APPENDIX G
IMPACTS OF PLUTONIUM DISPOSITION OPTIONS

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Each of the alternatives evaluated in this *SPD Supplemental EIS* is composed of a particular combination of plutonium disposition options and pit disassembly and conversion options. This appendix to this *Final Surplus Plutonium Disposition Supplemental Environmental Impact Statement (SPD Supplemental EIS)* addresses impacts from the construction and operation of facilities at the Savannah River Site (SRS) and Los Alamos National Laboratory (LANL) that may be used for plutonium disposition. Details about the pit disassembly and conversion options are provided in Chapter 2, Section 2.1; details about the plutonium disposition options are provided in Section 2.2; and details about the *SPD Supplemental EIS* alternatives are provided in Section 2.3. The environmental impacts of implementing the alternatives are presented in Chapter 4.

Appendix B to this *SPD Supplemental EIS* provides descriptions of the SRS and LANL facilities that may be used for plutonium disposition, while Appendix E addresses the environmental impacts from shipments of radioactive and nonradioactive materials and waste, including shipments of contact-handled transuranic (CH-TRU) waste to the Waste Isolation Pilot Plant (WIPP) and shipments of unirradiated mixed oxide (MOX) fuel to domestic commercial nuclear reactors. Appendix F addresses the environmental impacts at SRS and LANL from the options for pit disassembly and conversion; Appendix H, the environmental impacts from the principal support facilities at SRS and LANL needed for pit disassembly and conversion and plutonium disposition; and Appendix I, the environmental impacts from the use of MOX fuel in commercial nuclear power reactors.

The options for plutonium disposition addressed in this appendix may involve the use of multiple facilities at SRS and LANL; the options are as follows:

- *Immobilization and DWPF Option* – Surplus pit and non-pit plutonium would be immobilized at SRS within an immobilization capability constructed at K-Area, and can-in-canisters containing immobilized plutonium would be transferred to the Defense Waste Processing Facility (DWPF) at S-Area to be filled with vitrified high-level radioactive waste (HLW) and transferred to Glass Waste Storage Buildings (GWSBs).

- *MOX Fuel Option* – Surplus pit and non-pit plutonium would be fabricated at SRS into MOX fuel at the Mixed Oxide Fuel Fabrication Facility (MFFF) under construction in F-Area. MOX fuel would be subsequently shipped to domestic commercial nuclear power reactors for irradiation.

- *H-Canyon/HB-Line and DWPF Option* – Surplus non-pit plutonium would be dissolved at SRS at H-Canyon/HB-Line in H-Area, with the resulting plutonium solution transferred to DWPF in S-Area for vitrification with HLW within canisters that would be transferred to GWSBs.

- *WIPP Disposal Option* – Surplus plutonium would be prepared at SRS or LANL for potential disposal as CH-TRU waste at WIPP near Carlsbad, New Mexico. Surplus pit plutonium would be disassembled and converted to oxide at facilities at SRS or LANL (see Appendix F). At H-Canyon/HB-Line at SRS or Technical Area 55 (TA-55) facilities at LANL, oxidized pit plutonium would be blended with inert materials, placed into appropriate containers, and staged at onsite waste management facilities pending shipment to WIPP. Surplus non-pit plutonium would be transferred at SRS from storage at the K-Area Complex to H-Canyon/HB-Line and, after as-needed oxidation (see below), prepared for potential WIPP disposal in essentially the same way as that for pit plutonium.[1, 2]

Under all four plutonium disposition options, the analyses in this appendix only address activities and impacts attributable to plutonium disposition activities at a given facility and not other activities such as pit disassembly or conversion that may be performed at the same facility. For example, the impacts presented in this appendix for MFFF at SRS under the MOX Fuel Option are for fabrication of plutonium oxide into MOX fuel and not for conversion of pit plutonium to an oxide form in metal oxidation furnaces installed in MFFF. Impacts from metal oxidation at MFFF are addressed in Appendix F.

The analysis in this appendix for the MOX Fuel Option includes the impacts from fabricating MOX fuel at MFFF as well as from a preceding step in which 4 metric tons (4.4 tons) of non-pit plutonium would be converted to an oxide form at H-Canyon/HB-Line prior to transfer to MFFF for MOX fuel fabrication. This additional processing step for 4 metric tons (4.4 tons) of non-pit plutonium is applicable under the MOX Fuel Alternative; for all other alternatives the impacts under the MOX Fuel Option for plutonium disposition would be those from operation of MFFF alone.

Under the WIPP Disposal Option, the surplus non-pit plutonium addressed in this *SPD Supplemental EIS* includes plutonium metal and oxide and unirradiated Fast Flux Test Facility (FFTF) fuel. The plutonium metal would be oxidized at H-Canyon/HB-Line before blending and packaging. If the unirradiated FFTF could not be disposed of by direct disposal at WIPP, it would be disassembled, blended, and packaged for disposal at WIPP. H-Canyon would be used to disassemble fuel bundles, remove the pellets from fuel pins, and package the pellets into suitable containers; HB-Line would prepare and mix/blend the fuel pellet material with inert material, and package the blended material for shipment to WIPP.[1]

Under the WIPP Disposal Option, the environmental impacts associated with preparation of pit plutonium for potential WIPP disposal would depend on the pit disassembly and conversion option (see Appendix F).[3] Under the two options where a Pit Disassembly and Conversion Facility or Pit Disassembly and Conversion Project would be constructed at SRS, 7.1 metric tons (7.8 tons) of pit plutonium could be prepared at SRS for potential WIPP disposal. Under the Plutonium Facility (PF-4) and MFFF and PF-4, H-Canyon/HB-Line, and MFFF Options, however, 7.1 metric tons (7.8 tons) of pit plutonium could be prepared for potential WIPP disposal using a combination of SRS and LANL capabilities. In this event, the volumes of CH-TRU waste generated at SRS would decrease while the volumes of CH-TRU waste generated at LANL would increase, but the total CH-TRU waste volume as summed over SRS and LANL would remain approximately the same.

A capability to blend and package plutonium for shipment to WIPP would be required at LANL to disposition pit plutonium from LANL to WIPP as part of the WIPP Disposal Option. The process steps required to blend and package plutonium are well understood and currently being performed at LANL on a smaller scale in support of other programs, but some changes would be necessary at LANL to expand the capabilities to accommodate a larger volume. These changes or modifications would likely occur within the footprint of existing or planned LANL facilities.

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[1] *The analysis reflects the assumption that H-Canyon/HB-Line would be the facility used at SRS for preparation of surplus plutonium for potential WIPP disposal; however, surplus plutonium could also be prepared for potential WIPP disposal at the K-Area Complex at SRS with impacts enveloped by those for the Pit Disassembly and Conversion Project (see Appendix F). Impacts from K-Area storage and from staging TRU waste at SRS or LANL facilities pending shipment to WIPP are addressed in Appendix H.*

[2] *Impacts are presented in this appendix assuming the surplus plutonium is blended and placed into pipe overpack containers for shipment to WIPP. DOE is also evaluating the use of other packaging options that would generate less waste for shipment to WIPP. See Appendix E and Chapter 4, Sections 4.1.4 and 4.1.5.*

[3] *Under all four pit disassembly and conversion options, non-pit plutonium would be prepared at SRS for potential WIPP disposal – i.e., either 2 metric tons (2.2 tons) under the MOX Fuel Alternative or 6 metric tons (6.6 tons) under the WIPP Alternative.*

DOE could add capacity to accommodate the increased CH-TRU waste volume, throughput, and temporary storage capacity in existing facilities in TA-55 such as PF-4. At this stage detailed information is not available on the changes that would be required; however, the processes would be the same as those currently being performed at LANL. Because the general processes at HB-Line also are similar to those at LANL and because this document already has information on the impacts of the same scale of operations at HB-Line, DOE has used that information (where appropriate) in this Appendix G as part of a qualitative evaluation of the impacts of preparing plutonium at LANL for potential disposal at WIPP. Use of LANL facilities to prepare pit plutonium for potential disposal at WIPP may require additional NEPA analysis.

This appendix does not address the environmental impacts from disposal of CH-TRU waste at WIPP or disposal of HLW or used nuclear fuel (also known as spent fuel or spent nuclear fuel).[4] Impacts from TRU waste disposal are addressed in the *Waste Isolation Pilot Plant Disposal Phase Final Supplemental Environmental Impact Statement* (DOE 1997), and incorporated by reference in this *SPD Supplemental EIS* (see Appendix A, Section A.2.2).

G.1 Air Quality

Nonradioactive air pollutant impacts under each plutonium disposition option are evaluated in this section. Radioactive air pollutant impacts are evaluated in Section G.2, Human Health.

Activities under the various options could result in criteria, hazardous, and toxic air pollutant emissions from facility construction and operation. **Table G–1** shows air pollutant concentrations that were evaluated for operational activities at SRS and compared to applicable standards and significance levels. In this table, columns on the left provide impacts for specific plutonium disposition facilities at SRS, while columns on the right provide combined impacts for one or more SRS facilities as appropriate for each plutonium disposition option.[5]

Significance levels are concentrations below which no further analysis is necessary for that pollutant for the purpose of permitting. Concentrations above the significance levels could need to undergo further analysis to consider the cumulative impacts from other sources within the impact area (EPA 1990:C28; Page 2010a, 2010b; 40 CFR 51.165(b) (2)). Where new modeling was performed for this *SPD Supplemental EIS*, current U.S. Environmental Protection Agency (EPA) models were used. For example, the EPA AERMOD dispersion model (EPA 2004) was used unless stated otherwise. As required, updated emissions and concentrations were determined based on information provided in cited references.

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[4] *DOE has terminated the program for a geologic repository for used nuclear fuel and HLW at Yucca Mountain, in Nevada. Notwithstanding the decision to terminate the Yucca Mountain program, DOE remains committed to meeting its obligations to manage and ultimately dispose of used nuclear fuel and HLW. DOE established the Blue Ribbon Commission on America's Nuclear Future to conduct a comprehensive review and evaluate alternative approaches for meeting these obligations. The Commission report to the Secretary of Energy of January 26, 2012 (BRCANF 2012) provided a strong foundation for the development of the Administration's January 2013* Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste *(DOE 2013). This Strategy provides a framework for moving toward a sustainable program to deploy an integrated system capable of transporting, storing, and disposing of used nuclear fuel and HLW from civilian nuclear power generation, defense, national security, and other activities. The link to the strategy is http://energy.gov/downloads/strategy-management-and-disposal-used-nuclear-fuel-and-high-level-radioactive-waste. Full implementation of this Strategy will require legislation.*

[5] *This format is used to present information in several tables throughout this appendix.*

Table G–1 Estimated Air Pollutant Concentrations at the Site Boundary from Operations at Plutonium Disposition Facilities at the Savannah River Site

				SRS Facilities								*Plutonium Disposition Options*			
						H-Canyon/HB-Line			*DWPF* [d]						
Pollutant	*Averaging Period*	*More Stringent Standard or Guideline* [a]	*Significance Level* [b] *(μg/m³)*	*MFFF*	*K-Area Immobilization Capability* [c]	*Prepare Pu for MFFF*	*Prepare Pu for DWPF Vitrification*	*Prepare Pu for WIPP Disposal*	*Immobilized Pu*	*Waste from Pu Prepared for MFFF*	*Pu Prepared for Vitrification*	*Immobilization and DWPF*	*MOX Fuel* [e]	*H-Canyon/ HB-Line and DWPF*	*WIPP Disposal*
Criteria Pollutants (micrograms per cubic meter)															
Carbon monoxide	8 hours	10,000	500	23	18	N/C	N/C	N/C	N/C	N/C	N/C	18	23	N/C	N/C
	1 hour	40,000	2,000	79	140	N/C	N/C	N/C	N/C	N/C	N/C	140	79	N/C	N/C
Nitrogen dioxide	Annual	100	1	0.05	0.024	N/C	N/C	N/C	N/C	N/C	N/C	0.024	0.05	N/C	N/C
	1 hour	188	7.5	N/R	39	N/C	N/C	N/C	N/C	N/C	N/C	39	N/R	N/C	N/C
PM_{10}	24 hours	150	5	0.78	1	N/C	N/C	N/C	N/C	N/C	N/C	1	0.78	N/C	N/C
$PM_{2.5}$	Annual	15	0.3	0.0004	0.0008	N/C	N/C	N/C	N/C	N/C	N/C	0.0008	0.0004	N/C	N/C
	24 hours	35	1.2	0.78	1	N/C	N/C	N/C	N/C	N/C	N/C	1	0.78	N/C	N/C
Sulfur dioxide	Annual	80	1	0.003	0.0072	N/C	N/C	N/C	N/C	N/C	N/C	0.0072	0.003	N/C	N/C
	24 hours	365	5	4.8	7.9	N/C	N/C	N/C	N/C	N/C	N/C	7.9	4.8	N/C	N/C
	3 hours	1,300	25	22	59	N/C	N/C	N/C	N/C	N/C	N/C	59	22	N/C	N/C
	1 hour	197	7.8	N/R	65	N/C	N/C	N/C	N/C	N/C	N/C	65	N/R	N/C	N/C

DWPF = Defense Waste Processing Facility; μg/m³ = micrograms per cubic meter; MFFF = Mixed Oxide Fuel Fabrication Facility; MOX = mixed oxide; N/C = no change from existing emissions; N/R = not reported; PM_n = particulate matter less than or equal to *n* microns in aerodynamic diameter; Pu = plutonium; SRS = Savannah River Site; WIPP = Waste Isolation Pilot Plant.

