PART C. MODIFICATIONS TO CHAPTERS 1 THROUGH 7 OF THE DRAFT APT EIS

As discussed in Part A, modifications of the Draft EIS are presented in two ways: (1) complete sections, tables, and figures have been replaced or added with specific references to the Draft EIS, and (2) text or elements of tables in the Draft EIS which have been modified are shown as **bolded** text. In both cases, the change is preceded by a text box that explains the change and references the pertinent section of the Draft EIS. Following the text box is a specific reference to locations in the Draft EIS the change affects.

This section presents the technical modifications to Chapters 1 through 7 of the Draft APT EIS in the format described above. The changes are made to (1) incorporate responses to comments received during the public comment period and (2) update or clarify factual information. The changes are presented in the same order (by chapter) the information was presented in the Draft EIS. Transcripts and South Carolina Clearing House Forms can be found at the end of this document. Appendixes A, B, and C of the Draft EIS have not been modified and are not reproduced in this document. The assessment of the potential impacts associated with the No Action alternative can be found starting on page C-38 of this document.

Because DOE received few comments on the Draft APT EIS, it is not reprinting a revised draft as the Final EIS, as is typically done. Rather, DOE is finalizing the APT EIS by reference to the Draft EIS and is issuing this document as a record of changes made.

Chapter modifications are in the order of the Draft EIS. Each modification is preceded by a text box that describes the change, explains why the change was made, and references the applicable location in the Draft EIS. Modifications to text and tables that were in the Draft EIS are indicated by **bolded text**. In cases where modifications "replace" portions of the Draft EIS, the changes are not bolded.

Chapter 1. Modifications – Background and Purpose and Need for Action

[Chapter 1, Section 1.5 modification to the Draft APT EIS]

The Draft EIS described the implementing strategy associated with providing a safe and reliable supply of tritium. The following paragraphs replace text in Section 1.5 of the Draft EIS.

<u>Page 1-5, 2nd column, 2nd through 4th paragraphs replace with</u>:

DOE proposes to make one or more Record(s) of Decision (ROD) to select technology alternatives and a site for the APT. These decisions would be based on the environmental analysis contained in this EIS and other policy, technical, cost, and schedule information.

DOE prepared a draft EIS on the construction of a tritium extraction facility (TEF) (DOE 1998a). The APT EIS presents the analysis of one of the TEF alternatives, combining TEF into the APT [see Part D, Section 4.5.2 of this document]. A Record of Decision could be based on both these EISs. Other policy, technical, cost, and schedule information would also be used in this decision.

DOE has also issued a draft EIS (DOE/EIS-0288D) which analyzes the impacts of using an existing or partially built commercial light-water reactor to produce tritium. DOE proposes to make one or more Record(s) of Decision based on that EIS. The upgrade and consolidation of tritium facilities was evaluated in an environmental assessment followed by a Finding of No Significant Impact. The key milestones and status of each of these documents is presented in Figure 1-3.

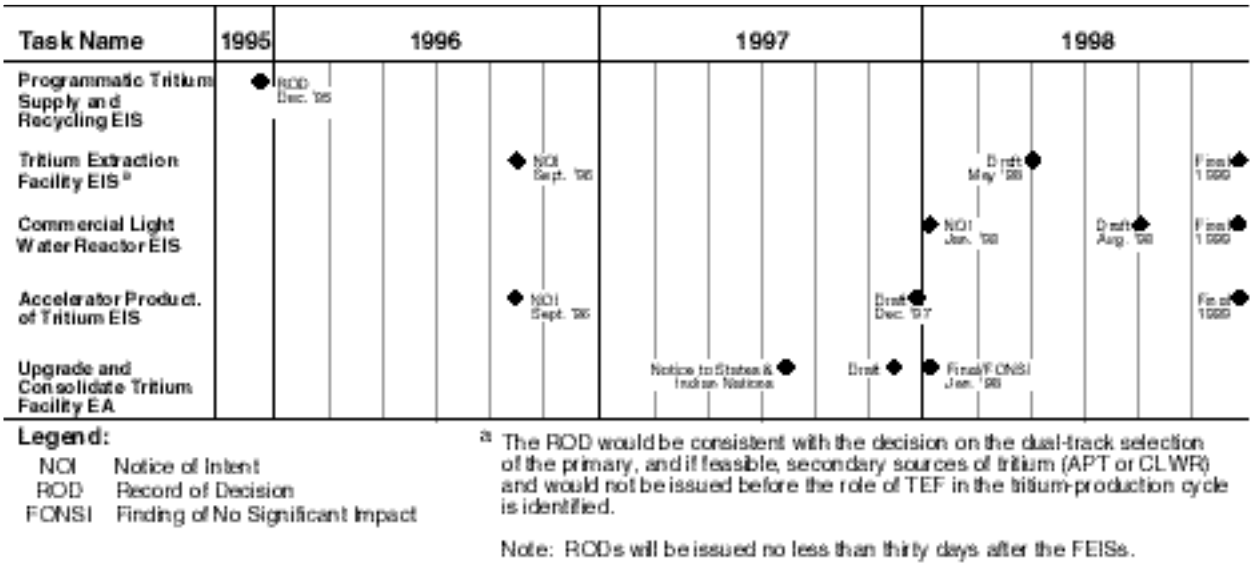


Figure 1-3. NEPA documentation for related DOE actions.

[Chapter 1, Section 1.5 modification to the Draft APT EIS]

In the Draft APT EIS, the Department reported that a Notice of Intent (NOI) had been issued for the preparation of an EIS to assess the potential environmental impacts of constructing and operating a tritium extraction facility at the Savannah River Site. Since the Draft APT EIS was issued, the Department issued a draft EIS on tritium extraction. This EIS identifies as its No Action alternative combining tritium extraction capabilities in the APT facility. The following text replaces the discussion of tritium extraction on page 1-6 of the Draft APT EIS.

Page 1-6, 1st column, 1st through 2nd paragraphs replace with:

Tritium Extraction. In May 1998, DOE issued the *Draft Environmental Impact Statement for the Construction and Operation of a Tritium Extraction Facility at the Savannah River Site* (DOE 1998a). In this draft, the Department proposes to construct and operate a Tritium Extraction Facility (TEF) at H Area on the Savannah River Site to provide the capability to extract tritium from commercial-light water reactor targets and from targets of similar design.

An alternative is to construct and operate TEF at the Allied General Nuclear Services facility, which is adjacent to the eastern side of the SRS. The No Action alternative for TEF would incorporate tritium extraction capabilities in the accelerator for production of tritium should the APT be selected as the primary source of tritium. The purpose of the proposed TEF action and alternatives evaluated is to provide extraction capability to support either tritium production technology (CLWR or APT).

[Chapter 1, Section 1.5 modification to the Draft APT EIS]

In November 1997, DOE issued a draft environmental impact statement on the *Management of Certain Plutonium Residues and Scrub Alloys Stored at the Rocky Flats Environmental Technology Site* (DOE/EIS-0277D). The Final was issued on August 28, 1998. The Savannah Site is one of the possible locations that could be utilized to manage the Rocky Flats material. This potential action has been added to Section 1.5 of the Draft APT EIS as a related DOE action.

Page 1-7, 1st column, after 2nd paragraph, insert the following:

Management of Certain Plutonium Residues and Scrub Alloys. In November 1997, the Department issued the *Draft Environmental Impact Statement on Management of Certain Residues*

and Scrub Alloy Stored at the Rocky Flats Environmental Technology Site (DOE 1997c). The Final was issued on August 28, 1998. In this EIS, DOE proposes to process certain plutonium-bearing materials being stored at the Rocky Flats Environmental Technology Site (Rocky Flats) near Golden, Colorado. These materials are plutonium residues and scrub alloy remaining from nuclear weapons manufacturing operations formerly conducted by DOE at Rocky Flats. In their present forms, these materials cannot be disposed of or otherwise dispositioned because they contain plutonium in concentrations exceeding DOE safeguards termination requirements.

DOE has identified and assessed three technical alternatives for processing these plutonium-bearing materials: (1) No Action, (2) Processing without Plutonium Separation, and (3) Processing with Plutonium Separation. Under the Processing with Plutonium Separation Alternative, DOE would remove most of the plutonium from the plutonium-bearing materials in preparation for disposal or other disposition. The Savannah River Site is the preferred site for hosting this activity. If separation is conducted at the Savannah River Site, it would be done utilizing a chemical process in F and H Canyons. Any plutonium resulting from separation processes would be placed in safe and secure storage pending disposition in accordance with decisions to be reached after completion of the *Surplus Plutonium Disposition EIS* (DOE 1998b). The remaining material would be prepared for disposal.

Chapter 1, Section 1.5 modification to the Draft APT EIS]

In July 1997, DOE issued the *Surplus Plutonium Disposition Draft Environmental Impact Statement* (DOE/EIS-0283D). Any plutonium resulting from separation processes at the Savannah River Site would be dispositioned in accordance with decisions to be reached after completion of the Surplus Plutonium Disposition EIS. This potential action has been added to Section 1.5 of the Draft APT EIS as a related DOE action.

Page 1-7, 1st column, after 2nd paragraph, insert the following:

Surplus Plutonium Disposition Draft Environmental Impact Statement. In July 1997, the Department issued the *Surplus Plutonium Disposition Draft Environmental Impact Statement* (DOE 1998b). DOE's disposition strategy allows for the immobilization of surplus plutonium and/or its use as mixed oxide (MOX) fuel in existing domestic commercial reactors, and involves eventual disposal in a geologic repository. The EIS analyzes alternatives that would immobilize some of the surplus plutonium and use some as MOX fuel; alternatives that would immobilize all of the surplus plutonium; and a No Action Alternative. The design of three disposition facilities are include in the alternatives (pit disassembly & conversion, MOX facility, and immobilization).

Chapter 2. Modifications – Proposed Action and Alternatives

[Chapter 2, Section 2.1 modification to the Draft APT EIS]

DOE has modified its description of the No Action alternative. In the Record of Decision (60 FR 63877) for the *Final Programmatic Environmental Impact Statement on Tritium Supply and Recycling,* the Department decided to pursue a dual-track option for providing a new source of tritium. In this Final APT EIS the Department has established the commercial-light water reactor as the No Action alternative for the accelerator production of tritium. The description of the No Action alternative in the Draft EIS is replaced with the following text.

Page 2-2, 1st column, 3rd through 4th paragraphs, replace with:

No Action Alternative. In compliance with the regulations of the Council on Environmental Quality (CEQ) for implementing NEPA (40 CFR Part 1500-1508), this EIS also assesses a No Action alternative. **The interpretation of no action varies, depending upon circumstances. Typically, no action means that the**

proposed activity would not be initiated. No action may also be defined in terms of no change in a current agency program. Because DOE has the responsibility to provide tritium for the nation's nuclear weapons stockpile and no longer operates nuclear material production facilities, DOE has completed a programmatic analysis on how to meet its responsibilities.

In October 1995, DOE issued the Final Programmatic Environmental Impact Statement for Tritium Supply and Recycling. This was followed on December 12, 1995, by a Record of Decision (ROD) which selected a dual-track path for tritium production. In this dual-track decision, the Department decided to pursue two tritium production technologies: Accelerator Production of Tritium and the supply of tritium using a commercial light-water reactor. The ROD further stipulated that one alternative would be selected as the primary source of tritium and that the other alternative, if feasible, would be developed as a back-up tritium source. Based on that ROD, if tritium is not produced in the APT, it will be produced in the commercial light-water reactor. Accordingly, for purposes of this EIS analysis, the No Action alternative for the Accelerator Production of Tritium at the Savannah River Site entails the production of tritium in the commercial light-water reactor. A summary of the environmental impacts associated with the production of tritium in the commercial light-water reactor is presented starting on page C-39 of this EIS.

Under the APT No Action alternative it is likely the Department would proceed with the construction and operation of a Tritium Extraction Facility (TEF) at the Savannah River Site for which a Draft EIS has already been issued (DOE 1998a). In that document, the Department has identified the APT with tritium extraction capabilities as the No Action alternative for the TEF.

SRS recycling and loading activities related to tritium would continue. In addition, other actions determined in the ROD for the Tritium Supply PEIS – the modernization and consolidation of existing SRS tritium facilities – would proceed as planned.

[Chapter 2, Section 2.3.5 modification to the Draft APT EIS]

In comment L2-04, the commenter questioned why DOE did not investigate existing industrial areas as potential sites for the APT. In its response, the Department indicates it did not believe existing industrial sites are feasible for a number of reasons. Consequently, the Department is clarifying the description of its siting process.

Page 2-15, 1st column, 1st and 2nd paragraphs, replaced with the following:

DOE assumed the APT complex would require approximately 250 acres of land with a footprint 6,560 feet long by 1,640 wide. The area requirements would not vary much with any combination of the technology or design options described in this chapter.

With the land requirements established, the next phase of the screening process was to develop exclusionary criteria (disqualifying conditions). Examples of these criteria include avoiding adverse impacts to threatened and endangered species, avoiding impacts to wetlands and sensitive ecosystems, and proximity to seismic faults. Wike et al. (1996) contains a complete listing of these exclusionary criteria. Seven potential sites (numbered 1-7) were initially identified. Two sites (numbered 5 and 7) were subsequently eliminated due to the presence of disqualifying conditions (proximity to seismic faults). One site (number 8) was added based on a request to examine a site in the vicinity of **the industrialized A- and M–Areas**. Although not explicitly used as exclusionary criteria, existing industrially developed areas **were examined and dismissed** as feasible sites because the APT, **due to its space requirements, would conflict with** (1) the presence of existing structures, (2) the presence of non-operating structures that would require extensive decontamination and decommissioning (D&D) prior to site preparation, or (3) the presence of active environmental activities.

[Chapter 2, Section 2.5 modification to the Draft APT EIS]

Section 2.5 of the Draft EIS described two potential design variations to the baseline accelerator: a modular or staged accelerator configuration, and combining tritium extraction capabilities with the APT. A third design variation has been identified that would serve to mitigate the potential impacts identified for precooler ponds 2 and 5 and responds to several issues raised by the Department of Interior (L2) and the Environmental Protection Agency (L4). The information in Section 2.5 has been modified and combined with information regarding impacts from the design variations. This modified section is being inserted as Section 4.5 of Chapter 4. The information presented in Section 2.5 is consequently reduced to a very brief introduction with references to the expanded section. Sections 2.5.1, 2.5.2, and 2.5.3 of the Draft EIS are therefore superseded by the modification presented in Part D, Section 4.5 of this document.

2.5 APT Design Variations

Page 2-21, 2nd column through page 2-25, 2nd column, 3rd paragraph is replaced with the following:

Three design variations that could enhance the Department's flexibility to supply the nation's future tritium needs have been evaluated. The first would retain the inherent operational and equipment characteristics of the baseline, but allow construction to proceed in stages (modular APT) (Section 4.5.1 of the Draft APT EIS). The second design variation would incorporate the functions of the Tritium Extraction Facility within the APT facility. The third design variation would still route cooling water blowdown to Pond C, but bypass precooler Ponds 2 and 5. These design variations along with their corresponding impacts on the environment are described in detail in the added Section 4.5 of Chapter 4 of the Draft APT EIS.

[Chapter 2, Section 2.7 modification to the Draft EIS]

Section 2.7 of the Draft EIS presented a comparison of environmental impacts. Table 2-3 provided a side by side comparison of each alternative to the preferred APT design. Section 2.7 has been modified to capture the potential impacts associated with the revised No Action alternative, the production of tritium in a commercial light-water reactor. Two new tables have been created to provide additional impact comparisons. Table 2-3 now presents the impacts of the No Action alternative. The original Table 2-3 in the Draft EIS is now Table 2-4 and is modified to reflect information developed for the Final EIS. The new Table 2-5 compares the potential impacts of the design variations described in Part D of this document to the preferred APT design. To facilitate readability, Section 2.7, as modified, is presented in this Final EIS.

Page 2-26, 1st column, 1st paragraph through page 2-39 is replaced with the following:

This section presents a comparison of the environmental impacts **associated with the No Action alternative (Table 2-3);** construction and operation of the baseline APT as a function of the differences with the preferred alternative **(Table 2-4); and three design variations (Table 2-5): the modular APT design, combining tritium extraction, and discharge of cooling water to Pond C**.

For each technical discipline, the impacts of the Preferred alternative are discussed. The Preferred alternative is composed of the following:

- ***Klystron radiofrequency tubes***
- ***Superconducting operation of accelerator structures***
- ***Helium-3 feedstock material***

Table 2-3. Comparison of No Action impacts.[a]

Potential impacts at the Savannah River Site			Potential impacts away from the Savannah River Site Commercial Light-Water Reactor				
APT Preferred alternative	TEF Preferred alternative	**AND**	Bellefonte Nuclear Plant	**OR**	Watts Bar Nuclear Plant	**OR**	Sequoyah Nuclear Plant
Construction Impacts							
About 250 acres of land would be graded and leveled. Additional roads, bridge upgrades, rail lines and utility upgrades would be required. No geologically significant formations or soils occur. Dewatering would be necessary and could result in short-term increases in solids to receiving water bodies. No surface faulting on site. Air emission from fugitive dust, exhaust emissions, and batch plants would be negligible. Small construction landfill required. Most waste generated would be solid waste and sanitary waste. Increases in the work force for APT construction would not result in a boom situation. Peak employment would be about 1,400 jobs.	Construct facility in already industrialized H-Area. No geologically significant formations or soils occur. Dewatering would be necessary and could result in short-term increases in solids to receiving water bodies. No surface faulting on site. Air emission from fugitive dust, exhaust emissions, and batch plants would be negligible. Increases in the work force for TEF construction would not result in a boom situation. Peak employment would be about 740 jobs.		Activities would largely consist of internal modifications to existing structures. Spent fuel storage facilities would require about 5 acres of land and about 50 construction workers. Construction waste: Small amounts of hazardous and nonhazardous wastes generated; no change from EPA designation as small Quantity Generator. Direct and indirect construction jobs peak at 9,000 for Bellefonte 1 or Bellefonte 1 and 2, reducing the unemployment rate to about 3 percent from the current 7.9 percent.		No modifications or construction activities required. Spent fuel storage facilities same as Bellefonte and Sequoyah. Construction jobs for the spent storage facility: 50 Construction waste: None		Same as Watts Bar Spent fuel storage facilities same as Bellefonte and Watts Bar. Construction jobs for the spent storage facility: 50 Construction waste: None
Impacts from Operation on Nonradiological Air Emissions							
Nonradiological emissions would be well within the applicable regulatory standards. Operations would result in small amounts of salt deposition and plumes from cooling-tower operations. Plumes would be visible off-site under certain meteorological conditions.	Negligible impacts from nonradioactive airborne effluent.		Nonradiological emissions would be well within the applicable regulatory standards. Operations would result in small amounts of salt deposition and plumes from cooling-tower operations. Plumes would be visible off-site under certain meteorological conditions.		Nonradiological emissions would be well within the applicable regulatory standards. Operations would result in small amounts of salt deposition and plumes from cooling-tower operations. Plumes would be visible off-site under certain meteorological conditions.		Nonradiological emissions would be well within the applicable regulatory standards. Operations would result in small amounts of salt deposition and plumes from cooling-tower operations. Plumes would be visible off-site under certain meteorological conditions.

a. No Action includes TEF impacts at SRS and one or more reactor impacts away from SRS.

Table 2-3. (Continued).

Potential impacts at the Savannah River Site		Potential impacts away from the Savannah River Site Commercial Light-Water Reactor		
APT Preferred alternative	TEF Preferred alternative **AND**	Bellefonte Nuclear Plant **OR**	Watts Bar Nuclear Plant **OR**	Sequoyah Nuclear Plant
Impacts from Operation on Radiological Air Emissions				
Negligible impacts from radioactive airborne effluents. Latent Cancer Fatalities (LCFs) expected: 0.0008	Negligible impacts from radioactive airborne effluents. Latent Cancer Fatalities (LCFs) expected: 0.00039	Negligible impacts from radioactive airborne effluents. Latent Cancer Fatalities (LCFs) expected: 0.0014	Negligible impacts from radioactive airborne effluents. Latent Cancer Fatalities (LCFs) expected: 0.0014	Negligible impacts from radioactive airborne effluents. Latent Cancer Fatalities (LCFs) expected: 0.0015
Impacts from Operation on Land Use and Infrastructure				
Land converted to industrial use. Electricity use: 3.1 terawatt-hrs/year	Land converted to industrial use. Electricity use: 0.021 terrawatt hrs/year	No land impacts. Electricity generation: approximately 1,300 MWe per Bellefonte reactor	No land use impacts. Electricity generation: approximately 1,300 MWe	No land use impacts. Electricity generation: approximately 1,300 MWe per Sequoyah reactor
Impacts from Operation on Waste Management				
Would generate solid and liquid wastes, but no high-level or transuranic waste; waste volumes would have negligible impact on capacities of waste facilities. Generation of electricity will generate various types of waste including fly ash, bottom ash, and scrubber sludge. Annual Values Sanitary solid: 1,800 metric tons Industrial: 3,800 metric tons Radioactive wastewater: 140,000 gallons Low-level radioactive waste: 1,400 cubic meters High concentration waste under evaluation: 12 cubic meters Sanitary wastewater: 3.2 million gallons Nonradioactive process wastewater: 920 million gallons	Would generate solid and liquid wastes, but no high-level or transuranic waste; waste volumes would have negligible impact on capacities of waste facilities. Annual Values Sanitary solid: 230 cubic meters Industrial: 33 cubic meters Low-level radioactive waste: 230 cubic meters Hazardous/mixed waste: 3.3 cubic meters Sanitary wastewater: 770,000 gallons Nonradioactive process wastewater: 11,000 gallons	Would generate solid and liquid wastes; waste volumes would have negligible impact on capacities of waste facilities. Annual Values Low-level radioactive waste: 40 cubic meters Mixed waste: <1 cubic meter Hazardous waste: 1.0 cubic meters Nonhazardous waste: 850,000 cubic meters 141 spent fuel assemblies per 18 month cycle	Would generate solid and liquid wastes; waste volumes would have negligible impact on capacities of waste facilities. Annual Values Low-level radioactive waste: 0.43 cubic meter No additional spent fuel if less than 2,000 TPBARs irradiated per 18 month cycle. Up to 60 additional spent fuel assemblies for 3,400 TPBARs per 18 month cycle.	Would generate solid and liquid wastes; waste volumes would have negligible impact on capacities of waste facilities. Annual Values Low-level radioactive waste: 0.43 cubic meter No additional spent fuel if less than 2,000 TPBARs irradiated per 18 month cycle. Up to 60 additional spent fuel assemblies for 3,400 TPBARs per 18 month cycle.

a. No Action includes TEF impacts at SRS and one or more reactor impacts away from SRS.

