. During the winter months, steam heating protects the fire protection water lines. Many of the old, outdated fire alarm systems in Laboratory facilities are being updated, and new systems are being added to facilities currently not covered. These improvements will enhance fire protection capability for the Laboratory and ensure compliance with requirements in fire protection standards.

Compressed Air. Compressed air supplies most of ORNL's major pneumatically operated control systems located in the Bethel Valley main campus, which include experimental programs and processes, as well as building ventilation systems. Clean, dry, instrument-quality, 100-pounds per square inch gage (psig), compressed air is produced at the ORNL Steam Plant. There are five air compressors available to meet the airflow demand. These compressors are backed up with diesel generators or steam turbines to enable uninterrupted service during electrical power outages. The compressed air is distributed thorough an arterial-looped underground and aboveground piping system.

HVAC. Heating and cooling of the buildings and equipment are primarily provided by space conditioning units. The HVAC systems in each building are maintained per the heating, cooling, and humidity control requirements applicable for each facility. ORNL maintains a large chilled water system to serve the cooling needs of several facilities.

Steam Plant. The steam production system consists of six natural gas/fuel oil dual-fired boilers, all of which are housed in the Steam Plant (Bldg. 2519). Total capacity of the six boilers is slightly over 300,000 pounds per hour of saturated steam at 250 psig. The steam plant supplies steam to both Bethel Valley and Melton Valley facilities. The plant was converted from coal firing to natural gas/fuel oil firing in late 1999. As part of the conversion, a new natural gas/fuel oil fired boiler was installed. The steam distribution system is generally in good condition due to major refurbishments of the system in 1988 and 1998. About 90% of the steam produced is used primarily for heating approximately 135 buildings, and the remainder is used for process steam. Steam is available to drive the off-gas turbines in the 3039-stack area during electrical power outages.

Steam Plant Wastewater Treatment Facility. The Steam Plant Wastewater Treatment Facility, formerly known as the Coal Yard Runoff Treatment Facility, was constructed in 1985 to treat wastewaters

from steam plant boiler blow down, runoff from the coal storage yard, ash handling water, and wastewater from various water softener/ion exchange/demineralizer regeneration systems at the ORNL Steam Plant. The system was designed by Alar Engineering Corporation of Mokena, Illinois. The treatment equipment is in Bldg. 2644, located due south of the Sanitary STP, along First Street, in the southwest area of the ORNL site. The plant now primarily only treats wastewater from the Steam Plant water softener regeneration and boiler blow down. Effluent from the treatment plant is discharged through a NPDES-permitted outfall.

3.8.1.2 Transportation

ORNL main site locations are accessible only by road. Although portions of the site border the Clinch River, there is no barge facility. Rail access is also limited as well, as no tracks run to the ORNL site. Vehicle circulation at ORNL may be divided into two sectors: off-site and on-site circulation. Off-site circulation consists of staff movements to and from work and between the various Oak Ridge installations on work assignments and materials delivery. Off-site roads include State Route (SR) 95 (White Wing Road), which provides access to the west end of the Bethel Valley area, and SR 62 and Scarboro Road, which provide access to the eastern end of Bethel Valley. On-site circulation consists of materials handling, movement of personnel between buildings and to and from parking lots, and contractor and vendor personnel movement.

The main road in the vicinity of the Central Campus is Bethel Valley Road, which is currently closed to non-authorized traffic. This east–west road provides access to the site from the surrounding SRs. Completion of several construction and expansion projects has helped alleviate some of the chronic parking problems experienced at the Bethel Valley site. Several main roads and access roads provide on-site transportation. The primary north and south corridors are First, Second, Third, Fourth, and Fifth streets. The major east and west corridors are White Oak and Central Avenues. Materials are transported via the same routes used by employees and visitors.

By far, the largest portion of the off-site traffic circulation generated by ORNL is personnel commuting to and from work. The average commute of an ORNL employee working in Bethel Valley is about 35 miles. Peak traffic occurs between 7 and 8 a.m. with the arrival of workers at the site, and between 4 and 5 p.m. with their departure. Minimal traffic delays are experienced during these peaks because work shifts are staggered, car and vanpooling are practiced, and most deliveries to and shipments from ORNL are timed to avoid the rush hour. Road maintenance and the movement of heavy equipment or escorted shipments typically occur during the workday after traffic flow has subsided.

3.8.2 Environmental Consequences

3.8.2.1 Proposed action

Utilities

Specific details about the utility requirements for companies locating within the ORSTP are not available; however, the anticipated utility requirements would be typical of standard light industrial and research operations. Though they are not anticipated, utility upgrades or replacements would occur as needed. Any future utility additions or upgrades/modifications as a result of activities associated with the ORSTP would not have a major environmental impact. Repairs and upgrades to existing utility systems necessary to support ORSTP user activities would be the responsibility of the lessee and/or the commercial user. Current plans are for the construction of minor extensions to the existing water and sanitary sewer systems to accommodate ORSTP development. These extensions would be funded by

non-DOE dollars and would be owned and operated by the city of Oak Ridge. Electrical power distribution would be handled in the same manner with extensions of the existing power network constructed and owned and operated by the city. The Oak Ridge Utility District would extend their existing pipeline to provide the required natural gas. Telecommunications services would be provided by ATT from their existing lines. Costs for these services would be passed on to the various users.

Because the project would primarily occur within an existing industrial complex, it is expected that the ongoing electrical power supply and transmission system updates would be adequate to supply the needed electricity without major modifications or upgrades. However, electrical demands from potential new users would have to be evaluated to ensure that demand could be met given potential future load demands from ORNL initiatives such as the supercomputer and other computing initiatives currently underway. It is also expected that anticipated water usage could be readily accommodated by the existing water supply system.

Sanitary wastewater resulting from activities at the ORSTP would be discharged to the ORNL STP for subsequent treatment. The ORNL STP is expected to accommodate the anticipated sewage discharge from the ORSTP facilities; however, if increased capacity is necessary to accommodate a significant increase in usage, current schedule projections for upgrading or replacing the STP may have to be accelerated. Depending on the nature of the ORSTP activities, wastewater collection and transfer systems or facilities could be needed for wastewaters other than sanitary wastewaters, or for sanitary wastewaters that would need to be transported to the STP rather than being facility-drain-disposed to the STP. Process wastewater that could not be discharged to the sewer and STP would be contained and transported to an approved off-site treatment facility or possibly the ORNL PWTC. Other major utility systems (i.e., process, potable, and fire protection water, compressed air, and steam that might be serving potential tenants in the ORSTP) are also anticipated to be capable of accommodating expected new activities associated with the ORSTP.

Transportation

The transport of materials and equipment associated with any construction and modification activities to accomplish the establishment of the ORSTP would be over regional and local roadways to the site, and no adverse transportation impacts are expected. Employee traffic to ORNL along Bethel Valley Road from the ORSTP would likely increase to some degree over current levels. Thus, some impacts would occur to traffic loading and possibly commute times due to the increase in personnel traveling Bethel Valley Road.

3.8.2.2 No action

Utilities

Under the no action alternative, utility repairs and upgrades would be conducted as part of ongoing research and landlord activities. Additional impacts would not occur.

Transportation

Traffic would likely continue to remain close to current levels and no impacts would occur.

3.9 WASTE MANAGEMENT

It is anticipated that the ORSTP users would use existing off-site licensed and/or permitted treatment, storage, and disposal facilities for any newly generated wastes; however, some on-site treatment could occur (primarily process wastewater) and would only be approved by DOE on a case-by-case basis. Therefore, the following subsections are provided for information as to the general waste management operations currently in place in the Central Campus area of ORNL.

3.9.1 Existing Conditions

In 1999, Bechtel Jacobs Company LLC (BJC) assumed responsibilities for waste storage, transport, and disposal at ORNL. ORNL's wastes are managed in seven categories: sanitary/industrial, low-level radioactive, transuranic (TRU), hazardous, mixed, toxic, and classified (ORNL 2002). These categories are briefly described below.

Sanitary wastes consist of both liquid and solid forms. Sanitary and process wastewater collection and treatment is discussed in Sect. 3.8.1. Sanitary/industrial solid wastes consist of paper, garbage, wood, metal, glass, plastic, demolition and construction debris, sanitary and food wastes from cafeteria operations, sludge from water and air treatment, and other special wastes. The Y-12 Complex Centralized Sanitary Landfill II is used for disposal of non-hazardous materials such as construction debris and other solid sanitary wastes (ORNL 2002).

3.9.1.1 Liquid low-level waste system

The liquid low-level waste (LLLW) system at ORNL collects, neutralizes, concentrates, and stores aqueous radioactive waste solutions from various sources at the Laboratory. The sources of these waste solutions are "hot" sinks and drains in R&D laboratories, radiochemical pilot plants (e.g., Bldg. 3019A), and nuclear reactors. The LLLW system/facilities are located throughout ORNL. The LLLW storage tanks are located near the LLLW source buildings, the LLLW Evaporator Facility is located near Third Street, and the Melton Valley Storage Tanks (MVSTs) and the Foster-Wheeler Environmental Corporation (FWENC) TRU processing facility are located in Melton Valley.

