5.5 SAVANNAH RIVER SITE

The following sections discuss the environmental impacts associated with the No Action Alternative and the MPF Alternative at SRS. The environmental impacts are presented below for each of the following environmental resource areas: land use, visual resources, site infrastructure, air quality and noise, water resources, geology and soils, biological resources, cultural and paleontological resources, socioeconomics, human health and safety, accidents, environmental justice, transportation, and waste management.

5.5.1 Land Use and Visual Resources

5.5.1.1 Land Use

The proposed concept for MPF is a multibuilding aboveground configuration. There would be three separate process buildings: Material Receipt, Unpacking, and Storage; Feed Preparation; and Manufacturing. They would be flanked by a number of smaller support facilities which would include: the Analytical Support Building, Production Support Building, Process Building Entry Control Facilities, Operations Support Facilities, Engineering Support Facility, PIDAS, Safe Havens, Standby Diesel Generator Buildings, Diesel Fuel Storage Tank, Chillers/Chemical Feed and Chilled Water Pump Buildings, Cooling Towers, Alternate Power Electrical Transformers, Truck Loading Docks, Liquid Nitrogen/Argon Storage Tanks, Chemical Storage Tanks, Bottled Gas Storage and Metering Buildings, HVAC Exhaust Stacks, Waste Staging/TRU Packaging Building, Commodities Warehouse, Roads and Parking Areas, and a Runoff Detention Area. In addition to these structures, a Construction Laydown Area and a Concrete Batch Plant would be built for the construction phase only. Upon construction completion, they would be removed and the area would be returned to its original state.

All buildings would be either one or two stories. The site would require two HVAC exhaust stacks; the tallest, standing 30 m (100 ft), would be located inside the PIDAS. Facility exhausts would be HEPA-filtered prior to discharge through the stacks.

Under the multibuilding configuration, production rates would dictate the size of the facilities proposed. The three potential facility capacities are 125, 250, and 450 ppy. Required acreage for each of the facility capacities during construction and operations is presented in Table 5.2.1.1–1.

The MPF reference location at SRS is a 32-ha (80-ac) tract immediately south of Road C near Burma Road. The site is flat and located on a topographic divide so surface drainage is both west toward Upper Three Runs and east toward Fourmile Branch streams. The reference location would be located on land categorized as Site Industrial (see Figure 4.5.1.1–3).

No Action Alternative

Under the No Action Alternative, no new buildings or facilities would be built and there would be no impact on land use at the site.

Modern Pit Facility Alternative

Construction Impacts

Depending on the facility capacity, an estimated 56-69 ha (138-171 ac) of land for buildings, walkways, building access, parking, buffer space, and construction-related workspace would be required to construct the MPF. The land required for the proposed MPF construction would represent approximately 0.07-0.09 percent of SRS's total land area of 803 km^2 (310 mi^2), an extremely small proportion. The 32-ha (80-ac) reference location has adequate space to accommodate the total facilities footprint and, NNSA believes that, should SRS be selected for the MPF site, the proposed facility design could be adapted to the space available or the site acreage reference location expanded to fit design.

Although there would be a change in land use, the proposed MPF is compatible and consistent with land use plans and the current land use designation, Site Industrial, for this area. No impacts to SRS land use plans or policies are expected.

Operations Impacts

Depending on the facility capacity, an estimated 44-56 ha (110-138 ac) of land for buildings, walkways, building access, parking, and buffer space would be required to operate the MPF. The reduction in required acreage from construction to operations represents the removal of the Construction Laydown Area and the Concrete Batch Plant upon construction completion. The land required for the proposed MPF operations would represent approximately 0.06-0.07 percent of SRS's total land area of 803 km^2 (310 mi^2), an extremely small proportion. As detailed above, DOE believes that, should SRS be selected for the MPF site, the proposed facility design could be adapted to the space available.

Although there would be a change in land use, the proposed MPF is compatible and consistent with land use plans and the current land use designation, Site Industrial, for this area. No impacts to SRS land use plans or policies are expected.

Sensitivity Analysis

Doubling shifts for any of the three proposed facility capacities would not have any additional effect on land use for this alternative.

5.5.1.2 Visual Resources

No Action Alternative

Under the No Action Alternative, there would be no impact on visual resources at SRS since no new facilities would be built.

Modern Pit Facility Alternative

Construction Impacts

Activities related to the construction of new buildings required for the MPF Alternative would result in a change to the visual appearance of the reference location due to the presence of construction equipment, new buildings in various stages of construction, and possibly increased dust. These changes would be temporary and, because of its interior location on the SRS site, would not be noticeable beyond the SRS boundary. Site visitors and employees observing MPF construction would find these activities similar to the past construction activities of other developed areas on the SRS. Thus, impacts on visual resources during construction would be minimal.

Operations Impacts

The MPF, which would include one- and two-story buildings, storage tanks, and two HVAC exhaust stacks, would change the appearance of the reference location. Views of the buildings, tanks, and exhaust stacks by visitors or employees using the SRS road network (Road C and Burma Road) would be limited by the forest vegetation and rolling terrain surrounding the location. Only the exhaust stacks would exceed the height of the forest vegetation. However, this change would be consistent with the currently developed areas of SRS.

Sensitivity Analysis

Doubling shifts for any of the three proposed facility capacities would not change the layout or physical features of the MPF reference location. Therefore, there would be no additional impacts to Visual Resources.

5.5.2 Site Infrastructure

This section describes the impact on site infrastructure at SRS for the No Action Alternative and the modifications that would be needed for the construction and operation of the MPF Alternative. These impacts are evaluated by comparing current site infrastructure to key facility resource needs for the No Action Alternative and the MPF Alternative.

5.5.2.1 No Action Alternative

Under the No Action Alternative, there would be no change to the site infrastructure at SRS. The environment and operations (current and planned) described in Chapter 4 (Affected Environment) would continue.

5.5.2.2 Modern Pit Facility Alternative

Construction Impacts

The projected demand on key site infrastructure resources associated with construction activities of the three proposed plant sizes (125, 250, or 450 ppy) for the MPF Alternative on an annual basis are shown in Table 5.5.2.2–1. Existing infrastructure at SRS would be adequate to support annual construction requirements for the proposed plant sizes for the projected 6-year construction period. Infrastructure requirements for construction would have a negligible impact on current site infrastructure resources.

Table 5.5.2.2–1. Annual Site Infrastructure Requirements for Construction of MPF at SRS

Proposed Alternatives	Electrical		Fuel		Process Gases
	Energy (MWh/yr)	Peak Load (Mwe)	Liquid (L/yr)	Coal (metric tons/yr)	Gases (m^3/yr)
Site capacity	4,400,000	330	Not limited[a]	Not limited[a]	Not limited[a]
Available site capacity	4,030,000	260	Not limited	Not limited	Not limited
No Action Alternative					
Total site requirement	370,000	70	28,400,000	210,000	
Percent of site capacity	8%	21%	Not limited	Not limited	Not limited
MPF Alternative					
125 ppy					
Total site requirement	370,000	73	30,000,000	210,000	
Percent of site capacity	10%	22%	Not limited	Not limited	Not limited
Change from No Action	1,000	3	1,520,000	0	2,200
Percent of available capacity	0.02%	1%	Not limited	Not limited	Not limited
Peak requirement	NA	NA	2,600,000	0	4,000
250 ppy					
Total site requirement	370,000	73.5	30,000,000	210,000	
Percent of site capacity	10%	22%	Not limited	Not limited	Not limited
Change from No Action	1,125	3.5	1,700,000	0	2,500
Percent of available capacity	0.03%	1%	Not limited	Not limited	Not limited
Peak requirement	NA	NA	2,900,000	0	4,200
450 ppy					
Total site requirement	370,000	74	30,000,000	210,000	
Percent of site capacity	10%	22%	Not limited	Not limited	Not limited
Change from No Action	1,333	4	2,170,000	0	3,200
Percent of available capacity	0.03%	2%	Not limited	Not limited	Not limited
Peak requirement	NA	NA	3,700,000	0	5,700

[a] Not limited due to offsite procurement.
NA = Not applicable.
Source: MPF Data 2003.

Operations Impacts

The estimated annual site infrastructure requirements for the pit production capacities of 125, 250, or 450 ppy are presented in Table 5.5.2.2–2. There would be negligible impacts to site infrastructure. Existing site infrastructure would be adequate to support all pit production capacities.

Sensitivity Analysis

Site infrastructure at SRS is more than adequate to meet the infrastructure requirements for surge use of two-shift operations. Impacts to site infrastructure from surge output are expected to be minor.

Table 5.5.2.2–2. Annual Site Infrastructure Requirements for Facility Operations Under MPF at SRS

Proposed Alternatives	Electrical		Fuel		Process Gases	
	Energy (MWh/yr)	Peak Load (MWe)	Liquid (L/yr)	Coal (metric tons/yr)	Nitrogen (m^3/yr)	Argon (m^3/yr)
Site capacity	**4,400,000**	**330**	**Not limited[c]**	**Not limited[c]**	**Not limited[c]**	**Not limited[c]**
Available site capacity	**4,030,000**	**260**	**Not limited**	**Not limited**	**Not limited**	**Not limited**
No Action Alternative						
Total site requirement	370,000	70	28,400,000	210,000	Not limited	Not limited[c]
Percent of site capacity	8%	21%	Not limited	Not limited	Not limited	Not limited
MPF Alternative						
125 ppy[a,b]						
Total site requirement	449,800	90.5	28,600,000	213,000	Not limited	Not limited
Percent of site capacity	10%	27%	Not limited	Not limited	Not limited	Not limited
Change from No Action	79,800	20.5	260,000	3,000[d]	224,000	4,200
Percent of available capacity	2%	8%	Not limited	Not limited	Not limited	Not limited
250 ppy[a,b]						
Total site requirement	483,750	93.5	28,700,000	214,000	Not limited	Not limited
Percent of site capacity	11%	28%	Not limited	Not limited	Not limited	Not limited
Change from No Action	114,000	23.5	360,000	4,200[d]	245,000	7,300
Percent of available capacity	3%	9%	Not limited	Not limited	Not limited	Not limited
450 ppy[a,b]						
Total site requirement	545,600	106.5	28,900,000	216,000	Not limited	Not limited
Percent of site capacity	12%	32%	Not limited	Not limited	Not limited	Not limited
Change from No Action	176,000	36.5	580,000	6,300[d]	303,250	11,800
Percent of available capacity	4%	14%	Not limited	Not limited	Not limited	Not limited

[a] Peak load is based on electrical demands of HVAC, lighting, and miscellaneous electrical systems. Peak load and annual electrical consumption estimates for the three pit production capacities are based on ratioing SRS FY99 Pit Manufacturing data (MPF Data 2002) to the multiple facility sizes. Estimates based on 24 hrs/day, 365 days per year.
[b] Diesel fuel estimates based on vendor fuel consumption data ratioed for expected diesel generator size. Diesel generator testing of 1 hour per week.
[c] Not limited due to offsite procurement.
[d] Used to generate steam.
Source: MPF Data 2003.

5.5.3 Air Quality and Noise

5.5.3.1 Nonradiological Releases

No Action Alternative

Construction Impacts

There would be no nonradiological releases to the environment because this alternative would not involve construction.

Operations Impacts

Under the No Action Alternative, small quantities of criteria and toxic pollutants would continue to be generated. These emissions are part of the baseline described in Chapter 4. No increases in emissions or air pollutant concentrations are expected under the No Action Alternative. Therefore, a PSD increment analysis is not required.

As part of its evaluation of the impact of air emissions, DOE consulted the Guidance on *Clean Air Act* Conformity requirements (DOE 2000d). DOE determined that the General Conformity rule does not apply because SRS is located in an attainment area for all criteria pollutants; therefore, no conformity analysis is required.

Modern Pit Facility Alternative

Construction Impacts

Construction of new structures would result in temporary increases in air quality impacts from construction equipment, trucks, and employee vehicles. Exhaust emissions from these sources would result in releases of sulfur dioxide, nitrogen oxide, $PM_{10,}$ total suspended particulates, and carbon monoxide. The calculation of emissions from construction equipment was based on emission factors provided in the EPA document AP-42, "Compilation of Air Pollutant Emission Factors" (EPA 1995). For highway vehicles (worker commuting vehicles and delivery vehicle) emission factors were obtained from the EPA Mobile Source Emission Factor Model, MOBILE6.2 (EPA 2002).

Fugitive dust generated during the clearing, grading, and other earth-moving operations is dependent on a number of factors including silt and moisture content of the soil, wind speed, and area disturbed. A common procedure to estimate fugitive emissions from an entire construction site is to use the EPA emission factor of 2.69 metric tons/ha (1.20 tons/ac) per month of activity (EPA 1995). This emission factor represents total suspended particulates (i.e., particles less than 30 microns in diameter). A multiplication factor of 0.75 was used to correct the emission rate to one for PM_{10} (EPA 1995). Also, it was assumed that water would be applied to disturbed areas. This would reduce emission rates by about 50 percent. Facility construction would necessitate a Concrete Batch Plant at the building site. Particulate matter, consisting primarily of cement dust, would be the only regulated pollutant emitted in the concrete mixing process. Emission factors for the Concrete Batch Plant were obtained from AP-42 (EPA 1995).

The estimated maximum annual pollutant emissions resulting from construction activities are presented in Table 5.2.3.1–1. Actual construction emissions are expected to be less, since conservative emission factors and other assumptions were used in the modeling of construction activities and tend to overestimate impacts. The temporary increases in pollutant emissions due to construction activities are too small to result in violations of the NAAQS beyond the SRS site boundary. Therefore, air quality impacts resulting from construction would be small.

The impacts on the public and on a hypothetical non-involved worker in the vicinity of the processing facilities resulting from nonradiological air emissions are presented in Section 5.5.9, Human Health and Safety.

