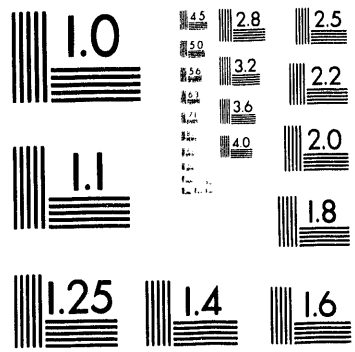
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DOE/EA-0860

ENVIRONMENTAL ASSESSMENT

Construction of a

Solid State Research Facility, Building 3150

Oak Ridge National Laboratory
Oak Ridge, Tennessee

July 1993

875

CONTENTS

FIGURES

1. NEED FOR THE ACTION

The Department of Energy (DOE) proposes to construct a new facility to house the Materials Synthesis Group (MSG) and the Semiconductor Physics Group (SPG) of the Solid State Division, Oak Ridge National Laboratory (ORNL). The location of the proposed action is Roane County, Tennessee. MSG is involved in the study of crystal growth and the preparation and characterization of advanced materials, such as high-temperature superconductors, while SPG is involved in semiconductor physics research. All MSG and a major portion of SPG research activities are now conducted in Building 2000, a deteriorating structure constructed in the 1940s. The physical deterioration of the roof; the heating, ventilation, and air conditioning (HVAC) system; and the plumbing make this building inadequate for supporting research activities. The proposed project is needed to provide laboratory and office space for MSG and SPG and to ensure that research activities can continue without interruption due to deficiencies in the building and its associated utility systems.

2. DESCRIPTION OF PROPOSED ACTION

2.1 PROPOSED ACTION

The proposed project would involve grading and leveling the proposed site next to facilities in the 3000 Area of ORNL (Fig. 1), pouring a concrete slab on the ground surface for the building foundation, and constructing a two-story metal and brick building approximately 100 feet long by 70 feet wide by 30 feet high on the former site of Building 3024 (Fig. 2). The new facility (Building 3150), which would be inside the security-fenced region of the main ORNL facilities complex, would include eight laboratories with associated offices and support space. The proposed action would involve excavation for installation of approximately 50 linear feet each of underground potable water piping and sanitary waste piping. A sprinkler system, electrical power system, elevator, and HVAC system would be installed during construction. Laboratory equipment and utilities would include standard fume hoods, laboratory benches, and compressed air. Nonradioactively contaminated and nonhazardous construction debris would be disposed of in the Y-12 Centralized Sanitary Landfill. The MSG equipment to be relocated to the proposed building would include (1) various furnaces (Lindberg, annealing, glass, astro, tube, etc.); (2) drying ovens; (3) scanning electron microscope; (4) various crystal growth equipment; and (5) various other machines and equipment now used as part of routine research activities. The SPG equipment would include excimer, ion, and dye lasers; solar spectrum simulator; electron beam and thermal evaporators; diffusion furnace; laminar flow hoods; vacuum equipment; and various other machines and equipment now used in SPG research.

Future plans for Building 2000 are not part of the proposed action but will be reviewed by ORNL facility planning staff to determine the disposition of the building. The facility will also be reviewed as to its historical/architectural value and whether or not it should be demolished or abandoned in place. A complete National Environmental Policy Act (NEPA) screening will be conducted during the planning stages on the final disposition of the facility.

2.2 OPERATIONS AND RESEARCH ACTIVITIES

Operations by MSG at the new facility would replace research activities now conducted in Building 2000. These activities involve the synthesis and characterization of specialized research materials, including a wide variety of crystalline and amorphous materials (e.g., metals and alloys,