[a] The more stringent of the Federal and state standards is presented if both exist for the averaging period.

[b] EPA 1990; Page 2010a, 2010b; 40 CFR 51.165(b)(2).

[c] Concentrations from the K-Area immobilization capability were estimated based on projected emissions from the K-Area Pit Disassembly and Conversion Project addressed in Appendix F, Section F.1.

[d] Contributions from DWPF are included in the concentrations from sources at SRS as presented in Chapter 3, Table 3–7. A fraction of those emissions could be attributed to plutonium disposition activities as discussed in Section G.1.1.

[e] Listed impacts for the MOX Fuel Option for plutonium disposition conservatively include those from processing 4 metric tons (4.4 tons) of non-pit plutonium at H-Canyon/HB-Line (and vitrification of waste resulting from this processing at DWPF) as a precursor for fabrication of the plutonium into MOX fuel at MFFF. This processing step for non-pit plutonium is applicable under the MOX Fuel Alternative; for all other alternatives the impacts under the MOX Fuel Option would be those from operation of MFFF alone.

Note: Values have been rounded where appropriate.

Source: DCS 2004:5-91; DOE/NNSA 2012; EPA 1990, 2009; Page 2010a, 2010b; SCDHEC 2012; 40 CFR 51.165.

G.1.1 Immobilization and DWPF

Construction—With the exception of a 2-acre (0.8-hectare) construction site at K-Area at SRS, construction of the K-Area immobilization capability would occur mostly inside existing buildings. Exterior activities, such as excavation and paving, would generate small quantities of fugitive dust and other emissions (SRNS 2012). Minimal emissions of pollutants would result from modifications to DWPF to support receipt and handling of canisters containing plutonium immobilized at K-Area.

Operations—Nonradioactive air pollutant emissions from the K-Area immobilization capability could result from operation and testing of additional diesel generators. Estimated air pollutant emissions from testing and operation of diesel generators at the K-Area immobilization capability are summarized in **Table G–2**. Generators would be tested intermittently. Generators operating less than 250 hours per year are considered insignificant sources and are exempt from Title V permitting (SRNS 2010). Other than emissions from diesel generators, there would be minimal emissions of other nonradioactive air pollutants from the immobilization capability. These would include small amounts of fluorides, hydrochloric acid, nickel and nickel oxide, and beryllium and beryllium oxide (SRNS 2012; WSRC 2008).

During the period when immobilized plutonium would be combined with vitrified HLW at DWPF, as much as 5 percent of DWPF emissions would be attributed to vitrification of HLW used to encase can-in-canisters of immobilized plutonium.

Table G–2 Estimated Air Pollutant Emissions from Testing and Operation of Diesel Generators for the K-Area Immobilization Capability at the Savannah River Site

Pollutant [a]	*250-Kilowatt (metric tons per year)* [b]	*810-Kilowatt (metric tons per year)* [b]	*Total (metric tons per year)*
Carbon monoxide	0.51	2.7	3.2
Nitrogen dioxide	2.4	12	14
PM_{10}	0.16	0.34	0.51
Sulfur dioxide	0.15	4.0	4.1
Carbon dioxide	87	570	660
Total organic compounds	0.19	0.34	0.54

PM_{10} = particulate matter less than or equal to 10 microns in aerodynamic diameter.

[a] Emissions data for $PM_{2.5}$ were not available. Emissions data were available for total organic compounds but not for volatile organic compounds. Total organic compounds include volatile organic compounds.

[b] The 250-kilowatt unit consists of one diesel generator; the 810-kilowatt unit consists of two diesel generators.

Note: To convert metric tons to tons, multiply by 1.1023.

Source: WSRC 2008.

G.1.2 MOX Fuel

Construction—MFFF is already under construction and impacts from its construction have been previously assessed (DOE 1999; NRC 2005). Emissions from MFFF construction are included with the SRS baseline (see Chapter 3, Section 3.1.4.2).

Operations—Nonradioactive air pollutant emissions would result from operation of MFFF. SRS boundary concentrations based on the latest projected emissions for operation of MFFF (currently under construction) are summarized in Table G–1. Under the MOX Fuel Alternative, 4 metric tons (4.4 tons) of non-pit plutonium would be converted to plutonium oxide at H-Canyon/HB-Line, but no changes are expected in operational air emissions from H-Canyon/HB-Line.

G.1.3 H-Canyon/HB-Line and DWPF

Construction—Internal modifications to H-Canyon/HB-Line at SRS would result in only minor emissions of criteria and toxic air pollutants (SRNL 2013).

Operations—No changes are expected in air pollutant emissions from H-Canyon/HB-Line. Disposition of surplus plutonium into sludge batches at DWPF is expected to result in no additional nonradioactive emissions from DWPF.

Additional steam required for dissolution processes at H-Canyon/HB-Line would result in additional air pollutant emissions from the steam-producing facilities at SRS. Estimated annual emissions of air pollutants from steam production are expected to increase by about 3 percent (SRNL 2013; WSRC 2008). The expected concentrations at the site boundary would be less than those presented for the SRS baseline in Chapter 3, Section 3.1.4.2, which are based on permitted emissions associated with the SRS Title V permit. H-Canyon/HB-Line emissions are primarily particulate matter and sulfur dioxide (SCDHEC 2003).

G.1.4 WIPP Disposal

Construction—At SRS, only minor modifications to H-Canyon/HB-Line would be required under this option, with correspondingly minor emissions of criteria and toxic air pollutants. Similarly at LANL, enhancement of the site capability to prepare surplus plutonium for potential WIPP disposal would occur within the footprint of existing TA-55 facilities with correspondingly minor emissions of criteria and toxic air pollutants.

Operations—Activities required to prepare surplus plutonium for WIPP disposal are not expected to cause changes in nonradioactive air pollutant emissions from H-Canyon/HB-Line at SRS or from TA-55 facilities at LANL. This is because operational nonradioactive air pollutant emissions from these facilities are expected to be primarily associated with testing of diesel generators which would occur independently of the particular activities conducted at these facilities.

G.2 Human Health

G.2.1 Normal Operations

The following subsections present the potential incident-free radiological impacts on workers and the general public at SRS and LANL associated with the plutonium disposition options. Human health risks from construction and normal operations are evaluated for several individual and population groups, including involved workers, a hypothetical maximally exposed individual (MEI) at the site boundary, and the regional population. **Tables G–3** and **G–4** summarize the potential radiological impacts on involved workers and the general public, respectively, associated with the facilities and processes that would be used at SRS under each of the four disposition options. Impacts are presented as estimated doses and latent cancer fatality (LCF) risks from 1 year of operation and as LCF risks for the life of the project. (LCFs are determined using a risk factor of 0.0006 LCFs per rem or person-rem [DOE 2003].) Life-of-project risks were determined by multiplying the annual impacts of a facility by the number of years the facility is projected to operate (see Appendix B, Table B–2).

G.2.1.1 Immobilization and DWPF

Construction—At SRS, construction of a K-Area immobilization capability and minor modifications to DWPF to accommodate receipt of can-in-canisters from the immobilization capability would be required. The majority of the construction activities would occur in areas having dose rates close to background levels, although there would be existing equipment that would require decontamination and removal. Due to the nature of the contamination, the external dose rates from this equipment would be low. The activities to decontaminate and remove contaminated equipment would result in small additional occupational exposures to the workers performing these activities. The 72 construction workers involved in decontamination and removal would receive a collective dose of about 3.3 person-rem per year. The workforce dose for this 2-year activity would be 6.6 person-rem, resulting in no additional LCFs (calculated value: 4×10^{-3} LCF). No additional construction worker dose is expected for the balance of the construction period.

No radiological impacts on the public are expected from construction activities. All immobilization capability construction activities involving radioactive materials would occur within an existing structure and would be subject to strict controls (WSRC 2008). Releases of radioactive materials to the environment caused by modifications to DWPF to accommodate the can-in-canisters are not expected.

Table G–3 Potential Radiological Impacts on Involved Workers from Plutonium Disposition Options at the Savannah River Site

	SRS Facilities								*Plutonium Disposition Options*			
			H-Canyon/HB-Line			*DWPF*						
	MFFF	*K-Area Immobilization Capability*	*Prepare Pu for MFFF*	*Prepare Pu for DWPF Vitrification*	*Prepare Pu for WIPP Disposal*	*Immobilized Pu*	*Waste from Pu Prepared for MFFF*	*Pu Prepared for Vitrification*	*Immobili-zation and DWPF*	*MOX Fuel* [a]	*H-Canyon/ HB-Line and DWPF*	*WIPP Disposal*
Total Workforce												
Number of radiation workers	450	314	100	14	130	25	5	8	339	555	22	130
Annual Collective worker dose (person-rem)	51	310	29	7.0	20 to 60	5.9	1.2	1.9	320	80	8.9	20 to 60
Annual LCFs [b]	0 (3×10^{-2})	0 (2×10^{-1})	0 (2×10^{-2})	0 (4×10^{-3})	0 (1×10^{-2} to 4×10^{-2})	0 (4×10^{-3})	0 (7×10^{-4})	0 (1×10^{-3})	0 (2×10^{-1})	0 (5×10^{-2})	0 (5×10^{-3})	0 (1×10^{-2} to 4×10^{-2})
Life-of- project LCFs [b, c]	1 (0.6 to 0.7)	2 (1.9)	0 (0.2)	0 (5×10^{-2})	0 to 1 (0.1 to 0.9)	0 (4×10^{-2})	0 (4×10^{-3})	0 (1×10^{-2})	2 (1.9)	1 (0.9 to 1)	0 (7×10^{-2})	0 to 1 (0.1 to 0.9)
Average Worker												
Annual dose (millirem) [d]	110	1,000 [e]	290	500	150 to 460	240	240	240	930	140	400	150 to 460
Annual LCF risk	7×10^{-5}	6×10^{-4}	2×10^{-4}	3×10^{-4}	9×10^{-5} to 3×10^{-4}	1×10^{-4}	1×10^{-4}	1×10^{-4}	6×10^{-4}	8×10^{-5}	2×10^{-4}	9×10^{-5} to 3×10^{-4}
Life-of-project LCF risk [c]	1×10^{-3} to 2×10^{-3}	6×10^{-3}	2×10^{-3}	4×10^{-3}	9×10^{-4} to 7×10^{-3}	1×10^{-3}	9×10^{-4}	2×10^{-3}	6×10^{-3}	2×10^{-3}	3×10^{-3}	9×10^{-4} to 7×10^{-3}

DWPF = Defense Waste Processing Facility; LCF = latent cancer fatality; MFFF = Mixed Oxide Fuel Fabrication Facility; MOX = mixed oxide; Pu = plutonium; SRS = Savannah River Site; WIPP = Waste Isolation Pilot Plant.

