ENVIRONMENTAL ASSESSMENT

NATURAL RESOURCE MANAGEMENT ACTIVITIES AT THE SAVANNAH RIVER SITE

DOE/EA-0826

U.S. DEPARTMENT OF ENERGY
SAVANNAH RIVER OPERATIONS OFFICE
ENVIRONMENTAL AND LABORATORY PROGRAMS DIVISION

July 1993

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LIST OF ABBREVIATIONS

BMP	Best Management Practices
DCLU	Designated Coordinating Land Users
CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
EA	Environmental Assessment
FW	Freshwater
FWS	U.S. Fish and Wildlife Service
LTRC	Lower Three Runs Creek
NEPA	National Environmental Policy Act
NRMP	Natural Resources Management Plan
PMOA	Programmatic Memorandum of Agreement
RCW	Red-Cockaded Woodpecker
SCDPRT	South Carolina Department of Parks, Recreation, and Tourism
SEFES	Southeastern Forest Experiment Station
SCS	Soil Conservation Service
SHPO	State Historic Preservation Officer
SRARP	Savannah River Archaeological Research Program
SREL	Savannah River Ecology Laboratory
SRFS	Savannah River Forest Station
SRS	Savannah River Site
SRTC	Savannah River Technology Center
T&E	Threatened and Endangered
USC	United States Code
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
WSRC	Westinghouse Savannah River Company

1.0 SUMMARY

The National Environmental Policy Act (NEPA) of 1969, as amended, requires Federal agencies to assess the environmental consequences associated with their actions (USC 4321-4347). It is the policy of the U.S. Department of Energy (DOE) to follow the letter and spirit of NEPA; to comply fully with the regulations of the Council on Environmental Quality (40 CFR Parts 1500-1508); and to apply the NEPA review process early in the planning stages for its proposed actions. The revised DOE NEPA Implementing Procedures (10 CFR 1021) became effective on May 26, 1992.

This environmental assessment (EA) reviews the environmental consequences of ongoing natural resource management activities on the Savannah River Site (SRS). The *Natural Resources Management Plan: Strategic Guidance for the Savannah River Site's Natural Resources Programs* (DOE, 1991) is a core document supporting the implementation of current programs. Appendix A contains the Natural Resources Management Plan (NRMP). While several SRS organizations have primary responsibilities for different elements of the plan, the United States Department of Agriculture (USDA), Forest Service, Savannah River Forest Station (SRFS) is responsible for most elements.

The SRS is a DOE-owned nuclear production facility encompassing about 198,000 acres in southwestern South Carolina. The Site borders the Savannah River and is near Augusta, Georgia, and Aiken and Barnwell, South Carolina (Figure 1). SRS facilities include five nuclear production reactors (one in standby status and four in extended shutdown), two chemical separations areas, a fuel and target fabrication facility, a defense waste processing facility, a saltstone waste facility, and various supporting facilities.

At present, the primary SRS mission in support of the national defense accounts for approximately 17,000 acres of the Site area. The remaining acreage (about 181,000 acres) consists primarily of forest lands the SRFS manages for DOE. Since the Federal Government acquired the SRS in 1951, SRFS has been involved with the management of natural resources on the Site.

At first, the natural resource management program focused on the reforestation of abandoned farmland. Over the years, management activities have expanded to include wildlife management, fire suppression, boundary maintenance, soil stabilization, timber management, secondary road maintenance, ecological research, and provision of limited outdoor recreation opportunities for SRS employees in the form of walking and jogging trails. DOE Orders 4300.1C, "Real Property and Site Development Plan," and 5400.1, "General Environmental Protection," provide the direction for the multiple-resource focus of current activities.

Beginning in 1985, SRFS led discussions between key natural resource organizations to develop a coordinated SRS multiple-natural resource management strategy (Irwin, 1987). These discussions led to the development and consideration of five alternative management scenarios (USDA, 1988a).

Of the five scenarios defined in 1985, the High-Intensity Management alternative established the upper bound of environmental consequences; it represents a more intense level of resource management than that being performed under current resource management activities. This alternative established compliance mechanisms for several natural resource-related requirements and maximum practical timber harvesting. Similarly, the Low-Intensity Management alternative established the lower bound of environmental consequences and represents a less intense level of resource management than that being performed under current resource management activities. This alternative also established compliance mechanisms, but defined a passively managed natural area. The Proposed Action of this EA describes the current level of multiple-natural resource

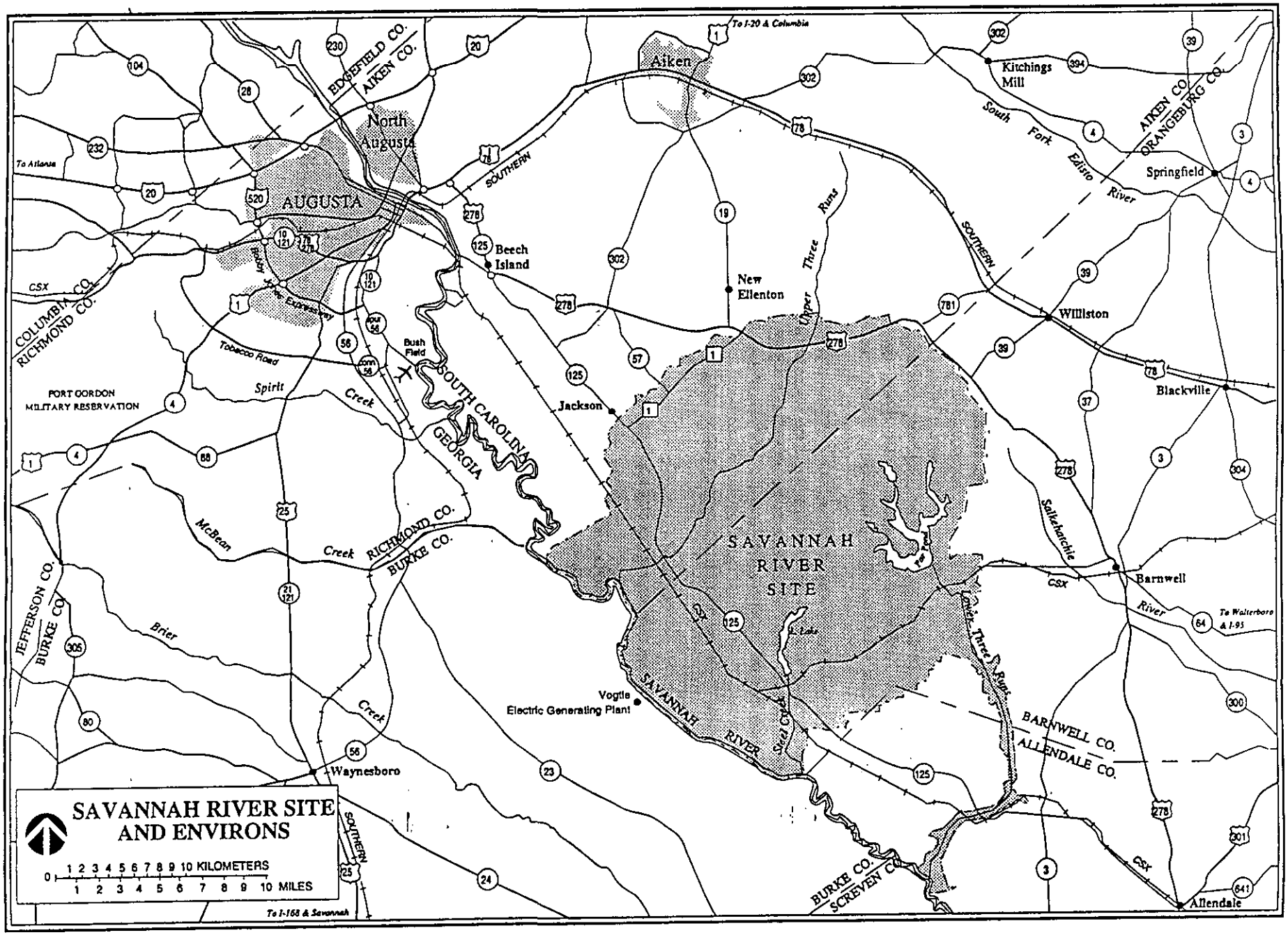

Figure 1. Savannah River Site and Vicinity

management on the SRS; it is also the "No-Action" alternative, in that it represents no change from present activities.

The Proposed Action integrates timber management with endangered species protection programs, balances regulatory compliance with natural resource and environmental protection programs, and actively conducts mission support and research program elements.

The management activities that have evolved through the late 1980s and early 1990s have resulted in reduced timber harvesting and increased ecological research and endangered species protection; however, the High-Intensity and Low-Intensity Management alternatives continue to establish the upper and lower range of reasonable alternatives. This EA reviews the environmental consequences of the Proposed Action and the High- and Low-Intensity Management alternative scenarios.

The potential environmental consequences associated with the Proposed Action would include impacts on streams and wetland areas, primarily from timber operations and secondary road construction and maintenance. The implementation of Best Management Practices (BMP) such as using brush windrows along contours to slow runoff, maintaining streamside and Carolina bay buffers, and using waterbars, culverts, and the expeditious revegetation of disturbed areas would minimize or eliminate increases in ambient water temperature and effects from siltation (USDA, 1989a, 1990a, 1990b, 1990c, and 1990d). Long-term timber management and research activities would enhance the viability of threatened and endangered species on the Site.

Under the High-Intensity Management alternative, the use of BMP, as mentioned above, would likewise minimize or eliminate potential consequences from ambient water temperature increases and siltation effects. Increased timber harvesting on shorter rotations would produce negative impacts on the habitat of the endangered red-cockaded woodpecker (RCW; *Picoides borealis*).

Under the Low-Intensity Management alternative, hardwood encroachment on mature pine stands would reduce the viability of the RCW population on the Site. The cessation of timber harvesting activities on the SRS could reduce forestry sector employment in the six-county SRS region of influence by as much as 9.25 percent, based on 1987 employment data (HALLIBURTON NUS, 1992a).

2.0 PURPOSE AND NEED FOR ACTION

The purpose of the Proposed Action of continuing natural resource management activities on the SRS is to carry out the requirements of DOE Orders 4300.1C, "Real Property and Site Development Planning" and DOE Order 5400.1, "General Environmental Protection" as guided by the NRMP. The Proposed Action is also the No Action Alternative.

The NRMP is the strategic guidance document that ensures compliance with DOE Orders 4300.1C and 5400.1. The NRMP integrates soils, water, plant conservation, fish, wildlife, threatened and endangered species, and forest management and reforestation needs in the development and utilization of the SRS. The NRMP embraces an integrated approach to multiple natural resource management ultimately leading to improved timber stands, enhanced biodiversity, and enhanced wildlife habitat for species preferring the longleaf pine/wiregrass community. Section 3.0 of the NRMP discusses policy, goals, and objectives.

3.0 PROPOSED ACTION AND ALTERNATIVES

3.1 Background

In 1985, at the beginning of the development of a coordinated multiple-natural resource management plan for the SRS, the SRFS led discussions with other organizations related to natural resources. These discussions led to the development and consideration of five alternatives (USDA, 1988a). The High- and Low-Intensity Management alternatives established the upper and lower bounds, respectively, of environmental consequences. By 1987, timber harvesting at the SRS was at a more intense level than that currently being conducted. However, since 1991, evolving management practices have resulted in reduced timber harvesting and increased emphasis on the ecological research and endangered species management elements of the plan. The management scenarios defined by the High- and Low-Intensity Management alternatives still bound the current level of natural resource activities on the SRS; this EA considers these alternatives and the Proposed Action (i.e., to continue natural resource management activities at their current levels of intensity).

The NRMP is a direct descendant of the original natural resource planning effort. It guides SRS natural resource management activities in the following 10 program elements:

1. Timber management
2. Fish and wildlife management
3. Soils, water, and air resources management
4. Visual and wellness facilities management
5. Cultural and archaeological resources management
6. Secondary road management
7. Wildland fire management
8. Boundary management
9. Public affairs
10. Research-related programs related to forest management, environment, and cultural and archaeological resources

The fundamental function of several of these NRMP elements is to help facilitate compliance with state and Federal regulations or to support the general SRS mission. Regardless of the alternative selected, the requirements of these elements will remain constant. The elements that fall into these categories include soils, water, and air resources management; visual and wellness facilities management; cultural and archaeological resources management; wildland fire management; boundary management; public affairs; and research-related programs. These elements do not influence the scope of overall management activities. On the other hand, integrated activities associated with timber management, wildlife management, secondary roads management, and research programs have greater direct influences on the scope of natural resource management activities. As a consequence, these elements would vary more between alternatives.

The SRFS; the Savannah River Archaeological Research Program (SRARP), which is a program of the University of South Carolina Institute of Archaeology and Anthropology supported through a cooperative agreement with DOE; the U.S. Forest Service Southeastern Forest Experiment Station (SEFES); the Savannah River Ecology Laboratory (SREL), which is operated by the University of Georgia Research Foundation, Inc., under contract with DOE; and the Savannah River Technology Center (SRTC; formerly the Savannah River Laboratory), which is operated by Westinghouse Savannah River Company (WSRC) under contract to DOE, share operational responsibilities for the various elements of the NRMP. Figure 1 of the NRMP (Appendix A) shows organizational responsibilities and coordination.

3.2 Proposed Action

The Proposed Action is the continued management of SRS natural resources at current levels of intensity and as guided by the NRMP. The following sections summarize the Proposed Action for each program element.

Timber Management The SRFS is responsible for planning and directing a timber management program (including the inventory, sale, harvest, reforestation, and silvicultural treatment of forest lands) consistent with guidance established in DOE Order 4300.1C. Section 4.1 of the NRMP provides the strategic guidance for this program element.

The Proposed Action would divide approximately 181,000 acres (about 91 percent of the total SRS area) into two management areas that SRFS would regulate on a long-term basis. Management Area 1 (69,000 acres) would consist of the developed areas of the Site and areas most influenced by current site operations. Management Area 2 (112,000 acres) would essentially be a natural buffer within the Site periphery. The boundaries for the two management areas were developed in cooperation with the U. S. Fish and Wildlife Service (FWS) and are based on the location of current site operations and RCW colonies, recruitment stands, and foraging areas. Both areas would include about 11,000 acres "set-aside" for ecological research and about 12,000 acres of wetlands in the Savannah River Swamp and Lower Three Runs Creek (LTRC) corridor. Figure 2 illustrates the locations of the two management areas, the Savannah River Swamp, LTRC corridor, and the research set-aside areas. No timber harvesting would occur in the set-aside areas, the swamp, or the LTRC corridor (a major onsite tributary of the Savannah River).

In both management areas, SRFS would continue to manage bottomland hardwood, upland hardwood, and mixed pine hardwood stands on 100-year rotations. In the longleaf (*Pinus palustris*) and loblolly (*P. taeda*) pine areas, rotation lengths for longleaf would continue to be 50 years in Management Area 1 and 120 years in Management Area 2; rotation lengths for loblolly would continue to be 50 years in Management Area 1 and 80 years in Management Area 2 (USDA, 1991a). The purpose of the longer rotation lengths in Management Area 2 would be to improve the management of RCW habitat. In conjunction with increased rotation lengths in the pine areas, SRFS would convert about 1,500 acres per year for the next 10 years of slash (*P. elliottii*) and loblolly pine in both management areas primarily to longleaf for the long-term benefit of the RCW and species associated with the longleaf pine/wiregrass ecosystem.

The total projected timber harvest would be approximately 1,800 acres per year (including the 1,500 acres per year of slash and loblolly pine conversion). Fewer than 200 acres of the total projected annual harvest would be bottomland hardwoods. SRFS would use even-aged management practices. It would limit hardwood harvests to tracts of 40 acres or less and pine harvests to tracts of 100 acres or less.

Even-aged management is the primary harvesting technique employed on the SRS. Even-aged management is preferred to uneven-aged management because of the efficiencies in converting sites to longleaf pine, the native species historically found throughout the coastal plain of the South on

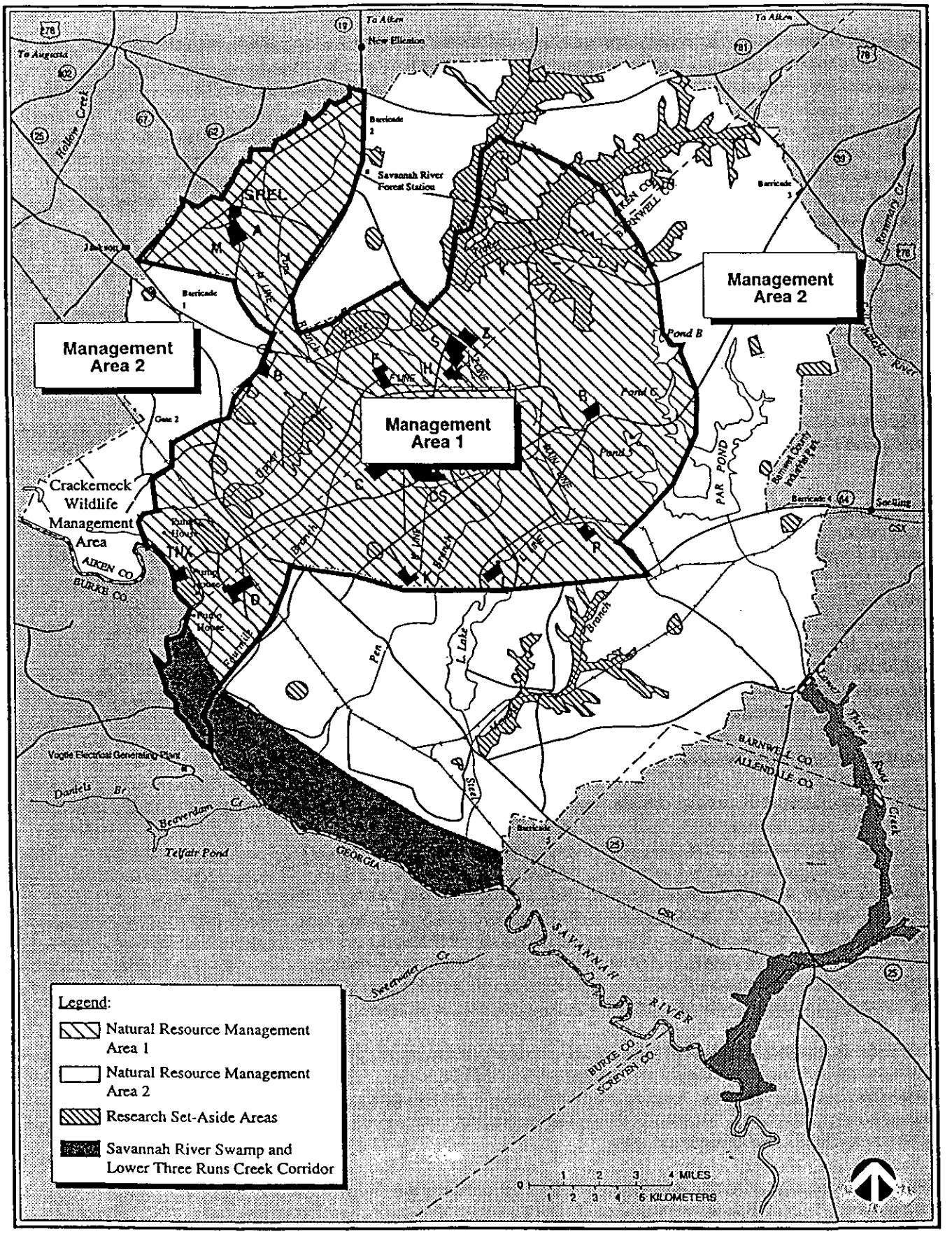

Figure 2. Savannah River Site Natural Resource Management Areas, Savannah River Swamp, Lower Three Runs Creek Corridor, and Research Set-Aside Areas

deep sand soils. The majority of the pine timber on SRS (58 percent) is between 31- and 50- years old, due to the intensive conversion of abandoned agricultural fields to predominantly slash and loblolly pine forests between 1951 and 1960. Many of these large fields were planted to single species in one year, resulting in large even-aged stands over much of the Site. Approximately fifty percent of the loblolly pine and all of the slash pine are now growing on sites marginally suited for them and better suited for longleaf pine. Because longleaf and loblolly pine are shade-intolerant, even-aged cuts are more effective in providing the forest openings required for regeneration.

Potential erosion on sites that are being harvested and regenerated is mitigated through proper engineering of logging roads, fire ditches, and loading decks. Implementation of BMP such as using brush windrows along contours to slow runoff, maintaining streamside and Carolina bay buffers, and using waterbars, culverts, and the expeditious revegetation of disturbed areas augments the engineering efforts (USDA, 1989a, 1990a, 1990b, 1990c, and 1990d). The SRS Wet Area Logging Guides (Appendix B), require contractor compliance with the specific provisions identified in Section 5.2 of this EA, further mitigating impacts to wetlands from harvesting activities.

Timber management activities, as well as all other natural resources management activities would comply with Occupational Safety and Health Administration standards.

Fish and Wildlife Management Fish and wildlife management activities on the SRS are the responsibility of SRFS in cooperation with SEFES, SREL, South Carolina Wildlife and Marine Resources Department, and WSRC. Section 4.2 of the NRMP provides the strategic guidance for this program element, which inventories and monitors animal and plant species. Under the Proposed Action, management activities would continue, including the restoration and management of viable populations of wildlife and plants native to the SRS; restoration and maintenance of selected Carolina bays; restoration of the longleaf/wiregrass communities; and development of wildlife and plant viewing areas for SRS employees. Onsite hunts for white-tailed deer (*Odocoileus virginianus*) and feral hogs (*Sus scrofa*) would continue on most of the Site. Small game and wild turkey (*Meleagris gallopavo*) hunting, as well as fishing, would also continue in the Crackerneck Wildlife Management Area of the SRS.

A key objective of the NRMP is the proposed continuance of protection and recovery activities for federally listed threatened and endangered animals and plants in accordance with the Endangered Species Act of 1973. At present, SRS is implementing strategies for the following three species:

- **Red-Cockaded Woodpecker (*Picoides borealis*).** The *Wildlife Management Handbook* (USDA, 1985) and *Red-Cockaded Woodpecker Standards and Guidelines, Savannah River Site* (USDA, 1991a) describe the SRS management strategy for the RCW. A significant element of this strategy is the conversion of all slash and some loblolly pine to longleaf pine and the increased pine rotation lengths described above under Timber Management. Other activities under the Proposed Action would include the continued maintenance of older age class pine; the construction of three to four artificial cavities per 10 acres of habitat within 3 miles of active colonies; the placement of cavity restrictors; habitat improvement; mid-story control; prescribed burning; the translocation of RCW; the avoidance of fragmentation of nesting habitat; and related research efforts.

- **Southern Bald Eagle (*Haliaeetus leucocephalus*).** The management strategy for the southern bald eagle (developed by the SRFS, the Forest Service, and the South Carolina Wildlife and Marine Resources Department) emphasizes the protection of current and possible future nest sites (USDA, 1985; USDI, 1986a). A 1,500-foot radius from each eagle nest forms the primary protection zone. The Proposed Action would limit timber management practices in these zones to thinnings, which would not occur during nesting and rearing periods. In addition, the Proposed Action would delineate a secondary

zone with an additional 3,700-foot radius beyond the primary zone. No structural development would occur in these zones either; however, even-aged timber harvesting would be allowed except during nesting and rearing periods (USDA, 1988b).

- **Wood Stork (*Mycteria americana*).** Wood stork management activities are a cooperative effort among DOE, SRTC, SREL, SRFS, the FWS, and the National Audubon Society. DOE built the Kathwood ponds on National Audubon Society property northwest of the SRS to increase wood stork use of the area and as mitigation for the restart of L-Reactor in 1985. Birds from a breeding colony at Big Dukes Pond near Birdsville, Georgia, often forage in the Savannah River Swamp and onsite Carolina bays and along the shoreline of Par Pond. Under the Proposed Action, wood stork research activities designed to determine foraging requirements would continue at the Kathwood ponds, in the Savannah River Swamp, and at the Birdsville rookery. This research would lead to the development of management plans (USDI, 1986b; USDI, undated).

Additional activities related to sensitive animal species include the following:

- **Shortnose Sturgeon (*Acipenser brevirostrum*).** From 1982 to 1985, SRS researchers collected eight larvae in the Savannah River adjacent to the SRS (DOE, 1987). Researchers continue to monitor the presence of this species. Four sturgeon larvae were collected from the Savannah River adjacent to SRS in a 1991 study of ichthyoplankton entrainment at the SRS Savannah River water intakes (WSRC, 1992a). However, investigators were unable to determine whether these larvae were *Acipenser brevirostrum* or Atlantic sturgeon (*A. oxyrhynchus*). The Proposed Action would include no habitat management activities.

- **Other Sensitive Species.** Under the Proposed Action, surveys and habitat management for both sensitive plant and animal species that might occur on the SRS would continue as needed to determine project-specific impacts. The SRFS program to determine species location, abundance, and temporal population trends would continue as would reintroduction of native, federally listed, or SRFS-sensitive species, based on prior DOE approval (USDA, 1991b). The recently listed Federally endangered species, smooth coneflower (*Echinacea laevigata*), is known to occur on the Site and a management plan is currently being formulated. One sensitive species located on the SRS, the American alligator (*Alligator mississippiensis*), has been downlisted since publication of the Floodplains/Wetlands Assessment in 1984 and is now classified as "threatened due to similarity of appearance" (to the American crocodile, *Crocodylus acutus*).

Soils, Water, and Air Resources Management The SRFS, in association with the Soil Conservation Service (SCS), is responsible for planning soils, water, and air management activities that deal with nonpoint sources. Section 4.3 of the NRMP provides the strategic guidance for this element of the program. The Proposed Action would continue to emphasize the control of water and air impacts related to soil movement on the SRS. DOE encourages contractors to use the technical expertise and capabilities of the SRFS and the SCS and have developed a handbook to assist with sediment and erosion control on the Site (DOE, 1992). Stabilization and control measures would continue around construction projects, waste closure sites, borrow pits, and spoil piles. The SRFS would continue to work with facility operations to address soils, water, and air issues by planting vegetation, monitoring soil movement, and maintaining grassed areas around facility sites.

Visual and Wellness Facilities Management The SRFS is responsible for planning, directing, and maintaining a visual and wellness facilities management program. Section 4.4 of the NRMP provides the strategic guidance for this program element. This element has resulted in the construction of one walking and jogging trail near the 700-Area. The Proposed Action would

maintain existing trails and formulate plans for additional ones. In addition, this element would continue ongoing practices to maintain SRS forest resources in a visually pleasing manner (e.g., maintain buffer zones around cut areas and develop wildlife viewing areas).

Cultural and Archaeological Resources Management The objective of this program element is to safeguard and protect the cultural and archaeological resources of the SRS through the SRARP. Section 4.5 of the NRMP provides the strategic guidance for this element. Under the Proposed Action, the organization responsible for an action under any element of the NRMP would consult with SRARP before beginning the activity. SRARP would determine the potential effects to the cultural and archaeological resources of the Site and assess the eligibility of such a resource for nomination to the National Register of Historic Places.