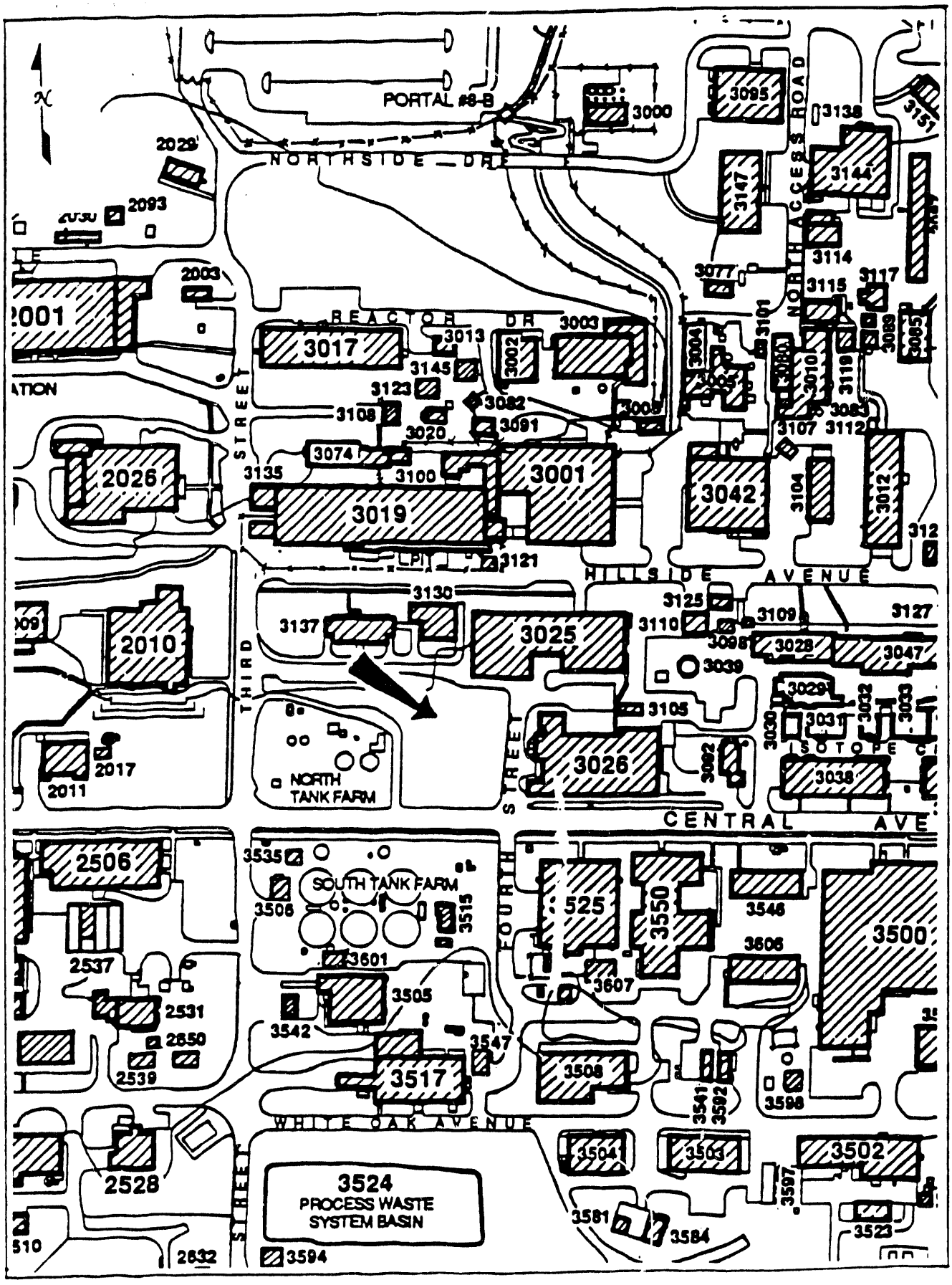

Fig. 1. Facilities in the immediate area of the proposed Solid State Research Facility.