Table 2-3. (Continued).

Potential impacts at the Savannah River Site		Potential impacts away from the Savannah River Site Commercial Light-Water Reactor		
APT Preferred alternative	TEF Preferred alternative **AND**	Bellefonte Nuclear Plant **OR**	Watts Bar Nuclear Plant **OR**	Sequoyah Nuclear Plant
Impacts from Operation on Human Health				
Public would receive radiation exposure from APT emissions and transportation of radioactive material; workers would receive radiation exposure from facility operations and transportation of radioactive material and from electromagnetic fields. Estimated fatal cancers: 0.0016	Public would receive radiation exposures from gaseous effluents. Estimated fatal cancers: 0.00039	Public would receive radiation exposures from gaseous and liquid effluents. Estimated fatal cancers: 0.0033	Public would receive radiation exposures from gaseous and liquid effluents. Estimated fatal cancers: 0.0032	Public would receive radiation exposures from gaseous and liquid effluents. Estimated fatal cancers: 0.0053
Impacts from Operation on Surface Water				
Blowdown rates (about 2,000 gpm) would cause negligible impact on surface water levels. Using Par Pond and pre-cooler ponds as discharge point for cooling water, temperatures would not exceed 90°F. Contaminated sediments would be resuspended in addition to radiological releases from APT. Estimated fatal cancers: 0.00021	Sanitary and industrial wastewater streams would be routed to existing SRS treatment facilities prior to release. Released water would be negligible compared to existing SRS releases.	Less than 1 percent of river flow. Water quality within regulatory limits. Public would receive radiation exposures from liquid effluents. Estimated fatal cancers: 0.0019	No change from existing operations. Public would receive radiation exposures from liquid effluents. Estimated fatal cancers: 0.0018	No change from existing operations. Public would receive radiation exposures from liquid effluents. Estimated fatal cancers: 0.0038
Impacts from Operation on Socioeconomics				
Operational work force about 500. No regional impacts.	Operational work force about 108. No regional impacts.	Operational work force: Operational work force about 800 for Bellefonte 1; about 1,000 for Bellefonte 1 and 2. Minor regional impacts.	Operational work force: 10 additional workers.	Operational work force: 10 additional workers.
Impacts from Transportation				
Negligible during operations period. During construction could expect about two fatalities to the public and workers due to increased traffic levels.	Vehicle emissions and less than one fatality per year. Routine and accidental doses.	Vehicle emissions and less than one fatality per year. Routine and accidental doses.	Same as for Bellefonte and Sequoyah.	Same as for Bellefonte and Watts Bar.

a. No Action includes TEF impacts at SRS and one or more reactor impacts away from SRS.

Table 2-4. Comparison of impacts among APT alternatives.

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
Impacts from Construction on Landforms, Soils, Geology, and Hydrology								
Negligible impacts. Some 250 acres of land would be graded or leveled. No geologically significant formations or soils occur. Dewatering necessary. No surface faulting on site. Sites for electricity generation exist.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Water table is deeper and would require less dewatering; no other changes estimated from Preferred alternative.	Impacts would depend upon the specific location of a new facility. Could require about 110 acres for natural gas or 290 acres for coal.
Impacts from Operation on Landforms, Soils, Geology, and Hydrology								
No impacts No dewatering required for operations.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Removal of 6,000 gpm on a sustained basis could impact groundwater flow to streams and compact clay layers	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Impacts would depend upon the specific location of a new facility
Impacts from Construction on Surface Water								
Negligible impacts. Dewatering of construction site could result in short - term increases in solids to the receiving water bodies.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	**Discharges would be similar to the Preferred alternative, although they would go to Pen Branch via Indian Grave Branch. Water levels in**	No change estimated from Preferred alternative	Impacts would depend upon the specific location of a new facility

Table 2-4. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
						the upper reaches of the stream system would be raised.		
Impacts from Operation on Surface Water								
Blowdown rates (about 2,000 gpm) would cause negligible impact on surface water levels. Using Par Pond and pre-cooler ponds as discharge point for cooling water, temperatures would not exceed 90°F. Contaminated sediments could be resuspended in addition to radiological releases from APT resulting in offsite population radiation exposure. Estimated fatal cancers: **0.00021**	Would require 7% less cooling water than Preferred due to lower waste heat generation; no other changes estimated from Preferred alternative	Would require 33% more cooling water than Preferred; no other changes from Preferred alternative	No change estimated from Preferred alternative	Blowdown rates (about 125,000 gpm) would result in higher temperatures to water bodies (about 100° F). A slight increase in "pre-cooler" pond water levels would occur. No other changes estimated from Preferred alternative.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Discharges would be similar to the Preferred alternative, although concentrations would vary and be localized.
Impacts from Construction on Nonradiological Air Emissions								
Air emissions (fugitive dust and exhaust emissions) would be negligible, well below the applicable regulatory standards. Impacts from electricity purchases,	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Emission types would be similar to the Preferred alternative, although concentrations would vary and be

Table 2-4. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
would be dispersed.								localized.
Impacts from Operation on Nonradiological Air Emissions								
Nonradiological emissions would be well within the applicable regulatory standards. Operations would result in small amounts of salt deposition and plumes from cooling-tower operations.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Nonradiological emissions would be well within applicable regulatory standards.
Impacts from Construction on Radiological Air Emissions								
No impacts; no radioactive materials stored during construction.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative
Impacts from Operation on Radiological Air Emissions								
Negligible impacts from radioactive airborne effluents Latent Cancer Fatalities (LCFs) expected: **0.0008**	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Slightly increased doses from airborne emissions LCFs expected: **0.00086**	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Higher doses from airborne emissions due to closer distance to SRS boundary. LCFs expected: **0.00089**	Impacts would depend upon the specific location of a new facility. However, the dose from radioactive effluents would be negligible.
Impacts from Construction on Land Use and Infrastructure								
Conversion of 250 acres of forested land to industrial use. Additional roads, bridge upgrades, rail lines and utility upgrades would	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Additional cooling water piping to K-area needed.	No change estimated from Preferred alternative	Impacts would depend upon the specific location of a new facility. Could require conversion of up to

Table 2-4. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
be required.								290 acres to industrial use.
Impacts from Operation on Land Use and Infrastructure								
No land use changes beyond construction. Electricity use: 3.1 terawatt-hrs/year	No change estimated from Preferred alternative	No change estimated from Preferred alternative Electricity use 23% higher than Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative
Impacts from Construction on Waste Management								
Some landfill construction required. Most waste generated would be solid waste and sanitary solid and liquid waste. Waste disposed at SRS. (Annual Values) Sanitary solid: 560 cubic meters Construction debris: 30,000 cubic meters **Industrial wastewater: 3.6 million gallons**	No change estimated from Preferred alternative	9% **less sanitary** waste generated due to smaller construction workforce required.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Additional construction waste generated from construction of facility.
Impacts from Operation on Waste Management								
Would generate solid and liquid wastes, but no high-level or transuranic waste; waste volumes would have	No change estimated from Preferred	37% more nonradioactive process wastewater	**8%** more low-level and **25%** more high concentration	2,000% greater flow of nonradioactive process	No change estimated from Preferred	No change estimated from Preferred	No change estimated from Preferred	Impacts would depend upon the type of power plant selected. However,

Table 2-4. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
negligible impact on capacities of waste facilities. Generation of electricity will generate various types of waste including fly ash, bottom ash, and scrubber sludge. (Annual Values) Sanitary solid: 1,800 metric tons Industrial: 3,800 metric tons Radioactive wastewater: 140,000 gallons High concentration low-level radioactive waste under evaluation: 2.5 cubic meters High concentration waste under evaluation: 12 cubic meters Sanitary wastewater: **3.3** million gallons Low-level radioactive waste: 1,400 cubic meters Nonradioactive process wastewater: 920 million gallons	alternative	required.	mixed waste generated than Preferred alternative.	wastewater required.	alternative	alternative	alternative	waste rates for new power plant would not be very different than for the Preferred alternative.

Table 2-4. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
Impacts from Construction on Visual Resources								
Negligible, facilities far from SRS boundaries and not visible to offsite traffic; facilities would look like other industrial areas at SRS.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Impacts would depend upon the specific location of a new facility.
Impacts from Operation on Visual Resources								
Negligible, plumes from mechanical-draft cooling towers would be visible under certain meteorological conditions.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Negligible, would not generate visible plumes.	No change estimated from Preferred alternative	Plume from K-area cooling tower would likely be more visible.	No change estimated from Preferred alternative	Impacts would depend upon the specific location of a new facility.
Impacts from Construction on Noise								
Noise primarily from construction equipment at APT site. Not audible at SRS boundaries; however, construction workers could encounter noise levels that would require administrative controls or protective equipment.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Noise would be similar to Preferred alternative, but specific impacts would depend upon the location of a new facility.
Impacts from Operation on Noise								
Noise from APT equipment operation and traffic; mechanical-draft cooling towers largest single source, not audible at SRS boundary.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No mechanical - draft cooling tower noise at APT site. Pump noise could be occasionally audible to river	No change estimated from Preferred alternative	No mechanical-draft-cooling tower noise at APT site. Pump and cooling tower noise at K-area.	No change estimated from Preferred alternative	Noise would be similar to Preferred alternative, but specific impacts would depend upon the location of a new facility.

Table 2-4. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
				traffic.				
Impacts from Construction on Human Health								
Concentrations of nonradiological constituents would be less than applicable limits for workers and public. Traffic-related accidents resulting in about 2 fatalities to the public and workers due to increased local traffic would be reduced with finish of construction. Occupational injuries to workers would be due to industrial activities and would have the following impacts for the construction period: Number requiring First Aid: 1,100 Number requiring medical attention: 280 Number resulting in lost work time: 93	No change estimated from Preferred alternative	Occupational injuries 6% less than Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Traffic fatalities 20% less than Preferred alternative No changes in occupational injuries estimated from Preferred alternative	Impacts would be similar to Preferred alternative, but specific impacts would depend upon the location of a new facility.
Impacts from Operation on Human Health								
Public would receive source radiation exposure from APT emissions and transportation of	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Slightly increased doses from resuspension of	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Slightly increased doses due to decreased	No change estimated from Preferred alternative.

Table 2-4. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
radioactive material; workers would receive radiation exposure from facility operations and transportation of radioactive material and from electromagnetic fields. Total LCFs to population (air, water, and transport) **0.0016**				contaminated material Total LCFs 0.0017			distance to public Total LCFs 0.0017	Impacts would be local vs. dispersed for electricity generation.
Impacts from Accidents on Human Health								
Negligible consequences for accidents with frequency of less than once in operating lifetime of facility.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Minor decreases in accident doses for low probability events.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	**No change estimated from Preferred alternative**
Impacts from Construction on Terrestrial Ecology								
Would result in the loss of up to 250 acres of forested land; no marked reduction in plant/animal abundance or diversity.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative; specific impacts would depend upon the location of a new facility.

Table 2-4. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
Impacts from Operation on Terrestrial Ecology								
Negligible impacts. Mechanical-draft cooling towers would result in salt deposition on vegetation; however, maximum rates (60 lb/acres/yr) are below threshold levels (180 lb/acres/yr).	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	**No salt deposition, otherwise** no change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Specific impacts would depend upon the location of a new facility.
Impacts from Construction on Wetlands Ecology								
No impacts are projected from construction activities.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Specific impacts would depend upon the location of a new facility.
Impacts from Operation on Wetlands Ecology								
Would result in minor impacts to wetlands. Temperature of the blowdown would be marginally higher than the ambient maximum temperature. During cooler months the warmth could have a positive impact by lengthening the growing season for some aquatic vegetation.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Would raise water level in Ponds 2 and 5 by 1.5 feet, possibly affecting wetland plant communities.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Specific impacts would depend upon the location of a new facility.

Table 2-4. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
Impacts from Construction on Aquatic Ecology								
Impacts to aquatic organisms in Upper Three Runs and tributaries would be minor due to use of soil and erosion control measures.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No changes estimated from Preferred alternative.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Specific impacts would depend upon the location of a new facility.
Impacts from Operation on Aquatic Ecology								
Impingement (132 fish) and entrainment (173,000 fish eggs and 326,000 larvae annually) would not substantially affect Savannah River fisheries. Solids in blowdown would have no impacts on aquatic ecology. Discharge temperatures would have only small localized effects on aquatic communities.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Impingement (2,600 fish) and entrainment (3.4 million fish eggs and 6.4 million larvae annually) would be increased. Discharge temperatures would be high enough to adversely affect aquatic communities.	**No impingement and entrain-ment, otherwise** no change estimated from Preferred alternative.	**Discharge to Pen Branch via Indian Grave Branch, otherwise** no change estimated from Preferred alternative.	No change estimated from Preferred alternative	Specific impacts would depend upon the location of a new facility.
Impacts from Construction on Threatened or Endangered Species								
Negligible, no threatened or endangered species at preferred site.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Negligible, no threatened or endangered species at alternate site.	Specific impacts would depend upon the location of a new facility.

Table 2-4. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
Impacts from Operation on Threatened or Endangered Species								
Negligible impacts to threatened and endangered species.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Fish kills in pre-cooler ponds could be beneficial to bald eagles. Heated discharges could force alligators to leave pre-cooler ponds in late summer.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No threatened or endangered species at alternate site.	Impacts would depend upon the specific location.
Impacts from Construction on Socioeconomics								
Increases in the work force for APT construction would not result in large regional impacts. Nominal impacts would be positive. Peak employment is about 1,400 jobs.	No change estimated from Preferred alternative	Employment would be lower with about 100 fewer jobs	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Peak workforce would be about 1,100 additional jobs. Impacts would vary by location.
Impacts from Operations on Socioeconomics								
Operational work force about 500. Work force would not result in large regional impacts. Nominal impacts would be positive.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Additional operational workforce about 200. Impacts would vary by location.
Impacts from Construction on Environmental Justice								
No adverse impacts on minority or low-income	No change estimated from Preferred	No change estimated from Preferred	No change estimated from Preferred	No change estimated from Preferred	No change estimated from Preferred	No change estimated from Preferred	No change estimated from Preferred	Specific impacts would depend upon the location of a

Table 2-4. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
populations expected.	alternative	alternative	alternative	alternative	alternative	alternative	alternative	new facility.
Impacts from Operations on Environmental Justice								
No adverse impact on minority or low-income populations expected.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Specific impacts would depend upon the location of a new facility.

Table 2-5. Comparison of impacts among design variations.[a]

Preferred alternative (Baseline APT)	Modular APT (3 kg/year)	Modular APT (1030 MeV)	APT/TEF Combination	Cooling Water bypass Ponds 2 and 5
Impacts from Operation on Surface Water				
Blowdown rates (about 2,000 gpm) would cause negligible impact on surface water levels. Using Par Pond and the pre-cooler ponds as discharge point for cooling water, temperatures would not exceed 90°F. Contaminated sediments would be resuspended in addition to radiological releases from APT resulting in offsite population radiation exposure. Estimated fatal cancers: 0.00021	No change estimated from Baseline APT.	Blowdown rates would be 10 percent lower than the Baseline APT. Radiological releases would be the same as the Baseline APT.	No change estimated from Baseline APT.	No impact to Ponds 2 and 5.
Impacts from Operation on Nonradiological Air Emissions				
Nonradiological emissions would be well within the applicable regulatory standards. Operations would result in small amounts of salt deposition and plumes from cooling-tower operations.	No change estimated from Baseline APT.	Nonradiological releases would be 10 percent lower than the Baseline APT.	No change estimated from Baseline APT.	No change estimated from Baseline APT.
Impacts from Operation on Radiological Air Emissions				
Negligible impacts from radioactive airborne effluents. Latent Cancer Fatalities (LCFs) expected: 0.0008	No change estimated from Baseline APT.	No change estimated from Baseline APT.	Increased doses from airborne emissions. LCFs expected: 0.0009	No change estimated from Baseline APT.
Impacts from Operation on Land Use and Infrastructure				
No land use changes beyond construction. Electricity use: 3.1 terawatt-hrs/year	No change estimated from Baseline APT.	Electricity use would be 32 percent lower than the Baseline APT. Electricity use: 2.0 terawatt-hrs/ year	No change estimated from Baseline APT.	No change estimated from Baseline APT.

a. Table 2-5 only summarizes the potential construction and operational impacts for those factors that could be different from what is described for the baseline accelerator.

Table 2-5. (Continued).

Preferred alternative (Baseline APT)	Modular APT (3 kg/year)	Modular APT (1030 MeV)	APT/TEF Combination	Cooling Water bypass Ponds 2 and 5
Impacts from Construction on Waste Management				
Some landfill construction required. Most waste generated would be solid waste and sanitary solid and liquid waste. Waste disposed at SRS. <u>Annual Values</u> Sanitary solid: 560 cubic meters Construction debris: 30,000 cubic meters Industrial wastewater: 3.6 million gallons	No change estimated from Baseline APT.	Construction wastes would be 10 percent lower than the Baseline APT.	No change estimated from Baseline APT.	No change estimated from Baseline APT.
Impacts from Operation on Waste Management				
Would generate solid and liquid wastes, but no high-level or transuranic waste; waste volumes would have negligible impact on capacities of waste facilities. Generation of electricity will generate various types of waste including fly ash, bottom ash, and scrubber sludge. <u>Annual Values</u> Sanitary solid: 1,800 metric tons Industrial: 3,800 metric tons Radioactive wastewater: 140,000 gallons Low-level radioactive waste: 1,400 cubic meters High concentration low-level radioactive waste under evaluation: 2.5 cubic meters High concentration mixed waste under evaluation: 12 cubic meters Sanitary wastewater: 3.3 million gallons Nonradioactive process wastewater: 920 million gallons	No change estimated from Baseline APT.	Operations wastes would be 10 percent lower than the Baseline APT. <u>Annual Values</u> Radioactive wastewater: 130,000 gallons Low-level radioactive waste: 1,300 cubic meters Sanitary wastewater: 3 million gallons Nonradioactive process wastewater: 830 million gallons	Some waste categories slightly higher than Baseline APT. Differences from Baseline APT <u>Annual Values</u> Radioactive wastewater: 150,000 gallons Low-level radioactive waste: 1,700 cubic meters	No change estimated from Baseline APT.

a. Table 2-5 only summarizes the potential construction and operational impacts for those factors that could be different from what is described for the baseline accelerator.

Table 2-5. (Continued).

Preferred alternative (Baseline APT)	Modular APT (3 kg/year)	Modular APT (1030 MeV)	APT/TEF Combination	Cooling Water bypass Ponds 2 and 5
Impacts from Construction on Human Health				
Concentrations of nonradiological constituents would be less than applicable limits for workers and public. Traffic -related accidents resulting in about 2 fatalities to the public and workers due to increased local traffic would be reduced with finish of construction. Occupational injuries to workers would be due to industrial activities and would have the following impacts for the construction period: Number requiring First Aid: 1,100 Number requiring medical attention: 280 Number resulting in lost work time: 93	No change estimated from Baseline APT.	Construction health impacts would be 10 percent lower than the Baseline APT.	No change estimated from Baseline APT.	No change estimated from Baseline APT.
Impacts from Operation on Human Health				
Public would receive radiation exposure from APT emissions and transportation of radioactive material. Workers would receive radiation exposure from facility operations, transportation of radioactive material, and from electromagnetic fields. Total LCFs to population (air, water, and transport): 0.0016	No change estimated from Baseline APT.	No change estimated from Baseline APT.	Radiation exposures to the public would be 10 percent higher due to higher air emissions as compared to the Baseline APT. Total LCFs to population (air, water, and transport): 0.0017	No change estimated from Baseline APT.
Impacts from Operation on Wetlands Ecology				
Would result in minor impacts to wetlands. Temperature of the blowdown would be marginally higher than the ambient maximum temperature. During cooler months the warmth could have a positive impact by lengthening the growing season for some aquatic vegetation.	No change estimated from Baseline APT.	No change estimated from Baseline APT.	No change estimated from Baseline APT.	No heated blowdown to Ponds 2 or 5. Minor impact for heated water only in Pond C.

a. Table 2-5 only summarizes the potential construction and operational impacts for those factors that could be different from what is described for the baseline accelerator.

Table 2-5. (Continued).