Secondary Road Management The SRS has about 1,800 miles of secondary roads through its forested areas. The construction, reconstruction, and maintenance of these roads are the responsibilities of the SRFS; WSRC performs field activities. Section 4.6 of the NRMP provides the strategic guidance for this program element. Roads are required by numerous organizations on SRS for a variety of reasons. The majority of new secondary road construction is required for access to test wells, utility lines, or research sites. A small portion of the new construction is to access timber sales. Most logging roads constructed now are temporary woods roads and are seeded and abandoned following the logging operation. The locations of all secondary roads are planned and coordinated through the site use system. The site use system employed at SRS is used to minimize the chance of conflict between organizations by coordinating all construction and research projects between all organizations for comment. At the current level of activity on the SRS, under the Proposed Action, SRFS would need to construct approximately 2 miles of new secondary road annually, and would reconstruct approximately 5 miles. Construction and reconstruction would include grubbing, excavation, drainage, surfacing, and erosion control. Maintenance of existing roads would involve surface blading, ditch maintenance, gravel replacement, herbicide treatment, mowing, trimming brush, and cleaning out culverts (DOE, undated; D. Strawbridge, SRFS, 1991). Activities would include annually blading approximately 400 miles of roads, clearing brush from 200 miles of roads, spreading 2,700 metric tons of gravel, and cleaning 500 miles of ditches.

All secondary road construction and reconstruction activities will require an Application & Permit For Site Use. Site Use applications are reviewed by a committee of Designated Coordinating Land Users (DCLU) composed of all SRS natural resource management organizations, including SRFS, SRARP, SREL, and SCWMRD. These DCLU consider environmental impacts of activities that have the potential to harm natural resources. Approval of these activities requires concurrence by all Coordinating Land Users. If a proposed activity is unacceptable to one or more of the Coordinating Land Users, it is either rejected or approved conditionally with necessary modifications and/or mitigative measures.

Wildland Fire Management The main purpose of wildland fire management is to protect the Site and the personnel employed there from the hazards of wildfires. The SRFS is responsible for this program element and has assistance agreements with the South Carolina Forestry Commission and WSRC. Section 4.7 of the NRMP provides the strategic guidance for this element.

The Proposed Action would continue the activities of prevention, presuppression, detection, suppression, and prescribed burns. Prevention would involve information and education through the use of roadside signs, safety campaigns, school programs, issuance of approvals for onsite burning, and hazard identification. Presuppression would involve the maintenance of equipment, training of personnel, and operation of a fire dispatch center. Fire detection would involve staffed fire towers and aerial flights. Suppression would involve the proper response of site crews in the event of a wildfire. SRFS would reduce the potential for wildfire through prescribed burns of

natural forest fuels; such burns are also a tool for preparing reforestation areas and enhancing wildlife habitat (USDA, 1989b).

Boundary Management The SRFS is responsible for inspecting and maintaining the 125-mile SRS boundary. Section 4.8 of the NRMP provides the strategic guidance for this program element. Under the Proposed Action, the SRFS and WSRC would continue to maintain 25-foot-wide cleared rights-of-way and firebreaks, barbed-wire fencing, gates, markers, and signs.

Public Affairs The SRFS is responsible for planning and directing a natural resources public affairs program. Section 4.9 of the NRMP provides strategic guidance for this element of the program. Under the Proposed Action, SRFS would monitor public sensitivity to natural resource activities. The promotion of SRS natural resource management programs would continue.

Research-Related Programs Section 5.0 of the NRMP provides strategic guidance related to research program elements. Under the Proposed Action, research related to wood stork and RCW foraging practices and habitat would continue. SRS organizations involved in natural resource management efforts would continue to be active in either direct research efforts or research support. SRFS would provide primary support to these organizations as required on each study area by providing access roads, removing timber, controlling competing vegetation, applying herbicide or fertilizer, and by protecting research areas from wildfire. SEFES would plan and conduct research dealing with the problems of managing forested ecosystems and providing the scientific basis for forest management at SRS. SREL would conduct ecological research and provide natural resource management recommendations. SRTC would conduct research on the environmental effects of SRS activities. SRARP would locate, monitor, manage, and make recommendations related to the cultural and archaeological resources of the site.

3.3 Alternatives

3.3.1 High-Intensity Management

The basis of the High-Intensity Management alternative approximates the High-Intensity alternative defined in 1985; it would approximate actual management practices that were employed from about 1986 to 1991. This alternative would establish (1) mechanisms for compliance with natural resource and environmental protection regulations and (2) the maximum practical timber harvesting level.

Timber Management Under the High-Intensity Management alternative, timber harvesting would occur on as many as 2,700 acres per year. The management of all pine areas in Management Area 1 activities would be on a 50-year rotation. The management of longleaf pine in Management Area 2 on an 80-year rotation and loblolly pine on a 70-year rotation would increase pine pulpwood and saw log production over current levels. The management of hardwoods would be on an 80-year rotation. SRFS would not harvest timber in the set-aside areas, the Savannah River Swamp, or the Lower Three Runs Creek corridor.

Even-aged management is preferred to uneven-aged management because of the efficiencies in converting sites to longleaf pine, the native species historically found throughout the coastal plain of the South on deep sand soils. The majority of the pine timber on SRS (58 percent) is between 31- and 50- years old, due to the intensive conversion of abandoned agricultural fields to predominantly slash and loblolly pine forests between 1951 and 1960. Many of these large fields were planted to single species in one year, resulting in large even-aged stands over much of the Site. Approximately fifty percent of the loblolly pine and all of the slash pine are now growing on sites marginally suited for them and better suited for longleaf pine. Because longleaf and loblolly pine are shade-intolerant, even-aged cuts are more effective in providing the forest openings required for regeneration.

In addition, SRFS would use even-aged harvesting, limiting cuts to 100 acres or less in the pine compartments and 40 acres or less in the hardwood areas. SRFS would also reduce its integrated RCW habitat enhancement activities and timber management.

Fish and Wildlife Management Under the High-Intensity Management alternative, SRFS would reduce its RCW enhancement activities. The protection of existing RCW colonies would continue. Southern bald eagle and wood stork activities would continue as in the Proposed Action. Ongoing hunts for white-tailed deer and feral hogs would continue, as would turkey and small game hunting and fishing in the Crackerneck Wildlife Management Area of the SRS. There would be no variation between the High-Intensity Management alternative and the Proposed Action for the shortnose sturgeon or other sensitive species.

Secondary Road Management Under this alternative, secondary road management activities would be similar in scope to those for the Proposed Action for reconstruction and maintenance work. New road construction, however, would exceed 3 miles per year.

The elements of the NRMP not discussed above provide a base level of natural resource management activities that do not vary measurably between the High-Intensity Management alternative and the Proposed Action.

3.3.2 Low-Intensity Management

The basis for the Low-Intensity Management alternative is the original Low-Intensity alternative; it defines a large, passively managed natural area. This alternative would limit principal management activities to supporting site security, safety, and research, along with activities to ensure compliance with state and Federal natural resource management requirements.

Timber Management Under this alternative, SRFS would limit timber harvesting activities to salvage operations (e.g., insect and fire-damaged timber), followed by natural regeneration.

Fish and Wildlife Management Under the Low-Intensity Management alternative, active endangered species management would cease due to reduction of expenditures and scope of management activities, including that for the RCW. SRFS would not discourage hardwoods from encroaching on RCW habitat areas.

Secondary Road Management SRFS would maintain the existing network of secondary roads under the Low-Intensity Management alternative to facilitate access to all site areas for security, research, deer hunts, and fire protection activities. Under this alternative, secondary road management activities would be limited to maintenance and reconstruction of existing road systems; SRFS would not construct new roads unless it needed them for timber salvage operations or to support the general site mission.

Wildland Fire Management Suppression and presuppression activities would cease under the Low-Intensity Management alternative. SRFS would practice active fire suppression only in the case of danger to SRS property or personnel. In addition, SRFS would allow natural fires that did not threaten onsite facilities or adjacent private land to exhaust themselves. SRFS would also create and maintain larger, cleared buffer zones around SRS facilities. This program element would leave the regeneration of forests lost due to wildfire to natural succession.

The NRMP elements not discussed above provide a mechanism for compliance with natural resource management requirements. These elements do not vary measurably between alternatives and are essentially the same as those for the Proposed Action.

Table 1. Comparison of the Proposed Action and the High and Low Intensity Management Alternatives

	Proposed Action No Action Alternative	High Intensity Management Alternative	Low Intensity Management Alternative
Timber Management	• Manage the timber resources on 158,000 acres; harvest 1800 acres annually of which 1500 acres would be conversion of slash and loblolly pine to loblolly and longleaf pine • Rotation lengths: 100 year - bottomland hardwood upland hardwood mixed pine hardwood 50 year (Area 1) - longleaf pine loblolly pine 120 year (Area 2) - longleaf pine 80 year (Area 2) - loblolly pine	• Harvest 2700 acres annually • Rotation lengths: 80 year - bottomland hardwood upland hardwood mixed pine 50 year (Area 1) - longleaf pine loblolly pine 80 year (Area 2) - longleaf pine 70 year (Area 2) - loblolly pine	• Limit timber harvesting to salvage operations
Fish and Wildlife Management	• Restoration and management of native wildlife and plants, Carolina bays, longleaf/wiregrass community • Development of wildlife and plant viewing areas for SRS employees • Sitewide public hunts for white-tailed deer and feral hogs; public hunts for small game, big game, and fishing at Crackerneck Wildlife Management Area	• Similar to Proposed Action except RCW management would be reduced to that practiced prior to 1991 and would entail primarily the protection and management of existing colonies	• All active wildlife management including endangered species management except research and white-tailed deer and feral hog hunts would cease • Public hunting on Crackerneck Wildlife Management Area would continue
Soils, Water, and Air Resources Management	• Program emphasizes the control of water and impacts related to soil movement • SRFS/SCS work closely with facility operations to address soils, water, and air issues	• Same as Proposed Action	• Same as Proposed Action
Visual Resources and Wellness Facilities Management	• Develop walking and jogging trails • Maintain visual appeal of SRS forest resources	• Same as Proposed Action	• Same as Proposed Action
Cultural and Archaeological Resources Management	• Protect cultural and archaeological resources of SRS • Determine potential impacts from proposed site activities	• Same as Proposed Action	• Same as Proposed Action

(Continued) Table 1. Comparison of the Proposed Action and the High and Low Intensity Management Alternatives

	Proposed Action No Action Alternative	High Intensity Management Alternative	Low Intensity Management Alternative
Secondary Road Management	• Maintain 1800 miles of secondary roads • Build approximately 2 miles of new roads annually • Reconstruct approximately 5 miles of roads annually	• Similar to Proposed Action except new secondary road construction would exceed 3 miles annually	• Existing network of secondary roads would be maintained to facilitate access for security, research, deer hunts, and fire protection • New construction of secondary roads for timber harvesting would be limited to salvage operations
Wildland Fire Management	• Prevention, presuppression, detection, suppression, and prescribed burns	• Same as Proposed Action	• Suppression and presuppression activities would cease except where property or personnel were endangered • Larger cleared buffer zones around facilities would be required as fire breaks
Boundary Management	• Inspect and maintain 125-mile SRS boundary	• Same as Proposed Action	• Same as Proposed Action
Public Affairs	• Plan and direct natural resources public affairs program	• Same as Proposed Action	• Same as Proposed Action
Research Related Activities	• Active in direct research efforts or research support	• Same as Proposed Action	• Same as Proposed Action

3.3.3 No Action

The No Action alternative is the same as the Proposed Action described in Section 3.2 of this EA. Table 1 provides a comparison of the Proposed Action and the High-Intensity and Low-Intensity Alternatives.

4.0 AFFECTED ENVIRONMENT

The *Final Environmental Impact Statement, Continued Operation of K-, L-, and P- Reactors* (DOE, 1990) discusses the SRS and its environs. The following is a summary of the current environment in Management Areas 1 and 2.

At present, more than 91 percent of the SRS is forested (Dukes, 1984). With the exception of the production and support areas, natural succession and an extensive forest management program conducted by the SRFS have converted most open fields to forest land. Table 2 and Figure 3 list the type and areal extent of SRS forest cover (USDA, 1991b) by management area.

A variety of vascular plant communities occur in the upland areas of the site (Dukes, 1984). Dry, sandy areas are dominated by longleaf pine and several species of oak (*Quercus* sp.). The more fertile uplands are dominated by oak, hickory (*Carya* sp.), and loblolly pine. Pine plantations established since 1951 include slash, loblolly, and longleaf pine (Workman and McLeod, 1990).

SRS has five major streams. Each has floodplains characterized by bottomland hardwood forests or scrub-shrub wetlands in varying stages of succession. Dominant species include maple (*Acer* sp.), bald cypress (*Taxodium distichum*), sweetgum (*Liquidambar styraciflua*), and black willow (*Salix nigra*). Bald cypress, water tupelo (*Nyssa aquatica*), red maple (*Acer rubrum*), and sweetgum dominate the Savannah River Swamp and extended wetland areas.

Carolina bays are among the unique features on SRS. They are elliptical wetland depressions scattered throughout the upland areas of the Site. The numerous bays exhibit variable hydrology and a range of plant communities from herbaceous marsh to forested wetland (Schalles et al., 1989; Shields et al., 1982).

Map 1, which is in the map pocket of this EA, shows the areal distribution of SRS forest types and important man-made features.

5.0 ENVIRONMENTAL CONSEQUENCES OF PROPOSED ACTION AND ALTERNATIVES

5.1 Water Resources

5.1.1 Surface Water

The Savannah River forms the western boundary of the SRS. The river receives drainage from five major tributaries on the SRS: Upper Three Runs Creek, Fourmile Branch, Pen Branch, Steel Creek, and Lower Three Runs Creek. These tributaries receive varying types of wastewater discharges from SRS plant processes and sanitary treatment systems, these outfalls are covered by a site-wide National Pollutant Discharge Elimination System (NPDES) permit. Varying levels of radionuclides occur in SRS streams as the result of past facility operations. Near the Site, the river is a South Carolina-designated class FW (Fresh Water) stream, as are all onsite streams (South Carolina State Register, Vol. 16, Issue 4, April 24, 1992).

Table 2. Areal Extent of Dominant Forest Cover Types on SRS[a]

Timber Types	Management Area 1	Management Area 2	Total Acres	Percent of Total
Longleaf pine	7,334	29,738	37,072	20
Loblolly pine	27,696	36,133	63,829	35
Slash pine	18,150	10,725	28,875	16
Mixed pine/hardwood	2,404	3,323	5,727	3
Upland hardwood	2,081	2,753	4,834	3
Bottomland hardwood	10,393	18,599	28,992	16
Savannah River Swamp	1,355	10,793	12,148	7
Total	69,413	112,064	181,477	100

a. Source: USDA, 1991b.

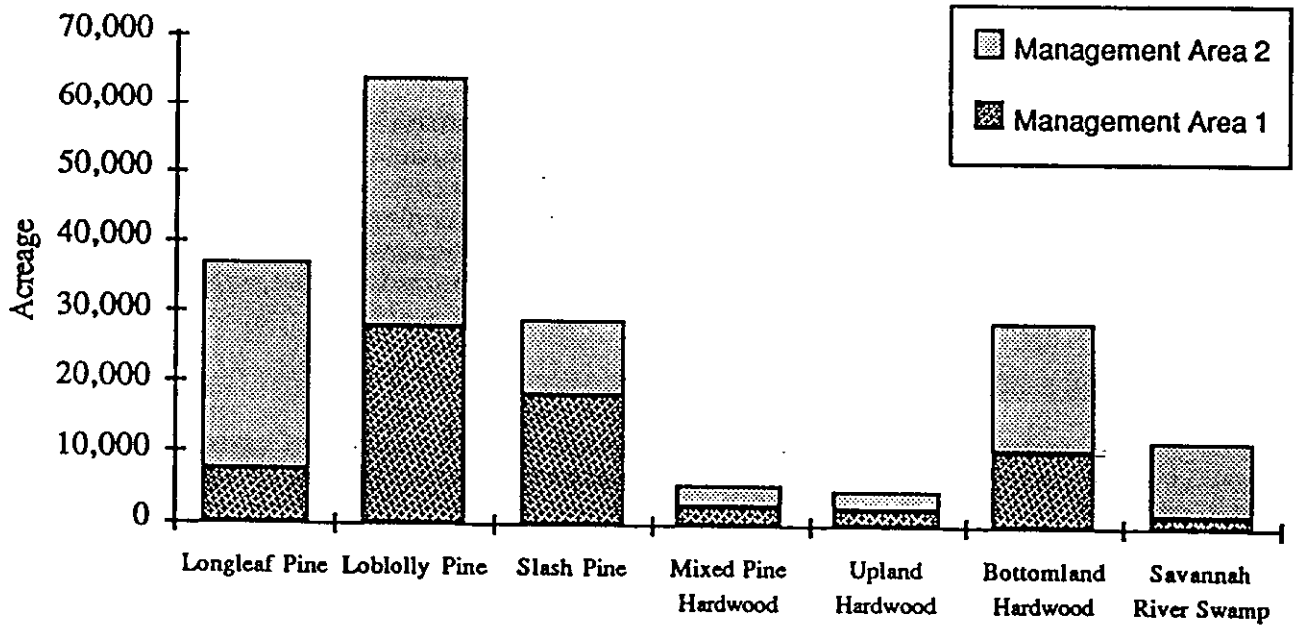

Figure 3. Areal Extent of Dominant Forest Cover Types on SRS

Proposed Action Impacts

Potential effects on the SRS streams from the Proposed Action would include increased ambient temperature and siltation from timber-cutting operations and secondary road construction and maintenance. Logging activities, site preparation, road construction, and boundary management could expose soil. Runoff from exposed soil areas not properly stabilized could affect streams.

South Carolina Land Resources Conservation Commission regulations (Title 48, Chapter 14, 72-300 to 72-316) became effective state-wide on June 26, 1992 and will become effective on Federal facilities, including SRS, on May 27, 1993. These regulations require DOE to submit a storm water management and sediment control plan for review and approval before any activities (other than timber management activities) under the Proposed Action could occur. Land disturbing activities undertaken on forest land for the production and harvesting of timber are exempt from these regulations [Section 72-302A(2)]. Therefore, no plan is required. The SRFS would continue to implement best management practices such as using brush windrows along contours to slow runoff, maintaining streamside and Carolina bay buffers, and maintaining waterbars and culverts following road construction, and the expeditious revegetation of disturbed areas augments the engineering efforts (USDA, 1989a, 1990a, 1990b, 1990c, and 1990d). Other activities of the SRFS (i.e., restoration or reclamation activities) would require a storm water management and sediment control plan. The plan would describe the control measures that DOE would implement to prevent and manage storm water runoff. To minimize and control potential impacts, DOE would develop the plan and use BMP, as mentioned above, during all activities that could produce erosion.

High-Intensity Management Impacts

Under the High-Intensity Management alternative, the increase in timber operations and road construction would provide more potential opportunities to impact surface waters due to increased frequency of activities and the greater area harvested. However, with the use of BMP, such as using brush windrows along contours to slow runoff, maintaining streamside and Carolina bay buffers, and maintaining waterbars and culverts following road construction, and the expeditious revegetation of disturbed areas, such impacts would be minimized (USDA, 1989a, 1990a, 1990b, 1990c, and 1990d).

Low-Intensity Management Impacts

Under the Low-Intensity Management alternative, the passive nature of management activities would result in only occasional potential impacts to surface waters due to infrequent vehicle traffic into natural areas to conduct research or perform salvage operations. BMP in conjunction with salvage operations would include using brush windrows along contours to slow runoff, maintaining streamside and Carolina bay buffers, and maintaining waterbars and culverts following road construction, and the expeditious revegetation of disturbed areas augments the engineering efforts (USDA, 1989a, 1990a, 1990b, 1990c, and 1990d) would render these impacts negligible. There would be no siltation or ambient water temperature impacts from planned timber harvesting.

5.1.2 Groundwater

The *Final Environmental Impact Statement, Continued Operation of K-, L-, and P- Reactors, Savannah River Site, Aiken, South Carolina* (DOE, 1990) contains detailed information on groundwater systems at the SRS and the surrounding region. Due to the nature of the Proposed Action, and the High- and Low-Intensity Management alternatives, DOE does not expect measurable effects to groundwater resources. Activities within the range of alternatives presented in this EA could generate small oil or fuel spills that SRS personnel would clean up and dispose of appropriately before they could penetrate to subsurface waters.

5.2 Floodplains and Wetlands

In accordance with 10 CFR 1022, "Compliance with Floodplain/Wetlands Environmental Review Requirements," DOE-Savannah River prepared the *Floodplain/Wetlands Assessment of Forest Management Activities at The Savannah River Plant* (NUS, 1984). This assessment described base floodplain and wetlands areas and reviewed alternative natural resource management scenarios for those areas. The floodplain/wetlands alternatives reviewed in 1984 bound the alternatives DOE is considering in this EA. The 1984 Floodplain/Wetlands Assessment adequately characterizes the wetland resources of the Savannah River Site. The only quantifiable change in the status of SRS wetlands since 1984 (i.e., the loss of riparian wetlands in the Steel Creek drainage resulting from the creation of L-Lake) is discussed later in this section.

The Floodplain/Wetlands Assessment references the 1984 Timber Management Plan. The current timber management elements of the NRMP propose less harvested acreage than did the 1984 Timber Management Plan. Therefore, the 1984 assessment of floodplain/wetland impacts is applicable to the range of alternatives described in this EA. Since 1984, the only measurable changes in the areal extent of floodplains or wetlands at the SRS have been a loss of 225 acres of bottomland hardwood habitat and an increase of less than 100 acres of shrub wetlands, emergent marsh, and submersed/floating leaved wetlands as a result of the construction of L-Lake (DOE, 1984). Appendix B contains the Floodplain/Wetlands Assessment.

For the Proposed Action and all alternatives, the SRS Wet Area Logging Guides (Appendix B), describe techniques employed by SRFS to further mitigate potential impacts to wetlands from harvesting or salvage activities by requiring contractor compliance with the following provisions:

1. Prevent logging slash from entering stream courses through the use of directional felling.
2. Remove all logging slash inadvertently felled in stream courses within 2 calendar days after notification by SRFS personnel.
3. Prevent skidding across streams except at designated crossings where protective measures are employed.
4. Mark main skid trails on the ground by the sales administrator to mitigate impacts to wetlands.
5. Limit skid trail rutting to a depth of 12 inches or less.
6. Log selected critical areas with winches.
7. Build roads within wetlands to minimum standards with emphasis on adequate culverts, lead-off ditching, and crowning. Roads will be closed following the operation.
8. Monitor skid roads daily to control use and prevent damage to the wetland.
9. Locate log decks on the driest sites available.

All aspects of the Clean Water Act would be complied with and coordination with the Environmental Protection Agency and U.S. Army Corps of Engineers would be made when appropriate.

The amount of bottomland hardwoods projected to be harvested annually (about 200 acres) would be constant for both the Proposed Action and the High-Intensity Management alternative. The impact of such operations would be mitigated through the application of the wet area logging provisions listed above.

5.3 Terrestrial Resources

Proposed Action Impacts

Under the Proposed Action, timber harvesting would alter habitat by creating conditions for the dominance of early natural succession plant species, thereby reducing suitable habitat for wildlife species that prefer mature, older forests [e.g., the eastern fox squirrel (*Sciurus niger*), Carolina chickadee (*Parus carolinensis*), and tufted titmouse (*P. bicolor*)], while improving habitat for early succession species [e.g., the white-tailed deer (*Odocoileus virginianus*), bobwhite quail (*Colinus virginianus*), and yellow-breasted chat (*Icteria virens*)] (Webster et al., 1985; Legrand and Hamel, 1980; Hamel, unpublished).

Species requiring older forests are generally attracted to this habitat for a variety of reasons including the increased number of mature, mast-producing trees and the increased number of dead, dying, and decaying trees, snags, and logs which provide food and nesting cavities in greater abundance than is usually found in a young forest. Species preferring early successional forests are attracted by the abundance of thick low-growing vines, shrubs, and herbaceous plant species that provide an abundance of browse and nesting and escape cover. Reforestation activities through mechanical clearing, herbicide use, and prescribed burns would have similar effects.

Some types of ecological research, such as stream and drift fence sampling, conducted on the SRS would have the potential to affect local wildlife populations through permitted collection, oversampling, or accidental death during handling.

Natural resource management under the Proposed Action would use a number of techniques to minimize the potential effects described above. SRFS would limit even-aged timber harvests to 40 acres or less for hardwoods and 100 acres or less for pine. Harvested areas would have irregular borders, which would include hardwoods, old hedgerows, and homesites that maintain valuable wildlife habitat. Buffers would occur along all watercourses and Carolina bays. SRFS would implement BMP to control storm water runoff. In addition, SRFS would use herbicides according to prescribed instructions.

Research scientists would monitor collection devices regularly during sampling periods and would remove them or close them securely at other times to avoid accidental animal deaths (W. D. McCort, SREL, 1991). The NRMP addresses uncoordinated research efforts that have resulted in oversampling and provides corrective actions for this issue.

The Proposed Action would not shift the balance of species from those preferring mature forest ecosystems to those preferring early successional ecosystems.

High-Intensity Management Impacts

Under the High-Intensity Management alternative, the alteration of natural plant succession would encompass a greater area of the SRS due to increased timber harvesting activity. Habitat would be altered by creating conditions for the dominance of early natural succession plant species, thereby reducing suitable habitat for wildlife species that prefer mature, older forests [e.g., the eastern fox squirrel (*Sciurus niger*), Carolina chickadee (*Parus carolinensis*), and tufted titmouse (*P. bicolor*)]. Habitat for early succession species [e.g., the white-tailed deer (*Odocoileus virginianus*), bobwhite quail (*Colinus virginianus*), and yellow-breasted chat (*Icteria virens*)] would be improved (Webster et al., 1985; Legrand and Hamel, 1980; Hamel, unpublished).

This alternative would result in increases in early successional habitat derived from increased timber harvesting acreage. Consequently, there would also be increases in those animal species preferring early successional habitat.

Low-Intensity Management Impacts

Under the Low-Intensity Management alternative, passive natural resource management activities would result in natural plant succession throughout most of the Site. Habitat manipulation would result from such natural phenomena as wildland fire, tornados, and hurricanes. The reduction of timber harvesting activities to salvage operations would maintain older aged forest habitat thereby creating conditions for the dominance of late natural succession plant species and increasing suitable habitat for wildlife species that prefer mature, older forests [e.g., the eastern fox squirrel (*Sciurus niger*), Carolina chickadee (*Parus carolinensis*), and tufted titmouse (*P. bicolor*)], while reducing habitat for early succession species [e.g., the white-tailed deer (*Odocoileus virginianus*), bobwhite quail (*Colinus virginianus*), and yellow-breasted chat (*Icteria virens*)] (Webster et al., 1985; Legrand and Hamel, 1980; Hamel, unpublished).

5.4 Air and Noise

5.4.1 Air Quality

The *Air Quality, Cooling Tower, and Noise Impact Analysis in Support of the New Production Reactor Environmental Impact Statement* (NUS, 1991) documents SRS baseline air quality conditions. Air quality monitoring at several SRS locations determines total suspended particulates, sulfur dioxide, nitrogen dioxide, and ozone (WSRC, 1989). South Carolina and Georgia perform additional monitoring of ambient air near SRS.