Waste is generated in buildings and discharged to collection tanks near the facility or is discharged directly to the LLLW Evaporator Service Tanks W-21 or W-22. These tanks store evaporator concentrate and dilute radioactive LLLW and are connected directly to the LLLW Evaporator systems. The contents of the tanks are transferred on a batch basis to the evaporator facility for volume reduction. Two 600-gal/hr evaporator systems, housed in Bldg. 2531, are used to concentrate the LLLW. Condensate from the evaporator systems receives treatment at the Bldg. 3544 PWTC for the removal of radiochemicals from the evaporation process. The LLLW concentrate is stored in 50,000-gal evaporator storage tanks until a pipeline transfers it to the MVSTs. The MVST contents are or will be treated at the FWENC TRU processing facility and eventually disposed of off-site.

LLLW is also transported by surface vehicles to the LLLW collection system for treatment as an alternative to the LLLW collection system, which utilizes a network of underground piping and tanks. Bulk liquid wastes that are not transferred by pipeline are transported from the generating facility by tank motor vehicle to the collection header in the South Tank Farm for further transport by pipeline to the storage tanks and Bldg. 2531 for treatment. Smaller quantities of liquid waste, such as those produced in some of the research laboratories, are bottled and transferred from the generating facility by motor vehicle directly to Bldg. 2531 for treatment (ORNL 2002).

3.9.1.2 Stack ventilation system

The stack ventilation systems in the Central Campus area include the 3019, 3020, and 3039 Stack Ventilation Systems. The primary functions of these ventilation systems are to safely and efficiently collect process gaseous waste streams from various ORNL facilities, provide the necessary filtration, monitor the streams for radionuclide and hazardous material contents, and discharge the combined streams to the atmosphere at a central location. The systems are designed to provide continuous, uninterrupted operation by utilizing backup fans, cross-connected systems, redundant capacity, and backup power supplies.

3.9.1.3 Low-level radioactive waste

Low-level radioactive waste (LLW) is waste that contains radioactivity but is not classified as high-level waste, TRU waste, spent nuclear fuel, or by-product material as defined by DOE Order 435.1, "Radioactive Waste Management." LLW does not contain hazardous waste as regulated by the Resource Conservation and Recovery Act of 1976 (RCRA) and as defined in 40 *CFR* 260–268 (or state of Tennessee equivalent standards). Some polychlorinated biphenyl (PCB)-contaminated or PCB-detectable waste as regulated by the Toxic Substances Control Act of 1976 (TSCA), and as defined in 40 *CFR* 761, may be accepted and handled as LLW. DOE Order 435.1 and the Atomic Energy Act, as amended, provide the primary regulatory guidance and requirements for the management of LLW.

LLW is generated throughout ORNL, and after characterization and waste certification, it is staged at the generating location until it is certified and accepted by the receiving facility. BJC, the DOE waste management contractor, determines the most suitable management option for all LLW generated by ORNL. Based on the characteristics and certification of the waste, BJC may (1) store the waste in one of several storage facilities dedicated to LLW; (2) utilize treatment options, such as compaction and incineration, offered by commercial facilities or in-house treatment options; or (3) ship the waste to an approved off-site disposal facility such as the Nevada Test Site or Envirocare (ORNL 2002).

3.9.1.4 Transuranic waste

TRU waste is waste that is contaminated with alpha-emitting transuranium (atomic number greater than 92) with half-lives greater than 20 years and concentrations greater than 100 nanocuries per gram at the time of assay. WAC and an implementing procedure are in place for treatment and disposal of TRU wastes generated at ORNL (ORNL 2002).

TRU waste is generated by a limited number of generators and facilities at ORNL. All TRU waste generated is stored in on-site storage facilities operated by BJC or FWENC. Most of these facilities are RCRA-permitted and store some RCRA-contaminated TRU waste, as well as some RCRA-contaminated LLW that exceeds the dose limits for BJC's other RCRA-permitted storage facilities. A very small quantity of TRU waste is also PCB contaminated (ORNL 2002). Limited treatment options are or will be conducted by FWENC and/or BJC, including stabilization, amalgamation, and/or macroencapsulation. Most TRU waste will eventually be disposed of at off-site facilities.

3.9.1.5 Hazardous waste

Hazardous waste is a waste or surplus material with negligible value that may cause or contribute to an increase in mortality or to an increase in serious irreversible illness, or pose a substantial present or potential hazard to human health or the environment when improperly stored, treated, disposed of, or transported. Hazardous wastes are defined in RCRA by specific source lists, non-specific source lists, characteristic hazards, and discarded commercial chemical product lists. Characteristic wastes are

those that exhibit the characteristics of ignitability, corrosivity, reactivity, or toxicity, as defined in 40 *CFR* 261.

Hazardous wastes are generated throughout ORNL and are stored in generator satellite accumulation areas or in (90-day) accumulation areas operated by the generator or Laboratory Waste Services (LWS) pending pickup. Based on the characteristics and certification of the waste, the waste may be (1) transported to an off-site commercial facility for treatment and/or disposal; (2) stored in one of several storage facilities permitted for hazardous waste; or (3) utilized for other on-site treatment. Most of ORNL's permitted storage of hazardous waste is consolidated in the 7650 series buildings on Melton Valley Access Road.

3.9.1.6 Mixed waste

Mixed waste is waste that contains both hazardous and radioactive components and must be managed to meet the requirements applicable to both. "Hazardous," in this instance, refers to both those wastes regulated by RCRA and those PCB wastes with concentrations or sources greater than or equal to 50 parts per million (ppm) and fully regulated under TSCA. Like hazardous wastes, mixed wastes are generated throughout ORNL and are stored in accumulation areas operated by the generator or LWS pending pickup. BJC determines the most suitable management option for all mixed wastes generated by ORNL. Based on the characteristics of the waste, BJC may store the waste in one of several storage facilities dedicated to mixed waste, pending determination of suitable treatment, storage, and disposal options (ORNL 2002). Many of ORNL's mixed wastes are treated in the TSCA Incinerator located at the East Tennessee Technology Park (ETTP).

3.9.1.7 TSCA waste

TSCA waste consists of PCB waste and asbestos waste and is regulated by the EPA under TSCA. In accordance with 40 *CFR* 761, Subpart D, TSCA regulates PCB materials (wastes/contaminated equipment) based on PCB concentration and waste type (such as PCB remediation waste or PCB bulk product waste). TSCA also regulates PCB/radioactive wastes. The ORR PCB Federal Facilities Compliance Agreement between EPA Region 4 and DOE-ORO addresses PCB compliance issues at ORNL. This agreement specifically addresses the unauthorized use of PCBs, storage and disposal of PCB wastes, spill cleanup and/or decontamination, PCBs mixed with radioactive materials, and records and reporting requirements. Some of ORNL's PCB/radioactive wastes are treated at the TSCA Incinerator at ETTP, whereas other PCB wastes are sent to commercial facilities within 1 year of generation.

TSCA also addresses the manufacturing, importing, and processing of asbestos and establishes requirements for asbestos abatement projects not covered by (1) the Asbestos Standard of the Occupational Safety and Health Administration (OSHA), 29 *CFR* 1926.58; (2) an asbestos standard adopted by a state as a part of a plan approved by OSHA under Sect. 18 of the Occupational Safety and Health Act of 1970; or (3) a state asbestos regulation which the EPA has determined to be comparable to, or more stringent than, that established in 40 *CFR* 763.120. Because ORNL does not manufacture, import, or process asbestos, and because asbestos activities are covered by an approved Asbestos Standard, any waste with asbestos-containing material (ACM) is not regulated under TSCA. ACM is either managed as sanitary waste, LLW, TRU waste, TSCA/RCRA waste, or TSCA/RCRA mixed waste if the ACM has come into contact with such constituents. Accordingly, asbestos is managed as a TSCA (PCB) waste only if it has come into contact with PCBs.

Generators initially store these wastes until transfer for either on-site storage, off-site storage, or disposal. PCB wastes received, treated, and disposed are routinely included in the totals for hazardous and mixed wastes (ORNL 2002).

3.9.2 Environmental Consequences

3.9.2.1 Proposed action

Specific details about the wastes that may be generated by companies locating within the ORSTP are not available; however, the types of uses proposed for the ORSTP could produce wastes typical of standard light industrial and research operations. Thus, it is anticipated that only minor quantities of hazardous waste and hazardous materials would be handled by the commercial companies that would be part of the ORSTP. It is also DOE's expectation that tenants under the ORSTP would practice waste minimization, source reduction, etc. In the event that they generate sufficient quantities to require reporting status, they would probably qualify as conditionally exempt small-quantity generators. Users would be expected to comply with the temporary storage provisions under RCRA (42 *United States Code* 6901, et seq.). These wastes would be handled by the company and would not enter into the ORNL waste management systems, except for possibly process wastewater. Use of the PWTC would be approved by DOE on a case-by-case basis. Quantities of solid non-hazardous waste generated would be recycled or transported to an appropriate landfill for disposal.

