4.2.4.5 Ecological Impacts

Potential aquatic impacts resulting from the Combination strategy would be similar to those discussed previously in Section 4.2.2.5.

Potential impacts of the Combination strategy to terrestrial organisms include those that result from consumption of contaminated standing water in open basins, biointrusion, noise, and/or habitat disturbance. As indicated in Section 4.2.1.5, the SRP contains numerous open basins with standing water, at least during wet periods, at various waste sites. Of the open basins that were indicated to contain contaminants that exceed the EPA drinking water standards (see Section 4.2.1.5), the Combination strategy proposes only to drain the surface water from the new TNX seepage basin, SRL seepage basins, and F- and H-Area seepage basins. Thus, the H-Area retention basin and the M-Area settling basin would still contain contaminated standing water that exceeds the EPA drinking-water criteria and could potentially impact wildlife that consume the water. However, the effects to wildlife that consume the contaminated standing water should be minimal in view of the conservative nature of the drinking water standards when applied to wildlife, and the low probability of significant numbers of wildlife consistently drinking the water from the basins.

Some waste sites on the SRP contain soils that are contaminated at levels sufficient to cause toxic effects to terrestrial organisms, as indicated in Section 4.2.1.5. The Combination strategy would remove contaminated soil and waste only from the R-Area seepage basin. The remaining waste sites will retain their wastes; however, the sites would be covered, regraded, and revegetated. Thus, assuming site maintenance prevents root penetration to the waste layer, impacts via the biointrusion pathway should not occur.

Impacts of noise and habitat disturbance would be similar to those discussed in Section 4.2.2.5. Impacts at borrow pits would be bracketed by the requirements of the Dedication and Elimination strategies.

Impacts to endangered species and wetlands would be similar to those discussed in Section 4.2.2.5.

4.2.4.6 Other Impacts

Occupational Risk

Total occupational risks to protected workers due to atmospheric releases of nonradioactive materials from removal of waste at selected existing waste sites would be very low, and would be considered not significant. Specifically:

- The total individual occupational carcinogenic risk (i.e., incremental lifetime probability of death from cancer) to an average worker is 1.6×10^{-10} for waste removal and closure of the old F-Area seepage basin. The total collective occupational carcinogenic risk to all workers involved in these activities is 1.5×10^{-9}. TC

- The total individual occupational noncarcinogenic risk (i.e., hazard index) to an average worker is 7.1×10^{-4} for the removal and closure of the old F-Area seepage basin.

TC

- No nonradiological constituents met the selection criteria for the R-Area reactor seepage basins. Therefore, the nonradiological risks for waste removal and closure of these sites is assumed to be zero.

Individual and collective occupational risks to cleanup workers and to transportation workers due to atmospheric releases of radioactive materials from removal of waste at the selected existing waste sites are presented below:

- Old F-Area seepage basin - 3.1 millirem total dose to the cleanup worker (8.7×10^{-7} risk) and 1.6 millirem total dose to the transportation worker (4.5×10^{-7} risk); the collective dose to all workers involved in these activities is 2.3×10^{-2} person-rem with a group risk of 6.6×10^{-6}.

TC

- R-Area reactor seepage basins - 4200 millirem total dose to the cleanup worker (1.2×10^{-3} risk) and 300 millirem total dose to the transportation worker (8.4×10^{-5} risk); the collective dose to all workers involved in these activities is 26.0 person-rem with a group risk of 7.3×10^{-3}.

TC

Archaeological and Historic Resources

This strategy would not involve any archaeological or historic resources; therefore, no impacts would be observed. (See Section 4.2.1.6.)

Socioeconomic Impacts

Socioeconomic impacts for this alternative would be insignificant, because the projected peak construction workforce would not exceed 200 persons and would be drawn from the existing construction workforce employed on the Plant. Because these workers already reside in the SRP area, no additional impacts to local communities and services due to inmigrating workers are expected.

Air Emissions Due to Transportation

The transportation of hazardous, mixed, and low-level waste from existing sites to new sites would result in the emission of small quantities of carbon monoxide and hydrocarbons from engine exhausts and truck traffic and suspended particulates and dust from ground-surface disturbances from the vehicles, due to the nature of the sources, which are near-ground releases. All applicable emission standards would be met during construction.