Operations Impacts

Pit manufacturing activities would result in the release of criteria and toxic pollutants into the surrounding air. The primary volume contributors are primarily nitrogen and argon, used to maintain inert atmospheres for glovebox operations. Carbon dioxide would be used as a cleaning agent and helium would be used for leak testing operations. Hydrogen and nitrogen dioxide are reaction products from aqueous purification operations (pyrochemical purification would produce lower amounts of hydrogen and nitrogen dioxide). The chemicals used for dye-penetrant testing of welds are assumed to be volatilized and released to the atmosphere. Organic solvents used for cleaning and chemicals used in the Analytical Laboratory for various analyses would not be expected to contribute any appreciable quantities of any other chemicals to the annual nonradioactive air emissions. Air emissions from periodic functional testing support systems (primarily standby diesel generators) include carbon monoxide, nitrogen dioxide, PM_{10}, sulfur dioxide, VOCs, and total suspended particulates (WSRC 2002e). The estimated emission rates (kg/yr) for nonradiological pollutants emitted under each of the three new facility scenarios are presented in Table 5.2.3.1–2. These emissions would be incremental to the SRS baseline. If SRS is selected as the preferred site, a PSD increment analysis would be performed under a project-specific tiered EIS to determine whether the pit manufacturing activities would cause a significant pollutant emission increase.

As part of its evaluation of the impact of air emissions, DOE consulted the Guidance on *Clean Air Act* Conformity requirements (DOE 2000d). DOE determined that the General Conformity rule does not apply because SRS is located in an attainment area for all criteria pollutants. Therefore, although each alternative would emit criteria pollutants, a conformity review is not necessary.

The maximum concentrations ($\mu g/m^3$) at the SRS site boundary that would be associated with the release of criteria pollutants under each of the three plant capacity scenarios (i.e., 125, 250, and 450 ppy) were modeled and are presented in Table 5.5.3.1–1. These concentrations were compared to the most stringent (Federal or state) ambient air quality standards. For each of the three capacity scenarios, incremental concentration increases would be small. For most pollutants, there would be an incremental increase of less than 1 percent of the baseline. The greatest increase would occur for nitrogen dioxide under the 450 ppy scenario, but ambient concentrations would remain below the ambient air quality standard. Since estimated emissions are maximum potential emissions and all emergency generators would not operate at the same time, the estimated emissions and resulting concentrations are conservative.

Table 5.5.3.1–1. Criteria Pollutant Concentrations at the SRS Site Boundary for the MPF—Operations

Pollutant	Averaging Period	Most Stringent Standard or Guideline [a] (μg/m^3)	Maximum Incremental Concentration (μg/m^3)			
			Baseline [b]	MPF Alternative		
				125 ppy	250 ppy	450 ppy
Carbon monoxide	8-hour	10,000	6,800	2.1	2.9	4.7
	1-hour	40,000	10,100	3.0	4.1	6.8
Nitrogen dioxide	Annual	100	9	1.1	1.4	2.4
Sulfur dioxide	Annual	80	4	0.074	0.10	0.17
	24-hour	365	18	0.37	0.51	0.83
	3-hour	1,300	50	0.83	1.1	1.9
PM_{10}	Annual	50	19	0.029	0.040	0.066
	24-hour	150	41	0.15	0.20	0.33
Total Suspended Particulates	Annual	75	28	0.079	0.11	0.18

[a] The more stringent of the Federal and state standards will be presented if both exist for the averaging period.
[b] The No Action Alternative is represented by the baseline. Aiken County ambient concentrations are listed.
NA = not available.
Source: MPF Data 2003, SC R61-62.5, St. 2, SCDHEC 2002.

The impacts on the public and on a hypothetical non-involved worker in the vicinity of the processing facilities resulting from nonradiological air emissions are presented in Section 5.5.9, Human Health and Safety.

Sensitivity Analysis

As discussed in Chapter 3, each plant could operate two shifts, increasing the number of pits produced per year. This increased capacity would result in increased releases of criteria pollutants. The increase in releases of criteria pollutants from the 125 ppy plant operating at surge capacity would be bounded by the 250 ppy facility releases. Similarly, the increase of criteria pollutants from the 250 ppy plant operating at surge capacity would be bounded by the 450 ppy plant releases (see Table 5.5.3.1–1). A review of the maximum incremental concentrations in Table 5.5.3.1–1 indicates that if the maximum incremental concentration of each criteria pollutant for the 450 ppy facility were conservatively doubled for surge capacity, concentrations would still not approach the most stringent standards or guideline concentrations.

5.5.3.2 Radiological Releases

No Action Alternative

Construction Impact

There would be no radiological releases to the environment because this alternative would not involve construction.

Operations Impacts

Under the No Action Alternative, small quantities of radionuclides would continue to be emitted. These emissions are part of the baseline described in Chapter 4. The impacts on the public and on a hypothetical non-involved worker in the vicinity of the processing facilities resulting from radiological air emissions are presented in Section 5.5.9, Human Health and Safety.

Modern Pit Facility Alternative

Construction Impacts

No radiological releases to the environment are expected in association with construction activities. However, the potential exists for contaminated soils and possibly other media to be disturbed during excavation and other site preparation activities. Prior to commencing ground disturbance, DOE would survey potentially affected areas to determine the nature and extent of any contamination and would be required to remediate any contamination in accordance with established site procedures.

Operations Impacts

Radioactive air emissions from pit manufacturing activities would involve plutonium, americium, and enriched uranium. The pit manufacturing activities would be performed within gloveboxes or vaults for radiological containment; and include plutonium recovery using aqueous or pyrochemical processes, foundry, machining, assembly, post assembly operations, inspection and certification, waste handling, and preparing the final product (pits) for shipment. Analytical operations would normally be conducted in laboratories consisting of rooms with gloveboxes and hoods for radiological containment. Each laboratory module would be separated from occupied areas of the laboratory facility by airlocks. Sample transfers would occur using a vacuum tube transfer system from the Feed Preparation and Manufacturing Facilities to the Analytical Support Facility. The ventilation exhaust from process and laboratory facilities would be filtered through double banks of HEPA filters before being released to the air via a 30-m (100-ft) tall stack. HEPA filters are the best available control technology for particulate emissions and are capable of removing more than 99.99 percent of entrained particles from the exhaust air.

DOE estimated routine radionuclide air emissions for three different plant capacities: 125, 250, and 450 ppy (see Table 5.5.3.2–1). Releases under each of the three capacity scenarios would be small. Total radionuclide emissions at SRS would increase by less than 3.76×10^{-7} percent. To ensure that total emissions are not underestimated, DOE's method for estimating emissions was conservative. Therefore, actual emissions from pit manufacturing operations would be smaller.

DOE estimated the radiation doses to the offsite MEI individual and the offsite population surrounding SRS. As shown in Table 5.5.3.2–2, the expected annual radiation dose to the offsite MEI would be much smaller than the limit of 10 mrem/yr set by both EPA (40 CFR 61) and DOE (DOE Order 5400.5) for airborne releases of radioactivity. The maximum estimated dose to the offsite population residing within an 80-km (50-mi) radius would also be very low. The impacts on the public and on a hypothetical non-involved worker in the vicinity of the processing facilities resulting from radiological air emissions are presented in Section 5.5.9, Human Health and Safety.

Table 5.5.3.2–1. Annual Radiological Air Emissions for the MPF at SRS—Operations

Isotope	Annual Emissions [a] (Ci/yr)			
	Baseline[b,c]	125 ppy	250 ppy	450 ppy
Americium-241	2.67×10^{-4}	2.08×10^{-7}	3.81×10^{-7}	7.61×10^{-7}
Plutonium-239	2.20×10^{-3}	7.72×10^{-6}	1.19×10^{-5}	2.05×10^{-5}
Plutonium-240	8.51×10^{-7}	2.01×10^{-6}	3.10×10^{-6}	5.35×10^{-6}
Plutonium-241	6.70×10^{-6}	1.48×10^{-4}	2.28×10^{-4}	3.94×10^{-4}
Uranium-234	3.26×10^{-4}	4.19×10^{-9}	5.58×10^{-9}	8.38×10^{-9}
Uranium-235	1.10×10^{-5}	1.32×10^{-10}	1.76×10^{-10}	2.64×10^{-10}
Uranium-236	7.17×10^{-10}	2.13×10^{-11}	2.84×10^{-11}	4.26×10^{-11}
Uranium-238	4.12×10^{-4}	1.18×10^{-12}	1.58×10^{-12}	2.36×10^{-12}
Tritium	4.74×10^{4}	---	---	---
Krypton-85	6.47×10^{4}	---	---	---
All other	$\mathbf{3.06 \times 10^{-1}}$	---	---	---
Total	$\mathbf{1.12 \times 10^{5}}$	$\mathbf{1.58 \times 10^{-4}}$	$\mathbf{2.43 \times 10^{-4}}$	$\mathbf{4.21 \times 10^{-4}}$

[a] Based on calendar year 2001 data.
[b] The No Action Alternative is represented by the baseline.
[c] Onsite emissions only.
Source: WSRC 2002f.

Table 5.5.3.2–2. Annual Doses Due to Radiological Air Emissions from MPF Operations at SRS

Receptor	125 ppy	250 ppy	450 ppy
Offsite MEI[a] (mrem/yr)	2.6×10^{-9}	4.3×10^{-9}	8.0×10^{-9}
Population within 80 km (50 mi) (person-rem per year)	4.2×10^{-7}	7.0×10^{-7}	1.3×10^{-6}

[a] The offsite MEI is assumed to reside at the site boundary.

Sensitivity Analysis

As discussed in Chapter 3, each plant could operate two shifts, increasing the number of pits produced per year. This increased capacity would result in increased radiological air emissions. The increase in radiological air emissions from the 125 ppy plant operating at surge capacity would be bounded by the 250 ppy facility emissions. Similarly, the increase in radiological air emissions from the 250 ppy plant operating at surge capacity would be bounded by the 450 ppy plant releases (see Table 5.5.3.2–1). A review of the annual radiological emissions in Table 5.5.3.2–1 indicates that if the emissions for the 450 ppy facility were conservatively doubled for surge capacity, concentrations remain very low. The additional dose represented by these emissions would be well below regulatory limits.

5.5.3.3 Noise

No Action Alternative

Construction Impacts

Under the No Action Alternative, continuing operations at SRS would not involve any new construction. Thus, there would be no impacts from construction noise on wildlife or the public.

Operations Impacts

The noise generating activities described in Section 4.5.3.4 would continue. These noise-generating activities are included in the SRS baseline and are not expected to change under the No Action Alternative.

Modern Pit Facility Alternative

Construction Impacts

Construction of new buildings would involve the movement of workers and construction equipment and would result in some temporary increase in noise levels near the area. Noise sources associated with construction would not include loud impulsive sources such as blasting. Although noise levels in construction areas could be as high as 110 dBA, these high local noise levels would not extend far beyond the boundaries of the construction site. Table 5.2.3.3–1 shows the attenuation of construction noise over relatively short distances. At 122 m (400 ft) from the construction site, construction noises would range from approximately 55-85 dBA. The *Environmental Impact Data Book* (Golden et al. 1980) suggests that noise levels higher than 80-85 dBA are sufficient to startle or frighten birds and small mammals. Thus, there would be little potential for disturbing wildlife outside a 122-m (400-ft) radius of the construction site. Given the distance to the site boundary (4.6 km [2.8 mi]) there would be no change in noise impacts on the public as a result of construction activities, except for a small increase in traffic noise levels from construction employees and material shipments. Impacts would be similar for each of the three plant capacities analyzed (e.g., 125, 250, and 450 ppy) for the MPF.

Construction workers could be exposed to noise levels higher than the acceptable limits specified by OSHA in its noise regulations (29 CFR 1926.52). However, DOE has implemented appropriate hearing protection programs to minimize noise impacts on workers. These include the use of administrative controls, engineering controls, and personal hearing protection equipment.

Operations Impacts

The location of these facilities relative to the site boundary and sensitive receptors was examined to evaluate the potential for onsite and offsite noise impacts. Noise impacts from pit manufacturing operations at the new buildings would be expected to be similar to those from existing operations. There would be an increase in equipment noise (e.g., heating and cooling systems, generators, vents, motors, material-handling equipment) from pit manufacturing activities. However, given the distance to the site boundary (about 4.6 km [2.8 mi]), noise emissions from equipment would not likely disturb the public. These noise sources would be far enough away from offsite areas that their contribution to offsite noise levels would be small. Some noise sources (e.g., public address systems and testing of radiation and fire alarms) could have onsite impacts, such as the disturbance of wildlife. But these noise sources would be intermittent and would not be expected to disturb wildlife outside of facility boundaries. Traffic noise associated with the operation of these facilities would occur onsite and along offsite local and regional transportation routes used to bring materials and workers to the site. Noise from traffic associated with the operation of these facilities would likely produce less than a 1-dBA increase in traffic noise levels along roads used to access the site, and thus would not result in any increased annoyance to the public. Impacts would be similar for each of the three plant capacities analyzed (e.g., 125, 250, and 450 ppy) for the MPF.

Operations workers could be exposed to noise levels higher than the acceptable limits specified by OSHA in its noise regulations (29 CFR 1926.52). However, DOE has implemented appropriate hearing protection programs to minimize noise impacts on workers. These include the use of administrative controls, engineering controls, and personal hearing protection equipment.

Sensitivity Analysis

If any of the three facilities operated at surge capacity, a second shift would be added. However, because of the distance of the facilities to the site boundary, noise from second-shift operations would not be noticeable offsite. Second-shift worker traffic would slightly increase noise levels on local roads. However, most material deliveries would likely occur during normal business hours, so there would be no increase in noise from truck traffic during the second shift. Impacts would be similar for each of the three plant capacities analyzed. Second-shift workers would be exposed to the same level of noise first-shift workers. DOE would implement the same hearing protection programs for the second shift as used for the first. The second shift would not affect worker hearing.

5.5.4 Water Resources

Environmental impacts associated with the proposed alternatives at SRS could affect groundwater resources. No impacts to surface water are expected. At SRS, groundwater resources would likely be used to meet all construction and operations water requirements. Table 5.5.4–1 summarizes existing surface water and groundwater resources at SRS, the total SRS site-wide water resource requirements for each alternative, and the potential changes to water resources at SRS resulting from the proposed alternatives.