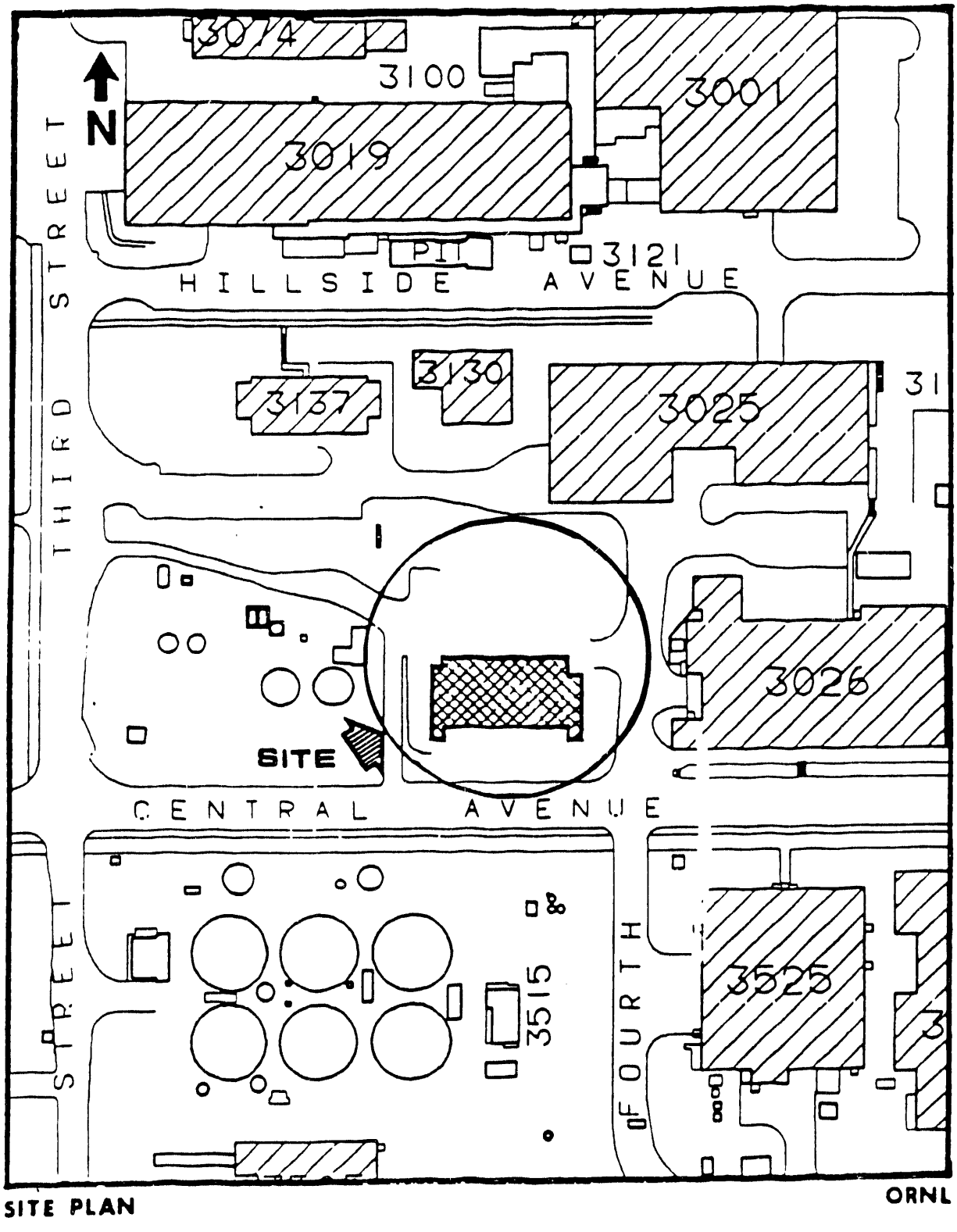

Fig. 2. Footprint of the proposed Solid State Research Facility.

ceramics, superconductors, and semiconductors). Operations by SPG at the proposed facility would replace all semiconductor physics research activities now being conducted in Building 2000. These activities involve growing thin films and multilayered, thin-film structures from semiconductor, superconductor, and ceramic materials, using molecular beam and laser-assisted methods.

These ongoing activities involve small research quantities (e.g., grams) of materials, most of which are nonhazardous. Some liquid hazardous wastes, including solvents, acids, and cleaning agents (standard laboratory chemicals), are generated in less than 1-liter amounts annually. Very small amounts (less than 1 gram) of solid waste are also generated.

Approximately 25 machines and/or other types of equipment would require cooling water during normal research operation. A closed-loop cooling water system would be installed to cool equipment during operation. Approximately 150 gallons of water would be contained in the cooling system; when removed (e.g., for maintenance and upgrade of the cooling system), the water would be treated at the ORNL Nonradiological Wastewater Treatment Plant prior to disposal. Among the items of equipment to be cooled are five radio-frequency units and five furnaces, a powder X-ray diffractometer, four or five small diffusion pumps, and miscellaneous equipment. All activities involving cooling water would be conducted in full accordance with all ORNL environmental protection procedures as well as applicable statutory and regulatory requirements and permits.

3. ALTERNATIVES TO PROPOSED ACTION

3.1 NO ACTION

Under the no-action alternative, current operations would continue under existing management practices and conditions. The physical deterioration of the existing facilities, including the roof, HVAC system, and plumbing, makes Building 2000 inadequate for supporting current and planned research activities. The HVAC system provides inadequate humidity control for sensitive materials experiments involving crystal growth, superconducting materials, and laser-film growth. Numerous attempts to repair the roof have failed, and leaks and plumbing breaks have resulted in frequent flooding of research areas and damage to equipment. Under this alternative, the minor impact associated with construction under the proposed action would not occur.

3.2 RENOVATION OF BUILDING 2000

Renovation would require extensive rehabilitation of an existing structure that has outlived its usefulness and would be more costly and less efficient than the proposed action. Renovation of Building 2000 would require replacement of the building's 20-gauge corrugated steel envelope, HVAC systems, and building support equipment. Because of age (the facility was constructed in 1947) and unique design (Quonset), Building 2000 does not meet current standards and codes of the Occupational Safety and Health Administration (OSHA), the National Fire Protection Association (NFPA), and the National Electric Codes. In addition, the entire attic area has been declared an asbestos zone by ORNL Industrial Hygiene Section. The cost of upgrading the facility and the cessation of operations for the duration of the upgrade would not constitute an economically sound alternative. Although the minor impact associated with construction of the

proposed project would not occur under this alternative, impacts caused by renovating Building 2000 would be greater because it would involve (1) removing and disposing of an assortment of old building materials including asbestos insulation, (2) upgrading the facility deteriorated underground utility system, and (3) relocating office equipment and personnel.

The proposed action would continue the same research in a much more suitable new facility on an already disturbed site. Under the no-action or renovation of Building 2000 alternatives, current research activities would continue to be threatened by the deterioration of the present facility.