Proposed Action Impacts

Under the Proposed Action, potential air quality impacts would derive from prescribed burns and fugitive dust. Normally, prescribed burns would be a management tool to reduce forest fuel and, subsequently, the chance for wildfire. Small particles of ash and gases such as carbon monoxide, carbon dioxide, hydrocarbons, and nitrogen oxides would comprise the smoke. The amount of gases and particulates in the smoke would depend on the amount and type of fuel consumed, the fuel moisture content, and the burn rate. The use of safe burning techniques in combination with burning only on days when weather conditions would support full combustion and efficient smoke dispersion would minimize regional air quality degradation and visibility impacts (USDA, 1989a; South Carolina Forestry Commission, undated). DOE would continue to follow South Carolina Department of Health and Environmental Control Air Pollution Regulation 62.2. Potential fugitive dust impacts arising from timbering operations, boundary management, and road construction/maintenance activities would be negligible.

High-Intensity Management Impacts

Under the High-Intensity Management alternative, the acreage undergoing prescribed burns would not be measurably greater than that under the Proposed Action. Potential fugitive dust impacts would increase proportionally due to increased secondary road construction and timber harvesting. However, the overall impacts would be negligible outside the immediate area of the activity.

Low-Intensity Management Impacts

Under the Low-Intensity Management alternative, due to the passive nature of the described activities, potential air quality impacts would be unmeasurable, with the exception of potential impacts from wildland fires that would be allowed to extinguish themselves. All wildland fires would be closely monitored and controlled in the event that they threatened a facility or surrounding private land.

5.4.2 Noise

Sound-Level Characterization of the Savannah River Site (NUS, 1990) documents SRS baseline noise conditions.

Proposed Action Impacts

Noise impacts from the Proposed Action would result from the use of heavy machinery in timbering operations, boundary management, and road construction and maintenance activities. These impacts would be transient and temporary.

High-Intensity Management Impacts

Under the High-Intensity Management alternative, noise impacts would be more frequent due to increased timber harvesting and road construction, but still transient and temporary.

Low-Intensity Management Impacts

Under the Low-Intensity Management alternative, noise impacts would be negligible.

5.5 Threatened and Endangered Species

Threatened, Endangered, and Candidate Plant and Animal Species of the Savannah River Site (HALLIBURTON NUS, 1992b) describes threatened, endangered (T&E), and candidate floral and faunal species known to occur or that might occur on the SRS. These include 5 species of bird, 1 species of mammal, 5 species of amphibians, 5 species of reptiles, 1 species of fish, 2 species of invertebrates, and 19 species of plants.

Researchers have found one federally listed endangered plant species, smooth coneflower, on the Site, several federally listed Category 2 species, and several state listed species (Knox and Sharitz, 1990). The following federally listed endangered animals are known to occur on the SRS or in the Savannah River adjacent to the Site: the southern bald eagle, the RCW, the wood stork, and the shortnose sturgeon (HALLIBURTON NUS, 1992b). The American alligator has been down-listed to "threatened by similarity of appearance." SRS contains no designated critical habitat.

Proposed Action Impacts

Under the Proposed Action, increased timber rotation length and the conversion of all slash and some loblolly pine to longleaf pine will have a positive effect on RCW populations. Other activities under the Proposed Action would include the continued maintenance of older age class pine; the construction of three to four artificial cavities per 10 acres of habitat within 3 miles of active colonies; the placement of cavity restrictors; habitat improvement; mid-story control; prescribed burning; the translocation of RCW; the avoidance of fragmentation of nesting habitat; and related research efforts. At present, there are seven times more RCWs on SRS than there were in 1985 when coordinated NRMP activities began. In addition, the Proposed Action would continue research and enhancement activities on other federally listed species. For example, the SRS wood stork management program, which initially resulted in the creation of foraging ponds on National Audubon Society property northwest of the Site, now focuses on research on wood stork feeding ecology and habitat requirements. This research will enable DOE and cooperating organizations to develop management plans based on sound, site-specific data. SRFS and SREL, at the request of DOE, are also developing a management plan for the SRS population of the smooth coneflower, a species listed as endangered in October 1992. The coneflower management plan is intended to foster awareness of this species among SRS land managers and establish a

strategy for increasing its population size. These activities would have benefits in the form of establishing and maintaining viable populations.

Activities under the Proposed Action with the potential to produce adverse or beneficial effects on T&E species would require consultation with the FWS. Furthermore, not only is T&E enhancement an essential part of the NRMP, but any proposed activities are subject to the SRS sitewide permitting system to avoid any negative impacts. Based on permit reviews, any potential impact to T&E populations would result in modification of the proposed activity in accordance with the *Wildlife Management Handbook* (USDA, 1985) and the 1991 FWS biological opinion (USDA, 1991a) in the case of RCW.

High-Intensity Management Impacts

Under the High-Intensity Management alternative, RCW management would continue under the biological opinion issued in 1986 by FWS. This would allow increased timber harvesting, producing a loss of older timber that could support RCW colonies and foraging habitat. This lost habitat and reduced potential for population expansion could isolate the population, resulting in the eventual genetic erosion of the population due to inbreeding depression. This alternative would not produce habitat changes affecting the southern bald eagle, wood stork, shortnose sturgeon, or smooth coneflower.

Low-Intensity Management Impacts

Under the Low-Intensity Management alternative, passive forest management would result in the possible encroachment of hardwoods into the RCW nesting and foraging areas. With the increasing decline of mature pines, RCW colonies would decrease and possibly disappear completely. This alternative would not produce habitat changes affecting the southern bald eagle, wood stork, or shortnose sturgeon.

5.6 Cultural Resources

A Programmatic Memorandum of Agreement (PMOA) among DOE, the South Carolina State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation is the instrument for the management of cultural resources at SRS. DOE uses the PMOA to identify cultural resources, assess them in terms of their eligibility for the National Register of Historic Places, and develop mitigation plans for affected resources in consultation with SHPO (SRARP, 1989).

Under the Proposed Action and the other alternatives, DOE would direct the performance of cultural resource reviews before NRMP activities began in a specific area. If these reviews indicated the presence of significant archaeological sites, DOE would direct the mitigation of impacts by either avoidance or data recovery.

5.7 Socioeconomics

The socioeconomic information in this section is derived from the *Socioeconomic Characteristics of Selected Counties and Communities Adjacent to the Savannah River Site* (HALLIBURTON NUS, 1992a). The Region of Influence is the area in which socioeconomic impacts could reasonably be expected to occur. The SRS Region of Influence is a six-county area in Georgia and South Carolina (Figure 4). More than 85 percent of the approximately 22,000 SRS workers reside in the Region of Influence. Onsite employers most directly involved with NRMP activities are the SRFS, SREL, South Carolina Wildlife and Marine Resources Department, and SCS; they employ a total of about 240 people, or 1 percent of the total SRS workforce.

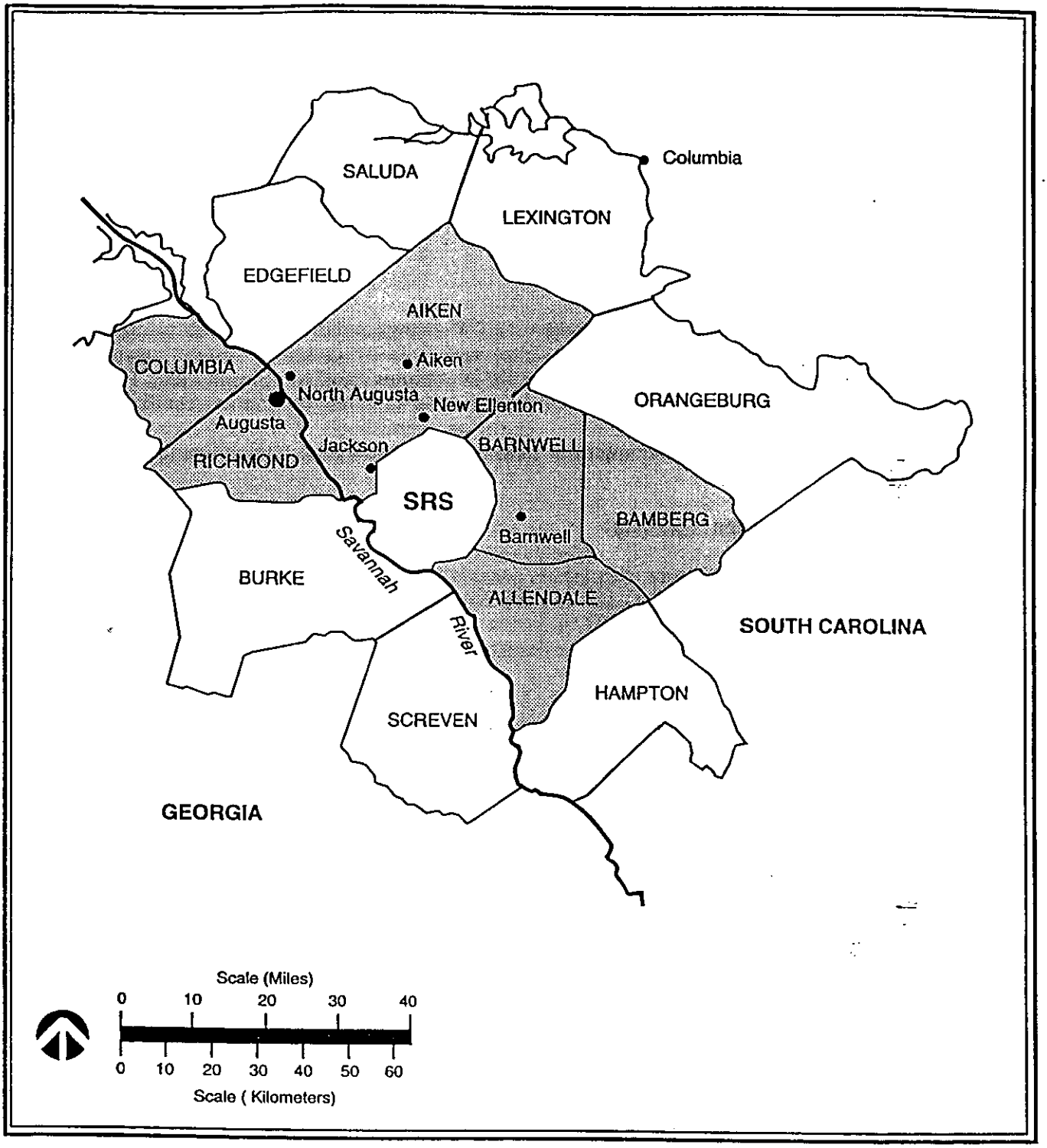

Figure 4. SRS Area of Influence

Under the Proposed Action, an additional 100 full-time employees would perform timber management activities on the SRS (USDA, 1987). Under the High-Intensity Management alternative, timber management jobs would not increase measurably above that of the Proposed Action. Under the Low-Intensity Management alternative, all timber management jobs could be lost. In 1987, the USDA estimated that an additional 50 jobs in nearby saw mills are related to SRS timber harvesting. Under the High-Intensity Management alternative, the number of saw mill jobs would not increase measurably. Under the Low-Intensity Management alternative, however, all 50 jobs could be lost, along with the 100 onsite jobs. Given the Region of Influence total of 1,621 forestry sector jobs in 1987, these lost jobs would represent as much as a 9.25 percent reduction in employment; 1989 data shows a 14 percent decrease in forestry sector jobs since 1987 in the Region of Influence.

Under the Proposed Action, revenues from timber harvesting would be less than $2.0 million per year. Under the High-Intensity Management alternative, revenues would exceed $2.0 million (WSRC, 1989). Under the Low-Intensity Management alternative, revenues would be unplanned and negligible. Timber revenues for the Region of Influence are approximately $40 million per year (Georgia Forestry Commission, 1989; South Carolina Forestry Commission, 1990).

Under the Proposed Action, DOE anticipates that 3,100 persons would visit the Site from early November through mid-December (WSRC, 1992b) to participate in annual deer hunts; 700 of these individuals would be from outside the Region of Influence and could spend the night. Based on a 1987-1988 survey, visitors to Aiken County spend about $75 per day (SCDPRT, 1990). Because tourism in the area is a multi-million-dollar industry, the SRS deer hunters would have negligible effects. Similarly, there would be little impact to the availability of overnight lodging. There would be no measurable changes under the High- or Low-Intensity Management alternatives.

5.8 Hazardous Materials

Vehicle movements during timber operations, boundary management, and road construction and maintenance could generate small oil or fuel spills that would be reported to the SRS Spill Coordinator. SRS personnel would then clean up the spill and dispose of the contaminant appropriately before it could penetrate to subsurface waters. USDA controls the use of herbicides, which it applies in accordance with prescribed instructions. Vegetation management, including herbicide use and site preparation techniques have been adopted and are described in the *Final Environmental Impact Statement: Vegetation Management for the Southeastern Coastal Plain/Piedmont* (USDA, 1989a).

The potential risk of minor spills would be greatest under the High-Intensity Management alternative and would decline for the Proposed Action and the Low-Intensity Management alternative.

5.9 Cumulative Impacts

The *Final Environmental Impact Statement, Continued Operation of K-, L-, and P-Reactors* (DOE, 1990) analyzed the cumulative impacts associated with new and planned facilities on the SRS. The Proposed Action and the High-Intensity Management alternative, in conjunction with other onsite activities, would produce cumulative effects related to transient siltation in streams and wetland areas. The magnitude of the impacts would vary depending on upstream flows and rainfall intensities at the time activities are ongoing. Erosion control measures (e.g.water bars in roads and adherence to the Wet Area Logging Guides) would mitigate the potential impacts.

Cumulative impacts to terrestrial resources would occur by altering habitat. Timber harvesting would alter habitat by creating conditions for the dominance of early natural succession plant

species, thereby reducing suitable habitat for wildlife species that prefer mature, older forests [e.g., the eastern fox squirrel (*Sciurus niger*), Carolina chickadee (*Parus carolinensis*), and tufted titmouse (*P. bicolor*)], while improving habitat for early succession species [e.g., the white-tailed deer (*Odocoileus virginianus*), bobwhite quail (*Colinus virginianus*), and yellow-breasted chat (*Icteria virens*)] (Webster et al., 1985; Legrand and Hamel, 1980; Hamel, unpublished). SRFS would harvest approximately 1800 acres annually or 1% of SRS forested land. Natural resource management under the Proposed Action and the high intensity alternative would use a number of techniques to minimize the cumulative impacts to wildlife of actions described above. SRFS would limit even-aged timber harvests to 40 acres or less for hardwoods and 100 acres or less for pine. Harvested areas would have irregular borders and would include hardwoods, old hedgerows, and homesites that maintain valuable wildlife habitat. Buffers would occur along all watercourses and Carolina bays. SRFS would implement BMP to control storm water runoff.

Cumulative air quality impacts would be transient, with the magnitude of the impacts varying due to local meteorological conditions and the nature of additional activities in the areas. Impacts from NRMP activities would be minimized by adhering to the restrictions discussed in Sections 5.4.1 of this EA.

Under the Low-Intensity Management alternative, 50 offsite and 100 onsite jobs would potentially be lost (USDA, 1987). Given the Region of Influence total of 1,621 forestry sector jobs in 1987 (HALLIBURTON NUS, 1992a), these lost jobs would represent as much as a 9.25-percent reduction in employment; 1989 data show a 14-percent decrease in forestry sector jobs since 1987 in the six-county SRS Region of Influence (HALLIBURTON NUS, 1992a).

6.0 LIST OF ORGANIZATIONS CONSULTED

U.S. Department of Energy Savannah River Operations Office

U.S. Department of Agriculture, Forest Service, Savannah River Forest Station

U.S. Department of Agriculture, Forest Service, Region 8, Atlanta, Georgia

Savannah River Ecology Laboratory

University of South Carolina, Columbia, South Carolina, Institute of Archaeology and Anthropology; SRARP

Halliburton NUS Corporation, Aiken, South Carolina

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Natural Resources Management Plan

Strategic Guidance

for the
Savannah River Site's
Natural Resources Programs

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Approved
February 15, 1991

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1.0 AUTHORITY, SCOPE AND RELATIONSHIPS

1.1 *AUTHORITY AND DIRECTION FOR THE NRMP*

The Natural Resources Management Plan (NRMP) furthers the Mission of the Savannah River Site (SRS) by helping to ensure environmental protection and responsible stewardship of the resources of the SRS. The NRMP encourages all SRS organizations involved in natural resource management to take an active role in environmental protection at SRS and is therefore consistent with the SRS Vision and Principles.

Authority and direction for land use planning and management of natural resources at the Savannah River Site is derived from DOE Order 4300.1B, "Real Property and Site Development Planning." This Order is augmented by Supplemental SR Correspondence which defines local responsibilities and procedures for planning the development and utilization of the SRS site and facilities. Supplemental SR Correspondence sets out the following responsibilities which have a direct bearing on the NRMP:

- Assigns responsibility for direction of the timber management program, preparation of a NRMP, and establishment of a fish and wildlife management policy to the Director of the Environmental Division.

- Establishes the SR Land Use Committee (SRLUC), and assigns the SRLUC responsibility for:

  - approval or disapproval of all general site land use activities as established under Supplemental SR Correspondence, "Site Use Coordination";

  - approval of the NRMP;

  - recommendation of SR land use policies to the Manager, SR.

- Specific operational methods will be addressed by developing various program operational plans called for in the NRMP. Affected and involved contractors and operational departments will be asked for input in planning and development and will be given the opportunity to review and comment on draft operational plans as they are developed. Memoranda of Understanding (approved by DOE-SR) will be written as necessary to more clearly define areas of program responsibilities.

Direction for preparation and content of the NRMP also comes from the Natural Resources Management Strategy Changes memorandum, prepared by the SRLUC and approved by the Manager, SR, in October 1988. This action memo directs that the NRMP include an increased role for the Savannah River Forest Station (SRFS) in:

- Secondary road management
- Boundary maintenance
- Forest fire suppression
- Animal management programs
- New research in forest management

This is the first such NRMP and this plan covers many complex and involved issues. Within one year of the approval date, the need to review the NRMP will be examined by DOE/SR, and revised when necessary.

As used in this Plan, DOE is defined as the Savannah River Operations Office, the Savannah River Special Projects Office, and the New Production Reactor Field Project Management Office. Each of these offices has line, support, and overview organizations and functions. As used in this plan, Divisions (e.g., Environmental Division, Engineering, Construction and Facilities Division) are understood to act as representatives of DOE.

Westinghouse Savannah River Company (WSRC), as used in this Plan, includes the Savannah River Laboratory which also has line and overview organizations and functions.

1.2 *SCOPE OF THE NRMP*

The NRMP provides the strategy and assigns responsibilities for natural resources management activities on the General Site within the framework of land use assigned through the Site Use Coordination and Approval System. The NRMP serves as the umbrella document for management operation plans to be prepared under each management and research program described herein. The NRMP provides policy direction for the management operation plans. The NRMP fulfills the responsibility assigned to the Director of the Environmental Division in Supplemental SR Correspondence to prepare a NRMP and the charge from the SRLUC to prepare a NRMP incorporating an increased role for the SRFS. Supplemental SR Correspondence defines responsibilities of DOE-SR officials and establishes local procedures for site use coordination and approval. This Supplemental SR Correspondence applies to all SR organization elements and contractors performing work for SR which may affect land, air, or surface water resources on the General Site. Thus, authority for assigning uses of land rests with the SRLUC through this Supplemental SR Correspondence.

1.3 *RELATIONSHIPS TO ORDERS AND OTHER PLANS*

The NRMP is consistent with the Secretary of Energy's 10-point initiative to move the Department aggressively toward full accountability in the areas of environment, safety, and health. Specifically, the NRMP furthers the first initiative (resetting of priorities) by providing a comprehensive plan for management of the natural resources of SRS and establishing a mechanism (the Natural Resources Coordinating Committee) to provide DOE management with expert advice on natural resources issues.

The requirements for preparation of the NRMP and the Site Development and Facility Utilization Plan (SD&FUP) are derived from DOE Order 4300.1B. Supplemental SR Correspondence supplements this Order as described in Section 1.1. The NRMP and the SD&FUP are therefore related, but the NRMP augments the SD&FUP rather than flows from it. The SD&FUP, while providing extensive information on site natural resources and the land use approval process, is primarily concerned with facility planning.

The Strategic Environmental Plan (SEP) prepared by the Operating Contractor is a similar augmentation of the SD&FUP that addresses a specific mission - environmental compliance. The NRMP has been prepared as a companion document to the SEP. Where they overlap, the policies and strategies in both plans will be consistent. Similarly, NRMP management operation plans will be companions of the Operating Contractor's Environmental Implementation Plan. Management activities carried out under the guidance provided by the NRMP will be consistent with the requirements of DOE Order 5400.1, General Environmental Protection.

As described in Section 1.2, the NRMP provides strategy and assigns responsibility for natural resources management. Assignment of land to specific uses is carried out under Supplemental SR Correspondence separate from the NRMP.

The Savannah River Land Use Plan was prepared in 1975 under the authority of the Savannah River Manual, Chapter 5301. This Chapter has been cancelled and superseded by Supplemental SR Correspondence, which restates the land use goals described in the Land Use Plan. Therefore, the functions of the Land Use Plan are carried out under the Site Use Coordination and Approval system..

Existing operation plans such as for timber management and boundary management will become the basis for the operation plans required by the NRMP. They will also continue to guide management activities until Operation plans are prepared under the NRMP and approved by DOE-SR. Table 1 lists authority and direction, responsibility, plan, policy or procedure for the NMRP.

Table 1. Authority, Direction, Responsibility and Plan, Policy or Procedure for the Natural Resources Management Plan.

Authority and Direction	*Responsibility (SR)*	*Plan, Policy or Procedure*
DOE Order 4300.1B Real Property and Site Development Planning	**Manager, SR** - Manage real property and the general site. - Develop site development plan. - Develop forest management program - Develop soil, water, and plant conservation plan. - Manage National Environmental Research Park program.	
SR Correspondence - Real Property and Site Development Planning	**Manager, SR** - Approve Site Development Plan	Site Development and Facility Utilization Plan (SD&FUP)
	Assistant Manager, SR - Review, comment, and concur in real property and site development plan actions.	SD&FUP
	Director, Engineering, Construction and Facilities (EC&F) Division - Manage real property. - Manage all archaeological and cultural resources	Archaeological Resource Protection Act, National Historic Preservation Act, 36 CFR 800, and other Federal and State laws and regulations
	Director, EC&F Division, with assistance, review, and concurrence of SR Land Use Committee - Establish goals and assumptions for site development plan.	SD&FUP

Table 1. Authority, Direction, Responsibility and Plan, Policy or Procedure for the Natural Resources Management Plan (continued).

Authority and Direction	*Responsibility (SR)*	*Plan, Policy or Procedure*
Supplemental SR Correspondence - Real Property and Site Development Planning	**SR Land Use Committee** - Approve or disapprove all general site land use activities as established under Supplemental SR Correspondence.	Site Use Coordination and Approval
	- Support the Director, EC&F Division, in the site development planning process.	SD&FUP
	- Recommend SRS land use policies to the Manager, SR. - Approve the NRMP.	NRMP
	Director, Environmental Division - Direct the forest management program.	Natural Resources Management Operation Plans
	- Prepare a Natural Resources Management Plan.	NRMP
	- Establish the policy for fish and wildlife management.	Fish and Wildlife Management Policy for the SRS
	- Manage the National Environmental Research Park Program.	

Table 1. Authority, Direction, Responsibility and Plan, Policy or Procedure for the Natural Resources Management Plan (continued).

Authority and Direction	*Responsibility (SR)*	*Plan, Policy, or Procedure*
	Director, Environmental Division - Contract actions related to the SRS forest management program. - Manage all hunting and fishing programs involving the public.	Natural Resources Management Operation Plans
	Director, Environmental Division - Ensure cooperation with state and Federal wildlife conservation agencies	
Supplemental SR Correspondence - Site Use Coordination Approval	**SR Land Use Committee** - Approve or disapprove all general site land use activities.	Site Use Coordination and Approval
	Coordinating Land Users - Familiarize themselves with the goals and overall plan for Land Use on the SRS and tailor their plans accordingly.	

Table 1. Authority, Direction, Responsibility and Plan, Policy or Procedure for the Natural Resources Management Plan (continued).

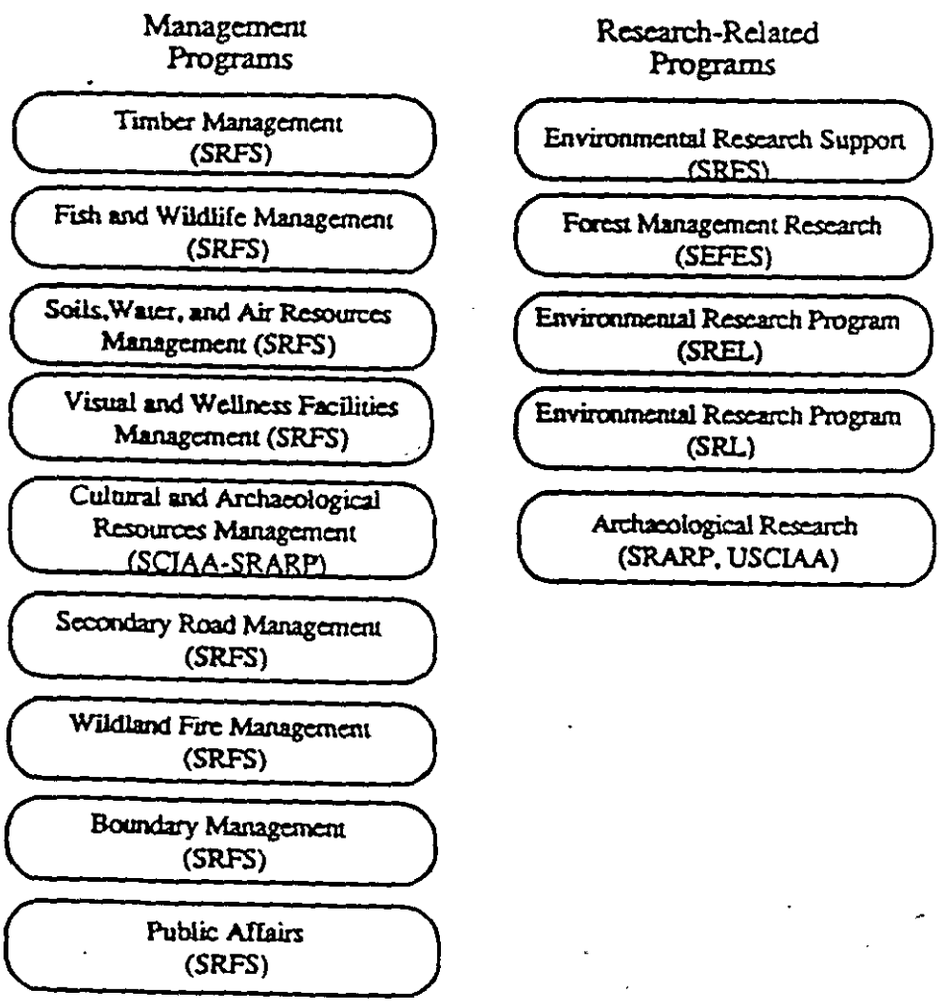
Authority and Direction	*Responsibility (SR)*	*Plan, Policy, or Procedure*
	- Discuss informally proposed uses of land with the SR functionally responsible division, other interested parties, and the Site Coordinator and, when appropriate, the SRLUC prior to submitting formal requests whenever there is a known probability the proposed use will conflict with other uses or planned uses. **Site Coordinator** - Review all requests for land use. - Approve land use requests based on comments and concurrence of others or refer action to the SR Land Use Committee for recommendations. - Refer to SR Land Use Committee for resolution if conflicts between users arise which the site coordinator is unable to resolve. - Coordinate proposals for change in land use goals and the Land Use Plan. - Make recommendations to the SRLUC for action.	