[a] Listed impacts for the MOX Fuel Option for plutonium disposition conservatively include those from processing 4 metric tons (4.4 tons) of non-pit plutonium at H-Canyon/HB-Line (and vitrification of waste resulting from this processing at DWPF) as a precursor for fabrication of the plutonium into MOX fuel at MFFF. This processing step for non-pit plutonium is applicable under the MOX Fuel Alternative; for all other alternatives the impacts under the MOX Fuel Option would be those from operation of MFFF alone.

[b] The integer indicates the number of excess LCFs that are expected in the population based on a risk factor of 0.0006 LCFs per person-rem (DOE 2003); the values in parentheses are the values calculated from the dose and risk factor.

[c] Ranges in impacts are due to differences in the quantities of material processed for different plutonium disposition options or the number of years that facilities would operate under the different alternatives.

[d] Dose to an average worker reflects the collective worker dose divided by the number of workers. Engineering and administrative controls would be implemented to maintain individual worker doses below 2,000 millirem per year, and as low as reasonably achievable.

[e] This estimate is based on a conceptual design. If the K-Area immobilization capability were implemented, engineering and administrative controls would be implemented as discussed in table note d to maintain individual worker does to levels as low as reasonably achievable.

Note**:** Doses are rounded to two significant figures; LCF risks are rounded to one significant figure. Values presented in the table may differ slightly from those presented in Appendix C due to rounding. Values are derived from analyses presented in Appendix C.

Table G–4 Potential Radiological Impacts on the Public from Plutonium Disposition Options at the Savannah River Site

	SRS Facilities								***Plutonium Disposition Options***			
			H-Canyon/HB-Line			***DWPF*** [a]						
	MFFF	***K-Area Immobilization Capability***	***Prepare Pu for MFFF***	***Prepare Pu for DWPF Vitrification***	***Prepare Pu for WIPP Disposal***	***Immobilized Pu***	***Waste from Pu Prepared for MFFF***	***Pu Prepared for Vitrification***	***Immobilization and DWPF***	***MOX Fuel*** [b]	***H-Canyon/ HB-Line and DWPF***	***WIPP Disposal***
Population within 50 Miles												
Annual dose (person-rem per year)	0.045 to 0.052	0.00062	0.26	0.26	0.26	–	–	–	0.00062	0.31	0.26	0.26
Annual LCFs [c]	0 (3×10^{-5})	0 (4×10^{-7})	0 (2×10^{-4})	0 (2×10^{-4})	0 (2×10^{-4})	–	–	–	0 (4×10^{-7})	0 (2×10^{-4})	0 (2×10^{-4})	0 (2×10^{-4})
Life-of-project LCFs [c]	0 (6×10^{-4} to 7×10^{-4})	0 (4×10^{-6})	0 (2×10^{-3})	0 (2×10^{-3})	0 (2×10^{-3} to 4×10^{-3})	–	–	–	0 (4×10^{-6})	0 (3×10^{-3})	0 (2×10^{-3})	0 (2×10^{-3} to 4×10^{-3})
Maximally Exposed Individual												
Annual dose (millirem)	0.00050 to 0.00058	0.0000075	0.0024	0.0024	0.0024	–	–	–	0.0000075	0.0029 to 0.0030	0.0024	0.0024
Annual LCFs [c]	3×10^{-10}	5×10^{-12}	1×10^{-9}	1×10^{-9}	1×10^{-9}	–	–	–	5×10^{-12}	2×10^{-9}	1×10^{-9}	1×10^{-9}
Life-of-project LCF risk [c,d]	6×10^{-9} to 8×10^{-9}	5×10^{-11}	2×10^{-8}	2×10^{-8}	1×10^{-8} to 4×10^{-8}	–	–	–	5×10^{-11}	3×10^{-8}	2×10^{-8}	1×10^{-8} to 4×10^{-8}
Average Exposed Individual [d]												
Annual dose (millirem per year) [e]	0.000052 to 0.000060	0.00000077	0.00029	0.00029	0.00029	–	–	–	0.00000077	0.00035	0.00029	0.00029
Annual LCF risk	3×10^{-11} to 4×10^{-11}	5×10^{-13}	2×10^{-10}	2×10^{-10}	2×10^{-10}	–	–	–	5×10^{-13}	2×10^{-10}	3×10^{-10}	2×10^{-10}
Life-of-project LCF risk [d]	7×10^{-10} to 9×10^{-10}	5×10^{-12}	2×10^{-9}	2×10^{-9}	2×10^{-9} to 4×10^{-9}	–	–	–	5×10^{-12}	3×10^{-9}	2×10^{-9}	2×10^{-9} to 4×10^{-9}

DWPF = Defense Waste Processing Facility; LCF = latent cancer fatality; MFFF = Mixed Oxide Fuel Fabrication Facility; MOX = mixed oxide; Pu = plutonium; SRS = Savannah River Site; WIPP = Waste Isolation Pilot Plant

[a] DWPF operations involving surplus plutonium are not expected to result in any incremental emissions; therefore, no impacts on the public are expected.

[b] Listed impacts for the MOX Fuel Option for plutonium disposition conservatively include those from processing 4 metric tons (4.4 tons) of non-pit plutonium at H-Canyon/HB-Line (and vitrification of waste resulting from this processing at DWPF) as a precursor for fabrication of the plutonium into MOX fuel at MFFF. This processing step for non-pit plutonium is applicable under the MOX Fuel Alternative; for all other alternatives the impacts under the MOX Fuel Option would be those from operation of MFFF alone.

[c] The integer indicates the number of excess LCFs that are expected in the population based on a risk factor of 0.0006 LCFs per person-rem (DOE 2003); the values in parentheses are the values calculated from the dose and risk factor.

[d] Ranges in impacts are due to differences in the number of years that facilities would operate under the different alternatives.

[e] Dose to an average member of the offsite population is obtained by dividing the population dose by the number of people projected to live within 50 miles (80 kilometers) of the SRS facilities in 2020 (approximately 809,000 for K-Area, 869,000 for F-Area, and 886,000 for H-Area).

Note: Doses are rounded to two significant figures; LCF risks are rounded to one significant figure. Values presented in the table may differ slightly from those presented in Appendix C due to rounding. Values are derived from analyses presented in Appendix C. To convert miles to kilometers, multiply by 1.6093.

Operations—Table G–3 presents the potential radiological impacts on involved SRS workers associated with this option. Doses to workers would result from operations at the K-Area immobilization capability and DWPF. This disposition option is projected to result in the highest radiological impacts on the workforce. Over the life of the project, the collective dose received by workers could result in 2 LCFs.

Table G–4 presents the potential radiological impacts on the general public in the SRS region. Doses to public receptors would result from emissions from the K-Area immobilization capability. Because activities at DWPF involving surplus plutonium are not expected to result in additional releases to the atmosphere (beyond those associated with vitrifying HLW alone), there would be no incremental radiological impacts on the public from this facility. Table G–4 shows that potential doses to all public receptors in the SRS region would be a small fraction of the 311-millirem-per-year dose each member of the public is assumed to receive from natural background radiation (see Chapter 3, Section 3.1.6.1).

G.2.1.2 MOX Fuel

Construction—At SRS, MFFF is already under construction and impacts from its construction have been previously assessed (DOE 1999; NRC 2005). No additional construction at MFFF would be required.

Under the MOX Fuel Alternative, H-Canyon/HB-Line may require modifications to dissolve and prepare 4 metric tons (4.4 tons) of non-pit plutonium as feed for MOX fuel fabrication. The amount of modification work needed would depend on the processing rate. Modifications could range from minor modifications made as part of normal operations to a level similar to that required for preparation of 6 metric tons (6.6 tons) of non-pit plutonium for potential WIPP disposal as discussed in Section G.2.1.4.

Operations—Table G–3 presents the potential radiological impacts on involved SRS workers associated with this option. Doses to workers would result from operations at MFFF. Under the MOX Fuel Alternative, doses would also result from operations at H-Canyon/HB-Line (and, to a much lesser extent, DWPF), assuming 4 metric tons (4.4 tons) of non-pit plutonium are processed at H-Canyon/HB-Line and fabricated into MOX fuel. The collective dose received by the workforce over the life of the project is not expected to result in any LCFs (calculated value: 2×10^{-3} LCF).

Table G–4 presents the potential radiological impacts on the general public in the SRS region. Doses to public receptors would result from emissions from MFFF, and under the MOX Fuel Alternative, also from H-Canyon/HB-Line, assuming 4 metric tons (4.4 tons) of non-pit plutonium are processed at H-Canyon/HB-Line for fabrication into MOX fuel. Potential activities at DWPF (to vitrify waste from plutonium processed at H-Canyon/HB-Line) are not expected to result in additional releases to the atmosphere, so there would be no incremental radiological impacts on the public from this facility. Impacts on the public from this option, the H-Canyon/HB-Line and DWPF Option, and the WIPP Disposal Option are comparable and are higher than those of the Immobilization and DWPF Option. Table G–4 shows that potential doses to all public receptors in the SRS region would be a small fraction of the 311-millirem-per-year dose each member of the public is assumed to receive from natural background radiation (see Chapter 3, Section 3.1.6.1).

G.2.1.3 H-Canyon/HB-Line and DWPF

Construction—At H-Canyon at SRS, some tanks and/or piping may be changed out or reconfigured to increase plutonium storage volume and capacity, and some equipment may be changed or added at HB-Line. These types of activities are part of normal operations and doses are accounted for in workers' operational doses. No construction or modification activities are expected at DWPF. Therefore, minimal impacts on construction workers are expected, and no impacts on the general public are expected.

Operations—Table G–3 presents the potential radiological impacts on involved SRS workers associated with this option. Doses to workers would result from operations at H-Canyon/HB-Line and DWPF. The collective dose received by the workforce over the life of the project is not expected to result in any LCFs (calculated value: 7×10^{-2} LCF).

Table G–4 presents the potential radiological impacts on the general public in the SRS region. Doses to public receptors would result from emissions from H-Canyon/HB-Line. Impacts on the public from this option, the MOX Fuel Option, and the WIPP Disposal Option are comparable and are higher than those of the Immobilization and DWPF Option. At DWPF, vitrification of HLW containing dissolved plutonium is not expected to result in additional releases to the atmosphere, so there would be no incremental radiological impacts on the public from this facility. Table G–4 shows that potential doses to all public receptors in the SRS region would be a small fraction of the 311-millirem-per-year dose each member of the public is assumed to receive from natural background radiation (see Chapter 3, Section 3.1.6.1).

G.2.1.4 WIPP Disposal

Construction—At SRS, glovebox installation and modifications at the H-Canyon/HB-Line to support preparation of 13.1 metric tons (14.4 tons) of surplus plutonium for potential WIPP disposal under the WIPP Alternative would result in a collective dose of 0.58 person-rem per year to a construction workforce of 10 (average dose of 58 millirem per worker per year). These modifications would occur over a 2-year period, resulting in a total dose of 1.2 person-rem, resulting in no additional LCFs (calculated value: 7×10^{-4} LCF). Less extensive modifications at H-Canyon/HB-Line would be expected to support preparation of 2 metric tons (2.2 tons) of non-pit plutonium for potential WIPP disposal under the MOX Fuel Alternative, with lower levels of exposure and no additional LCFs among the construction workforce. No impacts on the public would result from construction activities at H-Canyon/HB-Line.

At LANL, enhancing the capability in TA-55 facilities to prepare plutonium for potential WIPP disposal is expected to occur concurrently with pit disassembly and conversion modifications (see Appendix F, Section F.2.1.3) and not cause substantial additional radiological doses and risks among workers. Enhancing this capability is not expected to result in any radiological impacts on the public.

Operations—Table G–3 presents the potential radiological impacts on involved SRS workers associated with this option. Doses to SRS workers would result from operations at H-Canyon/HB-Line, assuming preparation at SRS of 2 metric tons (2.2 tons) (MOX Fuel Alternative) to 13.1 metric tons (14.4 tons) (WIPP Alternative) of surplus plutonium for potential WIPP disposal. The collective dose received by the workforce over the life of the project could result in up to 1 LCF.