Preferred alternative (Baseline APT)	Modular APT (3 kg/year)	Modular APT (1030 MeV)	APT/TEF Combination	Cooling Water bypass Ponds 2 and 5
Impacts from Construction on Socioeconomics				
Increases in the work force for APT construction would not result in a boom situation. Peak employment is about 1,400 jobs.	No change estimated from Baseline APT.	Peak employment would be 10 percent lower than the Baseline APT.	No change estimated from Baseline APT.	No change estimated from Baseline APT.

a. Table 2-5 only summarizes the potential construction and operational impacts for those factors that could be different from what is described for the baseline accelerator.

- ***Mechanical-draft cooling towers with river water makeup***
- ***Electricity from existing capacity and market transactions***
- ***Use of the preferred APT site***

Differences in impacts that could occur if different alternatives **or design variations** (see Table 2-5) were implemented are also presented. **Table 2-5 only summarizes the potential construction and operational impacts for those factors that could be different from what is described for the baseline accelerator.**

Based on current design information, the potential environmental impacts of the **three** design variations (the **stage one** modular APT design, combining tritium extraction, **and discharge to Pond C)** are generally bounded by the baseline APT.

DOE considers the expected impacts on the biological, human, and socioeconomic environment of construction and operation of an accelerator for production of tritium at the SRS to be minor and consistent with what might be expected for any industrial facility. Construction and operation of the Preferred alternative would result in the loss of about 250 acres of mixed pine/hardwood upland forest. Waste would be generated during both the construction and operation phases but in quantities that would have negligible impacts on SRS waste management facilities. No high-level waste or transuranic waste would be generated during construction or operation.

Some small impacts from discharge of cooling water to SRS streams and from nonradiological emissions to air and water would occur. Radiological releases during normal operation of the facility are expected to result in small latent cancer fatalities in workers or the public. Because no high or adverse impacts are expected, no disproportionately high or adverse impacts on minority or low-income communities are expected.

Implementation of certain of the technology alternatives could result in impacts different from those resulting from construction and operation of the Preferred alternative. Most notable would be the impacts from implementation of cooling water system alternatives and electric power supply alternatives. Once-Through Cooling Using River Water would result in withdrawal from the Savannah River of about 125,000 gallons per minute of river water and discharge of hot water to the Par Pond system during operation. Thermal impacts would be restricted to the upper portions of the Par Pond system and would not affect Par Pond discharges to Lower Three Runs. There would be a small increase in Lower Three Runs flows, however. **Bypassing precooler ponds 2 and 5 and discharging directly to Pond C via a discharge canal would eliminate the potential impacts to the precooler ponds.** The implementation of the Mechanical-Draft Cooling Towers with Groundwater Makeup alternative would result in the withdrawal of 6,000 gallons per minute of groundwater. Total groundwater withdrawal at SRS could therefore exceed the estimated groundwater production capacity of the aquifer. This could affect groundwater flow to site streams.

The Preferred alternative includes buying electricity from the commercial grid to support APT operation. In the case of commercial electricity purchases, the environmental impacts attributed to the APT load would be decentralized. In the case of the construction of a new electricity generating plant to support the APT, the environmental impacts would be localized at the site selected for the plant. Construction and operation of such a facility could require about 290 acres for a coal-fired plant and about 110 acres for a gas-fired plant.

Under the No Action alternative, **the Department would obtain required tritium from the irradiation of rods in a commercial light-water reactor. The potential impacts of utilizing a commercial light-water reactor are presented in the No Action impacts discussed under the Chapter 4 modifications to the Draft APT EIS and summarized in Table 2-3.**

With the selection of the CLWR as DOE's primary source for tritium, a tritium extraction facility will also be constructed at SRS. The potential environmental impacts are

summarized in this document and discussed in detail in the *Draft Tritium Extraction Facility Environmental Impact Statement* (DOE 1998).

The APT would not be constructed at the preferred site and the land would be released for use by other missions. On-going SRS missions would continue. Incremental amounts of waste generation and electricity consumption that would have been attributable to the APT would not occur. Employment would be a function of on-going missions and funding levels.

Chapter 3. Modifications – Affected Environment

[Chapter 3, Sections 3.3.1.1, 3.3.1.2, and 3.4.2 modifications to the Draft APT EIS]

The modular or staged accelerator design variation would result in a small modification of the APT footprint. The overall area would be slightly less than that of the baseline accelerator. Text changes have been made in Section 3.3.1.1, 3.3.1.2, and 3.4.2. Figures 3-4, 3-5, 3-5a, 3-16, and 3-17 and Table 3-1 have been revised to show the modular footprint and its relationship to the footprint for the baseline design.

Page 3-6, 1st column, 3rd paragraph and Figure 3-4 on page 3-7 are replaced by the following:

Both the preferred and alternate APT sites are on relatively flat, broad and sandy upland areas typical of the Aiken Plateau portion of the Savannah River Site that formed in deep beds of marine sediments (Wike et al. 1994). The orientation of the APT footprint on the preferred site is from southeast to northwest; the footprint orientation on the alternate site from southwest to northeast. Figure 3-4 shows the locations of the sites and their surface features (topography and nearby surface waters). **The footprint variation for the modular or staged accelerator design is also shown. As can be seen, the modular design variation would result in a slight widening of the footprint and a slight decrease in area.**

Page 3-8, 1st Column, 1st paragraph, 5th through 9th lines, Figure 3-5 on page 3-9, and Table 3-1 on page 3-10 are replaced with the following:

Figure 3-5 and 3-5a, soil maps for the preferred and alternate sites, show the boundaries of the soil mapping units. **The footprint variation for the modular or staged accelerator design is also shown. In the case of the modular design footprint, the preferred site would have predominantly Blanton and Fuquay sands.**

The alternative site would include roughly the same mix of soils for both footprints. Table 3-1 lists the physical, chemical, and engineering features of Fuquay sand and other surface soils at the sites.

Page 3-44, 1st Column, 1st paragraph, lines 2 through 15, and Figures 3-16 and 3-17 on pages 3-47 and 3-48 are replaced with the following:

Both sites also have small pockets of 40- and 60-year old upland hardwood stands of white oak, red oak, and hickory ranging in size from 8 to 12 inches in diameter (SRFS 1997). Understory species found on the preferred site include vacciniums (blueberries), sparkleberry, hickories, laurel oak, water oak, southern red oak, sweetgum, black cherry, persimmon, sassafras, and winged sumac. Ground cover includes Japanese honeysuckle, yellow jessamine, greenbrier, muscadine grape, spotted wintergreen, various grasses, legumes, and composites (SRI 1998). Figures 3-16 and 3-17 show the forest cover types of each site. **The footprint variation for the modular or staged accelerator design is also shown. In the case of the modular design footprint, forest cover of the preferred site will be virtually the same as with the baseline footprint. On the alternate site, more acres of longleaf pine and mixed loblolly pine hardwood stands will be included in the modular design footprint.**

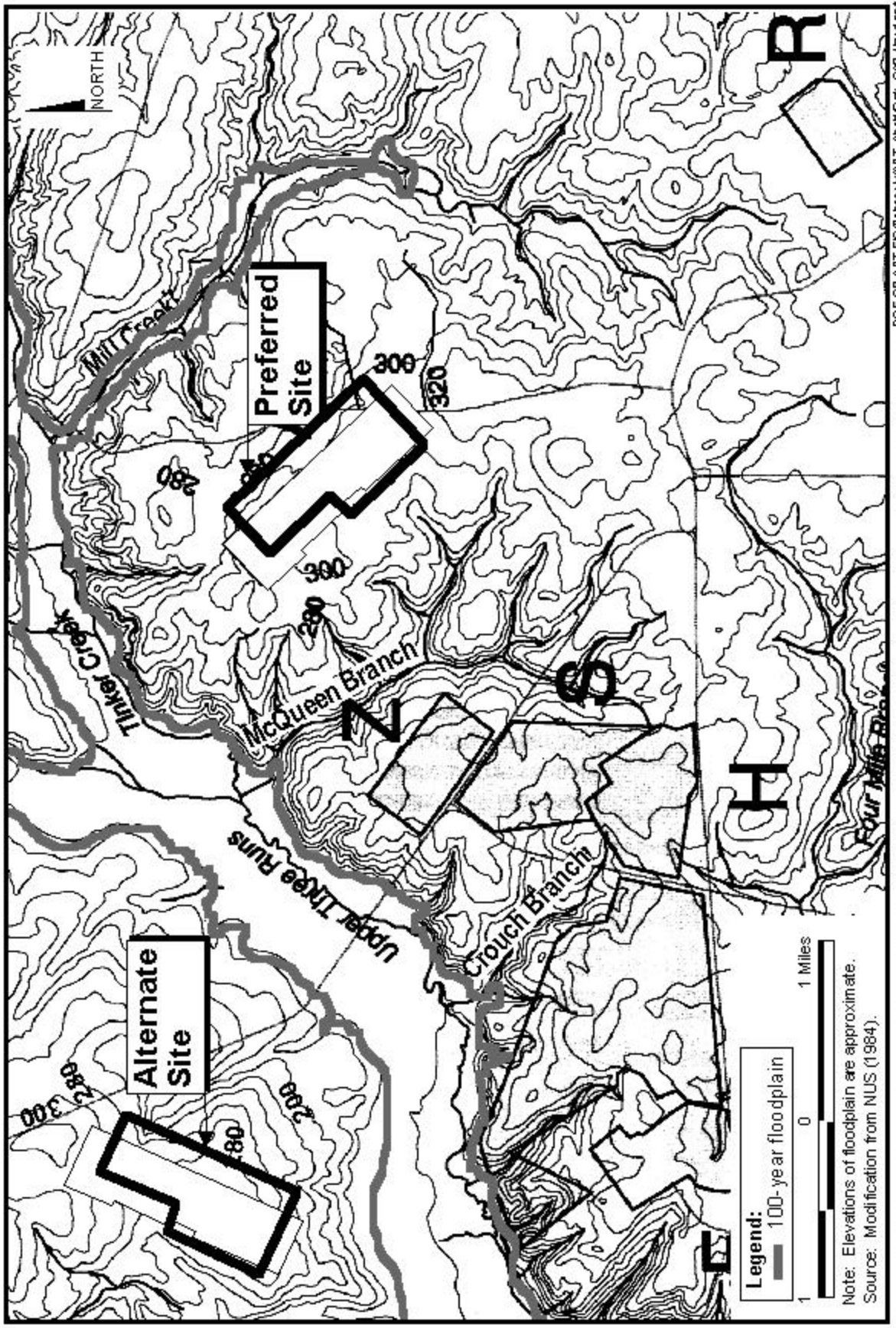
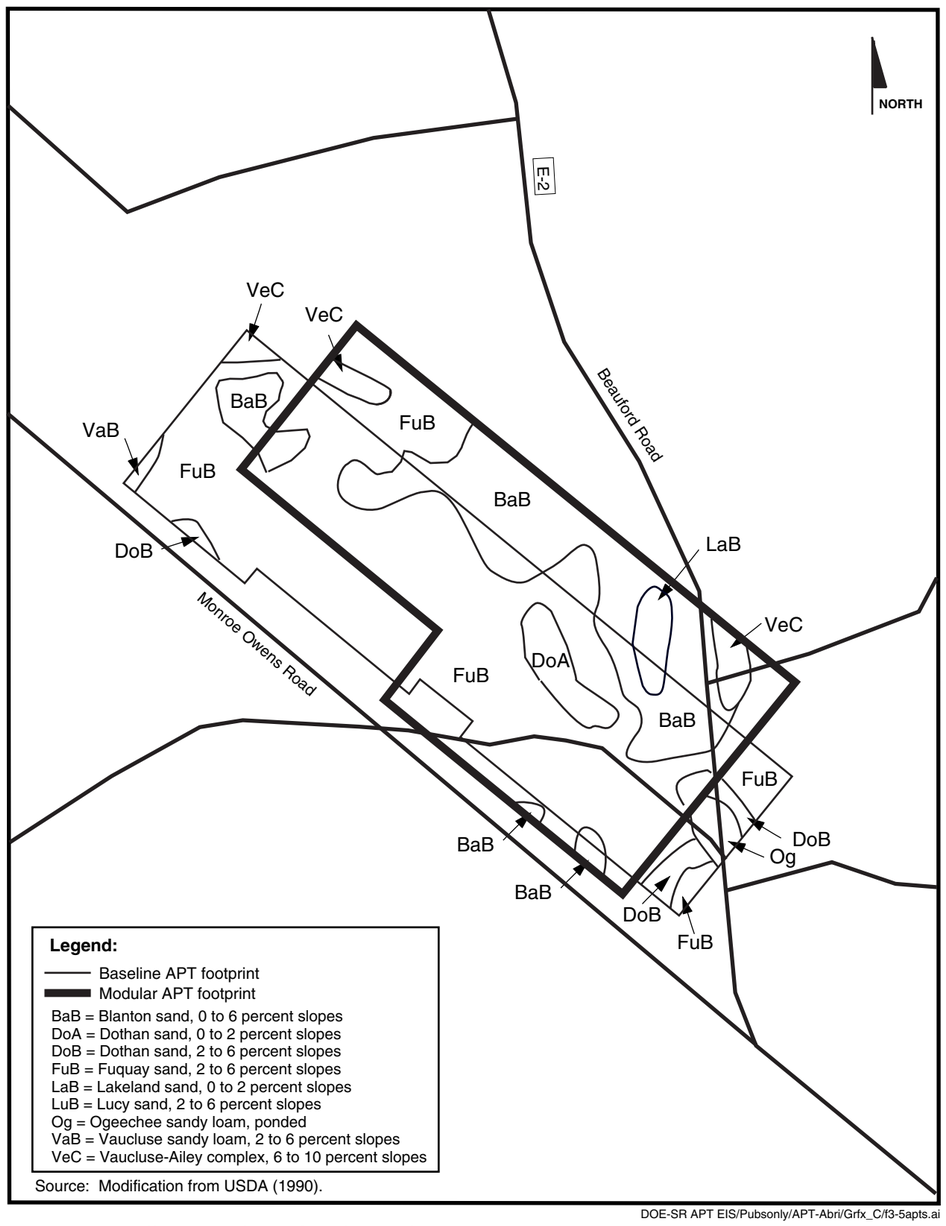
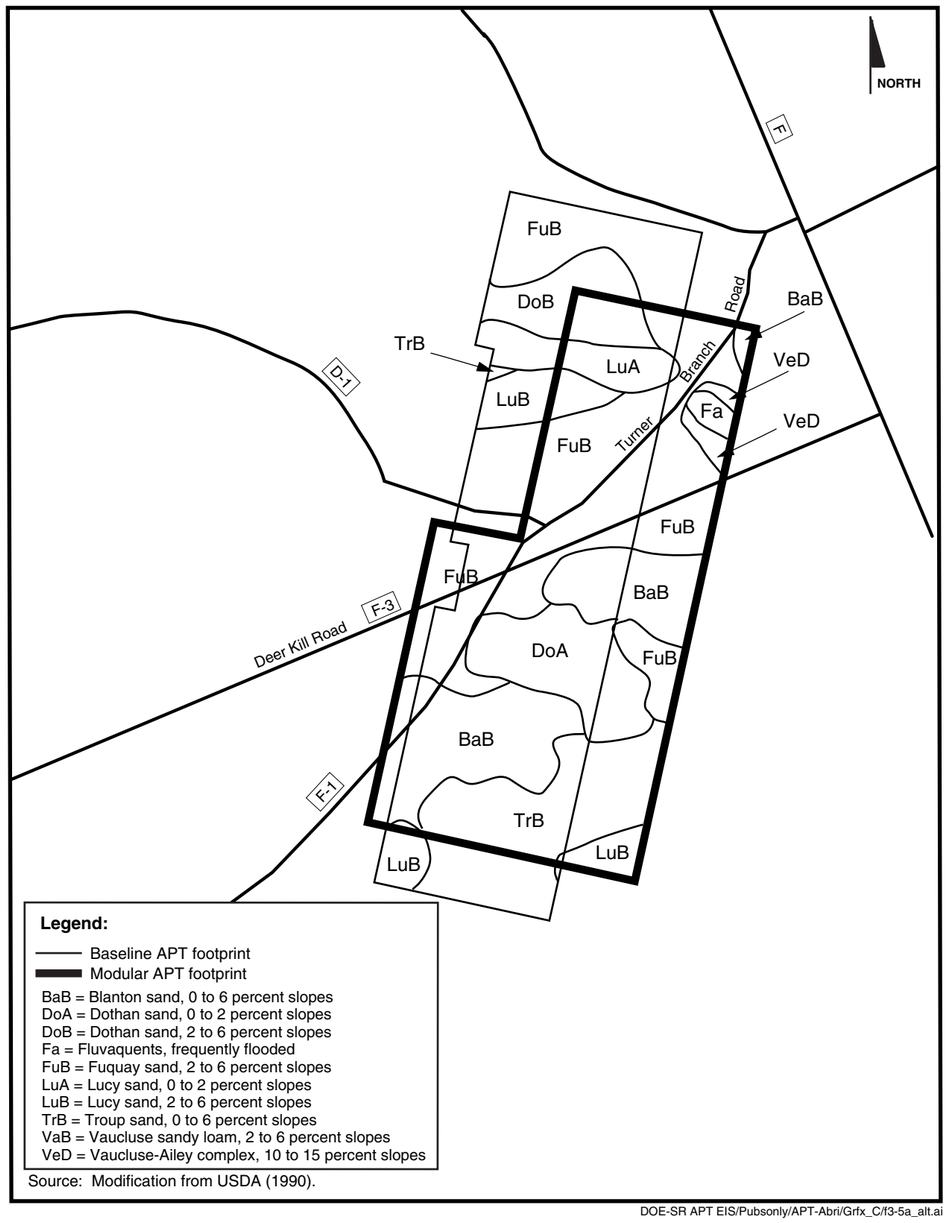


Figure 3-4. Land forms, topography, and 100-year floodplain of the preferred and alternate sites. The footprint of the modular design variation is superimposed over the baseline APT footprint at each site.



DOE-SR APT EIS/Pubsonly/APT-Abri/Grfx_C/f3-5apts.ai

Figure 3-5. Soil types at the preferred APT site.



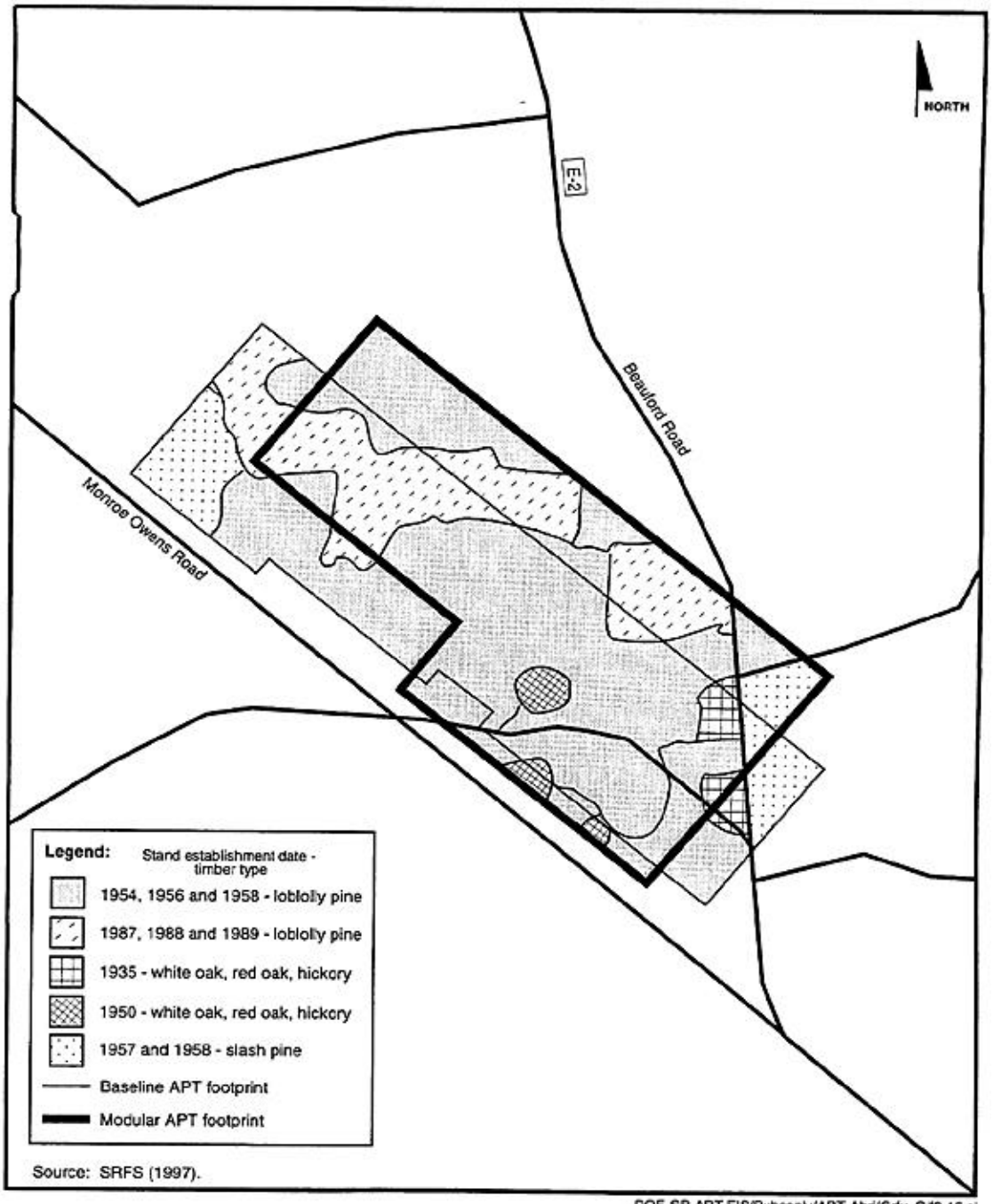
DOE-SR APT EIS/Pubsonly/APT-Abri/Grfx_C/f3-5a_alt.ai

Figure 3-5a. Soil types at the alternate APT site.