4.2.5 COMPARISON OF ALTERNATIVE ACTIONS AT EXISTING WASTE SITES

This section compares the modifications to existing waste sites that would be implemented under the four alternative waste management strategies and their potential environmental consequences. The four strategies are as follows:

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

- Dedication - No removal of waste at existing waste sites, and implementation of cost-effective closure and remedial actions, as required
- Elimination - Removal of waste to the extent practicable from all existing waste sites, and implementation of cost-effective closure and remedial actions, as required
- Combination - Removal of waste to the extent practicable at selected existing waste sites, and implementation of cost-effective closure and remedial actions, as required

4.2.5.1 Comparison of Strategies

The No-Action strategy presented in Section 2.1.1 provides continued protection of the offsite environment. Waste removal, closure, and remedial actions would not take place at the SRP, but measures considered necessary to protect the offsite environment would be implemented. Waste sites would be protected against erosion; weeds and grass would be mowed; groundwater monitoring wells would be installed; existing and new wells would be monitored; and fences would be installed to keep out animals and unauthorized personnel. The removal of volatile organics from the groundwater in the Tertiary sediments in M-Area through a system of recovery wells routed to an air stripper would be continued. The monitoring and protective activities described for no action would be included in the three remedial and closure actions described below.

No-removal remedial and closure actions would be included in the Dedication strategy presented in Section 2.1.2. Releases of hazardous substances from existing waste sites would be controlled through the closure of such sites (if not already closed). Further remedial actions could be required to control groundwater contaminant plume migration and other corrective actions (excluding removal) could be initiated at the sites to prevent further releases of hazardous substances. Dedication for waste management purposes of waste sites and contaminated (hazardous and radioactive) areas that could not be returned to public use after a 100-year institutional control period would be required. Existing basins that had not been filled would be backfilled after water was removed. The cost and analysis of environmental consequences for this strategy are based on the assumption that a low-permeability infiltration barrier would be installed at 34 of the 77 sites.

Waste-removal-at-all-sites remedial and closure actions would be included in the Elimination strategy presented in Section 2.1.3 (compliance through elimination of existing waste sites and storage of wastes). Under this strategy, the hazardous, low-level radioactive, and mixed waste (including contaminated soil) would be removed from all existing waste sites to the extent practicable. After a maximum 100-year institutional control period, these areas could be returned to the public. In addition to waste removal and closure, further remedial action to control the migration of hazardous and radioactive substances that have already been released from the site could be required.

Waste-removal-at-selected-sites remedial and closure actions would be included in the Combination strategy presented in Section 2.1.3 (compliance through a combination of dedication, elimination of existing waste sites, and storage of wastes). Wastes (including contaminated soil) would be removed from selected existing waste sites based on environmental and human health benefits and cost-effectiveness. The areas from which waste had been removed could be returned to the public 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. As with no removal, releases from existing waste sites would be controlled through closure (with or without waste removal), and compliance with groundwater-protection requirements would be achieved through the closure actions and, if necessary, further remedial actions and other corrective measures to control groundwater contaminant plume migration. The cost and environmental analysis for this approach are based on the preliminary evaluation that waste removal from the old F-Area seepage basin, and the six R-Area reactor seepage basins, would be most beneficial. The sites from which waste would not be removed would receive the same closure action as those in the no-waste-removal approach. Additional remedial action under this strategy could be required, but such actions would be fewer than those for the Dedication strategy because of the removal of waste at the selected sites.

4.2.5.2 Comparison of Environmental Consequences

This section compares the environmental consequences of the four strategies at existing waste sites that contain or might contain hazardous, low-level radioactive, or mixed waste. Table 4-43 summarizes these environmental consequences. These consequences are in addition to those that are explicit in the definitions of the remedial, removal, or closure actions (e.g., waste remains in or is removed from the waste sites).

Onsite Groundwater

Under no action, certain hazardous and radioactive constituents either exceed or are predicted to exceed applicable standards in the groundwater in Tertiary (near-surface) formations. Therefore, this strategy would not comply with current groundwater protection requirements. After the period of institutional control, small public water supply wells could be screened into these aquifers. By that time, most constituents in the groundwater may have decayed or dispersed to concentrations that are below regulatory, human health, and environmental concern. Dedication of areas where groundwater constituents are still above levels of concern would be necessary under no action.

By comparison, the concentration of constituents in these Tertiary sediments generally would be lower due to the implementation of the three other strategies. Also, remedial action (i.e., groundwater cleanup) could be implemented to reduce these contaminants to concentrations that are below regulatory, human health, and environmental concern.

Remedial actions that could be required could cause adverse effects through drawdown of these shallow aquifers. If detailed studies indicate that these effects would occur, recharge of the aquifers with the treated groundwater would be considered. Another reason for returning the treated groundwater is that tritium, which is not practical to remove with current technology, would have additional time to decay until it reaches outcrops at onsite streams.

Under no action, there is a slight probability of contamination of the groundwater underlying the Black Creek formation, a primary source of irrigation and drinking water. An upward head reversal over some areas of the SRP precludes the leakage of groundwater through the Ellenton Clay, which separates the Tertiary and Black Creek formations. This head reversal does not exist in the A-, M-, CS-, K-, H-, P-, and R-Areas. In A- and M-Areas, the existing recovery wells lower the head (and the concentration of contaminants) in the shallow aquifers and, therefore, minimize the flow from the Tertiary sediments into the Black Creek formation. The results of recent observations are presented in Appendixes B and F.