Table 5.5.4–1. Potential Changes to Water Resources from the MPF at SRS

Affected Resource Indicator	No Action[a]	MPF Alternative		
		125 ppy Single-Shift Operation	250 ppy Single-Shift Operation	450 ppy Single-Shift Operation
Construction - *Water Availability and Use*				
Water source	Groundwater	Groundwater	Groundwater	Groundwater
Total site-wide water operation requirement (million L/yr)	13,249	13,259.7	13,260.8	13,265.3
Percent change from No Action water use (13,249 million L/yr)	NA	0.81%	0.89%	0.12%
Water Quality				
Wastewater discharge into streams and rivers (million L/yr)	414[b]	416	416	421
Percent change from No Action wastewater discharges into streams and rivers	NA	0.48%	0.48%	1.69%
Operations - *Water Availability and Use*				
Water source	Groundwater	Groundwater	Groundwater	Groundwater
Total site-wide water operation requirement (million L/yr)	13,249	13,526.4	13,578.5	13,753.3
Percent change from No Action water use (13,249 million L/yr)	NA	2.1%	2.5%	3.8%
Water Quality				
Wastewater discharge into streams and rivers (million L/yr)	414[a]	459.0	475.9	495.8
Percent change from No Action Alternative wastewater discharge (414 million L/yr)	NA	10.9%	15.0%	19.8
Floodplain				
Actions in 100-year floodplain	NA	None	None	None
Actions in 500-year floodplain	No Information	No Information	No Information	No Information

[a] Source: DOE 1996c.
[b] Quantity listed is for the Central Sanitary Wastewater Treatment Facility.
All discharges to natural drainages require NPDES permits.
Source: MPF Data 2003.

5.5.4.1 Surface Water

No Action Alternative

No additional impacts on surface water resources are anticipated at SRS under the No Action Alternative beyond the effects of existing and projected activities. The environment and operations (current and planned) described in Chapter 4 (Affected Environment) would continue.

Modern Pit Facility Alternative

Construction Impacts

Surface water would not be used to support the construction of the MPF at SRS as groundwater is the source of water at SRS. Therefore, there would be no impact to surface water availability from construction. Sanitary wastewater would be generated by construction personnel. As plans include use of portable toilets, no onsite discharge of sanitary wastewater would be minimized.

During construction, an estimated total of 37.48 million L (9.9 million gal), 41.26 million L (10.9 million gal), and 54.13 million L (14.3 million gal) of liquid wastes would be generated for the 125 ppy, 250 ppy, and 450 ppy facilities, respectively. It is expected that construction should take approximately 6 years. Assuming an equal generation of liquid waste over that timeframe, it is estimated that approximately 6.25 million L/yr (1.65 million gal/yr), 6.88 million L/yr (1.82 million gal/yr), and 9.02 million L/yr (2.38 million gal/yr) of liquid waste would be generated for the 125, 250, and 450 ppy facilities, respectively. It is estimated that one-third of the liquid wastes generated during construction would be from sanitary wastewater, with the remaining amount attributed to concrete construction activities. Water runoff from construction would be handled according to SRS's NPDES permit for stormwater involving construction activities.

The potential for stormwater runoff from construction areas to impact downstream surface water quality is small. Appropriate soil erosion and sediment control measures (e.g., sediment fences, stacked haybales, mulching disturbed areas, etc.) would be employed during construction to minimize suspended sediment and material transport, as well as potential water quality impacts. SRS would comply with Federal and state regulations to prevent, control, and handle potential spills from construction activities.

The MPF reference location at SRS is not within the 100-year floodplain. Therefore, no impact on the floodplain is anticipated. Information concerning the 500-year floodplain in the area of the reference location is not available.

Operations Impacts

No impacts on surface water resources are expected as a result of operations at SRS. No surface water would be used to support facility activities. Sanitary wastewater would be generated as a result of operations stemming from staff use of lavatory, shower, and breakroom facilities, and from miscellaneous potable and sanitary uses. It is estimated that 45.0 million L (11.9 million gal), 61.9 million L (16.4 million gal), and 81.8 million L (21.6 million gal) of sanitary wastewater would be generated for the 125 ppy, 250 ppy, and 450 ppy facilities, respectively.

These quantities would represent 10.9 percent, 15.0 percent, and 19.8 percent increases, respectively, in sanitary wastewater discharges from the Central Sanitary Wastewater Treatment Facility. SRS's current NPDES permit would require modification and approval concerning the increase in wastewater discharges. Sanitary wastewater would be treated, monitored, and discharged into site streams and the Savannah River, as required under SRS's NPDES permit. No industrial or other NPDES-regulated discharges to surface waters are anticipated.

The MPF would not generate any radioactive water emissions. However, there is a potential for generating radioactive contaminated water from the operation and maintenance of safety showers in contaminated areas, the operation of decontamination stations, the mopping of floors in contaminated areas, and the testing of fire sprinkler systems located in contaminated areas. Wastewater that has the potential for being radioactively contaminated would be collected, sampled, and analyzed prior to discharge. Radioactive wastewater would be converted to a solid and disposed of in accordance with DOE procedures. The water emissions that are sampled, analyzed, and determined to be contaminated can be converted to a solid by processing through the MPF liquid process waste facilities for the plutonium purification process.

Sensitivity Analysis

For a 450 ppy facility working a double shift, more wastewater would be generated by the increased number of workers. As the Central Sanitary Wastewater Treatment Facility would be at less than 50 percent of its capacity under the 450 ppy single shift, this facility would have adequate capacity to handle the increase in flow for the double shift.

5.5.4.2 Groundwater

No Action Alternative

No additional impacts on groundwater availability or quality are anticipated at SRS under the No Action Alternative beyond the effects of existing and projected activities. The environment and operations (current and planned) described in Chapter 4 (Affected Environment) would continue.

Modern Pit Facility Alternative

Construction Impacts

Water would be required during construction for such uses as dust control and soil compaction, washing and flushing activities, and meeting the potable and sanitary needs of construction employees. The proposed use of portable toilets by construction personnel would greatly reduce water use over that normally required during construction. In addition, the water required for concrete mixing would likely be procured offsite. As a result, it is estimated that construction activities would require a total of approximately 71.92 million L (19 million gal), 79.49 million L (21 million gal), and 109.79 million L (29 million gal) of groundwater for the 125 ppy, 250 ppy, and 450 ppy capacity facilities, respectively. It is expected that construction should take approximately 6 years. Assuming an equal usage over that timeframe, it is estimated that approximately 10.7 million L/yr (2.8 million gal/yr), 11.8 million L/yr (3.1 million gal/yr), and 16.3 million L/yr (4.3 million gal/yr) would be needed for the 125, 250, and 450 ppy facilities, respectively. The total site water requirement including these quantities would be feasible since SRS has absolute ownership of the groundwater resource underlying SRS land and has no limit on the amount of water withdrawn annually.

There would be no onsite discharge of wastewater to the surface or subsurface, and appropriate spill prevention controls, and countermeasure plans would be employed to minimize the chance of petroleum, oils, lubricants, and other materials used during construction being released to the surface or subsurface and to ensure that waste materials are properly disposed. In general, no impact on groundwater availability or quality is anticipated.

Operations Impacts

Activities at SRS for the MPF would use groundwater primarily to meet the potable and sanitary needs of facility support personnel and for cooling tower water makeup. A summary of water usage by category and total is listed in Table 5.5.4.2–1. The percent change in water consumption for the No Action Alternative ranges from 2.1-3.8 percent. SRS has absolute ownership of the groundwater resource underlying SRS land and has no restrictions on the amount of groundwater withdrawn annually. However, SRS withdrawal routinely exceeds 379,000 L/day (100,120 gal/day) of water, and therefore the withdrawal rate is reported to the South Carolina Water Resource Commission.

Table 5.5.4.2–1. Summary of Water Consumption During Operations at SRS (million L)

	125 ppy	**250 ppy**	**450 ppy**
Domestic Water	44.9	61.7	81.6
Cooling Tower Makeup	232.5	267.8	422.7
Total	**277.4**	**329.5**	**504.3**
Total needed for site operation	13,526.4	13,578.5	13,753.3
Percent Change from No Action Alternative	2.1%	2.5%	3.8%

Source: MPF Data 2003.

No sanitary or industrial effluent would be discharged to the subsurface. Therefore, no operational impacts on groundwater quality would be expected.

Routine chemical additives would be added to the domestic water to control bacteria and pH, as well as to cooling tower water makeup for bacteria and corrosion control. Table 5.5.4.2–2 summarizes the chemicals added. Use of these types of chemicals is standard and no adverse impacts would be expected.

Sensitivity Analysis

The double shift for 450 ppy would cause an increase in water use over the 450 ppy single shift, which is almost a 4 percent increase in water use at SRS. It is expected that the total increase in groundwater use for the 450 ppy double shift would not exceed 10 percent over the No Action Alternative amount. Because SRS has no restriction on the quantity of groundwater they may withdraw, an increase of this magnitude is feasible.

Table 5.5.4.2–2. Summary of Chemical Additives to Domestic Water and Cooling Tower Water Makeup (kg)

Chemical	125 ppy	250 ppy	450 ppy
Water Chemicals			
Sodium hypochlorite	90	124	164
Sodium hydroxide	58	80	106
Polyphosphate	180	247	327
Cooling Tower Makeup			
Betz Slimicide	120	130	210
Betz 25K series (corrosion inhibitor)	7,000	8,000	12,700

Source: MPF Data 2003.

5.5.5 Geology and Soils

5.5.5.1 No Action Alternative

Under the No Action Alternative, no additional impacts on geology and soils are anticipated at SRS. The environmental impacts and operations (current and planned) described in Chapter 4 would continue. Hazards from large-scale geologic conditions, such as earthquakes, and from other site geologic conditions with the potential to affect existing SRS facilities are summarized in Section 4.4.5 and further detailed in other SRS *National Environmental Policy Act* (NEPA) documents.

5.5.5.2 Modern Pit Facility Alternative

Construction Impacts

The construction of MPF is expected to disturb land adjacent to existing facilities at SRS. Table 5.2.5.2–1 shows the amount of disturbance for the three different plant sizes. The major differences in the three facility layouts are in the sizes of the detention basin, Construction Laydown Area, and the roads and parking. The area of disturbance was calculated by extending the MPF area 9 m (30 ft) from the surrounding roads and the borders of the construction area and Concrete Batch Plant.

While the soils that would be disturbed are classified as prime farmland, the disturbed area would not be converted from farming to other purposes as it is not presently farmed. The FPPA (7 USC 4201 *et seq.*) and associated regulations require agencies to make evaluations of the conversion of farmland to non-agricultural uses by Federal projects and programs. SRS is exempt from FPPA under section 1540(c)(4) since the acquisition of SRS property occurred prior to FPPA's effective date of June 22, 1982 (7 USC 4201 *et seq.*).

Aggregate and other geologic resources (e.g., sand) would be required to support construction activities at SRS, but these resources are abundant in the South Carolina area. In addition to MPF construction and upgrades, excavation to remove and replace some existing utility systems would also be conducted. The land area to be disturbed is relatively small, the impact on geologic and soil resources would be relatively minor. The potential exists for contaminated soils and possibly other media to be encountered during excavation and other site activities. Prior to commencing ground disturbance, DOE would survey potentially affected areas to determine the extent and nature of any contaminated media and required remediation in accordance with the procedures established under the site's environmental restoration program and in accordance with appropriate requirements and agreements. Construction of the MPF would require a stormwater permit that would address erosion control measures to minimize the impacts of erosion.

As discussed in Section 4.5.5, faults located in the vicinity of the representative MPF site have the potential for earthquakes. While the risk for a large earthquake exists in association with the faults that are further away, the smaller potential earthquakes on the closer faults would result in the same or greater ground motion at the MPF site. Ground shaking could occur that would affect primarily the integrity of inadequately designed or nonreinforced structures, but not damaging or slightly damaging properly or specially designed or upgraded facilities.

Operations Impacts

The operation of the MPF at any of the three capacities would not be expected to result in impacts on geologic and soil resources. New, upgraded, and modified facilities would be evaluated, designed, and constructed in accordance with DOE Order 420.1, which requires that nuclear and nonnuclear facilities be designed, constructed, and operated so that workers, the public, and the environment are protected from the adverse impacts of natural phenomena hazards, including earthquakes.

Sensitivity Analysis

Utilizing the 450 ppy facility for two-shift operations, would not impact geologic or soil resources. A second shift of workers would use the same parking lot as the first shift. No increase in the size of the parking lot is foreseen.

5.5.6 Biological Resources

5.5.6.1 Terrestrial Resources

No Action Alternative

Under the No Action Alternative, impacts on terrestrial resources would not occur since no new facilities would be built and no new operations would be conducted. The Chapter 4 description of the existing SRS environment and operations would continue to be an accurate portrayal of the site conditions and current and planned activities not connected with the MPF.

Modern Pit Facility Alternative

Construction Impacts

The area identified for construction of MPF is located on a heavily wooded tract that is topographically flat (Salomone 2002) and in an area that supports a wide diversity of birds, mammals, reptiles, amphibians, and aquatic species.

Depending upon the MPF capacity, approximately 62-74 ha (152-182 ac) of forest and associated wildlife habitat would be cleared or modified during MPF construction. During site-clearing activities, highly mobile wildlife species or wildlife species with large home ranges (such as deer and birds) would be able to relocate to adjacent undeveloped areas. However, successful relocation may not occur due to competition for resources to support the increased population and the carrying capacity limitations of areas outside the proposed development. Species relocation may result in additional pressure to lands already at or near carrying capacity. The impacts could include overgrazing (in the case of herbivores), stress, and over-wintering mortality. For less mobile species (reptiles, amphibians, and small mammals), direct mortality could occur during the actual construction event or ultimately result from habitat alteration. Acreage used for the development also would be lost as potential hunting habitat for raptors and other predators.

Operations Impacts

Impacts to terrestrial resources are very similar regardless of the level of pit production operations (potential pit production capacities of 125, 250, and 450 ppy including surge capacities). The major difference is the size of the modification or loss of forested communities and wildlife habitat. The acreage modified or lost would range from 44-56 ha (110-138 ac) depending upon pit production capacity. In addition to the areas to be disturbed, there would be a decrease in quality of the habitat immediately adjacent to the proposed development due to increased noise level, traffic, lights, and other human activity, both pre- and post-construction. The adjacent habitat also would experience a loss of quality from the reduction in size, segmentation of the habitat, and restriction on mobility for some species (Kelly and Rotenberry 1993).