Table 3-1. Summary of soils covering the APT sites.[a]

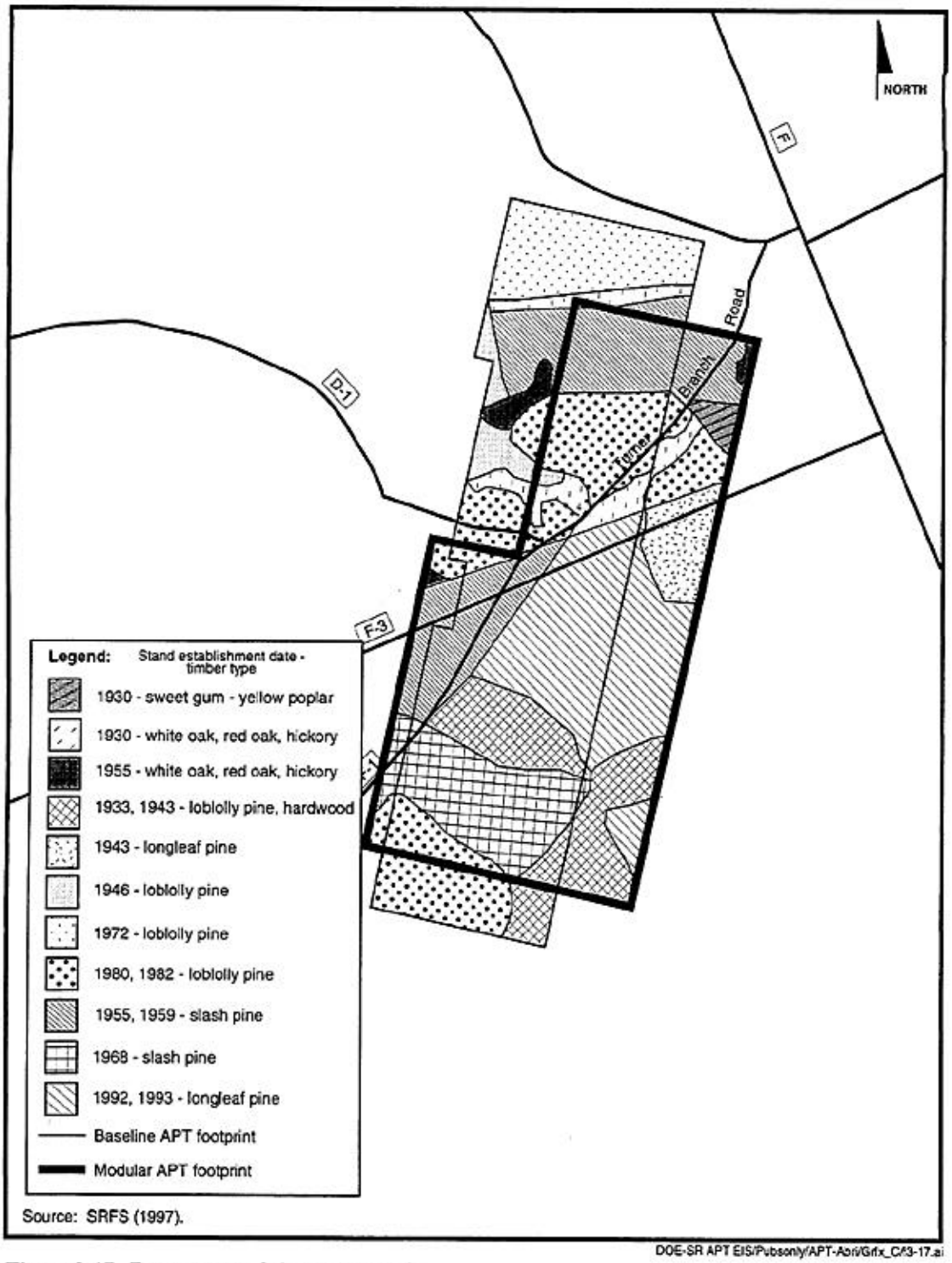
Soil Name (soil mapping unit designation)	Relative surface area at APT sites (percent)		Erosion hazard	Soil texture		Drainage class	Soil reaction (pH)	Risk of corrosion	
	Preferred	Alternate		Surface	Subsoil			Uncovered steel	Concrete
Blanton sand, 0 to 6 percent slopes (BaB)	13	16	Slight[b]	Sandy	Loamy	Somewhat excessively drained[c]	4.5 - 6.0	High	High
Dothan sand, 0 to 2 percent slopes (DoA)	4	9	Slight	Sandy	Loamy and clayey	Well drained[d]	3.6 - 6.0	Moderate	Moderate
Dothan sand, 2 to 6 percent slopes (DoB)	3	8	Slight	Sandy	Loamy and clayey	Well drained	3.6 - 6.0	Moderate	Moderate
Fluvaquents, frequently flooded (Fa)	0	0	**NA**	**Loamy**	**Loamy and sandy**	**Poorly drained**	**4.5-5.5**	**High**	**High**
Fuquay sand, 2 to 6 percent slopes (FuB)	73	38	Slight	Sandy	Loamy	Well drained	4.5 - 6.0	Low	High
Lakeland sand, 0 to 2 percent slopes (LaB)	4	0	**Slight**	**Sandy**	**Sandy**	**Excessively drained**	**4.5 - 6.0**	**Low**	**Moderate**
Lucy sand, 0 to 2 percent slopes (LuA)	0	6	Slight	Sandy	Loamy and clayey	Well drained	4.5 - 6.0	Low	High
Lucy sand, 2 to 6 percent slopes (LuB)	0	7	Slight	Sandy	Loamy and clayey	Well drained	4.5 - 6.0	Low	High
Ogeechee sandy loam, ponded (Og)	2	0	Slight	Loamy	Loamy	Poorly drained[e]	4.5 - 5.5	High	High
Troup sand, 0 to 6 percent slopes (TrB)	0	16	Slight	Sandy	Loamy	Well drained	4.5 - 6.0	Low	Moderate
Vaucluse sandy loam, 2 to 6 percent slopes (VaB)	<1	0	Moderate[f]	Loamy	Loamy and sandy	Well drained	3.6 - 5.5	Low	High
Vaucluse - Ailey complex, 6 to 10 percent slopes (VeC)	<1	0	Moderate	Loamy	Sandy, loamy, and clayey	Well drained	3.6 - 5.5	Low	High
Vaucluse - Ailey complex, 10 to 15 percent slopes (VeD)	0	0	**Moderate**	**Loamy**	**Sandy, loamy, and clayey**	**Well drained**	**3.6 - 5.5**	**Low**	**High**

a. Source: USDA 1990.
b. Slight = No particular erosion preventive measures are needed under ordinary farming practices.
c. Excessively drained = Water is removed from the soil very rapidly.
d. Well drained = Water is readily removed from a well drained soil, but not rapidly. It is available to plants throughout most of the growing season and wetness does not inhibit growth of roots for significant periods during the growing seasons.
e. Poorly drained = Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods.
f. Moderate = Erosion control measures are needed for particular silvicultural activities.



DOE-SR APT EIS/Pubsonly/APT-Abri/Grfx_C/f3-16.ai

Figure 3-16. Forest cover of preferred APT site.



DOE-SR APT EIS/Pubsonly/APT-Abri/Grfx_C/3-17.ai

Figure 3-17. Forest cover of alternate APT site.

[Chapter 3, Section 3.3.2.1 modification to the Draft APT EIS]

Table 3-5 of the EIS presents water quality information for the Savannah River both upstream and downstream of the Savannah River Site. The table and associated text have been modified to reflect the most recent information found in the *Savannah River Site Environmental Report for 1997*.

Page 3-18, 2nd column, 2nd paragraph and Table 3-5, page 3-21 are replaced with the following:

The South Carolina Department of Health and Environmental Control (SCDHEC) regulates the physical properties and concentrations of chemicals and metals in SRS effluents under the National Pollutant Discharge Elimination System (NPDES) program. This agency also regulates chemical and biological water quality standards for SRS waters. Table 3-5 lists the water quality characteristics of the Savannah River upstream and downstream of the site.

[Chapter 3, Section 3.3.4.1 modification to the Draft APT EIS]

Table 3-8 of the EIS presents average and maximum atmospheric concentrations of radioactivity at the SRS boundary and at 25- and 100-mile radii. The table and associated text have been modified to reflect the most recent information found in the Savannah River Site Environmental Report for 1997.

Page 3-28, 2nd column, 2nd paragraph and Table 3-8, page 3-29 are replaced with the following:

Table 3-8 lists average and maximum atmospheric concentrations of radioactivity at the SRS boundary, at a 25-mile radius, and at background monitoring locations (100-mile radius) during **1997**. Tritium is the only radionuclide of SRS origin detected routinely in offsite air samples above background concentrations (Arnett and Mamatey **1998**). Most of the radionuclides cannot be measured in the environment around the Site due to their extremely low concentrations. However, DOE used SRS-specific computer models such as MAXIGASP and POPGASP to calculate radiological doses for members of the public for the **1997** releases based on the amount released and the estimated concentrations in the environment.

[Chapter 3, Section 3.3.4.2 modification to the Draft APT EIS]

Table 3-9 of the Draft EIS presented the SRS baseline values for nonradiological air quality. The revised table and text reflect the most recent available information.

Page 3-28, 2nd column, 4th paragraph and Table 3-9, page 3-29 are replaced with the following:

DOE models the atmospheric dispersion of both maximum potential and actual emissions of regulated pollutants using the U.S. Environmental Protection Agency (EPA) *Industrial Source Complex Short Term Model* (EPA 1992). Table 3-9 lists estimated ambient concentrations of these regulated air pollutants.

[Chapter 3, Section 3.4.1 modification to the Draft APT EIS]

Table 3-11 presents information on individual and collective radiation doses at the SRS. It and the associated text have been modified to reflect the most recent information available.

Page 3-43, 1st column, 1st paragraph and Table 3-11, page 3-43 are replaced with the following:

Table 3-11 lists the maximum and average individual doses and SRS collective dose from 1989 to **1997**.

Table 3-5. Water quality in the Savannah River upstream and downstream from SRS (calendar year 1997).[a,b]

Parameter	Unit of measure[c]	MCL[d,e] or DCG[f]	Upstream		Downstream	
			Minimum[g]	Maximum[g]	Minimum	Maximum
Aluminum	mg/L	0.05-0.2[h]	**ND[k]**	**1.1**	**0.17**	**1.8**
Cadmium	mg/L	0.005[d]	ND	ND	ND	ND
Chemical oxygen demand	mg/L	NA	ND	**ND**	ND	**20**
Chromium	mg/L	0.1[d]	ND	ND	ND	**ND**
Copper	mg/L	1.3[l]	ND	**0.11**	ND	**0.042**
Dissolved oxygen	mg/L	>5.0[m]	**7.3**	**11**	**6.5**	**12**
Gross alpha radioactivity	pCi/L	15[d]	**<0.80[j]**	**<0.80[j]**	**<0.80[j]**	**0.80[j]**
Lead	mg/L	0.015[l]	ND	0.012	ND	ND
Mercury	mg/L	0.002[d,e]	ND	**ND**	ND	**ND**
Nickel	mg/L	0.1[d]	ND	ND	ND	ND
Nitrite/Nitrate (as nitrogen)	mg/L	10[d]	**0.26**	**0.46**	**0.18**	**0.54**
Nonvolatile (dissolved) beta radioactivity	pCi/L	50[d]	**<1.4[j]**	**3.0**	**<1.4[j]**	**2.8**
pH	pH units	6.5-8.5[h]	**6.5**	**7.4**	**6.0**	**7.2**
Phosphate	mg/L	NA[i]	0.018	0.52	0.029	0.25
Suspended solids	mg/L	NA	**3**	**14**	**6**	**23**
Temperature	°F	90[m]	**49**	77	**49**	**80**
Tritium	pCi/L	20,000[d,e]	**<440[j]**	**<440[j]**	**<440[j]**	**2,600**
Zinc	mg/L	5[h]	ND	**0.22**	0.026	**0.34**

a. Source: Arnett and Mamatey(1998a,b).
b. Parameters are those DOE routinely measures as a regulatory requirement or as part of ongoing monitoring programs.
c. mg/L = milligrams per liter; a measure of concentration equivalent to the weight/volume ratio.
pCi/L = picocuries per liter; a picocurie is a unit of radioactivity; one trillionth of a curie.
d. Maximum Contaminant Level (MCL), EPA National Primary Drinking Water Standards (40 CFR Part 141).
e. Maximum Contaminant Level (MCL): SCDHEC (1976).
f. DOE Derived Concentration Guides (DCGs) for water (DOE Order 5400.5, "Radiation Protection for the Public and the Environment"). DCG values are based on committed effective dose of 100 millirem per year for consistency with drinking water MCL of 4 millirem per year.
g. Minimum concentrations of samples. The maximum listed concentration is the highest single result found during one sampling event.
h. Secondary Maximum Contaminant Level (SMCL). EPA National Secondary Drinking Water Regulations (40 CFR Part 143).
i. NA = none applicable.
j. **Less than (<) indicates concentration below lower limit of detection (LLD).**
k. ND = none detected.
l. Action level for lead and copper.
m. Shall not exceed weekly average of 90°F after mixing nor rise more than 5°F in 1 week unless appropriate temperature criterion mixing zone has been established.

Table 3-8. Radioactivity in air at the SRS boundary, at the 25-mile radius, and at the 100-mile radius during 1997 (picocuries per cubic meter).[a]

Location	Gross alpha	Nonvolatile beta	Tritium
Site boundary			
Average	<0.0011[b]	0.015	<49[b]
Maximum	0.0033	0.031	65
25-mile radius			
Average	<0.0011[b]	0.016	<49[b]
Maximum	0.0044	0.038	<49[b]
Background (100-mile radius)			
Average	0.0011	0.011	<49[b]
Maximum	0.0030	0.018	<49[b]

a. Sources: Arnett and Mamatey (1998); Arnett (1998).
b. Less than (<) indicates concentrations below lower limit of detection (LLD).

Table 3-9. Estimated ambient concentration contributions of air pollutants from existing SRS sources and sources planned for construction or operation through 1996 (micrograms per cubic meter of air).[a,b]

Pollutant[c]	Averaging time	SC ambient standard (μg/m3)	Estimated SRS boundary conc. (μg/m3)[c]	Percent of standard
Criteria pollutants				
Sulfur dioxide[d]	3-hr	1,300[e,f]	690	53
	24-hr	365[e,f]	215	59
	Annual	80[e]	16	20
Total suspended particulate	Annual	75[e]	43	58
Particulate matter (≤10 μm)	24-hr	150[e]	81	54
	Annual	50[e]	4.8	9.6
Carbon monoxide	1-hr	40,000[e]	5,000	13
	8-hr	10,000[e]	630	6.3
Oxides of Nitrogen[f]	Annual	100[e]	8.8	8.8
Lead	Max. quarter	1.5[g]	<0.01	<0.67
Ozone	1-hr	235[e,j]	NA[l]	NA
Toxic air pollutants[l]				
Hydrochloric Acid	24-hr	175[k]	24	14
Benzene	24-hr	150[k]	28	19
Formaldehyde	24-hr	7.5[k]	0.5	6.7
Hexane	24-hr	200[k]	3.7	1.9
Nickel	24-hr	0.5[k]	0.12	24

a. Source: DOE (1998).
b. The concentrations are the maximum values at the SRS boundary.
c. Based on maximum potential emissions for 1996 for all SRS sources on the indicated pollutant.
d. Based on emissions for all oxides of sulfur (So_x).
e. Source: SCDHEC Standard No. 2.
f. Concentration not to be exceeded more than once a year.
g. Source: SCDHEC (1976). New NAAQS for particulate matter ≤2.5 microns (24-hour limit of 65 μg/m^3 and an annual average limit of 15 μg/m^3) will become enforceable during the life cycle of this facility.
h. Based on emissions for all oxides of nitrogen (NO_x).
i. Modeling was conducted for 137 toxic air pollutants; listed are those air toxics with site boundary concentrations estimated to be greater than 1 percent of the ambient standard.
j. New NAAQS for ozone (8 hours - 0.08 parts per million) will become enforceable during the life cycle of this facility.
k. Source: SCDHEC Standard No. 8.
l. NA = not available.

Table 3-11. SRS annual individual and collective radiation doses.[a]

Year	Number with measurable dose	Average individual worker dose (rem)[b]	Site worker collective dose (person-rem)
1989	12,363	0.070	863
1990	11,659	0.065	753
1991	8,391	0.055	459
1992	6,510	0.054	352
1993	5,202	0.051	264
1994	6,284	0.050	315
1995	4,846	0.053	256
1996	4,736	0.053	252
1997[c]		**N/A[d]**	**164**

a. Sources: **DOE (1996), WSRC (1998).**
b. The average dose includes only workers who received a measurable dose during the year.
c. 1997 data is incomplete and does not include the average individual worker dose.
d. N/A = Not applicable.

[Chapter 3, Section 3.4.5 modification to the Draft APT EIS]

Section 3.4.5, Threatened and Endangered Species, has been revised in response to comments L2-05 and L2-06. The description of eagle use of the SRS has been added to provide a more comprehensive assessment of the current status of eagles in the potentially affected areas.

Page 3-54, 2nd column, 2nd paragraph, line 8 through line 3 in the 1st column on page 3-55 are replaced with the following new paragraphs:

Bald eagles nest near Par Pond and L Lake and forage in both reservoirs (Bryan et al. 1996; Lemaster 1996). Par Pond was the center of eagle activity on the SRS until 1985, when L Lake was built. Bald eagle use of L Lake has increased since 1987, with the highest number of sightings occurring in the fall and winter of 1992-1993 (Bryan et al. 1996). Eagle use of Par Pond over the same period has remained at a constant but fairly low level. In the winters of 1991-1992 and 1992-1993, when Par Pond was drawn down for repairs, bald eagles were frequently observed foraging in the area (Bryan et al. 1996). After the reservoir was refilled, bald eagles were seen less frequently in the Par Pond area, but the reservoir continues to be used as a foraging area by nesting, over-wintering, and transient juvenile and adult bald eagles (SRI 1998). In 1984-1985, when bald eagle use of the Par Pond system was last studied, the largest number of sightings (66.7 percent) were at Par Pond, followed by Pond C (24.2 percent), Pond B (6.1 percent), and Pond 2 (3.0 percent) (Mayer et al. 1986). In recent years, eagles have been observed on a regular basis foraging around Pond C and Pond B, and have been seen occasionally at Pond 2 (Brooks 1998).

Although eagles are found on the SRS in all months of the year, most sightings are in winter and spring months (November through May) (Mayer et al. 1986). This is the time of the year when the birds are nesting and wintering in South Carolina. Eagles seen during the summer and early fall are most likely transients migrating either north or south (Sprunt and Chamberlain 1970; Mayer et al. 1986).

There are three bald eagle nesting territories on the Savannah River Site (DOE 1997). The Eagle Bay nest, discovered in 1986, is approximately 1 mile southwest of the Par Pond dam. The Pen Branch nest, discovered in 1990, is approximately 1 mile west of L Lake. The recently-discovered Road G nest is approximately 0.25 mile east of Par Pond (LeMaster 1996). Eagles have nested intermittently at the Eagle Bay location since its discovery in 1986 (Hart et al. 1996). Chicks hatched at the Pen Branch nest every year from 1990 to 1996. To date, no

young have been observed at the Road G nest. In the winter of 1997-1998, this nest was in a state of disrepair and was not used by eagles (Brooks 1998).

[Chapter 3, Section 3.4.5 modification to the Draft APT EIS]

Section 3.4.5, Threatened Endangered Species, has been revised in response to comments L2-05 and L2-06. The description has been added to provide a more comprehensive assessment of the current status of shortnose sturgeon in the area and is replaced by the following paragraph.

Page 3-55, 1st column, 2nd paragraph is replaced with the following:

Shortnose sturgeon have not been collected in the tributaries of the Savannah River that drain the SRS, but do occur in the Savannah River up- and downstream of the Site. Before 1982, shortnose sturgeon were not known to occur in the middle reaches of the Savannah River. However, 12 shortnose sturgeon larvae were collected near SRS during a 4-year (1982 through 1985) DOE study of ichthyoplankton abundance and entrainment in reactor cooling water systems (DOE 1987). A South Carolina Wildlife and Marine Resources Division (now South Carolina Department of Natural Resources) study of seasonal movement and spawning habitat preferences of Savannah River shortnose sturgeon found two probable spawning sites, one upstream of the SRS at river mile 177-179 and the other downstream of the Site at river mile 115-121 (Hall et al. 1991). Collins et al. (1992) tentatively identified three spawning locations in the Savannah River: river mile 111-118 (downstream of the Site), river mile 136-143 (adjacent to the Site), and river mile 171-172 (upstream of the Site). Sturgeon spawn in the main channel of the Savannah River in areas where current velocities and turbulence are high, maintaining a scoured clay-gravel bottom (Hall et al. 1991; Collins et al. 1992).