2.0 RESPONSIBILITIES AND COORDINATION

2.1 *PROGRAM RESPONSIBILITIES*

The DOE-SR Manager, through the SR Land Use Committee, has the overall responsibility for the NRMP. The plan will be implemented through contracts or agreements with non-DOE organizations to operate the several independent programs covered by the NRMP. Each program will have a particular DOE-SR division designated as administrator. The multifunctional nature of the NRMP results in administrative divisions from more than one SR Assistant Manager area. Figure 1 lists the Natural Resources Management and Research-Related Programs with the organization responsible for the program.

Figure 1. Natural Resources Management and Research Programs.



2.2 *NATURAL RESOURCES COORDINATING COMMITTEE*

A Natural Resources Coordinating Committee (NRCC) is established to enhance communications among SRS organizations, and to provide information and recommendations to the DOE/SR. Membership of the NRCC (an intrasite group) will consist of one representative from each of the following:

Environment, Safety, Health & Quality Assurance Division, Westinghouse Savannah River Company (WSRC); Savannah River Laboratory (SRL), WSRC; Engineering and Projects Division, WSRC; Savannah River Forest Station (SRFS); Savannah River Ecology Laboratory (SREL); Savannah River Archaeological Research Program (SRARP); SC Wildlife and Marine Resources Department (SCWMRD); Wackenhut Services, Inc. (WSI); Soil Conservation Service (SCS), Southeastern Forest Experiment Station (SEFES) (onsite personnel), and DOE-SR Environmental Division (ED).

A representative of the SR Land Use Committee Site-Use Coordinator shall attend meetings as an observer to provide an additional informational link to SR.

The NRCC will meet quarterly under the chairmanship of the DOE/SR-ED representative to exchange information and familiarize themselves with natural resource management, research, and policy issues and to provide a forum for the coordination of research and management issues (for example, a stream management policy). The DOE-ED representative has been designated to perform as chairman because of ED's overall responsibility for, and familiarity with natural resources management issues on the Site under the NRMP. The purpose of the Chairman is to coordinate the NRCC activities.

Through the interaction of the NRCC, members will advise the Assistant Manager for Environment, Safety, and Security on natural resource management issues.

Coordinating Land Users retain all perogatives for site use coordination and approval, as that system is in no way altered. Individual Coordinating Land Users will continue to interact with the SR Land Use Committee (SRLUC) as necessary.

The NRCC will provide the Assistant Manager for Environment, Safety, and Security (AMES&S) and the SRLUC with a Charter within 12 months of the approval of the NRMP. The NRCC will also establish operating procedures.

The charter shall be reviewed by the NRCC in conjunction with DOE-SR after a one year period and may be revised based on its working experience.

2.3 *OTHERS*

- Overall program responsibility is with the SR Manager, assisted by the SR Land Use Committee.
- Appropriate SR Divisions oversee program components as identified in Section 4.0.
- Program managers are fully responsible for compliance with applicable rules.

3.0 NRMP POLICY, GOALS, OBJECTIVES AND ASSUMPTIONS

3.1 *POLICY AND GOALS*

The overriding policy for SRS natural resources, recognizing that it is a support mission of DOE-SR, will be:

> Consistent with the Primary Mission of the Savannah River Site, the natural resources of the site will be both protected and utilized under a balanced research and management program that provides benefits to the nation.

Under this policy, the following goals have been defined for the management of SRS natural resources:

- Maintain a vegetated buffer zone around the SRS production facilities.
- Use "best management practices" to implement programs in the absence of specific guidelines.
- Implement activities that alter site conditions only after review by the site use coordination process.
- Conduct all programs in a cost-effective manner which does not compromise the essential quality of the programs.
- Conduct all programs with special attention to the security, health, safety and environment protection guidelines of the SRS.
- Support all programs with appropriate planning, research, technical staff, and resources to ensure that obligations are met.
- Communicate openly with DOE, the Management and Operating Contractor, other contractors and subcontractors on natural resource matters.
- Communicate with federal and state agencies and the public in a manner consistent with DOE policy.

In addition, all natural resources management activities must be carried out in a manner consistent with other SRS policies.

These include the Draft Stream Management Policy - Upper Three Runs (October 26, 1988), the SRS Fish and Wildlife Management Policy (Announcement No. SR-86-35, dated June 18, 1986), the SRS Domestic Animal Policy Action Plan (October 19, 1984), and the SRS Environmental Protection Policy (Announcement No. SR-90-05, dated January 12, 1990). Management practices will remain consistent with these and other SRS policies as they evolve.

3.2 *MANAGEMENT AND RESEARCH OBJECTIVES*

The following objectives detail how the goals described in Section 3.1 will be met.

- Maintain and support a well planned and coordinated program of manipulative and non-manipulative research on environmental and natural resource systems under the charter of the SRS National Environmental Research Park.

- Become the standard for efficiently and compatibly joining industrial production, environmental protection and natural resources management on the same site.

- Provide areas without natural resource activities to serve as controls for the study of managed ecosystems and as possible sites for manipulative research in the future.

- Incorporate, as policy develops and is detailed within the NRMP and the various operating plans, the Presidential policy of "no net wetlands loss."

- Attain viable populations of the endangered species native to the SRS and demonstrate the techniques for maintaining them.

- Establish and demonstrate the techniques for maintaining populations of all species of plants and animals native to the region.

- Effectively manage the fish and wildlife resources of the 310 square miles of protected habitat of the SRS to maintain biological productivity and diversity, including genetic diversity. Such management will be consistent with the prime mission of the Site - the production of nuclear materials for national defense.

- Public access for recreation (except within the Crackerneck Area where hunting is managed by the SCWMRD for DOE) is not permitted. Animals are hunted and trapped only to control safety hazards or excessive property damage. In special cases collections are made for scientific and monitoring studies or for translocation to other sites.

- Maintain a healthy forest that will produce a sustained yield of predominantly sawtimber-sized and other marketable products from both softwood and hardwood species.

- Inventory, research, and protect the cultural and archaeological resources of the SRS.

- Protect the SRS facilities and personnel from such hazards related to natural resources as wildlife and accidents involving wildlife.

- Maintain an identifiable physical SRS boundary that is coordinated with adjacent ownership patterns and land uses.

- Support a progressive employee wellness program making maximum use of developed and dispersed facilities that utilize natural resources.

- Participate regularly in an active, state-of-the-art public information program.

- Host nationally recognized, multi-disciplinary research programs that contribute to the understanding and management of forested ecosystems.

- Use SRS's intra- and interagency cooperative arrangements as patterns for similar ventures at other locations.

- Enable employees of all of SRS's natural resources organizations to become full partners with DOE in maintaining the security, health, safety and environment standards of the site.

- Establish and maintain a consolidated or cross-referenced data base of the current status of the SRS's natural resources and make it available to all site users.

- Utilize a geographic information system compatible with those used by other SRS organizations for the storage of inventory data for the Management Programs listed in Section 4.0 and the Research-Related Programs listed in Section 5.0. This system will be accessible to all Coordinating Land Users.

- Coordinate management programs with research activities through the Site Use Coordination and Approval System.

- Establish and efficiently maintain an adequate, but not excessive, network of secondary roads to serve all site users.

- Provide maximum protection and rehabilitation of the SRS's soil and surface water resources.

- Provide simultaneously for flexibility in locating future facilities and projects and in protecting existing site users.

3.3 *PLANNING ASSUMPTIONS*

The following assumptions established a framework for the natural resources management planning process which led to this strategic plan:

- The primary mission of the SRS will continue into the next century and will require increasing amounts of land.

- If and when the primary mission terminates, most if not all of the SRS will remain in federal ownership, have restricted access, and require management of the residual facilities and natural resources.

- The SRS budget will become more constrained in the future.

- The general public will become increasingly more conscious of SRS operations -- both directly and indirectly through regulatory agencies.

- Natural systems are dynamic, whether or not they are managed. Change due to natural phenomena (such as tornadoes or insect infestations) is constant and will occur.

- Technological improvements and cultural changes may alter the justification for natural resources management programs and their associated costs and benefits.

- The importance of research on managed and un-managed natural systems will increase relative to that of natural resources production.

- The adoption and implementation of natural resources management policies are not limited by existing organizations and agreements. Other organizations are also interested in and capable of managing SRS natural resources program.

- All Coordinating Land Users will obey applicable Federal and state laws and regulations and SRS plans, policies, or objectives.

- The special status of the Crackerneck Area is recognized as an area of game management where limited public hunts are conducted by the SCWMRD.

4.0 MANAGEMENT PROGRAMS

This section provides the objectives, strategies, standards, and coordination necessary to manage the timber, fish and wildlife, soil, water, air, visual and wellness, cultural, and archaeological resources of the SRS, plus the General Site programs involving secondary roads, wildland fires, boundaries, and public affairs.

4.1 *TIMBER MANAGEMENT*

The Forest Manager, SRFS, is charged with planning and directing a timber management program (including the inventory, sale, harvest, reforestation, and silvicultural treatment of commercial forest lands) under the administrative responsibility of the Environmental Division of DOE-SR.

The timber management program supports three general objectives of the NRMP. It is the principal management program which maintains the vegetative buffer around the SRS production facilities. It simultaneously provides the vegetative manipulation that may be necessary to support any other SRS program such as timber removal for facilities expansion, or timber stand alteration to develop habitats for endangered wildlife species. Finally, it seeks to provide for and perpetuate a relatively uniform flow of marketable forest products such as sawtimber, pulpwood, and pine straw.

For the purposes of this and other NRMP programs, that portion of the SRS General Site that has not been withdrawn from any of the routine activities of timber production will be called the commercial forest.

This plan does not preclude the use of forest management practices on lands withdrawn from routine activities of timber production to meet the goals and objectives of other programs (such as environmental research, facilities expansion, or habitat development for endangered species).

Program Objectives

Achievement of the following objectives will satisfy the policy goals for this program:

- Maintain an accurate and accessible inventory of current timber stand conditions including growth and mortality.
- Conduct all activities, except routine surveys and some emergency actions, in accordance with a DOE-approved timber management operation plan.

- The annual level of Timber Management activities will be based on the concept of "Area Control", which uses manageable (regulated) acres and rotation lengths to determine an annual level of acres to be treated, subject to fluctuations prompted by the primary mission. Targets will be measured in terms of acres treated.

- Develop rotation lengths for the different working groups based on constraints imposed by the primary mission, research, wildlife, visual, soil, water, and air resources as part of the Timber Management Operation Plan development.

- Based on the Operations Plan and the rotation lengths, attain a uniform distribution of age classes by working group form the commercial forest component.

- Be responsive to planned or unexpected changes in timberland conditions or allocations.

- Manage the commercial forest land to produce quality pine and hardwood sawtimber as the priority forest product.

- Maintain the diversity of plant and animal species native to the SRS.

- Incorporate the Presidential wetlands policy of "no net wetlands loss."

- Conduct the timber management program in an efficient and professional manner with the minimum administrative burden on DOE and the primary contractor.

Strategies and Standards

The following strategies and minimum standards will be pursued in order to meet the program objectives:

- The Forest Manager will prepare and submit to DOE a timber management operation plan (TMOP) within 24 months of the arrival of the responsible staff officer to implement this program. This plan should program activities for at least 5 years, consider longer-term consequences, and contain procedures for revision. The program will be conducted by a professional forester. Timber management activities may continue in the interim under the existing timber management plan.

- Under the TMOP and in coordination with other NRMP programs and operation plans, the Forest Manager will provide personnel, equipment and funding to conduct this program; or the Forest Manager may select and administer subcontractors to perform individual activities. Utilization of on-site resources will be carefully considered.

- As directed by the TMOP, the SRFS may generally use activities and practices similar to those employed on the National Forests. The results of the Cooperative Biodiversity Research Program will be assessed for input on new or modified activities or practices.

- The USDA Forest Service's R8 Compartment Prescription procedures will be used to survey stand conditions and propose treatments. Approximately 7 to 10 compartments will be examined each year and recommendations for management actions will be submitted to the Site Use Coordination and Approval System.

- Strategies and standards for the use of prescribed fire for timber management are in Section 4.7 Wildland Fire Management.

- Surveys for forest condition and health (volume, growth, and the presence of insects, disease, and damage) will be conducted on all SRS forested acres at planned intervals.

- Only the commercial forest portion of the SRS will receive the full range of programmed timber management treatments.

- The principal historic indicator used to set the level of the timber program is the number of acres treated.

- Conventional timber management treatments may be applied to other than commercial forest lands under emergency conditions or in support of specific research activities under DOE-approved plans.

- The SRFS will prepare, award, and administer the sales of timber and other products including the bidding process and sale contracts.

- The SRFS will prepare, award, and administer the contracts for forest management activities conducted by non-SRFS employees.

4.2 *FISH AND WILDLIFE MANAGEMENT*

The Forest Manager, SRFS, is charged with planning and directing a fish and wildlife management program that includes all habitat

and animal survey and manipulation activities including threatened, endangered and sensitive species under the administrative responsibility of the Environmental Division of DOE-SR. The SRS deer hunts and the special Crackerneck Area hunts are under the administrative responsibility of the Contracts and Property Division of DOE-SR. This program responsibility does not include fish and wildlife related research (see Sections 5.2, 5.3, and 5.4).

The fish and wildlife management program supports three general objectives; maintenance of fish and wildlife diversity, rehabilitation of endangered species populations, and control of hazardous or nuisance animals. This program includes certain special management activities such as the wild turkey trapping program conducted by the SCWMRD.

The SCWMRD has regulatory responsibilities which apply to the SRS and will be adhered to in the conduct of all activities under the Fish and Wildlife Management program. These responsibilities include public hunts on the Crackerneck area, scientific collecting permits, hunting licenses, and trapping permits. The Fish and Wildlife Management program is committed to a cooperative working relationship with the SCWMRD in regard to South Carolina Heritage Trust, the Nongame and Endangered Species Conservation Act, locally and statewide.

Program Objectives

Achievement of the following objectives will satisfy the policy goals of this program:

- Identify, estimate the frequency distribution of, and maintain healthy and viable populations of all wildlife and fish species native to and present on the SRS.

- Maintain a current inventory of fish and wildlife populations with associated estimates of change over time.

- Strive for the attainment of population levels for the threatened, endangered and sensitive species established in approved recovery plans.

- Strive for maximum protection of threatened, endangered and sensitive plant species.

- Strive for protection of wetlands as to be detailed in the Presidential wetlands policy.

- Reduce animal-vehicle accidents.

- Minimize animal-caused property damage (including costs of repairs).

- Coordinate with and assist the Security Contractor to ensure that no hunting, trapping, or fishing occurs

on the SRS except as permitted by managed programs, valid contracts, or approved research and monitoring programs.

- Continue to support the managed public use of SRS fish and wildlife resources of the Crackerneck Area, managed by SCWMRD.

- Continue to cooperate and coordinate fish and wildlife management activities with Savannah River Ecology Laboratory research programs.

- Ensure that any fish or animals properly removed from the SRS are monitored for contamination.

- Conduct all activities in support of this program in accordance with a DOE-approved fish and wildlife management operation plan.

Strategies and Standards

The following strategies and minimum standards will be pursued in order to meet the program objectives:

- The Forest Manager will prepare and submit to DOE a fish and wildlife management operation plan (FWMOP) within 24 months of the arrival of the responsible staff officer to implement this program. This plan should program activities for at least 5 years, consider longer-term consequences, and contain procedures for revision. The program will be developed and conducted by a professional biologist. Fish and wildlife management activities may continue in the interim under existing plans.

- Under the FWMOP and in coordination with other NRMP programs and operation plans, the Forest Manager will provide personnel, equipment and funding to conduct this program; or, the Forest Manager may select and administer subcontractors to perform individual activities. Utilization of on-site resources will be carefully considered.

- Under the FWMOP and in coordination with the TMOP and set-aside operating plans, the Forest Manager will provide the habitat conditions to meet the program objectives.

- The FWMOP will consider research findings to achieve the best plan possible consistent with DOE objectives.

- The results of the Cooperative Biodiversity Research Program will be assessed for input on new or modified activities or practices.

- Management efforts to primarily increase wildlife and game populations will be implemented only in special cases where the program is specifically approved by DOE. Such special case activities may include research studies; recovery of threatened, endangered, rare, or sensitive species; or maintenance and enhancement of the biological diversity.

- Activities on non-commercial forest lands which affect fish and wildlife populations must be consistent with the FWMOP and coordinated with the Forest Manager.

- Population surveys and modeling will be coordinated with and may be subcontracted to SREL or other fisheries or wildlife research or service organizations.

- Recovery of the Red-cockaded woodpecker population will continue under a joint research-operations venture by the SEFES, SREL, and the SRFS.

- Threatened, endangered and sensitive plant species will be identified, inventoried, and protected by joint activities with other site users and subcontractors.

- Managed public deer hunts will be used to control population levels.

- Contract hunting or trapping may be used to control populations of other nuisance species that cannot be regulated solely by habitat manipulation or natural methods.

- Introduction or reintroduction of any fish, wildlife or plant species must be approved by the SR Land Use Committee and be coordinated with research activities. Research using the existing populations is encouraged, especially where it is likely to enhance knowledge of the impact of site operations on these species.

- Habitat management is the principal wildlife management technique used at SRS. Value for wildlife habitat is considered along with value for prime mission, environmental research, and for timber production in making balanced land use decisions. Habitat management techniques include:

  - maintenance of a full spectrum of vegetation types and an appropriate balance of wildlife habitats. It is DOE policy to minimize the destruction, loss, or degradation of wetlands;

- retention of undisturbed examples of typical aquatic and terrestrial habitats;

- use of forest management activities as a tool for providing wildlife openings and a diversity of forest habitats.

• Strategies and standards for the use of prescribed fire for wildlife management are in Section 4.7 Wildland Fire Management.

4.3 *SOILS, WATER AND AIR RESOURCES MANAGEMENT*

Soils, Water and Air Resource Management is ultimately the responsibility of the organization that affects the given resource values. Accordingly, SRS contractors are to endeavor to use the special technical capabilities of the SRFS and the SCS in soil and water conservation for such activities as construction areas, borrow pits, spoil piles, and waste site closures.

The Forest Manager, SRFS, has the responsibility for planning and directing the soil resource program which deals with the non-point source impacts from natural resource management activities (such as on the commercial forest and secondary road rights-of way). The Soil Conservation Service (SCS) working jointly with the SRFS will provide onsite expert consultation and technical advice to the SRFS and other SRS contractors on specific problems related to the conservation of the SRS soil resource. The SRFS and SCS work will be under the administrative responsibility of the Environmental Division of DOE-SR.

The SRFS Forest Manager is responsible for the water and air resource program which deals with the non-point source impacts from natural resource management activities (such as on the forest land and secondary road rights-of-way). Program responsibilities include developing forest management activities which protect ground and surface waters and the air resource, and providing recommendations to WSRC and other site users, as directed by DOE, concerning impacts on water and air from non-forest operations.

Program Objectives [Organization(s) having responsibility follow in parentheses - if more than one is listed, the organization with the lead responsibility for developing and coordinating a comprehensive action is given first. DOE will also use other advisors as appropriate.]

Achievement of the following objectives will satisfy the policy goals of this program:

- Incorporate, as more specific guidance develops, the Presidential policy of "no net wetlands loss". (SRFS, SCS, WSRC)

- Continue to manage the soil resources of the SRS to enhance quality and productivity. (SRFS, SCS, WSRC)

- Continue to manage the water and air resources of the SRS to enhance quality and productivity. (SRFS, WSRC, SCS)

- Make available a complete and current survey inventory of the SRS soil resources to all site users, document changes to the survey, provide special user needs, and update the soils maps as needed. (SCS)

- Make available a complete and current inventory of the SRS water resources to all site users. (SRFS, WSRC)

- Provide training in the use of the soils inventory. (SCS)

- Provide technical advice on erosion control, soil types, soil properties for engineering, and soil resource materials availability (such as sand, clay, and gravel) to any SRS initiators of activities such as research, construction areas, borrow pits, spoil piles, and waste site closures. (SCS, SRFS)

- Provide advice on hydrologic factors that influence water quality and impact revegetation efforts on the soils aspects by any SRS activity, to all initiators of activities such as research, construction areas, borrow pits, spoil piles, and waste site closures (SRFS, SCS).

- Provide advice on the water aspects of any SRS activity to all initiators of such activities. (SRFS, SCS, WSRC)

- Identify areas of potential soil contamination in the general forest area and contact WSRC-EPD for regulatory guidance. (SCS, WSRC, SRFS)

- Locate and verify areas of all SRS contaminated soils in the general forest area. (WSRC, SCS, SRFS)

- Identify all areas of eroding soils on the SRS. (SCS)

- Stabilize all areas of eroding soils due to natural resource management activities, and other areas as requested by DOE or other site users. (SRFS, SCS)

- Stabilize all other areas of eroded soils. (WSRC, SRFS, SCS)

- Conduct all activities in the support of this program in accordance with a DOE approved management operation plan. (SRFS, SCS, WSRC)

- Provide technical support to all SRS site users in wetland, floodplain and riparian management using guidelines provided under Federal Executive Orders on Wetlands Protection (11990) and Floodplain Management (11988) and subsequent guidance. (SRFS, SCS, WSRC).

- Provide expert advice on the water aspects of any SRS land disturbance that could adversely impact water quantity or quality. (SRFS, SCS, WSRC)

- Provide expert advice on the air aspects of any natural resource management or land use activity that could adversely impact air quality of the general forest area. (SRFS, SCS, WSRC)

Strategies and Standards [Organization(s) having responsibility follow in parenthesis - if more than one is listed, the organization with the lead responsibility for developing and coordinating a comprehensive action is given first]

The following strategies and minimum standards will be pursued in order to meet the program objectives:

- The Forest Manager will take the lead responsibility for coordinating with SCS and WSRC the preparation and submittal to DOE of a Soil, Water, and Air Resource Management Operation Plan (SWARMOP) within 24 months of the arrival of the responsible staff officer. This plan will be based on an analysis of SRS soil water and air resources. The soil inventory performed by SCS will provide the basis to begin the soil analysis. Existing water and air monitoring data will provide the basis to begin the water and air analyses. WSRC will provide forecasts of future construction. The plan should contain programs and activities which will protect SRS soil, water, and air resources for at least 5 years, consider long term improvement programs, and contain procedures for revision.

  The program will be conducted by the SRFS working jointly with the SCS under a written agreement (approved by DOE-SR) between SRFS, SCS, and WSRC using this plan as a basis. This agreement will be set up within 6 months of the arrival of the responsible staff officer. Needed remediation or protection actions may proceed and needed activities may occur in the interim.

- Under the SWARMOP and in coordination with other NRMP programs and operation plans, the SRFS will provide personnel, equipment and funding to conduct this program; or, the SRFS may select and administer subcontractors to perform individual activities. The SCS will provide expert consultant(s). Utilization of other on-site resources will be carefully considered.

- Soil erosion control target actions, in conjunction with WSRC, will be established in the annual work plans. (SRFS, SCS)

- Existing programs to stabilize eroding soils on the General Site will be continued. (SRFS, SCS, WSRC)

- Upon request of the DOE-SR, or other site users, coordinate with other on-site organizations to assist in soils stabilization planning and implementation related to active construction sites. (SRFS, SCS).

- Existing activities for soil, water and air resource management associated with natural resource management will be continued. (SRFS, SCS, WSRC)

- Upon request by DOE-SR, coordinate with the Management and Operating Contractor or subcontractors to assist in mitigating water and air resource impacts. (SRFS)

- Soil resource advice and review will be provided to DOE. Other site users may obtain this upon request, through periodic training, or through the site use coordination process. (SCS, SRFS)

- Water and air resource advice and review will be provided to DOE. Other site users may obtain this upon request, through periodic training, or through the site use coordination process. (SRFS)

- Verify that soils information is correctly transferred to a SRS Geographic Information System. (SCS, SRFS, WSRC)

4.4 *VISUAL AND WELLNESS FACILITIES MANAGEMENT*

The Forest Manager, SRFS, is charged with planning and directing a visual and wellness facilities management program that includes planning, development, and maintenance of on-site wellness facilities for employees and improvement of the visual qualities of SRS forest lands. The Environmental Division of DOE-SR has administrative responsibility for visual resources management; the SR/Wellness Committee coordinates wellness facilities management.

The visual and wellness facilities management program supports several general objectives that address improved amenities for SRS employees. Active and passive utilization of natural resources can alter the quality of life, but in ways that are poorly understood and often unrecognized until opportunities are lost. This program seeks to capitalize on those opportunities.

Program Objectives

Achievement of the following objectives will satisfy the policy goals of this program:

- Improve SRS employee well-being by utilizing on-site natural resources amenities.

- Utilize the SRS's natural resources more fully for the education, health, and aesthetics of site employees in coordination with existing Site research and fish and wildlife management programs.

- Develop new techniques for wellness facilities and landscape management.

- Conduct all activities in support of this program in accordance with a DOE-approved visual and wellness facilities management operation plan.

Strategies and Standards

The following strategies and minimum standards will be pursued in order to meet the program objectives:

- The Forest Manager will prepare and submit to DOE a Visual and Wellness Facilities Management Operation Plan (VWFMOP) within 24 months of the arrival of the responsible staff officer to implement this program. This plan should program activities for at least 5 years, consider longer-term consequences and contain procedures for revision. Visual and wellness-related activities may occur in the interim under existing plans.

- Under the VWFMOP and in coordination with other NRMP programs and operation plans, the Forest Manager will provide personnel, equipment and funding to conduct this program; or, the Forest Manager may select and administer subcontractors to perform individual activities. Utilization of on-site resources will be carefully considered.

- SRS employees will be surveyed concerning desired facilities for use on the plant site.

- On the basis of employee surveys, picnic areas, hiking trails, and other facilities may be planned for major concentrations of SRS employees and elsewhere.

- State-of-the-art visual management techniques will be applied to SRS commercial forest lands viewed by the general public.

- The visual qualities of timber management activities that may be observed by commuting SRS employees will be improved.

4.5 *CULTURAL AND ARCHAEOLOGICAL RESOURCES MANAGEMENT*

The Director of the University of South Carolina's Institute of Archaeology and Anthropology (USCIAA) will plan and direct the Savannah River Archaeological Research Program (SRARP) under the administrative responsibility of the Contracts and Property Division of DOE-SR.

The SRARP supports the general objective that archaeological and cultural resources be safeguarded. While not technically natural resources, the material culture of previous occupants of the SRS are abundantly scattered throughout the site and are important to the national heritage and culture. Virtually all natural resources management activities may potentially discover and destroy these non-renewable resources. The close coordination necessary to safeguard these resources is the reason for including this program in the NRMP. The Archaeological Resource Management Plan (ARMP), which includes the Programmatic Memorandum of Agreement (PMOA), identifies areas that are archaeologically significant. The SRARP is also intimately associated with the site use coordination and approval system under the land use planning authority.

Program Objectives

Achievements of the following objectives will satisfy the policy goals of this program:

- Provide expert advice to DOE-SR on archaeological aspects of any SRS activity that involves land modification. Other site users may obtain these services with the consent of DOE-SR. Because of the sensitivity of archaeological resources, a need-to-know policy, relative to specific archaeological site location, should be devised and implemented through a cooperative effort between DOE-SR and SRARP.