There would be no direct untreated effluent discharges to the environment and air emissions would be controlled to levels that would not be expected to adversely affect terrestrial resources. With implementation and adherence to administrative procedures, along with facility design and engineering controls for pit production, MPF operations would minimize the potential for any adverse affects to plant and animal communities (terrestrial resources) in the surrounding environment.

Sensitivity Analysis

There would be minimal impacts to terrestrial resources during the two-shift operations. Wildlife road strikes (vehicle and wildlife collisions) may increase during morning and evening shift changes due to more vehicle traffic coupled with decreased visibility and higher wildlife activity.

5.5.6.2 Wetlands

No Action Alternative

Under the No Action Alternative, there would be no impacts to wetlands because no new facilities would be built and no new operations would be conducted. The Chapter 4 description of the existing environment and operations would continue to be an accurate portrayal of the site conditions and current and planned activities not connected with MPF.

Modern Pit Facility Alternative

Construction Impacts

Of the known 300 isolated upland Carolina bays and wetland depressions at SRS, none are located on the MPF site (Salomone 2002). Therefore, there would be no direct impacts to wetlands. Implementation of standard construction practices to minimize site runoff and erosion along with implementation of a stormwater pollution prevention plan would avoid any indirect degradation to wetlands in the area. Should SRS be selected, the potential for wetland impacts exists, and the site-specific tiered-EIS would analyze those potential impacts.

Operations Impacts

There are no adverse impacts predicted to wetlands from implementation of any of the MPF production capacities. There would be no direct untreated effluent discharges to the environment. With implementation and adherence to administrative procedures, along with facility design and engineering controls, MPF operations are not expected to adversely affect any wetlands.

Sensitivity Analysis

There would be no impacts to wetlands during the two-shift operations.

5.5.6.3 Aquatic Resources

No Action Alternative

Under the No Action Alternative, impacts on aquatic resources would not occur since no new facilities would be built and no new operations would be conducted. The Chapter 4 description of the existing environment and SRS operations would continue to be an accurate portrayal of the site conditions and current and planned activities not connected with the MPF.

Modern Pit Facility Alternative

This site is located on a topographic divide, so surface drainage is both west toward Upper Three Runs and east toward Fourmile Branch. Upper Three Runs is considered to be a valuable aquatic resource, not only to SRS, but also to regional ecosystem biodiversity (Salomone 2002).

Construction Impacts

There are no perennial or seasonal aquatic habitats within the proposed MPF location. Thus, there would be no direct impacts to aquatic resources. Indirect effects to aquatic resources downslope and within the SRS watershed would be avoided by implementation of standard construction practices to minimize site runoff and erosion along with implementation of a stormwater pollution prevention plan.

Operations Impacts

There would be no direct discharge of untreated operational effluent from MPF operations. Stormwater runoff from new facilities, roadways, parking lots, and other impervious areas are not predicted to result in any indirect adverse impacts on area aquatic resources. The quality of runoff waters would be similar to runoff from other SRS built environments and the quantity would represent a very minor contribution to the watershed.

Sensitivity Analysis

There would be no impacts to aquatic resources during the two-shift operations.

5.5.6.4 Threatened and Endangered Species

No Action Alternative

Under the No Action Alternative, impacts to threatened and endangered species and other special-interest species would not occur since no new facilities would be built and no new operations would be conducted. The Chapter 4 description of the existing environment and operations would continue to be an accurate portrayal of the site conditions and current and planned activities not associated with the MPF.

Modern Pit Facility Alternative

Section 7 of the *Endangered Species Act* requires all Federal agencies to ensure that actions they authorize, fund, or carry out do not jeopardize the continued existence of endangered or threatened species. Agencies must assess potential impacts and determine if proposed projects may affect federally-listed or proposed-for-listing species. Table 4.5.6.4–1 provides a list of Federal- and state-listed species and other species of special concern that occur or may occur at SRS. There are no known threatened or endangered species or species proposed for listing present at the proposed MPF site (Salomone 2002).

Construction Impacts

Depending upon the MPF capacity, approximately 62-74 ha (152-182 ac) of forest and associated wildlife habitat would be cleared or modified during MPF construction. Should SRS be selected for the construction and operation of the MPF, then DOE, prior to any habitat modifying activities, would conduct site-specific surveys at the appropriate time and assess, in concert with the USFWS, the potential impacts to special-interest species. It is highly probable that several special-interest species are present or use the area for foraging or hunting. Acreage temporarily modified from construction would be lost as potential habitat, foraging areas, or hunting habitat for special interest species until the area revegetates. Revegetation would probably occur within a 1-3 year timeframe depending upon site maintenance and climate conditions.

Operations Impacts

Depending upon pit production capacity, acreage permanently modified or lost as habitat, foraging areas, or as a prey base for species of special interest would range from 44-56 ha (110-138 ac). There would be no direct untreated effluent discharges to the environment and air emissions would be controlled to levels that would not be expected to adversely affect special-interest species. With implementation and adherence to administrative procedures, along with facility design and engineering controls for pit production, MPF operations would minimize the potential impacts to any individual within a special-interest species population.

Sensitivity Analysis

There would be no impacts to threatened and endangered species during the two-shift operations.

5.5.7 Cultural and Paleontological Resources

5.5.7.1 Cultural Resources

No Action Alternative

Under the No Action Alternative, there would be no new facility and operations would remain at current and planned levels. Since there would be no construction activities and operations would remain unchanged, there would be no impact to prehistoric, historic, or Native American cultural resources. The cultural resource environment would remain as described in Chapter 4 (Affected Environment).

Modern Pit Facility Alternative

Construction Impacts

Under the MPF Alternative, a block of land would be disturbed during construction. The size of the disturbed area would vary by the output of the facility, and would include SRS buildings and structures (inside the PIDAS fence), security fencing and perimeter roads, support buildings and parking, a detention basin, a Concrete Batch Plant, a Construction Laydown Area, and a 9-m (30-ft) wide buffer zone surrounding the facility. For purposes of analyzing impacts to cultural resources, the three sizes of disturbed areas would be 62 ha (152 ac) (125 ppy), 63 ha (156 ac) (250 ppy), and 74 ha (182 ac) (450 ppy).

The presence of cultural resources that would be impacted during construction of the MPF at the reference location or any other location at SRS is unknown. However, the reference location at SRS is located in Archaeological Zone 2 (moderate archaeological potential) and very close to Zone 1 (high archaeological potential). This location has not been previously disturbed by construction. Thus, there is a high probability that cultural resources are located within the reference location and would be impacted by the construction of the MPF. The probability that resources would be disturbed by construction of the MPF at another location within SRS is dependent on what archaeological zone the facility would be located in and whether that location has been previously disturbed. Although the number of resources that would be impacted is unknown, the probability for resource impacts would increase with an increase in the number of acres disturbed.

Because the exact location of the MPF at SRS is not yet determined, cultural resources arising from infrastructure construction (such as water, sewer, gas, electricity, access roads) are not analyzed here, but will be in the site-specific tiered EIS. However, like the facility itself, the greater the number of acres disturbed, the greater the possibility for impacts to cultural resources.

Prior to any ground-disturbing activity, DOE would identify and evaluate any cultural resources that could potentially be impacted by construction of the MPF. Methods for identification could include field survey, shovel tests, archival research, and consultation with interested Native American tribes. DOE would determine the possibility for impacts to the resources and implement appropriate measures to avoid, reduce, or mitigate the impacts. Identification, evaluation, determination of impact, and implementation of measures would be conducted in consultation with the South Carolina SHPO and in accordance with the *Archaeological Resources Management Plan of the Savannah River Archaeological Research Program* (SRARP 1989). If previously unknown cultural resources, such as subsurface resources, are discovered during construction, activities in the area of the discovery would stop and the discovery would be evaluated and treated appropriately, as determined by DOE in consultation with the South Carolina SHPO.

Operations Impacts

Operation of the MPF at any of the three capacity levels would have no impact on cultural resources.

Sensitivity Analysis

Utilization of the 450 ppy facility for two-shift operations, would have no impact on cultural resources.

5.5.7.2 Paleontological Resources

No Action Alternative

Under the No Action Alternative, there would be no new facility and operations would remain at current and planned levels. Since there would be no construction activities and operations would remain unchanged, there would be no impact to paleontological resources. The paleontological resource environment would remain as described in Chapter 4 (Affected Environment).

Modern Pit Facility Alternative

Construction Impacts

Paleontological resources at SRS are comprised exclusively of marine invertebrate fossils. These types of fossils are relatively widespread and common, and have a relatively low research potential or scientific value, except for deposits containing giant oysters. Thus, it is probable that paleontological resources would be impacted due to construction of the MPF or the associated infrastructure at the reference location. This is also true for any other area at SRS. The probability for impacts to paleontological resources would increase with an increase in the number of acres disturbed.

Paleontological resources would be included in the scope of any cultural resource inventories conducted prior to the beginning of construction. If previously unknown paleontological resources are discovered during construction, activities in the area of the discovery would stop and the discovery would be treated appropriately, as determined by DOE.

Operations Impacts

Operation of the MPF at any of the three capacity levels would have no impact on paleontological resources.

Sensitivity Analysis

Utilization of the 450 ppy facility for two-shift operations would have no impact on paleontological resources.

5.5.8 Socioeconomics

5.5.8.1 Regional Economy Characteristics

No Action Alternative

Under the No Action Alternative, there would be no change in the workforce currently at SRS. Therefore, there would be no impacts to the ROI employment, income, or labor force.

Modern Pit Facility Alternative

Construction Impacts

Facility– 125 ppy. Construction of the facility to produce 125 ppy would require a total of 2,650 man-years of labor. During peak construction, 770 workers would be employed at the site. In addition to the direct jobs created by the construction of the facility, additional jobs would be created in other supporting industries. It is estimated that approximately 550 indirect jobs would be created, for a total of 1,320 jobs. This represents less than 1 percent of the total ROI labor force.

Due to the low unemployment rate in the ROI and the fact that the construction industry only employs approximately 7 percent of the ROI labor force, it is estimated that many of the direct jobs would be filled by workers migrating into the ROI, at least temporarily during the construction period. Approximately 60 construction workers from outside the ROI would be required to fill these positions. The current ROI labor force would be sufficient to fill the indirect jobs.

ROI income would increase less than 1 percent as a result of the new jobs created. Based on the ROI average earnings of $32,300 for the construction industry, direct income would increase by

$24.9 million at peak construction. This would also generate additional indirect income in supporting industries. The total impact to the ROI income would be approximately $41.7 million ($24.9 million direct and $16.8 million indirect).

Facility–250 ppy. Construction of the facility to produce 250 ppy would require a total of 2,950 man-years of labor. During peak construction, 850 workers would be employed at the site. In addition to the direct jobs created by the construction of the facility, additional jobs would be created in other supporting industries. It is estimated that approximately 610 indirect jobs would be created, for a total of 1,460 jobs. This represents less than 1 percent of the total ROI labor force.

Due to the low unemployment rate in the ROI and the fact that the construction industry only employs approximately 7 percent of the ROI labor force, it is estimated that many of the direct jobs would be filled by workers migrating into the ROI, at least temporarily during the construction period. Approximately 140 construction workers from outside the ROI would be required to fill these positions. The current ROI labor force would be sufficient to fill the indirect jobs.

ROI income would increase less than 1 percent as a result of the new jobs created. Based on the ROI average earnings of $32,300 for the construction industry, direct income would increase by $27.5 million at peak construction. This would also generate additional indirect income in supporting industries. The total impact to the ROI income would be approximately $46.1 million ($27.5 million direct and $18.6 million indirect).

Facility–450 ppy. Construction of the facility to produce 450 ppy would require a total of 3,800 man-years of labor. During peak construction, 1,100 workers would be employed at the site. In addition to the direct jobs created by the construction of the facility, additional jobs would be created in other supporting industries. It is estimated that approximately 790 indirect jobs would be created, for a total of 1,890 jobs. This represents less than 1 percent of the total ROI labor force.

Due to the low unemployment rate in the ROI and the fact that the construction industry only employs approximately 7 percent of the ROI labor force, it is estimated that many of the direct jobs would be filled by workers migrating into the ROI, at least temporarily during the construction period. Approximately 390 construction workers from outside the ROI would be required to fill these positions. The current ROI labor force would be sufficient to fill the indirect jobs.

ROI income would increase less than 1 percent as a result of the new jobs created. Based on the ROI average earnings of $32,300 for the construction industry, direct income would increase by $35.5 million at peak construction. This would also generate additional indirect income in supporting industries. The total impact to the ROI income would be approximately $59.6 million ($35.5 million direct and $24.1 million indirect).

Operations Impacts

Facility–125 ppy. Operation of the facility to produce 125 ppy would require 988 workers. In addition to the direct jobs created by the operation of the facility, additional jobs would be created in other supporting industries. It is estimated that approximately 450 indirect jobs would be created, for a total of 1,440 jobs. This represents less than 1 percent of the total ROI labor force.

Due to the large ROI labor force, it is estimated that most of the direct jobs would likely be filled by current workers in the ROI. In addition, this ROI labor force would be sufficient to fill any indirect jobs generated.

The ROI income would increase less than 1 percent as a result of the new jobs created. Based on the ROI average earnings of $40,600 for the government services industry, direct income would increase by $40.1 million annually. This would also generate additional indirect income in supporting industries. The total impact to the ROI income would be approximately $57.7 million ($40.1 million direct and $17.6 million indirect).

Facility–250 ppy. Operation of the facility to produce 250 ppy would require 1,358 workers. In addition to the direct jobs created by the operation of the facility, additional jobs would be created in other supporting industries. It is estimated that approximately 620 indirect jobs would be created, for a total of 1,980 jobs. This represents approximately 1 percent of the total ROI labor force.

Due to the large ROI labor force, it is estimated that most of the direct jobs would likely be filled by current workers in the ROI. In addition, this ROI labor force would be sufficient to fill any indirect jobs generated.

ROI income would increase less than 1 percent as a result of the new jobs created. Based on the ROI average earnings of $40,600 for the government services industry, direct income would increase by $55.1 million annually. This would also generate additional indirect income in supporting industries. The total impact to the ROI income would be approximately $79.3 million ($55.1 million direct and $24.2 million indirect).

