CHAPTER 2

PROPOSED ACTION AND ALTERNATIVES

Waste management activities have been under way at the Savannah River Plant (SRP) since operations began in the early 1950s. Periodic reviews and the results of research and development programs were used to update and refine these activities. In 1977, the SRP reviewed its waste management activities and chose to continue those that were consistent with the requirements at the time (ERDA, 1977). Because of changing environmental concerns and regulations [including the Resource Conservation and Recovery Act (RCRA), the Hazardous and Solid Waste Amendments (HSWA) to RCRA, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Superfund Amendments and Reauthorization Act (SARA), and the Safe Drinking Water Act (SDWA)], some of these activities are no longer acceptable. Accordingly, the U.S. Department of Energy (DOE) is proposing to modify its waste management activities.

This dual-purpose environmental impact statement (EIS) is both a programmatic and a project-specific document. It considers broad waste management strategies and associated project-specific actions. The EIS does not preempt the regulatory decisionmaking process, but is a prerequisite to the DOE Record of Decision. It provides an analysis based on available data and information that describes the range of environmental impacts - beneficial and adverse - that accompany each strategy and project-specific action.

The action proposed in this EIS is the modification of waste management activities on the Savannah River Plant for hazardous, low-level radioactive, and mixed wastes for the protection of human health and the environment. The alternative to the proposed action is "no action," or not modifying existing waste management activities, and continuing current activities for managing low-level radioactive and chemical wastes. Because these activities would not comply with current applicable requirements and might affect activities that already protect groundwater resources, DOE does not consider the continuation of ongoing activities, or "no action," to be a "reasonable" alternative as defined in Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA) of 1969.

DOE could implement several alternative waste management strategies for SRP hazardous, low-level radioactive, and mixed waste to comply with applicable requirements. Section 2.1 describes the alternative strategies from which DOE will select a preferred alternative strategy in its Record of Decision (ROD) on this EIS. Sections 2.2, 2.3, and 2.4 describe the strategies for closing existing waste sites on the SRP, for new disposal facilities, and for managing the discharge of disassembly-basin purge water, respectively. Section 2.5 TE summarizes the environmental consequences of the alternative strategies.

The alternative strategies are based on combinations of project-specific actions. Such actions represent those evaluated in this EIS; they are represented by such decisions as the disposal of low-level radioactive waste in a TE facility for which conceptual designs are presented, or the disposal of

TE disassembly-basin purge water by direct discharge to surface streams or by discharge to seepage basins. Figure 2-1 shows the project-specific components of the alternative strategies.

2.1 ALTERNATIVE WASTE MANAGEMENT STRATEGIES

In considering modifications to SRP waste management activities for hazardous, low-level radioactive, and mixed wastes, DOE could select one of several alternative strategies. These strategies differ in the waste management concepts proposed for existing waste sites, new disposal facilities, and discharge of disassembly-basin purge water. They also differ in the degree to which they require dedication of land areas, long-term monitoring, and control to ensure that releases from SRP facilities are within applicable standards.

RCRA, as amended, reflects these differences by requiring the owner of a hazardous waste site having continuing releases either to remove and control contaminants from the soil, surface water, and groundwater outside the site while allowing the waste to remain in place, or to remove the waste from the site to within background levels or agreed-to alternative concentration limits. If the contaminants in environmental media outside a waste site were removed and controlled, the waste site land area would remain dedicated to waste management; long-term monitoring and oversight would be essential to ensure environmental protection. If the source of contamination (i.e., the waste material and contaminated soil within the site) were removed, the site would no longer need to be dedicated to waste management purposes, nor would it require long-term monitoring and oversight. Long-term monitoring would be necessary at any site where waste is left in place (i.e., closed as a landfill) or where groundwater contamination is confined. The requirements of CERCLA/SARA also apply to certain SRP existing waste sites.

This difference in the need to dedicate land areas for waste management purposes and to commit resources to long-term monitoring and oversight is also reflected in the choice of disposing of or storing hazardous, low-level radioactive, or mixed waste. Disposal requires the permanent or long-term dedication of land areas. Storage, on the other hand, requires neither permanent nor long-term dedication; storage implicitly assumes that research and development will provide better methods for disposal than those currently available.

The management of hazardous and mixed waste on the SRP is regulated by RCRA, HSWA, CERCLA/SARA, and DOE Orders. RCRA and HSWA provide a national program to minimize the present and future threat to human health and the environment from the transportation, treatment, storage, and disposal of hazardous waste. RCRA is administered by the South Carolina Department of Health and Environmental Control (SCDHEC), under the authority of the U.S. Environmental Protection Agency (EPA). CERCLA/SARA are administered by EPA. DOE Orders set forth policy, guidelines, and criteria for the management of hazardous, mixed, and low-level radioactive wastes generated by DOE facilities.

The following sections discuss alternative strategies for the modification of hazardous, low-level radioactive, and mixed waste management activities for existing waste sites, new storage and disposal facilities, and disassembly basin purge-water discharge, which would be consistent with the requirements of RCRA, HSWA, and DOE Orders. Additionally, in accordance with NEPA implementing regulations, this chapter also discusses a No-Action strategy.

Table 2-1 summarizes the alternative strategies for SRP hazardous, low-level radioactive, and mixed waste management activities; this table presents a central consideration of this EIS: the modification of a single waste management activity might require modification of another. Each alternative
E-57 strategy, therefore, must be comprised of mutually compatible project-specific components.

The development of the waste management strategies described in this EIS is a logical outgrowth of needed SRP waste management activities and recently enacted regulations. These individual activities are analyzed and evaluated as mutually exclusive and independent. The following discussions combine modifications that are consistent with the alternative strategies for the overall management of SRP hazardous, low-level radioactive, and mixed waste.

2.1.1 NO-ACTION STRATEGY - CONTINUED PROTECTION OF OFFSITE ENVIRONMENT

CEQ guidelines (40 CFR 1502.14) require a Federal agency to evaluate the environmental consequences of "no action." As a potential strategy for this EIS, "no action" would consist of:

- No removal of waste at existing waste sites, and no closure or remedial actions

- No construction of new facilities for the storage or disposal of hazardous, low-level radioactive, or mixed wastes

- Continuation of periodic discharges of disassembly-basin purge water to active seepage and containment basins.

The No-Action strategy would include the continuation of current activities for management of low-level radioactive and chemical wastes. Because the existing program would not comply with current groundwater and other environmental protection requirements, DOE does not consider it to be a "reasonable" alternative strategy.

2.1.2 DEDICATION STRATEGY - COMPLIANCE THROUGH DEDICATION OF EXISTING AND NEW DISPOSAL AREAS

For this strategy, the SRP hazardous, low-level radioactive, and mixed waste management activities could be modified to comply with applicable requirements by:

- Implementing closure (dewatering, stabilization, capping) and groundwater corrective actions, as required (installing grout curtains or barrier walls), to control contamination from existing waste sites in accordance with applicable standards

- Establishing new disposal facilities (e.g., vaults or trenches) above or below the ground

- Continuing the use of seepage and containment basins for the periodic discharge of reactor disassembly-basin purge water.

Releases of hazardous substances from existing waste sites that contain hazardous or mixed wastes would be controlled through the closure of such sites (if not already closed) under RCRA requirements, remedial actions to control groundwater contaminant plume migration and to restore groundwater quality, and other corrective actions (excluding removal) at the sites to prevent further releases of hazardous substances. Under this strategy, DOE would dedicate for waste management purposes those waste sites and contaminated (hazardous and radioactive) areas that could not be returned to public use after a 100-year institutional control period.

To accommodate hazardous, low-level radioactive, and mixed wastes generated from ongoing SRP operations, those presently in interim storage, and those from existing and planned waste management activities to comply with groundwater protection requirements (e.g., sludge from new effluent treatment facilities), new disposal facilities meeting applicable requirements would be established on the SRP.

The periodic discharges of filtered and deionized disassembly-basin water from C-, K-, and P-Reactors to active seepage and containment basins would continue. The use of basins for these discharges, which are not hazardous but are contaminated with tritium, would allow time for radioactive decay to occur while migrating to groundwater outcrops along onsite streams. If the seepage and containment basins and contaminated areas could not be returned to public use after a 100-year institutional control period, DOE would dedicate such areas permanently for waste management purposes.

2.1.3 ELIMINATION STRATEGY - COMPLIANCE THROUGH ELIMINATION OF EXISTING WASTE SITES AND STORAGE OF WASTES

The SRP hazardous, low-level radioactive, and mixed waste management activities could be modified to comply with all groundwater protection requirements by:

- Removing wastes to the extent practicable from all existing waste sites and implementing closure and groundwater remedial actions, as required
- Establishing new retrievable storage facilities
- Directly discharging disassembly-basin purge water to onsite streams, or evaporating such discharges through the use of a small commercially-available boiler, vent stack, and dispersion fan.

Under this strategy, no land areas would be dedicated for hazardous, low-level radioactive, and mixed waste management purposes. Such wastes, including contaminated soils, would be removed from all existing waste sites to the extent practicable. After an assumed 100-year institutional control period, most of these sites could be used for purposes other than waste management.

Wastes removed from existing waste sites and those generated from ongoing SRP operations and existing and planned waste management activities to comply with groundwater-protection requirements would be stored in facilities from which they could be retrieved. Hazardous and mixed wastes currently in interim storage at SRP would remain in the interim storage buildings. A research program would be initiated to investigate or develop new technologies for the permanent disposal of hazardous, low-level radioactive, and mixed wastes. Once these new technologies were proved to be cost-effective, stored wastes would be permanently disposed of.

The filtered and deionized disassembly-basin water from C-, K-, and P-Reactors would be discharged to onsite streams in accordance with a National Pollutant Discharge Elimination System (NPDES) permit or evaporated in a small commercially available boiler, vent stack, and dispersion fan. Seepage and containment basins used for the discharge of disassembly-basin purge water would be eliminated. Closure and remedial actions would be taken at these basins, if necessary, to ensure that contaminated areas could be returned to public use after a 100-year institutional control period.