Chapter 4. Modifications – Environmental Impacts

[Chapter 4 introduction, modifications to the Draft APT EIS]

Since the Draft APT EIS was issued, the Department has determined the probable location of concrete batch plants and construction debris disposal areas. The batch plants would be located within the APT site; construction debris would be discarded in the existing Burma Road landfill on the Savannah River Site or at one of three other possible locations on SRS. The information supercedes the batch plant and construction landfill discussions in Section 4.1.5, Waste Management, of the Draft EIS.

Page 4-1, 2nd column, 2nd and 3rd paragraphs are replaced with the following:

In addition to the construction activities described in Chapter 2, DOE could build two temporary facilities – concrete batch plants and a construction debris landfill.

Concrete Batch Plants: The planned location of the batching facilities (batch plant, associated sand and aggregate storage areas, and washdown basins) would be near the target blanket building and within the areas that would be cleared for the APT. About 10 acres of land is expected to be required. The exact location and area requirements for these facilities would be established on the basis of final decisions regarding APT layout (baseline accelerator or modular design).

Estimated water requirements for the batch plant are based on the need to produce approximately 340,000 cubic yards of concrete. About 30 gallons of water per cubic yard is needed for batching, and an additional 30 gallons of water per cubic yard is required for washout. Consequently total water requirements are estimated to be 21 million gallons; about 7.2 million gallons in the peak year of construction (DeCamp 1998).

Process water for the concrete batch operations would likely come from existing wells in H-Area or from the SRS domestic water supply system. Both of these sources would be reliable supplies of water for which supply pipelines can be readily installed early in the construction phase. River water is unlikely to be used because of potential variability in quality (e.g. suspended solids) and the fact that the supply pipeline to the Savannah River (to support cooling water needs should that alternative be selected) would not be installed until relatively late in the construction phase of the project. The washout water from batch plant operations would be routed to basins for the removal of suspended solids, then either reused or discharged via an NPDES outfall (DeCamp 1998).

Particulate matter, consisting primarily of cement dust, is the only pollutant of concern generated in the concrete mixing process. Emissions occur at the point of transfer of cement to the silo; however, filter bags with control effectiveness as high as 99 percent are typically used to remove particulate emissions. Particulate emissions limits for the operation of a concrete batch plant would be set in a construction permit granted by SCDHEC. Any fugitive dust emissions from sand and aggregate piles around the batch plant would be controlled by wet suppression, chemical dust suppressants, or other approved method.

Construction Debris Landfill. Construction debris would be disposed of at either the existing Burma Road landfill on the Savannah River Site, a future landfill to be developed at the Central Shops Borrow Pit, or on the selected APT site. The Burma Road landfill (which would require expansion to support APT generated waste) or any new landfill constructed would comply with all applicable SCDHEC siting criteria for Type III construction debris landfills (SCDHEC R.61-107.11, Part III) including a 100-year flood obstruction prohibition, compliance with wetland regulations, and be designed to ensure the landfill bottom is at minimum 2 feet above the seasonal high groundwater table. Based on the estimated amount of nonrecyclable construction debris that would be generated, and a 10-foot depth for uncompacted fill, approximately 14 acres would be required for the landfill (DeCamp 1998).

Surface water management for any new landfill or expansion of the Burma Road landfill would be in accordance with those guidelines set forth in an approved Stormwater Management and Sediment Reduction/Pollution Prevention Plan. Controls would be established for landfill operations to ensure that applicable SCDHEC requirements are met (e.g., controls to minimize run-off into active disposal areas, placement of interim cover, final grading to ensure positive drainage, and other requirements) as specified in R.61-107.11.

Integrity of the final soil cover (minimum of 2 feet) would be maintained as specified in R.61-107.11, Part III.B.5, and would include periodically inspecting the cover, repairing and re-establishing vegetation on those areas damaged by erosion, and similar activities.

[Chapter 4 introduction, modification to the Draft APT EIS]

In the Draft EIS, the Department indicated the No Action alternative would result in the design, but not the construction of the APT facilities. Based on that description of No Action, the Department expected no incremental impacts beyond the current baseline at the SRS. However, since the issuance of the Draft EIS, DOE has modified the APT No Action alternative (see page C-3 of this document).

If the department decides to not construct and operate the APT, it would pursue tritium production in one or more commercial light-water reactors. This action would change the estimates of the No Action impacts presented in the Draft EIS. Under this scenario, the No Action alternative impacts would include the construction and operation of the Tritium Extraction Facility at SRS, the possible completion of a partially constructed commercial light water reactor, the irradiation of targets in a commercial light-water reactor, and the transportation of those targets to the SRS. Impacts for these actions are covered in DOE/EIS-0271 and DOE/EIS-0288. The following summary replaces the text under "Impacts of the No Action Alternative" as found in the Draft EIS.

Page 4-2, 2nd column, 4th paragraph through page 4-3, 1st column, 1st paragraph is replaced with the following:

POTENTIAL NO ACTION IMPACTS AT THE SAVANNAH RIVER SITE

The potential No Action impacts associated with APT could occur at both the Savannah River Site and at reactor sites in Tennessee and/or Alabama. Table 2-3 of this document compares the potential impacts of the No Action alternative (both at and away from the SRS) to the baseline accelerator.

Tritium Extraction

The environmental impacts of extracting tritium at the SRS are described in the Draft TEF EIS (DOE 1998a). The following discussion is based on that document. In general, DOE considers the expected impacts from extracting tritium in either the H-Area or the Allied General Nuclear Services (AGNS) facility (i.e., the two alternatives evaluated in the Draft EIS) on the physical, biological, and human environment to be minor and consistent with what might be expected for an industrial facility.

Compared to extracting tritium in H-Area, the AGNS alternative would have higher radiation doses at the site boundary (due to the close proximity of the facility to the property boundary), but lower collective population doses (due to lower population densities in the nearby communities).

Less construction waste would be produced at AGNS than H-Area because putting TEF in AGNS would involve refurbishing existing facilities, and some new construction. Slightly higher volumes of sanitary waste would be generated at AGNS during operations due to a larger workforce.

Neither of the alternative sites for TEF is known to contain hazardous, toxic, or radioactive materials. Nonetheless, the potential exists that excavation-related activities could result in the discovery of previously unknown and undocumented hazardous, toxic, or radioactive materials. DOE would remove and dispose of such material in accordance with all applicable laws and regulations.

The AGNS alternative would require less land than the H- Area alternative. DOE has not identified any significant historic or archaeological resources at either alternative site that construction or operation of TEF could effect. No threatened, endangered, or other sensitive biotic resources are believed to occur on either site. At the AGNS site, construction noise and activity could have localized, but temporary, adverse effects on wildlife.

For the AGNS alternative, the contributions of nonradiological air constituents would be 0.13 percent of the applicable standard, higher than the onsite H-Area alternative. The annual radiological dose for the offsite maximally exposed individual would be 0.13 millirem higher for AGNS than for H-Area, but both would be well below the regulatory limit of 10 millirem from airborne releases.

POTENTIAL NO ACTION IMPACTS AWAY FROM THE SAVANNAH RIVER SITE

Should the Department select the commercial light-water reactor option of the dual-track strategy for producing tritium, it could be done at either the Tennessee Valley Authority's Bellefonte facility near Hollywood, Alabama, or at the Watts Bar or Sequoyah plants, located near Spring City and Soddy-Daisy, Tennessee respectively. Impacts could include those related to the completion of the Bellefonte plant, the construction of dry spent fuel storage facilities at each plant, the irradiation of TPBARs in Bellefonte, Sequoyah, and/or Watts Bar, and the transportation of the irradiated material to the Savannah River Site. The *Draft EIS For the Production of Tritium in a Commercial Light Water Reactor* (DOE 1998b) provides descriptions of the proposed actions and their potential impacts. The following information is taken from that document.

Commercial Light-Water Reactor Construction Impacts

Watts Bar and Sequoyah. Because the Draft CLWR EIS assumes that long-term spent nuclear fuel storage would take place at each of the reactor plants, a dry cask spent fuel storage facility may be required for Watts Bar 1 and Sequoyah 1 or 2 to support tritium production. This would be the only construction necessary for tritium production. Such a facility would consist of three reinforced concrete slabs covering approximately 3.5 acres. Approximately 60-80 horizontal storage modules (HSMs), each made of reinforced concrete, could be housed on the slabs. These HSMs would have a hollow internal cavity to accommodate a stainless steel cylindrical cask that would contain the spent nuclear fuel. Constructing such a facility would disturb approximately 5 acres and require approximately 50 construction workers. Premixed concrete would be used and negligible impacts to air quality, water, and biotic resources are expected.

Bellefonte. For Bellefonte units 1 and 2, which are only partially completed nuclear plants, additional construction activities would be required in order to produce tritium. The impacts of such construction are described below.

At Bellefonte 1 and 2, all major structures (e.g., containment buildings, cooling towers, turbine buildings, and support facilities) have been constructed. Therefore, construction activities would largely consist of internal modifications to the existing structures. No additional land would be disturbed in completing construction and there would be no impacts on visual resources, biotic resources (including threatened and endangered species), geology and soils, and cultural resources. Because the Draft CLWR EIS assumes that long-term spent fuel storage would take place at each of the reactor plants, a dry cask spent fuel storage facility would eventually be required at Bellefonte. The impacts of constructing such a spent fuel storage facility would be similar to those described above for Watts Bar and Sequoyah.

Completing construction of Bellefonte 1 would have the greatest impact on socioeconomics. During the peak year of construction (2002), approximately 4,500 direct jobs would be created. Approximately 4,500 secondary jobs would also be created. The total new jobs (9,000) would cause the regional economic area unemployment rate to decrease to approximately 3 percent, from the current rate of 7.9 percent. Public finance expenditures/revenues would increase by over 30 percent in Scottsboro and about 15 percent in Jackson County. Rental vacancies would decline to near zero and demand for all types of housing would increase substantially.

If Bellefonte 2 also was selected for completion, construction activities at Bellefonte 1 and Bellefonte 2 would be extended. The peak year of construction would shift to 2003, but the total number of direct jobs would be the same. The effects on the regional economic area unemployment rate, housing/rental vacancies, and public finance expenditures/revenues would be the same as for the construction completion of Bellefonte 1.

Commercial Light-Water Reactor Operational Impacts

The impacts of tritium production are described below, first for the operating reactors, then for the partially completed reactors.

Watts Bar and Sequoyah. Tritium production would have minimal or no effect (see Table 2-3) on land use, visual resources, water use and quality, air quality, archaeological and historic resources, biotic resources (including threatened and endangered species), and socioeconomics. Tritium production could cause some impacts in the following areas: radiation exposure (worker and public), spent fuel generation, and low-level radioactive waste generation.

Tritium production could cause the average annual worker radiation exposure to slightly increase but the resultant dose would be well within regulatory limits of 5,000 millirem per year. Radiation exposure to the public from normal operations also could increase, but would still remain well within regulatory limits at each of the reactor sites.

As a result of the irradiation process (assuming a maximum 3,400 targets) additional spent fuel would be generated at Watts Bar and Sequoyah. In the average 18-month fuel cycle, spent fuel

generation would increase from approximately 84 spent fuel assemblies to approximately 144 spent fuel assemblies. If less than approximately 2,000 targets were irradiated, there would be no change in the amount of spent fuel produced by the reactors. Storing the additional spent fuel is not expected to result in any discernible impacts. Radiation exposures would remain below regulatory limits for both workers and the public. There are no significant impacts from accidents associated with dry cask spent fuel storage.

Watts Bar and Sequoyah would generate approximately 0.43 additional cubic meters of low-level radioactive waste. Such an increase would amount to less than 1 percent of the low-level radioactive waste disposed of at the Barnwell, South Carolina low-level radioactive waste disposal facility.

Tritium production could change the potential risks associated with accidents at Watts Bar and Sequoyah. Potential impacts from accidents were determined using computer modeling. If a limiting design-basis accident occurred, tritium production would increase the individual risk of a fatal cancer by 7.5×10^{-9} to an individual living within 50 miles of Watts Bar. Statistically, the limiting design basis accident would create one additional fatal cancer approximately every 130 million years from tritium production in Watts Bar. For an individual living within 50 miles of Sequoyah 1 or 2, if a limiting design-basis accident occurred, tritium production would increase the risk of a fatal cancer by 1.2×10^{-8}. Statistically, the limiting design-basis accident would create one additional fatal cancer every 83 million years from tritium production in either of the Sequoyah reactors. For beyond-design basis accidents (accidents which have a probability of occurring approximately once in a million years), tritium production would not significantly change the consequences of an accident. This is due to the fact that the potential consequences of such an accident would be dominated by radionuclides other than tritium. For these types of accidents, the additional tritium would produce an estimated statistical risk of less than 1.0 fatal cancer to the 50-mile population surrounding the plants.

Bellefonte. Because neither Bellefonte 1 or 2 is currently operating, the CLWR EIS attributes all of the environmental impacts of operating these plants to the tritium production program. Consequently, environmental impacts would occur in the following areas: visual resources, water use, biotic resources, socioeconomics, radiation exposure (worker and public), spent fuel generation, and low-level radioactive waste generation. In addition, tritium production would also change the accident risks associated with these reactors.

During operation, the Bellefonte units would produce vapor plumes from cooling towers that would be visible up to ten miles away. These plumes could create an aesthetic impact on the towns of Pisgah, Hollywood, and Scottsboro, Alabama.

During operations, the Bellefonte units would each utilize less than 0.5 percent of the river flow from Guntersville Reservoir and would not cause any adverse impacts to other users. Discharges from the plants would be treated and monitored before release and would comply with National Pollutant Discharge Elimination System permits. Impacts to water quality would be minimal and no standards would be exceeded. Operation of either or both of the Bellefonte plants for tritium production would have a small impact on biotic resources, although there would be some fish losses from cooling water intake screens.

During operations, approximately 800 direct jobs would be created at Bellefonte 1 along with an approximately equal number of indirect jobs. The total new jobs (approximately 1,600) would cause the regional economic area unemployment rate to decrease to approximately 5.9 percent. Public finance expenditures/revenues would decline from the levels during construction but would remain 10 to 15 percent higher than they would be otherwise at Scottsboro and 5 to 10 percent higher in Jackson County. If Bellefonte 2 also were completed, a total of approximately 1,000 direct jobs would be created, along with approximately 1,000 indirect jobs.

Tritium production would result in worker radiation exposures but the resultant doses would be well within regulatory limits of 5,000 millirem per year. Radiation exposures to the public from normal operations also would increase but still remain well within regulatory limits. The population dose within 50 miles of the plant would increase from 0 person-rem to approximately 11 person-rem per year for Bellefonte 1.

Based on producing the maximum amount of tritium in the average 18 month fuel cycle, spent fuel generation would increase from 0 spent fuel assemblies to approximately 141 spent fuel assemblies. The impacts of storing the spent fuel in a dry cask spent fuel storage facility are the same as described above for the existing operating reactor plants.

Tritium production at Bellefonte 1 would generate approximately 40 cubic meters of low-level radioactive waste. This amount of waste would be a small fraction of the low-level radioactive waste disposed of at the Barnwell, South, Carolina low-level radioactive waste disposal facility.

Potential impacts from accidents were determined using computer modeling. If a limiting design-basis accident occurred, tritium production would increase the individual risk of a fatal cancer by 4.1×10^{-9} to an individual living 50 miles of Bellefonte. Statistically, this means that one additional fatal cancer would occur approximately every 240 million years from tritium production at either Bellefonte 1 or 2. For beyond-design basis accidents (accidents which have a probability of occurring approximately once in a million years), tritium production would not significantly change the consequences of an accident. This is due to the fact that the potential consequences of such an accident would be dominated by radionuclides other than tritium. For these types of accidents, the additional tritium would produce a statistical risk of less than one fatal cancer to the 50 mile population surrounding the plants.

Transportation Impacts

The potential impacts of transporting irradiated material to the Savannah River Site would be essentially the same for Watts Bar, Sequoyah, or Bellefonte. Impacts would be limited to toxic vehicle emissions and traffic fatalities. The transportation risks would be less than one fatality per year.

Radiological material transportation impacts could result in routine and accidental deaths. In all instances, the risks associated with this material would be much less than one fatality per year.

[Chapter 4, Section 4.1.1.2 modification to the Draft APT EIS]

Comment L4-03 questioned the information about potential groundwater activation discussed in Section 4.1.1.2. This section has been modified to clarify the discussion. The dominant activation product generated would be tritium.

Page 4-4, 2nd column, 4th paragraph through 1st paragraph on page 4-5 are replaced with the following:

During accelerator operations, some neutrons could penetrate the accelerator shielding and be available for absorption by stable (nonradioactive) atoms in the soil and groundwater to form radioactive atoms. The expected production of tritium beneath the facility would be less than 2×10^{-3} curies per year. **These radioactive atoms (tritium) would be expected to migrate with groundwater, but would take between 50 and 80 years to reach surface water outlets (Stephenson 1997). Transport modeling of these activation products show that groundwater tritium levels would at all times be below EPA drinking water standards away from the APT site.** The accelerator tunnel and target/blanket building shielding would be designed (Fikani 1997) so that the radiation dose from the calculated tritium concentration in groundwater, for a hypothetical individual drinking the APT site groundwater continuously throughout the year, would be less than one-eighth of the U.S. Environmental Protection Agency drinking water standard of 4 millirem per year. Dispersion during movement would produce even lower doses to a real receptor, therefore, there would be minimal impacts from the activation of groundwater.

[Chapter 4, Section 4.1.2.1 modification to the Draft APT EIS]

The text box in the Draft EIS discussing impacts from operations to surface water is revised to clarify the conditions under which a Clean Water Act Section 316 (a) Demonstration would be required.

Page 4-5, 2nd column, text box is revised to contain the following text:

Operation of the APT would result in thermal discharges from the cooling water system to a series of pre-cooler ponds and ultimately Par Pond. **Based on heat dissipation studies (see Section 4.5.3), low-volume cooling tower discharges would have little or no effect on temperatures in the receiving water bodies. In the case of the Once-Through Cooling Water alternative, however, discharges to the pre-cooler ponds would be in excess of 100°F. This could create a situation in which the average weekly temperature in the receiving water bodies is greater than 90°F, the SCDHEC standard for freshwaters. The once-through discharge also could be more than 5°F above ambient temperatures, exceeding the SCDHEC standard for discharges to lakes and reservoirs. DOE could be required to conduct a Clean Water Act Section 316(a) Demonstration.**

Under each cooling water alternative, cesium-137, trapped in the fine sediments of Par Pond, could be remobilized. The Once-Through Cooling Water alternative could resuspend the most cesium-137. Potential exposures to the public, in either case, would be small. Potential health impacts associated with water pathways are included in the totals reported in Section 4.2.1.

The Department is considering a design variation for the discharge of cooling water, bypassing precooler ponds 2 and 5 and discharges directly to Pond C via an existing discharge channel. Section 4.5.3 in Part D of this document describes this design variation and evaluates the potential impacts.

[Chapter 4, Section 4.1.2.2 modifications to the Draft APT EIS]

Based on evolving design work for the accelerator, waterborne source terms have been modified. Table 4-1 and 4-2 have been modified to reflect the revised information. Although the source term is higher than estimated in the Draft EIS, the expected dose to exposed individuals and the public is still small.

Page 4-6, 2nd column, Table 4-1 and Table 4-2, page 4-7 are replaced with the following:

Table 4-1. Estimated annual releases (curies) of major radionuclides in liquid discharges from the APT.[a]

Radionuclide	Annual releases[b]
Tritium	**3,000**
Cobalt-60	0.0001
Chromium-51	0.002
Sodium-22	0.001

a. Source: England (1997) **and England (1998a)**.
b. Annual releases will not change significantly with alternative.

[Chapter 4, Section 4.1.3.3 modifications to the Draft APT EIS]

Table 4-11 and associated text, which present information on OSHA-regulated nonradiological air pollutants at the preferred APT site for a hypothetical worker, are modified to reflect changes resulting from recalculation of the maximum concentrations.

Page 4-16, 2nd column, 3rd paragraph and Table 4-11, page 4-18, are replaced with the following:

Table 4-11 lists air quality impacts to a hypothetical worker in the vicinity of the APT facilities. For all the regulated pollutants emitted, exposures to the nearby worker would be below permissible exposure levels defined in 29 CFR Part 1910.100.

Table 4-2. Average annual doses from radiological and nonradiological constituents discharged in liquid effluents for the preferred configuration, and percent differences in alternatives to the Preferred alternative.