Closure and remedial actions would protect the major drinking-water aquifers.

Offsite Groundwater

The effects of any of the four strategies on offsite groundwater would not be significant. Groundwater flow in the Tertiary formations is almost entirely to onsite streams. One exception is a groundwater divide that passes through the A- and M-Areas. Most of the waste sites in the A- and M-Areas are west of this divide. *Groundwater is believed to flow laterally to the west from these* sites until it enters the Congaree Formation near the Plant boundary. The water would then flow slowly downward into the Black Creek Formation. By the time any hazardous or radioactive constituents entered the Black Creek Formation, they would be diluted to concentrations well below (health-based) regulatory limits, even under no action.

Surface Water

Nitrate, tritium, and cesium-137 concentrations are predicted to exceed regulatory limits in Four Mile Creek under the No-Action strategy, and tetrachloroethylene is predicted to exceed its MCL in Upper Three Runs Creek. All other concentrations in the onsite streams and the Savannah River are predicted to be below regulatory standards. No constituents in surface water would exceed applicable standards under any of the three closure and remedial action strategies. Groundwater cleanup could reduce those concentrations to below regulatory limits. TC

Radiological Doses TE

Total cumulative (all waste sites) annual dose to the maximum individual from all pathways due to radiological releases at the SRP boundary under the No-Action strategy was estimated to be 14.6 millirem in 1985. This dose is well below *the 100-millirem DOE annual limit. The corresponding onsite peak* dose in 2085 is estimated to be 3920 millirem, which would be received primarily by the assumed use of an onsite shallow-aquifer drinking-water well adjacent to the R-Area and direct gamma exposure at the F-Area seepage basins (see Section 4.2.1.3). This emphasizes the need for rather extensive site dedication at the end of institutional control under the No-Action strategy. Remedial actions would be taken as required under the other three alternative strategies to ensure that doses are below the 100-millirem DOE annual limit. TC TE

Health Effects

Under the No-Action strategy, there would be essentially no adverse health effects during the period of institutional control. Based on conservative assumptions, adverse health effects could occur as a result of exposures onsite beginning after the period of institutional control. Dedication of

TC waste sites, including implementation of appropriate remedial actions, could avoid these adverse effects. Under any of the closure and remedial action strategies, appropriate actions (e.g., groundwater cleanup) would be taken to ensure that the concentrations of hazardous and radioactive constituents in the groundwater are brought to levels below regulatory human health and ecological concern. Human health at the waste sites would be protected either by removal of the hazardous and radioactive waste and surrounding soil or by dedication, based on the specific remedial and closure action chosen.

Other Impacts

TE The primary environmental consequences for these strategies, other than those discussed above, include ecological effects and occupational risks from site closure activities.

Under the No-Action strategy, offsite ecology would be protected. Slight onsite aquatic ecological effects could occur due to releases of radioactive or hazardous constituents to surface streams. Terrestrial ecology could be affected under the Dedication, Elimination, and Combination strategies, due to closure actions (e.g., borrow areas for backfilling). Under the Elimination and Combination strategies, terrestrial ecology would be affected due to the removal and transport of the waste to suitable new onsite storage or disposal facilities.

TE There would also be some occupational risks under the Elimination and Combination strategies from waste removal due to worker exposure to radiological and hazardous substances. In some cases, waste removal could require many crews working for short periods of time to ensure individual doses do not exceed occupational limits.

The transportation of hazardous, mixed, and low-level waste from existing sites to new sites would result in the emission of small quantities of carbon monoxide and hydrocarbons from engine exhausts and truck traffic, and suspended particulates and dust from ground-surface disturbances. The effects of these emissions would be small and limited to short distances from the vehicles due to the nature of the sources, which are near-ground releases. All applicable emission standards would be met during construction.

Accidents

The environmental impacts and risk of potential accidents associated with each strategy are discussed in Section 4.5.

Nonradioactive Air Releases

Risks and health effects from air releases are predicted to be low for all four strategies. Public risks are generally greatest at the end of institutional control because it is assumed that the maximally exposed individual would be at the waste sites rather than at the SRP boundary in 2085, when the institutional control period would end.

Risk would decrease steadily until 2985, the end of the modeling period. The second-highest risk year is 1985, the assumed year of closure actions. For example, under no action, total lifetime carcinogenic risk due to nonradioactive atmospheric releases to the maximally exposed individual in 1985 is about 5.6×10^{-8}. In 2085, this risk is predicted to be about 1.7×10^{-6}. By 2985, the risk would decrease to less than 5×10^{-8}. The three closure and remedial action values are even lower. Noncarcinogenic risks due to nonradioactive releases are not significant. TC

4.3 STRATEGIES FOR NEW WASTE MANAGEMENT FACILITIES

DOE is considering the construction of new waste management facilities for hazardous, mixed, and low-level radioactive wastes at the Savannah River Plant. DOE estimates that the capacity of the present low-level waste disposal facility will be exhausted by early 1989 and that the hazardous and mixed waste interim storage facilities will reach capacity by 1992.