2.1.4 COMBINATION STRATEGY - COMPLIANCE THROUGH A COMBINATION OF DEDICATION AND ELIMINATION OF EXISTING WASTE SITES, AND BOTH STORAGE AND DISPOSAL OF WASTES

For this strategy, the SRP's hazardous, low-level radioactive, and mixed waste management activities could be modified to comply with all groundwater protection and other environmental requirements by:

- Removing wastes at selected existing waste sites to the extent practicable and implementing closure and groundwater remedial actions, as required by applicable regulations

- Establishing a combination of retrievable storage and aboveground or belowground disposal

- Continuing the use of seepage and containment basins for the periodic discharge of reactor disassembly-basin purge water, while continuing investigations of source mitigation measures.

Under this strategy, hazardous, low-level radioactive, and mixed wastes (including contaminated soils) would be removed to the extent practicable from selected existing waste sites, based on cost-effectiveness and on environmental and human health risks. Preliminary analyses for this EIS have identified sites in R- and F-Areas for waste removal; additional sites may be selected in the future, based on further site-specific investigations and regulatory interactions. After a maximum 100-year institutional control period, the areas from which waste material and contaminated soil had been removed could be used for purposes other than waste management. Sites from which waste material and contaminated soil had not been removed would be dedicated for waste management purposes if they could not be returned to public use after the 100-year control period. TC

New retrievable storage and disposal facilities would be established to accommodate waste removed from existing waste sites and waste generated from ongoing SRP operations and existing and planned waste management activities to comply with groundwater protection requirements. Disposal facilities for hazardous or mixed waste would be permitted in accordance with applicable requirements. The combination of new storage and disposal facilities [e.g., greater confinement disposal (GCD), vaults, and engineered low-level trenches] would minimize the amount of hazardous, low-level radioactive, and mixed waste placed in disposal facilities and would allow DOE to initiate a research program to develop new technologies for permanent disposal. DOE would dedicate disposal facilities established for these wastes for waste management purposes.

Under this strategy, periodic discharges of filtered and deionized disassembly-basin water from C-, K-, and P-Reactors to the active seepage and containment basins would continue. DOE would continue to assess the general applicability of other mitigation measures at the SRP. If DOE were to determine that detritiation or another approach is applicable, it would discontinue the use of these basins and evaluate actions to return the basin areas to public use after a 100-year institutional control period.

2.1.5 OTHER ALTERNATIVE STRATEGIES

In addition to the No-Action strategy and the three alternative strategies described above, other strategies considered included discontinuing SRP operations or shipping and disposing of hazardous, low-level radioactive, and mixed wastes at another (offsite) facility.

DOE determined that discontinuing SRP operations, which would affect only the volume of future hazardous, low-level radioactive, and mixed waste to be
TE stored or disposed of, would be unacceptable, because such a strategy would not allow DOE to meet established requirements for the production of defense nuclear materials.

Strategies for the shipment and management of hazardous, low-level radioactive, and mixed wastes at an offsite facility were also eliminated because of increased environmental and human health risks due to the transportation of wastes (ERDA, 1977) as well as the uncertainties associated with SRP operational dependence on the continued availability and capacity of offsite waste disposal sites (see Chapter 1).

2.1.6 EIS DECISIONS AND NEPA DOCUMENTATION

Table 2-2 presents the decisions that will be based on this EIS, regulatory interactions related to this EIS, and other SRP waste management NEPA documentation. Only those activities in the first column will be included in the Record of Decision (ROD) for this EIS. Other activities and NEPA documents will be tiered or referenced to this EIS as part of ongoing NEPA documentation activities. These documentation activities are not part of the ROD for this EIS, but will be based on regulatory agency interactions.

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The environmental effects of high-level radioactive waste (HLW) management were not assessed in this EIS, but are discussed in Waste Management Operations, Savannah River Plant FEIS (ERDA 1537); a supplement to ERDA 1537, Double-Shell Tanks for Defense High-Level Radioactive Waste Storage (DOE/EIS-0062); Long Term Management of Defense High-Level Radioactive Wastes (Research and Development Program for Immobilization (DOE/EIS-0023); and the Defense Waste Processing Facility FEIS (DOE/EIS-0082). Records of Decision have been published for all of the EISs cited above, except ERDA 1537.

J-1 DOE has prepared an environmental assessment (DOE/EA-0315) on the continued disposal and retrievable storage of transuranic (TRU) wastes. The alternatives were not analyzed in this EIS; however, source terms of TRU waste disposed of in the burial ground (643G) were factored into the analysis.

2.2 EXISTING WASTE SITES

Table 2-3 exhibits the current status of existing waste sites (i.e., solid and radioactive waste sites) that fall within the scope of this EIS and how they relate to current waste regulations. Several interim status sites are included in the table (as they are in Table 6-1), even though they are not within this scope of the EIS.

Potential CERCLA sites are those that are known to be inactive after November 19, 1980. They include both potentially hazardous sites and potentially mixed waste sites as defined in this EIS. One site, the D-Area Oil Seepage Basin, is potentially hazardous under SCHWMR but not under Federal
TC (RCRA) regulations.

Known releases are those concentrations of hazardous constituents that exceed the higher of background or Table I values (40 CFR 264, 94(a)) at the point of compliance. Release does not include radionuclides, hazardous constituents detected in soil or groundwater within a site boundary (fenceline), or any substance migrating directly to surface water or air.

Additional information related to these sites is given in Appendixes B and F on a site-by-site basis and in the following sections as related to waste management strategies.

Under the alternative strategies discussed in Section 2.1, DOE could take four of the following possible actions at existing waste sites that contain or might contain hazardous, low-level radioactive, and mixed waste:

- No removal of waste at existing waste sites, and no closure or remedial actions (no action)
- No removal of waste at existing waste sites, and implementation of cost-effective closure and remedial actions as required (dedication)
- Removal of waste to the extent practicable from all existing waste sites, and implementation of cost-effective closure and remedial actions as required (elimination)
- Removal of waste to the extent practicable at selected existing waste sites, and implementation of cost-effective closure and remedial actions as required (combination)

The following sections describe existing SRP waste sites that contain or might contain hazardous, low-level radioactive, and mixed wastes, and the project-specific actions that DOE could take under each strategy.

2.2.1 EXISTING WASTE SITES CONSIDERED

Operations on the SRP result in the generation of hazardous wastes; low-level radioactive wastes; mixed wastes, which contain both hazardous and radioactive materials; and other solid wastes such as sanitary and domestic wastes and rubble.

At the SRP, 168 waste sites have been or are being used for the disposal or storage of wastes. This section considers 77 of these 168 sites in detail as existing waste sites. Six active reactor seepage basins and the K-Area containment basin receive periodic low-level radioactive discharges from the disassembly basins at C-, K-, and P-Reactor. These basins are considered in Section 2.4, which examines the alternatives for managing disassembly-basin purge water. The L-Reactor seepage basin was analyzed in the Final EIS for L-Reactor operation. The remainder of the 168 waste sites contain sanitary waste, solid waste, and/or rubble, or are otherwise not appropriate for consideration in this EIS (see Appendix B). No decision is made in this EIS on waste management activities for the remaining existing waste sites.

The 77 waste sites that are considered in detail consist of 37 sites that have or might have received hazardous waste, 19 sites that have or might have received low-level radioactive waste, and 21 sites that have or might have received mixed waste. In general, these 77 sites are near the facilities from which they receive wastes. This results in several clusters, or groupings, of waste sites rather than individual sites distinctly separated from each other.

Because actions taken at a waste site, including groundwater withdrawal, might affect the groundwater transport of waste in other sites, a conservative boundary of influence was calculated for each waste site based on the planned actions, extent of data availability, and type of waste (Du Pont, 1984a). The intersection and overlapping of the individual waste site boundaries led to the identification of ten geographic groupings of waste sites and two miscellaneous areas - each containing a single waste site - where actions taken for waste sites in one geographic grouping would not be expected to interact with actions taken in another grouping. Figure 2-2 shows the ten geographic groupings and two miscellaneous areas.

Table 2-4 lists the waste sites within each of the ten geographic groupings and the miscellaneous areas. TE This table also indicates, for each of the 77 waste sites, the potential category of waste that is or might be contained in the site and if the site is currently receiving waste material. The 77 waste sites listed in Table 2-4 are characterized in Appendix B, together with a brief description of other waste sites not considered in this EIS.

2.2.2 ALTERNATIVE STRATEGIES FOR EXISTING WASTE SITES

This section summarizes the four project-specific actions that DOE could take for the waste sites listed in Table 2-4. TE Each action is included in one of the alternative strategies discussed in Section 2.1.