Impacts from accidental spills would be addressed by individual operating entities through the use of safety procedures and spill prevention plans. If required by state/federal law, companies locating within the ORSTP would have a spill prevention, control, and countermeasures plan and/or an emergency response plan, should a release of hazardous materials (to any environmental medium—air, surface water, groundwater, soils) occur. Resources are available for response to an event such as a release off-site through mutual-aid agreements between the city of Oak Ridge, ORNL, and the surrounding communities.

3.9.2.2 No action

Under the no action alternative, there would be no change to current waste generation and handling from routine operations at ORNL. Waste storage, transport, and disposal activities associated with the Central Campus area would continue to be handled under ORNL's Waste Management Program, which is described in Sect. 3.9. No additional impacts would occur.

3.10 HUMAN HEALTH AND SAFETY

3.10.1 Existing Conditions

Past activities at ORNL have resulted in releases of radionuclides and chemicals to the environment. Such releases combine with natural sources and can augment the exposure to humans both on- and off-site. Natural background sources include cosmic radiation and uranium and thorium in native soils. Inorganic elements, such as arsenic, beryllium, and manganese, are also found in native soils on the ORR, including ORNL. These naturally existing sources of radiological and chemical exposures become the background exposure to which the effects of the man-made releases would be added. The *Oak Ridge Reservation Annual Site Environmental Report for 2005* (DOE 2006) summarizes releases of environmental contamination levels of chemicals and radiation and resulting exposures for calendar year 2005.

In general, human exposure pathways include direct contact, inhalation, and ingestion. Radiation exposure is commonly categorized as either external (exposure to penetrating radiation) or internal (ingestion and inhalation). Ingestion of radionuclides can be through the intake of water or foodstuffs (e.g., vegetation and fish).

DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, limits the effective dose equivalent (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 100 mrem. 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 control value for a worker's radiation dose is 5000 mrem/year total EDE from combined internal and external sources.

3.10.2 Radiological Exposure to the Public

The average annual background radiological EDE from natural and man-made sources to an individual residing in the United States is approximately 360 mrem. Approximately 300 mrem of the 360 mrem are from natural sources (e.g., radon, cosmic radiation), about 55 mrem of which are from natural external radiation sources (i.e., cosmic and terrestrial radiation) [National Council on Radiation Protection and Measurements 1987]. External radiation exposure rates from background sources have been measured in Tennessee. The measured rates are equivalent to an average annual EDE of 42 mrem, ranging between 19 and 72 mrem (Myrick et al., 1981). This average is less than the U. S. annual average of 55 mrem.

DOE (2006) provides estimates of radiological doses from ORNL; information from this report is summarized here. The calculated radiation dose to the maximally exposed off-site individual resulting from airborne releases from ORNL was about 0.1 mrem during 2005, which is less than 1% of the natural external radiation background EDE to an average Tennessee resident. The maximally exposed individual for ORNL is assumed to be located about 3.1 miles east of the 3039 Stack and 2.6 miles east-northeast of the 7911 Stack. The contribution of ORNL emissions to the collective EDE to the population residing within 50 miles of the ORR was calculated to be about 2.7 person-rem, which is approximately 25% of the collective EDE for the ORR.

3.10.3 Radiological Exposure to Workers

Workers at selected buildings in the Central Campus area are potentially exposed to radioactive hazards. Some facilities contain out-of-date, service-contaminated equipment remaining from former operations and other work involving spent fuel, plutonium, ^{233}U, thorium, and other radionuclides. An extensive health physics program is used to track any migration of contamination, which is impeded by a combination of engineered physical boundaries (e.g., gloveboxes, cells, and multi-zoned ventilation controls).

3.10.4 Chemical Exposure to the Public

Health effects attributed to chemical exposures can be categorized as carcinogenic or non-carcinogenic. Chemical carcinogenic risks are reported here as a lifetime probability of developing an excess cancer. EPA defines a target cancer risk range of 10^{-4} (1 in 10,000) to 10^{-6} (1 in 1,000,000), which defines when cleanup actions are to be considered under CERCLA. Non-carcinogenic 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 non-carcinogens are defined as those with an HI greater than 1.

DOE (2006) 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. For ingestion of drinking water, HQs were estimated upstream [Clinch River kilometer (CRK) 70] and downstream (CRK 16) of

ORR discharge points. HQs were less than 1 for detected chemical analytes for which there are reference doses or maximum contaminant levels (i.e., barium, manganese, zinc, etc.).

To evaluate the potential health effects from the fish consumption pathway, HQs were estimated for the consumption of non-carcinogens, and risk values were estimated for the consumption of carcinogens detected in sunfish and catfish collected both upstream and downstream of ORR discharge points. For consumption of sunfish and catfish, an HQ greater than 1 was calculated for both Aroclor-1254 and Aroclor-1260 at all three locations [CRK 70 (upstream of city of Oak Ridge), CRK 32 (downstream of ORNL), and CRK 16 (downstream of all DOE inputs)] based on catfish consumption. Risk calculated for the intake of PCBs (including Aroclor-1254 and Aroclor-1260) was approximately 10^{-5} for PCBs found in sunfish and 10^{-4} for PCBs found in catfish collected at all three locations. Risk values of 10^{-4} were also calculated for arsenic in sunfish and catfish at all three locations. TDEC has issued a fish advisory for the non-consumption of catfish from the Melton Hill Reservoir and a precautionary fish consumption advisory for catfish in the Clinch River arm of the Watts Bar Reservoir.

3.10.5 Chemical Exposure to Workers

Potential chemical hazards to personnel working in the Central Campus area include uncoated Pb shielding, Pb paint, PCBs, asbestos, combustible foam insulation, perchlorate contamination, hazardous chemicals used in research and development and routine operations and maintenance, and legacy beryllium contamination. RCRA hazardous and TSCA wastes are produced in the course of routine operations and maintenance of the facility. Oversight for control of occupational chemical exposures at existing facilities currently is under the responsibility of either the UT-Battelle Environment, Safety, and Health organization or BJC, both of whom must ensure compliance with the provisions of DOE Order 440.1, *Worker Protection Management for DOE Federal and Contractor Employees* (DOE 1997b). This Order includes a requirement that contractors comply with Federal OSHA regulations.

3.10.6 Environmental Consequences

3.10.6.1 Proposed action

Construction workers would be subject to typical hazards and occupational exposures faced at other industrial construction sites. Falls, spills, vehicle accidents, confined-space incidents, and injuries from tool and machinery operation could occur. Similar accidents could occur at facilities during operation. Workers would be expected to receive applicable training, be protected through appropriate controls and oversight, and be afforded the same level of safety and health protection found at similar science and technology parks. DOE minimizes standard construction hazards through strict adherence to 29 *CFR* 1926, OSHA Standard for Construction, and DOE and ORNL health and safety policies and procedures.

Looking at the types of research and light manufacturing activities that would be established within the ORSTP, it is anticipated that they would have minimal emissions and effluents common to other science and technology parks and light 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 business that would locate to ORNL as part of the ORSTP would be required to conform to the IND-1, Industrial District regulations.

No unique occupational health and safety hazards would be expected from the ORSTP. Individuals working for companies that would be part of ORSTP would be classified as DOE co-located workers. Co-located workers that have access to ORNL receive applicable training and are protected through appropriate controls and oversight. It would be the company's responsibility to operate in a safe and protective manner. Issues related to public and worker exposures to effluents and emissions from ORSTP

facilities would be addressed by permits and regulations under the state of Tennessee. It is anticipated that most of the operations that would be part of the ORSTP would not result in radiological exposures. However, if a company did handle radioactive material they would be regulated by the Nuclear Regulatory Commission or the state of Tennessee. These facilities would be required to comply with the terms and conditions of their radioactive materials license if applicable.

BSL-2 laboratory research would be conducted to maximize safe working conditions. The agents manipulated at BSL-2 are often ones to which workers have had exposure to in the community, often as children, and to which they have already experienced an immune response or an immunization is recommended before working with specific agents (e.g., hepatitis B). Some work may be done on an open bench by persons wearing appropriate protective clothing or gear. Any work that may produce splatters or aerosols of infectious materials is typically performed inside a biological safety cabinet or other containment device. Strict microbiological practices, policies, and procedures are followed and access is controlled. Waste materials are separated and infectious wastes are decontaminated by treating with chemical disinfectants and/or steam autoclaving.

3.10.6.2 No action

Under the no action alternative, current facility operations would continue in support of assigned missions. In the short-term, exposures of workers and the public would be bounded by the existing conditions as reported above. As buildings continue to age, increasing controls could be needed to ensure worker health and safety. Many of the existing facilities are slated to undergo D&D (including deactivation, decontamination, decommissioning, and demolition) as part of EM's plan for remediating the Central Campus area. Potential impacts that could result from any environmental cleanup actions would be addressed in the appropriate CERCLA documents that would be required and are not included in the scope of this analysis.