		Percentage difference of results for alternatives						
		Cooling water system			Accelerator technology	Feedstock Material	Radio-frequency power	Site location
Factor	Results for preferred alternative	Once-through cooling using river water	Cooling towers with groundwater makeup	K-Reactor cooling tower with river water makeup	Room temperature	Lithium-6 aluminum alloy	Inductive output tube	Alternate site
Annual MEI[a] dose from radiological discharges	**0.015** millirem	NC[b]	NC	NC	NC	NC	NC	NC
Annual MEI dose from resuspension of contaminated sediments	0.0013 millirem	+6,150%[d]	NC	-60%	NC	NC	NC	NC
Total annual MEI dose from liquid pathways	**0.016** millirem	**+49%**	NC	**NC**	NC	NC	NC	NC
Annual population dose from radiological discharges	**0.42** person-rem	NC	NC	NC	NC	NC	NC	NC
Annual population dose from resuspension of contaminated sediments	0.0035 person-rem	+6,150%[f]	NC	-60%	NC	NC	NC	NC
Total annual population dose from liquid pathways	**0.42** person-rem	+**51**%	NC	NC	NC	NC	NC	NC
Average annual temperature of liquid discharges	70°F	+18°F [g]	NC	NC	NC	NC	NC	NC
Maximum annual temperature of liquid discharges	88°F	+14°F	NC	+1°F	NC	NC	NC	NC
Average annual concentration of total dissolved solids in liquid discharges	190 milligrams per liter	-67%	-99%[c]	NC	NC	NC	NC	NC
Average annual concentration of total solids in liquid discharges	220 milligrams per liter	-67%	-99%	NC	NC	NC	NC	NC

a. MEI - maximally exposed individual.
b. NC = Difference in results between this alternative and the Preferred alternative is less than 5 percent.
c. Results for this alternative are several orders of magnitude less than that for the Preferred alternative, even though the designation "-99%" indicates only two orders of magnitude difference.
d. 0.081 millirem.
e. 0.096 millirem.
f. 0.22 person-rem.
g. Percent difference not meaningful for temperature.

Table 4-11. Estimated maximum concentrations at hypothetical worker location (640 meters) from APT operations of nonradiological air pollutants regulated by OSHA at the preferred APT site (milligrams per cubic meter).[a]

				Percentage difference of results for alternatives						
				Cooling water system			Accelerator technology	Feedstock Material	Radio-frequency power	Site location
Air emissions	Averaging time[b]	OSHA standard[b]	Results for Preferred alternative	Once-through cooling using river water	Cooling towers with groundwater makeup	K-Reactor cooling tower with river water makeup	Room temperature	Lithium-6 aluminum alloy	Inductive output tube	Alternate site[d]
Oxides of sulfur	8-hour TWA	13	0.0037	NC[c]	NC	NC	NC	NC	NC	NC
Total particulates	8-hour TWA	15	**0.0049**	NC	NC	NC	NC	-5%	NC	NC
Particulate matter (≤10 microns)	8-hour TWA	5	**0.0033**	NC	NC	NC	NC	NC	NC	NC
Carbon monoxide	8-hour TWA	55	0.060	NC	NC	NC	NC	NC	NC	NC
Oxides of nitrogen	Ceiling	9	**2.4**	NC	NC	NC	NC	NC	NC	NC
Lead	8-hour TWA	0.5	4.4×10^{-6}	NC	NC	NC	NC	NC	NC	NC
Beryllium	8-hour TWA	0.002	8.4×10^{-7}	NC	NC	NC	NC	NC	NC	NC
	Ceiling	0.005	$\mathbf{8.7 \times 10^{-6}}$	NC	NC	NC	NC	NC	NC	NC
Mercury	Ceiling	0.1	$\mathbf{1.1 \times 10^{-5}}$	NC	NC	NC	NC	NC	NC	NC
Ethyl Alcohol	8-hour TWA	1900	$\mathbf{4.5 \times 10^{-5}}$	NC	NC	NC	NC	-25%	NC	NC

a. Source: **Hunter (1997).**

b. Air pollutants regulated by OSHA under 29 CFR Part 1910. Averaging values listed are 8-hour time weighted averages (TWA) except those oxides of nitrogen that are not-to-be exceeded Ceiling Values. Beryllium has both an 8-hour TWA and a ceiling limit. Source: 29 CFR Part 1910.100.

[Chapter 4, Section 4.1.3.4 modifications to the Draft APT EIS]

Based on evolving design work for the accelerator, source terms have been modified. Section 4.1.3.4, Radiological Air Emissions, and Tables 4-12 and 4-13 have been modified to reflect the revised information. Although the source term is higher than estimated in the Draft EIS, the expected dose at the Site boundary is still small. In the Draft EIS, radiological dose was estimated at ground level; the revised calculations in the Final EIS assumes an 80 meter stack height.

Page 4-19, 2nd column, 9th paragraph through page 4-22, 1st column, 4th paragraph, including Tables 4-12 and 4-13, pages 4-20 and 4-21, are replaced with the following:

After determining the routine emission rates, DOE used the computer codes MAXIGASP and POPGASP to estimate radiological doses to the maximally exposed individual (MEI) and to the population surrounding the SRS. MAXIGASP and POPGASP are both site-specific computer programs, which means that meteorological parameters (e.g., wind speed and direction) and population distribution parameters (e.g., number of people surrounding the SRS, location of people in sectors around the Site) are integrated into the programs. Meteorology gathered at the SRS for the period from 1987 through 1991 (the most recent validated data set available) was used for the radiological dispersion model. Releases were assumed **to occur at a height of 80 meters, corresponding to the stack height.** The 1990 population census database was used to represent the population that lives within a 50-mile radius of the center of the SRS. For the APT airborne releases, the MEI would be at the SRS boundary in the north sector.

Although a large number of radionuclides would be emitted as a result of normal operations, a few would account for essentially all of the potential dose. For the Preferred alternative, radiological emissions are expected from the accelerator building, the target blanket building, and the Tritium Separation Facility. The APT facility is assumed to operate 24 hours a day, 365 days a year. Sources of radioactive emissions include activated air in the accelerator tunnel, which includes radionuclides such as argon-41 and carbon-11. A majority of the radionuclides emitted come from the target/blanket building, including some tritium and carbon-11, **and most of the argon-41**. Emissions also can result from fugitive sources such as minor leaks in system piping and other process leaks, as well as maintenance activities which require systems to be opened. Projected annual emissions for the radionuclides that are the major contributors to dose are presented in Table 4-12. **As can be seen in Table 4-12, APT operations would result in the release of tritium in both the elemental and oxide forms. Tritium oxide behaves like water and is easily absorbed into the human body while only a very small fraction of elemental tritium is absorbed. Therefore, when assessing the dose due to tritium, the effects of elemental tritium are negligible compared to tritium oxide.** Tritium emissions would produce the highest impact to the MEI, accounting for **87 percent** of the estimated dose, followed by argon-41, accounting for **12 percent** of the dose.

Table 4-12. Projected annual radionuclide emissions from routine operations of the APT facility (curies).[a]

Radionuclide	Annual emissions
Tritium (oxide)	**30,000**
Tritium (elemental)	**8,600**
Carbon-11	250
Argon-41	**2,000**

a. Source: Shedrow (1997a) **and England (1998a)**.

Table 4-13 presents the calculated maximum radiological doses from routine operations. According to these results, the calculated maximum committed effective dose equivalent to a hypothetical individual at the SRS boundary is **0.037 millirem** for each year of operations, which is well below the annual dose limit of 10 millirem from SRS atmospheric releases. None of the cooling water configurations con-

Table 4-13. Annual radiological doses from routine radiological air emissions from the APT.[a]

		Percentage differences of doses for alternatives						
		Cooling water system			Accelerator technology	Feedstock Material	Radio-frequency source	Site location
Receptor	Doses for Preferred alternative	Once-through cooling using with river water	Cooling towers with groundwater makeup	K-Reactor cooling tower with river water makeup	Room temperature	Lithium-6 aluminum alloy[c]	Inductive output tube	Alternate site
MEI dose (millirem)	**0.037**	NC[b]	NC	NC	NC	NC	NC	**+113%**
Population dose (person-rem)	**1.6**	NC	NC	NC	NC	**+7%**	NC	**+11%**
Worker dose (millirem)	**0.17**	NC	NC	NC	NC	**-40%**[d]	NC	**+7%**

a. Derived from Simpkins (1998).
b. NC = No change; difference in doses between this alternative and the Preferred alternative is less than 5 percent.
c. Includes radiological emissions from operation of the Tritium Extraction Facility.
d. Does not include dose from TEF operation to workers (0.24 millirem) as it is in a different location.

tribute to the annual dose; likewise, using room temperature operation or using inductive output tubes does not affect the dose results. The use of lithium-6 feedstock material would necessitate operation of the Tritium Extraction Facility which would have additional radiological emissions. The estimated dose to the MEI for the Lithium-6 Feedstock Material alternative is **0.041 millirem**, of which **34 percent** is attributable to the Tritium Extraction Facility.

Tritium is estimated to be the major contributor to the offsite population dose with a calculated dose of 1.6 person-rem per year for the preferred configuration. The population dose associated with the use of a lithium-6 feedstock material is **1.8 person-rem with 0.66 person-rem or 38 percent** attributable to the Tritium Extraction Facility in H-Area.

Table 4-13 also lists the onsite worker dose (hypothetical worker 640 meters downwind) resulting from radiological releases. The estimated maximum committed effective dose equivalent to the worker from annual releases is **0.17 millirem** for each year of operation. As with the MEI dose, using the lithium-6 feedstock material affects the radiological impacts. The dose for the Lithium-6 Feedstock Material alternative decreases the dose from the Preferred alternative by **40 percent**. Doses would decrease under this alternative because the Tritium Extraction Facility is likely to emit less Tritium oxide than the Tritium Separation Facility (5,000 curies per year versus **9,600 curies** per year) and is farther from the SRS boundary. In the event the Tritium Separation and Tritium Extraction Facilities are consolidated at the APT site, administrative controls would limit the curie content of the facilities.

As with the nonradiological impacts, radiological doses from the alternate site would be slightly greater due to the site's location in relation to the SRS site boundary. The calculated committed effective dose equivalent to the MEI residing at the SRS boundary **is 0.079 millirem** for each year of operation, which is well below the annual dose limit of 10 millirem from SRS atmospheric releases (Table 4-13). The offsite population does from APT operations at the alternate site would be **1.8 person-rem** per year.

For the alternate site, the onsite worker dose resulting from radiological releases would be 0.18 millirem per year. This dose is slightly greater than the dose reported in Table 4-13 because of terrain variations between the two sites.

None of the alternatives for either the preferred or alternate site would result in concentrations or radiological doses that would exceed the regulatory limits. Section 4.2 describes the potential health effects of these releases on members of the public and workers for the alternate site.

[Chapter 4, Section 4.1.4 modification to the Draft APT EIS]

Section 4.1.4 of the Draft EIS evaluated the potential impacts of the construction and operation of the APT on SRS land use and infrastructure (e.g., roads, powerlines, and piping). Text has been modified to describe the actions DOE could take if at some time in the future, because of age and condition, the existing river water system was found to be inadequate.

<u>Page 4-22, 2nd column, 3rd paragraph replaced with the following</u>:

Pipeline construction would be required to carry river water to the preferred site (approximately 18,000 feet); for the alternate site about 24,600 feet. The groundwater makeup alternative would require additional land disturbance activities to install a well system.

Each alternative cooling water design using water from the Savannah River would make use of either the existing river water system or a new water supply system. If a new supply system is required, the new system could be placed in the existing river water corridor or the existing system piping could be used as a sleeve for the new piping. Prior to installing any new system elements, DOE would evaluate the potentially affected areas for the presence of threatened or endangered species,

archaeological sites, and other sensitive resources.

[Chapter 4, Section 4.1.5 modification to the Draft APT EIS]

The discussion and definition of Greater-Than-Class-C (GTCC) Waste in the text box in Section 4.1.5 has been modified per comment L3-05 and L4-04 and to reflect current DOE waste guidance. The waste designated as GTCC in the Draft APT EIS will more accurately be referred to as APT special case or high concentration waste under evaluation.

Page 4-25, 2nd column, text box is revised to contain the following:

The Resource Conservation and Recovery Act (RCRA) is the Federal statute governing the management of hazardous waste from generation to disposal. Hazardous waste includes such materials as waste solvents, toxic metals, and industrial process waste products.

The classification of radioactive wastes is based on the concentration of short- and long-lived radionuclides. APT special case or high concentration wastes under evaluation contain long-lived radionuclides **and would remain hazardous for an extended period of time**. Classes A and B include radioactive wastes with concentrations of short-lived and perhaps some long-lived radionuclides.

[Chapter 4, Section 4.1.5 modification to the Draft APT EIS]

Tables 4-15 and 4-17, page 4-26 and 4-28, Waste Generation and Treatment, Storage, and Disposal, respectively of the Draft EIS, and the associated text have been modified to reflect revised waste generation estimates. Industrial wastewater estimates have been added to the revised Table 4-15. Waste generation estimates for the design variations can be found in Section 4.

Page 4-25, 1st column, 1st paragraph and Tables 4-15 and 4-16, pages 4-26 and 4-27 are replaced with the following:

Construction. The construction phase would generate nonhazardous, nonradioactive wastes, including sanitary solid wastes, construction debris (mixed rubble, metals, plastics), and sanitary wastewater. Table 4-15 lists estimated maximum annual quantities of waste for construction of the Preferred alternative and compares it with the other alternatives.

Page 4-25, 2nd column, 4th paragraph through page 4-27, 1st column, 1st paragraph and Table 4-17, page 4-18 are replaced with the following:

DOE would manage APT wastes for treatment and disposal according to waste type, using SRS and offsite waste treatment, storage, and disposal facilities. Table 4-17 lists the waste types and quantities destined for treatment, storage, and disposal facilities and the subsequent impact to the facility divided by preferred configuration and alternative.

[Chapter 4, Section 4.2.12 modifications to the Draft APT EIS]

Table 4-22 and associated text were revised to reflect the changes in radioactive source terms for both waterborne and airborne effluents discussed earlier in the text. Although the source terms and consequences are higher than estimated in the Draft EIS, the expected impacts are still small.

Page 4-36, 1st column, 4th paragraph and Table 4-22, page 4-37 are replaced with the following:

Table 4-22 lists projected health impacts from routine operation of the APT facilities. The table lists radiological dose information and traffic information for the preferred configuration; it also lists changes in the expected impacts for the alternatives.

Table 4-15. Waste generation and impacts comparison for preferred configuration and alternatives.[a]

		Percentage differences of waste quantities for alternatives						
		Cooling water system			Accelerator technology	Feedstock Material	Radio-frequency power	Site location
Environmental factor (waste type)	Annual waste quantities for Preferred alternative	Once-through cooling using river water	Cooling towers with groundwater makeup	K-Reactor cooling tower with river water makeup	Room temperature	Lithium-6 aluminum alloy	Inductive output tube	Alternate site
Construction wastes[a] maximum based on construction schedule								
Sanitary solid	560 cubic meters	NC[b]	NC	NC	-9%	NC	NC	NC
Construction debris	30,000 cubic meters	NC	NC	NC	NC	NC	NC	NC
Industrial wastewater	**3.6 million gallons**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**	**NC**
Sanitary wastewater	1.5 million gallons	NC	NC	NC	-9%	NC	NC	NC
Operations waste								
Sanitary solid	1,800 metric tons	NC	NC	NC	NC	NC	NC	NC
Industrial	3,800 metric tons	NC	NC	NC	NC	NC	NC	NC
RCRA hazardous	1.0 cubic meter	NC	NC	NC	NC	NC	NC	NC
Radioactive wastewater	140,000 gallons	NC	NC	NC	NC	NC	NC	NC
Low-level radioactive waste[c]	1,400 cubic meters	NC	NC	NC	NC	**+18%**	NC	NC
High concentration low-level radioactive waste under evaluation (special case waste)	2.5 cubic meters	NC	NC	NC	NC	NC	NC	NC
Mixed waste[c]	1.0 cubic meter	NC	NC	NC	NC	**-18%**	NC	NC
High concentration mixed waste under evaluation	12 cubic meters	NC	NC	NC	NC	+25%	NC	NC
Sanitary wastewater	**3.2 million gallons**	NC	NC	NC	**+5**	**NC**	NC	NC
Nonradioactive process wastewater	920 million gallons	+2,000%[d]	NC	NC	+37%	NC	-5%	NC

a. **Sources: England (1998b,c); DeCamp (1998).**
b. NC = Difference in impacts between this alternative and the Preferred alternative is less than 5 percent.
c. Excluding High concentration waste.
d. 19 billion gallons.

Table 4-17. Impacts on waste treatment, storage, and disposal facilities for operation of preferred configuration and alternatives.[a,b]

Waste facility[c]	Waste quantity (Preferred alternative)	Waste type[d]	Operating capacity	Impact for preferred configuration	Impact for room temperature	Impact for Lithium-6 Feedstock Material
CIF	500 m^3/yr	Incinerable LLRW, incinerable MW	9,500 m^3/yr[e,f]	5 percent of capacity	N/C[g]	N/C
Onsite compactor	75 m^3/yr	LLRW	1,600 m^3/yr	5 percent of capacity	N/C	**+24%**
E-Area LAW vault	33,000 m^3 total[h]	LLRW, compacted LLRW, LLRW ash	31,000 m^3/ vault[e]	1.1 vault	N/C	+8%
E-Area ILTV	2,100 m^3 total[h]	LLRW with Tritium	5,300 m^3/vault[e]	0.4 vault	N/C	+6%
Storage building	600 m^3 total[h]	**MW, MW ash, high concentration MW**	620 m^3/bldg.[e]	1 building	N/C	+20%
Three Rivers Landfill	5,600 metric tons per year	Sanitary solid, industrial solid	900 metric tons per day[i]	6.2 days per year	N/C	N/C
Central Sanitary WTF	**3.2 million gallons**	Sanitary wastewater	1 million gallons per day	**3.2 days**	N/C	N/C

a. Source: **England et al. (1997**) and **England (1998b,c)**.
b. Impacts for other alternatives would not vary from the Preferred alternative impacts.
c. Waste facilities: CIF = Consolidated Incineration Facility; LAW = Low Activity Waste; ILTV = Intermediate Level Tritium Vaults; WTF = Wastewater Treatment Facility.
d. Waste types: LLRW = low-level radioactive wastes; MW = mixed waste.
e. Source: DOE (1995b).
f. All waste considered as solid feed.
g. N/C = difference within 5 percent.
h. 40-year total.
i. Source: DOE (1995a).

[Chapter 4, Section 4.2.2.4 modification to the Draft APT EIS]

Section 4.2.2.4, Threatened and Endangered Species, is revised in response to comments L2-05 and L2-06. The analysis has been broadened to provide a more comprehensive assessment of the potential impacts on eagles.

DOE's evaluation of impingement and entrainment of shortnose sturgeon during times of large cooling water withdrawals in studies conducted in 1983 and 1990 indicated nominal impacts to this species. Consequently, APT operations at considerably lesser flow would not be expected to impact the species. No text changes are included.

Page 4-56, 1st column, 3rd paragraph is replaced with the following:

As noted in Section 3.4.5, bald eagles forage around Par Pond and the pre-cooler ponds. When P-Reactor was operational, thermal fish kills on Pond C attracted bald eagles (Mayer et al. 1986). Under the preferred cooling water alternative, Mechanical-Draft Cooling Towers with River Water Makeup, fish kills (beyond those that occur in any natural body of water) would not be expected. Operation of the APT facilities and discharge of cooling water under the Once-Through Cooling Water alternative could result in fish kills in Ponds 2 and 5 in late summer or in other seasons if the accelerator were restarted after an extended outage.

Table 4-22. Impacts on public health from normal operation of APT facilities.

		Percentage differences of impacts for alternatives						
		Cooling water system			Accelerator technology	Feedstock Material	Radio-frequency power	Site location
Factor	Impacts for Preferred alternative	Once-through cooling using river water	Cooling towers with groundwater makeup	K-Reactor cooling tower with river water makeup	Room temperature	Lithium-6 aluminum alloy	Inductive output tube	Alternate site
Annual radiation dose to MEI from APT emissions (millirem/year)[a,b]	**0.053**	**+150%**	NC	NC	NC	NC	NC	**+97%**
Annual radiation dose to MEI from transportation of radioactive material (millirem/year)	2.8×10^{-6}	NC[c]	NC	NC	NC	+11%	NC	NC
Total annual radiation dose to MEI from APT operations (millirem/year)	**0.053**	**+150%**	NC	NC	NC	NC	NC	**+97%**
Annual radiation dose to population from APT emissions (person-rem/year)	**2.0**	+11%	NC	NC	NC	**+6%**	NC	**+9%**
Annual radiation dose to population from transportation of radioactive material (person-rem/year)	1.1	NC	NC	NC	NC	NC	NC	NC
Total annual radiation dose to population from APT operations (person-rem/year)	**3.1**	**+7%**	NC	NC	NC	NC	NC	**+6%**
Estimated number of cancer fatalities from annual population dose	**0.0016**	**+7%**	NC	NC	NC	NC	NC	**+6%**
Estimated traffic accident fatalities per year on roads near SRS	0.12	NC	NC	NC	NC	NC	NC	-18%

a. Reported as the sum of the dose from air emissions and liquid emissions, even though the MEI for the two emissions are in different locations.
b. MEI - maximally exposed individual.

Based on Par Pond studies (DOE 1997), fish in the pre-cooler ponds are assumed to contain levels of mercury and cesium-137 that are somewhat higher than background. If thermal fish kills were to occur in Ponds 2 and 5, bald eagles would likely feed on the dead fish. However, potential harm to bald eagles from ingesting contaminated fish would be mitigated by the fact that these fish kills would be infrequent and would most likely occur in late summer, when eagles are least likely to be found on the SRS (SRI 1998).

Further, eagles foraging in the area would be feeding on dead, dying, and living fish from the pre-cooler ponds and Par Pond even in the absence of large-scale thermal fish kills. As a result, thermal kills would simply reduce the energy costs of capturing these fish. It's not clear that significantly more contaminated prey would be consumed. Eagles are known to gorge and fast, depending on the availability of food (Stalmaster 1987), thus gorging on easily obtainable dead fish might simply mean eating less contaminated fish in ensuing days than would have been consumed under normal circumstances.