Facility–450 ppy. Operation of the facility to produce 450 ppy would require 1,797 workers. In addition to the direct jobs created by the operation of the facility, additional jobs would be created in other supporting industries. It is estimated that approximately 820 indirect jobs would be created, for a total of 2,620 jobs. This represents approximately 1.3 percent of the total ROI labor force.

Due to the large ROI labor force, it is estimated that most of the direct jobs would likely be filled by current workers in the ROI. In addition, this ROI labor force would be sufficient to fill any indirect jobs generated.

ROI income would increase less than 1 percent as a result of the new jobs created. Based on the ROI average earnings of $40,600 for the government services industry, direct income would increase by $73.0 million annually. This would also generate additional indirect income in supporting industries. The total impact to the ROI income would be approximately $105 million ($73 million direct and $32 million indirect).

Sensitivity Analysis

If the facility were operated on a two-shift system, additional employees would be required for the second shift. This would lead to additional increases in ROI employment and income.

5.5.8.2 Population and Housing

No Action Alternative

Under the No Action Alternative, there would be no change in the workforce currently at SRS. Therefore, there would be no impacts to the ROI population or housing market.

Modern Pit Facility Alternative

Construction Impacts

Facility–125 ppy. The influx of new workers would increase the ROI population and create new housing demand. A total of 140 new residents would be expected in the ROI, including workers and their families. This is less than a 1 percent increase over the current population. The current housing market would likely be sufficient to absorb this increase in the ROI population.

Facility–250 ppy. The influx of new workers would increase the ROI population and create new housing demand. A total of 350 new residents would be expected in the ROI, including workers and their families. This is less than a 1 percent increase over the current population. The current housing market would likely be sufficient to absorb this increase in the ROI population.

Facility–450 ppy. The influx of new workers would increase the ROI population and create new housing demand. A total of 1,000 new residents would be expected in the ROI, including workers and their families. This is less than a 1 percent increase over the current population. The current housing market would likely be sufficient to absorb this increase in the ROI population.

Operations Impacts

Facility–125, 250, or 450 ppy. There would be no impact to the ROI population, housing markets, or community services because all of the new jobs would likely be filled by workers already residing in the ROI, and no in-migration would occur.

Sensitivity Analysis

If the facility were operated on a two-shift system, additional employees would be required for the second shift. This would lead to additional increases in ROI employment and income. However, the existing labor force would likely be able to fill these jobs. Therefore, there would be no additional impacts to the ROI population or housing.

5.5.8.3 Community Services

No Action Alternative

Under the No Action Alternative, there would be no change in the workforce currently at SRS. Therefore, there would be no impacts to ROI community services.

Modern Pit Facility Alternative

Construction Impacts

Facility–125, 250, or 450 ppy. The increase in population would not increase demand on local community services. Comparable levels of service could be maintained without increased staffing.

Operations Impacts

Facility–125, 250, or 450 ppy. There would be no impact to ROI community services because all of the new jobs would likely be filled by workers already residing in the ROI.

Sensitivity Analysis

If the facility were operated on a two-shift system, additional employees would be required for the second shift. This would lead to additional increases in ROI employment and income. However, the existing labor force would likely be able to fill these jobs. Therefore, there would be no additional impacts to ROI community services.

5.5.9 Human Health and Safety

5.5.9.1 Radiological Impacts

No Action Alternative

Under the No Action Alternative, DOE would continue to use the plutonium pit manufacturing capability of PF-4 located in TA-55 at LANL. There would be no change in SRS operations.

Construction Impacts

Under the No Action Alternative, there would be no radiological impacts on members of the public or workers because this alternative would not involve any construction.

Operations Impacts

Under this alternative, the radiological releases to the environment from SRS would continue at the same rates described in Section 4.5.9. The associated impacts on the general public living within 80 km (50 mi) of SRS and the offsite MEI would continue at the levels shown in Table 4.5.9.1–2. As shown in that table, the expected annual radiation dose to the offsite MEI would be much smaller than the limit of 10 mrem/yr set by both EPA (40 CFR 61) and DOE (DOE Order 5400.5) for airborne releases of radioactivity. The fatal cancer risk to the offsite MEI due to radiological releases from SRS operations is estimated to be 9×10^{-8}, while 0.005 excess fatal cancers are projected in the population living within 80 km (50 mi) of SRS from normal SRS operations.

Under this alternative, the radiation dose received by SRS workers would continue at the rates described in Section 4.5.9. These worker radiation doses at SRS are presented for the year 2000 in Table 4.5.9.1–3. The number of projected fatal cancers among SRS workers from normal operations in 2000 is 0.065.

Modern Pit Facility Alternative

Construction Impacts

No radiological risks would be incurred by members of the public from construction activities. Construction workers could be at a small radiological risk. They could receive doses above natural background radiation levels from exposure to radiation from other past or present activities at the site, including that associated with residual contamination at the facilities being upgraded. However, these workers would be protected through appropriate training, monitoring, and management controls. Their exposures would be limited to ensure that doses were kept as low as reasonably achievable.

Operations Impacts

Impacts to the Public. DOE expects minimal public health impacts from the radiological consequences of MPF operations. Public radiation doses would likely occur from airborne releases only (Section 5.5.3). Table 5.5.9.1–1 lists incremental radiation doses estimated for the public (offsite MEI and collective population dose) and corresponding incremental LCFs. To put the doses into perspective, comparisons with natural background radiation levels are included in the table.

Table 5.5.9.1–1. Annual Radiological Impacts on the Public from MPF Operations at SRS for All Three Pit Production Rates

Receptor	125 ppy	250 ppy	450 ppy
Population within 80 km			
Collective dose (person-rem)	4.2×10^{-7}	7.0×10^{-7}	1.3×10^{-6}
Percent of natural background radiation[a]	0.00000000013%	0.00000000022%	0.00000000041%
LCFs[b]	2.1×10^{-10}	3.5×10^{-10}	6.5×10^{-10}
Offsite MEI			
Dose (mrem)	2.6×10^{-9}	4.3×10^{-9}	8.0×10^{-9}
Percent of regulatory dose limit	0.000000026%	0.000000043%	0.000000080%
Percent of natural background radiation[a]	0.00000000089%	0.0000000015%	0.0000000027%
Cancer fatality risk[b]	1.3×10^{-15}	2.2×10^{-15}	4.0×10^{-15}

[a] The average annual dose from background radiation at SRS is 293 mrem (see Section 4.3.9); the 1,085,852 people living within 80 km (50 mi) of SRS in the year 2043 would receive an annual dose of 318,155 person-rem from the background radiation.
[b] Based on a cancer risk estimate of 0.0005 LCFs per person-rem.
[c] The offsite MEI is assumed to reside at the site boundary, 10,800 m (35,435 ft) southwest from the MPF. An actual residence may not currently be present at this location.

As shown in the table, the expected annual radiation dose to the offsite MEI would be much smaller than the limit of 10 mrem/yr set by both the EPA (40 CFR 61) and DOE (DOE Order 5400.5) for airborne releases of radioactivity. The risk of a LCF to this individual from operations would be less than or equal to 4.0×10^{-15} per year (i.e., about 1 chance in 250 trillion per year of a LCF). The projected number of fatal cancers to the population within 80 km (50 mi) would be less than or equal to 6.5×10^{-10} per year (i.e., about 1 chance in 1.5 billion per year of a LCF).

Impacts to Modern Pit Facility Workers. Estimates of annual radiological doses to workers involved with MPF operations are independent of geographical location. These dose estimates are solely a function of:

- The number of radiological workers, as determined in the development of the MPF staffing estimate for each throughput alternative. The current estimates were developed by application of a factor to the total workers for each work group based on operating experience in plutonium facilities. Approximately 60 percent of total operating staff are estimated to be radiological workers.

- The working dose rate at the glovebox surface for each unit operation or workstation. These dose rates were calculated based on the maximum mass (plutonium, americium) and form (metal, oxide) of material being handled. Standard “weapons grade” isotopic distribution, and americium content of 0.5 percent were assumed.

- The amount of time spent by direct operators/first line supervisors in the radiation area. This was determined from a time-motion estimate of direct “hands-in-gloves” labor required to perform each individual operation and the number of parts processed per year for a given pit production rate. Efficiency scaling factors were applied for various operations. For Foundry and Machining operations, this was assumed to be 50 percent; for Assembly and Post-Assembly & Testing, efficiencies were 90 percent.

As indicated above, the collective annual dose (mrem/yr) received by individual direct operators is calculated based on the number of operators required for the various production rates, the time spent in the radiation area, and the associated dose rates for each operation. The collective exposures for support group workers were added to these numbers and were calculated using empirical data that implies that exposure for these workers can be estimated as a percentage of direct operator exposure (e.g., Analytical Laboratory Technician ~25 percent of direct operator exposure). The average individual dose is calculated as the collective exposure divided by the estimated number of radiological workers for each throughput alternative.

The estimates of annual radiological doses to workers under each of the three pit production rates are provided in Table 5.5.9.1–2. As shown in the table, the annual doses to individual workers for all levels of production would be well below the DOE limit of 5,000 mrem (10 CFR 835.202) and the DOE-recommended control level of 1,000 mrem (10 CFR 835.1002). The projected number of fatal cancers in the workforce from annual operations involving 125 ppy would be 0.064 (or 1 chance in 16 that the worker population would experience a fatal cancer per year of operations). For annual pit production rates of 250 and 450, the projected number of fatal cancers would be 0.12 and 0.22, respectively (1 chance in 8 or 5, respectively, that the worker population would experience a fatal cancer per year of operations).

Table 5.5.9.1–2. Annual Radiological Impacts on MPF Workers at SRS from Operations for All Three Pit Production Rates

Production Rate	125 ppy	250 ppy	450 ppy
Number of Radiological Workers	**550**	**800**	**1,100**
Individual Workers[a]			
Average individual dose, mrem/yr	290	390	510
Average worker cancer fatality risk[b]	1.2×10^{-4}	1.6×10^{-4}	2.0×10^{-4}
Worker Population			
Collective dose (person-rem)	160	310	560
Cancer fatality risk[b]	0.064	0.12	0.22

[a] The regulatory dose limit for an individual worker is 5,000 mrem/yr (10 CFR 835). However, the maximum annual dose to a worker would be kept below the DOE Control Level of 1,000 mrem/yr, as established in 10 CFR 835.1002. Further, DOE recommends that facilities adopt a more limiting 500-mrem/yr Administrative Control Level (DOE 1999e). To reduce doses to levels that are as low as reasonably achievable, an effective dose reduction plan would be enforced.
[b] Based on a cancer risk estimator of 0.0004 LCFs per person-rem.

Sensitivity Analysis

DOE could operate the MPF using a double shift to increase the plutonium pit manufacturing capability. Double-shift operation of the MPF under any of the three capacities would approximately double the quantities of radioactive emissions from the MPF presented for single-shift operation at each capacity. Thus, the calculated radiation dose and LCFs to the offsite MEI and the population living within 80 km (50 mi) of SRS would approximately double.

Similarly, double-shift operation of the MPF under any of the three capacities would approximately double the radiation dose to MPF workers presented for single-shift operation at each capacity. Thus, the calculated adverse health impacts to MPF workers would be approximately double.

5.5.9.2 Nonradiological Impacts

This section considers illness, injury, and fatality rates associated with construction and operation of the MPF on the SRS workforce. Nonradiological impacts to workers were evaluated using occupational injury, illness, and fatality rates obtained from BLS, U.S. Department of Labor data. DOE values are historically lower than BLS values owing to the increased focus on safety fostered by complex-wide programs, including ISM and the VPP. Additionally, the small number of fatal accidents reported in the CAIRS makes associated calculated fatality rates statistically invalid.

No Action Alternative

Under the No Action Alternative, DOE would continue to use the plutonium pit manufacturing capability of PF-4 located in TA-55 at LANL. There would be no change in injury, illness, and fatality trends currently observed at SRS.

Modern Pit Facility Alternative

Construction Impacts

The potential risk of occupational injuries and fatalities to workers constructing the MPF would be expected to be bounded by injury and fatality rates for general industrial construction. Using BLS data for 1997-2001, Total Recordable Cases, Lost Workday Cases, and Fatalities were estimated for both the peak workforce loading and for the duration of construction activities including site preparation (6¾ years). These values are shown below in Table 5.5.9.2–1.

Table 5.5.9.2–1. Injury, Illness, and Fatality Estimates for Construction of MPF at SRS

Injury, Illness, and Fatality Categories	MPF Operating Capacity		
	125 ppy	250 ppy	450 ppy
Peak Annual Employment	770	850	1,100
Total Recordable Cases	66	73	95
Total Lost Workday Cases	32	35	46
Total Fatalities	0.16	0.17	0.023
Project Duration (6¾ years)			
Total Recordable Cases	228	254	328
Total Lost Workday Cases	110	122	157
Total Fatalities	0.54	0.60	0.78

Source: MPF Data 2003, BLS 2002b.

No chemicals have been identified that would be a risk to members of the public from construction activities associated with any of the MPF operating capacities. Construction workers would be protected from hazardous chemicals by adherence to OSHA and EPA occupational standards that limit concentrations of potentially hazardous chemicals. Implementation of ISMS programs to construction activities would also decrease the potential for worker exposures by providing hazards identification and control measures for construction activities (WSRC 2002c).

Operations Impacts

During normal (accident-free) operations, total facility staffing would range from approximately 988-1,797, depending on the operating capacity of the selected MPF. The potential risk of occupational injuries and fatalities to workers operating the MPF would be expected to be bounded by injury and fatality rates for general chemical manufacturing. Using BLS data for 1997-2001, Total Recordable Cases, Lost Workday Cases, and Fatalities were estimated for facility populations for each of the operating capacities. These values are shown below in Table 5.5.9.2–2.

Table 5.5.9.2–2. Injury, Illness, and Fatality Annual Estimates for Normal Operations of MPF at SRS

Injury, Illness, and Fatality Categories	MPF Operating Capacity		
	125 ppy	250 ppy	450 ppy
Total Recordable Cases	43	59	78
Total Lost Workday Cases	22	30	40
Total Fatalities	0.04	0.05	0.07

Source: MPF Data 2003, BLS 2002b.