DOE is considering four alternative strategies for future waste management at SRP:

- No Action
- Dedication
- Elimination
- Combination

Each strategy would be implemented through one or more technologies. Chapter 2 describes the alternative strategies and their associated technologies. Table 2-9 lists the waste management strategies and the technologies that form the basis of this environmental evaluation. Appendix E describes the technologies.

This section provides the range of potential environmental impacts associated with the new waste management facilities of each strategy, and the basis for future decisions on project-specific actions and the design and location of a new low-level radioactive waste management facility. Each waste management strategy has been defined in terms of technologies and facilities, which would be designed and operated to comply with all applicable regulations and requirements. Since there are several alternative technologies which could be selected to implement a strategy, the potential environmental impacts lie within a range defined by the least-protective and most-protective technologies. All technologies selected for consideration in this EIS are capable of providing adequate waste management in compliance with regulations; however, the most-protective technology may differ from the least-protective technology by superior structural characteristics or additional back-up systems such as liners or leachate collection. TC

To ensure that the impact evaluations consider all possible technological options, waste volumes, and waste characteristics (i.e., within the limitations set by the strategy), the EIS takes a conservative approach. Evaluations are based on the least-protective technological alternative of each strategy. If a technology is acceptable in terms of demonstrated regulatory compliance, all other (more protective) technologies under that strategy would be acceptable as well.

The environmental impacts described in the following sections are both quantitative and qualitative. Some analyses (i.e., atmospheric, groundwater, and surface-water modeling) were conducted relative to specific sites due to the need for or availability of site-related parameters. (Appendix E discusses the selection and location of candidate sites used for evaluation purposes.) Some analyses, such as those for archaeological and historic resources, were conducted at the three or four highest-ranked candidate sites. Other analyses (e.g., noise) were based on conditions known to exist at most SRP locations. Table 4-44 lists the bases of impact evaluations in each environmental category.

The accuracy of quantitative impacts (i.e., modeling results) is affected by assumptions, the potential ranges of significant parameters, and available project-specific details. On the average, these results are within a factor of 5 level of accuracy, and provide a determination of the relative performance of a strategy as a basis for comparative evaluations and preliminary strategy selection.

4.3.1 NO-ACTION STRATEGY

The No-Action strategy was developed and evaluated in compliance with the guidelines of the Council on Environmental Quality (CEQ) for implementing NEPA regulations. It assesses the consequences of taking no action to provide the needed facilities for current and future waste management. The strategy is defined as continuing waste management with no new facilities. For evaluation purposes, the No-Action strategy can be described as a form of "makeshift" indefinite storage. Structures that are currently unused would be used to store wastes in appropriate containers until their capacity was reached, after which waste would be stored in other available (unused or abandoned) structures and pads, followed by storage on minimally prepared open areas at existing waste sites. Bulk storage of wastes would not be used. (Refer to Appendix E.)

TC

4.3.1.1 Groundwater and Surface Water

Wastes would be stored without pretreatment and without protection, detection, or backup containment systems, which would increase the risk of an accidental release of waste to the environment. This could range from no release to the release of all waste stored; the potential impacts to groundwater and surface water could range from no significant impacts to massive and gross contamination.

Offsite groundwater would not be affected by adopting the No-Action strategy because the groundwater flow paths in the vicinity of the low-level waste burial ground, mixed waste management facility, and other probable storage locations terminate at onsite streams or the Savannah River.

4.3.1.2 Nonradioactive Atmospheric Releases

No significant air-quality impacts would result from the use of heavy equipment to prepare storage areas and handle the waste containers. However, for the reasons discussed in Section 4.3.1.1, these could range from no significant impact to severe impacts from toxic plumes resulting from a storage area fire.

Table 4-44. Basis for New Waste Management Facility Impact Evaluations

Environmental category	Basis of evaluation
Groundwater	Impact of technology analyzed using computer model or presumption of facility compliance with regulations; assumptions include (1) candidate Site B (RCRA-type facilities for hazardous or mixed waste), Site L (DOE-type facilities for delisted mixed waste), or Site G (DOE-type facilities for low-level radioactive waste); (2) waste stream consists of operations and interim storage wastes; and (3) some pretreatment. TC
Surface water	Same as basis for groundwater.
Nonradiological air	Impacts based on the presumption that wastes are containerized at the treatment or generating facility before delivery for disposal or storage.
Ecology	Impacts based on a conservative estimate of the land area required for the most land-intensive technologies, assuming maximum waste volumes and various ecological features, as determined at the candidate sites.
Radiological releases	Same as basis for groundwater.
Archaeological and historic	Impacts based on results of an archaeological and historic field survey of candidate sites.
Socioeconomics	Impacts assume a peak construction force for new waste management facilities not exceeding 200 persons.
Noise	Impacts based on attenuation features at all possible siting locations.
Site Dedication	Impacts based on an estimate of the land area required for disposal assuming the most land intensive technologies and maximum waste volumes.
Institutional	Impacts assessed relative to applicable regulations.