The details for each project-specific action are preliminary, presented for the purpose of approximating its costs and environmental consequences. Specific actions such as the selection of sites for waste removal (see Section 2.2.2.4), the volume of waste removed, site capping, or groundwater remedial

Table 2-4. Existing Waste Sites by Geographic Grouping | TE

	Waste sites	Building	Receiving waste	Potential category[a]
		A- AND M-AREAS		
1-1[b]	716-A motor shop seepage basin	904-101G	No	Hazardous
1-2	Metals burning pit	731-4A	No	Hazardous
1-3	Silverton Road waste site	731-3A	No	Hazardous
1-4	Metallurgical laboratory basin	904-110G	No	Hazardous
1-5	Miscellaneous chemical basin	731-5A	No	Hazardous
1-6	A-Area burning/rubble pit	731-A	No	Hazardous
1-7	A-Area burning/rubble pit	731-1A	No	Hazardous
1-8	SRL seepage basin	904-53G	No	Mixed
1-9	SRL seepage basin	904-53G	No	Mixed
1-10	SRL seepage basin	904-54G	No	Mixed
1-11	SRL seepage basin	904-55G	No	Mixed
1-12	M-Area settling basin	904-51G	No	Mixed
1-13	Lost Lake	904-112G	No	Mixed
		F- AND H-AREAS		
2-1	F-Area acid/caustic basin	904-74G	No	Hazardous
2-2	H-Area acid/caustic basin	904-75G	No	Hazardous
2-3	F-Area burning/rubble pit	231-F	No	Hazardous
2-4	F-Area burning/rubble pit	231-1F	No	Hazardous
2-5	H-Area retention basin	281-3H	No	Low-level radioactive
2-6	F-Area retention basin	281-3F	No	Low-level radioactive
2-7	Radioactive waste burial ground	643-7G	Yes	Low-level radioactive
2-8	Mixed-waste management facility	643-28G	No	Mixed
2-9	Radioactive waste burial ground	643-G	No	Mixed
2-10	F-Area seepage basin	904-41G	Yes	Mixed
2-11	F-Area seepage basin	904-42G	Yes	Mixed

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Table 2-4. Existing Waste Sites by Geographic Grouping (continued)

	Waste sites	Building	Receiving waste	Potential category[a]
2-12	F-Area seepage basin	904-43G	Yes	Mixed
2-13	F-Area seepage basin (old)	904-49G	No	Mixed
2-14	H-Area seepage basin	904-44G	Yes	Mixed
2-15	H-Area seepage basin	904-45G	Yes	Mixed
2-16	H-Area seepage basin	904-46G	No	Mixed
2-17	H-Area seepage basin	904-56G	Yes	Mixed
		R-AREA		
3-1	R-Area burning/rubble pit	131-R	No	Hazardous
3-2	R-Area burning/rubble pit	131-1R	No	Hazardous
3-3	R-Area acid/caustic basin	904-77G	No	Hazardous
3-4	R-Area Bingham pump outage pit	643-8G	No	Low-level radioactive
3-5	R-Area Bingham pump outage pit	643-9G	No	Low-level radioactive
3-6	R-Area Bingham pump outage pit	643-10G	No	Low-level radioactive
3-7	R-Area seepage basin	904-57G	No	Low-level radioactive
3-8	R-Area seepage basin	904-58G	No	Low-level radioactive
3-9	R-Area seepage basin	904-59G	No	Low-level radioactive
3-10	R-Area seepage basin	904-60G	No	Low-level radioactive
3-11	R-Area seepage basin	904-103G	No	Low-level radioactive
3-12	R-Area seepage basin	904-104G	No	Low-level radioactive
		C- AND CS-AREAS		
4-1	CS burning/rubble pit	631-1G	No	Hazardous
4-2	CS burning/rubble pit	631-5G	No	Hazardous
4-3	CS burning/rubble pit	631-6G	No	Hazardous
4-4	C-Area burning/rubble pit	131-C	No	Hazardous
4-5	Hydrofluoric acid spill area	631-4G	No	Hazardous
4-6	Ford Building waste site	643-11G	No	Low-level radioactive
4-7	Ford Building seepage basin	904-91G	No	Mixed

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Table 2-4. Existing Waste Sites by Geographic Grouping (continued) TE

	Waste sites	Building	Receiving waste	Potential category[a]
		TNX-AREA		
5-1	D-Area burning/rubble pit	431-D	No	Hazardous
5-2	D-Area burning/rubble pit	431-1D	No	Hazardous
5-3	TNX burying ground	643-5G	No	Low-level radioactive
5-4	TNX seepage basin (old)	904-76G	No	Mixed
5-5	TNX seepage basin (new)	904-102G	Yes	Mixed
		D-AREA		
6-1	D-Area oil seepage basin	431-D	No	Hazardous
		ROAD A AREA		
7-1	Road A chemical basin	904-111G	No	Mixed
		K-AREA		
8-1	K-Area burning/rubble pit	131-K	No	Hazardous
8-2	K-Area acid/caustic basin	904-80G	No	Hazardous
8-3	K-Area Bingham pump outage pit	643-1G	No	Low-level radioactive
8-4	K-Area seepage basin	904-65G	No	Low-level radioactive
		L-AREA		
9-1	L-Area burning/rubble pit	131-L	No	Hazardous
9-2	L-Area acid/caustic basin	904-79G	No	Hazardous
9-3	CMP pit	080-17G	No	Hazardous
9-4	CMP pit	080-17.1G	No	Hazardous
9-5	CMP pit	080-18G	No	Hazardous
9-6	CMP pit	080-18.1G	No	Hazardous
9-7	CMP pit	080-18.2G	No	Hazardous
9-8	CMP pit	080-18.3G	No	Hazardous
9-9	CMP pit	080-19G	No	Hazardous

Footnotes on last page of table.

TE | Table 2-4. Existing Waste Sites by Geographic Grouping (continued)

	Waste sites	Building	Receiving waste	Potential category[a]
9-10	L-Area Bingham pump outage pit	643-2G	No	Low-level radioactive
9-11	L-Area Bingham pump outage pit	643-3G	No	Low-level radioactive
9-12	L-Area oil and chemical basin	904-83G	No	Mixed
		P-AREA		
10-1	P-Area burning/rubble pit	131-P	No	Hazardous
10-2	P-Area acid/caustic basin	904-78G	No	Hazardous
10-3	P-Area Bingham pump outage pit	643-4G	No	Low-level radioactive
		MISCELLANEOUS AREAS		
11-1	SRL oil test site	080-16G	No	Hazardous
11-2	Gunsite 720 rubble pit	N80,000; E27,350[c]	No	Hazardous

[a]This EIS uses the terms "hazardous," "low-level radioactive," and "mixed" (i.e., hazardous and low-level radioactive) in their most common sense, without specific regard to technical or regulatory definitions, unless indicated.
[b]The numbering system arbitrarily identifies the geographic group and each site within that group. For example, site 1-1 represents the first site in the first geographic group.
[c]No building number; located by SRP map coordinate system.

actions, if any, would be based on detailed site-specific modeling, actual monitoring results, and decisions resulting from regulatory interactions.

Section 4.2 describes the potential environmental consequences associated with these actions at existing waste sites; Appendix F describes them in more detail on a site-by-site basis.

2.2.2.1 No Action

Under the No-Action strategy, waste removal, closure, and remedial actions would not take place on the SRP, but measures considered necessary to protect the offsite environment would continue. More specifically, waste sites would be maintained for erosion protection, weed control, and grass mowing; additional groundwater monitoring wells would be installed; existing and new wells would be monitored; and fences would be installed where necessary to exclude animals and unauthorized personnel. The ongoing program to remove volatile organics from the groundwater in the Tertiary (shallow) sediments in M-Area through a system of recovery wells routed to an air stripper would continue. The monitoring and protective activities described for No Action would also be included in the closure and remedial actions described in Sections 2.2.2.2 through 2.2.2.4.

Under No Action, some hazardous and radioactive constituents would exceed applicable standards in the groundwater in the Tertiary sediments, and would not comply with current groundwater-protection requirements. Small supply wells could be screened into these aquifers after the period of institutional control, when most constituents in the groundwater would have decayed or dispersed to concentrations that would be below regulatory, human health, and environmental concern. Dedication of the existing waste sites and areas where groundwater constituents were still above these levels of concern would be necessary to ensure the protection of human health and the environment.

While No Action would have cost advantages and reduced occupational risks, it would not comply with current groundwater protection requirements and could render parts of the SRP unsuitable for public use after the 100-year institutional control period. Table 2-5 lists details assumed for the purpose of assessing the No-Action strategy. TE

2.2.2.2 Dedication

Using the Dedication strategy, releases of hazardous substances from existing waste sites would be controlled through the closure of such sites (if not already closed). Groundwater corrective actions (such as recovery, treatment, and installation of barrier walls or grout curtains) could be implemented to control groundwater contaminant plume migration. Dedication of those sites and contaminated areas that could not be returned to public use after a 100-year institutional control period would be required for waste management purposes; about 300 acres of SRP land would be involved. TC

Under the Dedication strategy, existing basins that have not previously been filled would be backfilled after dewatering. Wastes and sludges would be stabilized and impermeable barriers (caps) would be installed as required. Berms or other structures to prevent runon or runoff would be installed as required. Preliminary cost estimates and modeling of contaminant transport are based on the assumptions identified in Table 2-6. TE

Preliminary modeling indicates that the number of remedial actions that could be required under the Dedication strategy would be greater than those required under a strategy that included waste removal. Chapter 4 presents predicted concentrations of contaminants.

The primary disadvantages of this strategy are the extent of groundwater remediation potentially required and the need to dedicate the waste sites for waste management purposes. This strategy, however, would have significant advantages over the Elimination strategy (Section 2.2.2.3) with respect to cost, terrestrial ecology impacts, and occupational risks.

2.2.2.3 Elimination

The Elimination strategy includes removal of hazardous, low-level radioactive, and mixed waste (including contaminated soil) from all existing waste sites to the extent practicable and the closure of each site (see Section 2.2.2.2). After a maximum 100-year institutional control period, these areas could be returned to public use. Further remedial actions to control the migration of hazardous and radioactive substances from some sites would be required.

Table 2-7 lists preliminary estimates of the volumes of contaminated soil and waste and the costs of removal and closure. When the mixed and low-level burial grounds are included, approximately 3.2 million cubic meters of waste and potentially contaminated soil are contained in the existing waste sites. Without the burial grounds, the volume totals approximately 214,000 cubic meters. After waste removal, all sites would be backfilled, and the waste, contaminated soil, and some additional potentially contaminated soil would be transported to an acceptable onsite storage or disposal facility (see Section 2.3). TE TC

This strategy would require the fewest groundwater corrective actions, if any. Predicted concentrations of contaminants are presented in Chapter 4.

The primary advantages of this strategy are that the removal of waste and subsequent closure and remedial actions would eliminate the waste sites, the need to dedicate these areas for waste management purposes, and their monitoring after closure. Significant disadvantages include the extremely high cost of removing, transporting, and disposing of or storing the waste in a new disposal or storage facility; the potential adverse effects on the terrestrial ecology during these activities; and significant occupational risks primarily due to transportation accidents and worker exposure to radioactive substances during waste removal activities. TE TE

2.2.2.4 Combination

Under the Combination strategy, wastes (including contaminated soil) would be removed from existing waste sites selected on a basis of environmental and human health benefits and cost-effectiveness, and all sites would be closed. The areas from which waste had been removed could be returned to public use after the institutional control period. Sites from which waste was not removed would be dedicated for waste management purposes if they were not suitable for public use after the institutional control period. Releases from existing waste sites would be controlled through closure (as described in Section 2.2.2.2), with or without waste removal, and applicable requirements would be met. Groundwater corrective actions could be required in addition to closure to control groundwater contaminant plume migration.