Under the PF-4 and MFFF and PF-4, H-Canyon/HB-Line, and MFFF Options for pit disassembly and conversion, pit plutonium could be prepared for potential WIPP disposal at LANL rather than at SRS. If this were to occur, there would be a reduction in the life-of-project doses and risks to workers at SRS, coupled with an increase in doses and risks to workers at LANL. Should the Department proceed with this approach, more detailed information would be developed regarding the levels of exposure that could be experienced by workers engaged in WIPP preparation activities at LANL, and the number of operational workers that could be required. It is expected, however, that workers at LANL preparing plutonium for potential WIPP disposal could receive radiation doses comparable to those estimated in Table G–3 for workers preparing plutonium for potential WIPP disposal at H-Canyon/HB-Line at SRS. That is, the average worker involved in this activity at H-Canyon/HB-Line is estimated to receive an annual dose of approximately 460 millirem with a calculated risk of an LCF of 3×10^{-4}, and with 130 occupationally exposed workers receiving an annual collective dose of 60 person-rem with an annual collective risk of an LCF of 4×10^{-2}. These annual doses and risks at SRS are expected to envelope those doses and risks that could be experienced by workers performing WIPP preparation activities at LANL. The total dose and risk experienced by workers at LANL over the life of the project would depend on the total quantity of pit plutonium prepared at LANL for potential WIPP disposal.

Table G–4 presents the potential radiological impacts associated with this option on the general public in the SRS region. Doses to public receptors would result from emissions from H-Canyon/HB-Line, assuming preparation at SRS of from 2 to 13.1 metric tons (2.2 to 14.4 tons) of surplus plutonium for potential WIPP disposal. Annual impacts on the public from this option, the H-Canyon/HB-Line and DWPF Option, and the MOX Fuel Option are comparable and are higher than those of the Immobilization and DWPF Option. Table G–4 shows that potential doses to all public receptors would be a small fraction of the 311-millirem-per-year dose each member of the public is assumed to receive from natural background radiation (see Chapter 3, Section 3.1.6.1). Life-of-project impacts to the public in the SRS region could be reduced to the extent under the PF-4 and MFFF and PF-4, H-Canyon/HB-Line, and MFFF Options for pit disassembly and conversion that pit plutonium was prepared at LANL for potential WIPP disposal rather than at SRS.

At LANL, although detailed information is not available about the design and operation of an enhanced WIPP preparation capability, preparation of plutonium for potential disposal at WIPP is not expected to substantially change the annual radiological emissions and corresponding doses to members of the public from those associated with pit disassembly and conversion activities (see Appendix F, Section F.2.1.3, and Table F–5). This is because preparation of pit plutonium at TA-55 for potential WIPP disposal is expected to represent a minor variation on operations at PF-4 involving pit disassembly and conversion. As shown in Table F–5, disassembly and conversion of 35 metric tons (38.6 tons) of pit plutonium in PF-4 could result in annual doses of 0.21 person-rem to the population, 0.081 millirem to an MEI, and 4.7×10^{-4} millirem to the average individual, resulting in annual LCF risks of 1×10^{-4}, 5×10^{-8}, and 3×10^{-10}, respectively. Preparing pit plutonium for potential WIPP disposal is not expected to change these annual impacts; however, it could extend the surplus plutonium disposition activities at LANL by a few years and therefore add to the life-of-project risks shown in Table F–5.

G.2.2 Accidents

The following subsections present the potential impacts on workers and the general public at SRS and LANL associated with possible accidents involving the plutonium disposition options. Human health risks from these accidents are evaluated for several individual and population groups, including noninvolved workers, a hypothetical MEI at the site boundary, and the regional population. **Table G–5** summarizes potential radiological impacts on the general public associated with the facilities and processes at SRS that would be used under each of the four disposition options, while **Table G–6** summarizes the potential radiological impacts at SRS on the MEI and noninvolved workers. Impacts are presented as estimated doses and LCF risks from the accidents under consideration (see Appendix D for further details on these accidents). Activities at DWPF or the GWSBs at SRS involving surplus plutonium disposition are not expected to result in additional risks above those for operation of these facilities for HLW alone.

G.2.2.1 Immobilization and DWPF

The limiting design-basis accident at the K-Area immobilization capability would be an explosion in a metal oxidation furnace. If this accident were to occur, the public residing within 50 miles (80 kilometers) of SRS would receive an estimated dose of 630 person-rem. This dose would result in no additional LCFs among the general public (calculated value: 0.4 LCF). The MEI would receive a dose of 2.1 rem which represents a risk to the MEI of developing a latent fatal cancer of 1×10^{-3}, or 1 chance in 1,000. A noninvolved worker located 1,000 meters (3,280 feet) from the accident source at the time of the accident, who was unaware of the accident and failed to take any emergency actions, would receive a dose of 27 rem with a risk of developing a latent fatal cancer of 3×10^{-2}, or about 1 chance in 33.

A design-basis earthquake involving K-Area when the immobilization capability was operational would expose the public residing within 50 miles (80 kilometers) of SRS to an estimated dose of 9.9 person-rem. This dose would result in no additional LCFs among the general public (calculated value: 6×10^{-3} LCF). The MEI would receive a dose of 0.033 rem which represents a risk to the MEI of developing a latent fatal cancer of 2×10^{-5}, or 1 chance in 50,000. A noninvolved worker would receive a dose of 0.43 rem with an increased risk of developing a latent fatal cancer of 3×10^{-4}, or about 1 chance in 3,300.

Table G–5 Risks to the Public within 50 Miles (80 kilometers) from Limiting Accidents Associated with Plutonium Disposition Options at the Savannah River Site

	SRS Facilities						*Plutonium Disposition Options*							
	MFFF		*K-Area Immobilization Capability*		*H-Canyon/ HB-Line*		*Immobilization and DWPF*		*MOX Fuel* [a]		*H-Canyon/ HB-Line and DWPF*		*WIPP Disposal*	
Accident	*Dose (person-rem)*	*LCFs*	*Dose (person-rem)*	*LCFs*	*Dose (person-rem)*	*LCFs*	*Dose (person-rem)*	*LCFs*	*Dose (person-rem)*	*LCFs*	*Dose (person-rem)*	*LCFs*	*Dose (person-rem)*	*LCFs*
Limiting design-basis accident	1.6	0 (9×10^{-4})	630	0 (0.4)	280	0 (0.2)	630	0 (0.4)	280	0 (0.2)	280	0 (0.2)	280	0 (0.2)
Design-basis earthquake [b]	0.0020	0 (1×10^{-6})	9.9	0 (6×10^{-3})	280	0 (0.2)	9.9	0 (6×10^{-3})	280	0 (0.2)	280	0 (0.2)	280	0 (0.2)
Beyond-design-basis earthquake [b]	240	0 (0.1)	100	0 (6×10^{-2})	15,000	9	100	0 (6×10^{-2})	15,000	9	15,000	9	15,000	9

DWPF = Defense Waste Processing Facility; LCF = latent cancer fatality; MFFF = Mixed Oxide Fuel Fabrication Facility; MOX = mixed oxide; SRS = Savannah River Site; WIPP = Waste Isolation Pilot Plant.

[a] Listed impacts for the MOX Fuel Option for plutonium disposition conservatively include those from processing 4 metric tons (4.4 tons) of non-pit plutonium at H-Canyon/HB-Line (and vitrification of waste resulting from this processing at DWPF) as a precursor for fabrication of the plutonium into MOX fuel at MFFF. This processing step for non-pit plutonium is applicable under the MOX Fuel Alternative; for all other alternatives the impacts under the MOX Fuel Option would be those from operation of MFFF alone.

[b] Doses and risks to the public for the design-basis earthquake and beyond-design-basis earthquake are added for all SRS facilities that may be involved in a particular plutonium disposition option. Note that the impacts for the design-basis earthquake and the beyond-design-basis earthquake for H-Canyon/HB-Line include a seismically-induced fire.

Note: Values are derived from analyses presented in Appendix D.

Table G–6 Risk to the Maximally Exposed Individual and Noninvolved Worker from Limiting Accidents Associated with Plutonium Disposition Options at the Savannah River Site

	SRS Facilities						*Plutonium Disposition Options*							
	MFFF		*K-Area Immobilization Capability*		*H-Canyon/HB-Line*		*Immobilization and DWPF*		*MOX Fuel* [a]		*H-Canyon/ HB-Line and DWPF*		*WIPP Disposal*	
Accident	*Dose (rem)*	*LCF Risk*	*Dose (rem)*	*LCF Risk*	*Dose (rem)*	*LCF Risk*	*Dose (rem)*	*LCF Risk*	*Dose (rem)*	*LCF Risk*	*Dose (rem)*	*LCF Risk*	*Dose (rem)*	*LCF Risk*
Maximally Exposed Individual														
Limiting design-basis accident	0.0094	6×10^{-6}	2.1	1×10^{-3}	0.41	2×10^{-4}	2.1	1×10^{-3}	0.41	2×10^{-4}	0.41	2×10^{-4}	0.41	2×10^{-4}
Design-basis earthquake [b, d]	7.2×10^{-6}	4×10^{-9}	0.033	2×10^{-5}	0.41	2×10^{-4}	0.033	2×10^{-5}	0.41	2×10^{-4}	0.41	2×10^{-4}	0.41	2×10^{-4}
Beyond-design-basis earthquake [b, d]	0.86	5×10^{-4}	0.36	2×10^{-4}	26	3×10^{-2}	0.36	2×10^{-4}	27	3×10^{-2}	26	3×10^{-2}	26	3×10^{-2}
Noninvolved Worker														
Limiting design-basis accident	0.22	1×10^{-4}	27	3×10^{-2}	1.6	9×10^{-4}	27	3×10^{-2}	1.6	9×10^{-4}	1.6	9×10^{-4}	1.6	9×10^{-4}
Design-basis-earthquake [c, d]	0.00016	1×10^{-7}	0.43	3×10^{-4}	1.6	9×10^{-4}	0.43	3×10^{-4}	1.6	9×10^{-4}	1.6	9×10^{-4}	1.6	9×10^{-4}
Beyond-design-basis earthquake [c, d, e]	22	3×10^{-2}	12	7×10^{-3}	1,400	1	12	7×10^{-3}	1,400	1	1,400	1	1,400	1

DWPF = Defense Waste Processing Facility; LCF = latent cancer fatality; MFFF = Mixed Oxide Fuel Fabrication Facility; MOX = mixed oxide; rem = roentgen equivalent man; SRS = Savannah River Site; WIPP = Waste Isolation Pilot Plant.

[a] Listed impacts for the MOX Fuel Option for plutonium disposition conservatively include those from processing 4 metric tons (4.4 tons) of non-pit plutonium at H-Canyon/HB-Line (and vitrification of waste resulting from this processing at DWPF) as a precursor for fabrication of the plutonium into MOX fuel at MFFF. This processing step for non-pit plutonium is applicable under the MOX Fuel Alternative; for all other alternatives the impacts under the MOX Fuel Option would be those from operation of MFFF alone.

[b] For the purposes of this analysis, doses and risks to the maximally exposed individual for the design-basis earthquake and beyond-design-basis earthquake accidents are added across all SRS facilities that may be involved in a particular plutonium disposition option even though the maximally exposed individual for accidents in K-Area would be different than the maximally exposed individual near H-Area, for example.

[c] Doses and risks to noninvolved workers for the design-basis and beyond-design-basis earthquake accidents are presented for the highest dose to such an individual at a specific area since a noninvolved worker at K-Area would not be near H-Area should an accident occur there and vice versa.

[d] Impacts from design-basis and beyond-design-basis earthquakes involving H-Canyon/HB-Line include impacts from seismically induced fires.

[e] Individual doses in excess of 400 to 450 rem are assumed to result in a fatality.

Note: Values are derived from analyses presented in Appendix D.

A beyond-design-basis earthquake involving K-Area when the immobilization capability was operational would expose the public residing within 50 miles (80 kilometers) of SRS to an estimated dose of 100 person-rem. This dose would result in no additional LCFs among the general public (calculated value: 6×10^{-2} LCF). The MEI would receive a dose of 0.36 rem which represents a risk to the MEI of developing a latent fatal cancer of 2×10^{-4}, or 1 chance in 5,000. A noninvolved worker would receive a dose of 12 rem with a risk of developing a latent fatal cancer of 7×10^{-3}, or about 1 chance in 140.