4.3.1.3 Ecology

The amounts of waste releases discussed above could produce ecological impacts ranging from no significant impact to severe and detrimental impacts, depending on the type of waste involved, the location, the pathways, and the effectiveness of cleanup activities.

Construction of facilities would not occur under this strategy; therefore, impacts on the ecology from new construction (i.e., clearing and development of land) would not occur.

4.3.1.4 Radiological Releases

TE Although the No-Action strategy objectives would be to prevent releases of radiological contaminants to the environment, the risk of a serious release, although unquantified, is higher with no action than with any of the other strategies.

4.3.1.5 Archaeological and Historic Resources

The No-Action strategy would not impact any archaeological or historic resources because only existing structures, pads, and disposal sites would be used for the indefinite storage of waste, and resources which may have been in these areas have either been recovered or destroyed by previous construction practices.

4.3.1.6 Socioeconomics

The No-Action strategy contains an inherent increased risk of an accidental release of waste to the environment ranging from no release to release and dispersion of all waste stored in this manner. The potential socioeconomic impacts could be substantial with a large-scale, catastrophic accidental release because of the temporary workforce required for cleanup, the possible shutdown of affected SRP operations and associated layoffs, and the potential offsite effects on property demand and values due to public reactions.

4.3.1.7 Site Dedication/Institutional Control

The No-Action strategy would not result in the permanent placement of wastes at a candidate site, but rather would include an indefinite period of make-shift storage, which would preserve the ability to retrieve the waste. Site dedication would be required only as long as the wastes remained on the site or in the event of a significant accidental release.

4.3.1.8 Noise

Noise produced by the operation of equipment during preparation and operation of the storage areas would be negligible at the nearest offsite area. In areas where workers could be exposed to equipment noise, they would wear protective equipment in accordance with applicable standards and regulations.

4.3.1.9 Other Impacts

Health Effects

With the unquantified risk of contaminant releases under no action, there is an unquantified but directly related risk of human health effects from potential releases of hazardous chemicals and radionuclides.

Occupational Risks

With the unquantified risk of contaminant releases under no action, there is an unquantified but directly related risk to workers due to potential interaction with hazardous chemicals and radionuclides.

Accidents

Section 4.6 describes the environmental impacts and risks of potential accidents from the movement of waste.

4.3.2 DEDICATION STRATEGY

Waste management under the Dedication strategy would include new disposal facilities to manage hazardous, mixed, and low-level radioactive wastes. Dedication implies that wastes would not be retrieved; therefore, disposal sites would be dedicated in perpetuity for waste management to ensure long-term environmental and public health protection.

Table 2-9 lists the technologies included in the Dedication strategy. The minimum technological alternatives identified for evaluation of groundwater, surface water, and radiological releases are Resource Conservation and Recovery Act (RCRA) landfills and RCRA-type vaults for hazardous waste; RCRA landfills and RCRA-type vaults for some, and cement/fly ash matrix (CFM) vaults for other mixed wastes; and engineered low-level trenches (ELLTs) and vaults or greater confinement disposal (GCD) for low-level radioactive waste. TC

Groundwater and atmospheric modeling conducted to quantify environmental impacts and health risks have projected exceedances of environmental or health standards, which generally result from conservative modeling assumptions. For example, if a structural failure occurred in the future and the modeling predicted contamination, this EIS assumes that DOE would take the appropriate actions to avoid or mitigate the conditions. The EIS limits the comparison of impacts to the end of the 100-year institutional control period.

4.3.2.1 Groundwater and Surface Water

Technologies for hazardous and mixed waste (i.e., RCRA landfills and vaults) would meet or exceed RCRA minimum technology standards and achieve the goal of ("essentially zero") releases. The combined effects of high-integrity waste containers, the filling of void spaces to prevent subsidence, double liners (primary and secondary), double-leachate monitoring and collection systems, low permeability caps, surface drainage facilities, and maintenance would provide the necessary containment and backup systems to ensure that wastes or waste constituents are not released to the environment. Groundwater modeling beyond the institutional control period indicates that eventually both technologies would fail. However, during the period of monitoring and maintenance, no significant impacts should occur. TC

For mixed wastes, CFM vaults represent the minimum technology (i.e., no liners, no leachate collection). Modeling indicates that no groundwater or surface-water would exceed standards but that uranium-238 would exceed the derived standard, and that a peak concentration would occur after 10,000 years; however, this exceedance is qualified because the model does not

include chemical solubility limits for uranium. Radionuclides are not expected to exceed their derived standards in groundwater or surface water.
TC (Note: The derived standard is the concentration of a radionuclide that yields an annual effective whole-body dose of 4 millirem per year, which is the Interim Primary Drinking Water Standard.) (Refer to Appendix G.)