No chemical-related health impacts are associated with normal (accident-free) operations of MPF at the three identified operating capacities. Initial screens for the hazard analysis did not result in the identification of any controls necessary to protect the public or workers from direct chemical exposures. Facility design features that minimize the worker exposures during facility operations act as defense-in-depth controls. In addition to these controls, worker protection is augmented by facility safety programs such as ISMS, work planning, chemical hygiene, industrial hygiene personnel monitoring, and emergency preparedness (WSRC 2002c).

Sensitivity Analysis

DOE could operate the MPF using a double shift to increase the plutonium pit manufacturing capability. Double-shift operation of the 450 ppy facility would approximately double the impacts to the SRS illness and injury rates for facility associated activities. No chemical-related health impacts would be associated with this increase in operations.

5.5.10 Facility Accidents

This section presents the potential impacts on workers (both involved and non-involved) and the public due to potential accidents associated with the operation of the MPF at SRS. Additional details supporting the information presented here are provided in Appendix C.

An accident is a sequence of one or more unplanned events with potential outcomes that endanger the health and safety of workers and the public. An accident can involve a combined release of energy and hazardous materials (radiological or chemical) that might cause prompt or latent health effects. The sequence usually begins with an initiating event, such as a human error, equipment failure, or earthquake, followed by a succession of other events that could be dependent or independent of the initial event, which dictate the accident's progression and the extent of materials released. Initiating events fall into three categories:

- *Internal initiators* normally originate in and around the facility, but are always a result of facility operations. Examples include equipment or structural failures and human errors.

- *External initiators* are independent of facility operations and normally originate from outside the facility. Some external initiators affect the ability of the facility to maintain its confinement of hazardous materials because of potential structural damage. Examples include aircraft crashes, vehicle crashes, nearby explosions, and toxic chemical releases at nearby facilities that affect worker performance.

- *Natural phenomena initiators* are natural occurrences that are independent of facility operations and occurrences at nearby facilities or operations. Examples include earthquakes, high winds, floods, lightning, and snow. Although natural phenomena initiators are independent of external facilities, their occurrence can involve those facilities and compound the progression of the accident.

If an accident were to occur involving the release of radioactive or chemical materials, workers, members of the public, and the environment would be at risk. Workers in the facility where the accident occurs would be particularly vulnerable to the effects of the accident because of their location. The offsite public would also be at risk of exposure to the extent that meteorological conditions exist for the atmospheric dispersion of released hazardous materials. Using approved computer models, DOE predicted the dispersion of released hazardous materials and their effects. However, prediction of latent potential health effects becomes increasingly difficult to quantify for facility workers as the distance between the accident location and the worker decreases. This is because the individual worker exposure cannot be adequately defined with respect to the presence of shielding and other protective features. The worker also may be injured or killed by physical effects of the accident.

Emergency Preparedness

Each DOE site has established an emergency management program. This program has been developed and maintained to ensure adequate response for most accident conditions and to provide response efforts for accidents not specifically considered. The emergency management program incorporates activities associated with emergency planning, preparedness, and response.

5.5.10.1 No Action Alternative

Under the No Action Alternative, all current activities would continue at existing levels. Potential accident scenarios for the No Action Alternative are addressed in existing documentation included by reference (DOE 1996c).

5.5.10.2 Modern Pit Facility Alternative

Radiological Impacts

DOE estimated radiological impacts to three receptors: (1) the MEI at the SRS boundary; (2) the offsite population within 80 km (50 mi) of SRS; and (3) a non-involved worker 1,000 m (3,281 ft) from the accident location. DOE did not evaluate total dose to non-involved workers because of the uncertain nature of worker locations at the time of the accident.

Tables 5.5.10.2–1 through 5.5.10.2–3 show the frequencies and consequences of the postulated set of accidents for the public (offsite MEI and the general population living within 80 km [50 mi] of the facility) and a hypothetical non-involved worker for the three pit production rates. The dose shown in the tables are calculated by the MACCS computer code based on accident data. The LCF values are calculated using a dose-to-LCF conversion factor. For the MEI and the population the conversion factor is 0.0005 LCFs per rem or person-rem respectively. For workers, the dose-to-risk conversion factor is 0.0004 LCFs per rem. If the dose to an MEI or worker exceeds 20 rem, the dose-to-risk conversion factor is doubled to 0.001 and 0.0008 respectively. Tables 5.5.10.2–4 through 5.5.10.2–6 show the accident risks, obtained by multiplying the consequences by the likelihood (frequency per year) that an accident would occur. The accidents listed in these tables were selected from a wide spectrum of accidents described in the *Topical Report - Supporting Documentation for the Accident Impacts Presented in the Modern Pit Facility Environmental Impact Statement* (Tetra Tech 2003). The selection process, screening criteria used, and conservative estimates of material at risk and source term (see Appendix C) ensure that the accidents chosen for evaluation in this EIS bound the impacts of all reasonably foreseeable accidents that could occur at the MPF. Thus, in the event that any other accident that was not evaluated in this EIS were to occur, its impacts on workers and the public would be expected to be within the range of the impacts evaluated.

Table 5.5.10.2–1. MPF Alternative Radiological Accident Frequency and Consequences at SRS for 125 ppy

Frequency (per year)	Offsite MEI		Offsite Population[a]		Non-involved Worker	
	Dose (rem)	LCFs[b]	Dose (person-rem)	LCFs[c]	Dose (rem)	LCFs[b]
Beyond Evaluation Basis Earthquake with Fire						
1×10^{-5}	3.16	0.0016	13,100	6.55	207	0.17
Fire in a Single Building						
1×10^{-4}	1.64	0.00082	5,930	3.0	127	0.1
Explosion in a Feed Casting Furnace						
1×10^{-2}	1.92	0.00096	6,950	3.5	149	0.12
Nuclear Criticality						
1×10^{-2}	3.4×10^{-6}	1.7×10^{-9}	0.013	6.3×10^{-6}	0.00061	2.4×10^{-7}
Fire-induced Release in the CRT Storage Room						
1×10^{-2}	0.13	6.4×10^{-5}	463	0.23	9.92	0.004
Radioactive Material Spill						
1×10^{-2}	0.038	1.9×10^{-5}	139	0.07	2.98	0.0012

[a] Based on a year-2043 population of 1,085,852 persons residing within 80 km (50 mi) of SRS.
[b] Increased likelihood of a LCF.
[c] Increased number of LCFs.

Table 5.5.10.2–2. MPF Alternative Radiological Accident Frequency and Consequences at SRS for 250 ppy

Frequency (per year)	Offsite MEI		Offsite Population[a]		Non-involved Worker	
	Dose (rem)	LCFs[b]	Dose (person-rem)	LCFs[c]	Dose (rem)	LCFs[b]
Beyond Evaluation Basis Earthquake with Fire						
1×10^{-5}	3.26	0.0016	13,500	6.75	213	0.17
Fire in a Single Building						
1×10^{-4}	1.7	0.00085	6,150	3.07	132	0.11
Explosion in a Feed Casting Furnace						
1×10^{-2}	1.92	0.00096	6,950	3.47	149	0.12
Nuclear Criticality						
1×10^{-2}	3.4×10^{-6}	1.7×10^{-9}	0.013	6.3×10^{-6}	0.00061	2.4×10^{-7}
Fire-induced Release in the CRT Storage Room						
1×10^{-2}	0.13	6.4×10^{-5}	463	0.23	9.92	0.004
Radioactive Material Spill						
1×10^{-2}	0.038	1.9×10^{-5}	139	0.07	3.0	0.0012

[a] Based on a year-2043 population of 1,085,852 persons residing within 80 km (50 mi) of SRS.
[b] Increased likelihood of a LCF.
[c] Increased number of LCFs.

Table 5.5.10.2–3. MPF Alternative Radiological Accident Frequency and Consequences at SRS for 450 ppy

Frequency (per year)	Offsite MEI		Offsite Population[a]		Non-involved Worker	
	Dose (rem)	LCFs[b]	Dose (person-rem)	LCFs[c]	Dose (rem)	LCFs[b]
Beyond Evaluation Basis Earthquake with Fire						
1×10^{-5}	6.27	0.0031	26,000	13	411	0.33
Fire in a Single Building						
1×10^{-4}	3.3	0.0017	11,900	5.96	255	0.2
Explosion in a Feed Casting Furnace						
1×10^{-2}	1.92	0.00096	6,950	3.47	149	0.12
Nuclear Criticality						
1×10^{-2}	3.4×10^{-6}	1.7×10^{-9}	0.013	6.3×10^{-6}	0.00061	2.4×10^{-7}
Fire-induced Release in the CRT Storage Room						
1×10^{-2}	0.26	1.3×10^{-4}	927	0.46	19.8	0.0079
Radioactive Material Spill						
1×10^{-2}	0.038	1.9×10^{-5}	139	0.07	2.98	0.0012

[a] Based on a year-2043 population of 1,085,852 persons residing within 80 km (50 mi) of SRS.
[b] Increased likelihood of a LCF.
[c] Increased number of LCFs.

Table 5.5.10.2–4. Annual Cancer Risks Due to MPF Accidents at SRS for 125 ppy

Accident	Offsite MEI[a]	Offsite Population[b,c]	Non-involved Worker[a]
Beyond Evaluation Basis Earthquake with Fire	1.6×10^{-8}	6.6×10^{-5}	1.7×10^{-6}
Fire in a Single Building	8.2×10^{-8}	0.0003	1.0×10^{-5}
Explosion in a Feed Casting Furnace	9.6×10^{-6}	0.035	0.0012
Nuclear Criticality	1.7×10^{-11}	6.3×10^{-8}	2.4×10^{-9}
Fire-induced Release in the CRT Storage Room	6.4×10^{-7}	0.0023	4.0×10^{-5}
Radioactive Spill Material	1.9×10^{-7}	0.0007	1.2×10^{-5}

[a] Increased likelihood of a LCF.
[b] Increased number of LCFs.
[c] Based on a year-2043 population of 1,085,852 persons residing within 80 km (50 mi) of SRS.

Table 5.5.10.2–5. Annual Cancer Risks Due to MPF Accidents at SRS for 250 ppy

Accident	Offsite MEI[a]	Offsite Population[b,c]	Non-involved Worker[a]
Beyond Evaluation Basis Earthquake with Fire	1.6×10^{-8}	6.8×10^{-5}	1.7×10^{-6}
Fire in a Single Building	8.5×10^{-8}	0.00031	1.1×10^{-5}
Explosion in a Feed Casting Furnace	9.6×10^{-6}	0.035	0.0012
Nuclear Criticality	1.7×10^{-11}	6.3×10^{-8}	2.4×10^{-9}
Fire-induced Release in the CRT Storage Room	6.4×10^{-7}	0.0023	4.0×10^{-5}
Radioactive Spill Material	1.9×10^{-7}	0.0007	1.2×10^{-5}

[a] Increased likelihood of a LCF.
[b] Increased number of LCFs.
[c] Based on a year-2043 population of 1,085,852 persons residing within 80 km (50 mi) of SRS.

Table 5.5.10.2–6. Annual Cancer Risks Due to MPF Accidents at SRS for 450 ppy

Accident	Offsite MEI[a]	Offsite Population[b,c]	Non-involved Worker[a]
Beyond Evaluation Basis Earthquake with Fire	3.1×10^{-8}	0.00013	3.3×10^{-6}
Fire in a Single Building	1.7×10^{-7}	0.0006	2.0×10^{-5}
Explosion in a Feed Casting Furnace	9.6×10^{-6}	0.035	0.0012
Nuclear Criticality	1.7×10^{-11}	6.3×10^{-8}	2.4×10^{-9}
Fire-induced Release in the CRT Storage Room	1.3×10^{-6}	0.0046	7.9×10^{-5}
Radioactive Spill Material	1.9×10^{-7}	0.0007	1.2×10^{-5}

[a] Increased likelihood of a LCF.
[b] Increased number of LCFs.
[c] Based on a year-2043 population of 1,085,852 persons residing within 80 km (50 mi) of SRS.

The accident with the highest risk to the offsite population (see Tables 5.5.10.2–4 through 5.5.10.2–6) is the explosion in a feed casting furnace for the 125 ppy, 250 ppy and 450 ppy production cases. The increased number of LCF in the offsite population would be 0.035 per year (i.e., about 1 chance in 28 per year of a LCF in the total population) for all three production cases. The highest risk of a LCF to an offsite MEI located 10,840 m (35,564 ft) southwest from the accident would be 9.6×10^{-6} per year (i.e., about 1 chance in 104,000 per year of a LCF) for all three production cases. The highest risk of a LCF to a non-involved worker located 1,000 m

(3,281 ft) from the accident would be 0.0012 per year (i.e., about 1 chance in 800 per year of a LCF) for all three production cases.

Hazardous Chemicals Impacts

DOE estimated the impacts of the potential release of the most hazardous chemicals used at the MPF. A chemical's vapor pressure, acceptable concentration (ERPG-2), and quantity available for release are factors used to rank a chemical's hazard. The accident scenario postulates a major leak, such as a pipe rupture, and the released chemical forming a pool about one inch in depth in the area around the point of release. Additional information on the evaporation and dispersion of each chemical is provided in Appendix C. Tables 5.5.10.2–7 through 5.5.10.2–9 provide information on each chemical and the frequency and consequences of an accidental release. The source term shown represents the amount of the chemical that is accidentally released. The American Industrial Hygiene Association defines ERPG-2 as the maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action. The distance from the release point to the point where the ERPG-2 concentration is reached in relation to the site boundary reflects the consequence of the chemical's release. As the distance to the ERPG-2 point increases, the potential number of persons onsite and offsite that may be exposed to concentrations in excess of ERPG-2 would be expected to increase. The distance to the nearest site boundary is 8.7 km (5.4 mi). None of the chemicals released in the accident would exceed ERPG-2 limits offsite.