G.2.2.2 MOX Fuel

The limiting design-basis accident during operation of MFFF in F-Area would be a criticality incident. If this accident were to occur, the public residing within 50 miles (80 kilometers) of SRS would receive an estimated dose of 1.6 person-rem. This dose would result in no additional LCFs among the general public (calculated value: 9×10^{-4} LCF). The MEI would receive a dose of 0.0094 rem which represents a risk to the MEI of developing an LCF of 6×10^{-6}, or about 1 chance in 170,000. A noninvolved worker would receive a dose of 0.22 rem with a risk of developing a latent fatal cancer of 1×10^{-4}, or 1 chance in 10,000.

A design-basis earthquake involving F-Area when the MFFF was operational would expose the public residing within 50 miles (80 kilometers) of SRS to an estimated dose of 0.0020 person-rem. This dose would result in no additional LCFs among the general public (calculated value: 1×10^{-6} LCF). The MEI would receive a dose of 7.2×10^{-6} rem which represents a risk to the MEI of developing a latent fatal cancer of 4×10^{-9}, or 1 chance in 250 million. A noninvolved worker would receive a dose of 0.00016 rem with a risk of developing a latent fatal cancer of 1×10^{-7}, or 1 chance in 10 million.

A beyond-design-basis earthquake involving F-Area when the MFFF was operational would expose the public residing within 50 miles (80 kilometers) of SRS to an estimated dose of 240 person-rem. This dose would result in no additional LCFs among the general public (calculated value: 0.1 LCF). The MEI would receive a dose of 0.86 rem which represents a risk to the MEI of developing a latent fatal cancer of 5×10^{-4}, or 1 chance in 2,000. A noninvolved worker would receive a dose of 22 rem with a risk of developing a latent fatal cancer of 3×10^{-2}, or about 1 chance in 33.

The impacts listed in Tables G–5 and G–6 under the MOX Fuel Option for plutonium disposition include those for operation of H-Canyon/HB-Line to process 4 metric tons (4.4 tons) of non-pit plutonium as a precursor to fabrication of this non-pit plutonium into MOX fuel at MFFF. The impacts from postulated accidents at H-Canyon/HB-Line would be the same as those addressed below in Section G.2.2.3. These combined accident impacts would be applicable under the MOX Fuel Alternative; under all other alternatives the accident impacts for the MOX Fuel Option for plutonium disposition would be those for the MFFF alone.

G.2.2.3 H-Canyon/HB-Line and DWPF

The limiting design-basis accident involving plutonium dissolution activities at H-Canyon/HB-Line (and conversion of non-pit plutonium to plutonium oxide under the MOX Fuel Alternative) at SRS would be a level-wide fire in HB-Line involving plutonium oxides and solutions. If this accident were to occur, the public residing within 50 miles (80 kilometers) of SRS would receive an estimated dose of 280 person-rem. This dose would result in no additional LCFs among the general public (calculated value: 0.2 LCF). The MEI would receive a dose of 0.41 rem which represents a risk to the MEI of developing a latent fatal cancer of 2×10^{-4}, or 1 chance in 5,000. A noninvolved worker would receive a dose of 1.6 rem with a risk of developing a latent fatal cancer of 9×10^{-4}, or about 1 chance in 1,100.

A design-basis earthquake with fire involving H-Canyon/HB-Line would expose the public residing within 50 miles (80 kilometers) of SRS to an estimated dose of 280 person-rem. This dose would result in no additional LCFs among the general public (calculated value: 0.2 LCF). The MEI would receive a dose of 0.41 rem which represents a risk to the MEI of developing a latent fatal cancer of 2×10^{-4}, or 1 chance in 5,000. A noninvolved worker would receive a dose of 1.6 rem with a risk of developing a latent fatal cancer of 9×10^{-4}, or about 1 chance in 1,100.

A beyond-design-basis earthquake with fire involving H-Canyon/HB-Line would expose the public residing within 50 miles (80 kilometers) of SRS to an estimated dose of 15,000 person-rem. This dose would result in 9 additional LCFs among the general public. The MEI would receive a dose of 26 rem, which represents a risk to the MEI of developing a latent fatal cancer of 3×10^{-2}, or about 1 chance in 33. A noninvolved worker would receive a dose of 1,400 rem, which would likely result in a near-term fatality.

G.2.2.4 WIPP Disposal

At SRS, the results of the accident analysis of the plutonium disposition options indicate that the accidents discussed in Section G.2.2.3 involving H-Canyon/HB-Line represent the limiting risks under the WIPP Disposal Option as well. This is because H-Canyon/HB-Line would be used at SRS to prepare the surplus plutonium for potential WIPP disposal and the same accidents could occur. At LANL, enhancement of the capability at TA-55 to prepare surplus plutonium for potential WIPP disposal is not expected to result in substantial accident impacts and risks in addition to those evaluated in Appendix F, Section F.2.2.3. This is because the enhanced capability is not expected to change the limiting design basis accident at PF-4, which is a hydrogen deflagration associated with dissolution of plutonium metal, nor change the quantity of material at risk in TA-55 facilities potentially impacted by a design-basis and a beyond-design-basis earthquake accident.

G.3 Socioeconomics

This section analyzes the potential annual socioeconomic impacts of different plutonium disposition options. Impacts on direct and indirect employment, economic output, value added and earnings are presented for the peak years of construction for these facilities and for the surplus plutonium activities at these facilities during their peak years of operations. The area that would experience the impacts presented in this section is the region of influence (ROI) surrounding each facility. The socioeconomic ROI for the facilities at SRS is defined as the four-county area of Columbia and Richmond Counties in Georgia, and Aiken and Barnwell Counties in South Carolina. The socioeconomic ROI for PF-4 at LANL is defined as the four-county area of Los Alamos, Rio Arriba, Sandoval, and Santa Fe Counties in New Mexico. All values are presented in 2010 dollars.

G.3.1 Immobilization and DWPF

Construction—**Table G–7** summarizes the socioeconomic impacts at SRS that would be generated during the peak year of construction of the K-Area immobilization capability. This capability would be constructed over a 6-year period. Direct employment during construction of the immobilization capability is expected to peak at 252 workers. The direct construction employment would generate an estimated 159 indirect jobs in the ROI. The direct economic output during the peak year of construction is estimated to be approximately \$25 million. Approximately \$23 million of the direct economic output would be value added to the local economy in the form of final goods and services directly comparable to gross domestic product (GDP). Approximately \$16 million of the value added would be in the form of direct earnings of construction workers.

There would be some minor modifications to DWPF to receive the can-in-canisters. However, no additional employment would be required to support these modifications. Therefore, no socioeconomic impacts are expected to result from modifications at DWPF.

Operations—**Table G–8** summarizes the peak annual socioeconomic impacts at SRS generated by the K-Area immobilization capability and DWPF operations associated with immobilized plutonium. Direct employment at the K-Area immobilization capability is expected to peak at 434 workers. The direct employment would generate an estimated 516 indirect jobs in the ROI. The direct economic output during the peak year of operations is estimated to be \$77 million, of which \$65 million is estimated to be value added to the local economy in the form of final goods and services directly comparable to GDP. Approximately \$38 million of the value added would be in the form of direct earnings of those employed at the K-Area immobilization capability.

Table G–7 Peak Annual Socioeconomic Impacts from Construction in Support of Plutonium Disposition Options at the Savannah River Site

	SRS Facilities									*Plutonium Disposition Options*			
			H-Canyon/HB-Line			*DWPF* [c]							
Resource	*MFFF* [a]	*K-Area Immobilization Capability*	*Prepare Pu for WIPP Disposal*	*Prepare Non-Pit Pu for MFFF* [b]	*Prepare Pu for DWPF Vitrification* [b]	*Immobilized Pu*	*Waste from Non-Pit Pu Prepared for MFFF*	*Pu Prepared for Vitrification*		*Immobilization and DWPF*	*MOX Fuel*	*H-Canyon/ HB-Line and DWPF*	*WIPP Disposal*
Direct employment	N/A	252	10	0	0	negligible	0	0		252	0	0	10
Indirect employment	N/A	159	6	0	0	negligible	0	0		159	0	0	6
Output ($ in millions)	N/A	$25	$1.0	0	0	negligible	0	0		$25	0	0	$1.0
Value added ($ in millions)	N/A	$23	$0.9	0	0	negligible	0	0		$23	0	0	$0.9
Earnings ($ in millions)	N/A	$16	$0.6	0	0	negligible	0	0		$16	0	0	$0.6

DWPF = Defense Waste Processing Facility; MFFF = Mixed Oxide Fuel Fabrication Facility; MOX = mixed oxide; N/A = not applicable; Pu = plutonium; SRS = Savannah River Site; WIPP = Waste Isolation Pilot Plant.

[a] Construction requirements associated with MFFF are not included in this *SPD Supplemental EIS* because the building is already under construction in accordance with decisions reached through previous National Environmental Policy Act analyses (DOE 1999; NRC 2005) and its workforce requirements fall within SRS's current workforce requirements.

[b] Modifications to H-Canyon/HB-Line to support preparation of non-pit plutonium for MFFF (applicable under the MOX Fuel Alternative) or to support dissolution of non-pit plutonium for vitrification at DWPF are not expected to require additional employment and would fall within SRS's current workforce requirements.

[c] Minor modifications would be made to DWPF to accommodate can-in-canisters received from K-Area, with no additional employment expected to be needed. There would be no need for modification of DWPF to support vitrification of waste generated from processing non-pit plutonium for MOX fuel fabrication (applicable under the MOX Fuel Alternative) or for vitrifying plutonium dissolved at H-Canyon/HB-Line.

Table G–8 Peak Annual Socioeconomic Impacts from Facility Operations in Support of Plutonium Disposition Options at the Savannah River Site

	SRS Facilities								*Plutonium Disposition Options*			
			H-Canyon/HB-Line [a]			*DWPF* [b]						
Resource	***MFFF***	***K-Area Immobilization Capability***	***Prepare Pu for WIPP Disposal***	***Prepare Pu for MFFF***	***Prepare Pu for DWPF Vitrification***	***Immobilized Pu***	***Waste from Pu Prepared for MFFF***	***Pu Prepared for Vitrification***	***Immobilization and DWPF***	***MOX Fuel*** [c]	***H-Canyon/ HB-Line and DWPF***	***WIPP Disposal***
Direct employment	1,000	434	130	100	40	0	0	0	434	1,100	40	130
Indirect employment	1,189	516	155	119	48	0	0	0	516	1,308	48	155
Output ($ in millions)	$178	$77	$23	$18	$7.1	0	0	0	$77	$196	$7.1	$23
Value added ($ in millions)	$150	$65	$20	$15	$6.0	0	0	0	$65	$165	$6.0	$20
Earnings ($ in millions)	$88	$38	$11	$8.8	$3.5	0	0	0	$38	$97	$3.5	$11

DWPF = Defense Waste Processing Facility; MFFF = MOX Fuel Fabrication Facility; MOX = mixed oxide; Pu = plutonium; SRS = Savannah River Site; WIPP = Waste Isolation Pilot Plant.

[a] The listed values reflect those workers who would be engaged in plutonium conversion or disposition operations.

[b] Annual operations at DWPF to support plutonium disposition activities are not expected to result in additional employment beyond those already included in SRS's current workforce requirements.

[c] Listed impacts for the MOX Fuel Option for plutonium disposition conservatively include those from processing 4 metric tons (4.4 tons) of non-pit plutonium at H-Canyon/HB-Line (and vitrification of waste resulting from this processing at DWPF) as a precursor for fabrication of the plutonium into MOX fuel at MFFF. This processing step for non-pit plutonium is applicable under the MOX Fuel Alternative; for all other alternatives the impacts under the MOX Fuel Option would be those from operation of MFFF alone.

Operations at DWPF would continue at their current rate and are not expected to require any additional employment. Therefore, no socioeconomic impacts are expected to result from DWPF operations associated with immobilized plutonium.