Groundwater modeling for low-level radioactive waste facilities predicts that, for all radionuclides except tritium and uranium-234, the concentrations are well below derived standards. When solubility controls are considered, the uranium concentration should not exceed the derived standard.

TE Tritium from intermediate-activity vaults or GCD facilities is predicted to reach its peak concentration (70 times the derived standard) in the groundwater about 38 years after closure (i.e., during the institutional control period). The model assumes that facilities would contain no liners and no leachate collection. However, an exceedance of the derived standard for tritium is not expected to occur during the 100 years after closure, because vault and GCD technologies include leachate collection systems to intercept and recover tritium. Continued DOE recovery of tritium would ensure that the SRP meets groundwater standards. DOE could also choose to segregate and store intermediate-activity tritium wastes for decay in place.

In summary, DOE does not expect chemical and radioactive constituents to exceed actual or derived standards in SRP groundwaters or surface waters from new hazardous, mixed, and low-level radioactive disposal facilities under the Dedication strategy.

4.3.2.2 Nonradioactive Atmospheric Releases

The construction of waste disposal facilities under the Dedication strategy would result in the emission of small quantities of carbon monoxide and hydrocarbons from engine exhausts and truck traffic, and suspended particulates and dust from ground-surface disturbances. All applicable emission standards would be met during construction.

All waste would be delivered in sealed disposal containers and, therefore, would result in no air releases. Thus, no significant air quality impacts are anticipated.

4.3.2.3 Ecology

The operation and dedication of facilities is not expected to involve constituent releases that would exceed groundwater or surface-water standards; no waste-related adverse impacts on aquatic and terrestrial ecology are expected.

Construction of the facilities could require clearing and development of as much as 400 acres for facilities and roads. Existing or potential wildlife habitat would be destroyed; however, the maximum acreage amounts to only about 0.2 percent of the available habitat on the SRP and would constitute an insignificant impact.

TC Although endangered and threatened species [i.e., bald eagle, red-cockaded woodpecker, wood stork, American alligator, and shortnose sturgeon] are known to exist on the SRP, none are known to occur on or near any candidate site.

Short-term soil erosion impacts to swamps or surface streams could occur as a result of construction; however, these would be minimized by erosion control measures.

Belowground technologies risk uptake of waste constituents by vegetation if roots are allowed to penetrate the facilities and reach the waste. To prevent this, shallow-rooted plants would be used to stabilize soils during closure; these plants would be maintained by mowing during the postclosure institutional control period.

4.3.2.4 Radiological Releases

Modeling of releases and transport showed that peak radiological doses from mixed wastes exceeded the 4 millirem per year standard in groundwater, but not in the Savannah River or in food grown onsite. The model predicted that uranium-238 would not meet standards. However, if solubility limits for uranium are considered, no exceedance is expected. (See Appendix G.) TE

Modeling for low-level radioactive facilities showed that the sum of all radionuclides except intermediate-activity waste tritium and uranium were well below the 4 millirem per year standard. If solubility limits for uranium are considered, no exceedance of the dose standard is expected. Also, if liners and leachate collection systems for tritium are assumed to function, plus extended institutional control as necessary to ensure that groundwater standards are achieved, no dose exceedances due to tritium are expected. TE

In summary, peak doses due to releases of mixed or low-level radioactive wastes are not expected to exceed the 4 millirem per year drinking-water standard.

4.3.2.5 Archaeological and Historic Resources

The Dedication strategy would not impact any archaeological or historic resources. A survey of five of the six top-ranked candidate sites located no significant archaeological or historic sites requiring impact mitigation. However, if Candidate Site K were selected for low-level waste facilities, an archaeological survey would take place.

4.3.2.6 Socioeconomics

The socioeconomic impacts of the Dedication strategy are expected to be negligible, because no significant increase in the existing SRP construction workforce would be required.

4.3.2.7 Site Dedication/Institutional Control

Disposal of hazardous, mixed, or low-level radioactive wastes under the Dedication strategy would require the dedication of a disposal area as large as 400 acres plus a buffer zone.

Operational life and closure of the facilities would extend for at least 20 years. After closure, an institutional control period of at least 100 years would then be implemented. Beyond that, site dedication and full institutional control in perpetuity would ensure that the site would never be entered inadvertently. The placement of permanent markers to inform future generations, the implementation of security measures, and the accompanying dedication of land-use buffer zones would be key components of the site dedication program.