Table 5.5.10.2–7. MPF Alternative Chemical Accident Frequency and Consequences at SRS for 125 ppy

Chemical Released	Quantity Released (kg)	ERPG-2 [a]		Concentration [a]		Frequency
		Limit (ppm)	Distance to Limit (km)	At 1,000 m (ppm)	At Site Boundary 8.7 km (ppm)	
Nitric acid	10,500	6	0.44	1.27	0.017	10^{-4}
Hydrofluoric acid	550	20	0.49	3.35	0.03	10^{-4}
Formic acid	1,500	10	0.13	0.19	0	10^{-4}

[a] Site boundary is at a distance of 8.7 km (5.4 mi) west.

Table 5.5.10.2–8. MPF Alternative Chemical Accident Frequency and Consequences at SRS for 250 ppy

Chemical Released	Quantity Released (kg)	ERPG-2 [a]		Concentration [a]		Frequency
		Limit (ppm)	Distance to Limit (km)	At 1,000 m (ppm)	At Site Boundary 8.7 km (ppm)	
Nitric acid	21,000	6	0.62	2.45	0.032	10^{-4}
Hydrofluoric acid	1,100	20	0.66	6.51	0.06	10^{-4}
Formic acid	3,000	10	0.18	0.37	0	10^{-4}

[a] Site boundary is at a distance of 8.7 km (5.4 mi) west.

Table 5.5.10.2–9. MPF Alternative Chemical Accident Frequency and Consequences at SRS for 450 ppy

Chemical Released	Quantity Released (kg)	ERPG-2 [a]		Concentration [a]		Frequency
		Limit (ppm)	Distance to Limit (km)	At 1,000 m (ppm)	At Site Boundary 8.7 km (ppm)	
Nitric acid	40,000	6	0.86	4.52	0.06	10^{-4}
Hydrofluoric acid	2,000	20	0.83	11.5	0.11	10^{-4}
Formic acid	5,500	10	0.24	0.66	0.0084	10^{-4}

[a] Site boundary is at a distance of 8.7 km (5.4 mi) west.

Involved Worker Impacts

For all of the accidents, there is a potential for injury or death to involved workers in the vicinity of the accident. Prediction of potential health effects becomes increasingly difficult to quantify as the distance between the accident location and the receptor decreases. This is because the individual worker exposure cannot be adequately defined with respect to the presence of shielding and other protective features. The worker also may be acutely injured or killed by physical effects of the accident.

The number of workers that would be at the MPF during operations would range from 988-1,797 (125-450 ppy) (including security guards). Each process facility within the MPF would have attached safe haven structures designed in accordance with a number of life safety, fire protection, and safeguards and security requirements. These structures are required for personnel protection during various accident scenarios and are made of reinforced concrete similar in design to the process building wall construction. They would be designed to accommodate 120 percent of the building occupancy for a number of hours and would require their own independent ventilation systems (WSRC 2002b).

The facility ventilation system would control dispersal of any airborne radiological debris from the accident. Following initiation of accident/site emergency alarms, workers would evacuate the area in accordance with site emergency operating procedures and would not be vulnerable to additional radiological or chemical risk of injury.

5.5.11 Environmental Justice

Under Executive Order 12898, DOE is responsible for identifying and addressing disproportionately high and adverse impacts on minority or low-income populations. Minority persons are those who identify themselves as being Black or African American; American Indian and Alaska Native; Asian; Native Hawaiian and other Pacific Islander; or another non-White race; or persons of Hispanic or Latino ethnicity. Persons whose incomes are below the Federal poverty threshold are designated low-income.

At SRS, the 80-km (50-mi) radius includes portions of McCormick, Edgefield, Saluda, Aiken, Lexington, Barnwell, Bamberg, Orangeburg, Allendale, and Hampton Counties in South Carolina, and Warren, McDuffie, Columbia, Richmond, Jefferson, Burke, Emanuel, Jenkins, and Screven Counties in Georgia. Table 5.5.11–1 provides the racial and ethnic composition of these counties based on the 2000 Census, as well as the number of people below the poverty level.

Figures 5.5.11–1 and 5.5.11–2 show the distribution of these populations throughout the area around the site. Figure 5.5.11–1 shows the minority populations located with an 80-km (50-mi) radius of the site. Figure 5.5.11–2 shows the low-income populations located within the same 80-km (50-mi) radius. This study area corresponds to the region of potential radiological impacts.

Table 5.5.11–1. Racial, Ethnic, and Socioeconomic Composition Surrounding SRS

Population Group	Population	Percent of Total
Hispanic or Latino	21,156	2.2
Black or African American	338,908	34.6
American Indian and Alaska Native	2,850	0.3
Asian	9,991	1.0
Native Hawaiian and Other Pacific Islander	437	0.0
Other Race	962	0.1
Two or More Races	9,152	0.9
White	595,084	60.8
Total	**978,540**	**100**

In 2002, minority populations comprised 30.9 percent of the U.S. population, 37.4 percent of the Georgia population, and 33.9 percent of the South Carolina population. The percentage of minority populations in the area surrounding SRS is 39.1 percent, more than that in the United States and the states of South Carolina and Georgia.

Based on 1999 income, low-income populations comprised 12.4 percent of the U.S. population, 13.0 percent of the Georgia population, and 14.1 percent of the South Carolina population. Within the counties surrounding LANL, 15.9 percent of the population lives below the poverty level.

As shown in Section 5.5.9, Human Health and Safety, there are no large adverse impacts to any populations. Therefore, there would be no disproportionately high and adverse impacts to minority or low-income populations.

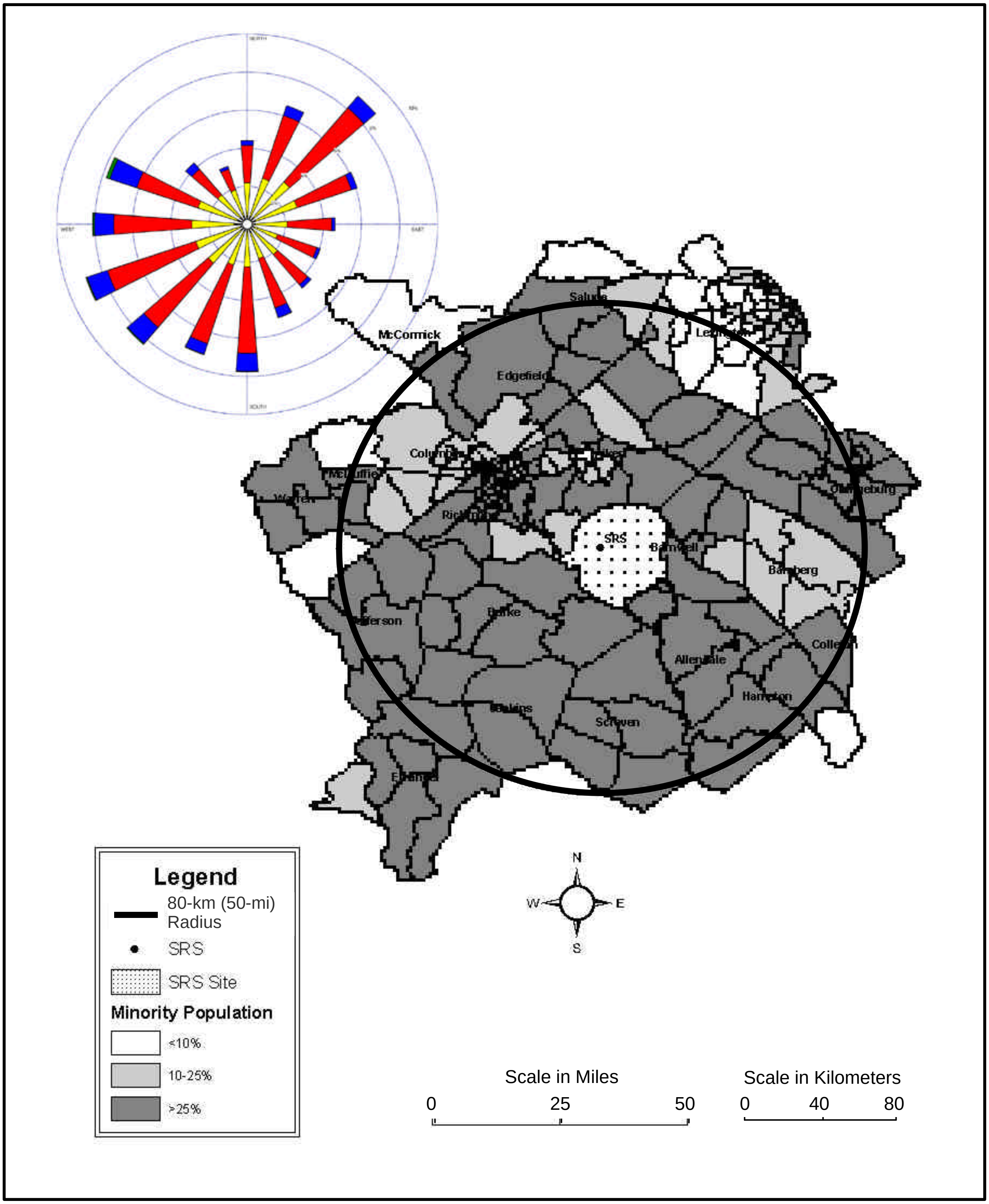

Figure 5.5.11–1. Distribution of the Minority Population Surrounding SRS

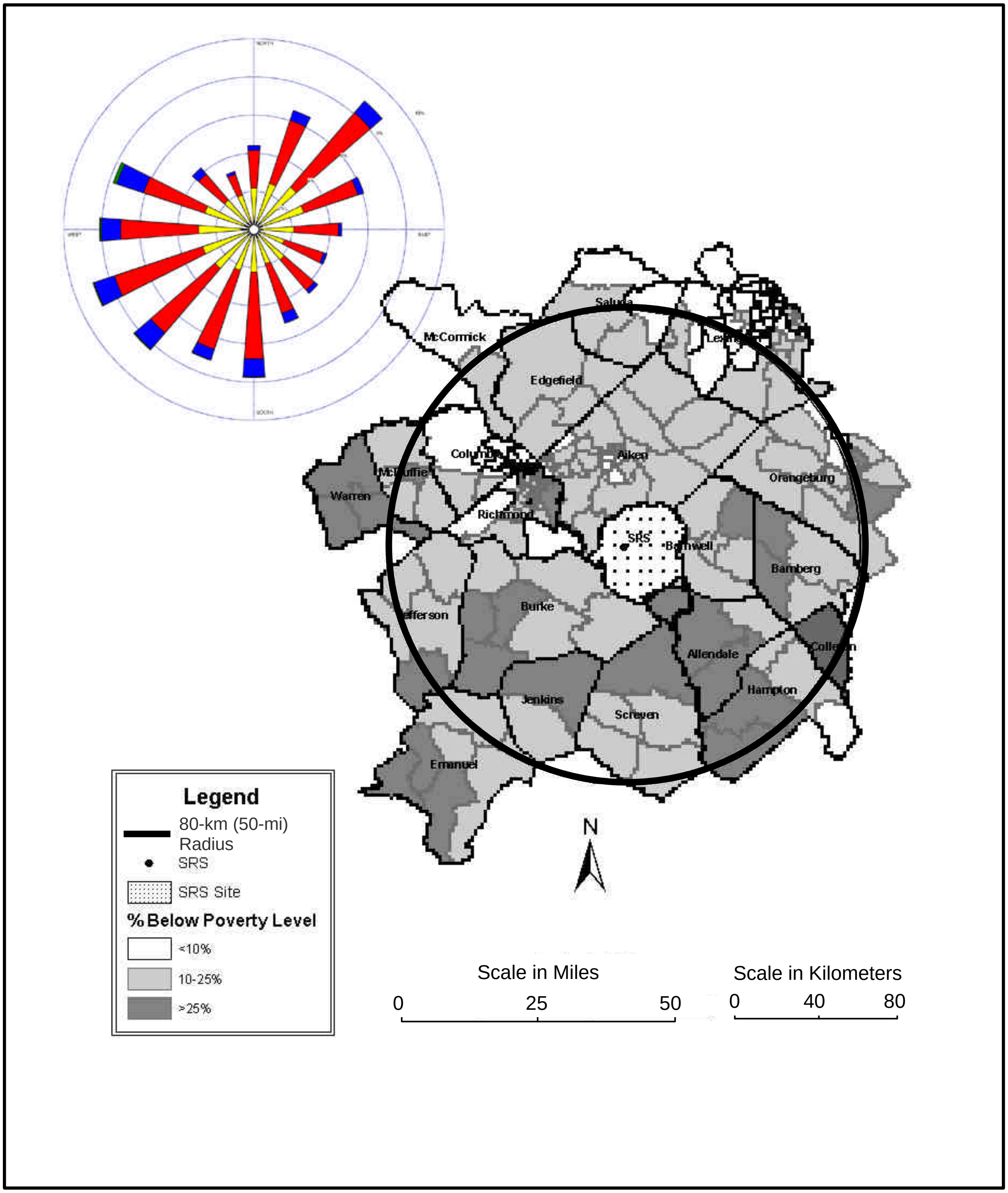

Figure 5.5.11–2. Distribution of the Low-Income Population Surrounding SRS

5.5.12 Transportation

Impacts to the human environment from transportation can result from two sources: operation of the vehicle and the presence of the cargo. Vehicle-related impacts could include increased emissions, traffic congestion, noise, and traffic accidents. Cargo-related impacts could include incident-free radiation dose to those on and near the highway and radiation dose or chemical exposure from the cargo when the containers are breached following an accident.

This EIS is primarily concerned with determining a candidate DOE site for MPF. A second EIS would be prepared once a DOE site is identified for more detailed analysis. Accordingly, this EIS focuses on a limited suite of analyses that will most specifically aid decisionmakers in distinguishing transportation impacts among the five DOE sites under consideration. NNSA has selected for quantitative analysis incident-free radiation dose to workers and the public, accident radiation dose-risk (which includes the probability of the accident occurring) to all individuals affected by the accident, and traffic accident fatalities. In addition, the analysis presents a qualitative discussion on traffic impacts near the DOE facility under both construction and operations. Traffic impacts would result from commuting workers and construction deliveries. Other potential analytical endpoints are roughly proportional to the analyzed endpoints and would yield similar relative distinction among the five DOE sites.

Appendix D presents NNSA's methodology in analyzing the selected analytical endpoints and provides some detail on the calculations, including the more important analytical parameters.