3.11 INTENTIONAL DESTRUCTIVE ACTS

DOE is required to consider intentional destructive acts, such as sabotage and terrorism, in each EIS or EA that it prepares. After review, it was determined that the likelihood of such acts for activities that would be carried out under the ORSTP is extremely low. However, it is possible but highly unlikely that random acts of vandalism could occur. It is anticipated that measures would be implemented to control facility access and provide security (identification badges, proximity cards, alarms, cameras, etc.). Also, the risk of intentional destructive acts is further minimized because public access to ORNL is controlled by force protection/anti-terrorism measures such as security fences, vehicle patrols by security guards, and security checkpoints at the portals on Bethel Valley Road.

The Public Health Security and Bioterrorism Preparedness and Response Act of 2002 and the Agricultural Bioterrorism Protection Act of 2002 set forth the requirements for possession, use, and transfer of select agents and toxins. Entities that fall under these requirements must obtain a certificate of registration from the appropriate Administrator/Secretary and must submit the information necessary to conduct a security risk assessment. Entities may also be required to develop and implement a written biosafety plan that is commensurate with the risk of the select agent or toxin and/or a biocontainment plan with procedures that are sufficient to contain the select agent or toxin; develop and implement a written security plan establishing policies and procedures that ensure the security of areas containing select agents and toxins to safeguard against unauthorized access, theft, loss, or release; and develop and implement an emergency/incident response plan.

4. CUMULATIVE IMPACTS

Cumulative impacts are those that may result from the incremental impacts of an action considered additively with the impacts of other past, present, and reasonably foreseeable future actions. Cumulative impacts are considered regardless of the agency or person undertaking the other actions (40 *CFR* 1508.7, CEQ 1997), and can result from the combined or synergistic effects of individually minor actions over a period of time.

4.1 POTENTIALLY CUMULATIVE ACTIONS

This section describes present actions as well as reasonably foreseeable future actions that are considered pertinent to the analysis of cumulative impacts for the proposed establishment of the ORSTP at ORNL**.** The actions are as follows and the location of the actions is shown on Fig. 4.1.

ETTP-Horizon Center. DOE has transferred title of the developable portion (approximately 426 acres) of what was previously referred to as Parcel ED-1 to Horizon Center LLC, a subsidiary of CROET, for the continued development as an industrial/business park for research and development, as well as manufacturing, distribution, and corporate headquarters office facilities. DOE maintains ownership of the remainder of the parcel, which includes the Natural Area (approximately 491 acres). Horizon Center LLC, under a lease agreement, with DOE leases the Natural Area.

ETTP-Heritage Center. DOE has made some of its underutilized facilities at ETTP available for lease or title transfer. They are in turn subleased to private sector firms (DOE 1997). With the onset of the accelerated cleanup plan for ETTP, DOE has also transferred title to some buildings and land parcels. To date, six buildings, totaling over 300,000 ft^2, have been transferred and work is progressing on the transfer of additional facilities (CROET 2006). As cleanup is progressing, DOE and CROET are transitioning the former gaseous diffusion plant to a private industrial park known as the Heritage Center. Commercial use of these facilities does not constitute a change of the primary use of the property, which has been industrial for over 60 years.

SNS. The SNS is a new, state-of-the-art, accelerator-based science facility occupying an approximately 80-acre site atop Chestnut Ridge on the ORR. The facility consists of accelerator buildings, the target building, the central laboratory and office building, and miscellaneous support buildings totaling about 600,000 ft^2. Once fully operational, the SNS will be the world's foremost neutron scattering facility, providing important scientific capabilities for basic research in many fields, including material sciences, life sciences, chemistry, solid state and nuclear physics, earth and environmental sciences, and engineering sciences. Furthermore, the facility is expected to employ about 500 people and host over 2,000 visiting scientists and engineers per year.

Y-12 Modernization Program. DOE has issued a Final Site-Wide EIS and ROD on the operation of the Y-12 Complex and modernization of facilities (DOE 2001b). Major actions include construction of a Highly Enriched Uranium Materials Facility, which will replace multiple aging facilities within a single state-of-the-art storage facility; a Purification Facility, which was completed in 2004 and was the first major production facility built at Y-12 in more than 30 years; a Uranium Processing Facility, which will replace current enriched uranium and other processing operations; an Enriched Uranium Manufacturing Facility to replace current enriched uranium and other processing operations; and the Beryllium Capability project, which will upgrade an existing facility, installing modern equipment that will protect

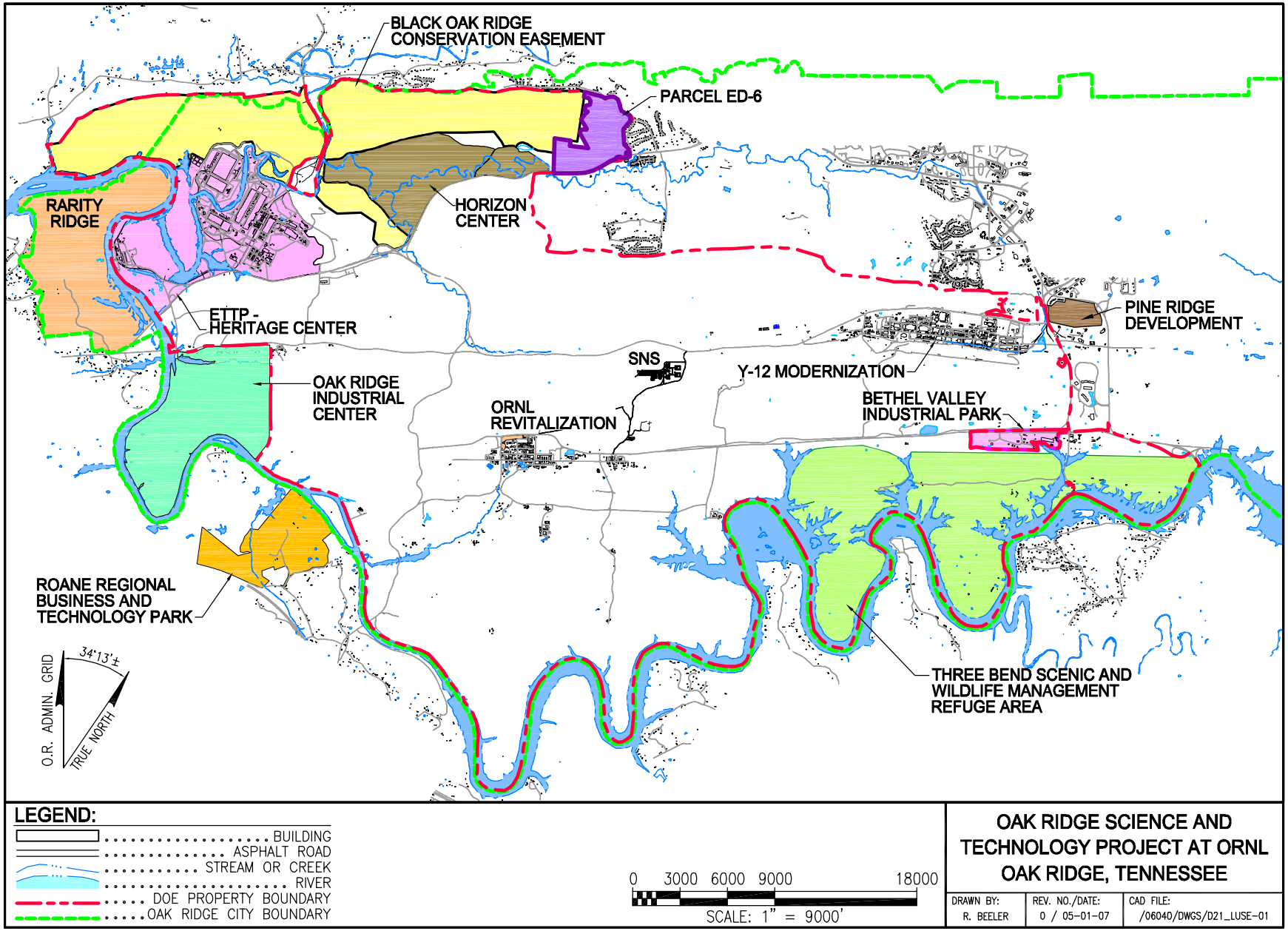

Fig. 4.1. Actions contributing to cummulative impacts.

workers from exposure to beryllium and improve efficiency and reliability, Many existing facilities have been demolished to prepare for the new construction that began in 2003. By 2013 when the Uranium Processing Facility becomes operational, Y-12 will have reduced its defense manufacturing footprint by almost one-half.