4.3.2.8 Noise

Noise produced by the operation of heavy equipment during construction and operation of the facilities would be negligible at the nearest SRP boundary. In the construction areas and other areas where workers could be exposed to equipment noise, they would wear protective equipment in accordance with applicable standards and regulations.

4.3.2.9 Other Impacts

Occupational Risks

Because contaminant releases to the environment are not expected to occur, and sealed waste containers would be used, risks to workers are expected to be negligible.

Accidents

The environmental impacts and risk of potential accidents from the movement of waste to the facility are discussed in Section 4.6.

4.3.3 ELIMINATION STRATEGY

Waste management under the Elimination strategy includes sufficient retrievable storage facilities to accommodate all hazardous, mixed, and low-level radioactive wastes for a 20-year period (see Table 2-9). Waste would be stored rather than disposed of, in anticipation of future methods of treatment, recycling, or disposal. Following retrieval of the waste, the land could be used for other nonrestricted purposes or returned to a natural condition.

TC | Storage facilities would be permitted and operated in accordance with applicable regulations (e.g., 40 CFR 264 and 270).

For the period of operation, storage buildings would be monitored and inspected on a continual basis. Special design would facilitate early detection and rapid recovery of any spilled or leaked wastes. The environmental evaluation assumes that no waste would be released from the facilities.

Because the impacts are assessed for the 20-year period of operation, the evaluation of the Elimination strategy is more limited than that of the Dedication strategy. No postoperational impacts are considered, and no consideration is given to impacts from the construction and operation of the future
TE | management facilities that would be required to treat or dispose of the waste.

4.3.3.1 Ground and Surface-Water Effects

The retrievable-storage facilities of the Elimination strategy would meet the zero-release goals of the applicable regulations. Groundwater and surface water would not be contaminated with waste constituents.

The base floodplain of the region is confined primarily to wetlands and low terraces along the Savannah River and its primary tributaries. Siting criteria avoid such flood-prone areas; thus, no impacts due to potential flooding of storage facilities are expected.

4.3.3.2 Nonradioactive Atmospheric Releases

The construction of the retrievable-storage facilities under the Elimination strategy would result in the emission of small quantities of carbon monoxide and hydrocarbons from engine exhausts and truck traffic, and suspended particulates and dust from ground-surface disturbances. All applicable emission standards would be met during construction.

All waste would be delivered in high-integrity storage containers and, therefore, would result in no air releases. No air-quality impacts are anticipated.

4.3.3.3 Ecology

To avoid siting the facilities in sensitive areas, the retrievable-storage and all ancillary facilities described in Section 2.3.5 would comply with applicable regulations. The facilities would be constructed to minimize the impacts on habitats, wetlands, endangered and threatened species, and migratory waterfowl in the vicinity. Construction would require the clearing and development of currently undeveloped sites for structures, roads, and fences. The loss of as much as 400 acres of habitat would represent 0.2 percent of the 184,200 acres of wildlife habitat on the SRP, an insignificant ecological impact. Releases to the environment are not expected with this alternative; no contaminant-associated impacts on ecology are projected.

4.3.3.4 Radiological Releases

The retrievable-storage facilities under the Elimination strategy would meet or exceed RCRA or as low as reasonably achievable (ALARA) requirements with respect to facilities, structures, and waste containers. Because they would be properly constructed, operated, and maintained, all potential spills or leaks of mixed or low-level waste would be contained within the storage unit and a rapid and thorough cleanup response would be facilitated. Thus, radiological releases to the environment through any pathway are not expected to occur with this alternative.

4.3.3.5 Archaeological and Historic Resources

Based on field studies, the retrievable-storage facilities under the Elimination strategy would not impact any archaeological or historic resources. The archaeological survey of five of the six top-ranked candidate sites located no significant resources requiring impact mitigation. However, if Candidate Site K were selected to implement low-level waste facilities, an archaeological survey would be performed.

4.3.3.6 Socioeconomics

The socioeconomic impacts of the Elimination strategy are expected to be negligible because no significant increase in the existing SRP construction work force would be required.

4.3.3.7 Site Dedication/Institutional Control

The Elimination strategy would not require permanent site dedication. Following retrieval and removal of the waste, the facilities could be removed and the site returned to a natural condition or reclaimed for other nonrestricted use. This strategy presumes that technologies for treatment, recycling, or disposal will be available by the end of the 20-year operational life of the facilities.

4.3.3.8 Noise

Noise produced by the operation of heavy equipment during construction and operation of the waste storage facilities would be negligible at the nearest offsite area. In the construction areas and in other areas where workers could be exposed to excessive equipment noise, they would wear protective equipment in accordance with applicable standards and regulations.

4.3.3.9 Other Impacts

Occupational Risks

Because contaminant releases to the environment are not expected to occur, and high-integrity waste containers would be used, risks to workers are expected to be negligible.