- Assist DOE-SR and SRS contractors in their continued compliance with the Archaeological Resource Protection Act (ARPA), the National Historic Preservation Act (NHPA), and other applicable federal, state and SRS laws, regulations, orders, plans, policies and directives.

- Conduct prehistoric and historic archaeological research pertinent to the SRS cultural resources.

- Maintain complete and current inventory of SRS archaeological resources through archaeological survey and site testing.

- Public education/service.

Strategies and Standards

The following strategies and minimum standards will be pursued in order to meet the program objectives:

- SRARP will prepare and submit to DOE-SR the Archaeological Resource Management Plan, which includes a PMOA, by March 1, 1990. This plan will identify potential archaeological resource set-asides. These set-asides will be identified through the site use system. The plan will also identify current and planned land use activities and the steps needed to assure archaeological compliance with federal laws and regulations. This plan is based on analysis of recorded archaeological sites on SRS to date. The plan will be revised as refined new data become available, primarily from on-going, coordinated land use activities.

- Cooperate with the Management and Operating Contractor, through DOE, for early planning on construction projects to avoid adverse effects on archaeological resources in compliance with federal laws and regulations.

- Continue to coordinate with the SRFS on their prescriptions and road maintenance tasks to protect cultural resources.

- Continue to disseminate, with the concurrence of DOE, research results to the scientific community and to the public.

- Enlist the assistance of Wackenhut Services, Inc. for the enforcement of ARPA.

4.6 *SECONDARY ROAD MANAGEMENT*

The Forest Manager, SRFS, is charged with management of the SRS secondary road program that includes the inventory, planning, construction, reconstruction, and maintenance of all SRS secondary roads under the administrative responsibility of the Enginering, Construction and Facilities Division of DOE-SR. Secondary roads are defined as all gravel and native surfaced roads except parking lots and roads within fenced compounds. Also included are 31 miles of low maintenance or abandoned paved roads.

The secondary road management program supports the general objective to provide an effective network of roads that access the SRS General Site. It is vital to the success of the primary mission as well as the natural resources programs. Important aspects of this program are that it be efficiently managed, environmentally acceptable, and comprehensive. It includes all the construction, reconstruction, and maintenance activities on existing and proposed segments of the entire secondary road

system. It is separate from but must be coordinated with programs responsible for the primary road system and the networks within production facility areas.

Program Objectives

Achievement of the following objectives will satisfy the policy goals of this program:

- Improve the secondary road system to realize reduced maintenance costs, increased service and safety, reduced sedimentation, less land removed from other uses, and better communications.
- Adopt uniform standards for secondary road management activities.
- Limit future changes in the network to those beneficial to meet site user needs in the long run.
- Minimize unauthorized and substandard roads.
- Make available to all SRS site users information on all road locations, characteristics, needs, and plans.
- Maintain a road system that will be accessible to all SRS site users.
- Conduct all activities in support of this program in accordance with a DOE-approved secondary road management operation plan.

Strategies and Standards

The following strategies and minimum standards will be pursued in order to meet the program objectives:

- The Forest Manager will prepare and submit to DOE a Secondary Road Management Operation Plan (SRMOP) within 24 months of the arrival of the responsible staff officer to implement this program. This plan will be based on an analysis of the system as directed by the Forest Manager. The plan should program activities for at least 3 years, consider longer-term consequences, and contain procedures for revision. The program will be conducted by a professional forest engineer. Secondary road management activities will continue in the interim under existing plans.
- Under the SRMOP and in coordination with other NRMP programs and operation plans, the Central Services Works Engineering Department (WSRC) will perform secondary road management activities under the programmatic guidance of the Forest Manager. Within 6 months of the arrival of the responsible staff

officer, the Forest Service and the Operating Contractor will enter into a Memorandum of Understanding (approved by DOE-SR) that will establish the conditions for using WSRC in secondary road management.

- State-of-the-art transportation planning techniques will be used to make additions, deletions, or other changes in the network.

- Existing and potential users of the road system will provide the needs to be addressed by this program. These and other site users will also provide information to reduce impacts of the road system on other SRS objectives.

- The secondary road system will be coordinated with other transportation networks and programs, then renamed and signed. Road identification will be based on timber compartments, a site-wide administrative subdivision. Road naming and all mapping must be approved by the Site Coordinator in accordance with Supplemental SR Correspondence.

- Road naming, signing, and mapping will follow simple, logical rules and be widely communicated to all General Site users.

- Standards for road management activities including closure will be developed and rigidly enforced.

- Procedures for rapidly responding to emergency situations related to road management will be prepared and implemented.

4.7 *WILDLAND FIRE MANAGEMENT*

The Forest Manager, SRFS, is charged with planning and directing a wildland fire management program (including prevention, presuppression, detection, and suppression of all wildfires on-site or that threaten the SRS, and responsibility for all programs that use prescribed or controlled fire) under the administrative responsibility of the Environmental Division of DOE-SR. This program applies to areas outside the control fences. Facility fire management and control programs remain the responsibility of the Operating Contractor. The SRFS will closely coordinate with the Operating Contractor's fire department on wildland fire management activities.

The wildland fire management program primarily supports the general objective to protect SRS facilities and personnel from the hazards of wildfires. It simultaneously supports policy environmental goals. It also supports other NRMP programs with prescribed burning activities to reduce fuels, prepare planting sites, and manipulate vegetation for wildlife habitats.

Program Objectives

Achievement of the following objectives will satisfy the policy goals of this program:

- Minimize the chances of catastrophic wildfires originating on the SRS or endangering it from off-site.
- Reduce the frequency of SRS wildfires, minimize damage to natural resources, and prevent damage to production facilities.
- Meet air quality standards through smoke management (major roadways and production facilities should not be adversely affected by smoke).
- Meet those wildlife habitat management objectives that may be obtained through prescribed burning.
- Prevent damage to adjacent ownerships from SRS wildfires.
- Become a full partner with other fire control organizations on and off-site to obtain maximum benefits from reciprocal agreements established through DOE/Office of Chief Counsel (OCC) and DOE/C&P.
- Minimize the health and safety risks to personnel participating in this program.
- Conduct all activities in support of this program in accordance with a DOE-approved wildland fire management operation plan.

Strategies and Standards

The following strategies and minimum standards will be pursued in order to meet the program objectives:

- The Forest Manager will prepare and submit to DOE a Wildland Fire Management Operations Plan (WFMOP) within 24 months of the arrival of the responsible staff officer to implement this program. This plan will be based on a complete analysis of the SRFS wildfire situation as directed by the Forest Manager. The plan should program activities for at least 5 years, consider longer-term consequences, and contain procedures for revision. The program will be conducted by a professional forest fire specialist.
- Under the WFMOP and in coordination with other NRMP programs and operation plans, the Forest Manager will provide personnel, equipment and funding to conduct this program; or, the Forest Manager may select and

administer subcontractors to perform certain individual activities. Utilization of on-site resources will be carefully considered.

- The personnel assigned to this program will be trained and maintained in a high state of readiness.
- The equipment assigned to this program will be maintained in a high state of readiness.
- Subject to the WFMOP, the SRS's fire detection system will be renovated and appropriately manned with trained personnel.
- A rigorous prescribed burning program will be pursued using state-of-the-art techniques to reduce and maintain forest fuels at safe levels.
- A state-of-the-art fire weather monitoring and fire danger rating system will be instituted.
- All SRS debris burning will be carefully monitored and controlled.
- Prescribed burning for timber, wildlife, and other objectives will be integrated into the wildland fire program.
- Procedures for supervisory support and reinforcements will be established with the USDA Forest Service Southern Regional Office.
- Reciprocal fire fighting agreements will be negotiated with the SC Forestry Commission and local fire control organizations through DOE/OCC and DOE/C&P.
- Arrangements for on-site organizations such as WSI and WSRC to support presuppression and suppression activities will be established.
- Fire damage assessment procedures will be established and followed.
- An intensive fire prevention program concerning the dangers of wildfires and the benefits of prescribed fire will be developed to target the SRS population.
- The fire prevention program will also address incendiarism and cooperative activities with WSI will seek to eliminate this source of wildfire ignition.
- State-of-the-art techniques of smoke management will be employed by trained and experienced specialists.

- During times of low fire danger at SRS, wildfire suppression personnel will be available for emergency fire duty elsewhere in the nation.

4.8 *BOUNDARY MANAGEMENT*

The Forest Manager, SRFS, is charged with managing the SRS boundary program that includes activities related to the administrative and physical location, marking, and maintenance of SRS's external boundaries, acquisition of necessary rights-or-way, and knowledge of adjacent owners and land uses under the administrative responsibility of the Engineering, Construction and Facilities Division of DOE-SR.

The boundary management program supports the policy goals to protect the SRS at its perimeter and be a good neighbor to adjacent lands. It is concerned with all aspects of boundary location, fencing, clearing, signing, firelands, and maintenance, as well as information on adjacent lands and waterways. This program is limited to the physical maintenance of SRS's external boundaries. The Security Contractor is responsible for intrusion prevention.

Program Objectives

Achievement of the following objectives will satisfy the policy goals of this program:

- Maintain a SRS perimeter that is clearly identifiable and exceeds the minimum requirements for plant security.
- Improve the perimeter's defense against the passage of wildfires.
- Keep current information on boundary conditions and adjacent ownerships that is available to all site users.
- Become a friendly and cooperative neighbor to adjacent landowners.
- Conduct all activities in support of this program in accordance with a DOE-approved boundary management operation plan.

Strategies and Standards

The following strategies and minimum standards will be pursued in order to meet the program objectives:

- The Forest Manager will prepare and submit to DOE a Boundary Management Operations Plan (BMOP) within 24 months of the arrival of the responsible staff officer to implement this program. This plan should program activities for at least 5 years, consider the

longer-term consequences, and contain procedures for revision. The program will be conducted by a professional engineer skilled in lands management, engineering, and fire control. Boundary maintenance activities will continue in the interim under existing plans.

- Under the BMOP and in coordination with other NRMP programs and operation plans, the Central Services Works Engineering Department (WSRC) will perform boundary management activities under the programmatic guidance of the Forest Manager. Within 6 months of the effective date of the NRMP, the Forest Service and the Operating Contractor will enter into a Memorandum of Understanding (approved by DOE-SR) that will establish the conditions for using the WSRC in boundary management.

- The entire boundary will be inspected annually and its location, current condition, and maintenance needs will be recorded.

- Fencing and gates will be kept clear of brush and maintained in a continuously serviceable condition.

- Emergency repairs will be conducted promptly.

- Where appropriate, fire breaks no less than 25 feet wide with no overhanging brush or tree limbs will be maintained.

- Communications will be established with adjacent landowners and maintained for mutual benefits.

- A current inventory of adjacent land ownership and condition will be maintained.

- WSRC is responsible for all survey data relating to the boundary (e.g., maps, Federal trespass legal descriptions, boundary monuments, records of metes and bounds), and SRFS will coordinate with WSRC on this aspect.

- Activities to acquire rights-of way or property will be conducted by the DOE Office of Chief Counsel and the Engineering, Construction and Facilities Division.

4.9 *PUBLIC AFFAIRS*

The Forest Manager, SRFS, is charged with planning and directing a public affairs program which monitors the public's sensitivity to natural resources activities and promotes a favorable public image of the SRS's natural resources management and research under the administrative responsibility of the Office of External Affairs of DOE-SR.

The public affairs program supports the general objective on public information. It simultaneously supports all other policy goals by building and maintaining public awareness and support of the SRS's natural resources programs. It is therefore concerned with the authority and foundations for any activity and its visibility to the public (including SRS employees). To avoid duplication and insure a consistent approach to public relations, this program will be coordinated with the Operating Contractor's public affairs program, as well as with DOE-SR/Office of External Affairs.

Program Objectives

Achievement of the following objectives will satisfy the policy goals of this program:

- Improve the general public's opinion of the SRS by recognition of its natural resources benefits, its contributions to environmental improvement, and its historical and cultural resource protection activities and contributions to the understanding of man's past.

- Promote an image with the general public with the SRS as a leader in research related to natural resources.

- Become a model of public relations activities for other federal installations.

- Conduct all activities in support of this program in accordance with a DOE-approved public affairs operation plan.

Strategies and Standards

The following strategies and minimum standards will be pursued in order to meet the program objectives:

- The Forest Manager will prepare and submit to DOE a public affairs operation plan (PAOP) within 24 months of the arrival of the responsible staff officer to implement this program. The program will be conducted by a professional public affairs officer skilled in public relations. Public affairs

activities may continue in the interim under existing policies.

- Under the PAOP and in coordination with other NRMP programs and operation plans, the Forest Manager will provide personnel, equipment and funding to conduct this program; or, the Forest Manager may select and administer subcontractors to perform individual activities. Utilization of on-site resources will be carefully considered.

- The frequency and quality of public information activities will be increased to fully publicize the successes and benefits of the SRS natural resources research and management programs.

- Public relations will become an integral part of all NRMP management and research programs.

- Key personnel will be trained to recognize and successfully exploit opportunities for favorable publicity.

- Procedures will be established to ensure that natural resources publicity is compatible with SRS policies without being rendered ineffective.

5.0 RESEARCH-RELATED PROGRAMS

The SRS is a major site for research - not only in the area of nuclear materials production but also in the areas of natural and cultural resources that may or may not be related to the production mission of the plant. Such research has been performed principally by the University of Georgia's Savannah River Ecology Laboratory (SREL), the Operator Contractor's Savannah River Laboratory (WSRC), and the USDA Forest Service's Southeastern Forest Experiment Station (SEFES),and the Savannah River Archaeological Research Program. Scientists from other organizations have conducted studies in cooperation with these groups and/or under the auspices of the SRS National Environmental Research Park (NERP) program as administered by DOE's Office of Health and Environmental Research. Environmental research at SRS includes basic research and studies related to the prime mission, SR land management issues, or to the NERP program.

Research management and quality is strictly the responsibility of the organization conducting the research and the appropriate DOE oversight organization.

5.1 *RESEARCH SUPPORT*

The Forest Manager, SRFS, is charged with planning and directing a research support program that includes activities related to the location, establishment, marking, access, and vegetative manipulation of research study areas in the commercial forest of the SRS and on other lands as requested under the administrative responsibility of the Environmental Division of DOE-SR.

The research support program supports the general objectives related to research and the objective of inculcating the SRS primary mission objectives related to security, health, and safety in all General Site-using organizations.

Program Objectives

Achievement of the following objectives will satisfy the policy goals of this program:

- Meet research scientists' needs for General Site information in the appropriate location of their study areas.
- Provide the natural resources management activities necessary to manipulate conditions on study areas.
- Protect all research areas registered through the site-use process from other than natural alteration of their conditions.
- Advise DOE if other research activities which are not on the Site Use System arise.
- Make available knowledge of all research study areas currently active on the General Site to all existing and future site users.
- Locate research study areas, control sites, and forest production activities to reduce conflicts and maximize total benefits.
- Conduct all activities in support of this program in accordance with a DOE-approved research support operation plan.

Strategies and Standards

The following strategies and minimum standards will be pursued in order to meet the program objectives:

- The Forest Manager will prepare and submit to DOE a Research Support Operation Plan (RSOP) within 12 months of the arrival of the responsible staff officer to implement this program. This plan should program activities for at least 3 years and contain procedures for revision. The program will be conducted by the SRFS. Research support activities may continue in the interim under existing agreements.
- Under the RSOP and in coordination with other NRMP programs and operation plans, the Forest Manager will provide personnel, equipment and funding to conduct this program; or, the Forest Manager may select and administer subcontractors to perform individual

activities. Utilization of on-site resources will be carefully considered.

- The Forest Manager will coordinate with site users to ensure that their research sites, control sites, and set-asides are accurately mapped and their boundaries are clearly marked in the field .

- The Operation and Work Plans for the SRS's natural resources management programs will have sufficient flexibility to perform management activities for research studies.

- The research needs of the SRFS will be identified, periodically updated, and made known to the appropriate research organizations.

- The SRFS will provide fiscal and other administrative support for SEFES-conducted research on the SRS and, if directed by DOE, for other research organizations involved in forest management research.

- The SRFS will promote the dissemination and implementation of research findings by incorporating them into its normal operations, demonstrating these practices to visitors, and assisting in the publication of scientific reports.

5.2 *FOREST MANAGEMENT RESEARCH (SEFES)*

The Director of the SEFES will plan and conduct a research program addressing the problems of managing forested ecosystems under the administrative responsibility of the Environmental Division of DOE-SR. This program is to be coordinated with SREL, WSRC, SRFS, and others as deemed desirable.

The forest management research program supports the general objectives to conduct a nationally recognized research program and to address the research needs of SRS General Site management. The Director, SEFES, who conducts the federal government's forestry research programs in Virginia, the Carolinas, Georgia, and Florida, is responsible for this program.

Program Objectives

Achievement of the following objectives will satisfy the policy goals of this program:

- Provide the scientific basis for the forest management programs of the SRS.

- Provide field study areas to address the research problems of SEFES research work units

- Contribute to a national research program that increases the knowledge of forest ecosystems and

develops manipulative practices to increase benefits to mankind.

- Optimize the cooperation between forestry and environmental research efforts for mutual benefits.

- Conduct all activities in support of this program in accordance with a DOE-approved forest management research plan.

Strategies and Standards

The following strategies and minimum standards will be pursued in order to meet the program objectives:

- The Director, SEFES, will prepare and submit to DOE a Forest Management Research Plan (FMRP) within 24 months of the arrival of the responsible staff officer to implement this program. This plan should program activities for at least 5 years and contain procedures for revision. The program will be conducted by assigned research work unit leaders with a single individual designated as the Director's representative to coordinate the program. Research activities may continue in the interim under existing agreements.

- The SEFES will permanently assign a research scientist or administrator to the SRFS to serve as the Research Coordinator.

- The Director's representative and other scientists will meet periodically with the SRFS to discuss research needs and findings.

- The SEFES will consider the SRS a primary field location for as much of the total SEFES research program as is appropriate.

- The SEFES will actively seek non-Forest Service cooperators for its SRS-research studies and encourage independent studies by other forestry organizations.

- SEFES will use both its own resources plus those of DOE, the primary contractor, and the Forest Service's Southern Region to disseminate its research findings.

- The forestry research program will be jointly funded by DOE and the SEFES, be administratively supported by the SRFS, and receive some field support from the SRFS.

5.3 *ENVIRONMENTAL RESEARCH (SREL)*

The mission of the Savannah River Ecology Laboratory is to acquire and communicate knowledge of ecological processes and

principles. This knowledge should be useful in defining and understanding issues of environmental concern to DOE in formulating management program options for future decisions. SREL will plan and conduct a program of ecological research under the administrative responsibility of the Environmental Division of DOE-SR. This program will be coordinated, as appropriate, with WSRC, SEFES, SRFS and others as deemed desirable.

Program Objectives

Achievement of the following objectives will satisfy the policy goals of this program:

- Continue to conduct studies addressing issues of ecological and environmental concern to DOE-SR in operating the SRS.

- Continue to provide guidance and recommendations regarding management of the natural resources of the SRS.

- Continue to interact with WSRC, SRFS, SEFES, and other SRS groups on matters of environmental concern and on research programs.

- Continue to disseminate the results of research through professional journals, reports to DOE, and meetings with DOE-SR and other on-site groups, and in popular articles for public dissemination.

Strategies and Standards

The following strategies and minimum standards will be pursued in order to meet the program objectives:

- SREL will continue to participate in the Cooperative Biodiversity Research Program.

- SREL will continue to collaborate with WSRC, SRFS, SEFES, and other applicable organizations in environmental research programs of mutual interest.

- SREL will continue to serve as a major national ecological research center providing educational and scientific opportunities to students and professionals.

- SREL will continue to support SRS organizations in the documentation, assessment and evaluation of environmental effects associated with activities on SRS.

- SREL will continue to maintain a staff of trained professionals in a variety of biological disciplines in order to provide the highest caliber of ecological research on the SRS.

- SREL will continue to interact vigorously with colleagues off-site to infuse new ideas and methodologies into laboratory research programs.

5.4 *ENVIRONMENTAL RESEARCH (WSRC)*

The Manager of WSRC's Environmental Sciences Research will plan and conduct a program of environmental research under the administrative responsibility of the Environmental Division of DOE-SR. This program is to be coordinated with SREL, SEFES, SRFS, and others as deemed desirable.

The Environmental Sciences and Environmental Technology Sections are primarily responsible for environmental research at WSRC. The overall objectives of the sections include regulatory compliance support activities, monitoring programs for detection of environmental impact, baseline surveys for site characterization, measurement and modeling of transport processes, emergency response to unplanned effluent releases to the environment, and the development of information, tools and techniques for environmental assessment, protection, and remediation.

Program Objectives

Achievement of the following objectives will satisfy the policy goals of this program:

- Continue to acquire, document, and share environmental data that is crucial to minimizing environmental impacts on the SRS.

- Continue to assist in identifying criteria that could result in restrictions on the uses of particular areas of the SRS.

- Continue to pursue collaborative research with other users of the SRS.

- Continue to develop and implement innovative techniques for the measurement and prediction of environmental effects of activities on the SRS.

Strategies and Standards

The following strategies and minimum standards will be pursued in order to meet the program objectives:

- WSRC will continue to encourage information exchange by participation in the Technical Exchange Program and by other methods, including the coordination with the use of GIS systems on the SRS.

- WSRC will participate in the Cooperative Biodiversity Research Program

- WSRC will continue to collaborate with SREL, SRFS, SEFES, and other applicable organizations in environmental research programs.

- WSRC will continue to work toward defining baseline conditions for environmental parameters on the SRS.

- WSRC will continue to develop innovative techniques for the measurement and prediction of concentrations of environmental contaminants in the atmosphere, surface water, and ground water on the SRS.

- WSRC will continue to support SRS organizations in the assessment and prediction of environmental effects associated with past, present, and planned activities on the SRS.

- WSRC will continue to maintain a staff of trained professionals in a variety of technical disciplines to advise and consult with operations groups, with the objective of minimizing environmental changes that might result from SRS activities.

5.5 *ARCHAEOLOGICAL RESEARCH (SRARP, USCIAA)*

The primary mission of the Savannah River Archaeological Research Program is the management of the cultural and archaeological resources of the SRS. The secondary mission, which enhances the ability to perform the primary mission, is the investigation of past cultural systems within the context of changing environmental and socio-economic parameters. The knowledge derived from this research enables the SRARP to help DOE to better manage and protect archaeological and cultural resources. SRARP will continue to plan and conduct a program of archaeological research, in conjunction with enhancing the management of the cultural resources, under the administration of DOE's Environmental Division.

Program Objectives

Achievement of the following objectives will satisfy the policy goals of this program:

- Continue to conduct archaeological research pertinent to the management of the cultural and archaeological resources of the SRS.

- Continue to develop research methods to monitor, manage, and minimize the impact of SRS activities on archaeological resources.

- Continue to identify, inventory, and research archaeological sites in order to enhance predictive modelling capabilities.

- Continue geoarchaeological studies on the SRS and in the Savannah River Valley to enhance the understanding of how past cultural systems articulated with a changing paleoenvironment.

- Continue historic sites research on socio-economic development and agricultural land use impact on the environment within the Savannah River Valley.

- Disseminate research results to the scientific community and to the public.

Strategies and Standards

The following strategies and minimum standards will be pursued in order to meet program objectives:

- SRARP will continue to support SRS organizations in the documentation, assessment, and evaluation of archaeological and cultural resources associated with SRS activities through the Programmatic Memorandum of Agreement.

- SRARP will continue to provide an outlet for graduate research enabling enhancement of the management of the cultural resources.

- SRARP will continue to maintain a staff of trained professionals with a variety of archaeological specialties in order to provide the highest caliber of archaeological research on the SRS.

- SRARP will continue to interact with colleagues off-site in order to communicate new ideas and methodologies that may be incorporated into archaeological research programs.

Floodplain/Wetlands Assessment

OF FOREST MANAGEMENT ACTIVITIES AT THE SAVANNAH RIVER PLANT

PREPARED FOR THE U.S. DEPARTMENT OF ENERGY AND THE U.S. FOREST SERVICE BY

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SRC-84-8010/1

FLOODPLAIN/WETLANDS ASSESSMENT OF FOREST MANAGEMENT ACTIVITIES AT THE SAVANNAH RIVER PLANT

Prepared for

U.S. Department of Energy
U.S. Forest Service

By

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October 1984

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I. SUMMARY

The Savannah River Plant (SRP) is a major facility of the U.S. Department of Energy (DOE) that produces defense nuclear materials. The Plant covers approximately 300 square miles in South Carolina. Forest resources on the SRP occupy about 88 percent of the site; these resources are managed through an interagency agreement between DOE and the U.S. Forest Service (USFS). This document assesses the environmental consequences of existing forest management activities (i.e., the proposed action) on floodplains and wetlands as required by Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands), and in accordance with DOE Regulation 10 CFR 1022 (Compliance with Floodplain/Wetland Environmental Review Requirements).

Included as part of this assessment are separate maps (1 inch = 4000 feet) of the base floodplain and wetland plant communities. The base floodplain, which covers 37,128 acres, is associated primarily with the Savannah River and five principal streams that drain the SRP. Nearly half the base floodplain is adjacent to the Savannah River. The remainder occupies the corridors of Upper Three Runs Creek (19 percent), Lower Three Runs Creek (17 percent), Par Pond (8.3 percent), Steel Creek (4.6 percent), Four Mile Creek (2.4 percent), and Pen Branch (1.7 percent). The SRP also contains an interspersion of structurally diverse and highly productive wetland communities that include the Savannah River swamp, Carolina bays, bottomland hardwood forests, scrub-shrub, and emergent wetlands. These wetlands, which provide habitat for numerous species of wildlife, cover 39,251 acres. Many wetland communities occur within the floodplains, but others, such as Carolina bays, are often located outside the base floodplain. The largest contiguous expanse of wetlands on the SRP is the Savannah River swamp (7462 acres); it is not managed or regulated by the USFS under the existing program.

USFS forest management activities on the SRP began in the early 1950s. Due to the complexity of the SRP's construction and operational activities, forest management has broadened to include various fields of natural resource management. The policy for implementing these activities is set forth in the USFS Timber Managment Plan; it includes forest management, wildlife management, soils reclamation, road management, and research support. Forest management includes timber harvesting, site preparation, reforestation, timber stand improvement, and prescribed burning. The forest management activity with the greatest potential to impact floodplains and wetlands is timber harvesting. As many as 400 acres of bottomland hardwoods are scheduled for annual harvest under the Timber Management Plan (1979-1988), although actual harvested acreages are much lower. The USFS has established specific wet area logging guidelines for use in compartment harvest operations that consider the need to protect natural and beneficial effects of floodplains and wetlands.

Wildlife management activities affect game and nongame species, furbearers, and endangered and threatened species. In floodplains and wetlands, these activities have centered on population control of the beaver, a furbearer whose activities have undermined secondary roads and adversely impacted several hundred acres of timber on the SRP. Other wildlife that are indirectly affected by forest management activities include white-tailed deer, feral hog, Russian boar, and wild turkey.

Soil management activities of the USFS typically include the reclamation of spoil piles and borrow pits, and the protection of soils in forest management activities. These activities are directed at controlling erosion and, at the same time, providing food and cover for wildlife.

Road management activities include road inventories and condition surveys, and the development of construction and maintenance plans for implementation by the SRP operating contractor (Du Pont). Construction and maintenance of secondary roads in floodplains and wetlands are generally precluded, although some woods roads are necessary to provide access to forest compartments for prescription and fire management.