4. DESCRIPTION OF EXISTING ENVIRONMENT

Fig. 3 shows the location of the DOE Oak Ridge Reservation (ORR) with respect to the geographic region. ORNL is one of three major facilities located on DOE ORR (Fig. 4). The ORNL facilities, which are centrally located on ORR, lie primarily in two valleys: Bethel Valley and, to the south of Bethel Valley, Melton Valley. The valleys are separated by Haw Ridge. The major ORNL facilities are clustered in Bethel Valley, and the satellite facilities are more widely separated from each other in Melton Valley.

The proposed action would take place in Bethel Valley inside the security-fenced region of the main ORNL facilities complex (Fig. 5) in the 3000 Area (Fig. 1). The construction would be in a previously developed area, which is the former site of Building 3024, the Fabrication Department Shop B previously used in fabricating various metal components for research and laboratory functions. Building 3024 was demolished in 1986. The cleared and leveled site is between Third Street and Fourth Street and is bounded on the west by the North Tank Farm (inactive underground liquid low-level waste storage area) and on the east by Building 3026 (Radioisotope Development Laboratory) (Fig. 1). This site contains no objects of historical or archeological significance, and no environmentally sensitive animal or plant species are present.[1,2,3,4,5,6] The proposed new building (Fig. 2) would be located on a hill north of and sloping downward toward Central Avenue, the main east-west thoroughfare in the ORNL mair facilities complex. This site is above any known floodplain areas and contains no wetlands.[7] The soil at the site has been investigated and found to be free of radioactive contamination.[8]

5. POTENTIAL ENVIRONMENTAL IMPACTS

Site preparation and construction activities, which would include minor amounts of leveling and excavation for underground piping, would take place on a previously developed area which is not a Solid Waste Management Unit site. Because a recently demolished building occupied the area, only scattered weeds and patches of grass exist on the site. The potential environmental impacts during the construction phase are erosion, the generation of fugitive dust, and the generation of construction wastes. Erosion and soil control, including the erection of geotextile filter fabric silt fences, straw bale barriers, sediment traps, check dams, or other control structures, would be provided to minimize siltation and erosion to reduce the potential for impacts on water quality. Fugitive dust would be minimized by either wetting the ground surface during dry and windy weather or performing construction activities when the ground surface is favorable and less likely to generate significant amounts of airborne particulates. Approximately 200 cubic yards of excavated soil would be removed; and although no contamination is expected, the soil would be further tested for the possible presence of radioactivity. If