ORNL Revitalization Program. DOE is implementing a revitalization project at ORNL to modernize some ORNL facilities, maintain ORNL's competitive R&D worker health and safety, and reduce operating costs. The project includes constructing new facilities on brownfield land and remodeling numerous existing facilities to relocate ORNL staff currently housed at Y-12, other ORR facilities, and in commercial office space. Up to six buildings will potentially be demolished. Approximately 1.8M ft^2 of space in aging buildings, mostly at Y-12, is being vacated.

Conceptual plans include construction of up to 24 new facilities totaling approximately 1.2M ft^2 in Bethel Valley near the main ORNL entrance, near the West Portal in Bethel Valley, and within the footprint for the SNS. Some of the new construction is being funded by the state of Tennessee and the private sector. About 20 acres of brownfield property in Bethel Valley have been transferred from DOE to the private sector in support of this proposed action. The environmental consequences of this project were reviewed in an EA, and a FONSI was signed on June 1, 2001 (DOE 2001a). Construction has been completed on the Joint Institute for Computational Sciences, Research Office Complex, Engineering Technology Facility, and new facility for the new Laboratory for Comparative and Functional Genomics Program.

The first phase of the ORSTP was included in this revitalization analysis. Due to the larger vision for the ORSTP, however, the present EA has been prepared.

Roane Regional Business and Technology Park. This industrial park is located north of Interstate 40 in Roane County approximately 3 miles southwest of the ORSTP site. The 655-acre site includes areas for industrial development and greenbelt uses. The park will be developed in three phases. Phase I development of 200 acres was completed in late 2001 and is expected to house industries that will provide about 500 jobs. Industries located at the site include, instrumentation, light metalwork, and materials handling. Additional types of industries expected to locate at the park include information technology, automotive transportation, and corporate administrative offices (Human 2000, TECD 2006).

Pine Ridge Development. In 1969, the city of Oak Ridge acquired 230 acres of property, identified as Site X, from the then Atomic Energy Commission. The property included the current Valley Industrial Park and a portion of Pine Ridge. In 1999, the city transferred approximately 71 acres of Pine Ridge between South Illinois Avenue, Union Valley Road, and Scarboro Road to the Industrial Development Board, which in turn sold the property to a private developer. The area is now being developed for office space, light manufacturing, and storage facilities.

Oak Ridge Industrial Center. The Oak Ridge Industrial Center is located at the site partially developed by TVA for the Clinch River Breeder Reactor prior to 1983. The 1245-acre property is for sale by TVA and has been considered for development by several manufacturing industries. TVA has graded a 150-acre tract on the property to <2% slope. The remaining land is rolling to rough terrain, having an 8 to 20% slope (ORCC 1999). The developable land contains tracts with hardwood forests and pine plantations impacted by the Southern pine beetle. The site also contains cultural resources. TVA has also designated a 103-acre tract bordering Grassy Creek as the Grassy Creek Habitat Protection Area to be reserved for protection of bugbane (*Cimicifuga rubifolia*) habitat (TVA 1988). A feeder road may be constructed by the Tennessee Department of Transportation (TDOT) to improve access from SR 58, pending the sale and further industrial development of the property (ORCC 1999).

Parcel ED-6. DOE has determined that Parcel ED-6 (approximately 336 acres) is excess property and is considering conveyance to the city of Oak Ridge for new residential development. Under the mixed development alternative, a portion of the land could also be used for commercial development (offices and retail establishments). The general location of the property is west of Wisconsin Avenue, south of Whippoorwill Drive, north of the Oak Ridge Turnpike (SR 95), and east of the Horizon Center Industrial Park. A portion of the North Boundary Greenway is located on the parcel and is maintained by the city under a license from DOE. Parcel ED-6 is part of the area included in the ORR Land Use Planning Process conducted during 2001 and 2002 (Focus Group 2002).

4.2 CUMULATIVE IMPACTS BY RESOURCE AREA

4.2.1 Land Use

Of the original 58,582 acres of land acquired in 1942 by the federal government, 31,770 acres have been conveyed and approximately 26,800 acres remain within the ORR. The purposes for which ORR land has been conveyed include:

- 16,855 acres for residential, commercial, and community development;
- 1,031 acres to federal agencies and for transportation easements;
- 9,626 acres for preservation and recreation;
- 4,247 acres for industrial development; and
- 11 acres for mission-related purposes.

Current land outgrants (lease/license/permit areas) include:

- 2,966 acres for the Black Oak Ridge Conservation Easement;
- 2,920 acres for the Three Bend Scenic and Wildlife Management Refuge Area; and
- 468 acres for the Parcel ED-1 Natural Area.

Title transfer of land and facilities at ETTP could potentially remove an additional 500 to 1300 acres of land. However, the majority of the ETTP area being considered for title transfer has already been developed for industrial purposes or been impacted in some other way. Further development would not result in significant changes from this industrial land use.

A few changes in the acreage of National Environmental Research Park (NERP) have occurred over the past 23 years. The NERP serves as an outdoor laboratory to evaluate the environmental consequences of energy use and development as well as the strategies to mitigate these effects. When designated in 1980, the size of NERP was about 13,590 acres. Some research land was lost with the sale of the former Boeing property for residential use (Rarity Ridge) and some other land areas. In 1998, the NERP designation was removed from the ETTP Area of Responsibility and the Horizon Center property. Since then, NERP has been expanded to include most of the undeveloped area of ORR and is currently about 20,000 acres. The Black Oak Ridge Conservation Easement, executed in 2005, resulted in approximately 3000 acres of ORR land being set aside for conservation and recreation purposes. It is assumed that the NERP designation for this area would remain.

The ORSTP would not add to the cumulative impacts resulting from other property leased or conveyed from DOE to public or private entities because the affected area has already been developed and ORNL employees or visitors would occupy the facilities regardless of funding source.

4.2.2 Air Quality

Additional air emissions or changes to air quality as a result of implementation of the proposed action would be negligible. The overall balance of air emissions for operations should be approximately the same as current levels, and could be less depending on specific design features of new and remodeled facilities. Although the proposed action evaluated in this EA does not appear to have the potential to bring about major impacts to air quality, the overall trend in the Roane and Anderson counties area does present such a potential. Other types of industrial development, increased traffic, and general population growth could also impact air quality.

Construction activities, although exempt from PSD limits in 40 *CFR* 52.21, can be a major source of emissions, particularly PM-10 (particles less than 10 micrometers in diameter), in the form of fugitive dust. Such sources tend to be of short duration (during the construction period) and largely result in impacts of a localized nature. These temporary emissions could be minimized by application of wetting agents during dry periods. Construction activities under the ORSTP would be incremental and it is expected that less than 10 acres would be developed at one time.

4.2.3 Socioeconomics

Major industrial initiatives include reindustrialization of the ETTP-Heritage Center, development of the Horizon Center, the SNS project at ORNL, the Roane Regional Business and Technology Park, and potential development of the Oak Ridge Industrial Center. The cumulative impact of new development is likely to result in increased population, employment, and income. The proposed ORSTP is expected to represent a small part of the total acreage proposed for development, and its effect on the cumulative impacts is expected to be correspondingly small.

Actual employment and income impacts from cumulative development would depend on the success of each of these developments, and the overall rate at which development proceeds, both of which are uncertain. Developers have recently scaled back plans for some of these projects, based on current market conditions (Huotari 2006b). Property tax revenue would depend on the value of the properties, future tax rates, and any tax abatements that may be negotiated.

4.2.4 Transportation

Cumulative transportation impacts in Roane and Anderson counties could occur from increased development and growth. These potential impacts could be combined with ongoing environmental restoration and D&D activities on the ORR and with the planned expansion of the state highways by TDOT. The main transportation impact of commercial and industrial development would be an increase in average daily traffic volumes.

Associated with increases in traffic is the potential for an increased number of accidents, additional noise and air pollution, and road deterioration and damage. The increase in average daily traffic volumes could result in inconveniences for other vehicles (personal and commercial) on affected routes and connecting roads. Commercial operations could suffer temporarily reduced business while customers avoid affected areas because of traffic delays. Increased pavement deterioration and damage could increase costs associated with maintaining or resurfacing roads and highways. Although noise associated with increases in traffic is normally not harmful to hearing, increased traffic noise is considered by the public to be a nuisance. Increased accidents put an additional strain on local emergency response personnel. Increased vehicular traffic also has the greatest potential to increase air pollution in the local area because emissions from motor vehicles are poorly regulated.

4.2.5 Biodiversity

Implementation of the proposed action would have little effect on ecological resources because no impacts to wetlands or threatened and endangered species have been identified.