G.3.2 MOX Fuel

Construction—At SRS, MFFF is already under construction and impacts from its construction have been previously assessed (DOE 1999; NRC 2005). No modifications would be required at MFFF as it is currently being constructed to support this plutonium disposition option, and no modifications are expected at H-Canyon/HB-Line. Therefore, no socioeconomic impacts are expected above those previously analyzed.

Operations—Table G–8 summarizes the peak annual socioeconomic impacts at SRS that would be generated during the peak year of disposition activities. While most disposition activities would occur at MFFF, conversion of 4 metric tons (4.4 tons) of non-pit plutonium to an oxide could occur at H-Canyon/HB-Line as part of the MOX Fuel Alternative and would result in a small amount of waste needing to be sent to DWPF annually, with no change in employment at DWPF. Table G–8 conservatively includes the impacts from this potential activity with the values listed for the MOX Fuel Option.

Direct employment at MFFF is expected to peak at 1,000 workers. The direct employment would generate an estimated 1,189 indirect jobs in the ROI. The direct economic output during the peak year of operations is estimated to be $178 million, of which $150 million is estimated to be value added to the local economy in the form of final goods and services directly comparable to GDP. Approximately $88 million of the value added would be in the form of direct earnings of those employed at MFFF.

Direct employment required for conversion of plutonium material to plutonium oxide at H-Canyon/HB-Line for use at MFFF is estimated to peak at 100 workers. The direct employment would generate an estimated 119 indirect jobs in the ROI. The direct economic output during the peak year of H-Canyon/HB-Line operations is estimated to be approximately $18 million, of which $15 million would be value added to the local economy in the form of final goods and services directly comparable to GDP. Approximately $8.8 million of the value added would be in the form of earnings of H-Canyon/HB-Line workers engaged in plutonium conversion activities.

Operations at DWPF would continue at their current rate and would not be expected to require any additional employment. Therefore, no socioeconomic impacts would be expected to result from DWPF operations associated with MOX fuel fabrication.

G.3.3 H-Canyon/HB-Line and DWPF

Construction—At SRS, modifications that may be needed at H-Canyon/HB-Line to support disposition of surplus plutonium through H-Canyon/HB-Line and DWPF would be minor and are not expected to require additional employment. No facility construction or modification is expected at DWPF.

Operations—Table G–8 summarizes the peak annual socioeconomic impacts at SRS that would be generated by operation of H-Canyon/HB-Line and DWPF for plutonium disposition. Under this disposition option, 6 metric tons (6.6 tons) of plutonium would be processed through H-Canyon/HB-Line so that it could be sent to DWPF for vitrification. Direct employment during peak operations at H-Canyon/HB-Line is estimated to be 40 workers. The direct employment would generate an estimated 48 indirect jobs in the ROI. The direct economic output during the peak year of H-Canyon/HB-Line operations is estimated to be approximately $7.1 million, of which $6.0 million would be value added to the local economy in the form of final goods and services directly comparable to GDP. Approximately $3.5 million of the value added would be in the form of earnings of H-Canyon/HB-Line workers engaged in plutonium preparation activities.

Operations at DWPF to prepare plutonium for disposition through DWPF would continue at their current rate and would not require any additional employment. Therefore, no socioeconomic impacts are expected from DWPF operations associated with plutonium disposition.

G.3.4 WIPP Disposal

Construction—At SRS, Table G–7 summarizes the peak annual socioeconomic impacts that would be generated by modifications to H-Canyon/HB-Line needed to prepare plutonium for potential WIPP disposal using three HB-Line process lines. Direct employment during the peak year of H-Canyon/HB-Line modifications is estimated to require 10 workers. The direct employment would generate 6 indirect jobs in the SRS ROI. The direct economic output during the peak year of modifications is estimated to be approximately $1.0 million, of which $0.9 million would be value added to the local economy in the form of final goods and services directly comparable to GDP. Approximately $0.6 million of the value added would be in the form of earnings of workers. The direct employment required for H-Canyon/HB-Line modifications would be drawn from the existing SRS workforce and is not expected to result in additional employment.

At LANL, enhancement of LANL's capability to prepare surplus plutonium for potential WIPP disposal is not expected to result in substantial annual socioeconomic impacts from construction. Development of a capability to prepare surplus plutonium for potential WIPP disposal would be accomplished concurrently with the proposed enhancement to LANL's pit disassembly and conversion capability (see Appendix F, Section F.3.3), and any requirement at LANL for additional construction employment under this option is expected to be minor.

Operations—At SRS, Table G–8 summarizes the peak annual socioeconomic impacts that would be generated by H-Canyon/HB-Line operations in support of plutonium disposition at WIPP. Direct employment during the peak year of H-Canyon/HB-Line operations related to this plutonium disposition option is estimated to be 130 workers. The direct employment would generate an estimated 155 indirect jobs in the ROI. The direct economic output generated during the peak year of operations is estimated to be approximately $23 million, of which $20 million would be value added to the local economy in the form of final goods and services directly comparable to GDP. Approximately $11 million of the value added would be in the form of earnings of H-Canyon/HB-line workers engaged in plutonium preparation activities. The direct employment required for H-Canyon/HB-Line operations would be drawn from the existing SRS workforce and is not expected to result in additional employment. To the extent under the PF-4 and MFFF and PF-4, H-Canyon/HB-Line, and MFFF Options for pit disassembly and conversion that pit plutonium was prepared for potential WIPP disposal at LANL rather than at SRS, peak annual socioeconomic impacts at SRS would be unchanged, although the overall time required at H-Canyon/HB-Line to prepare plutonium for potential WIPP disposal would be reduced.

At LANL, to the extent under the PF-4 and MFFF and PF-4, H-Canyon/HB-Line, and MFFF Options that pit plutonium was prepared at LANL for potential WIPP disposal, employment could be required at LANL in addition to that evaluated for PF-4 in Appendix F, Section F.3.3. Detailed information is not available regarding the levels of employment that could be required. It is expected, however, that any additional direct employment at LANL would be enveloped by that estimated for SRS for performing the same WIPP preparation activities, which involves the direct employment of 130 workers. Any additional direct employment at LANL would be expected to result in approximately the same number of indirect jobs in the LANL ROI. In addition, the period of plutonium disposition operations at LANL could be extended by a few years, resulting in continued annual socioeconomic impacts over this period.

G.4 Waste Management

This section analyzes impacts of plutonium disposition options on waste management facilities at SRS and LANL. The waste types addressed include CH-TRU and mixed CH-TRU waste (analyzed collectively), solid LLW, solid MLLW, solid hazardous waste, solid non-hazardous waste, liquid LLW, and liquid non-hazardous waste. The generation of these waste streams is the result of construction, modifications and operations associated with the facilities being analyzed for plutonium disposition activities. Years of operation would vary depending on the combination of pit disassembly and conversion and plutonium disposition options that might be implemented under the *SPD Supplemental EIS* alternatives.

Waste management facilities and their associated capacities at SRS and LANL are described in Chapter 3, Sections 3.1.10 and 3.2.10, respectively. Waste management impacts are evaluated as a percentage of treatment, storage, disposal capacity, or existing generation rate, depending on a particular waste type's onsite disposition. Appendix F, Tables F–10 and F–11, provide summaries of capacities for SRS and LANL waste management facilities and the evaluation criteria used to assess impacts.

G.4.1 Immobilization and DWPF

Construction—**Table G–9** summarizes the average annual amount of waste that would be generated from facility construction or modification at SRS. The K-Area immobilization capability would be constructed over a 6-year period. Construction would generate solid LLW, solid MLLW, solid hazardous waste, and solid non-hazardous waste. There would be a few minor modifications at DWPF to accommodate the receipt of the can-in-canisters from the immobilization capability, but the waste generated from these modifications is expected to be negligible. Construction of GWSBs is not analyzed in this *SPD Supplemental EIS* because the impacts associated with storage of up to 10,000 canisters containing vitrified HLW have been previously analyzed (DOE 1994). **Table G–10** summarizes the total amount of waste that would be generated.

Table G–9 Immobilization and DWPF Option Average Annual Construction Waste Generation at the Savannah River Site

Facility	*CH-TRU Waste (m^3/yr)*	*Solid LLW (m^3/yr)*	*Solid MLLW (m^3/yr)*	*Solid Hazardous Waste (m^3/yr)*	*Solid Nonhazardous Waste (m^3/yr)*	*Liquid LLW (liters per year)*	*Liquid Nonhazardous Waste (liters per year)*
K-Area immobilization capability	negligible	420	17	17	420	negligible	negligible
DWPF	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Percent of SRS Capacity	*negligible*	*1.1*	*5.7*	*5.7*	*<0.1*	*negligible*	*negligible*

CH-TRU = contact-handled transuranic; DWPF = Defense Waste Processing Facility; LLW = low-level radioactive waste; m^3/yr = cubic meters per year; MLLW = mixed low-level radioactive waste; SRS = Savannah River Site.
Note: To convert cubic meters to cubic feet, multiply by 35.314; liters to gallons, multiply by 0.26418.
Source: SRNS 2012.

Table G–10 Immobilization and DWPF Option Total Construction Waste Generation at the Savannah River Site

Facility	*CH-TRU Waste (m^3)*	*Solid LLW (m^3)*	*Solid MLLW (m^3)*	*Solid Hazardous Waste (m^3)*	*Solid Nonhazardous Waste (m^3)*	*Liquid LLW (liters)*	*Liquid Nonhazardous Waste (liters)*
K-Area immobilization capability	negligible	2,500	100	100	2,500	negligible	negligible
DWPF	negligible	negligible	negligible	negligible	negligible	negligible	negligible

CH-TRU = contact-handled transuranic; DWPF = Defense Waste Processing Facility; LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; m^3 = cubic meters.
Note: To convert cubic meters to cubic feet, multiply by 35.314; liters to gallons, multiply by 0.26418.
Source: SRNS 2012.

Operations—**Table G–11** summarizes the peak annual amount of waste that would be generated from immobilization operations at SRS. Operations from the facilities cited in the table would generate CH-TRU waste, solid LLW, solid MLLW, solid hazardous waste, solid non-hazardous waste, and liquid LLW.

Table G–11 Immobilization and DWPF Option Peak Annual Operations Waste Generation at the Savannah River Site

Facility	*CH-TRU Waste (m^3/yr)*	*Solid LLW (m^3/yr)*	*Solid MLLW (m^3/yr)*	*Solid Hazardous Waste (m^3/yr)*	*Solid Nonhazardous Waste (m^3/yr)*	*Liquid LLW (liters per year)*	*Liquid Nonhazardous Waste (liters per year)*
K-Area immobilization capability	460	250	80	80	50	negligible	negligible
DWPF [a]	negligible	7.9	0.1	negligible	negligible	6.3	negligible
Percent of SRS Capacity	*3.5*	*0.7*	*27*	*27*	*<0.1*	*<0.1*	*negligible*

CH-TRU = contact-handled transuranic; DWPF = Defense Waste Processing Facility; LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; m^3/yr = cubic meters per year; SRS = Savannah River Site.

[a] DWPF waste is the incremental annual volumes that would be generated over that generated from normal DWPF operations for the additional canisters that would be processed annually to support the Immobilization and DWPF Option. For example, 95 canisters over 10 years of immobilization activities yields approximately an additional 10 canisters that would be annually processed at DWPF.

Note: To convert cubic meters to cubic feet, multiply by 35.314; liters to gallons, multiply by 0.26418.

Source: SRNS 2012.

The K-Area immobilization capability would operate for 10 years to immobilize 13.1 metric tons (14.4 tons) of plutonium. In support of the Immobilization and DWPF Option, DWPF would also operate for 10 years. Approximately 790 can-in-canisters would be sent from the K-Area immobilization capability to DWPF. Due to displaced HLW from the can-in-canisters, approximately 95 additional canisters of vitrified HLW would be generated (WSRC 2008). The GWSBs in S-Area currently have the capacity to store up to 4,590 canisters and S-Area storage capacity could be expanded (e.g., an additional GWSB or dry cask storage on a pad) to up to 10,000 canisters (DOE 1994; SRNS 2012; SRR 2013); therefore, there would be no waste management impacts from storage of these additional HLW canisters. DWPF would need to remain operational for an additional 6 years to accommodate the timing of transfer of can-in-canisters from the K-Area immobilization capability to DWPF. The annual waste generation from DWPF operations as shown in Chapter 3, Table 3–21, would represent approximately 30 percent of normal full-scale operations. However, the total amount of waste that would be generated at DWPF during its operational lifecycle would not change, with the exception of that incremental waste associated with the processing of approximately 95 additional canisters.