Sites where preliminary modeling indicates that significant reductions in groundwater contaminants would occur as a result of waste removal include the old F-Area seepage basin and the six R-Area seepage basins. Transport modeling predicts that the concentrations of contaminants in the groundwater at those sites would be reduced extensively (e.g., by factors of 15 and greater) due to waste removal. This strategy assumes, for cost and assessment purposes, waste removal at these sites. The other 70 sites are assumed to receive the same closure actions as the Dedication strategy described in TE

Section 2.2.2.2. Required groundwater corrective action under this option could be less than that required for the no-waste-removal action because of the removal of waste at the selected sites.

Table 2-8 lists parameters for sites under the Combination strategy. Approximately 12,500 cubic meters of waste and potentially contaminated soil are contained in the selected sites; this equals approximately 6 percent of the total volume of waste and contaminated soil contained in existing waste sites, excluding the mixed and low-level burial grounds. The excavated waste, contaminated soil, and some additional potentially contaminated soil would be transported to an acceptable onsite storage or disposal facility (see Section 2.3). TE TC

The magnitude of remedial actions potentially required probably would not be significantly greater than that of the Elimination strategy (removal at all sites), and less than that of no removal. Modeling predicts that the concentration of uranium-238 would be reduced by a factor of 15 by removal of waste from the old F-Area seepage basin. Concentrations of strontium-90 and yttrium-90 would be reduced by a factor of 100 by removal of waste at the R-Area seepage basins.

In comparison with the Elimination strategy, the Combination strategy significantly reduces the cost, ecological impacts, occupational hazards, and new storage/disposal capacity requirements of waste removal. Its primary disadvantage is that DOE would have to dedicate for waste management purposes those sites where waste had not been removed and that were not suitable for public use after the 100-year institutional control period.

2.3 <u>NEW DISPOSAL/STORAGE FACILITY STRATEGIES</u>

Section 2.1 describes the alternative waste management strategies for SRP waste management activities. Each of the alternative strategies includes a disposal and storage alternative that, in turn, includes one or more project-specific actions. This section describes these actions and the manner in which they can be combined as part of the selected strategy.

2.3.1 PROJECT-SPECIFIC TECHNOLOGIES

The Notice of Intent (NOI) to prepare this EIS (DOE, 1985) listed five alternatives for hazardous, mixed, and low-level radioactive waste facilities. Project-specific technologies derived from these five alternatives provide the basis for the waste management strategies. Table 2-9 lists the alternatives and their corresponding technologies. TE

Requirements under RCRA, HSWA, and DOE Orders cover all aspects of waste management, including the siting of facilities, facility design, facility permits and operations, limits on the release of waste constituents from facilities, design requirements for waste containers, leak detection systems, leachate recovery systems, runoff and runon control systems, liners, waste segregation, and waste acceptance. These site-specific, project-specific actions will be addressed in future planning and in response to the regulatory permitting and decisionmaking processes that will ensure that new facilities meet all

TE

Table 2-9. NOI Alternatives and Corresponding Technologies

NOI Alternative[a]	Technology	Waste Applications
Retrievable storage	Storage buildings	Hazardous, mixed, or low level
Shallow land disposal	RCRA landfill	Hazardous or mixed
	Belowground vault (RCRA)	Hazardous or mixed
	CFM[b] vault	Mixed
	Engineered low-level trench	Low level
	Belowground vault (DOE)	Low level
	GCD trench	Low level
	GCD borehole	Low level
Aboveground disposal	Aboveground vault (RCRA)	Hazardous or mixed
	Aboveground vault (DOE)	Low level
	Abovegrade operation	Low level
Combination	All of the above	As applicable
No action	No new facilities	Hazardous, mixed, or low level

TC

[a]NOI-Notice of Intent to prepare this EIS (50 FR 16534)
[b]Cement/flyash matrix (solidification)

applicable requirements. To provide DOE an environmental basis for selecting a waste management strategy, this EIS describes the technologies for new facilities and presumes that they are designed to comply with all applicable requirements.

TC

The following sections describe each technology in terms of its function and features. These descriptions do not include such design details as construction materials, dimensions, and siting, because site-specific details to achieve regulatory compliance will be developed during the permitting process. The descriptions focus on the basic capabilities, long-term reliability, and effectiveness of each technology for waste management as it applies to each alternative strategy.

2.3.1.1 Storage Buildings

Storage buildings are being considered for retrievable storage of hazardous, mixed, and low-level radioactive wastes. They would be used to hold containerized wastes safely and securely for as long as 20 years. The design would include segregation of noncompatible hazardous wastes; radiation shielding as necessary; liquid recovery drains and alarmed sumps; smoke, fire, vapor, and radiation detection systems; ventilation systems; and automatic fire extinguishing systems. Operational controls would include site security, periodic inspections of the waste containers and the facility, personnel training, emergency preparedness and procedures, and recordkeeping.

2.3.1.2 RCRA Landfill

The RCRA landfill is being considered for hazardous and mixed waste disposal. It would employ a double-lined (primary and secondary liners) trench with double leachate-collection systems (above the primary liner and between the primary and secondary liners). Figure 2-3 shows two liner systems. Waste in containers would be stacked in the trench. As it is filled, the trench would be covered by a membrane sealed to the primary liner to form a watertight envelope. A low-permeability cap over the facility would divert percolating water laterally away from the closed trench.

The landfill would not contain an engineered structure; it would rely on the sides of the trench, on the waste containers, and on fill soil for stability. Placement below the surface of the ground would provide all necessary radiation shielding (for mixed waste) following closure.

When sited, designed, and operated in accordance with RCRA regulations, this type of hazardous and mixed waste disposal should provide many decades of reliable service. The primary leachate-collection system would provide warning and a means of recovering the waste if the containers failed. The secondary leachate-collection system would provide warning and the means to recover the wastes if the primary liner failed. If a secondary liner of clay were employed, its design would delay leachate penetration for at least 30 years (EPA, 1985). Although the hazardous and mixed wastes being disposed of could outlast the disposal facilities described in this EIS, the integrated systems would provide the early warning necessary to take mitigative action so that releases to the environment would not occur (i.e., zero release).

2.3.1.3 RCRA Vault

DOE is considering the use of RCRA-type vaults (vaults that comply with RCRA) for the disposal of hazardous and mixed waste at SRP. A typical hazardous or mixed waste disposal vault is a building-size, watertight, reinforced-concrete box set on or below the ground surface. An exterior leachate-collection system and secondary liner envelop the bottom of the facility. An interior liner and leachate-collection system are within the concrete structure. Figure 2-4 shows an arrangement of barriers used in this technology. TE

Containerized wastes would be segregated and stacked in the chambers of the facility. Empty spaces could be filled with sand or grout, and the facility would be sealed by a sloped, reinforced-concrete roof. If the facility were constructed belowground, it would then be covered with soil to grade. If aboveground, it could remain exposed or be mounded with soil to provide additional radiation shielding.

Vaults rely on the waste containers, the interior and exterior leachate-collection systems, and the concrete structure to ensure long-term isolation of wastes and no releases to the environment.

2.3.1.4 Cement/Flyash Matrix Vault

The cement/flyash matrix (CFM) vault is a technology for the disposal of selected mixed wastes. This technology involves segregating the mixed waste

sludge from such facilities as the M-Area effluent treatment facility (ETF), the F- and H-Area ETF, the Fuel Production Facility (FPF), and the Naval Fuel Materials Facility wastewater treatment plant, plus ash from incinerators in which hazardous, mixed, and low-level radioactive waste might have been burned. These wastes would be blended into a cement/flyash matrix and discharged as a slurry directly into reinforced-concrete vaults, where it would cure to a hard, concrete-like substance. This solidification process
TC should render the waste nonhazardous and eligible for possible delisting under
TE RCRA regulations. DOE is also considering blast furnace slag as a component in the stabilization of wastes.

The CFM vault technology differs from the RCRA-type vault in that it would contain no liners and no leachate-collection system. Instead, this technology would rely on the solidification of the waste in conjunction with the concrete structural barrier to preclude the release of waste constituents and maintain environmental standards. Failure to obtain delisting for the solidified waste under RCRA would eliminate this disposal technology. Although cement/flyash solidification could remain as a predisposal treatment, the disposal facilities would have to meet RCRA minimum technology requirements.

2.3.1.5 Engineered Low-Level Trench

DOE is considering the engineered low-level trench (ELLT) for the disposal of low-activity (less than 300 millirem per hour), low-level radioactive waste. The trench would have a crushed-stone floor on which containerized wastes would be stacked. The empty spaces between the containers would be filled and the trench covered. A low-permeability cap above the waste would divert percolating water away from the containers. The cap would be covered with soil to grade for protection, and the surface would be contoured to channel the runoff away from the site.

The low-activity portion of the low-level radioactive waste stream which would be disposed of using ELLTs would account for approximately 95 percent of the
TC waste by volume but would contain less than 2 percent of the radioactivity (Cook, Grant, and Towler, 1987). With the relatively low radioactivity of this waste, ELLTs would require no engineered structure, liners, or leachate-collection systems. Rather, this technology would rely on appropriate site conditions, waste containers, a low-permeability cap, and postclosure site maintenance to minimize the intrusion of water into the closed trench and to prevent excessive migration of radionuclides into the environment.

2.3.1.6 Low-Level Waste Vault

Vault technology (other than that for RCRA vaults) that complies with DOE Orders is also being considered for disposal of low-level, low-activity (less than 300 millirem per hour) and intermediate-activity (greater than 300 millirem per hour) radioactive waste. A typical low-activity vault would consist of a building-size, reinforced concrete box set on or below the surface of the ground. Containerized wastes would be closely packed in the vault and, when filled, the vault would be closed with a concrete cap or roof. The vault would be covered with soil to grade for the belowground design or mounded with soil for the aboveground design to provide added shielding (Cook, Grant, and Towler, 1987).