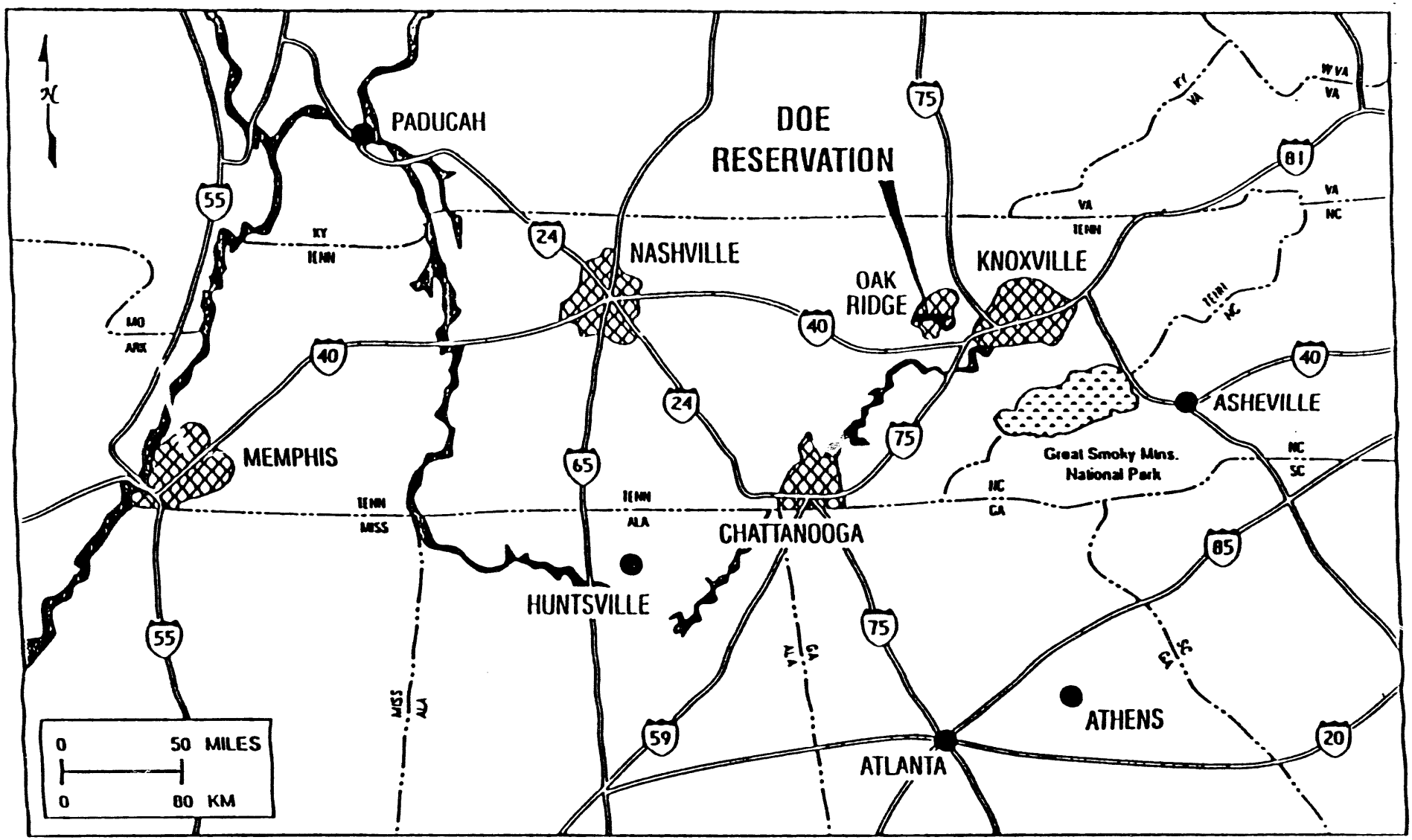

Fig. 3. Location of Oak Ridge with respect to geographic region.

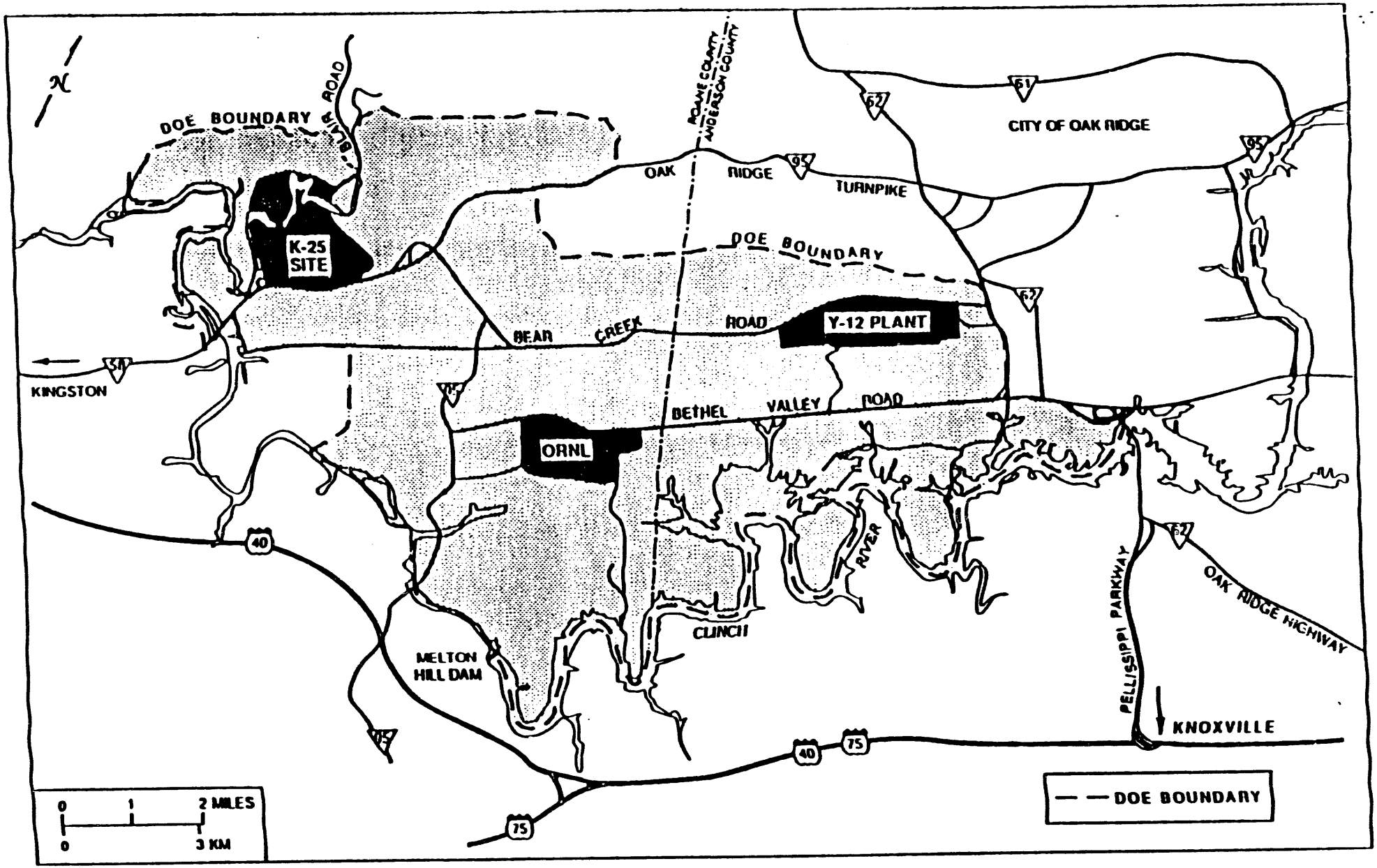

Fig. 4. Department of Energy Oak Ridge Reservation boundaries and three DOE facilities.