Some local industrial development projects are mitigating impacts to habitats. Approximately 491 acres of Parcel ED-1 (Horizon Center) is not available for development and contains natural area corridors and buffers for native vegetation and wildlife species. There are 103 acres along Grassy Creek reserved for habitat protection at the Oak Ridge Industrial Center (TVA 1988). About 61 acres of the Roane Regional Business and Technology Park are being left as a greenbelt area. The SNS project will create wetland habitat to replace habitat lost during construction, and cooling water will be dechlorinated prior to discharge to minimize effects on aquatic resources (DOE 1999). In addition, a forested pathway will be retained along Chestnut Ridge during vegetation clearing for the SNS project to minimize effects on terrestrial wildlife movements (DOE 1999). Efforts to reuse the land area at ETTP could reduce the number of habitat areas that might otherwise be converted to industrial sites, although they are limited to begin with. Additionally, large areas of Blackoak Ridge, McKinney Ridge, and portions of Pine Ridge are not suitable for development and provide a large area to protect sensitive ecological resources.

5. LIST OF AGENCIES AND PERSONS CONTACTED

The following agencies and persons were contacted for information and data used in the preparation of this EA.

Name	Affiliation	Location	Topic
Lee Barclay	U. S. Fish and Wildlife Service	Cookeville, TN	Endangered Species Act, Sect. 7 – Informal Consultation
Joseph Garrison	Tennessee Historical Commission	Nashville, TN	National Historic Preservation Act, Sect. 106 – Compliance
Cindy Hunter	DOE-ORO Real Estate Office	Oak Ridge, TN	Socioeconomics
Gerald Palau	Oak Ridge National Laboratory	Oak Ridge, TN	ORNL and ORSTP Site Information

6. REFERENCES

AURP (Association of University Research Parks) 2006. "Executive Summary: 2006 Park Profile Survey." Available at http://www.aurp.net/about/statistics.cfm. Accessed September 25.

Bechtel (Bechtel National, Inc.), CH2M Hill, Ogden, and PEER 1992. *Site Characterization Report for Waste Area Grouping 1 at Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR-1042/V1&D1, Oak Ridge, TN.

Bureau of Economic Analysis 2007. *Table CA30 Regional economic profiles*, available at http://www.bea.gov/bea/regional/reis/. Accessed May 10.

Census (Bureau of the Census) 2000. American FactFinder. Available at http://factfinder.census.gov/, accessed September 5-6, and 25-27, 2006.

City of Oak Ridge 2005. "City of Oak Ridge, Tennessee, Fiscal Year 2006 Annual Budget."

City of Oak Ridge 2006. "City of Oak Ridge Proposed Budget Fiscal 2007."

CROET (Community Reuse Organization of East Tennessee) 2006. Personal communication from Jeff Deardorff, CROET, to Sharon Bell, SAIC, October 12.

DOE (U. S. Department of Energy) 1998. *Engineering Evaluation/Cost Analysis for the Core Hole 8 Plume Source (Tank W-1A) Removal Action at Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR/02-1714&D2, Office of Environmental Management, Oak Ridge, TN.

DOE 1999. *Remedial Investigation/Feasibility Study for Bethel Valley Watershed at Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR/01-1748/V1&D2, Office of Environmental Management, Oak Ridge, TN.

DOE 2001a. *Finding of No Significant Impact (FONSI) and Environmental Assessment for the Oak Ridge National Laboratory Facilities Revitalization Project*, DOE/EA-1362, U. S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, TN, June.

DOE 2001b. *Final Site-Wide Environmental Impact Statement for the Y-12 National Security Complex*, Volume I, September.

DOE 2002. *Record of Decision for Interim Actions in Bethel Valley, Oak Ridge, Tennessee*, DOE/OR/01-1862&D4, Office of Environmental Management, Oak Ridge, TN.

DOE 2003. *Engineering Study Work Plan for Groundwater Actions in Bethel Valley, Oak Ridge, Tennessee*, DOE/OR/01-2035&D2, Office of Environmental Management, Oak Ridge, TN.

DOE 2006. *Oak Ridge Reservation Annual Site Environmental Report for 2005*, DOE/ORO/2218, Office of Environmental Management, Oak Ridge, TN.

Focus Group 2002. *Final Report of the Oak Ridge Land Use Planning Focus Group*, September.

Haase, C. S., Walls, E. C., and Farmer, C. D. 1985. *Stratigraphic and structural data for the Conasauga Group and the Rome Formation on the Copper Creek fault block near Oak Ridge, Tennessee: Preliminary results from test borehole ORNL-JOY No. 2*, ORNL/TM-9159, Oak Ridge National Laboratory, Oak Ridge, TN.

Hatcher, R. D. Jr., Lemiszki, P. J., Drier, R. B., Ketelle, R. H., Lee, R. R., Leitzke, D. A., McMaster, W. M., Foreman, J. L., and Lee, S. Y. 1992. *Status Report on the Geology of the Oak Ridge Reservation*, ORNL/TM-12074, Environmental Sciences Division, Publication No. 3860, Office of Environmental Restoration and Waste Management, Oak Ridge, TN.

Human 2000. Personal communication from Gary Human, Roane County Industrial Development Board, to Julia Gartseff, SAIC, July.

Hunter, C. 2006a. Personal communication from Cindy Hunter, DOE Real Estate Office, to Sharon Bell, SAIC, September 5.

Hunter, C. 2006b. Personal communication from Cindy Hunter, DOE Real Estate Office, to Sharon Bell, SAIC, September 28.

Huotari, J. 2006a. "Thousands of homes in 'pipeline,'" *The Oak Ridger*, February 14. Available at http://oakridger.com/stories/021406/com_20060214014.shtml, accessed April 4, 2006.

Huotari, J. 2006b. "Rarity Ridge plans revised, scaled back," *The Oak Ridger*, March 22. Available at http://oakridger.com/stories/032206/com_20060322009.shtml, accessed March 22, 2006.

National Council on Radiation Protection and Measurements 1987. *Ionizing Radiation Exposure of the Population of the United States*, NCRP Report No. 93, Washington, D.C.

OMB (Office of Management and Budget) 2000. "Guidance on Aggregation and Allocation of Data on Race for Use in Civil Rights Monitoring and Enforcement," March 9. Available at http://www.whitehouse.gov/ omb/bulletins/b00-02.html, accessed November 8, 2001.

ORCC (Oak Ridge Chamber of Commerce) 1999. Personal communication from Kim Denton, ORCC, to Julia Gartseff, SAIC, November 4.

ORNL (Oak Ridge National Laboratory) 2002. *Oak Ridge National Laboratory Land and Facilities Plan*, ORNL/TM-2002/1, Oak Ridge, TN, August.

ORNL (Oak Ridge National Laboratory) 2003. *Oak Ridge National Laboratory Liquid and Gaseous Waste Treatment System Strategic Plan*, ORNL/TM-2003/197, Oak Ridge, TN, August.

Palau, G. 2006. Personal communication from Gerry Palau, Construction Manager, UT-Battelle, to Sharon Bell, SAIC, October 3.

Rosensteel, B. 1996. *Wetland Survey of the X-10 Bethel Valley and Groundwater Operable Units at Oak Ridge National Laboratory*, ORNL/ER-350, Oak Ridge National Laboratory, Oak Ridge, TN.

Solomon, D. K., Moore, G. K., Toran, L. E., Drier, R. B., and McMaster, W. M. 1992. *Status Report: A Hydrologic Framework for the Oak Ridge Reservation*, ORNL/TM-12026, Environmental Sciences Division, Publication No. 3815, Oak Ridge National Laboratory, Oak Ridge, TN.

TECD (Tennessee Department of Economic and Community Development) 2006. "Tennessee Prospector: Available Buildings and Sites," available at http://www.tennesseeprospector.com, accessed October 10.

TVA (Tennessee Valley Authority) 1988. *Watts Bar Reservoir Land Management*, August (reprinted September 1992).

USDA (U. S. Department of Agriculture) 1942. *Soil Survey of Roane County Tennessee*, Series 1936, No. 18, Bureau of Plant Industry.

APPENDIX A
COMMENT RESPONSES

COMMENT RESPONSE MATRIX

DRAFT ENVIRONMENTAL ASSESSMENT FOR THE OAK RIDGE SCIENCE AND TECHNOLOGY PROJECT AT THE OAK RIDGE NATIONAL LABORATORY, OAK RIDGE, TENNESSEE

Reviewer Names: John A. Owsley, Director
Reviewer Agency/Organization: State of Tennessee, Department of Environment and Conservation
Reviewer Telephone Number:
Reviewer Mailing Address:
Reviewer e-mail Address:

Comment #	Page Number	Line Number(s)	Name	Comment	Comment Response
				General Comments	
1.				The State is primarily concerned with the proper characterization, handling, and disposition of wastes generated by companies or businesses resulting from the conduct of the project. It is important that all regulatory requirements be met in this regard.	Companies that are part of the ORSTP would be required, as a condition of their lease, to comply with all regulatory requirements, including obtaining any applicable permits and licenses. Except for the possible use of the ORNL Process Wastewater Treatment Complex, wastes generated by private companies leasing space would be handled by commercial companies and recycled or transported to an appropriate landfill for disposal. The regulatory approach used at the East Tennessee Technology Park (ETTP) - Heritage Center would serve as a model for private companies leasing space at the ORSTP.