As with the ELLT, the relatively low radioactivity of this waste would permit a design requiring no liners or leachate-collection system. Suitable performance would be achieved through proper siting, waste containers, and a sealed concrete structure to minimize the intrusion of water and the migration of radionuclides.

The design of the vault for intermediate-activity waste could be similar to that for the low-activity vault except that it could include an exterior, low-permeability liner and leachate-collection system. Increased stability could be achieved by structural design or by filling any empty spaces in the interior with a suitable material prior to closure (Cook, Grant, and Towler, 1987).

2.3.1.7 Abovegrade Operation

DOE is considering abovegrade operation (AGO) for the disposal of low-activity, low-level radioactive waste. This technology would consist of a stable stack of waste-filled containers enclosed within a low-permeability membrane. It would be situated on a subbase of clay or other low-permeability material and would include interior and exterior leachate-collection systems.

Containerized waste would be stacked in the prepared facility. Empty spaces would be filled with sand to improve stability and minimize subsidence. When the stack was completed, it would be mounded with additional sand and sealed with a cover membrane. The entire mound would then be covered with soil and stabilized with vegetation.

AGO technology involves no engineered structure, but derives its structural stability from the arrangement and integrity of the waste containers. The contoured shape, low-permeability membrane enclosure, high-integrity containers, and double leachate-collection systems would effectively prevent migration of radionuclides from the low-activity waste into the surrounding environment.

2.3.1.8 Greater Confinement Disposal

DOE is considering GCD technologies (boreholes and trenches) for the disposal of low-level, intermediate-activity radioactive waste (greater than 300 millirem per hour).

In a typical design, a large hole about 3 meters in diameter would be bored to a depth of 9 or 10 meters. After a leachate-collection system was installed, the lower 6 meters would be lined with concrete and an interior liner of fiberglass. Containerized wastes would be placed in the lined hole, and any empty spaces would be filled with grout. A concrete cover would seal the waste inside the cylindrical capsule. Closure would include construction of a low-permeability cap to divert percolating water and surface contouring to channel runoff away from the facility.

GCD trenches would have the same shielding and stability objectives as boreholes. A typical design would consist of a concrete-lined trench divided into cells and underlaid by a leachate-collection system. Containerized or bulk waste would be placed in the cells and grouted in place. When filled, the cells would be sealed by a concrete cover. A low-permeability cap and surface contouring would be added.

GCD technology would rely on a combination of several features to prevent migration of radionuclides from the facility. These would include proper siting, a sealed concrete structure, grout encapsulation of waste in place, a low-permeability cap, and a leachate-collection system.

2.3.2 WASTE VOLUMES

This section describes the waste and contaminated material generated on the SRP that require treatment and disposal or storage. Appendix E describes in more detail the types and potential quantities of waste generated.

The SRP generates five types of waste:

- Hazardous waste
- Low-level radioactive waste
- Mixed waste (combined hazardous and low-level radioactive wastes)
- High-level radioactive [including transuranic (TRU)] waste
- Nonhazardous and nonradioactive waste

This EIS considers only the first three preceding waste types; the others have been considered in other NEPA documents. These waste materials are derived from plant operations, maintenance, and planned renovations; from waste held in storage pending treatment or disposal before the startup of new facilities; and contaminated materials from closure or remediation activities at existing waste sites.

Liquid, solid, and semisolid operations waste is generated by plant processes; by maintenance, renovation, and demolition of facilities; and by offsite defense facilities. Interim-storage waste is liquid, solid, and semisolid waste held in storage, pending the startup of new treatment or disposal facilities. Closure-action waste includes contaminated soil or soil-waste mixtures exhumed in the remediation or closure of existing waste sites.

Hazardous, mixed, and low-level radioactive wastes generated at SRP include:

- Hazardous and mixed waste combustible oils, solvents, and solids

- Mixed and low-level radioactive solvents, scintillation solutions, contaminated equipment, building rubble, and job control waste

- Mixed waste sludges from effluent-treatment facilities

- Hazardous, mixed, and low-level radioactive ash and scrubber blowdown from incinerators

- Hazardous, mixed, and low-level radioactive waste exhumed from existing waste sites, including contaminated soil

Treatment by effluent treatment facilities using ion exchange, reverse osmosis, neutralization, and filtration to detoxify SRP waste streams is ongoing or planned. In this EIS, this activity is considered "operations." The residuals from these treatment operations are among the wastes considered in this EIS.

All hazardous, mixed, and low-level radioactive wastes are suitable for the application of one or more predisposal treatment technologies. "Predisposal treatment" is the treatment of waste before storage or disposal, to reduce volume or alter the chemical or physical characteristics of the waste, rendering it less toxic or more stable.

The following predisposal technologies could be applied to SRP wastes prior to storage or disposal:

- Incineration - Reduces volume, destroys certain hazardous constituents, and chemically stabilizes combustible wastes or a combustible fraction. Shredding might be used before incineration.

- Compaction - Reduces volume for compressible wastes; sometimes used in conjunction with shredding.

- Evaporation - Reduces volume and physically stabilizes by removing water or other volatile liquid from a waste until a dry salt remains.

- Solidification - Chemically and physically stabilizes by incorporating waste materials in an insoluble solid or crystalline matrix such as grout or concrete.

- Encapsulation - Physically stabilizes waste by enclosing it in a jacket or membrane of impermeable, chemically inert, water-resistant material; increases the disposal volume.

Predisposal treatment substantially affects the volume of waste to be disposed of as well as its characteristics.

Waste volumes and characteristics are important considerations in the design and sizing of a waste management facility. Project-specific details, to be developed during a later stage of planning in conjunction with the regulatory permitting process, could have a substantial effect on waste disposal and storage volumes. These details include the following:

TE

- Existing waste sites at which removal actions are to occur

- Determinations based on site field testing and examination of the quantity of waste and/or contaminated soil to be removed to a hazardous, mixed, or low-level facility

- The future availability or integration of predisposal treatment technologies into the management of SRP wastes (see Appendix D)

This EIS describes maximum and minimum waste volumes from assumptions regarding waste removal from existing sites and the volume reduction or expansion effects of predisposal treatment. Table 2-10 lists the estimated 20-year minimum and maximum volumes of waste as generated.

2.3.3 ALTERNATIVE TECHNOLOGICAL STRATEGIES

The waste management strategies - Dedication, Elimination, and Combination - could be carried out using different technologies. The basis for determining the magnitude of environmental impacts is limited to those technologies described in Section 2.3.1, the range of disposal and storage volume capacities (Table 2-10), and assumptions on the use and effects of predisposal treatment. There is a range of environmental impacts associated with the implementation of each strategy as defined in this EIS (Chapter 4). If an alternative strategy with a higher environmental impact and/or minimum technology will continue to ensure regulatory compliance and an acceptable level of environmental protection, then all other strategies which result in reduced environmental impacts would be acceptable as well. Table 2-11 lists the waste management strategies and their associated technologies (see Sections 2.3.3.1, 2.3.3.2, 2.3.3.3, and 2.3.3.4). TC

With new waste management facilities, the chosen strategy would involve planning to determine the relationships between waste generators and storage, treatment, and disposal facilities. Planning during the regulatory-permitting process would ensure that designs meet applicable regulations and achieve environmental compliance.

The following sections describe each strategy in terms of volume capacity requirements, costs, and major advantages and disadvantages. Cost estimates are based on current planning. Cost ranges are provided only as an indication of the magnitude of potential costs of a strategy, along with a list of additional cost considerations (Moyer, 1987). Detailed costing would be developed during the planning for the implementation of the chosen strategy. (See Appendix E.) TE

2.3.3.1 No Action

The No-Action strategy, the inclusion of which in this EIS is required by NEPA regulations, discloses the consequences of not constructing new facilities to accommodate future waste management needs. Under this strategy, the SRP would continue to operate and generate wastes, meaning that applicable regulations and criteria would not be met. Current facilities would be used until capacity is reached, after which containerized waste would be stored indefinitely in existing structures, on existing pads, or in other secure and safe areas.

TC Under the No-Action strategy, the total estimated 20-year waste volume would be about 748,300 cubic meters.

Cost estimates for the No-Action strategy bracket the range of waste volume but do not reflect specific costs of the preparation and use of existing structures and areas for storage. These facilities have not been specifically identified or assessed for such use. The estimated waste-management costs for 20 years of the No-Action strategy would be about $102 million. Life-cycle costs cannot be estimated, but they would include the cost of continued storage or of waste retrieval, treatment, and disposal, including closure and postclosure costs of the disposal facility. TC

The major advantages of the No-Action strategy are a delay in future expenditures for waste-management facilities and the use of structures on the SRP that otherwise would remain unused.

The disadvantages of this strategy include an unquantified risk of potentially adverse releases of waste due to the lack of adequate waste management facilities. This lack of facilities would not comply with RCRA, DOE Orders, and other applicable regulations. The No-Action strategy is not "reasonable." Finally, no action would delay expenditures for waste management facilities and require a future investment in waste management.