The USFS also supports numerous research activities for universities, the Southeastern Forest Experiment Station, and others.

The proposed action evaluated in this assessment includes those activities affecting floodplains and wetlands on the SRP. These can be summarized as (1) the annual maximum harvest of 400 acres of bottomland hardwood forests and associated harvest activities, (2) population control of the beaver, and (3) activities associated with soil and road management. Alternative actions that were considered include no action, custodial management, uneven-aged management, even-aged management with shorter rotations, and even-aged management with longer rotations.

The environmental consequences of the proposed action, as determined from potential impacts to soils, air and water quality, vegetation, fisheries and wildlife, endangered and threatened species, archeological and historic resources, and socioeconomics, are summarized as follows:

Direct and Indirect Impacts

Direct impacts result from forest management activities within the floodplains and wetlands. Indirect or secondary impacts are typically associated with areas outside the floodplains or wetlands, and are not a direct result of forest management activities. Activities impacting floodplain/wetlands include:

- A maximum annual harvesting by clearcutting 400 acres of bottomland hardwood forest on the SRP is a negative direct impact; it would eliminate most existing vegetation and associated wildlife habitat within the harvest area.

- The disturbance of soils associated with timber harvesting and site preparation is a direct negative impact.

- The reforestation of cleared areas is a positive indirect impact.

- The enhancement of wildlife habitat diversity through the creation of "edges" and varying successional stages is a positive indirect impact.

- The removal of beaver from areas exhibiting excessive canopy mortality and damage to secondary roads and railroads is a direct negative impact to individual beaver communities; beaver control positively benefits timber and road management at SRP.

Short-Term/Long-Term Impacts

Short-term impacts are temporary changes occurring during and immediately following the implementation of forest managment activities. Such impacts include the temporary disturbance and compaction of soils, modification of vegetative structure, increased turbidity and sedimentation of streams, deterioration of air quality in the vicinity of motorized equipment, and decreased carrying capacity of wildlife habitat.

Long-term impacts typically result from the cumulative effects of forest management activities, and last 10 years or longer. Long-term impacts include a sustained yield and economic return from forest resources, and enhancement of wildlife habitat diversity through the establishment of variously aged plant communities.

Impacts to Lives and Property

Because there are no dwellings or inhabitants continuously living within the floodplains and wetlands of the SRP, there would be no impacts to lives and property. Forest management activities at SRP will not change the flooding regime of the Savannah River or affect offsite lives and property.

Impacts to Natural and Beneficial Values of Floodplains and Wetlands

The continuation of existing forest management activities at SRP would avoid to the maximum extent possible adverse impacts associated with the use and modification of the floodplains and wetlands because:

- Modification of water levels or flow regimes due to forest management activities is not expected; thus, the natural and beneficial values of the floodplain would be maintained.

- During flood conditions, forest management activities in floodplains and wetlands are not undertaken, and do not create an added dimension to an occurring disaster, as would liquified gas terminals and facilities producing and storing highly volatile, toxic, or water-reactive materials.

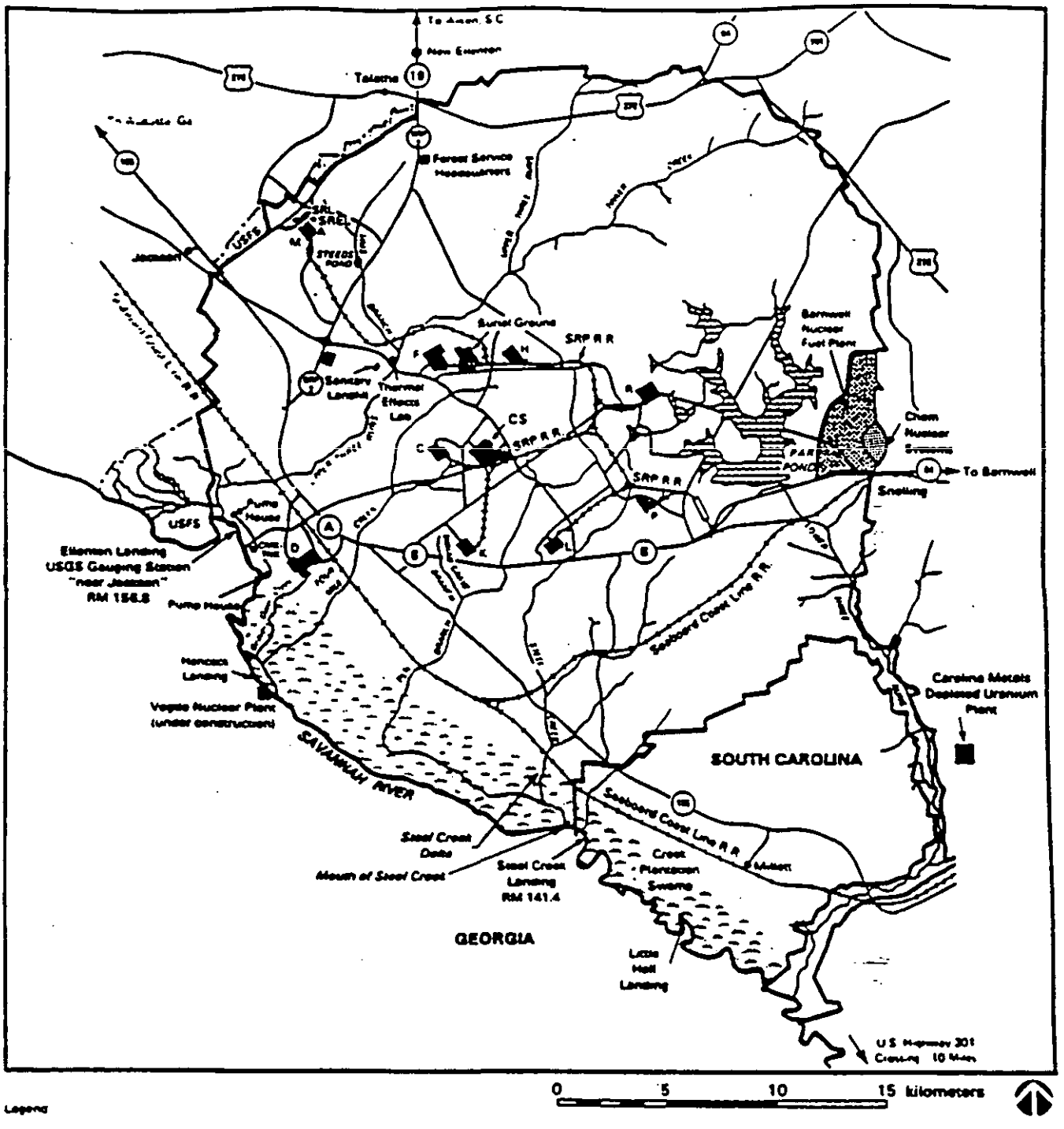
- No essential and irreplaceable records, utilities, and/or emergency services are affected or lost as a result of the floodplain/wetlands forest management activities at SRP.

Long-term adverse impacts are not expected to (1) the water quality maintenance and ground-water recharge capacity, (2) important wildlife habitat (endangered or threatened species), (3) cultural resource values (open space, archeological sites, scientific study areas), and (4) cultivated resource values (agriculture, aquaculture, and forestry). Thus, the natural and beneficial value of the floodplains and wetlands should not be significantly altered.

II. INTRODUCTION

The Savannah River Plant (SRP) of the U.S. Department of Energy (DOE) is a nuclear products facility that covers 192,323 acres (Figure 1). Approximately 88 percent of the SRP is forested. These forest resources are managed by the U.S. Forest Service (USFS) under an interagency agreement with the Department of Energy. The goals of the forest management program are to produce forest products, provide quality habitat for native wildlife and endangered species, improve aesthetics, protect soil and watershed values, and to provide forest ecosystems for environmental research. Forest management on the SRP encompasses a broad array of activities including timber harvesting, site preparation, reforestation, timber stand improvement, prescribed burning, wildlife management, soils reclamation, management of secondary roads, and research support. Because these activities sometimes affect the floodplains and wetlands of the SRP, a floodplain/wetlands assessment is required in accordance with Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands); these orders are implemented by the DOE regulation "Compliance with Floodplain/ Wetlands Environmental Review Requirements" (10 CFR 1022).

The purpose of this assessment is to evaluate the effects of existing forest management activities of the USFS (i.e., the proposed action) on the floodplains and wetlands of the SRP. Principal components of this assessment include a description of forest management activities, a characterization of the affected environment, an evaluation of the environmental consequences, and a discussion of alternatives. In accordance with 10 CFR 1022, this document does not identify, select, or recommend a preferred action. The information in this document is provided to inform the public on proposed DOE actions in the floodplain/wetlands area and to provide DOE with an analysis on which it can base a statement of finding for proposed SRP forest management activities in floodplains and wetlands in the future.



Legend

C, K, R, L, P Reactor Areas (C, P, K are operating) Road A = Highway 125
F, H Separations Areas
M Fuel and Target Fabrication
D Heavy Water Production
A Savannah River Laboratory and Administration Area
CS Central Shops
RM River Mile

Figure 1. Savannah River Plant Site.

III. DESCRIPTION OF FOREST MANAGEMENT ACTIVITIES

Forest management activities of the Forest Service at the SRP began in the early 1950s; these activities include five general areas: (1) timber management, (2) wildlife management, (3) soils reclamation, (4) road management, and (5) research support. Because these disciplines are interrelated, the application of one activity often affects another; for example, a particular forest management practice such as clearcutting might enhance food and cover for wildlife, which is a primary objective of wildlife management. Forest management is the principal function of the USFS at the SRP; it includes timber harvesting, site preparation, reforestation, timber stand improvement, and prescribed burning.

This section presents a brief history of forest management at the SRP, and provides an overview of current USFS forest management activities. Where applicable, the section emphasizes forest management activities that affect floodplains and wetlands.

Management History

Forest management activities at SRP began in 1951 under a cooperative agreement between the U.S. Forest Service and the U.S. Atomic Energy Commission (AEC). In 1953, following surveys of soil, drainage, and site conditions, the Forest Service began a limited program to reforest approximately 68,000 acres, in which 10 million loblolly, slash, and longleaf pine seedlings were planted mechanically. Following the initial success of this effort, the AEC requested that the Forest Service manage forest resources on the entire SRP.

The USFS initiated a prescription planting program in 1955. Under this management program, specific site preparation, timber-stand improvement, and prescribed burning activities were performed in each managed compartment. In 1955, the first timber sale was conducted to salvage highgraded stands and to prepare such areas for further reforestation.

The forest management program continued: the 100 millionth tree was planted in 1968; from 1968 to 1978, an additional 7 million trees were planted. In all, 94,426 acres were planted before 1984. The objective of the early reforestation program was to establish tree cover on old agricultural lands. In addition, trees were planted on failed plantations, plant military sites, construction areas, borrow pits, and areas damaged by fire, insects, or disease. The present program averages about 2475 acres per year, of which about 325 acres are naturally regenerated in hardwood species. Reforestation of floodplains and wetlands is infrequent and limited in size.

Former management programs included research support under the Cooperative Forest Research Program, which began in 1963, and management of public deer hunting from 1965 to 1981. Current programs include soil reclamation and secondary road management, which began in the early 1970s, and red-cockaded woodpecker habitat improvement, which began in 1980. In 1975, the Forest Service was asked to provide firefighting guidance, support, and personnel to E. I. du Pont de Nemours and Company, the operating contractor for DOE at SRP.

The first Timber Management Policy Statement was written in 1957, and the first Timber Management Plan (TMP) was completed in 1967. The TMP format was expanded in 1978 to include elements required by the National Environmental Policy Act (NEPA) of 1969. The current TMP covers the period between 1979 and 1988.

Forest Management

The principal objective of forest management at the SRP is to promote and achieve a pattern of timber resource use on a sustained-yield basis, while maintaining and enhancing soil, water, and wildlife resources. To implement this objective, the USFS has delineated 85 timber compartments, which average about 2260 acres each (Figure 2). Compartment boundaries are based on physiographical features.

In response to Executive Orders 11988 and 11990, the USFS at SRP has established specific wet area logging guidelines (Appendix A) for use in timber harvest operations. These include guidelines for identifying floodplains or wetlands within a compartment scheduled for harvest, special equipment and methods of harvest that are allowed, and other site-specific regulations. They also provide such protective measures as removal of slash from stream courses; prevention of skidding across streams; establishment of depth limits in ruts; and specifications for roads, skid trails, and yarding and decking areas.

The acreage planned for each regeneration cut in floodplains and wetlands is based on guidelines contained in the Timber Management Plan. The acreage needed to regenerate in each regulation group is derived by dividing the group acreage by its rotation in years and multiplying the result by 10. As part of determining stand condition and treatment requirements, economic consideration is given to the feasibility of performing the improvement work through a commercial timber sale. The volume per acre and the value of products to be removed are estimated. The cost of harvesting the timber is balanced against its worth to determine the feasibilty of a timber sale.

The current Timber Management Plan (1979-1988) proposes a total estimated annual yield of 4 million board feet of sawtimber and 79,000 cords of small roundwood products from an annual average cut area of 4078 acres. The average annual growth during the plan period is estimated to be 13.1 million board feet of sawtimber and 74,000 cords of poletimber.

The Timber Management Plan stipulates even-aged forest management for lands that are suitable for sustained-yield timber production. Even-aged management favors the biologic requirements of most species of commercial trees occurring on SRP, including bottomland hardwoods. Most commercial species are shade-intolerant trees requiring ample sunlight, moisture, and nutrients to survive and fully develop. Even-aged management intermixes stands of different age classes, thus providing a variety of wildlife habitat. Regulating stand size and age class structure can achieve a higher level of sustained yield.

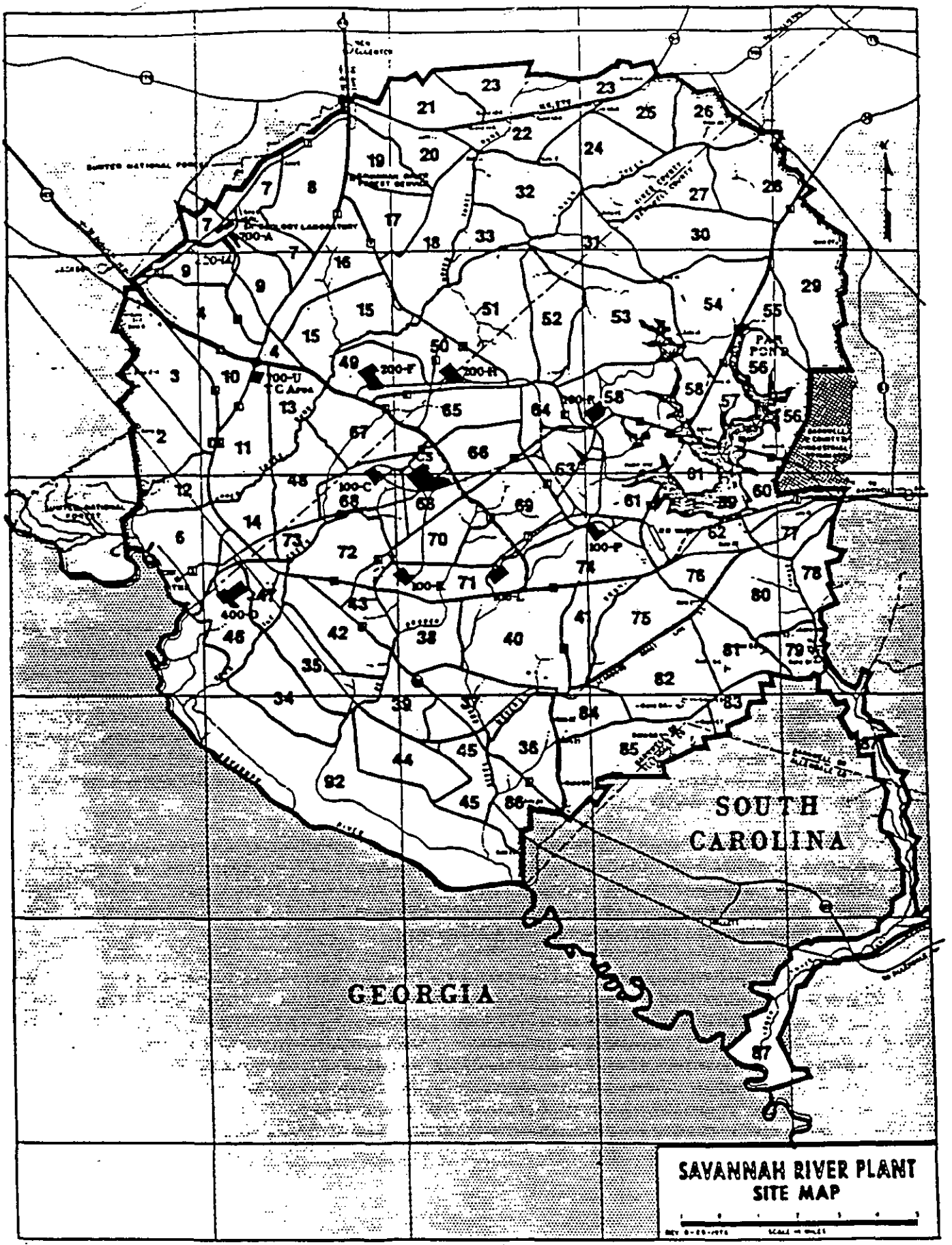


Figure 2. Timber Compartment Map of the Savannah River Plant.

Five regulation groups have been established for the SRP. These forest types, listed below, have similar management needs and rotations:

Regulation group	Acres	Percentage	Rotation (years)
Longleaf pine	23,432	15.0	60
Loblolly pine	105,689	67.8	60
Upland hardwood	3,602	2.3	80
Bottomland hardwood	22,491	14.4	80
Low-intensity management	579	0.4	60
Total	155,793	99.9	

These rotations will produce a variety of timber products and meet other forest resource management goals. Timber is harvested during the regeneration cut at the end of the rotation and several periodic thinnings spaced throughout the rotation.

Every 10 years a forester examines each timber compartment (averaging 2261 acres) and prepares a detailed compartment prescription that recommends cuts and silvicultural treatments for each stand, when necessary, for its growth and development. One-tenth of the forest on SRP is covered annually to ensure full coverage during the 10-year plan period. A compartment prescription summarizes planned timber stand treatments, cuts, road reconstruction, and maintenance as well as coordination with planned wildlife, research, and other activities. The prescription discusses impacts of the proposed actions on soil, air, water-quality, vegetation, wildlife, archeological, and cultural resources. The SRP Forest Manager and his staff review and approve these prescriptions.

All proposed timber sales and related silvicultural activities are reviewed and approved by DOE. Before a sale is contracted, the compatibility of the sale with current and future land uses is assured by coordination through the SRP site-use system.

Timber Harvesting

Timber harvesting is accomplished by regeneration and intermediate cuttings. Regeneration cuttings include seed tree, shelterwood, or clearcutting methods. Intermediate cuttings are accomplished by thinning techniques. Thinnings achieve desired stocking levels for improved growth rate, improve tree stem quality and species composition, and reduce mortality. Clearcutting typically does not exceed 100 acres on pine sites and 40 acres on bottomland hardwood sites. In accordance with the SRP Timber Manangement Plan (1979-1988), approximately 400 acres of bottomland hardwoods could be harvested annually. The amount of the annual harvest in floodplains and wetlands varies. Timber sales in floodplains and wetlands for FY 1984 through 1986 will average about 54 acres annually. No timber sales in floodplains or wetlands occurred in FY 1984. In FY 1985, two 50-acre tracts are scheduled to be harvested from the floodplain of Upper Three Runs Creek. Two tracts totaling 62 acres are scheduled to be harvested from the floodplain of Steel Creek in FY 1986. Thus, only small isolated stands associated with the floodplains and wetlands of creeks will be affected. No forest management activities will occur in the Savannah River swamp, the largest contiguous wetland on the SRP.

Site Preparation

To establish a new timber stand, favorable growing conditions for new seedlings must be created and maintained. Site preparation for natural regeneration, seeding, or tree planting requires the removal of existing vegetation that would compete with new seedlings for space, moisture, nutrients and sunlight. Several methods or combinations of methods are used for site preparation on SRP:

- Shearing and raking - Undesirable and noncommercial stems are sheared and raked into windrows. This method can cause significant soil disturbance, but is useful for regenerating species such as longleaf pine. It is not used on highly erodable or moist soils.

- Drum chopping - Existing vegetation is suppressed by a bulldozer pulling a heavy, water-filled drum fitted with cutting blades. Vegetation is leveled, and is often prescribed to be burned prior to reforestation. Normally, drum chopping causes negligible soil disturbance, and is a suitable mechanical site preparation method for fragile sites.

- Powersaw clearing - Vegetation is felled by powersaws to encourage natural regeneration of hardwood stands from advanced reproduction and root and stump sprouting. Powersaw site preparation is done on slopes and erodable soils that cannot withstand the impacts of mechanical site preparation.

- Herbicide treatments - Two basic herbicide application methods are used. (1) aerial and ground application and (2) stem injection. Both are designed to control broadleaf and hardwood competition; stem injection is typically used to control pines. The use of herbicides complies with the Pesticide Control Act of 1972.

- Prescribed burning - Controlled burns are used to eliminate slash where mechanical site preparation is not needed or in conjunction with mechanical methods. Because this method eliminates existing vegetation, reforestation methods are more effective and economical.

Site-prepared areas range in size from 10 to 100 acres; they are distributed so an age difference of 10 years or more usually exists between a prepared area and adjacent stands. This results in a mixture of newly reforested and older stands. The younger stands contain a variety of vegetation and insects, and provide dispersed food and cover for wildlife species.

Mechanical treatment with bulldozers and powersaws is used in pine forests, depending on the terrain and management objectives. Hardwood stands are treated with powersaws and hand tools.

About 2475 acres are treated annually for site preparation. Approximately 1900 acres will be treated by mechanical equipment and/or prescribed burning, and the remaining 575 acres will be treated primarily with herbicides, mechanical breakage, and powersaws. In the current Timber Management Plan, as much as 400 acres of bottomland hardwoods are scheduled for site preparation, primarily by powersaw.

Reforestation

Reforestation consists of a combination of natural regeneration through shelterwood or seed tree cutting, wind transport of seeds, advanced reproduction or sprouting, or mechanized tree planting. Currently, more than 95 percent of all pine plantations are established by mechanized planting; the preferred method of reestablishing hardwood species is through advanced reproduction and sprouting. Areas too wet for large planting equipment are usually hand planted. Approximately 2478 acres are scheduled for regeneration annually.

After site preparation has been accomplished on an area, a new tree crop can be established by a variety of natural or artifical methods:

- Natural regeneration - Forest species can be regenerated naturally following clearcutting, shelterwood cutting, or seed tree cutting. These methods can regenerate stands more effectively later in the rotation when the forests are older and more capable of producing seed crops. Heavy seeded hardwood species are regenerated naturally from advanced reproduction, and stump and root sprouting following site preparation methods that sever residual stems. Light seeded hardwood species are regenerated by seed transported by the wind.

- Artificial regeneration - Normally, loblolly and longleaf pine seedlings are planted on prepared sites by mechanized planters pulled by crawler tractors. In wetlands and areas having steep slopes, hand planting is used. Artificial seeding is done occasionally on areas intensively site-prepared for longleaf pine. This method of reforestation is usually done on deep sandy soils.

Approximately 1760 acres of loblolly and 390 acres of longleaf pine are scheduled to be planted annually, primarily in uplands. Approximately 325 acres will be naturally regenerated, primarily in bottomland hardwood species.

Although some of the higher quality slash pine stands on SRP are managed to rotation, many ice-damaged and diseased stands are regenerated to loblolly or longleaf pine prior to rotation age. Slash pine is extremely vulnerable to ice and wind damage, and to Fomes annosus and Fusiform rust diseases. Because of heavy losses in these slash pine stands in recent years, slash pine has been discontinued as a management type.

Timber Stand Improvement

Timber Stand Improvement (TSI), which includes release, precommercial, and noncommerical thinning, is the elimination or suppression of undesirable trees in favor of more valuable species. Thinning is done chemically, mechanically, or by hand to reduce competition and stimulate growth, thus increasing the total yield of the stand.

- Release - Release treatment frees young trees from competing vegetation by providing sunlight, nutrients, space, and moisture needed for development. Release is typically accomplished by injecting an approved herbicide into the stems of competing vegetation. About 400 acres of pine seedlings and saplings are released annually.

- Precommercial thinning - Precommerical thinning reduces the number of stems in young stands, below commercial size, to stimulate the growth of selected crop trees, and to increase the total yield of useful material from the stand. Precommercial thinning is needed only in a small number of naturally or artificially seeded pine stands.

- Noncommerical thinning - Noncommercial thinning reduces the stem density of young hardwoods without benefit of a commercial sale. Thinnings stimulate the growth of selected crop trees and increase the total yield of the stand. At present, the demand for poletimber-size hardwood is limited because of a weak hardwood pulpwood market.

Prescribed Burning

Prescribed burning is used to prepare sites for natural or artificial regeneration, and for other timber management purposes. These uses include (1) control of undesirable species development in pine stands in favor of grasses, legumes, and other vegetation for improvement of wildlife habitat, (2) reduction of fuel buildup on coniferous stands, and (3) control of brownspot disease on longleaf pine seedlings. Prescribed burning reduces the chance of destructive wildfires occuring on SRP land and damaging adjacent private forest lands, which normally have extensive fuel buildup due to a lack of prescribed burns.

Prescribed burning activities attempt to duplicate the role of fire in the history of southern forests, and are essential for perpetuating existing forest stock. Approximately 10,000 to 14,000 acres of upland forest are burned annually. Prescribed burning is occasionally conducted in floodplains and wetlands, but is limited to isolated stands of pine.

Smoke direction must be controlled to avoid contamination of the ventilation systems of SRP facilities. Weather conditions and wind patterns are monitored before and during controlled burns.

Wildlife Management

Wildlife management by the USFS is directed at featured game and nongame species, and at endangered species. The preservation and enhancement of habitat for the endangered red-cockaded woodpecker is the principal wildlife management program being conducted at the SRP by the USFS. In general, hardwood growth in woodpecker nesting colonies is suppressed by using fire or mechanical removal. Prior to the purchase of SRP lands, most red-cockaded woodpecker colonies occurred in less accessible bottomland conifer stands. However, as preferred habitats became unavailable, many lowland colonies became inactive. Recent USFS management activities have concentrated primarily in upland areas.

Other USFS management activities, including even-aged management, regeneration, and TSI, enhance wildlife habitat by increasing habitat diversity, edge effect, and temporary openings. Burnings specifically intended to regenerate wildlife forage are done annually on approximately 4000 acres. In addition, numerous hedgerows, abandoned homesites, orchards, Carolina bays, and other valuable wildlife habitats are protected.

Between 1965 and 1981, the USFS managed an annual public deer hunt to control the size of the herd at SRP. Although no habitat management programs were designed specifically to benefit deer, general forest management practices had led to an increase in the size of the herd from an estimated several dozen deer in 1951 to between 2000 and 4000 deer in 1983. The annual harvest was established to reduce the potential for habitat destruction and the incidence of deer-vehicle accidents. The hunt program is now managed by Du Pont.

The USFS also cooperates with the South Carolina Wildlife and Marine Resources Division in managing the wild turkey. The purpose of this program is to create a large, unhunted turkey population for use in the restoration of wild turkeys elsewhere in the State of South Carolina.