Comment #	Page Number	Line Number(s)	Name	Comment	Comment Response
2.				To what extent will tenants/facilities obtain their own permits, and to what extent will they be allowed to operate under DOE permits? Will these private facilities operating on DOE property be required to obtain their own National Pollutant Discharge Elimination System (NPDES) permits or will they be allowed to use DOE's permit? Would these private facilities, working with radioactive materials on DOE property, be regulated by NRC or would they fall under DOE's regulatory authority?	Companies that are part of the ORSTP would be responsible for obtaining any permits that would be applicable to their operations. It is anticipated that process wastewater would be contained and transported off-site to suitable commercial treatment facilities, as determined by the tenants. If the waste acceptance criteria could be met, it is possible that DOE, on a case-by-case basis, would allow companies to use the ORNL Process Wastewater Treatment Complex. It is not anticipated that individual stormwater NPDES permits would be required at the ORSTP. Consistent with the approach taken at the ETTP – Heritage Center, companies would identify their proposed operations and anticipated discharges and would obtain approval to discharge their sanitary or non-process waste into the site's sanitary sewer system. Companies working with radioactive material would be regulated by the NRC or the State and would be required to comply with the limits and requirements of their radioactive licenses, as specified.

Comment #	Page Number	Line Number(s)	Name	Comment	Comment Response
3.	Page 2-3	13		Although DOE on line 13, page 2-3, assures that private parties will be responsible for their own permitting, this issue is complicated by the fact that ORNL already operates under Resource Conservation and Recovery Act (RCRA) and NPDES permits and that DOE is self-regulating with respect to radionuclides, as well as the fact that Comprehensive Environmental Response, Compensation, and Liability Act (CERCAL) activities are ongoing. Will these new tenants/facilities be permitted to build their own outfalls into creeks? What happens when tritium or other radionuclides in the ground water show up in these outfalls? In outfall 080, for example, high levels of curium suddenly appeared in 2006. This was thought to be due to mobilization of contaminants as a result of CERCLA activities. Since the State cannot regulate DOE discharges of radionuclides, this was not a regulatory problem. However, unpermitted discharges of radionuclides would be a regulatory problem for these private entities.	Consistent with the response to Comment Number 2, it is not anticipated that the tenants would build their own outfalls into creeks. The tenants locating at the ORSTP that would be producing process waters are envisioned to be small start-up companies that would be assisting with the technology transfer mission of ORNL. They would not be large-scale manufacturers. It should be noted, however, that depending on the circumstances, tenants could be allowed to build their own outfalls into creeks provided that they have upstream monitoring points before they join ORNL's regulated conveyances. This is unlikely; however, if this were the case, then in a sense ORNL would be operating as a "publicly owned treatment works" where they would have to develop waste acceptance criteria to ensure that ORNL would not exceed any of their permitted limits. Full characterization of proposed wastewaters would have to be obtained prior to accepting any discharges. As the permit owner, all due-diligence would be needed by ORNL and the tenant would have to be a co-permittee.
Water Pollution Control Specific Comments					
4.				Water pollution permitting and construction storm water issues include: • Issuance of Individual Storm water NPDES permit for the ORST Project. • Approval for extensions of water and wastewater lines.	It is not anticipated that individual stormwater NPDES permits would be required at the ORSTP. DOE would be responsible for any approvals that might be needed for utility system extensions.

Comment #	Page Number	Line Number(s)	Name	Comment	Comment Response
				• Approval for construction storm water discharges from future phases of the project. • Modification to NPDES Permit TN0002941, as needed, for changes to wastewater generated by the S&T Project and treated at DOE facilities.	DOE and any other applicable regulatory approval would be obtained for construction stormwater discharges. See response to Comment #3.
				• The DEA is unclear as to the arrangements for the City of Oak Ridge to "own and operate" utility extensions in the middle of a federal facility. Recommend these arrangements, as currently envisioned, be described and mechanisms for shared legal responsibilities for operating and maintenance be clarified. • Sanitary Wastewater: Given that the existing wastewater plant's design capacity is 0.3 mgd and current average flows are 0.21 mgd, the capacity for domestic waste treatment may be adequate. With an additional 2200 employees in the ORSTP, the DEA should address, in more detail, the proposed wastewater improvements required to support the project.	The arrangements for the utility extensions at ORSTP are being made between DOE and the applicable utility provider and would be documented in either Memorandums of Agreement or Service Agreements. Similar to what has been done at ETTP, the DOE Real Estate Office would issue the necessary easements to allow for the utility extensions. Historically, ORNL employment levels were greater than the present-day levels even with the additional jobs created through the ORSTP. ORNL is planning to grow independently of the ORSTP, and future expansion of wastewater treatment capacity, if needed, would be handled as a part of the overall utility operations and planning at the Laboratory.
				• Process Wastewater: The description of the Project Wastewater Treatment Complex (PWTC) appears conflicting in the final two statements. In one place, significant upgrade or replacement is indicated – the final statement indicates the facilities are "significantly oversized" (assumed it is meant hydraulically). Recommend the DEA clarify this discrepancy.	Clarification changes have been made to the EA. Any upgrades or replacements would occur as needed, though it is not anticipated. This is because of DOE's expectation that its tenants would practice waste minimization, source reduction, etc. However, upgrades or replacement of certain parts of the system could be necessary based upon new, more efficient treatment technologies and changes in the types of wastes that might be handled.

Comment #	Page Number	Line Number(s)	Name	Comment	Comment Response
				• Storm water collection – the DEA should reflect that serious water quality problems in White Oak Creek occur due to discharges from the exiting ORNL storm water collection system, primarily from legacy contaminants. The development of this project cannot be approved by TDEC pending DOE comments to minimize temporary storm water impacts and reducing legacy contaminants in storm water.	The EA has been revised to reflect that there have been water quality problems in White Oak Creek. DOE is addressing water quality in White Oak Creek through its ongoing waste control and minimization efforts via the EM program. In areas where the problem is particularly acute, stormwater runoff from new construction could be designed to alternative catchments and periodic monitoring occur.
				• The DEA should address in Section 3.3, "Water Resources," that appropriate permitting actions must be completed prior to approval for this project by the State of Tennessee.	Text has been added stating that any required permits would be obtained.

Comment #	Page Number	Line Number(s)	Name	Comment	Comment Response
				DOE-Oversight Specific Comments	
5.	Page 3-2		Table 3-1	DOE asserts that, "*Air emissions from operations would be minor and typically controlled within the facility. External effects would be negligible. The overall balance of air emissions from operations should be approximately the same as current levels*," when DOE has gone to great lengths to be 'all-inclusive' in the types of private sector companies that would be welcomed into the Oak Ridge Science and Technology Park. Actually, it is rather difficult, at this time, for DOE to evaluate the effects on air quality or the other parameters when it is uncertain the nature of tenants/facilities that will be locating to the site, what processes they will be conducting, or what wastes they will produce. Several of the potential uses cited on pages 2-1 and 2-2 could significantly affect air quality or one of the other parameters, e.g., oil extraction from shale can produce both liquid and gaseous products that may be released. Advanced agricultural technologies could produce genetically modified organisms that, if released, could affect biological resources. The uses are not sufficiently defined to adequately assess these impacts.	Because DOE does not know the specific companies that may seek to locate in the ORSTP, a bounding analysis was performed. A bounding analysis relies on assumptions to produce results that will not underestimate the most likely potential impacts. When Halcyon identifies a potential company to sublease space to, a review would then be performed to ensure that their operations have been adequately evaluated in the EA. If not, then further evaluation under NEPA would be necessary before the company can locate at ORSTP. In part, the conclusions drawn in the EA are based on the fact that every company that has an emission source that requires regulation would go through the appropriate permitting process. DOE understands that TDEC, and/or EPA, is the regulatory authority and that air quality requirements must be met. It is up to the individual companies to coordinate with EPA and/or TDEC and to seek and obtain all required permits prior to construction and operation. It should be noted that the analysis considered that ORSTP development would occur incrementally. Each occupant with an emission would have to work within the allowable increment remaining so that ORNL can remain compliant.

Comment #	Page Number	Line Number(s)	Name	Comment	Comment Response
6.	Page 3-3		Table 3-1	"*Human health and safety*" "*No unique occupational health and safety hazards would be expected from the ORSTP. Individuals working for companies that would be part of ORSTP would be classified as DOE co-located workers.*" Based on the present research and development at ORNL, would a biosafety level-2 laboratory not present unique occupational health and safety hazards?	BSL-2 laboratory research can involve working with agents of moderate risk to personnel and the environment. However, containment devices, administrative controls, and practices and procedures for any BSL-2 facility would be designed to maximize safe working conditions for all. DOE is seeking approval of the concept of enabling the ORSTP to be developed, not the types of industries that could be located there. Research like this presently occurs at ORNL now in safe, controlled, and compliant conditions. Tenants who conduct similar activities would have to meet similar requirements, which may be governed by OSHA instead of a DOE Order, but health-protectiveness is paramount regardless of the driver.
7.	Page 3-11	26–28		"*Based on commonly observed emissions from similar construction activities…*" What similar construction activities? DOE has no idea as to what facilities might be constructed in the park so how can it find similar activities to compare the emissions to? Please explain.	The text is referring to emissions that occur at typical construction sites for new facilities (i.e., fugitive dust and exhaust from construction vehicles and equipment). DOE has extensive experience with these types of construction projects, including the types of emissions that are produced, to what extent, and how best to control or reduce them.