2.3.3.2 Dedication

The Dedication strategy would involve waste management by construction and operation of waste disposal facilities (i.e., nonretrievable) as listed in Table 2-11. These technologies are described in Section 2.3.1. TE

Table 2-11 indicates that there are technologies for each waste category. To provide an environmental assessment (see Chapter 4), this section discusses impacts in terms of the most- and least-protective technologies. TC

For hazardous and mixed wastes, RCRA landfills and vault technology are considered equally capable of providing adequate groundwater protection. However, under the mixed waste category, CFM vault technology is potentially less protective of groundwater; it was, therefore, identified for environmental evaluation. TE

For low-level waste, the vault and GCD technologies for intermediate-activity waste disposal were considered equally protective of groundwater. Among the technologies for low-activity waste disposal, the ELLT technology was considered to be the least protective and was used in the evaluations of environmental impacts. TE TC

Dedication would allow the use of predisposal treatment for volume reduction, detoxification, and solidification. The total 20-year disposal volume, therefore, could range between about 290,400 and 837,700 cubic meters, depending on the predisposal treatments and the volume of waste removed from existing sites. TC

Cost estimates for the Dedication strategy include the waste volume and technologies described above. The 20-year costs are estimated to range from about \$194 million to about \$895 million, while the life-cycle costs, including postclosure monitoring and maintenance for as long as 100 years, would range from about \$221 million to about \$976 million. These costs do not include predisposal treatment, with the exception of the CFM vaults, in which cement/flyash solidification is an integral part of the disposal process. There is a cost tradeoff between predisposal treatment to reduce waste volume and the construction and operation of larger disposal facilities. The lower disposal cost estimate, which assumes predisposal treatment, is low by an amount equal to the cost of such treatment. TC

The major advantage of the Dedication strategy is that treated or untreated wastes would be disposed of permanently to comply with applicable regulations and environmental standards. The major disadvantages are that the facilities would be costly to construct and operate, the land for disposal would be dedicated in perpetuity, and, in the event of a failure, retrieval of waste packages could be difficult or impossible if practices such as in-place grouting have occurred.

2.3.3.3 Elimination

Waste management under the Elimination strategy would involve the construction and operation of retrievable storage facilities for all containerized wastes TE using storage buildings, as listed in Table 2-11 and described in Section 2.3.1. The objective would be to delay permanent placement in anticipation of improved future methods of treatment, recycling, or disposal.

The Elimination strategy could benefit from the use of predisposal treatment for volume reduction. However, the use of such treatment should not preclude future waste management options.

Wastes under this strategy would be derived from the removal and closure of all existing waste sites, SRP operations for 20 years, and the interim storage facilities currently being used. The estimated total 20-year storage volume TC would be 3,993,400 cubic meters (991,500 cubic meters if wastes derived from the burial grounds are excluded).

The estimated cost for the Elimination strategy ranges from about $1.09 billion to about $5.98 billion for 20 years of storage, without and including the mixed waste/low-level waste burial grounds, respectively. These costs do not include retrieval before the end of the 20-year operating period. Life-cycle costs cannot be estimated, but would include the cost of continued storage (beyond 20 years) or the cost of waste retrieval, treatment, and disposal, including closure and postclosure costs of the disposal facility.

The major advantages of the Elimination strategy would be that no land would be dedicated to waste disposal in perpetuity and that, if a failure occurs, waste recovery and retrieval would be relatively simple. The facilities would TC be permitted and operated to comply with applicable regulations and environmental standards.

The disadvantages of the Elimination strategy would be that the facilities would be costly to construct and operate, and the waste would not be destroyed, requiring additional expenditures for waste retrieval, treatment, and disposal.

2.3.3.4 Combination

While the management of all waste by either disposal (Dedication) or storage (Elimination) is feasible, the management of specific wastes might be made TE more economical, more technologically feasible, or more environmentally reliable by using elements of each of these strategies. Waste management under the Combination strategy would include the best mix of the disposal and storage technologies listed in Table 2-11 (trenches, vaults, and storage TE facilities). Section 2.3.1 describes the technologies evaluated in this EIS.

Under the Combination strategy, predisposal treatment for volume reduction, detoxification, and solidification could aid the disposal operations. Compaction is the only predisposal treatment currently applicable to the storage part of waste management operations. Based on the mix of disposal and storage technologies, the application of predisposal treatment, and the volume of waste removed from existing waste sites, the 20-year total disposal/storage volume would range from about 305,100 to 855,700 cubic meters of treated and untreated waste. TC

Cost estimates for the Combination strategy include the waste volumes and technologies described above. The estimated 20-year costs would range from about $310 million to about $992 million. Life-cycle costs would range from about $333 million to about $1.03 billion, plus the cost of predisposal treatment. TC The life cycle costs shown do not include costs for removing waste from a storage facility to a permanent disposal facility.

The primary advantage of the Combination strategy is that it would use the best mix of technologies to optimize performance, recover and retrieve waste, minimize costs, and comply with applicable regulations and environmental standards. The major disadvantages are that some land would be dedicated to waste disposal in perpetuity, it would require future expenditures for treatment and disposal of stored wastes, and all of the facilities would be costly to construct and operate.

2.4 DISCHARGE OF DISASSEMBLY-BASIN PURGE WATER

SRP periodically purges water contaminated with radioactivity from the C-, P-, and K-Reactor disassembly basins, thereby reducing tritium concentrations in the reactor disassembly areas, to keep occupational exposures as low as reasonably achievable.

Disassembly-basin water becomes contaminated when tritium and other radionuclides are carried over in process water that adheres to the fuel and target assemblies, and when tritium, as water of hydration, is retained in aluminum oxide on the assemblies. Disassembly-basin water is recirculated through sand filters and deionizers to clarify it and to remove radionuclides; this process does not remove tritium, however, and small residues of other radionuclides also remain. The purge is not continuous, but occurs at a frequency that depends on the type of reactor assemblies and the frequency of assembly discharge operations; typically, the basins are purged twice yearly.

Currently, reactor disassembly-basin water is discharged to C- and P-Area seepage basins and to the K-Area containment basin. The K-Area basin effectively behaves as a seepage basin, and the following discussions treat it as such. Water discharged to the seepage basins either evaporates, carrying tritium to the atmosphere, or migrates to the shallow groundwater, which transports it laterally to outcrop areas along onsite surface streams.

Section 2.4.1 describes the waste management strategies evaluated for the discharge of disassembly-basin purge water.

2.4.1 WASTE MANAGEMENT STRATEGIES

DOE is considering the following strategies for the discharge of reactor disassembly-basin purge water:

- No Action, or continued discharge of disassembly-basin purge water to active reactor seepage and containment basins

- Dedication, the same as No Action

- Elimination, either evaporation of disassembly-basin water or direct discharge to onsite streams

- Combination (the preferred strategy), continued discharge of disassembly-basin purge water to active reactor seepage basins, and assessment of the applicability of mitigating measures such as moderator detritiation

The four following sections describe these strategies.

2.4.1.1 No Action

Under the No-Action waste management strategy, water discharged from reactor disassembly basins would continue to go to reactor area seepage basins. Approximately 30 percent of the tritium released to seepage basins would evaporate, and the remaining tritium and other radionuclides would seep into the groundwater. The other radionuclides would be retarded by adsorption and
TE reduced by radioactive decay to insignificant amounts by the time they reached surface water. Tritium, however, would travel directly with the groundwater, decaying during the 4 to 11 years of subsurface transport to outcrops along surface streams.

2.4.1.2 Dedication

The Dedication strategy, like the No-Action strategy, would continue the current practice of periodically discharging disassembly-basin purge water to active reactor seepage and containment basins.

2.4.1.3 Elimination

The Elimination strategy would include evaporation of the disassembly basin purge water or direct discharge to onsite streams.

Purge water from the reactor disassembly basins could be evaporated with small, commercially available evaporators or with waste heat from the reactors. Tritium would be the only radionuclide released to the atmosphere. Liquid discharges to seepage basins would be discontinued. The only liquid releases to the environment would be residual seepage to streams of purge
TE water released to seepage basins before the initiation of the evaporation process.

Small, commercially available equipment, consisting of a storage tank, filters, an evaporator, and a stack with a blower, could be installed in each reactor area. Disassembly-basin water would be purged into large storage tanks from which the water would be pumped through sand filters and ion-exchange beds to the evaporator. Steam would be used to heat the water, and the tritiated water vapor would be vented to a stack. Air would be added to dilute and disperse the vapor, which would be visible from the stack under all atmospheric conditions (Du Pont, 1984).

If reactor waste heat were used, lined evaporation ponds would be constructed in each reactor area. Disassembly-basin purge water discharged to these ponds would evaporate to the atmosphere, carrying tritium with it. Other radionuclides would not evaporate. Evaporation would be accelerated through the use of a grid of underwater pipes heated by waste heat from the area's reactor (Du Pont, 1984b).

As for direct discharge, disassembly-basin purge water, diluted with cooling water, could be discharged to nearby onsite streams. Evaporative losses to the atmosphere would be small. However, the main advantage of seepage-basin use, radioactive decay, would be lost. This would be especially significant for those radionuclides that have exceptionally long travel times. Concentrations of tritium and other radionuclides in onsite streams and the Savannah River would reach maximums during purges and drop to lower levels afterward.

2.4.1.4 Combination

The Combination waste management strategy includes continued assessment of mitigation measures and discharges of disassembly-basin purge water to seepage basins, as in the No-Action strategy. DOE has considered detritiation of heavy-water reactor moderator at a central facility as a means of mitigating tritium releases from the Savannah River Plant, including those from disassembly-basin discharges. A moderator-detritiation plant (MDP), constructed to process moderator from each SRP reactor, would effectively reduce equilibrium-moderator tritium concentrations. Because reactor moderator is the source of disassembly-basin-water contamination, a corresponding reduction in basin-water tritium concentrations, and therefore releases, would be expected.

2.5 SUMMARY AND COMPARISON OF ALTERNATIVE WASTE MANAGEMENT STRATEGIES

This section summarizes and compares the four alternative waste management strategies listed in Table 2-1. It encompasses the range of project-level strategies discussed in this EIS for existing waste sites, new disposal facilities, and disassembly-basin purge water. The No-Action strategy would continue current waste management practices and would not include the establishment of new disposal or storage facilities.

Table 2-12 compares the alternative waste management strategies, including the potential environmental impacts; capital, annual operating, lifetime maintenance and monitoring costs; and closure and postclosure costs where applicable. The table does not list schedules for implementation of any of the TE alternatives, including the preferred alternative, because of the need to establish priorities for implementation and to pursue further onsite studies and interactions with regulatory agencies. Final remedial and closure actions would be based on more detailed site-specific modeling and monitoring results and regulatory interactions. The strategy decision will precede any project-specific decisions.