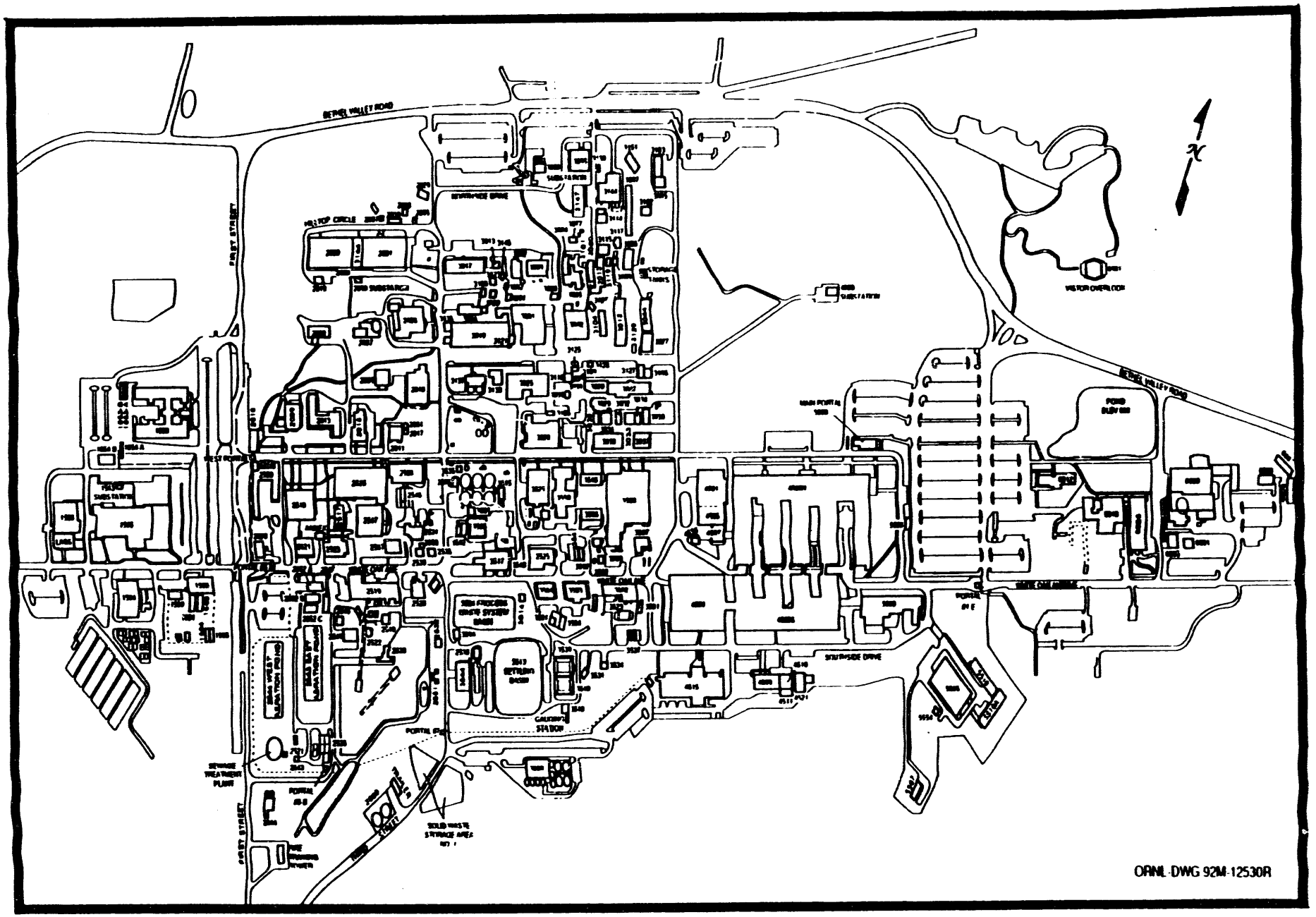

Fig. 5. Main ORNL facilities complex.

noncontaminated, the soil would be reused as clean fill in the maintenance of existing roads and parking lots. In the unlikely event that it is found to be radioactively contaminated, the soil would be properly packaged and disposed of in ORNL Solid Waste Storage Area (SWSA) 6. Construction wastes, which would consist of approximately 30 cubic yards of construction debris (e.g., nonuseable lumber, broken brick, and solidified concrete) would be collected and disposed of at an existing Tennessee Department of Environment and Conservation (TDEC)-permitted centralized landfill site in accordance with TDEC requirements. The proposed Y-12 Plant Centralized Sanitary Landfill 6, which is expected to start operation in FY 1993, has a fill capacity of approximately 150,000 cubic yards and will be permitted to receive waste for 3.4 years.