G.4.2 MOX Fuel

Construction—MFFF is already under construction at SRS and impacts from its construction have been previously assessed (DOE 1999; NRC 2005). Wastes from MFFF construction are included with current SRS waste generation rates (see Chapter 3, Section 3.1.10).

Operations—**Table G–12** summarizes the peak annual volumes of waste that would be generated at SRS from operations under the MOX Fuel Option. Operations from the facilities cited in the table would generate CH-TRU waste, solid LLW, solid hazardous waste, solid non-hazardous waste, liquid LLW, and liquid non-hazardous waste.

Table G–12 MOX Fuel Option Peak Annual Operations Waste Generation at the Savannah River Site

Facility	*CH-TRU Waste (m^3/yr)*	*Solid LLW (m^3/yr)*	*Solid MLLW (m^3/yr)*	*Solid Hazardous Waste (m^3/yr)*	*Solid Nonhazardous Waste (m^3/yr)*	*Liquid LLW (liters per year)*	*Liquid Nonhazardous Waste (liters per year)*
H-Canyon/ HB-Line [a]	22	130	negligible	negligible	negligible	negligible	negligible
DWPF [a]	negligible	negligible	negligible	negligible	negligible	negligible	negligible
MFFF	260	450	negligible	0.3	1,000	1,200,000	340,000,000
Percent of SRS Capacity	*2.1*	*1.6*	*negligible*	*<0.1*	*<0.1*	*0.2*	*23*

CH-TRU = contact-handled transuranic; DWPF = Defense Waste Processing Facility; LLW = low-level radioactive waste; MFFF = Mixed Oxide Fuel Fabrication Facility; MLLW = mixed low-level radioactive waste; MOX = mixed oxide; m^3/yr = cubic meters per year; SRS = Savannah River Site.

[a] Waste volumes associated with conversion activities for 4 metric tons (4.4 tons) of non-pit plutonium for transfer to MFFF; these wastes are applicable under the MOX Fuel Alternative; for all other alternatives the waste volumes under the MOX Fuel Option for plutonium disposition would be those from operation of MFFF alone.

Note: To convert cubic meters to cubic feet, multiply by 35.314; liters to gallons, multiply by 0.26418.

Source: SRNL 2013; SRNS 2012.

Conversion of 4 metric tons (4.4 tons) of non-pit plutonium materials to plutonium oxide would occur at H-Canyon/HB-Line under the MOX Fuel Alternative. Conversion of non-pit plutonium materials to plutonium dioxide at H-Canyon/HB-Line is assumed to take 6 years. In addition, processing of additional feed material at DWPF associated with non-pit plutonium conversion activities at H-Canyon/HB-Line would increase by less than 1 percent; therefore, any increase in waste generation at DWPF is expected to be negligible. It is estimated that no more than approximately 2 additional HLW canisters would be produced at DWPF (i.e., approximately 1 canister for every 2 metric tons (2.2 tons) of plutonium processed in H-Canyon/HB-Line). HLW storage operations would not be impacted by these additional canisters. MFFF would operate for 21 to 24 years, depending on the alternative.

G.4.3 H-Canyon/HB-Line and DWPF

Construction—At SRS, minor modifications to H-Canyon/HB-Line are expected under the H-Canyon/HB-Line and DWPF Option, with no construction or modification expected at DWPF; therefore, no additional construction waste would be generated.

Operations—**Table G–13** summarizes the peak annual amount of waste that would be generated at SRS from operations under the H-Canyon/HB-Line and DWPF Option. Operations from the facilities cited in the table would principally generate CH-TRU waste and solid LLW. H-Canyon/HB-Line would operate for 13 years to process 6 metric tons (6.6 tons) of non-pit plutonium materials for shipment to DWPF.

Approximately 48 additional vitrified glass canisters would be generated from disposition of 6 metric tons (6.6 tons) of surplus plutonium at H-Canyon/HB-Line with vitrification at DWPF, assuming no credit for using gadolinium as a neutron poison (see Appendix B, Section B.1.4.1). These additional canisters would not be significant to the existing operation of DWPF. If gadolinium is credited, then approximately 20 additional canisters would be generated (SRNL 2013). For the reasons discussed in Section G.4.1, the additional canisters would have no impacts on HLW storage capacity in S-Area.

Table G–13 H-Canyon/HB-Line and DWPF Option Peak Annual Operations Waste Generation at the Savannah River Site

Facility	*CH-TRU Waste (m^3/yr)*	*Solid LLW (m^3/yr)*	*Solid MLLW (m^3/yr)*	*Solid Hazardous Waste (m^3/yr)*	*Solid Nonhazardous Waste (m^3/yr)*	*Liquid LLW (liters per year)*	*Liquid Nonhazardous Waste (liters per year)*
H-Canyon/ HB-Line [a]	6	130	negligible	negligible	negligible	negligible	negligible
DWPF	negligible	negligible	negligible	negligible	negligible	negligible	negligible
Percent of SRS Capacity	*<0.1*	*0.4*	*negligible*	*negligible*	*negligible*	*negligible*	*negligible*

CH-TRU = contact-handled transuranic; DWPF = Defense Waste Processing Facility; LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; m^3/yr = cubic meters per year; SRS = Savannah River Site.
[a] Waste associated with dissolution of 6 metric tons (6.6 tons) of non-pit plutonium for transfer to DWPF.
Note: To convert cubic meters to cubic feet, multiply by 35.314; liters to gallons, multiply by 0.26418.
Source: SRNL 2013.

G.4.4 WIPP Disposal

Construction—**Table G–14** summarizes the average annual quantities of waste that would be generated from construction or modifications at SRS to enable preparation of surplus plutonium for potential WIPP disposal using three HB-Line process lines. Minor modifications to H-Canyon/HB-Line would be required and would occur over a 2-year period. Modification of H-Canyon/HB-Line would generate CH-TRU waste. **Table G–15** summarizes the total quantities of waste that would be generated during construction at SRS.

At LANL, development of an enhanced capability in TA-55 facilities for preparation of surplus plutonium for potential WIPP disposal is expected to represent a minor variation on facility modifications proposed for the enhanced pit disassembly and conversion capability at PF-4 (see Appendix F, Section F.4.3), with expected negligible generation of additional wastes. Enhancement of the LANL capability for preparation of surplus plutonium for potential WIPP disposal is not expected to result in annual generation of CH-TRU waste, LLW, or MLLW in excess of LANL waste management capacity, and no significant annual or total construction-period impacts on on- or offsite waste management capacity.

Table G–14 WIPP Disposal Option Average Annual Construction Waste Generation at the Savannah River Site

Facility	*CH-TRU Waste (m^3/yr)*	*Solid LLW (m^3/yr)*	*Solid MLLW (m^3/yr)*	*Solid Hazardous Waste (m^3/yr)*	*Solid Nonhazardous Waste (m^3/yr)*	*Liquid LLW (liters per year)*	*Liquid Nonhazardous Waste (liters per year)*
H-Canyon/ HB-Line	5	negligible	negligible	negligible	negligible	negligible	negligible
Percent of SRS Capacity	*<0.1*	*negligible*	*negligible*	*negligible*	*negligible*	*negligible*	*negligible*

CH-TRU = contact-handled transuranic; LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; m^3/yr = cubic meters per year; SRS = Savannah River Site.
Note: To convert cubic meters to cubic feet, multiply by 35.314; liters to gallons, multiply by 0.26418.
Source: SRNL 2013.

Table G–15 WIPP Disposal Option Total Construction Waste Generation at the Savannah River Site

Facility	CH-TRU Waste (m^3)	Solid LLW (m^3)	Solid MLLW (m^3)	Solid Hazardous Waste (m^3)	Solid Nonhazardous Waste (m^3)	Liquid LLW (liters)	Liquid Nonhazardous Waste (liters)
H-Canyon/ HB-Line	10	negligible	negligible	negligible	negligible	negligible	negligible

CH-TRU = contact-handled transuranic; LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; m^3 = cubic meters; WIPP = Waste Isolation Pilot Plant.
Note: To convert cubic meters to cubic feet, multiply by 35.314; liters to gallons, multiply by 0.26418.
Source: SRNL 2013.

Operations—**Table G–16** summarizes the peak annual amount of waste that would be generated at SRS from operations under the WIPP Disposal Option. Operations would principally generate CH-TRU waste and solid LLW. Two metric tons (2.2 tons) of non-pit plutonium materials would be packaged for shipment to WIPP under the MOX Fuel Alternative. It is assumed that two processing lines would be used at HB-Line to prepare the plutonium for shipment to WIPP, requiring 10 years to complete. Under the WIPP Alternative, it is assumed that three processing lines would be used at HB-Line to prepare 13.1 metric tons (14.4 tons) of pit and non-pit plutonium for shipment to WIPP (SRNL 2013), requiring 25 years to complete.

Table G–16 WIPP Disposal Option Peak Annual Operations Waste Generation at the Savannah River Site

Facility	CH-TRU Waste (m^3/yr)	Solid LLW (m^3/yr)	Solid MLLW (m^3/yr)	Solid Hazardous Waste (m^3/yr)	Solid Nonhazardous Waste (m^3/yr)	Liquid LLW (liters per year)	Liquid Nonhazardous Waste (liters per year)
H-Canyon/ HB-Line [a]	350	95	negligible	negligible	negligible	negligible	negligible
H-Canyon/ HB-Line [b]	770	83	negligible	negligible	negligible	negligible	negligible
Percent of SRS Capacity [c]	*5.8*	*0.3*	*negligible*	*negligible*	*negligible*	*negligible*	*negligible*

CH-TRU = contact-handled transuranic; LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; m^3/yr = cubic meters per year; SRS = Savannah River Site; WIPP = Waste Isolation Pilot Plant.
[a] Waste associated with packaging 2 metric tons (2.2 tons) of non-pit plutonium for shipment to WIPP under the MOX Fuel Alternative, assuming packaging within pipe overpack containers.
[b] Waste associated with packaging 13.1 metric tons (14.4 tons) of pit and non-pit plutonium for shipment to WIPP under the WIPP Alternative, assuming packaging within pipe overpack containers.
[c] Percent of SRS capacity represents the amount of TRU waste under the WIPP Alternative and the amount of solid LLW under the MOX Fuel Alternative, for which the maximum volumes of TRU waste and LLW, respectively, would be generated.
Note: To convert cubic meters to cubic feet, multiply by 35.314; liters to gallons, multiply by 0.26418.
Source: SRNL 2013.

At LANL under the WIPP Alternative, no operational wastes would be generated in addition to those evaluated in Appendix F, Section F.4.3, and summarized in Table F–20, with no additional impacts on LANL waste management capacity, if 7.1 metric tons (7.8 tons) of pit plutonium were transported to SRS for preparation for potential WIPP disposal. These wastes are estimated as 170 cubic meters (220 cubic yards) and 180 cubic meters (240 cubic yards) of CH-TRU waste and LLW, respectively. Under the PF-4 and MFFF and PF-4, H-Canyon/HB-Line, and MFFF Options for pit disassembly and conversion, however, some or all of this pit plutonium could be prepared at LANL for potential WIPP disposal. In this event, the activities and processes required to prepare the plutonium at LANL for potential WIPP disposal would be the same as those required at H-Canyon/HB-Line at SRS. The volumes of CH-TRU waste generated at SRS would decrease while the volumes of CH-TRU waste generated at LANL would increase, but the total CH-TRU waste volume as summed over SRS and LANL would remain approximately the same. Careful planning may be needed to expedite the throughput of this additional CH-TRU waste within TA-55 facilities and transfer to LANL waste management areas for staging for shipment to WIPP (see Appendix H).