Comment #	Page Number	Line Number(s)	Name	Comment	Comment Response
8.	Page 3-12	2–3		Although it is true that regulatory processes will discourage violations of air quality standards, it may not be true that no adverse impacts to air quality will occur. Different industries are subject to different emissions standards, so without knowing what types of industries are likely to build facilities, DOE cannot predict whether there may be adverse impacts to air quality.	As part of the leasing process, DOE would review applications from prospective companies regarding potential air emissions, any applicable regulatory requirements, and their ability to control emissions so that air quality would not be significantly impacted. A process similar to that used at ETTP would be in place at ORNL wherein proposed future tenants' planned activities would have to be evaluated for suitability to the site and location proposed. Major sources of air emissions typical of heavy industries would not be permitted as part of the ORSTP.
9.	Page 3-28	25–26		"*Some of ORNL's Polychlorinated Biphenyl (PCB)/radioactive wastes are treated at the Toxic Substance Control Act (TSCA) Incinerator at ETTP, whereas other PCB wastes are sent to commercial facilities within 1 year of generation.*" At present, the majority of PCB wastes accumulated at ORNL are not scheduled for disposition within 1 year of generation.	The text "within 1 year of generation" has been deleted from the sentence.
10.	Page 3-30	12		"*(NRCP 1987)*" This document is not cited in the reference section. NRCP also does not appear in the Acronyms list.	NRCP 1987 has been added to the references section and the acronym has been spelled out.
11.	Page 4-3	5–21		The Facilities Revitalization Project (FRP) was rolled into the Integrated Facilities Disposition Project (IFDP) for which 126 ORNL facilities are being proposed. The IFDP is mentioned in several sections of the EA. It seems probable that the section that refers to the FRP was copied from some other document and needs to be updated.	The EA has been revised. The FRP text was removed and there is no mention of the IFDP to avoid confusion.

Comment #	Page Number	Line Number(s)	Name	Comment	Comment Response
12.	Page 4-5		Section 4.2.2	The statement that change to the air quality would be negligible cannot be supported because you do not know what kind of facilities might be operating as a result of implementation of the proposed action. In Section 1.3, it states that bounding analysis allowed technical experts to analyze the potential for adverse impacts for reasonably foreseeable uses; the list of potential uses presented in Section 2.1 includes activities that could potentially impact air quality. DOE should include the results of the technical expert's analyses to support the conclusion or acknowledge that the actual impacts cannot be determined until specific tenants/facilities are identified.	See response to Comments Number 5 and 8. The impacts are acceptable because they would have to be within permitted limits. The EPA and TDEC permit processes are designed to identify and address significant adverse impacts, which DOE does not anticipate. If the potential for significant impacts were identified, DOE would conduct a further, separate, NEPA review.

APPENDIX B
CORRESPONDENCE

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

September 28, 2007

Mr. Gary S. Hartman
Oak Ridge Operations Office
Post Office Box 2001
Oak Ridge, Tennessee, 37831

RE: DOE, ORNL/SCIENCE & TECHNOLOGY, OAK RIDGE, ANDERSON COUNTY

Dear Mr. Hartman:

In response to your request, received on Wednesday, September 19, 2007, we have reviewed the documents you submitted regarding your proposed undertaking. Our review of and comment on your proposed undertaking are among the requirements of Section 106 of the National Historic Preservation Act. This Act requires federal agencies or applicant for federal assistance to consult with the appropriate State Historic Preservation Office before they carry out their proposed undertakings. The Advisory Council on Historic Preservation has codified procedures for carrying out Section 106 review in 36 CFR 800. You may wish to familiarize yourself with these procedures (Federal Register, December 12, 2000, pages 77698-77739) if you are unsure about the Section 106 process.

Considering available information, we find that the project as currently proposed MAY ADVERSELY AFFECT PROPERTIES THAT ARE ELIGIBLE FOR LISTING IN THE NATIONAL REGISTER OF HISTORIC PLACES. You should now begin immediate consultation with our office. Please direct questions and comments to Joe Garrison (615) 532-1550-103. We appreciate your cooperation.

Sincerely,

E. Patrick McIntyre, Jr.
Executive Director and
State Historic Preservation Officer

EPM/jyg

Department of Energy

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

November 20, 2007

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

Dear Dr. Garrison:

UPDATE TO NOTIFICATION OF PROPOSED UNDERTAKING FOR THE OAK RIDGE SCIENCE AND TECHNOLOGY PROJECT

The purpose of this letter is to provide clarification with respect to the establishment of the Oak Ridge Science and Technology Project (ORSTP) at the Oak Ridge National Laboratory (ORNL). As indicated in our letter of August 3, 2007, the U.S. Department of Energy (DOE) Oak Ridge Office (ORO) is preparing an Environmental Assessment (EA) to evaluate the impacts of leasing underutilized facilities and land parcels at ORNL for the establishment of a project that will support the technology transfer mission of the laboratory. As indicated during our telephone conversation on October 25, 2007, we are in receipt of your letter dated September 28, 2007, in response to our notification letter and we are hopeful that the Tennessee Historical Commission will provide a revised response that incorporates the information that is included in this update.

Activities associated with the ORSTP would consist of leasing existing facilities and/or land parcels for new construction. Construction would only be performed in previously disturbed areas where it has been determined that no sensitive cultural resources exist. In addition, modifications to existing facilities, in order to support their reuse, would occur only in structures determined to be of no historic significance. In contrast and consistent with our telephone conversation, any demolition of ORNL facilities would be conducted under the Integrated Facilities Disposition Project (IFDP). The enclosed correspondence, dated October 25, 2007, describes the proposed ORO and National Nuclear Security Administration (NNSA) undertaking for the IFDP at ORNL and the Y-12 National Security Complex. As stated in that letter, DOE has determined that the proposed actions taken under the IFDP may adversely affect properties at ORNL and the Y-12 National Security Complex that are eligible for listing in the National Register of Historic Places.

We hope this additional information clarifies the difference between the ORSTP and the IFDP. If you have any questions or need additional information, please contact me at (865) 576-0835.

Sincerely,

Katatra C. Vasquez

Katatra C. Vasquez
Cultural Resources
Management Coordinator

Enclosure

cc w/enclosure:
Tom McCulloch, Advisory Council on Historic Preservation
George Malosh, SC-3, HQ/FORS
Skip Gosling, HR-76, FORS
Pam Gorman, Y12-30, NNSA/OR, Bldg. 9204-1
Robert Brown, M-2, ORO
Walter Perry, M-4, ORO
Randy Smyth, SE-30, ORO
Mark Belvin, SE-31, ORO
David Allen, SE-32, ORO
Gary Hartman, SE-32, ORO
Johnny Moore, SC-10, ORO
Larry Clark, NS-50, ORO
Sue Cange, NS-53, ORO
Patty Hart, NS-53, ORO
Nancy Carnes, CC-10, ORO

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

November 29, 2007

Ms. Katatra C. Vasques
Oak Ridge Operations Office
Post Office Box 2001
Oak Ridge, Tennessee. 37831

RE: DOE, ORNL SCIENCE & TECHNOLOGY PROJECT, OK RIDGE, ANDERSON COUNTY

Dear Ms. Vasques:

In response to your request, received on Tuesday, November 27, 2007, we have reviewed the documents you submitted regarding your proposed undertaking. Our review of and comment on your proposed undertaking are among the requirements of Section 106 of the National Historic Preservation Act. This Act requires federal agencies or applicant for federal assistance to consult with the appropriate State Historic Preservation Office before they carry out their proposed undertakings. The Advisory Council on Historic Preservation has codified procedures for carrying out Section 106 review in 36 CFR 800. You may wish to familiarize yourself with these procedures (Federal Register, December 12, 2000, pages 77698-77739) if you are unsure about the Section 106 process.

Considering available information, we find that the project as currently proposed will NOT ADVERSELY AFFECT ANY PROPERTY THAT IS ELIGIBLE FOR LISTING IN THE NATIONAL REGISTER OF HISTORIC PLACES. Therefore, this office has no objection to the implementation of this project. Please direct questions and comments to Joe Garrison (615) 532-1550-103. You may find additional information concerning the Section 106 process and the Tennessee SHPO's documentation requirements at. http://www.tennessee.gov/environment/hist/federal/sect106.shtml

We appreciate your cooperation.

Sincerely,

E. Patrick McIntyre. Jr.
Executive Director and
State Historic Preservation Officer

EPM/jyg