Accidents

The environmental impacts and risks of potential accidents from the movement of waste to the facilities are discussed in Section 4.6.

4.3.4 COMBINATION STRATEGY

Waste management under the Combination strategy consists of an optimum mix of disposal and storage technologies for hazardous, mixed, and low-level radioactive waste characteristics and volumes. The technologies for implementing
TC the Combination strategy are listed in Table 2-9. The technologies identified for evaluation of groundwater, surface-water, and radiological releases are the same as those for the Dedication strategy.

Modeling has been conducted for those cases in which disposal is part of the Combination strategy. Although some exceedances of environmental or health standards have been projected, they result from modeling assumptions. Impacts are evaluated to the end of the 100-year institutional control period.

Under the Combination strategy, the storage of wastes, assumed to be part of this strategy, would result in no releases of waste constituents to the environment during its 20-year period of operation and thereafter.

4.3.4.1 Groundwater and Surface Water

No waste releases are expected from any storage facilities during their 20-year operational period or thereafter, and releases of hazardous contaminants from hazardous and mixed waste disposal facilities are not expected to occur.

The Combination strategy assumes that tritium, carbon-14, and iodine-129 wastes would be segregated from the intermediate-activity waste streams and stored. Modeling indicates that all radionuclides, with the exception of uranium-234, remain at concentrations below derived standards in groundwater and surface water. Although uranium-234 is shown to exceed the derived standard slightly, when solubility limits are considered, it is projected to remain well below its standard. Thus, no significant groundwater and surface-water impacts are expected through the institutional control period under the Combination strategy. TE

4.3.4.2 Nonradioactive Atmospheric Releases

The construction of storage and disposal facilities under the Combination strategy would result in the emission of small quantities of carbon monoxide and hydrocarbons from engine exhausts and truck traffic and suspended particulates and dust from ground-surface disturbances. All applicable emission standards would be met during construction.

All waste would be delivered in sealed disposal or storage containers; therefore, there would be no air releases. Thus, there would be no air-quality impacts.

4.3.4.3 Ecology

The operation and dedication of facilities is not expected to involve constituent releases that would exceed groundwater or surface-water standards; no waste-related adverse impacts on aquatic and terrestrial ecology are expected.

Construction of the facilities could require clearing and development of as much as 400 acres for facilities and roads. Existing or potential wildlife habitat would be destroyed; however, the maximum acreage amounts to only about 0.2 percent of the available habitat on the SRP and would constitute an insignificant impact.

Although endangered and threatened species [i.e., bald eagle, red-cockaded woodpecker, wood stork, American alligator, and shortnose sturgeon] are known to exist on the SRP, none are known to exist on or near any candidate site. TE

Short-term soil erosion could occur to onsite surface streams and wetlands as a result of construction; however, these would be minimized by erosion control measures.

Belowground technologies risk uptake of waste constituents by vegetation if, following closure, roots are allowed to penetrate the facilities and reach the waste. To prevent this, shallow-rooted plants would be used to stabilize soils during closure; these plants would be maintained by mowing during the postclosure institutional control period.

4.3.4.4 Radiological Releases

Assuming that tritium, carbon-14, and iodine-129 are segregated and stored, and ignoring the model results for uranium based on previous discussions, radiological dose predictions from mixed and low-level radioactive disposal TE facilities are well below the 4-millirem-per-year standard.

4.3.4.5 Archaeological and Historic Resources

The Combination strategy would not impact any archaeological or historic resources. If Candidate Site K were selected for low-level waste facilities, an archaeological survey would be performed.

4.3.4.6 Socioeconomics

The socioeconomic impacts of the Combination strategy are expected to be negligible, because no significant increase in the existing SRP construction force would be required.

4.3.4.7 Site Dedication/Institutional Control

The disposal areas plus a buffer zone of the Combination strategy would require dedication of as much as 400 acres.

Operational life and closure of the facilities would extend for at least 20 years. Following closure, an institutional control period of at least 100 years would be implemented. Dedication and full institutional control would ensure that the sites would never be entered inadvertently. The placement of permanent markers to inform future generations, the implementation of security measures, and the accompanying dedication of land-use buffer zones would be key components of the site dedication program.

4.3.4.8 Noise

Noise produced by the operation of heavy equipment during construction and operation of the facilities would be negligible at the nearest offsite area. In the construction areas and in other areas where workers could be exposed to equipment noise, they would wear protective equipment in accordance with applicable standards and regulations.

4.3.4.9 Other Impacts

Occupational Risks

Contaminant releases to the environment are not expected to occur, and high-integrity waste containers would be used; therefore, risks to workers are expected to be negligible.

Accidents

The environmental impact and risk of potential accidents from the movement of waste to the facility are discussed in Section 4.6.