An Ecological Risk Assessment (DOE 1997) examined potential risks to bald eagles from contaminants (mercury and radionuclides) in Par Pond fish and found a moderate level of risk from mercury, if a number of conservative assumptions were made. The risk assessment assumed that an eagle would: (1) forage on Par Pond year-round, (2) feed exclusively on Par Pond fish (bass) containing the maximum measured concentration of mercury, and (3) absorb 100 percent of the mercury ingested with fish. Using more realistic assumptions (an eagle is present for nine months and eats fish containing the average measured concentration of mercury), the risk assessment concluded that "it is unlikely that mercury in Par Pond fish poses a significant potential risk to the bald eagle." Similarly, the risk assessment concluded that the potential ecological risks to avian predators (specifically the bald eagle) from radiological contaminants in Par Pond "can be considered to be very small."

[Chapter 4, Section 4.4.2.5 modification to the Draft APT EIS]

The discussion of human health impacts associated with electricity generation, page 4-74, 2nd Column, contained a typographical error which results in a much higher potential health risk than is actually the case. The Draft EIS reported a "death from coal-fired electricity generation" coefficient of 100 deaths per gigawatt hour. The coefficient should be 100 deaths per gigawatt year.

<u>Page 4-74, 2nd column, 2nd paragraph, lines 16 through 28 are replaced with the following</u>:

Applying the result of previous studies conducted in the United States (which suggest that 70,000 persons die prematurely through air pollution), and assuming that one-third arise from coal-fired electricity generation, produces a coefficient of 100 deaths per gigawatt **year** (Wilson 1996). The health effects from the operation of a gas-fired facility would be less because the gaseous and particulate emissions would be much less than those from a coal-fired plant. The Polk EIS (EPA 1994) discusses health effects associated with natural-gas-fired turbines.

Chapter 5. Modifications – Cumulative Impacts

[Chapter 5 modifications to the Draft APT EIS]

Chapter 5, Cumulative Impacts, has been modified to reflect changes noted elsewhere in this document and includes potential new missions at the Savannah River Site, management of scrub alloys currently stored at the Rocky Flats Site and surplus plutonium disposition. It also removes the impacts associated with the River Water System to reflect the recent Record of Decision. Certain other enhancements to Chapter 5 of the Draft APT EIS have also been made in accordance with a handbook recently prepared by the Council on Environmental Quality providing guidance on the preparation of cumulative impacts assessments. The following text modifies the introduction to cumulative impacts starting on page 5-1 of the Draft APT EIS.

Page 5-1, 1st column, 1st paragraph through page 5-2, 1st column, last bullet is replaced with the following:

The Council on Environmental Quality (CEQ) regulations that implement the procedural provisions of the National Environmental Policy Act (NEPA) define cumulative effects as impacts on the environment that result from the addition of the incremental impact of the action to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes the actions (40 CFR **Part** 1508.7). The U.S. Department of Energy (DOE) based the cumulative impacts analysis in this chapter on actions associated with the construction and operation of a linear accelerator to produce tritium at the Savannah River Site (SRS), other actions associated with onsite activities, and offsite activities with the potential to cause **cumulative** environmental impacts.

Based on the examination of the potential direct and indirect impacts of APT actions coupled with other actions in the region, DOE determined that the cumulative impacts associated with the following disciplines are the most significant: (1) public and worker health, (2) air resources, (3) water resources, (4) waste generation, (5) utilities and energy consumption, (6) ecological resources, and (7) socioeconomics resources.

The cumulative impacts of past actions have either passed through the environment or are captured in existing baseline information. For example, Par Pond contamination levels exist due to past reactor operations. The potential impact of resuspending cesium due to APT water discharges is an incremental impact added to impacts associated with past operations.

Cumulative impact assessment is based on both geographic (spatial) and time (temporal) considerations. As mentioned above, past impacts are captured in the existing environmental baseline. Geographic boundaries vary by discipline depending upon the time an effect remains in the environment, the extent to which the effect can migrate, and the magnitude of the potential impact. Based on these factors, DOE has determined that for impacts to air, water, and waste generation, a 50-mile radius surrounding SRS is the potential impact zone. For water releases, the downstream population that uses the Savannah River as its source for drinking water is included in the project impact zone. The project impact zone for socioeconomic resources is a six county region in South Carolina and Georgia where approximately 90 percent of the SRS workforce lives: Aiken, Allendale, Bamberg, and Barnwell Counties in South Carolina, and Columbia and Richmond Counties in Georgia.

Nuclear facilities within a 50-mile radius of SRS include Georgia Power Company's Vogtle Electric Generating Plant across the Savannah River from SRS; Chem-Nuclear Services, Inc., a commercial low-level waste burial site just east of SRS; and Starment CMI, Inc. (formerly Carolina Metals, Inc.). Radiological impacts from the operation of the Vogtle Electric Generating Plant, a two-unit commercial nuclear power plant are minimal, but DOE has factored them into the analysis. The South Carolina Department of Health and Environmental Control Annual Report indicates that operation of the Chem-Nuclear Services facility and the Starment CMI facility do not noticeably impact radiation levels in air or liquid pathways in the vicinity of the SRS. Therefore, they are not included in this assessment.

The counties surrounding SRS have numerous existing (e.g. generating stations, textile mills, paper product mills, and manufacturing facilities) and planned (e.g., Bridgestone Tire and Hankook Polyester) industrial facilities with permitted, or to be permitted, air emissions and discharges to surface waters. Because of the distance between the SRS and the private industrial facilities there is little opportunity for interactions of plant emissions, and no notable cumulative impact or air or water quality. Construction and operation of Bridgestone Tire and Hankook Polyes-

ter could have some effect, cumulatively, on regional employment.

DOE has also evaluated the impacts from its own existing and future actions by examining impacts to resources and the human environment as described in Section 1.6. The analysis is based on information contained in the referenced documents for pertinent actions which are occurring, or could occur, at the SRS:

- *Savannah River Site Spent Nuclear Fuel Management Environmental Impact Statement (61 FR 69085).* Although a Notice of Intent has been prepared, this EIS has not yet been issued. Information used in this chapter is based on maximum values utilizing preliminary report data (Young 1997). The proposed action of this EIS is to provide additional capability at SRS to receive and prepare spent nuclear fuel for ultimate disposal at a Federal geologic repository. Specific actions needed to accomplish this include construction and operation of a Treatment and Storage Facility, a Treatment Facility, and additional dry storage capacity.

- *Defense Waste Processing Facility Supplemental Environmental Impact Statement (DOE 1994a).* **The selected alternative in the Record of Decision (ROD) is the completion and operation of the Defense Waste Processing Facility to immobilize high-level radioactive waste at the SRS. The facility is currently in operation.**

- *Savannah River Site Waste Management Final Environmental Impact Statement (DOE 1995a).* The selected alternative in the ROD involves the treatment and minimization of radioactive and hazardous wastes at the SRS.

- *Programmatic Environmental Impact Statement for Tritium Supply and Recycling (DOE 1995b).* DOE's decision is either to pursue the purchase of an existing commercial nuclear reactor or irradiation services, or to build an accelerator to produce tritium. DOE selected the SRS as the location for an accelerator, if it decides to build one. In addition, DOE would upgrade the tritium recycling facilities to support either option. **However, these issues are addressed separately in the following discussion on the Environment Assessment for the Tritium Facility Modernization and Consolidation Project at the Savannah River Site (DOE 1997c). This document has also summarized in Part C, Chapter 4, Section 4.0 modifications to the Draft APT EIS the potential on-site and off-site impacts associated with producing tritium at a commercial reactor site. As noted previously, the No Action alternative for this EIS is the commercial light-water reactor track. Consequently, the SRS impacts for No Action would include construction and operation of the tritium extraction facility (TEF), transport of material to the SRS, and impacts associated with reactor operations. The cumulative impacts of constructing and operating the TEF is captured in this document. The cumulative impacts of reactor operations are presented in the Draft CLWR EIS (DOE 1998b).**

- *Environmental Impact Statement – Interim Management of Nuclear Materials (DOE 1995c).* **DOE is implementing the selected scenarios for most of the nuclear materials discussed in that EIS with the exception of the "comparative management scenario" alternatives for H-Canyon Plutonium-239 solutions (process to metal), Mark-16 and –22 fuels (process and storage for vitrification in the Defense Waste Processing Facility), and other aluminum-clad fuel targets (processing and storage for vitrification).**

- *Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement (DOE 1996).* The cumulative impacts analysis incorporates the Maximum Commercial Use-Blending Disposition at SRS Alternative.

- ***Construction and Operation of a Tritium Extraction Facility at the Savannah River***

Site Draft Environmental Impact Statement (DOE 1998a). **The cumulative impact analysis is based upon information in the Draft TEF EIS. For purposes of this document, the potential impacts associated with the Tritium Extraction Facility also would be factored in the No Action alternative impacts for the APT.**

- ***Draft Environmental Impact Statement on Management of Certain Residues and Scrub Alloy Stored at the Rocky Flats Environmental Technology Site (DOE 1997b).*** **If material separation is conducted at the SRS, it would be done utilizing a chemical process in F and H Canyons. Any plutonium resulting from separation processes would be placed in safe and secure storage pending disposition.**

- ***Environmental Assessment for the Tritium Facility Modernization and Consolidation Project at the Savannah River Site (DOE 1997c).*** **This environmental assessment addresses the potential impacts of consolidating the tritium activities currently performed in Building 232-H into the newer Building 234-H. Tritium extraction functions would be transferred to TEF, under the Preferred alternative. The overall impact would be to reduce emissions by up to 50 percent. Another effect would be to reduce the amount of low-level waste generated. Effects on other resources would be negligible. Therefore, impacts from these actions have not been included in this cumulative impacts analysis.**

- ***Surplus Plutonium Disposition Environmental Impact Statement (DOE 1998b).*** **This EIS analyzes the activities necessary to implement DOE's disposition strategy for site surplus plutonium. SRS is the preferred site for a mixed-oxide fuel production facility.**

[Chapter 5, Section 5.1 modifications to the Draft APT EIS]

The estimated cumulative radiological doses to human receptors from exposure to waterborne sources downstream from the SRS has been updated pursuant to the modifications presented elsewhere in this document. Additionally, information has been added to Table 5-1, page 5-3 of the Draft APT EIS, to include the potential impacts associated with the Rocky Flats scrub alloy and surplus plutonium disposition, and to remove the impacts associated with the River Water System. The ROD for the River Water EIS selected the No Action alternative. Consequently, the Department is maintaining L-Lake levels and the potential impacts identified with allowing lake levels to decline will not occur.

Page 5-2, 2nd column, 3rd and 4th paragraphs, and Table 5-1 on page 5-3 are replaced with the following:

Table 5-1 summarizes the estimated cumulative radiological doses to human receptors from exposure to waterborne sources downstream from the SRS. Liquid effluents from the Site could contain small quantities of radionuclides that would be released to SRS streams that are tributaries of the Savannah River. The exposure pathways considered in this analysis included drinking water, fish ingestion, shoreline exposure, swimming, and boating. As discussed in Section 4.1.2, the Preferred alternative would result in an annual radiological dose of **0.000015** rem (or **0.015** millirem) to the maximally exposed individual at the SRS boundary from liquid releases.

The estimated cumulative dose from all SRS activities to the maximally exposed member of the public from liquid releases would be **0.00029** rem (or **0.29** millirem) per year, well below the regulatory standard of 4 millirem per year (40 CFR Part 141). Adding the population doses associated with current and projected SRS ac-

Table 5-1. Estimated average annual cumulative radiological doses and resulting health effects to offsite population from liquid releases.

	Offsite population			
	Maximally exposed individual		50-mile population	
Activity	Dose[a]	Fatal cancer risk[b]	Collective dose[c]	Latent cancer fatalities[d]
Accelerator Production of Tritium	**1.5×10^{-5}**	**8.2×10^{-9}**	**0.42**	**2.1×10^{-4}**
Tritium Extraction Facility[e]	0	0	0	0
Defense Waste Processing Facility[g]	0	0	0	0
Plant Vogtle[h]	5.4×10^{-5}	2.7×10^{-8}	0.0025	1.3×10^{-6}
Surplus HEU disposition[i]	0	0	0	0
Interim Management of Nuclear Materials[k]	**2.4×10^{-5}**	**1.2×10^{-8}**	**0.09**	**4.5×10^{-5}**
Management of Spent Nuclear Fuel[n]	5.7×10^{-5}	2.9×10^{-8}	0.19	9.5×10^{-5}
1995 SRS practices[m]	1.4×10^{-4}	7.0×10^{-8}	**2.2**	**1.1×10^{-3}**
Rocky Flats Pu Residue[o]	**0**	**0**	**0**	**0**
Surplus Plutonium Disposition[p]	**0**	**0**	**0**	**0**
Total	**2.9×10^{-4}**	**1.5×10^{-7}**	**2.9**	**1.4×10^{-3}**

a. Dose in rem.
b. Probability of fatal cancer.
c. Dose in person-rem.
d. Incidence of excess fatal cancers.
e. Source: DOE (1998a).
f. **Deleted**
g. Source: DOE (1994a).
h. Source: NRC (1996).
i. Source: DOE (1996a); HEU = highly enriched uranium.
j. **Deleted**
k. Source: DOE (1995c).
l. Deleted.
m. Source: Arnett and Mamatey (1996).
n. Source: Young (1997), maximum of options.
o. Source: DOE (1997b).
p. Source: DOE (1998b).

tivities would yield a cumulative annual dose of **2.9** person-rem from liquid sources. This translates into **0.0014** latent cancer fatality for each year of exposure of the 620,000-person population living within a 50-mile radius of the SRS.

[Chapter 5, Section 5.2 modifications to the Draft APT EIS]

The estimated cumulative concentrations of nonradiological air pollutants have been updated pursuant to the modifications presented elsewhere in this document. Additionally, information has been added to Table 5-2 and text modified the Draft APT EIS, to include the potential impacts associated with the Rocky Flats scrub alloy and surplus plutonium disposition, and to remove the impacts associated with the River Water System.

Page 5-3, 2nd column, 1st paragraph and Table 5-2 on page 5-4 are replaced with the following:

Table 5-2 compares the cumulative concentrations of nonradiological air pollutants from the SRS to Federal and state regulatory standards. The listed values are the maximum modeled concentrations that could occur at ground level at the Site boundary. The data demonstrates that total estimated concentrations of nonradiological air pollutants from the SRS, including the contributions from the SRS **as a whole and including APT,** would be below the regulatory standards at the Site boundary.

Table 5-2. Estimated maximum nonradiological cumulative ground-level concentrations of criteria and toxic pollutants (micrograms per cubic meter) at SRS boundary.

	Pollutant								
	Carbon monoxide	Carbon monoxide	Nitrogen oxides	Sulfur dioxide	Sulfur dioxide	Sulfur dioxide	Particulate matter (<10 microns)	Particulate matter (<10 microns)	Total supended particles
Averaging time	1 hr	8 hr	Annual	3 hr	24 hr	Annual	24 hr	Annual	Annual
Waste Management[a]	31	27	0.79	3.8	0.81	0.05	4.6	0.1	2.0
Interim Management of Nuclear Materials[b]	47	11	1.7	0.027	0.0061	0.00038			
Surplus HEU disposition[c]	0.14	0.07	0.01	0.71	0.32	0.02	<0.01	<0.01	0.05
SRS baseline[d]	5,000	630	8.8	690	220	16	81	4.8	43
Management of Spent Nuclear Fuel[e]	9.8	1.3	3.4	0.98	0.13	0.02	0.13	0.02	0.02
Tritium Supply and Recycling[f]	0.8	0.4	0.1	3.8	1.7	0.1	0.4	0.02	<0.01
Tritium Extraction Facility[d]	3.6	0.45	0.0055	0.088	0.001	0.00009	0.01	0.00009	0.00016
Rocky Flats Pu Residue[g]	NA	NA	NA	NA	NA	NA	NA	NA	NA
Accelerator Production of Tritium	6.1	0.76	0.0091	0.13	0.016	0.00014	0.016	0.0003	0.00057
Surplus Plutonium Disposition[h]	1.3	0.34	0.041	2.8	1.1	0.078	0.042	0.0026	0.0026
Total	5,100	670	15	700	220	16	86	4.9	45
Regulatory standard	40,000	10,000	100	1,300	365	80	150	50	75
Percent of standard	13	6.7	15	54	60	21	57	9.9	61

a. Source: DOE (1995a).
b. Source: DOE (1995c).
c. Source: DOE (1996a); HEU-highly enriched uranium.
d. Source: DOE (1998a).
e. Source: Young (1997).
f. Source: DOE (1995b).
g. Source: DOE (1997b).
h. Source: DOE (1998b).

[Chapter 5, Section 5.2 modification to the Draft APT EIS]

The estimated cumulative radiological doses have been updated pursuant to the modifications presented elsewhere in this document. Additionally, text has been modified and information has been added to Table 5-3 of the Draft APT EIS, to include the potential impacts associated with the Rocky Flats scrub alloy and surplus plutonium disposition, and to remove the impacts associated with the River Water System.

Page 5-4, 1st column, sentences 1 and 2 and Table 5-3 on page 5-5 have been replaced with the following:

DOE also evaluated the cumulative impacts of airborne radioactive releases in terms of dose to a maximally exposed individual at the SRS boundary. Table 5-3 lists the results of this analysis, using 1995 emissions (1992 for Plant Vogtle) as the SRS baseline.

[Chapter 5, Section 5.2 modification to the Draft APT EIS]

Two commenters, M1-03 and M1-10, expressed concern over the electricity required to operate the APT, the consequent use of fossil fuels, and the possible contribution to the greenhouse effect. As noted in the response, a discussion of the greenhouse effect has been added to end of Section 5.2 of the Draft APT EIS.

Page 5-4, 2nd column, after 1st paragraph insert the following:

In addition to these airborne releases, the generation of electricity to power the APT project would result in the release of greenhouse gases from the combustion of fossil fuels. It is estimated that the additional carbon dioxide released from power generation for APT would raise the total emissions for the United States by less than 0.07 percent and globally by less than 0.015 percent for all electricity alternatives analyzed.

[Chapter 5, Section 5.2 modification to the Draft APT EIS]

The estimated cumulative volumes of all classifications of waste that could be generated at the SRS have been updated pursuant to the modifications presented elsewhere in this document. Additionally, information has been added to Table 5-4 of the Draft APT EIS, to include the potential impacts associated with the Rocky Flats scrub alloy and surplus plutonium disposition.

Page 5-4, 2nd column, 2nd paragraph through page 5-6, 1st column, 1st paragraph and Table 5-4 on page 5-5 replaced with the following:

Table 5-4 lists cumulative volumes of high-level, low-level, transuranic, hazardous, and mixed wastes that the SRS would generate. The values are based on the SRS 30-year expected waste forecast (WSRC 1994). It also lists waste forecasts for the APT Preferred alternative. The 30-year waste forecast is based on operations waste **forecasted for** existing generators and the following assumptions: secondary waste from the Defense Waste Processing Facility, In-Tank Precipitation, and Extended Sludge Processing operations addressed in the DWPF EIS (DOE 1994a); high-level waste volumes based on the selected option for the F-Canyon Plutonium Solutions EIS (DOE 1994b) and the Interim Management of Nuclear Materials EIS (DOE 1995c); some investigation-derived wastes handled as hazardous waste in compliance with the Resource Conservation and Recovery Act; purge water from well sampling handled as hazardous waste, and continued receipt of small amounts of low-level waste from other DOE facilities and Naval nuclear operations. Waste generated from decontamination and decommissioning and planned environmental restoration projects are not included in the operations waste forecast.

The estimated quantity of waste from operations in this forecast during the next 30 years would be 600,000 cubic meters. In addition, waste associated with environmental restoration and de-

Table 5-3. Estimated average annual cumulative radiological doses and resulting health effects to offsite population from airborne releases.

Activity	Offsite population			
	Maximally exposed individual		50-mile population	
	Dose[a]	Fatal cancer risk[b]	Collective dose[c]	Latent cancer fatalities[d]
Accelerator Production of Tritium	3.7×10^{-5}	1.9×10^{-8}	1.6	8.0×10^{-4}
Tritium Extraction Facility[e]	2.0×10^{-5}	1.0×10^{-8}	0.77	3.9×10^{-4}
Defense Waste Processing Facility[g]	1.0×10^{-6}	5.0×10^{-10}	0.071	3.6×10^{-6}
Plant Vogtle[h]	5.4×10^{-7}	2.7×10^{-10}	0.042	2.1×10^{-5}
Surplus HEU disposition[i]	2.5×10^{-6}	1.3×10^{-9}	0.16	8.0×10^{-5}
Interim Management of Nuclear Materials[k]	9.7×10^{-4}	4.9×10^{-7}	40	0.02
Management of Spent Nuclear Fuel[n]	1.5×10^{-5}	7.5×10^{-9}	0.56	2.8×10^{-4}
1995 SRS activities[m]	5.0×10^{-5}	2.5×10^{-8}	2.8	0.0014
Rocky Flats Pu Residue[o]	5.7×10^{-7}	2.8×10^{-10}	0.0062	3.1×10^{-6}
Surplus Plutonium Disposition[p]	4.0×10^{-6}	2.0×10^{-9}	1.6	8.0×10^{-4}
Total	1.1×10^{-3}	5.5×10^{-7}	48	0.024

a. Dose in rem.
b. Probability of fatal cancer.
c. Dose in person-rem.
d. Incidence of excess fatal cancers.
e. Source: DOE (1998a).
f. Source: DOE (1995a).
g. Source: DOE (1994a).
h. Source: NRC (1996).
i. Source: DOE (1996a); HEU = highly enriched uranium.
j. **Deleted.**
k. Source: DOE (1995c).
l. **Deleted.**
m. Source: Arnett and Mamatey (1996).
n. Source: Young (1997, maximum of options.
o. Source: DOE (1997b).
p. Source: DOE (1998b).