Research operations in the new facility would replace current ongoing activities in Building 2000. No new or additional solid wastes, liquid effluents, or gaseous emissions would be generated by moving the current research activities into the new building. Any potential environmental impact during the operation of the proposed facility would involve the generation of waste. Waste generated during research activities would include solvents, acids, and other cleaning agents in less than 1-liter amounts. All liquid hazardous wastes generated would be collected, transported, and stored inside Building 7652, a Resource Conservation and Recovery Act (RCRA)-permitted facility, and Building 7653, an interim RCRA-permitted facility. No increase in waste storage capacity or expansion of existing waste treatment facilities would be required by transfer of the activities to the new building. Very small amounts (less than 1 gram) of solid waste would be generated during research operations. Solid samples would include phosphate glasses (about 1—5 cm long and about 1 cm thick) and metals such as aluminum, lead, and bismuth (in gram amounts). The samples would be kept at the new facility or reused in related research activities. When no longer useful, samples that are considered hazardous would be managed as hazardous wastes at existing ORNL facilities for hazardous waste management. Small amounts of fumes from sample preparation activities (e.g., inert gases, laser gases, and vapor from acid solutions) would be discharged through laboratory hoods in full conformance with ORNL's existing air emissions permits. Wastewater generated during research would be discharged into ORNL's process waste system for treatment and disposal.

Evaluations by the ORNL Environmental Compliance Section of the Office of Environmental Compliance and Documentation have determined that no additional RCRA, Clean Air Act (CAA), Clean Water Act (CWA), Aquatic Resources Alterations (ARA), or National Emissions Standards for Hazardous Air Pollutants (NESHAPs) permits would be required. No radioactive wastes would be produced. Other waste generation would be minimized, and all wastes would be managed under current ORNL standard practice procedures prepared to promote environmental protection. All activities would be conducted in full accordance with all applicable statutory and regulatory requirements and permits. Approximately 150 gallons of water would be used in the closed-loop cooling system; when disposal is warranted, the water would be discharged into the Nonradiological Wastewater Treatment System for treatment prior to discharge into White Oak Creek. Discharge of the treated cooling water into White Oak Creek would not require a new permit or modifications to the existing National Pollutant Discharge Elimination System (NPDES) permit.

The site for the proposed facility is a previously used building site within the fenced area at ORNL and does not now provide habitat for sensitive plant or animal species. Construction and operations of the facility are not expected to affect environmentally sensitive areas such as archeological or historic sites; habitats of any threatened, endangered, or other rare wildlife species; floodplains; or wetlands.[1,2,3,4,7] The state of Tennessee Historical Commission has concurred that the proposed action will not adversely affect National Register of Historic Places-eligible or -listed properties, and the Advisory Council on Historic Preservation agrees with the

state's determination.[5,6] The Appendix contains copies of sensitive area coordination letter responses. Siltation and erosion controls would minimize impacts to surface water quality. Any pavement, curbs, drainage systems, or lawns affected by the construction phase of the proposed project would be restored to their original condition at the completion of the project. The area around the proposed building would be graded and seeded. Any topsoil stripped from the construction site would be used in areas that need to be filled; and additional treatment, such as seeding, mulching, fertilization, and watering, would be provided until final acceptance.

Final decision on the disposition Building 2000 has not been made. The facility would be reviewed to determine its historical/architectural value and whether or not it should be demolished or abandoned in place. Because of the shortage of suitable building sites inside the security-fenced region of the main ORNL facilities complex in Bethel Valley, the facility could be demolished to allow the site to be used in the future. Because the one-story Quonset hut structure was constructed of sheets of tin, wood, and sheetrock, the impact to the environment during the demolition process is anticipated to be minimal. Small amounts of demolition dust would be expected, and the resulting debris would either be salvaged or disposed of at the existing Y-12 Sanitary Landfill site. A complete NEPA screening would be conducted in the planning stages on the final management of this facility, and it would include a consultation with the state of Tennessee Historic Preservation Office (SHPO), if warranted.

6. SUMMARY

The proposed action would involve the construction of a two-story building (100 feet long by 70 feet wide by 30 feet high) on the former site of Building 3024, located within the main ORNL facilities area. Site preparation and construction activities would have negligible environmental impacts and would have no effect on environmentally sensitive areas. When the facility is no longer useful, all materials associated with the project would be removed to restore the site to a natural state or for use as a future building site. Research activities at the new facility would be a continuation of current research activities, which mainly involve synthesis and characterization of crystalline and amorphous materials, growth and characterization of semiconductor thin films, and growth and characterization of superconductor thin films. Waste generated during research activities would be quantitatively and qualitatively the same as current wastes and would be disposed of at existing ORNL facilities that operate in full conformance with all applicable statutory and regulatory requirements and permits. Environmental impacts resulting from this action are expected to be minimal.