Beaver populations have increased markedly at SRP in recent years. Impounded water in beaver ponds has undermined secondary roads and railroads, and has killed several hundred acres of timber, primarily in upland areas. This damage requires financial expenditures for road repair and results in lost timber revenues. Following consultations with the U.S. Fish and Wildlife Service and the South Carolina Wildlife and Marine Resources Department, Du Pont contracted for a selective trapping program administered by USFS at 34 wetland areas in 1983 and 1984. During this period, 240 beaver were trapped and removed. This managment approach is designed to minimize damage to roads, railroads, and timber by controlling individual beaver populations on the SRP.

Soils Management

Soils management by the USFS includes reclamation of spoil piles and borrow pits that were created during plant construction, and protection of soils in forest management activities. Initial reclamation efforts were directed toward halting erosion, with eventual reconditioning of these areas to support tree growth and wildlife.

During the construction of facilities, roads, and dams, about 2000 acres of spoil piles and borrow pits were created. These areas were not revegetated and, in many cases, severe soil erosion resulted. In 1974, the USFS began efforts to revegetate these areas, and approximately 504 acres have been reclaimed. The ultimate goal is to restore the areas to a condition that will support tree growth. A temporary benefit, in addition to controlling soil erosion, is production of wildlife food. By the year 2000 all sites are expected to be productive.

Road Management

Forest Service responsibility includes road inventories and condition surveys, the development of annual work plans, and specifications for implementation by Du Pont (Traffic and Transportation Department). Du Pont is responsible for the management of both paved (primary) and nonpaved (secondary) roads and performs management activities with their personnel or subcontractors. The Forest Service also advises Du Pont crews performing work and evaluates results.

The SRP secondary road system is an extensive network of single-lane, nonsurfaced roads used by farmers and timber cutters prior to plant acquisition and of hastily constructed roads that serve nuclear production activities. The secondary road density on the Plant is approximately 1 mile per 189 acres. Of the 1018 miles of secondary roads on the SRP, 70 percent consist of woods roads, 16 percent are general-use roads, and 14 percent are powerline roads.

Secondary roads provide access to each forest compartment for prescription and fire management. Before conducting a timber sale and subsequent harvest, the Forest Service upgrades existing roads to handle logging equipment and haul vehicles. In some instances, new roads must be built. In general, new roads in wetlands and floodplains are either prohibited or minimized unless the construction of a permanent road can reduce impacts to sensitive areas used by harvest equipment. Stream crossings are avoided if access to both sides of a creek is available.

Periodic road maintenance includes grading to control erosion, ditching and ditch maintenance to control and channel runoff, and clearing debris from culverts to avoid washouts and flooding of upstream areas. Roadbanks are also stablized, fertilized, and planted to reduce erosion potential. Annual secondary road management will average approximately 120 miles of maintenance, 18 miles of reconstruction, and 3 miles of construction, to be implemented by Du Pont. USFS crews will stabilize road banks on recently constructed and reconstructed roads, and will control vegetation on approximately 30 miles annually.

Research Support

The Forest Service supports research for improving forest management practices specific to SRP by the Savannah River Ecology Laboratory (University of Georgia), the University of South Carolina, the Southeastern Forest Experiment Station, Clemson University, and others. Research has included experimental plantings to increase biomass production and disease resistance, the use of sewage sludge to reduce soil nutrient depletion, and the development of site rehabilitation strategies.

IV. AFFECTED ENVIRONMENT

The SRP Site

The Savannah River Plant occupies a 300-square-mile site along the Savannah River on the Upper Coastal Plain of South Carolina (Figure 1). SRP facilities include five nuclear production reactors (three currently operating), two chemical separations areas, a fuel and target fabrication facility, a heavy-water production facility (on standby), waste management operations, and support facilities. These facilities are used in the production of defense nuclear materials and occupy less than 5 percent of the total SRP area. Reservoirs, ponds, streams, and other water bodies occupy 6364 acres. Approximately 88 percent (169,358 acres) of the Plant is forested. Forest land that is currently managed covers 155,793 acres (81 percent). Unregulated forest land, which includes a major portion of the Savannah River swamp, totals 12,612 acres (7 percent); this area is not managed for a sustained yield of timber products. Some timber might be harvested from this area, but it will be incidental to other management objectives.

The elevation of the Savannah River Plant ranges from 90 to 400 feet above mean sea level (Dukes, 1984). The climate in the SRP area is temperate with mild winters and long summers. The average rainfall at the Plant from 1952 through 1978 was approximately 47 inches. Precipitation is greatest in March, and least in November (DOE, 1982).

Floodplains

In general, a floodplain is any land area susceptible to being inundated from any source of flooding. Flooding occurs primarily when the carrying capacity of the channel is exceeded, and can also occur when the channel is obstructed by vegetation, sediment, or other debris. Floodplains at SRP include those areas adjacent to the Savannah River, streams, and impoundments; all are part of the Savannah River basin, a major watershed in the southeastern United States (Dukes, 1984).

The flow of the Savannah River is almost completely controlled by multi-purpose storage reservoirs (Cooley and Farnworth, 1974). Clarks Hill and Hartwell Reservoirs provide power, flood control, and recreation to the Central Savannah River Area. These reservoirs and the New Savannah Bluff Lock and Dam, which is located 12 miles south of Augusta, Georgia, have stabilized the river flow near the Savannah River Plant to a yearly average of about 297 cubic meters (10,480 cubic feet) per second. Russell Reservoir, which is scheduled to start generating electrical power in November 1984, will further stabilize Savannah River flows.

Since 1963, it has been the intent of the U.S. Army Corps of Engineers to maintain a minimum flow of 178 cubic meters (6300 cubic feet) per second 80 percent of the time below the Savannah Bluff Lock and Dam at Butler Creek (COE, 1981). During periods of low precipitation, releases from Clarks Hill Lake will be reduced and flows at the New Savannah Bluff Lock and Dam could become less than the 164 cubic meters (5800 cubic feet) per second required for navigation. During the 1981 drought, the 7-day low flow was about 138 cubic meters (4900 cubic feet) per second.

In the vicinity of the Savannah River Plant, the Savannah River overflows its banks (or its 3-meter-high levee bordering the swamp) when river elevations rise higher than 28 meters (91 feet) above mean sea level. This river stage initiates flooding of the SRP Boat Dock (Ellenton Landing), and corresponds to a flow of 439 cubic meters (15,490 cubic feet) per second. Records taken at the Boat Dock indicate that the SRP wetlands bordering the Savannah River have been flooded approximately 22 percent of the time (Dukes, 1984). Although floods can occur in any season, they are most likely to occur during February through March and in connection with tropical storms and hurricanes from August through October (COE, 1981).

Executive Order 11988 requires that the base floodplain be used when evaluating Federal actions. The base floodplain is the area that, during any given year, has one chance in 100 of being inundated (i.e., the 100-year flood). The SRP has a base floodplain (compiled from USGS quadrangle maps) that covers approximately 37,128 acres (Figure 3). It is associated primarily with the Savannah River and five principal streams that drain the Plant site. Nearly half (46.6 percent) of the SRP base floodplain is adjacent to the Savannah River; the remainder occupies the corridors of Upper Three Runs Creek (19.0 percent), Lower Three Runs Creek (17.3 percent), Par Pond (8.3 percent), Steel Creek (4.6 percent), Four Mile Creek (2.4 percent), and Pen Branch (1.7 percent).

The base floodplain map shown in Figure 3 is a composite of U.S. Geological Survey quadrangle sheets prepared before the construction of the Russell Reservoir. The flood control storage of this reservoir, which is equivalent to 3.22 inches of runoff from the drainage area, compensates for the effect of the loss of natural valley storage because of the permanent reservoir storage. This ensures that flood discharges are not increased by Russell Reservoir.

Wetlands

The SRP contains extensive, widely distributed wetlands, most of which are associated with floodplains, creeks, and impoundments. The southwestern plant boundary adjoins 17 miles of the Savannah River, which has a floodplain that supports an extensive swamp forest. This swamp, which covers approximately 7462 acres, is separated from the river by a natural levee. Timber was cut in the Savannah River swamp in the late 1800s. The present Savannah River swamp forest consists of second-growth cypress, gum, and numerous hardwood species (Sharitz, Irwin, and Christy, 1974). Six major streams drain the SRP and eventually flow into the Savannah River. Upper Three Runs and Lower Three Runs Creeks flow directly into the river. Beaver Dam Creek, Upper Four Mile Creek, Pen Branch, and Steel Creek drain into the swamp, where their flows merge and discharge into the river at the mouth of Steel Creek. The Savannah River swamp and other wetland types such as Carolina bays, bottomland hardwood forest, scrub-shrub, and emergent wetlands provide an interspersion of structurally diverse and productive wetland communities.

Several studies have been conducted in wetlands on the SRP. Hoy (1953) provided a historic perspective, and listed some of the dominant arborescent flora of the swamp. A listing of the flora in bottomlands bordering the Savannah River swamp betweeen Pen Branch and Steel Creek was compiled by Swails

et al. (1958). Welbourne (1958) examined the wetlands vegetation of Steel Creek. Recent studies, which have focused primarily on the effects of thermal effluent discharge on the vegetation of SRP streams, include those by Sharitz, Irwin, and Christy (1978), Sharitz, Gibbons, and Gause (1974), Martin et al. (1977), Christy et al. (1980), and Repaske (1981). Relatively few studies have examined the distribution and structure of wetland communities on the SRP. Shields (1980) studied the distribution and abundance of ponds and Carolina bays on the SRP, and Jones et al. (1981) provided a key to forest community types, including successional trends in upland and lowland forests. Whipple, Wellman, and Good (1981) described the compositional variation in the old growth forests along the Savannah River and Upper Three Runs Creek. Jensen, Christensen, and Sharitz (1984) prepared a map of the vegetation in the Savannah River swamp. Previously, however, a comprehensive assessment of the distribution and classification of wetland communities on the SRP has been unavailable.

The distribution of wetlands on the SRP as determined from aerial photography and Landsat thematic satellite imagery is shown in Figure 4 (inside back cover). The computerized data base generated from the remote sensing showed that approximately 97 percent of the SRP is forested, 20 percent contains wetlands, and 4 percent is used for production areas and roads (Table 1). Wetlands, which covered 39,251 acres, were partitioned into four categories: (1) forest wetlands consisting of cypress-tupelo (2.9 percent) and bottomland hardwoods (13.5 percent), scrub-shrub wetlands (1.0 percent), emergent wetlands (0.8 percent), and water (2.3 percent).

Table 1. Land use/cover classes of the SRP

Land Use/Cover Class	Acres	Percent
Roads	4,100	2.1
Production areas	3,125	1.6
Clear areas/power lines	11,179	5.8
Upland pine/hardwood	135,073	70.0
Wetlands		
Bottomland hardwoods	25,931	13.5
Cypress-tupelo	5,505	2.9
Scrub-shrub	1,852	1.0
Emergent	1,552	0.8
Water*	4,411	2.3
Total	192,728	100.0

*Includes Savannah River

The most common and abundant wetlands category is bottomland hardwoods, which covers 25,931 acres or 66 percent of all wetlands (Table 1). Sharitz, Gibbons, and Gause (1974) described the undisturbed portions of the Savannah River swamp forest as being dominated by bald cypress and tupelo gum in the low areas, and along stream channels by red maple, water ash, water elm, and other bottomland hardwoods in higher areas. Whipple, Wellman, and Good (1981) associated bottomland hardwood forest on sites where flooding was of limited depth and

primarily restricted to the late winter and early spring. Canopy dominants of several stands of bottomland hardwoods along Upper Three Runs Creek included sweet gum, water oak, laurel oak, ash, sycamore, hackberry, American elm, tupelo gum, bald cypress, and red maple. Numerous other hardwood species also occurred in the canopy and the understory.

The second most abundant wetland category was cypress-tupelo, a wetland community that exists primarily in the deeper parts of the Savannah River swamp (Whipple, Wellman, and Good, 1981). Stands of this community are characterized completely or nearly completely by cypress and tupelo. This wetland type occupies 5505 acres, and is inundated most or all of the year (Whipple, Wellman, and Good, 1981).

Scrub-shrub wetlands covered approximately 1852 acres, and have been quantitatively measured by Smith, Sharitz, and Gladden (1981) along Steel Creek. These dense shrub communities were characterized by button bush, willow, and alder. This wetland type bordered the stream channels and at places extended across the width of the floodplain. Although this description is based on studies of Steel Creek, a formerly impacted stream that has undergone 15 years of successional recovery, other scrub-shrub wetland types can be assumed to be structurally similar.

Emergent wetlands include persistent and nonpersistent flora. Smith, Sharitz, and Gladden (1981) described the persistent wetland community as being dominated by dense grasses and forbs with scattered low shrubs. Nonpersistent wetland communities were dominated by smartweed, cattail, burreed, Canada rush, and sugar-cane beardgrass. This wetland type occupies about 1552 acres on the SRP (Table 1).

V. ENVIRONMENTAL CONSEQUENCES

This section briefly characterizes various environmental parameters (i.e., soils, water quality, air quality, etc.) on the SRP and assesses the environmental consequences of the proposed action (i.e., the continuation of existing forest management activities). This approach is intended to provide a context in which relative impacts can be assessed.

Soils

The soils of the SRP were formed from coastal plain sediments predominantly from the tertiary period and from alluvial sediments of a more recent geologic age. The soils formed from the coastal plain sediments are predominantly well drained to excessively drained with sandy surfaces and sandy clay loam subsoils.

The soils formed from alluvial sediments are generally high in silt and clay in the surface and subsurface layers. Surface layers are predominantly loamy fine sand to loam with most subsurface textures ranging from sandy clay loam to silty clay. Alluvial and stream terrace soils comprise about 18 percent of the total SRP acreage and over half of these are somewhat poorly to very poorly drained.

Soil pH typically ranges between 4.0 and 5.0. Although most soils are low in plant nutrients, they usually respond well to fertilization. Soil characteristics that limit forest management activities are wetness, flooding, droughtiness, and potential erodibility. Excessively wet soils comprise about 11 percent of the total Savannah River Plant area. In general, these soils are very productive to timber, but they present problems in harvesting, regeneration, and access.

About 6 percent of the soils in the Savannah River Plant area have a severe erosion hazard. These occur mostly on slopes greater than 6 percent. For the most part, these soils are presently uneroded, but have the potential to erode if laid bare for any long period of time. Most of these soils are fairly productive for timber, but harvesting, regeneration, and road construction present erosion control problems. Included in the severe erosion hazard group are about 2000 acres of borrow pits and spoil areas. Most of these are not revegetated and are eroding.

Forest management activities in floodplains and wetlands cause localized soil disturbance and compaction, which result in soil movement and some sediments reaching streams. Proper logging practices reduce soil movement to offsite areas. Soil erosion is generally very minimal and temporary. Compaction of soils is minor, except for areas used for loading logs and skid trails. Where possible, these areas are located outside floodplains and wetlands. Logging under conditions of excessive soil moisture on many soils can cause severe rutting, and temporary damage to soil structure by compaction, and can impede soil permeability.

About one-third of the SRP consists of droughty sandy soils. Timber productivity on these soils is fairly low. Although harvesting presents no major problems, regeneration is difficult because seedling mortality is generally high.

Protection of soils from erosion or compaction is an essential component of all forest management activities at the SRP. This is most critical in wet areas and along steep slopes. The USFS Wet Area Logging Guide (Appendix A) lists specific requirements for the protection of soils, with restrictions on the time of year that harvests are allowed to ensure drier conditions, and on the depth and extensiveness of rutting. Daily monitoring by USFS personnel of all logging operations in wet areas is also required by the wet area logging guide. If erosion begins, the USFS takes immediate corrective action. Similar measures are used to protect soils during reforestation and timber stand improvement activities.

Road construction and maintenance will also cause some impacts to soils. Localized soil movement can be expected while work is in progress due to soil exposure while cutting, filling, and shaping road surfaces.

Soil nutrient loss is a continuous natural process in forests due to leaching. Such losses are temporarily accelerated by timber harvesting. Minor nutrient losses also result from the removal of wood fiber and slash from the site. These losses are negligible in terms of long-term site productivity.

Water Quality

Forest management activities in floodplains and wetlands that potentially affect water quality are road construction and maintenance, timber harvest, and, to a lesser extent, site preparation for planting, timber stand improvement, and prescribed burning. Water quality impacts that result from these activities could lead to increased runoff and erosion, sedimentation, nutrient loading, and elevated temperatures of adjacent water bodies.

Road construction within floodplains, at stream crossings, and adjacent to wetlands contributes the greatest amount of sediment through the disturbance and subsequent erosion of unstable soils. Secondary impacts of sedimentation include increased turbidity, temperature, oxygen demand, and stream channel degradation and aggradation. Road maintenance consisting of grading or ditch rehabilitation can also lead to increased sedimentation.

Vegetation removed during clearcutting, site preparation, or TSI can result in soil disturbance and erosion, increased runoff, and the accumulation of plant materials that are transported to water bodies following heavy precipitation or flooding. Removal of vegetation shading the water bodies could also lead to an increase in exposure to sunlight and, if additional nutrients are available, potentially degrading algae blooms.

Trees and associated vegetation within watersheds influence water yield through transpiration of soil water, interception of precipitation with subsequently higher evaporation, and modification of precipitation distribution. Runoff and erosion would increase with the loss of ground cover.

Depending on the slope aspect and elevation of timber removal near a stream, streamflow might increase, the time of peak runoff might be shifted, or the base of the peak flow period might be broadened. If water yields become

excessive, erosion from adjacent slopes or the stream channel will impact water quality. Channels unable to carry an increased sediment load might experience additional impacts such as scouring, head cutting, or bar formation.

Impacts to water quality in floodplains and wetlands are expected to be minimal, short-term, and usually associated with increased sedimentation. Harvesting is usually limited to blocks less than 40 acres; wide filter strips are employed. In accordance to SRP wetland logging guides, the use of heavy equipment and skidding near streams is controlled, roadbuilding in sensitive areas is limited, slash is prohibited from entering streams, and site restoration is undertaken as soon as possible following a harvest or other activity.

Air Quality

The effects of forest management activities on the air quality of floodplains and wetlands can result from two major sources, equipment exhaust emissions and fires. Any management or harvesting activity that requires the use of motorized equipment will cause a short-term deterioration of local air quality that is expected to dissipate following completion of the activities. Vehicle exhaust can contain measurable quantities of carbon particulates, carbon monoxide, nitrous oxide, lead, and ozone.

Between 1954 and 1983, 739 wildfires burned 9921 acres on the SRP. The total dollar value of the damage was approximately $171,601. Prescribed burns are conducted to reduce available fuel and, thus, the likelihood of destructive wildfires. Because prescribed burning for timber stand improvement and site preparation is done under stringent controls and with close observation of weather patterns and local ground conditions, serious reductions in air quality are generally avoided.

Vegetation

The phytogeography of Georgia and South Carolina includes three principal forest types. Associated with the Piedmont is the oak-hickory-pine forest, whereas the southern mixed forest overlies the coastal plain (Kuchler, 1964). Dominant canopy species of the oak-hickory-pine forest include hickory, shortleaf and loblolly pine, white oak, and post oak. Beech, sweetgum, magnolia, slash and loblolly pine, white oak, and laurel oak characterize the canopy of the southern mixed forest. The southern floodplain forest, which adjoins major rivers such as the Savannah, typically consists of tupelo, numerous species of oak, and bald cypress.

The SRP is near the line that divides the oak-hickory-pine forest and the southern mixed forest. Consequently, species representative of each occur. In addition, vegetation has been influenced strongly by farming, fire, edaphic features, and topography. There is no virgin forest in the region (Braun, 1950). Except for SRP facilities, many previously disturbed areas have been reclaimed by natural plant succession or have been planted with pine by the Forest Service.

The vegetation of the floodplains and wetlands of the SRP should not be adversely impacted by the proposed forest management activities. Under the proposed action, the Savannah River swamp, which is the largest contiguous expanse of wetlands on the SRP (Compartment 92, Figure 2), is excluded at the request of DOE from any forest management activity. The forested wetlands that would be impacted are associated primarily with streams and tributaries.

Approximately 400 acres of bottomland hardwoods are slated for clearcutting annually under the Timber Management Plan (1979-1988). The environmental consequences of this action are short-term, and include the following: (1) if permitted to revegetate naturally, cleared areas will probably be colonized by shade-intolerant, pioneer species, thus, providing habitat for wildlife that prefer early successional stages; (2) existing forested vegetation will be eliminated, increasing the potential for erosion and increased water runoff; and (3) the reduction in transpiration caused by the removal of trees might result in an undesireable elevation of the water table. No emergent wetlands are expected to be impacted.

Fisheries and Wildlife

Like other typical southeastern coastal plain rivers and streams, the Savannah River and its associated swamp and tributaries have a diverse fish fauna. Descriptions of the fishes of the Savannah River have been included in many ecological studies during the last 30 years. Matthews (1982) reviewed studies published by the Academy of Natural Sciences of Philadelphia between 1951 and 1976. The results of fisheries studies in the river near the Savannah River Plant were reported by McFarlane, Frietsche, and Miracle (1978) and Dudley, Mullis and Ferrell (1977). Additionally, the Georgia Game and Fish Division (1982) reported on an electrofishing survey conducted at 24 locations in the Savannah River between the New Savannah River Bluff Lock and Dam and Port Wentworth. Data on anadromous species, many of which are important in the Savannah River, were compiled by Rulifson, Huish, and Thoesen (1982).

A diversified and abundant wildlife population including amphibians, reptiles, birds, and mammals inhabit floodplains and wetlands of the SRP. Because of its temperate climate and numerous aquatic habitats, the SRP site contains a diversified and abundant herpetofauna. Species having zoogeographic ranges that include the Savannah River Plant include 17 salamanders, 26 frogs and toads, 10 turtles, 1 crocodilian, 9 lizards, and 31 snakes (Conant, 1975). Many additional species have ranges that are peripheral to the site, and could also occur here. Gibbons and Patterson (1978) provide an overview of the herpetofauna of the entire Savannah River Plant, including comments on relative abundance and peripheral species accounts.

Birds of the floodplains and wetlands include residents, which inhabit SRP environs year round, and migrants, which use the area enroute to their breeding and wintering grounds. Several species either winter or breed in the area. Habitat affinities of birds range from cavity-nesters such as wood ducks to red-winged blackbirds, which typically nest among emergent cattails. These species-specific attributes, the isolation of the SRP site from the public, and its proximity to the Atlantic Flyway, all contribute to an abundant and diversified avifauna.

More than 40 species of mammals have zoogeographic ranges that include the SRP (Burt and Grossenheider, 1976; Golley, 1966); 25 of these are known to occur in the vicinity of the proposed action. The raccoon, white-tailed deer, opossum, beaver, feral pig, and river otter are perhaps the most abundant mammals that inhabit the floodplain and wetlands of the SRP.

Forest management activities that pose the greatest potential impact to wildlife in floodplains and wetlands are timber harvesting and the trapping of beaver. The principal direct, short-term impact to forested wetlands results from clearcutting. This forest management practice removes vegetation from areas as large as 40 acres in size, thus temporarily eliminating food and cover for the wildlife living there. The long-term, indirect impact, however, is the enhancement of wildlife habitat diversity through the creation of variously aged stands interspersed among the forest ecosystem. The regeneration and development of habitat structure following the clearcutting of a typical hardwood stand in a southeastern forest is described by Holbrook (1974). After clearcutting, site preparation and establishment of a new stand can take up to 5 years. This stand provides food in the form of grass, legumes, weed seeds, insects, fruit from low shrubs, and browse. Cover is available through herbaceous and shrub species. The second phase of development might require between 5 and 10 years, and is characterized by seedlings and saplings. Associated with this stage is high fruit production and cover through dense coppice reproduction. The third phase can occur between 10 and 25 years after harvest. Referred to as pole stands, this stage is characterized by dense immature trees; the understory is typically sparse, and food resources are scarce (i.e., no mast or fruit). Immature saw timber usually develops between 25 and 50 years. This habitat typically supports productive understories that provide abundant food and cover for wildlife. Trees are usually not mature enough at this stage to provide dens for cavity nesting species. After 50 to 80 years following clearcutting, mature sawtimber develops. Food is available from the production of mast, understory browse, and fruit. Dens are available in the mature trees that characterize the forest. Thus, the creation of even-aged stands at various stages of successional development is a positive impact to wildlife because it provides greater habitat dispersion, food, and cover.

The trapping and removal of beaver are road and timber damage control measures that directly impact local beaver populations. This forest management practice indirectly impacts other wildlife because it eliminates or deteriorates aquatic habitat (i.e., beaver ponds). Beaver ponds are used by numerous species of aquatic and semiaquatic species such as salamanders, frogs, wading birds (herons), and other mammals such as the otter and mink. This practice, however, does not jeopardize the large beaver population present on the SRP, nor does it significantly reduce the availability of aquatic habitat.

Endangered and Threatened Species

The Endangered Species Act of 1973 (Public Law 93-205) is administered by the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) with cooperating states and other Federal agencies, and affords protection to some 300 species of native American plants and animals. A species can be federally listed under either of two categories, endangered or threatened, depending on its status and the degree of the threat posed to it. When a species is proposed for endangered or threatened status, areas essential to its

survival or conservation are also proposed as "critical habitat," when appropriate. Compliance with the Endangered Species Act requires Federal agencies to consult with the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service on potential impacts and mitigation and to conduct a biological assessment of any listed or proposed species that might be present in the area of the proposed action.

In addition to the Federal list, the State of South Carolina also recognizes and affords protection to fauna in accordance with the South Carolina Nongame and Endangered Species Conservation Act of 1974. However, the State does not afford protection to flora other than federally protected species.

This section addresses those species that inhabit floodplains and wetlands on the SRP, and are protected by Federal listings. [For unprotected taxa such as those of "special concern" or "peripheral," consult Forsythe and Ezell (1979) and Rayner et al. (1979).]

The shortnose sturgeon is listed by the Federal Government as an endangered species in the United States (USDOI, 1983). The species is found only on the east coast of North America in tidal rivers and estuaries. Prior to 1982, the shortnose sturgeon had not been reported in the middle reaches of the Savannah River in the vicinity of the Savannah River Plant. However, shortnose sturgeon larvae were found in ichthyoplankton samples collected in the Savannah River above Upper Three Runs Creek and the 3G pumphouse intake canal as part of the Savannah River Biological Measurement Program (ECS, 1983). Although this species occurs within the floodplain of the SRP, forest management activities will have no effect on the continued existence of the species. Consultation with the NMFS regarding SRP activities and their affect on the shortnose sturgeon was completed in 1983; NMFS concluded that ongoing operations at SRP do not affect this species.

The American alligator, an inhabitant of wetland ecosystems in the Southeast, was threatened with extinction in the 1950s and 1960s. It is listed as endangered by the Federal Government (USDOI, 1983), and as threatened by the State of South Carolina. The SRP is near the northern limit of the alligator's range; in this region, winter temperatures probably restrict its distribution.

Studies of the fauna of the SRP site (Freeman, 1955; Jenkins and Provost, 1964) indicate that the alligator has always been a resident of the area. Its abundance probably increased following closure of the area to the public. This isolation afforded protection from hunting for several years before such protection was provided legally.