DOE has identified the Combination waste management strategy as its preferred alternative. This strategy complies with applicable environmental regulations and guidelines through a combination of dedication at some existing waste sites and elimination of other selected waste sites, and combined storage and disposal of hazardous, low-level radioactive, and mixed wastes. DOE's preferred strategy is based on project-specific actions, including removal of wastes at selected existing waste sites; groundwater remedial and closure actions at existing waste sites, as required; construction of a combination of retrievable storage, aboveground, and belowground disposal facilities for hazardous, mixed, and low-level radioactive wastes; management of periodic discharges of disassembly-basin purge water from active reactors by discharging filtered, deionized disassembly-basin purge water to seepage and containment basins; and continuing evaluation of tritium-mitigation measures. Tables 2-13 and 2-14 list the project-specific actions for new waste disposal facilities and the discharge of disassembly-basin purge water, respectively.

The following sections provide summaries and more detailed comparisons of the ranges of environmental impacts and costs associated with each of the waste management strategies.

2.5.1 SUMMARY OF ALTERNATIVE WASTE MANAGEMENT STRATEGIES

2.5.1.1 No-Action Strategy TE

Existing Waste Sites

The No-Action strategy would continue current activities for existing hazardous, low-level radioactive, and mixed waste sites. It would be inconsistent with DOE's policy of complying with all applicable requirements, including groundwater protection. Therefore, it is not considered a "reasonable" approach for those waste sites that are within the scope of this EIS.

New Disposal Facilities

The No-Action strategy would involve no new facilities, such as sites, buildings, landfills, vaults, engineered trenches, and boreholes. For the purposes of this analysis, DOE assumed that the SRP would continue to operate and generate wastes. Existing SRP facilities would be used until their capacities were reached, and then structures, pads, or areas with minimal preparation for indefinite waste storage would be used.

Due to the risk of environmental releases of waste, and because the waste management practices described for No-Action would not comply with applicable regulations, the No-Action strategy is not considered acceptable.

Discharge of Disassembly-Basin Purge Water

The No-Action strategy would continue the present practice of periodic discharges of disassembly-basin purge water to active reactor seepage and containment basins. This would allow retardation on soil and radioactive decay during travel through groundwater to reduce radioactive releases to the environment. The maximum individual and collective doses of the No-Action strategy would be low and would amount to a fraction of the dose from natural background radiation. Because seepage basins are already in use for this purpose, there would be no additional cost of implementation.

2.5.1.2 Dedication Strategy

Existing Waste Sites

Closure with no removal of waste (Dedication strategy) would have the least cost, the lowest occupational risks, and the least disturbance of terrestrial ecology. The Dedication strategy would have the greatest potential to require groundwater corrective action, and as many as 77 waste sites that were not suitable for public use after the institutional control period would have to be dedicated to waste management uses, involving about 300 acres of SRP land.

New Disposal Facilities

The Dedication strategy would involve deposition of hazardous, mixed, and low-level radioactive wastes in permanent disposal facilities constructed on or under the ground surface. Hazardous and mixed waste would be disposed of in above- or belowground double-lined vaults or RCRA-type landfills with double liners and leachate-collection systems and other features meeting the requirements of RCRA, HSWA, and DOE Orders. A technology applicable to a select portion of the mixed waste stream would involve solidification of the waste and discharge into cement/flyash matrix vaults. This technology assumes that the mixed waste can be rendered nonhazardous by solidification and delisted under RCRA. Low-level radioactive wastes would be disposed of in facilities meeting the requirements of DOE Orders, including ELLTs for low-activity wastes (less than 300 millirem per hour), in GCD for intermediate-activity wastes (greater than 300 millirem per hour), in a shielded above- or belowgrade vault, or by stacking contained wastes in an AGO constructed at grade on a pad without a building or vault. TE

Discharge of Disassembly-Basin Purge Water

The Dedication strategy for the discharge of disassembly-basin purge water would continue the current practice of discharging the purge water to active reactor seepage and containment basins.

2.5.1.3 Elimination Strategy

Existing Waste Sites

Removal of wastes at all waste sites (Elimination strategy) would involve high closure expense, occupational risks, disturbance of terrestrial habitat and associated wildlife, and cost of new retrievable storage facilities for the exhumed materials. No SRP land would be required for dedication to waste management uses, however, other than an outfall delta near the old TNX seepage basin.

New Disposal Facilities

The retrievable-storage alternative (Elimination strategy) encompasses technologies using structures designed to accommodate a specific type of waste (e.g., hazardous, mixed, and low-level waste). The retrievable-storage alternatives for hazardous and mixed wastes are similar in technology and would meet applicable standards. These facilities would be designed to achieve essentially zero releases, thereby producing no significant adverse environmental impacts. In the case of mixed waste, in addition to meeting RCRA requirements, they would shield radiation sources. The technologies for low-level waste would consist of engineered storage of waste with various degrees of isolation and shielding to accommodate different levels and types of radioactivity. These facilities would meet the ALARA requirements of DOE Orders. Waste would be removed from retrievable storage facilities in the future and transferred to disposal facilities. This action is not evaluated in this EIS.

Discharge of Disassembly-Basin Purge Water

Under the Elimination strategy, use of the active reactor seepage and containment basins would be discontinued and the purge water would be discharged directly to surface streams currently receiving purge water via outcrops or evaporated to the atmosphere. Although discharges to seepage basins would be discontinued immediately, releases to surface streams from residual seepage from prior use would continue for several years. The maximum individual dose from direct discharge would be low but would average about four times the corresponding no-action or the evaporation doses. The average collective dose for direct discharge would be more than double that of no action, while TC evaporation would produce about one-third the no-action collective dose within defined regional population groups. The advantages of direct discharge are ease of implementation, insignificant costs, and no need to dedicate the TE seepage basins and surrounding areas (Du Pont, 1984b).

2.5.1.4 Combination Strategy

Existing Waste Sites

The primary considerations in choosing the Combination strategy (the DOE-preferred alternative) are the reduced environmental effects and occupational risks from remedial and closure actions, the cost of remedial and closure actions, the capacity and cost of new storage and disposal facilities, and the amount of land, if any, that would be dedicated for waste management purposes at the end of the institutional control period. Costs presented do not include costs for transfer of wastes from storage facilities to disposal facilities.

Waste removal prior to closure is identified on a preliminary basis for those selected sites at which such removal is predicted to reduce significantly the peak concentrations of waste constituents in groundwater; other waste sites would be closed without waste removal and dedicated for waste management purposes. All sites would receive groundwater corrective actions as required.

This strategy would provide the same degree of environmental protection and produce fewer ecological and occupational risks at a substantially lower cost than the Elimination strategy. Substantially less land area would have to be dedicated for waste management purposes than under the Dedication strategy.

New Disposal Facilities

The Combination strategy for new disposal facilities would apply a combination of retrievable storage and aboveground or belowground disposal technologies. Its objective would be to optimize the management of wastes with different characteristics within the hazardous, mixed, and low-level radioactive waste streams generated at the SRP. This strategy would comply with the requirements of RCRA, HSWA, and DOE Orders.

The technologies available for shallow land disposal of hazardous, mixed, and low-level wastes involve permanent deposition of wastes below the ground surface. Hazardous and mixed waste facilities are required to meet RCRA and HSWA minimum technology standards, while low-level waste facilities must meet the technology standards under DOE Orders.

Discharge of Disassembly-Basin Purge Water

The Combination strategy includes continued discharge of disassembly-basin purge water to active reactor seepage and containment basins and the continuation of the pursuit of studies of reactor moderator detritiation or other mitigation measures. Moderator detritiation is discussed below to provide an upper range of costs.

2.5.2 ESTIMATED COSTS TE

The costs for each waste management strategy include preliminary capital costs, estimated 20-year life-cycle operating costs, closure costs, and post-closure maintenance and monitoring costs. Groundwater remedial actions treatment and well installation costs are not included. These costs could vary considerably depending on choices of treatment and well locations. An average cost per well installation is about $7,500. TC

Existing Waste Sites

For existing waste sites, capital costs for removal of wastes and closure actions, as required, range from about $2 million for the No-Action strategy to about $1.2 billion for removal of waste to the extent practicable at all sites (Elimination strategy). The major part of the estimated cost is for the removal of wastes at the low-level radioactive burial grounds. The estimated costs for existing waste site removal and closure do not include potentially required groundwater corrective actions (e.g., recovery and treatment, installation of barrier walls, or grout curtains). Unit costs for these operations are available but, because site-specific remedial action requirements have not been determined, they have not been calculated. TC

There are no operating costs associated with the removal of waste and closure at existing waste sites; however, the postclosure maintenance and monitoring costs range from about $37 million to about $51 million. Most of this cost is TC for the low-level radioactive waste burial grounds. Costs presented do not include the cost of transfer of wastes from storage to disposal facilities.

New Disposal Facilities

Estimated capital costs for new waste management facilities range from about $15 million for the No-Action strategy to about $3.6 billion for the Elimination strategy. Estimated operating costs range from about $51 million for the Dedication strategy to a maximum of about $2.4 billion for the Elimination strategy.

TC The closure of new disposal facilities and retrieval/decontamination of new storage facilities ranges from about $19 million to about $48 million. Finally, the estimated postclosure maintenance and monitoring costs range from about $27 million to about $81 million. The estimates do not include the costs of predisposal treatment or the costs of post-storage treatment and disposal.

Discharge of Disassembly-Basin Purge Water

There would be no increase in costs for the direct discharge of disassembly-basin purge water to onsite streams or to the active reactor seepage basins. Costs for capital installations are estimated to be about $7.5 million for evaporation, with 20-year life-cycle operating costs estimated at about $18 million. Costs per person-rem averted are estimated to be about $0.5 million.

TC TE The estimated capital cost of constructing and operating a detritiation facility is about $125 million, with a 20-year operating cost of about $124 million. In a 20-year operating period, total facility costs would be about $250 million. The detritiation facility would ordinarily serve four reactors (C, K, L, and P). Because this EIS addresses only three of these reactors, (C, K, and P), about 75 percent ($187 million) of the total amount is applicable to this analysis. On the basis of these cost values and the dose commitments of this and the No-Action strategy for the 26-year period studied (see Section 4.4.1), the cost per person-rem averted would exceed $3 million.