7. REGULATORY AGENCIES AND PERSONS CONSULTED

The following agencies were contacted:

Tennessee Historical Commission, Herbert L. Harper, Executive Director and Deputy State Historic Preservation Officer

Advisory Council On Historic Preservation, Don L. Klima, Director, Eastern Office of Project Review

United States Department of Interior, Fish and Wildlife Service, Lee A. Barclay, Ph.D., Field Supervisor

8. REFERENCES

1. M. C. Wiest, Historical/Archaeological Coordinator, *Review of Site for the Proposed Solid State Research Facility, Building 3150*, internal correspondence, Oak Ridge Natl. Lab., Oak Ridge, Tenn., March 30, 1992.

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

3. L. A. Barclay, U.S. Fish and Wildlife Service, Cookeville, Tenn., letter to R. L. Kroodsma, Oak Ridge Natl. Lab., Oak Ridge, Tenn., June 19, 1990.

4. R. T. Bay, U.S. Fish and Wildlife Service, Cookeville, Tenn., letter to R. L. Kroodsma, Oak Ridge Natl. Lab., Oak Ridge, Tenn., March 7, 1991.

5. H. L. Harper, Executive Director and Deputy State Historic Preservation Officer, Tenn. Historical Commission, Nashville, Tenn., letter to P. J. Gross, U.S. DOE, Oak Ridge, Tenn., Oct. 20, 1992.

6. D. L. Klima, Director, Eastern Office of Project Review, Advisory Council on Historic Preservation, Washington, D.C., letter to P. J. Gross, U.S. DOE, Oak Ridge, Tenn., Nov. 16, 1992.

7. M. Cunningham and L. R. Pounds, *Wetlands on the Oak Ridge Reservation, Draft Report*, March 1991.

8. J. B. Murp' y, *3024 Site Sampling and Analysis Plan and Data Summary*, internal correspondence, Oa Ridge Natl. Lab., Oak Ridge, Tenn., Feb. 7, 1992.

9. APPENDIX

Letter, H. L. Harper to P. J. Gross

Letter, D. L. Klima to P. J. Gross

TENNESSEE HISTORICAL COMMISSION
701 BROADWAY
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE, TENNESSEE 37243-0442
615/742-6716

October 20, 1992

Peter J. Gross
DOE
P. O. Box 2001
Oak Ridge, Tennessee 37831-8739

Re: DOE, SILID STATE RESEARCH FACILITY, OAK RIDGE, ROANE COUNTY,

Dear Mr. Gross:

Pursuant to your request, this office has reviewed your correspondence plus additional documentation relative to the above-referenced undertaking. Based on available information, we concur that the project as currently proposed will not adversely affect National Register of Historic Places-eligible or -listed properties.

Unless project plans change, this office has no objection to the implementation of this project. You must now seek the comment of the Advisory Council on Historic Preservation prior to project implementation. Please enclose a copy of this determination along with all support documentation delineated at 36 CFR Part 800. Until such time as the Council has rendered a final comment on this project, your Section 106 obligation under federal law has not been met. Should project plans change, please contact this office to determine what additional action, if any, is necessary. Questions and comments may be directed to Joe Garrison (615)742-6720. Your cooperation is appreciated.

Sincerely,

Herbert L. Harper
Executive Director and
Deputy State Historic
Preservation Officer

HLH/jyg

Mr. Tom McCulloh
National Advisory Council

Letter From Tennessee SHPO, Concurrence Of No Adverse Effect For Construction Of Solid State Research Facility, Oak Ridge National Laboratory (ORNL)

Attached is a letter from the Tennessee SHPO that provides concurrence that the construction of the Solid State Research Facility at ORNL will not adversely affect eligible or listed National Register Properties. Also included, are a brief project summary, and panoramic photographs taken from the location of the proposed building that were supplied to the SHPO. This information is provided for your review and acceptance as part of DOE/OR's compliance with Section 106 of the National Historic Preservation Act.

Peter Gross

R.O. Hultgren
Herbert Harper
L.M. Thompson
M.E. Mitchell

Advisory Council On Historic Preservation

The Old Post Office Building
1100 Pennsylvania Avenue, NW, #809
Washington, DC 20004

NOV 16 1992

Mr. Peter J. Gross
Director
Environmental Protection Division
Department of Energy
Oak Ridge National Laboratory
P.O. Box 2001
Oak Ridge, TN 37831-8739

REF: Construction of Solid State Research Facility

Dear Mr. Gross:

On November 9, 1992, the Council received your determination that the referenced project would have no adverse effect upon historic properties on or eligible for the National Register of Historic Places. We have reviewed your supporting documentation, including the concurrence of the Tennessee State Historic Preservation Officer, and we agree with your determination.

This letter confirms that the requirements of Section 106 of the National Historic Preservation Act and the Council's regulations have been met for this project. Both this letter and your supporting documentation should be retained in your environmental or project files.

If you have any questions, please contact Tom McCulloch at (202) 606-8505. Thank you for your cooperation.

Sincerely,

[illegible] J. Klima
Director, Eastern Office
of Project Review

DATE
FILMED
1/20/94
END