The alligator is locally common on the SRP and breeds in Par Pond and the Savannah River swamp. Murphy (1981) reported sightings of alligators in the Savannah River swamp and in the major SRP streams. Alligator breeding habitat with documented nests exists along the backwater lakes and in the swamp associated with Beaver Dam Creek, which enters the swamp several kilometers upstream from Steel Creek. Although much of Steel Creek and the Savannah River swamp do not contain vast areas of optimum alligator habitat, patches of quality habitat are present. There are beaver ponds and Carolina bays near the river swamp or creek floodplain margins, open-water oxbow lakes, and open-canopied, marshy

areas typical of productive alligator habitat described by Joanen (1969), Joanen and McNease (1970), and Smith, Sharitz, and Gladden (1981, 1982). Forest management activities in floodplains and wetlands are not expected to adversely impact the American alligator.

The wood stork, which is the only "true" stork to nest in the United States, has experienced a 75-percent decline in its population since the 1930s. It is classified as endangered by the State of South Carolina and the U.S. Fish and Wildlife Service (USDOI, 1984). They currently nest only in Florida, Georgia, and South Carolina. The Birdsville rookery in Jenkins County, Georgia is the most northern in the United States; it was discovered in July 1980. Wood storks do not nest at SRP.

The wood stork forages in the Savannah River swamp at SRP. In 1983, a total of 478 wood stork observations was made. Surveys showed that large concentrations of wood storks foraged in the swamp near the Steel Creek and Beaver Dam Creek deltas. Small numbers were also recorded for the Four Mile Creek and Pen Branch deltas. Forest management activities are not expected to produce adverse impacts on this species.

The endangered red-cockaded woodpecker population historically nested in open pine stands in wetlands. Encroachment of hardwood species resulted in the deterioration of habitat quality, and nesting declined. Currently, there are no known active colonies of this species inhabiting floodplains and wetlands on the SRP; forest management activities in SRP floodplains and wetlands are not expected to adversely impact this species.

Archeological and Historic Resources

Archeological and historic resources that occur within floodplains and wetlands on the SRP include sites along the various rivers and streams, building sites from former communities, old cemeteries, and natural areas of interest such as Carolina bays, the Savannah River swamp, and ecological research areas. Forest management activities that involve ground alteration could impact archeological and historic sites. Activities conducted in an area of cultural or ecological importance can reduce the character of the visual setting or affect the uniqueness of the site. Potentially damaging activities under the direction of the USFS include site preparation for planting, harvesting, and log-skidding, and road construction to a harvest site. Road construction, skidding, and loading pose the greatest potential for impacting archeological resources. Other forest management activities are probably no more severe than those resulting from former agricultural practices (plowing, disking, etc.).

The Institute of Archeology and Anthropology (IAA), University of South Carolina, has identified sites of archeological, historic, or cultural significance. With the exception of gristmills, most of the sites known to contain archeological resources are located along the terraces on the edges of floodplains and wetlands and at the confluences of streams. IAA analyses to date indicate that approximately 68 percent of all significant archeological sites occur within 984 feet (300 meters) of water. The association of archeological sites with stream confluences is futher corroborated by the fact that 67 percent of the significant sites on SRP occurred within this same distance (i.e., 984 feet) from streams having numerous feeder tributaries. Regular

forest management, road construction, and timber harvest activities are implemented with full awareness and protection of the marked areas. Any forest management activity planned for an area having resources of archeological or historic interest will be reviewed and monitored by an SRP archeologist. Important or unique natural areas are also avoided by forest management activities. One potential benefit of conducting forest management activities within floodplains and wetlands would be the discovery and identification of important but previously unknown sites.

Socioeconomics

Between 1955, when the first timber sale was made, and 1983, approximately $16.6 million of timber was sold, with $15.1 million of timber actually harvested. With the exception of 1959 when no timber was cut, an average of $571,885 in revenues has been returned to SRP each year during this period. This compares with an average annual budget of $463,000 over the same period, and a total of $19.8 million for FY 1981 - FY 1990. Thus, since 1955 the production of commercial timber at the SRP has compensated the expenditures resulting from USFS forest management operations, and returned a cumulative profit of $457,123 to the Department of Energy.

Because the majority of the high-value tree species are maintained in plantations in the upland areas of the SRP, most of the revenues generated by the harvests have not been from floodplain or wetland forests. The current value for hardwood pulpwood is $3.00 per cord and $80 per thousand board feet for hardwood saw timber. This compares to $28 per cord for pine pulpwood and $165 per thousand board feet for pine sawtimber. Thus, pine pulpwood is about 9 times more valuable than hardwood pulpwood; pine sawtimber is about twice as valuable as hardwood sawtimber. Based on these values and assuming the harvest of 400 acres of bottomland hardwoods, the total amount of dollars generated annually would be about $10,272 for hardwood pulpwood and $136,960 for hardwood sawtimber. This represents an average annual yield of $147,232 or about 11 percent of the timber sold in 1983.

Current forest management activities provide 24 full-time Federal jobs, 15 part-time jobs usually held by local people, and assistance for 26 cooperative research projects. More than 50 percent of the 1982 operating budget of nearly $2 million was spent on fixed-price contracts, research support, and Du Pont support. Most of the persons directly employed by the USFS are or have become local residents, whose purchases and taxes help support local communities.

In addition, approximately 100 persons are employed by logging contractors during harvest, and employment opportunities are provided by several support industries including five sawmills, five papermills, one plywood plant, and one wood preserving plant, all of which receive raw materials from the SRP.

Capital expenditures involved in forest management, including periodic replacement of vehicles and heavy implements used in TSI, support equipment, and supplies can also come from local contracts or bids, benefitting distributors and retail businesses as well as national manufacturers.

Forest management activities provide experience, training, and income for both Federal and other employees. Research support in a number of areas benefit

the Forest Service, the scientific community, and other social and business institutions. Federally assisted manpower programs, including the Senior Community Service Employment program, public information programs and newsletters, and assistance with the popular deer hunts have also paid important social dividends to both the SRP and the USFS.

The production of forest products has been planned to provide a stabilizing influence on the economy of the surrounding region, while providing a number of employment opportunities for local residents. Furthermore, the types of activities conducted by the USFS generally do not require the importation of job skills that are not readily available locally or within the region, avoiding problems of immigrating populations. With a 1983 DOE book value of the forest resource of nearly $92 million and a continuing high national demand for wood products, the managed Savannah River forest will probably be able to contribute an increasing proportion of both the raw material and economic needs ranging from local communities to the national level.

VI. ALTERNATIVES

Alternative forest management activities that were evaluated include (1) no action, (2) custodial management, (3) uneven-aged management (single tree selection), (4) even-aged management with shorter rotations, and (5) even-aged management with longer rotations. This section discusses these alternatives and their environmental consequences.

No Action

This alternative would exclude any forest management activities within floodplains and wetlands. The forests of floodplains and wetlands would undergo the process of natural succession. Given the absence of timber harvesting, there would be no need for site preparation, reforestation, timber stand improvement, or other activities described for the proposed action.

Under this alternative, floodplain and wetland vegetation would undergo structural changes as a result of natural conditions such as wind, icing, fire, lightning, insects, disease, flooding, and other phenomena. Openings created by these events would be colonized by shade-intolerant species and subsequently dominated by shade-tolerant species. Habitat diversity would be reduced under this alternative because there would be no early successional communities and edges resulting from timber harvesting practices.

The absence of wildlife management in floodplains and wetlands would permit the beaver population to increase, creating new aquatic habitat and increasing damage to roads and timber. There would be no direct adverse impacts to endangered and threatened species that inhabit floodplains and wetlands.

This alternative is not considered to be practicable because it is inconsistent with forest resources management objectives, and precludes the use of timber resources. Additionally, this option has the potential to significantly increase damage to roads and timber due to unmanaged beaver populations.

Custodial Management

This alternative is designed to maintain the floodplains and wetlands of the Savannah River in a near natural state. No management activities would occur in floodplains and wetlands except the salvage of timber killed or damaged by fire, insects, disease, wind, and ice. Limited reforestation might be required. Neither timber stand improvement work nor prescribed burning would be performed.

Custodial management would favor the development of large, mature bottomland hardwood forests with relatively open understories. This alternative would not be labor intensive nor would it require large capital expenditures. There would be minimal soil disturbance and adverse impacts to the watershed because timber management activities would consist of occasional timber removal and limited road reconstruction. Water quality would be unaffected.

As the health and vigor of overly mature trees decline and natural mortality occurs, there is increased susceptibility to disease and insect infestation, which affects the quantity and quality of timber. The diversity of wildlife habitat would decrease because openings and edge effect would not be created by timber harvesting. The lack of prescribed burning would permit the buildup of unincorporated organic matter. However, this should not increase the potential for wildfire in wetlands because of moist conditions. The potential for wildfire in floodplains is appreciably greater than in wetlands.

Implementation of this alternative would also be inconsistent with the management objectives for SRP forest resources. The diversity and dispersion of early successional wildlife habitat would be decreased, and the potential for beaver to damage roads and timber would increase. This alternative, therefore, was considered to be less practicable and was rejected.

Uneven-Aged Management; Single Tree Selection

An uneven-aged forest stand contains trees of all ages and size classes. In the single tree selection method of reproduction, single mature trees are removed at relatively short intervals. Cuttings are repeated indefinitely to maintain or create uneven-aged stands. Concurrent thinnings control stocking and improve growth of the stand. Under this method, there is no mechanical site preparation. Natural reproduction would be relied upon for establishing new trees. This management approach favors the establishment of shade-tolerant species (e.g., dogwood, beech, bay, holly, and winged elm), many of which are less desirable for timber. Because harvesting is done more frequently, this alternative would necessitate managing a greater number of forest stands.

The forest openings created by selecting single trees would provide less herbaceous forage for wildlife than even-aged management. Also, regeneration of mast producing species would be reduced because oaks and hickories are typically shade-intolerant.

Stands are logged more frequently under uneven-aged management, which increases negative impacts on water, soil, and residual vegetation primarily because the additional roads required to support this harvest system would increase soil compaction and surface area runoff.

Logging under the single-tree selection method is both difficult and expensive (Smith, 1964). Management costs increase because more areas must be worked in any one year, and more complicated forest regulation techniques are required. Reforestation and timber stand improvement work must be done by hand.

This alternative is not considered to be practicable because (1) logging is difficult and expensive, (2) more frequent harvests require more roads, producing greater impacts to soils and water quality, and (3) when markets are poor and logging expensive, only the largest and best trees can be cut profitably.

Even-Aged Management - Shorter Rotations

Even-aged management with shorter rotations, especially on the more productive sites, would require intensified timber management. Rotation age would be set at the culmination of mean annual cubic foot growth, which would be about 50 years for bottomland hardwoods. High quality sawtimber products would be sacrificed to maximize fibre production. Mechanical site preparation would be restricted because moist soils would not support heavy machinery. The rate of timber harvest, reforestation, and related site preparation would increase because of the shorter rotations. This would result in increased clearcutting.

Clearcutting with shorter rotations maximizes fibre production in comparison to the proposed action. Also, a higher return would be achieved per dollar invested primarily because of simplified management. This system is beneficial to species such as turkey, deer, and other wildlife that use early successional habitats for food and cover. The production of fiber benefits pulpwood operations and industries that use small roundwood.

The rate of regeneration cutting and site preparation would be significantly greater than that of the proposed action. This would result in increased impacts to soils, and could cause a proportionate increase in soil erosion and stream turbidity. Visual resource protection would be sacrificed for timber production.

Intensified timber management would require cutting more acres annually, thus reducing the number and variety of forest stands available for other uses. Coordination of research and timber management activities would be more difficult to control. This management alternative would not conform to the objective for NERP in providing both protection and allocation of land for ecological research.

This alternative was evaluated because a large amount of land similar to SRP is being managed with this objective. This alternative, however, would not meet the Forest Service's timber management objective of growing sawtimber or the multiple-use management objectives of the SRP Land Use Plan and the Forest Management Program. Implementation of this alternative is not considered practicable.

Even-Aged Management - Longer Rotations

Another alternative is even-aged management with longer rotations. A rotation age of 100 years for bottomland hardwoods would decrease the frequency rate of timber harvest, regeneration, and related site preparation. Thus, fewer areas would be clearcut.

Less annual acreage of regeneration cutting and site preparation would reduce adverse impacts to soils, air, and water quality. Longer rotations favor the development of stands characterized by large, mature trees, and an open understory. Herbaceous ground cover would typically be sparse. Also, fewer visual impacts would be caused due to fewer regeneration cuts.

Longer rotations would produce large, high-quality sawlogs. Some timber might be undesireable for industrial use because of its large size; the availability of small roundwood would be reduced. Increased age will also produce trees of reduced vigor and decrease annual volume growth. Also, overly mature trees are more susceptible to disease and insect attack.

This alternative would lower the economic return because the frequency and magnitude of timber harvesting would be reduced. This alternative also favors wildlife species such as the wild turkey, squirrel, cavity nesters, and other wildlife that prefer mature forests with sparse understories. Wildlife that inhabit more densely stocked habitats and those associated with early successional stages would not benefit from this option. This alternative also fails to provide for the sustained yield of timber, and is therefore not considered to be practicable.

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VIII. GLOSSARY

Base Flood	That flood which has a 1 percent chance of occurrence in any given year (also known as a 100-year flood).
Critical Habitat	Specific areas within the geographical area occupied by a species, at the time it is listed, on which are found those physical or biological features (a) essential to the conservation of the species and (b) which may require special management considerations or protection.
Edaphic Factors	The conditions due to the physical or chemical nature of the soil or water or in whatever medium plants grow.
Emergent Marsh	Wetlands characterized by erect, rooted herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present during most of the growing season, and is usually dominated by perennial plants.
Endangered Species	A species or subspecies which is in danger of extinction throughout all or a significant portion of its range.
Even-aged Stand	A stand of trees that are all the same age or at least of the same age class; a stand is considered even-aged if the difference in age between the oldest and youngest trees does not exceed 20 percent of the length of the rotation.
Even-aged Management	The system where trees of the same age and characteristics are grown together in stands from the time of regeneration to the time of final harvest.
Flood or Flooding	A temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland and/or tidal waters, and/or the unusual and rapid accumulation or runoff of surface waters from any source.
Floodplain	The lowlands adjoining inland and coastal waters and relatively flat areas and floodprone areas of offshore islands including, at a minimum, that area inundated by a 1 percent or greater chance flood in any given year. The base floodplain is defined as the 100-year (1.0 percent) floodplain. The critical action floodplain is defined as the 500-year (0.2 percent) floodplain.
Floodplain/Wetlands Assessment	An evaluation consisting of a description of a proposed action, a discussion of its effects on the floodplain/wetlands, and consideration of alternatives.

High Hazard Areas	Those portions of riverine and coastal floodplains nearest the source of flooding which are frequently flooded and where the likelihood of flood losses and adverse impacts on the natural and beneficial values served by floodplains is greatest.
Minimize	To reduce to the smallest degree practicable.
Practicable	Capable of being accomplished within existing constraints. The test of what is practicable depends on the situation and includes consideration of many factors, such as environment, cost, technology, and implementation time.
Primary Roads	These are paved two and four lane roads, providing access to the SRP and all major facilities.
Rotation	The period of years required to grow a crop of timber to a specified condition of either economic or natural maturity.
Secondary Roads	Aggregate and non-surface arterial collector and local roads. Includes general use roads, powerline roads, and woods roads.
Scrub-Shrub	Includes wetlands dominated by woody vegetation less than 6 meters tall. Species include true shrubs, young trees, and trees or shrubs that are small or stunted.
Stand	A contiguous group of trees sufficiently uniform in species composition, arrangement of age classes, and condition to be a homogeneous and distinguishable unit.
Sustained Yield	The achievement and maintenance, in perpetuity, of a regular periodic output of various renewable resources without impairment of land productivity.
Threatened Species	Any species or subspecies which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
Timber Stand Improvement (TSI)	The elimination or suppression of unmerchantable trees and those having no value to wildlife, in order to favor more desireable trees.
Uneven-aged Stand	A stand that contains at least three age classes.
Uneven-aged Management	The system where trees of different ages and characteristics are grown together in stands from the time of regeneration to the time of final harvest.

Upland Hardwoods/ Pine	Homogeneous or mixed hardwood or pine trees not located in a floodplain or on a hillside with an emerging water table.
Wetlands	Those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs and similar areas such as sloughs, potholes, wet meadows, river overflow, mudflats, and natural ponds.
Xeric	With scanty moisture.

APPENDIX A

USFS Wet Area Logging Guides for the Savannah River Plant

The following guides are for use in compartment prescriptions, sale preparations, and sale administration to protect the soil and watershed values of the wet areas on SRP.

A. The compartment prescriber will identify in the compartment prescription those areas within the compartment where measures will be taken to protect wetlands during timber harvesting activities. The prescription will contain any direction necessary including special equipment, in addition to the following guides, to protect wet areas. Otherwise, these guides are assumed to apply to all wet areas identified in the prescription.

B. The sale preparation process will include:

1. Modification of marking to include any special marking instructions contained in the compartment prescription that pertains to protecting wetlands.

2. The timber sale contract will contain any or all of the following provisions:

   a. All slash and/or logging debris will be removed from stream courses within two (2) calendar days after notification to the timber operation to do so.

   b. Wherever possible, directional felling will be used to prevent slash and/or logging debris from entering a stream course.

   c. Skidding will not be allowed across a live stream, except at designated crossings where protective measures are used.

   d. Skid trails will be verbally approved by the sales administrator in advance. Main skid trails will be marked on the ground by the sales administrator.

   e. In all wet areas, which includes the stream course and its adjacent floodplain and slope and all areas of standing water, rutting to a depth greater than twelve (12) inches will not be allowed.

   f. Winching will be required up to one hundred-twenty (120) feet in selected critical areas as identified on the sale area map and on the ground to skidder operators.

C. Road Layout

1. Roads will be laid out to provide as much service to wet areas as practical. The objective will be to reduce skid distance and repetition over the same trails.

2. Roads within wet areas will be built to minimum standards with emphasis on adequate culverts, lead off ditches and crowning.

3. Road closure.

D. Skid Trails

1. When an operator is known to be logging in a wet area close monitoring on a daily basis will be used to control use and prevent damage.

2. Early in the use of a skid trail slash will be laid on, at an angle to skid direction, to reduce rutting.

3. The sales administrator will ensure operator use of new skid trails when rutting reaches twelve (12) inches on existing trails.

E. Yarding and Decking

1. Yarding and decking areas will be laid out on the ground by the sales administrator prior to opening a cutting unit containing a wet area.

2. Yarding and decking areas will be located on the driest site available even outside the cutting unit if necessary.

3. Where practical, use several small yarding and decking areas instead of a few large areas.

F. Summary

The timber sale administrator know and enforce contract site protection and erosion control measures. They must be able to recognize and act to mitigate problems, especially those not covered in the above guidelines. He should ask for assistance when necessary and shut down logging operations when necessary.

STATEMENT OF FINDINGS

FOREST RESOURCES MANAGEMENT ACTIVITIES IN FLOODPLAIN/WETLANDS

AT THE

SAVANNAH RIVER PLANT

AIKEN, SOUTH CAROLINA

I. Finding

Forest resources management activities in floodplain/wetlands at the Savannah River Plant (SRP) will continue.

II. Background

Forest resources management activities are prescribed by the U. S. Forest Service (USFS) for the Department of Energy (DOE) in floodplain/wetlands at SRP. In accordance with 10 CFR 1022, DOE's regulation implementing Executive Orders 11988 and 11990, a "Floodplain/Wetlands Assessment of Forest Management Activities at the Savannah River Plant" (DOE/SR-5002) was prepared as the basis for this statement of findings.

The SRP is a 300 square mile DOE facility located near Aiken, South Carolina at which defense nuclear materials are produced. Approximately 88 percent of SRP is forested. Forest resources are managed by USFS for DOE under an interagency agreement that has been in effect since 1951.

Forest resources management activities affecting floodplain/wetlands include timber harvesting, wildlife management (primarily forage and cover planting and beaver and feral hog control), soils management (soil erosion control and borrow pit reclamation), road management (limited woods roads construction and maiutenance), and research support activities.

III. Alternatives Considered in the Floodplain/Wetlands Assessment

1. Custodial management
2. Uneven-Aged management - Single tree selection
3. Even-Aged management - Shorter rotations
4. Even-Aged management - Longer rotations
5. No action

IV. Reasons for Action in Floodplain/Wetlands

1. Management Goal

The principal objective of USFS forest management at SRP is to promote and achieve a pattern of timber resource use on a sustained-yield basis, while maintaining and enhancing soil, water, and wildlife resources. The proposed action of continuing the ongoing forest management activities in floodplain/wetlands is the only alternative that fully meets this principal objective.

2. General

Other alternatives considered in the assessment either decrease the quality of timber resources produced, decrease the diversity and availability of wildlife habitat, increase soils disturbance and compaction, and/or affect the availability of lands which could potentially be used for research.

3. Cost

Alternatives to the continuing ongoing forest resource management activities (except for the Even-Aged Management - Shorter Rotation Alternative) will increase costs of forest management activities at SRP either through the costs of implementing the alternative or by decreasing the amount and/or quality of harvested timber.

V. Impact Mitigation Measures for Activities in Floodplain/Wetlands

Timber harvesting in floodplain/wetlands at SRP is conducted in accordance with the "Wet Area Logging Guides". This document, developed for USFS use at SRP, considers the need to protect the natural and beneficial values of floodplain/wetlands by identifying timber compartment areas that are in floodplain/wetlands, specifying special equipment and methods of harvest that are allowed (e.g., location of yarding areas, slash disposal, skidder operation, etc.) and other site specific regulations. Implementation of the "Wet Area Logging Guides" is required for those timber harvests which impact floodplain/wetlands.

VI. Determination

Based on the DOE/SR-5002 and for the reasons cited above, it has been determined that continuing presently prescribed activities in floodplain/wetlands at SRP is the only practicable alternative to the Department of Energy - Savannah River Operations Office in the implementation of its forest resources management program.

R. L. Morgan

Manager

Savannah River Operations Office - Department of Energy

10/18/84

Date

U.S. DEPARTMENT OF ENERGY
FINDING OF NO SIGNIFICANT IMPACT
NATURAL RESOURCE MANAGEMENT ACTIVITIES
AT THE SAVANNAH RIVER SITE, AIKEN, SC

AGENCY: U.S. Department of Energy

ACTION: Finding of No Significant Impact

SUMMARY: The Department of Energy (DOE) has prepared an Environmental Assessment (EA), DOE/EA-0826, for the continued management of SRS natural resources on the Savannah River Site (SRS), Aiken, South Carolina. Based on the information and analyses in the EA, DOE has determined that the proposed action is not a major Federal action significantly affecting the quality of the human environment, within the meaning of the National Environmental Policy Act (NEPA) of 1969. Therefore, the preparation of an environmental impact statement is not required and DOE is issuing a Finding of No Significant Impact (FONSI).

PUBLIC AVAILABILITY:

Copies of the EA and FONSI are available from:

Mr. Karl E. Goodwin
Office of Processing and Reactor Facilities
U. S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585
Phone: (301) 903-5498

For further information on the NEPA process, contact:

Ms. Carol Borgstrom
Office of NEPA Oversight
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585
Phone: (202) 586-4600 or (800) 472-2756

BACKGROUND: Since the acquisition of the SRS by the Federal government in the 1950s, natural resource management activities have expanded from the original goal of reforesting abandoned farmland to include wildlife management, wildfire suppression, boundary maintenance, soil stabilization, timber management, secondary road maintenance and ecological research. Through the late 1980s and early 1990s, natural resource management activities have resulted in a coordinated SRS natural resource management strategy, reduced timber harvesting and increased ecological research and protection of endangered species. Presently, DOE and the U.S. Forest Service (USFS) manage timber resources on 158,000 acres of the 198,000 acre site.

PROPOSED ACTION: The proposed action is for DOE and USFS to continue management of SRS natural resources in accordance with the Natural Resource Management Plan by integrating timber management with endangered species protection programs, balancing regulatory compliance with natural resource and environmental protection programs, and including mission support and research program elements. The proposed action would harvest 1800 acres annually and construct 2 miles of new secondary roads annually. Other activities include wildlife and fisheries management; soils, water, and air resources management; cultural and archaeological resources management; fire, secondary road, and boundary management.

ALTERNATIVES: In addition to the proposed action, DOE considered (1) the no-action alternative (which is the same as the proposed action, in that it would continue present activities), (2) a high-intensity management alternative, and (3) a low-intensity management alternative.

The high-intensity management alternative would establish (1) mechanisms for compliance with natural resource and environmental protection regulations and (2) the maximum practical timber harvesting level. This alternative would include the harvesting of as many as 2,700 acres of timber and limiting even-age cuts to 40-acre tracts for hardwood and 100-acre tracts for pine. Endangered species management would include protection of existing red-cockaded woodpecker colonies, with reduced enhancement activities. Management activities for other threatened and endangered species would be the same as in the proposed action. New secondary road construction would be greater than 3 miles annually.

The low-intensity management alternative would limit principal management activities to supporting site security, safety, and research, along with activities that would ensure compliance with Federal and state natural resource management requirements. Ongoing timber management activities would cease under this alternative, as would active management of threatened and endangered species.

ENVIRONMENTAL IMPACTS: The EA analyzed the potential consequences of the proposed action of continuing natural resource management activities at current levels to determine if there were any significant environmental impacts. The analysis assessed potential impacts on water resources, floodplains and wetlands, terrestrial resources, air and noise, threatened and endangered species, cultural resources, socioeconomics, and hazardous materials. No significant impacts were identified from the continued management of SRS natural resources.

Potential effects on SRS streams from the proposed action would include increased water temperatures and siltation from timber-cutting operations and secondary road construction and maintenance. However, the impacts would be minimized by brush windrows along contours to slow runoff, streamside and Carolina bay buffers, waterbars and culverts following road construction, and revegetation of disturbed areas.

No modification of water levels or flow regimes due to management activities would be expected. The proposed action would not significantly alter the natural and beneficial value of the floodplains and wetlands. However, temporary impacts could include disturbance and compaction of soils, modification of vegetative structure, increased turbidity and sedimentation of streams, deterioration of air quality in the vicinity of motorized equipment, and decreased carrying capacity of wildlife habitat for some species.

Under the proposed action, timber harvesting would continue to alter habitat by creating conditions for the dominance of early natural succession plant species, thereby reducing suitable habitat for wildlife species that prefer mature forests. Increasing the rotation length of the timber stands, limiting even-age timber cuts to 40 acres for hardwood and 100 acres for pine, and preserving hedgerows, homesites, and hardwood inclusions would minimize a shift in the balance of species from those preferring mature forest ecosystems to those preferring early successional ecosystems. Endangered species management strategies coordinated with the U.S. Fish and Wildlife Service and the USFS would continue for the red-cockaded woodpecker, southern bald eagle, and wood stork.

If cultural resource reviews indicated the presence of significant archaeological sites, DOE would direct the mitigation of impacts by either avoidance or data recovery. Potential air and noise quality impacts from prescribed burns and machinery operation would be temporary and insignificant. No cumulative impacts to the environment are expected from the proposed action other than those discussed above.

DETERMINATION: Based on the information and analyses in the EA, DOE has determined that the proposed action of continuing natural resource management activities on the SRS at current levels does not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of NEPA. Therefore, an environmental impact statement is not required.

Issued at Washington, D.C., this 15th day of July 1993.

Peter N. Brush
Acting Assistant Secretary
Environment, Safety and Health