Table 5-4. Estimated cumulative waste generation from SRS (cubic meters).

	High-level	Low-level	Hazardous/ mixed	Transuranic	Total
Waste Management[a]	150,000	340,000	90,000	18,000	600,000
Tritium Extraction Facility[b]	0	9,300	130	0	9,500
Surplus HEU disposition[d]	0	2,900	4,000	0	7,000
Rocky Flats Pu Residue[e]	32	200	0	300	530
Management of Spent Nuclear Fuel[f]	11,000	140,000	270	3,700	150,000
Accelerator Production of Tritium	0	42,000	390	0	42,000
Surplus Plutonium Disposition[g]	0	150	37	160	350
D&D wastes[h,i]	0	100,000	310	0	100,310
Total	160,000	530,000	95,000	22,000	1,500,000

a. Source: DOE (1995a).
b. Source: DOE (1998a).
c. Deleted.
d. Source: DOE (1996a); HEU = highly enriched uranium.
e. Source: DOE (1997).
f. Source: Young (1997b).
g. Source: DOE (1998b).
h. Decontamination and decommissioning (including environmental restoration.
i. Source: England et al. (1997).

contamination and decommissioning activities would have a 30-year expected forecast of 100,310 cubic meters (England et al. 1997). Therefore, the total amount of waste from SRS activities (exclusive of APT operation) is estimated to be approximately 1,300,000 cubic meters.

[Chapter 5, Section 5.4 modification to the Draft APT EIS]

The estimated cumulative consumption of electricity from activities at the SRS has been updated pursuant to the modifications presented elsewhere in this document. Additionally, information has been added to Table 5-5 of the Draft APT EIS, to include the potential impacts associated with the Rocky Flats scrub alloy and surplus plutonium disposition, and to remove the impacts associated with the River Water System. Table 5-5a has been added to summarize the projected environmental impacts from the generation of this electricity.

Page 5-7, Table 5-5 is replaced with the following table as called out on page 5-6, 2nd column, 3rd paragraph and Table 5-5a is added:

Table 5-5 lists the cumulative consumption of electricity from activities at the SRS. The values are based on annual consumption estimates. Of the SRS activities, accelerator production of tritium would place the largest demand on electricity resources.

Table 5-5a lists the projected environmental impacts from the generation of electricity required for the SRS activities listed in Table 5-5.

[Chapter 5, Section 5.5 modification to the Draft APT EIS]

The estimated cumulative radiological health effects of routine SRS operations has been updated pursuant to the modifications presented elsewhere in this document. Additionally, information has been added to Table 5-6 of the Draft APT EIS, to include the potential impacts associated with the Rocky Flats scrub alloy and surplus plutonium disposition, and to remove the impacts associated with the River Water System.

Page 5-9, Table 5-6 is replaced with the following table as called out on page 5-8, 1st column, 2nd paragraph:

Table 5-6 summarizes the cumulative radiological health effects of routine SRS operations based on 1995 data and proposed DOE actions. The EISs listed in this table describe the impacts resulting from proposed DOE actions. In addition to estimated radiological doses to the hypothetical maximally exposed individual and the offsite population, Table 5-6 lists potential latent cancer fatalities for the public and workers due to exposure to radiation. These data demonstrate that operation of APT will minimally increase cumulative radiation doses to the public and onsite workers.

[Chapter 5, Section 5.7 modifications to the Draft APT EIS]

Since the issuance of the Draft APT EIS, two additional reasonably foreseeable actions have been identified for the Savannah River Site. SRS has been identified as the preferred site for the disposition of surplus plutonium and is one of the alternative sites for the disposition of Rocky Flats plutonium and scrub alloy. The text in Section 5.7 and Table 5-7 have been modified to incorporate associated employment levels.

Page 5-10, 1st column, 2nd paragraph through 2nd column, 2nd paragraph and Table 5-7 on page 5-11 are replaced with the following:

Table 5-7 summarizes the estimated cumulative regional economic and population changes from construction and operation of the APT facility (Preferred alternative), a potential $200 million Treatment and Storage Facility that DOE could build at the SRS to manage spent nuclear fuel (Young 1997), the processing of Rocky Flats scrub alloy, the construction and operation of mixed-oxide processing facility, and the construction and operation in Aiken County of a $435 million tire factory by Bridgestone-

Table 5-5. Estimated average annual cumulative electrical consumption.

Activity	Electricity consumption (megawatt-hours)
Accelerator Production of Tritium	3,100,000
Tritium Extraction Facility[a]	**21,000**
Defense Waste Processing Facility[b]	32,000
Surplus HEU disposition[c]	5,000
Tritium supply and recycling[d]	24,000
Interim Management of Nuclear Materials[e]	140,000
Waste Management	N/A[f]
1993 SRS usage[h]	660,000
Management of Spent Nuclear Fuel[i]	24,000
Rocky Flats Pu Residue	**N/A[j]**
Surplus Plutonium Disposition[k]	**38,000**
Total	4,000,000

a. Source: DOE (1998sa).
b. Source: DOE (1994a).
c. Source: DOE (1996); HEU = highly enriched uranium.
d. Source: DOE (1995b); includes recycling upgrades only.
e. Source: DOE (1995c).
f. Not available in Waste Management EIS.
g. Deleted.
h. Source: DOE (1995e).
i. Source: Young (1997).
j. Source: DOE (1997b), information not available on annual basis. However, maximum value of options at SRS is 7,200 MWh spread over a multi-year processing campaign.
k. Source: DOE (1998b).

Table 5-5a. Environmental impacts from electricity generation required for SRS projected activities.

Factor	Value
Air emissions (pounds per year)	
Carbon dioxide	8,900,000,000
Sulfur oxides as SO_2	2,800,000
Nitrogen oxides as NO_2	10,000,000
Volatile organic compounds	2,700,000
Carbon monoxide	8,600,000
Particulate matter (PM_{10})	1,800,000
Radioactive emissions (curies)	2,600
Water consumption (acre-feet)	2,700
Liquid radioactive effluent (curies)	25,000
Solid waste (pounds per year)	
Ash	41,000,000
Total metals	400,000
Nuclear solid waste	13,000
Additional land use (acres)	N/A
Construction employees (work-years)	N/A
Operations (employees per year)	290

N/A = Not applicable.

Table 5-6. Estimated average annual cumulative radiological doses and resulting health effects to offsite population and facility workers.

	Maximally exposed individual				Offsite population[a]				Workers	
Activity	Dose from airborne releases[b]	Dose from liquid releases[b]	Total Dose[b]	Fatal Cancer risk[c]	Collective dose from airborne releases[d]	Collective dose from liquid releases[d]	Total collective dose[d]	Latent cancer fatalities[e]	Collective dose[d]	Latent cancer fatalities[e]
Management of Spent Nuclear Fuel[f]	1.5×10^{-5}	5.7×10^{-5}	7.2×10^{-5}	3.6×10^{-8}	0.56	0.19	0.75	3.8×10^{-4}	55	0.022
Defense Waste Processing Facility[h]	1.0×10^{-6}	0	1.0×10^{-6}	5.0×10^{-10}	0.071	0	0.071	3.6×10^{-5}	120	**0.048**
Surplus HEU Disposition[i]	$\mathbf{2.5\times10^{-6}}$	0	$\mathbf{2.5\times10^{-6}}$	$\mathbf{1.3\times10^{-9}}$	**0.16**	0	**0.16**	$\mathbf{8.0\times10^{-5}}$	**11**	**0.0044**
Interim Mgmt of Nuclear Materials[k]	9.7×10^{-4}	2.4×10^{-5}	9.9×10^{-4}	$\mathbf{5.0\times10^{-7}}$	**40**	**0.09**	**40**	**0.02**	**127**	**0.051**
Plant Vogtle[m]	$\mathbf{5.4\times10^{-7}}$	5.4×10^{-5}	5.5×10^{-5}	2.7×10^{-8}	0.042	0.0025	0.045	2.2×10^{-5}	NA	NA
1995 SRS Activities[n]	5.0×10^{-5}	1.4×10^{-4}	1.9×10^{-4}	$\mathbf{9.5\times10^{-8}}$	**2.8**	**2.2**	**5.0**	**0.0025**	**160**	**0.64**
Tritium Extraction Facility[o]	2.0×10^{-5}	0	2.0×10^{-5}	1.0×10^{-8}	0.77	0	0.77	3.9×10^{-4}	**4**	1.6×10^{-3}
Accelerator Production of Tritium	3.7×10^{-5}	1.5×10^{-5}	5.3×10^{-5}	2.7×10^{-8}	1.6	0.42	**2.0**	**0.0010**	**88**	3.5×10^{-2}
Rocky Flats Pu Residue[p]	$\mathbf{5.7\times10^{-7}}$	**0**	$\mathbf{5.7\times10^{-7}}$	$\mathbf{2.8\times10^{-10}}$	**0.0062**	**0**	**0.0062**	$\mathbf{3.1\times10^{-6}}$	**7.6**	**0.003**
Surplus Plutonium Disposition[q]	$\mathbf{4.0\times10^{-6}}$	**0**	$\mathbf{4.0\times10^{-6}}$	$\mathbf{2.0\times10^{-9}}$	**1.6**	**0**	**1.6**	**0.0008**	**561**	**0.22**
Total	$\mathbf{1.1\times10^{-3}}$	$\mathbf{2.9\times10^{-4}}$	$\mathbf{1.4\times10^{-3}}$	$\mathbf{7.0\times10^{-7}}$	**48**	**2.9**	**51**	**0.025**	**1,134**	**1.0**

a. Collective dose to the 50-mile (80-kilometer) population for atmospheric releases and to the downstream users of the Savannah River for liquid releases.
b. Dose in rem.
c. Probability of fatal cancer.
d. Dose in person-rem.
e. Incidence of excess fatal cancers.
f. Source: Maximum of options Young (1997).
g. **Deleted.**
h. Source: DOE (1994a).
i. Source: DOE (1996a); HEU = highly enriched uranium.
j. **Deleted.**
k. Source: DOE (1995c).
l. Deleted.
m. Source: NRC (1996).
n. Source: Arnett and Mamatey (1996).
o. Source: DOE (1998a).
p. Source: DOE (1997b).
q. Source: DOE (1998b).

Table 5-7. Cumulative economic and population measures.[a]

Year	Total employment	Population	Personal income[b]	Gross regional product[b]	State and local government expenditures[b]
1	93	26	2.8	4.4	0.0
2	1,422	447	43.5	74.5	1.3
3	3,191	1,489	99.6	181.7	4.6
4	**4,936**	2,931	1,43.1	275.2	9.2
5	**5,593**	4,036	1,27.6	249.7	12.8
6	**5,692**	4,758	1,25.4	246.5	15.4
7	**3,996**	5,292	1,22.2	242.1	17.3
8	**3,162**	5,613	1,14.4	234.5	18.7
9	**2,767**	5,752	1,06.8	237.4	19.3
10	**4,992**	5,761	1,02.0	244.8	19.6
11	**4,815**	5,672	97.7	244.0	19.5
12	**4,815**	5,554	97.9	247.3	19.2
13	**4,822**	5,449	98.6	250.3	19.0
14	**4,869**	5,370	100.8	257.3	19.0
15	**4,914**	5,318	103.1	264.1	18.9
16	**4,955**	5,276	105.1	270.7	18.9
17	**4,999**	5,245	107.4	277.6	19.0
18	**5,044**	5,224	109.9	284.9	19.0
19	**5,038**	5,208	112.4	291.8	19.0
20	2,342	5,193	114.7	298.7	19.0
21	2,379	5,184	117.3	306.1	19.1
22	2,410	5,180	119.1	313.4	19.2
23	2,444	5,183	121.3	321.4	19.3
24	2,474	5,196	123.3	329.4	19.3
25	2,500	5,219	125.4	337.3	19.6
26	2,525	5,253	127.6	345.2	19.9
27	2,546	5,298	129.7	353.0	20.1
28	2,566	5,354	131.9	360.9	20.4
29	2,585	5,420	134.1	368.5	20.7
30	2,603	5,495	136.4	376.4	21.1
31	2,621	5,578	139.0	384.5	21.6
32	2,639	5,667	141.6	392.8	22.0
33	2,656	5,758	144.2	401.0	22.5
34	2,675	5,851	147.0	409.5	22.9
35	2,698	5,949	150.3	418.1	23.6
36	2,722	6,053	154.0	427.3	24.3
37	2,747	6,159	157.9	436.6	24.9
38	2,773	6,267	161.8	446.1	25.4
39	2,800	6,373	165.9	455.8	26.1

a. Source: REMI (1996); DOE (1998b).
b. All dollar amounts are millions of 1996 dollars.

Firestone, Inc., which will employ 800 when fully operational.

In the case of the scrub alloy activities, no new facilities would be required. Operations would be handled by the existing SRS workforce (DOE 1997b). The existing chemical processing canyons would be utilized. The mixed-oxide processing facility, however, could require a peak workforce of 1,212 employees and could add an additional 973 indirect jobs. The operational work force is estimated to be 996; additional indirect jobs could total 1,781 (DOE 1998b).

During the construction period, average annual rates of growth for the five economic and population measures (Table 5-7) are less than during the 4-year historical period discussed in Section 4.3.2.1. The average annual growth rates during the construction period for these projects are 0.47%, 0.7%, and 1.62% for employment, population, and total personal income, respectively. The growth rates for GRP and state and local government expenditures are 1.21% and 1.9%. Potential impacts to the regional construction industry would be less than discussed in Section 4.4.2.6 for the coal-fired electricity generating plant, as the tire factory will be completed and operational before the SRS construction work force reaches its peak. During the operational phase of the APT facility, the growth rates for these measures would be less than the historical rates.

Chapter 6. Modifications – Resource Commitments

[Chapter 6, Section 6.2 modification to the Draft APT EIS]

Since the Draft APT EIS was issued, the Department has advanced potential plans for concrete batch plants and a construction debris landfill as described in Part C, modifications to Chapter 4 (page C-36) of this document. Additionally, as described in this document, the modular design variation would require slightly less land. Based on these plans, the text has been modified to reflect the commitment of resources associated with these actions.

Page 6-2, 1st column, 2nd paragraph is replaced with the following:

In addition to the 250 acres identified above, construction of the APT could result in the construction of two temporary **construction support** facilities: concrete batch plants and a construction debris landfill. **The concrete batch plant would require about 10 acres within either of the APT sites. Total land requirements for the landfill would be about 14 acres. The batch plants would utilize approximately 21 million gallons of water during construction.** At the end of the operational life of the temporary facilities, DOE would close or remove infrastructure in accordance with permit and regulatory requirements.

Chapter 7. Modifications – Applicable Laws, Regulations, and Other Requirements

[Chapter 7, Section 7.1 modification to the Draft APT EIS]

Since the issuance of the Draft APT EIS, DOE has determined that a construction debris landfill, as discussed starting on page C-36 of this document, could be required. Table 7-1 has been modified to include the South Carolina Solid Waste Management Act. A description of the Act is added to Section 7.1.1.

Page 7-6, 1st column, after 1st paragraph insert the following:

The South Carolina Solid Waste Policy and Management Act of 1991, (Section 44-96-10 et seq.), (SCDHEC Regulation R.61-107 et set) SCDHEC has received authorization to implement a non-hazardous solid waste management program in the State of South Carolina. EPA and SCDHEC regulations (40 CFR Part 258; SCDHEC R.61-107 et seq) implement RCRA requirements for the management and disposal of non-hazardous solid waste. The regulations include siting criteria and operating requirements for solid waste landfills. DOE would be required to obtain a

Table 7.1. Environmental permits and consultations required by regulation.

Activity/Topic	Regulation	Requirements	Agency
Site Preparation	Federal Clean Water Act (Section 404 and Section 401)	Wetlands 404 Permit (determination pending), Stormwater Pollution Prevention Plan for Industrial Activity, Water Quality Certification	USACOE/[a] SCDHEC[b]
		Stormwater Pollution Prevention/Erosion Control Plan for construction activity	SCDHEC WSRC/EPD[c]
Wastewater Discharges	Federal Clean Water Act S.C. Pollution Control Act	NPDES Permit(s) for Dewatering Basin Discharge, Cooling Water, and Balance of Plant Process Wastewater Discharges	SCDHEC
		Process Wastewater Treatment Systems Construction and Operation Permits	SCDHEC
		Sanitary Waste Water Pumping Station Tie-in Construction Permit; Permit to Operate	SCDHEC WSRC/EPD
Cooling Water Discharges	Federal Clean Water Act [Section 316(a)]	316(a) thermal effects study (determination pending)	SCDHEC
	Federal Clean Water Act [Section316(b)]	316(b) impingement and entrainment study (determination pending)	SCDHEC
Air	Clean Air Act - NESHAP;	Rad Emissions - Permit to construct new emission source (if needed)	EPA[d]
		Air Construction and Operation permits – as required. Fire Water Pumps; Diesel Generators	SCDHEC
		General source - Stacks, Vents, Concrete batch plant	SCDHEC
		Air Permit - Prevention of Significant Deterioration (PSD)	SCDHEC
Domestic Water	Safe Drinking Water Act	Construction and operation permits for line to domestic water system and Construction of APT Water Tower	WSRC/EPD SCDHEC
Waste Management	Resource Conservation and Recover Act (RCRA)	RCRA Permit – Radiological Waste Storage Facility	SCDHEC
	S.C. Solid Waste Management Act	**Construction debris landfill permit**	**SCDHEC**
Structures over 200 feet	Federal Aviation Administration (FAA)	Permit for Structures over 200 feet; APT construction cranes, stacks, water tower	FAA
Historic Preservation	Archaeological Resource Protection Act; National Historic Preservation Act	Excavation or Removal Permit (determination pending); Consultation)	Advisory Council on Historic Preservation; State Historic Preservation Officer
Endangered Species	Endangered Species Act	Consultation	U. S. Fish and Wildlife Service National Marine Fisheries Service
Migratory Birds	Migratory Bird Treaty Act	Consultation	U. S. Fish and Wildlife Service

a. USACOE - United States Army Corps of Engineers.
b. South Carolina Department of Health and Environmental Control.
c. WSRC/EPD Westinghouse Savannah River Company Environmental Protection Department.
d. Environmental Protection Agency.

permit to construct and operate a construction debris landfill at the APT site, or to expand the existing Burma Road Landfill for disposal of APT generated waste.

Miscellaneous Modifications in the Draft EIS

Items 2 through 7 note modifications to correct figure or table call outs and correct several references used in the Draft EIS. References cited in Part C of the Final EIS but not called out in the Draft EIS are listed below in item number 1. If the reference has not changed from the Draft EIS, it is not included in this listing.

Additional Part C References by chapter

Chapter 1

DOE (U.S. Department of Energy), 1997c, *Draft Environmental Impact Statement on Management of Certain Plutonium Residues and Scrub Alloy Stored at the Rocky Flats Environmental Technology Site*, DOE/EIS-077D, Washington, D.C.

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Chapter 2

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WSRC (Westinghouse Savannah River Company), 1998, Savannah River Site Radiological Performance, 4th Quarter 1997, ESH-SHP-980007, Savannah River Site, Aiken, South Carolina.

Chapter 4

DeCamp, G., 1998, APT-Burns & Roe, Aiken, South Carolina, Response to APT Final EIS - Request for Technical Data, AI98-ESH-0005, memorandum to R. Reynolds, Westinghouse Savannah River Company, January 28.

DOE (U.S. Department of Energy), 1998a, *Draft Environmental Impact Statement for the Construction & Operation of a Tritium Extraction Facility at the Savannah River Site*, DOE/EIS-0271D, Savannah River Operations Office, Aiken, South Carolina.

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DOE (U.S. Department of Energy), 1998b, *Surplus Plutonium Disposition Environmental Impact Statement*, DOE/EIS-0283D, Washington, D.C.

Corrections

- Correction to Chapter 2 reference: WSRC (1996b) to Wike et al. (1996). Wike, L. D., D. B. Moore-Shedrow, C B. Shedrow, 1996, Site Selection for the Accelerator for Production of Tritium at the Savannah River Site, **Rev. 1,** WSRC-TR-96-0279, Westinghouse Savannah River Company, Aiken, South Carolina, **October**.

- Correction to Chapter 3 reference: change WSRC (1996b) to Wike et al. (1996). Wike, L. D., D. B. Moore-Shedrow, C B. Shedrow, 1996, Site Selection for the Accelerator for Production of Tritium at the Savannah River Site, Rev. 1, WSRC-TR-96-0279, Westinghouse Savannah River Company, Aiken, South Carolina, **October**.

- In the text box on page 4-3 the EPA drinking water standard is 4 millirem **per year.**

- Correction to Chapter 4, Section 4.1.5 reference: Shedrow (1997a) should be England et al. (1997).

- The section callout in the second paragraph, page 4-54, 2nd Column, should be **3.3.2** rather than 3.2.2.

- Correction to Chapter 4 Reference: Hunter, C.H., 1997, "Nonradiological Air Quality Calculations for the Accelerator Production of Tritium (APT) Environmental Impact Statement (EIS)," SRT-NTS-97/**0277**, interoffice memorandum to C. B. Shedrow, Westinghouse Savannah River Company, Aiken, South Carolina, **September 10**.