2.5.3 SITE DEDICATION

2.5.3.1 Existing Waste Sites

Under the No-Action strategy, dedication of currently inactive sites would be required if groundwater constituents exceeded regulatory limits.

The Dedication strategy would require that contaminated areas remaining at existing waste sites not be returned to public use; they would be dedicated for waste management purposes. About 300 acres of SRP land would be involved.

For the Elimination strategy at existing waste sites, no site dedication is expected (except for an outfall delta adjacent to the old TNX seepage basin), because waste and contaminated soil would be removed to the extent practicable. Sites could be used for purposes other than waste management after the 100-year institutional control period.

Under the Combination strategy, sites from which waste had been removed could be returned to public use after the 100-year control period; sites from which waste had not been removed would be dedicated for waste management purposes if they could not be returned to public use.

2.5.3.2 New Disposal Facilities

The No-Action strategy includes an indefinite period of waste storage; site dedication is required only as long as wastes remain in the storage facility or potentially in the event of an accidental release.

Under the Dedication strategy, new disposal facilities would require up to 400 acres, plus buffer zones around the facilities. These areas are insignificant (0.2 percent) in terms of total available SRP natural areas.

Site dedication is not required under the Elimination strategy. Stored wastes would be retrieved and disposed of permanently. The sites used for storage could be returned to a natural condition or be reclaimed for other nonrestricted uses after waste retrieval is completed, although land would be required for disposal sites.

Under the Combination strategy, disposal facilities would be dedicated for waste management purposes. Up to 400 acres, plus buffer zones, would be required. The retrieval storage portion could be returned to other use after wastes are removed to permanent disposal facilities, which would require additional (but currently unknown) land areas.

2.5.3.3 Discharge of Disassembly-Basin Purge Water

Under the No-Action strategy, active reactor seepage and containment basins would continue operating as at present. At the end of the 100-year control period, the basins would be dedicated for waste management purposes as needed if they could not be returned to public use.

Seepage basins for discharge of disassembly-basin purge water would eventually be eliminated under the direct-discharge or the evaporation alternative. Closure and remedial actions could return these areas to public use after the 100-year institutional control period.

2.5.4 GROUNDWATER IMPACTS

Under the No-Action strategy, groundwater in Tertiary (shallow) formations would continue to show chemical and radionuclide concentrations exceeding applicable standards or guidelines in some onsite areas. In addition to any removal and closure actions implemented at existing waste sites, remedial actions could be required to bring groundwater constituent concentrations into compliance with the applicable standards or guidelines. Potential impacts to the Cretaceous sediments aquifer would continue as a result of head reversal changes.

Groundwater withdrawal as part of a required remedial action could have small effects on Tertiary aquifers under the three waste management strategies. Observations of a number of wells in areas involved in groundwater pumping would be maintained to determine the extent of drawdown effects.

New disposal and storage facility construction and operations are not expected to affect groundwater under any of the waste management strategies, because they would be designed to be essentially zero release. No action, by comparison, would pose the greatest risk of short-term groundwater impacts from accidental releases of stored wastes.

Only implementation of the Elimination strategy for disassembly-basin purge-water discharges would halt the release of tritium to the groundwater; other strategies would continue the present minor onsite groundwater impacts.

Offsite groundwater impacts are not expected under any of the waste management strategies for existing waste site removal, closure, and remedial actions or for construction or operation of new disposal and storage facilities, because groundwater flow paths are intercepted by onsite surface streams and the Savannah River. Under the No-Action strategy, DOE is committed to maintaining offsite groundwater quality.

2.5.5 SURFACE-WATER IMPACTS

Surface-water quality would be improved under the three waste management strategies because of groundwater remedial actions at existing waste sites. Under the No-Action strategy, nitrate and tritium would exhibit elevated levels in Four Mile Creek.

New disposal-facility construction and operation are not expected to impact surface streams because of essentially zero or ALARA designs. The No-Action strategy (i.e., continued temporary storage of wastes) has the greatest potential to impact surface streams as a result of accidental releases of stored wastes.

Concentrations of tritium in surface water would increase with direct discharge of disassembly-basin purge water because of a loss of delay time in transit. Under the No-Action, Dedication, or Combination strategy, releases would remain at existing levels.

2.5.6 PUBLIC HEALTH EFFECTS

At existing waste sites, adverse health effects to a hypothetical maximally exposed individual resulting from the No-Action strategy are estimated to occur onsite in the year 2085, assuming termination of institutional control at that time. The Dedication, Elimination, or Combination strategy coupled with potentially required groundwater remedial actions would pose no significant increase in health effects.

A wide range of health effects from accidental releases of stored wastes could occur under the No-Action strategy. The essentially zero or ALARA release designs of new disposal or storage facilities would greatly reduce both hazardous chemical and radiological health effects.

No significant adverse health effects would result from continued discharge of disassembly-basin purge water to seepage basins.

2.5.7 AQUATIC ECOLOGY

Under the No-Action strategy, offsite ecological systems would be protected and onsite streams would continue to show some minor impacts. The Dedication, Elimination, or Combination waste management strategy at existing waste sites would have an overall benefit by eliminating any minor impacts to onsite aquatic ecosystems.

The Dedication, Elimination, and Combination waste management strategies (essentially zero or ALARA designs) for new disposal facilities preclude aquatic ecosystem impacts, but the No-Action strategy could cause a range of short-term aquatic effects from accidental releases.

The Elimination waste management strategy (direct discharge of disassembly-basin purge water to onsite streams) has the greatest potential for aquatic impact. Evaporation to the atmosphere would reduce potential aquatic impacts. Continuation of discharges to seepage basins (No-action, Dedication, or Combination waste management strategy) would continue the current minor level of impacts.

2.5.8 TERRESTRIAL ECOLOGY

Under the No-Action strategy for existing waste sites, offsite terrestrial ecosystems would be protected. Existing open or active sites could have some floral or faunal impacts. The Dedication, Elimination, or Combination waste management strategy would eliminate impacts due to direct exposure to contaminated materials or groundwater. Clearing and development of land are required for construction of new disposal facilities; however, no impacts are expected from hazardous or radioactive contaminants at these facilities because of the essentially zero or ALARA designs of these strategies. Short-term impacts could result from accidental releases of wastes stored under the No-Action strategy.

The discharge of disassembly-basin purge water to seepage basins would cause no significant impacts to terrestrial ecosystems. Under the Elimination waste management strategy, direct discharge of disassembly-basin purge water to onsite streams would increase tritium concentrations and potential impacts, but evaporation would increase atmospheric releases and decrease liquid releases.

2.5.9 HABITAT/WETLANDS

Under the No-Action strategy, previously disturbed habitats would not be disturbed further. Some habitat recovery could occur at closed and inactive waste sites, and potentially minor impacts to wetlands could occur from some sites. Short-term habitat disruption could occur under the Dedication, Elimination, or Combination waste management strategy because of the use of borrow pits for backfill. Wetlands are sufficiently removed from most existing waste sites that any impacts would be minimal. Some sites could require special erosion-control measures during closure to prevent impacts.

DOE estimates that habitat losses from new waste management facility construction could range from less than 50 acres to about 400 acres, depending on the technology adopted and the waste volumes.

Impacts to habitat and wetlands would be insignificant under the No-Action strategy for discharge of disassembly-basin purge water. Direct discharge (Elimination waste management strategy) would increase tritium releases to onsite streams.

2.5.10 ENDANGERED SPECIES

No impacts to endangered species are expected as a result of the implementation of any of the strategies, because no species have been observed in the immediate vicinity of existing waste sites. Habitat losses could occur as described above (Section 2.5.9).

Sites being considered for locations of new disposal facilities are not near any known critical habitat for endangered species; such species have not been sighted near storage facilities, and no impacts are expected.

No impacts to endangered species are expected through any of the disassembly-basin purge-water strategies, because the basins do not serve as habitats for these species.

2.5.11 ARCHAEOLOGICAL AND HISTORIC SITES

No archaeological or historic sites are located near existing waste sites. One archaeological site is near a candidate site for a new disposal/storage facility and would require an additional survey. No archaeological or historic sites would be affected by disassembly-basin purge-water discharge actions; there are no sites in the vicinity of seepage basins.

2.5.12 SOCIOECONOMICS

No impacts are expected for any of the waste management strategies for existing waste sites, new disposal facilities, or disassembly-basin purge-water discharge. The peak workforce is not expected to exceed 200 workers, all of whom would be drawn from the existing workforce.

2.5.13 NOISE

Noise impacts on the Plant from the implementation of the waste management strategies would be minor and short-term. Offsite impacts would be insignificant, due to the distance to the SRP boundary and buffering effects. The No-Action strategy would not increase noise above its current level.

2.5.14 ACCIDENTS/OCCUPATIONAL RISKS

Accident probabilities and occupational risks result from the transport of wastes from existing waste sites where removal would occur; from movement of backfill and capping materials; from fires, spills, and leaks; and from exposure of onsite workers. Special precautions would be required for protection of workers at the low-level radioactive waste burial grounds if the wastes were removed. Accidents at new disposal facilities could involve spills, leaks, and fires; the range of impacts would depend on the volumes and types of wastes handled. The use of high-integrity containers, spill recovery, and other secure waste-disposal provisions would reduce the numbers and impacts of accidents.

If necessary in case of an accident, notification of state agencies in South Carolina and Georgia would be made in accordance with Memoranda of Understanding executed between the Department of Energy, the South Carolina Department of Health and Environmental Control, the South Carolina Emergency Preparedness Division, Office of the Adjutant General; and one between the Department of Energy, the Georgia Department of Defense, the Georgia Emergency Management Agency, and the Georgia Department of Natural Resources, Environmental Protection Division. K-4

No significant occupational risks are expected under any strategy for the discharge of disassembly-basin purge water.

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