5.5.12.1 No Action Alternative

There are no activities at SRS under the No Action Alternative that are related to the Proposed Action.

5.5.12.2 Modern Pit Facility Alternative

Construction Impacts

Construction of the MPF at SRS would result in increased traffic due to commuting construction workers and deliveries of construction materials and equipment. Although this traffic increase would tend to increase congestion on local roads, the increase would be small compared to the average daily traffic levels reported in Section 4.5.10 and would be temporary.

Operations Impacts

Radiological transportation under the MPF Alternative for SRS would include transport of pits from Pantex (near Amarillo, Texas) to SRS, recycle of enriched uranium parts to and from the Y-12 (Oak Ridge, Tennessee), return of pits and enriched uranium parts to Pantex, and shipment of TRU waste to WIPP (near Carlsbad, New Mexico). LLW would be disposed of at SRS. The NNSA's analysis includes options for 125, 250, and 450 ppy. Table 5.5.12.2–1 presents the number of shipments for the MPF Alternative. Tables 5.5.12.2–2 and 5.5.12.2–3 present incident-free impacts from this transportation. Tables 5.5.12.2–4 and 5.5.12.2–5 present the accident impacts.

Table 5.5.12.2–1. Numbers of Shipments per Year at SRS for the MPF

Transported Materials	125 ppy	250 ppy	450 ppy
Pits	14	28	50
EU parts	10	20	36
TRU waste	74	93	142
Total	**98**	**141**	**228**

EU = enriched uranium.

Table 5.5.12.2–2. Annual Incident-Free Transportation Impacts to Workers at SRS for the MPF

Transported Materials	125 ppy		250 ppy		450 ppy	
	Collective Dose (person-rem)	LCFs	Collective Dose (person-rem)	LCFs	Collective Dose (person-rem)	LCFs
Pits	0.23	9.1×10^{-5}	0.46	1.8×10^{-4}	0.82	3.3×10^{-4}
EU parts	0.054	2.2×10^{-5}	0.11	4.3×10^{-5}	0.19	7.8×10^{-5}
TRU waste	2.8	1.1×10^{-3}	3.5	1.4×10^{-3}	5.3	2.1×10^{-3}
Total	**3.1**	**1.2 ´ 10^{-3}**	**4.1**	**1.6 ´ 10^{-3}**	**6.4**	**2.5 ´ 10^{-3}**

Table 5.5.12.2–3. Annual Incident-Free Transportation Impacts to the General Public at SRS for the MPF

Transported Materials	125 ppy		250 ppy		450 ppy	
	Collective Dose (person-rem)	LCFs	Collective Dose (person-rem)	LCFs	Collective Dose (person-rem)	LCFs
Pits	0.35	1.7×10^{-4}	0.70	3.5×10^{-4}	1.2	6.2×10^{-4}
EU parts	0.091	4.5×10^{-5}	0.18	9.1×10^{-5}	0.33	1.6×10^{-4}
TRU waste	5.3	2.7×10^{-3}	6.7	3.3×10^{-3}	10.0	5.1×10^{-3}
Total	**5.8**	**2.9 ´ 10^{-3}**	**7.6**	**3.8 ´ 10^{-3}**	**12.0**	**5.9 ´ 10^{-3}**

Table 5.5.12.2–4. Annual Transportation Accident Radiological Impacts at SRS for the MPF

Transported Materials	125 ppy		250 ppy		450 ppy	
	Dose Risk (person-rem)	LCFs	Dose Risk (person-rem)	LCFs	Dose Risk (person-rem)	LCFs
Pits	4.9×10^{-7}	2.5×10^{-10}	9.9×10^{-7}	4.9×10^{-10}	1.8×10^{-6}	8.8×10^{-10}
EU parts	9.3×10^{-12}	4.7×10^{-14}	1.9×10^{-10}	9.3×10^{-14}	3.4×10^{-10}	1.7×10^{-13}
TRU waste	0.011	5.4×10^{-6}	0.013	6.7×10^{-6}	0.021	1.0×10^{-5}
Total	**0.011**	**5.4 ´ 10^{-6}**	**0.013**	**6.7 ´ 10^{-6}**	**0.021**	**1.0 ´ 10^{-5}**

Table 5.5.12.2-5. Annual Nonradiological Fatalities From Transportation Accidents at SRS for the MPF

Transported Materials	125 ppy		250 ppy		450 ppy	
	Number of Accidents	Number of Fatalities	Number of Accidents	Number of Fatalities	Number of Accidents	Number of Fatalities
Pits	0.010	5.5×10^{-4}	0.020	1.1×10^{-3}	0.036	1.9×10^{-3}
EU parts	3.3×10^{-3}	1.1×10^{-4}	6.5×10^{-3}	2.2×10^{-4}	0.012	4.0×10^{-4}
TRU waste	0.086	3.6×10^{-3}	0.11	4.5×10^{-3}	0.16	6.8×10^{-3}
Total	**0.099**	**4.2 ´ 10^{-3}**	**0.13**	**5.8 ´ 10^{-3}**	**0.21**	**9.2 ´ 10^{-3}**

The addition of 988-1,797 new employees under the three capacity options would represent an increase in SRS employment ranging from 8.2-15 percent, with a corresponding increase in commuting traffic. Although this additional traffic increase would tend to increase congestion on local roads, the increase is small compared to the overall average daily traffic level reported in Section 4.5.10.

Sensitivity Analysis

Should NNSA elect to operate a new 450 ppy facility at SRS in two shifts, the impacts would increase. The incident-free doses for the 450 ppy facility reported in Tables 5.5.12.2–2 and 5.5.12.2–3 would increase by approximately the factor 1.8 because the numbers of shipments would increase. The accident values in Table 5.5.12.2–4 would also increase by a factor of 1.8 because of increased probability of the accident; however, the consequences of an accident, should one occur, would not change. The duration of traffic congestion during shift change would increase.

5.5.13 Waste Management

This section considers the burden that waste generation associated with construction and operation of the MPF places on the SRS waste treatment, storage, and disposal infrastructure. Impacts are evaluated based on routine waste generation, excluding wastes generated from environmental restoration or D&D activities. Impacts associated with transportation of radioactive waste from SRS to offsite disposal facilities are provided in Section 5.5.12.

5.5.13.1 No Action Alternative

Under the No Action Alternative, DOE would continue to use the plutonium pit manufacturing capability of PF-4 located in TA-55 at LANL. There would be no change to the current and planned SRS waste management activities described in Section 4.5.11.

5.5.13.2 Modern Pit Facility Alternative

Construction Impacts

Construction of MPF would generate solid and liquid sanitary waste and liquid nonhazardous waste. Table 5.5.13.2–1 summarizes the total volume of waste generated over the 6 years of construction activity for the three proposed MPF operating capacities.

Table 5.5.13.2–1. Total Waste Generation from Construction of the MPF (m^3)

Waste type	MPF Operating Capacity		
	125 ppy	250 ppy	450 ppy
Hazardous waste	4.9	5.1	5.9
Sanitary waste	7,110	7,870	11,200
Sanitary wastewater	37,500	41,300	54,100

Source: MPF Data 2003.

MPF construction activities would increase annual sanitary waste generation by 54-84 percent, relative to current SRS operations. The waste would be disposed in an onsite structural fill or the Three Rivers Regional Landfill, located within SRS boundaries. If there were sufficient demand, DOE may pursue a permit for an onsite construction and debris landfill, replacing the Burma Road Landfill that was filled to capacity in 2001. This combination of disposal facilities would provide adequate capacity to handle the projected amount of waste.

MPF construction activities would increase the annual routine hazardous waste generation by less than 2 percent over current SRS operations. The hazardous waste would be sent offsite for treatment and disposal at a commercial facility. Commercial treatment is readily available and currently used to treat most SRS hazardous wastes.

Sanitary wastewater generated during MPF construction would be treated in the Centralized Sanitary Wastewater Treatment Facility. The anticipated volume of sanitary wastes would not be expected to have any effect on the existing capacity of the SRS sanitary sewer system.

A detention pond would be constructed to manage stormwater runoff from the entire MPF site including the Construction Laydown Area and Concrete Batch Plant. The basin would be sized to limit stormwater discharge from the developed site to no greater than the pre-existing conditions, with a basin area of approximately 0.4 ha (1 ac) per 16 ha (40 ac) of developed land.

A Concrete Batch Plant would operate at the MPF site during the construction phase. The Concrete Batch Plant would include a basin to manage wastewater from equipment washout activities. The facility would be located on approximately 4 ha (10 ac) adjacent to the PIDAS. The Concrete Batch Plant would be disassembled and the area would be restored once MPF construction is completed.

Operations Impacts

Normal operation of the MPF would generate TRU waste, LLW, mixed LLW, hazardous waste, and sanitary waste. Table 5.5.13.2–2 summarizes the estimated waste generation rates for the three proposed MPF operating capacities.

Table 5.5.13.2–2. MPF Operations Annual Waste Generation (m^3)

Waste type	MPF Operating Capacity		
	125 ppy	250 ppy	450 ppy
TRU waste	590	740	1,130
LLW	2,070	3,300	5,030
Mixed LLW—solid	1.5	2.0	3.5
Mixed LLW—liquid	0.2	0.4	0.7
Hazardous waste—solid	2.5	3.0	5.0
Hazardous waste—liquid	0.3	0.4	0.6
Sanitary waste	5,500	5,800	6,900
Sanitary wastewater	45,000	61,900	81,800

Source: MPF Data 2003.

SRS currently manages an inventory of approximately 11,000 m^3 (388,500 ft^3) of legacy TRU waste (WSRC 2002a). The projected TRU waste volumes for the three proposed MPF operating capacities represent an increase by a factor of 7.1, 8.8, and 14, respectively, in the annual routine TRU waste generation at SRS. TRU waste generated from plutonium pit manufacturing includes gloves, filters, and other operations/maintenance waste from the MPF gloveboxes. Americium process waste would be solidified and packaged as TRU waste. About 36 percent of the TRU waste would be mixed waste. The TRU waste would be transferred from the MPF process buildings to the Waste Staging/TRU Packaging Building, which would be located outside of the PIDAS. The Waste Staging/TRU Packaging Building would include a staging area with capacity for approximately 1,200 TRU waste drums (about 250 m^3 [8,800 ft^3] of TRU waste). A drum loading area equipped with overhead bridge cranes would load the waste drums into TRUPACT-II shipping containers and load the TRUPACT-II containers onto trucks for transport to WIPP. The size of the Waste Staging/TRU Packaging Building (approximately 1,950 m^2 [21,000 ft^2]) is not expected to vary with the MPF operating capacity. Section 6.5 discusses the availability of WIPP for disposal of TRU waste resulting from MPF operations.

LLW from MPF operations would include job control waste, failed equipment, and other general operations/maintenance waste. Any liquid LLW resulting from MPF operations would be solidified prior to leaving the facility. LLW generation for the three proposed MPF operating capacities would increase the annual LLW generation at SRS by 37, 58, and 92 percent, respectively. The LLW would be transferred to E-Area for disposal. Offsite disposal could also be used for LLW that is not technically or economically suitable for disposal at SRS. The estimated capacity of the E-Area facilities is approximately 245,600 m^3 (8,673,400 ft^3) and the projected volumes for disposal are about 118,900 m^3 (4,199,000 ft^3) (DOE 2000g). The remaining capacity would be adequate to dispose of all the projected LLW from MPF operations (104,000-251,000 m^3 [3,672,760-8,864,000 ft^3] from the 125 ppy operating capacity but not from the 250 ppy and 450 ppy operating capacities). Expansion of the currently planned LLW disposal facilities at SRS by 38,300-124,300 m^3 (1,352,600-4,389,700 ft^3) would be required for the 250 and 450 ppy operating capacities.

MPF operations would generate small amounts of hazardous waste and mixed LLW. These wastes include lead acid batteries, lubricating oils/fluids, rags, and sorbents. The projected hazardous waste volumes from MPF operations represent 4.3-8.5 percent of the annual routine volumes currently managed at SRS. Commercial treatment is readily available and currently used to treat most SRS hazardous wastes.

Operation of the MPF would increase annual routine mixed LLW generation at SRS by about 1 percent relative to current site operations. Depending on the characteristics of the mixed LLW, it would be transferred to onsite treatment facilities or shipped to commercial or DOE treatment and disposal facilities.

Nonhazardous waste from MPF operations includes sanitary solid waste and wastewater. The solid waste would be disposed in an onsite structural fill or the Three Rivers Regional Landfill, located within SRS boundaries. If there were sufficient demand, DOE may pursue a permit for an onsite construction and debris landfill, replacing the Burma Road Landfill that was filled to capacity in 2001. Although MPF operations would increase annual sanitary waste generation by 250-320 percent relative to current SRS operations, the combination of disposal facilities is expected to provide adequate disposal capacity.

Sanitary wastewater generated during MPF operations would be treated in the Centralized Sanitary Wastewater Treatment Facility. The anticipated volume of sanitary wastes would not be expected to have any effect on the existing capacity of the SRS sanitary sewer system.

MPF operations are not expected to generate radioactive wastewater. However, the potential does exist for generating radioactively contaminated water from the operation and maintenance of safety showers in contamination areas, the operation of decontamination stations, the mopping of floors in contamination areas, and the testing of fire sprinkler systems located in contamination areas. Wastewaters that could potentially be contaminated would be collected, sampled, and analyzed prior to discharge. Any contaminated wastewater would be solidified by processing through the liquid-process waste facilities for the plutonium purification process (MPF Data 2003).

Sensitivity Analysis

DOE could elect to operate the MPF using a double shift to increase the plutonium pit manufacturing capability. Double-shift operation of the 450 ppy facility would approximately double the impacts to the waste management infrastructure from those described above for the single-shift operation. Although this would substantially increase the SRS routine waste generation, the volumes resulting from double-shift operation are not expected to exceed the available capacities of the waste management facilities, except for the currently planned onsite LLW disposal. The remaining capacity of the planned E-Area disposal facilities would not be adequate to dispose of all the projected LLW from MPF double-shift operation. Some expansion of the currently planned LLW disposal facilities at SRS would be required. See Section 6.5 for a discussion of the availability of WIPP for disposal of TRU waste resulting from MPF operations.