G.5 Transportation

Transportation involves the movement of materials between facilities involved in the surplus Plutonium Disposition Program including pit disassembly and conversion facilities, plutonium disposition facilities, support facilities, and domestic commercial nuclear power reactors, as well as waste to treatment, storage, and disposal facilities. This type of system-wide analysis does not lend itself to analysis of a portion of the system (e.g., just the plutonium disposition options) when evaluating impacts from transportation of materials and wastes. See Appendix E, "Evaluation of Human Health Effects from Transportation," for a detailed description of the transportation impacts associated with the alternatives being evaluated in this *SPD Supplemental EIS*. Included are the effects associated with the plutonium disposition options addressed for each alternative. Appendix E, Section E.11, provides a discussion of the impacts associated with onsite shipments at SRS and LANL.

G.6 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health and environmental effects of their programs, policies, and activities on minority and low-income populations. The alternatives considered in this *SPD Supplemental EIS* involve construction and operation of several facilities in various combinations, with different levels of efforts and operational timeframes. This type of system-wide analysis does not lend itself to analysis of a portion of the system (e.g., just the plutonium disposition options). Chapter 4, Section 4.1.6, presents the potential impacts on populations surrounding the facilities at SRS and LANL that would be involved in surplus plutonium activities under the *SPD Supplemental EIS* alternatives. Included are the impacts associated with the plutonium disposition facilities.

G.7 Other Resource Areas

G.7.1 Land Resources

This section describes impacts that the plutonium disposition options would have on land resources. Land resources include land use and visual resources. Construction of the K-Area immobilization capability at SRS under the Immobilization and DWPF Option has the most potential to affect land resources. The other plutonium disposition options evaluated in this appendix would have no to minimal potential for impacting land resources.

G.7.1.1 Immobilization and DWPF

Gloveboxes and other equipment required for safe plutonium preparation would be installed within the K-Area Complex; however, construction of new support systems would be needed, such as a chiller building, cooling towers, office space, sand filter, fan house, and exhaust tunnel and stack. Approximately 2 acres (0.8 hectares) of previously disturbed land at K-Area would be required during construction of these support systems. Because K-Area is an industrialized area, this would not represent a change in land use. Minor modifications to DWPF at S-Area to support filling can-in-canisters with vitrified HLW would occur within the existing DWPF structure, resulting in no impacts on land use. Operation of the facilities involved in this option would involve no ground-disturbing activities and, therefore, would not result in impacts on land use at SRS.

Installation of gloveboxes and other equipment within an existing structure at the K-Area Complex would not impact visual resources, although a number of new structures would be constructed at K-Area including the previously-mentioned support systems. Because each of these structures would be constructed within the built-up portion of K-Area, there would be no change in its overall industrial appearance or its current Visual Resource Management Class IV designation. Because modifications to DWPF would occur within the existing structure there would be no change to visual resources at S-Area. Operation of the facilities involved in this option would not impact visual resources at SRS.

G.7.1.2 MOX Fuel

No additional construction would be required at MFFF to fabricate plutonium oxide into MOX fuel beyond that analyzed in previous National Environmental Policy Act analyses (DOE 1999; NRC 2005). Therefore, there would be no impacts on existing land use or visual resources under this option. Operation of any of the facilities potentially involved in this option would involve no ground-disturbing activities and, therefore, would not result in impacts on land use or visual resources at SRS.

G.7.1.3 H-Canyon/HB-Line and DWPF

Facility modifications to H-Canyon include changing out or reconfiguring some tanks and/or piping to increase plutonium storage volume and capacity, and changes to or adding some equipment at HB-Line. Because all such modifications would be within the existing structure, there would be no change in land use or visual resources at H-Area. A transfer bypass line may be installed around a diversion box at the H-Area tank farm on land that is already disturbed and used for industrial purposes; thus, if this line is installed, it would not impact land resources at H-Area. No additional features would be required at DWPF. Operation of the facilities involved in this option would involve no ground-disturbing activities and, therefore, would not result in impacts on land use or visual resources at SRS.

G.7.1.4 WIPP Disposal

At SRS, because implementing this option would involve minor modifications to equipment within the existing H-Canyon/HB-Line structure, there would be no potential for impacts on land use or visual resources at SRS. At LANL, modifications to provide an enhanced capability to prepare surplus plutonium for potential WIPP disposal would likely occur within the footprint of existing TA-55 facilities, with no impacts on land use and visual resources. At SRS and LANL, facility operations under this option would involve no ground-disturbing activities; thus, there would be no impacts on land use or visual resources at either site.

G.7.2 Geology and Soils

Impacts on geology and soils can occur from disturbance of geologic and soil materials during land clearing, grading, and excavation activities, and the use of geologic and soils materials during facility construction and operations. Disturbance of geologic and soil materials includes excavating rock and soil, soil mixing, soil compaction, and covering with building foundations, parking lots, roadways, and fill materials. The use of geologic and soils materials during facility construction and operations includes using crushed stone, sand, gravel, and soil in road and building construction, as fill during construction, and as feed for processing activities during operations.

Construction of the K-Area immobilization capability at SRS under the Immobilization and DWPF Option has the most potential to affect geology and soils by disturbance of the land surface and the use of geologic and soils materials. The other plutonium disposition options evaluated in this appendix would have no to minimal potential for land disturbance and use of geologic and soils materials.

G.7.2.1 Immobilization and DWPF

Construction—As described in Section G.7.1.1, construction of the K-Area immobilization capability would disturb a total of 2 acres (0.8 hectares) of previously disturbed land. During construction, best management practices (BMPs) such as silt fences, straw bales, geotextile fabrics, and revegetation would be used to control erosion. The South Carolina Department of Health and Environmental Control (SCDHEC) requires a Stormwater Pollution Prevention Plan (SWPPP) under the South Carolina National Pollutant Discharge Elimination System (NPDES) General Permit for stormwater discharges from construction activities (Permit Number SCR100000) (NRC 2005:4-24, 5-2). Because this area has already been disturbed, a limited area of soils would be disturbed at any time, and BMPs would be used to limit soil erosion, minimal impacts on geology and soils at SRS are expected.

It is estimated that 1,200 tons (1,100 metric tons) of crushed stone, sand, and gravel, and 9,500 cubic yards (7,300 cubic meters) of soil would be used during construction of the K-Area immobilization capability (WSRC 2008). The crushed stone, sand, and gravel would be supplied from offsite commercial sources, and the soils would be supplied from onsite resources and from soils stockpiled at the construction site during excavation. The total quantities of these materials would represent small percentages of regionally plentiful resources and are unlikely to have adverse impacts on geology and soils at SRS. It is expected that no geologic and soil materials would be needed at DWPF to support facility modifications under this option.

Operations—Operation of the facilities involved in this option would involve no ground-disturbing activities and little or no use of geologic and soils materials and, therefore, would result in minimal impacts on SRS geology and soils.

G.7.2.2 MOX Fuel

Construction— MFFF is already under construction and impacts from its construction have been previously assessed (DOE 1999; NRC 2005); no additional impacts on SRS geology and soils are expected.

Operations—Operation of the facilities potentially involved in this option would involve no ground-disturbing activities and little or no use of geologic and soils materials and, therefore, would have minimal impacts on SRS geology and soils.

G.7.2.3 H-Canyon/HB-Line and DWPF

Construction—Although there would be some minor modifications to equipment at H-Canyon/HB-Line to prepare and dissolve plutonium for subsequent vitrification with HLW at DWPF, these modifications would take place within an existing structure. There would be no additional ground disturbance at H-Area and no impacts on SRS geology and soils. A transfer bypass line may be installed around a diversion box at the H-Area tank farm on land that is already disturbed and used for industrial purposes. If this bypass line is installed, control measures would be implemented similar to those discussed in Section G.7.2.1 to minimize the potential for erosion and sediment loss. Therefore, implementing this option would require little or no use of geologic and soils materials and have minimal impacts on SRS geology and soils.

Operations—Operation of the facilities involved in this option would involve no ground-disturbing activities and little or no use of geologic and soils materials and, therefore, would result in minimal impacts on SRS geology and soils.

G.7.2.4 WIPP Disposal

Construction—At SRS, implementing this option would involve minor modifications to equipment within the existing H-Canyon/HB-Line structure; thus, there would be no potential for erosion and sediment loss. There would be little or no requirement for local geologic and soil materials, with minimal impacts on SRS geology and soils. At LANL, modifications to provide an enhanced capability to prepare surplus plutonium for potential WIPP disposal would likely occur within the footprint of existing TA-55 facilities, with no impacts on geology and soils.

Operations—Operation of SRS or LANL facilities under this option would involve no ground-disturbing activities and little or no use of local geologic and soils materials and, therefore, would result in minimal impacts on geology and soils at either site.

G.7.3 Water Resources

This section analyzes impacts on water resources (surface water and groundwater). The Immobilization and DWPF, MOX Fuel, and H-Canyon/HB-Line and DWPF Options only involve activities at SRS; the WIPP Disposal Option involves activities at SRS and LANL.

G.7.3.1 Immobilization and DWPF

G.7.3.1.1 Surface Water

Construction—K-Area would be modified to support plutonium immobilization. The estimated area of land disturbance is 2 acres (0.8 hectares). Site work would include temporary and permanent erosion controls; site preparation, excavation, and backfill; installation of access walkways, driveways, and parking areas; installation of utilities (water, sanitary sewer, electrical); and final grading and provision of storm drainage and ground cover. The management and discharge of construction site runoff would be in compliance with stormwater permits. Some existing utility lines would be removed or relocated (WSRC 2008). Existing K-Area systems would be used to support new domestic, process, cooling water, and sanitary sewer lines. New structures would include a sand filter, fan house, exhaust tunnel, and stack. Surface water would not be used to support construction activities (SRNS 2012).

Surface water quality would be protected during construction using methods similar to those that would be implemented for optional construction of the Pit Disassembly and Conversion Facility in F-Area at SRS (see Appendix F, Section F.7.3.1.1). In accordance with the requirements of the SCDHEC, an SWPPP would be implemented during construction to minimize the amount of sediment in runoff to surface waters. Because BMPs would be used to control stormwater runoff and soil erosion, K-Area construction-induced sedimentation is expected to have minimal, short-term impacts on water quality in Indian Grave Branch and Pen Branch. Any accidental spills of oil, gas, or diesel fuels, paint, or hydraulic fluids that could affect stormwater runoff water quality would be contained and remediated. No long-term impacts on water quality or changes to stream channel morphology, aquatic habitats, or flow regimes are expected, and the availability of surface water for downstream users would not be limited (WSRC 2008).

Modifications to DWPF at S-Area to facilitate vitrification of HLW canisters containing immobilized plutonium would occur within an existing structure with no potential for erosion or sediment loss that could impact surface water quality. There would be no need for construction of additional HLW canister storage capacity.

Operations—Impacts on surface water from operation of the K-Area immobilization capability are expected to be minimal. K-Area heating, ventilating, and air conditioning (HVAC) condensate (SCDHEC Permit SC0000175) and stormwater (SCDHEC Permit SCR000000) are discharged at NPDES outfall K-18 into Indian Grave Branch via the K-Reactor Discharge Canal, which merges with Pen Branch prior to discharging into the Savannah River (WSRC 2008). Discharges from the outfall are limited for pH, total suspended solids, and flow, and potential contaminants are limited to safe concentrations; this ensures minimal impacts on receiving streams. Typically, tritium concentrations in the discharge are at or below background levels and flow rates generally range from 200 to 400 gallons (760 to 1,500 liters) per minute. Sanitary wastewater from K-Area would be routed to the Central Sanitary Wastewater Treatment Facility (CSWTF) for processing before discharge from a permitted outfall (SRNS 2012). Some process-generated wastewater may also be routed to CSWTF depending on the content of metals such as zinc or copper in the wastewater.

DWPF and the GWSBs at S-Area would operate in accordance with existing permits; discharges from these facilities are expected to have negligible impacts on receiving streams (WSRC 2008). Surface water sources would not be used to supply water for facility operations; therefore, no decrease in surface water levels or flows is expected. Plutonium disposition activities would not limit the availability of surface water availability to downstream users.

G.7.3.1.2 Groundwater

Construction—No liquid effluents would be directly discharged to groundwater during construction (WSRC 2008). Modification of DWPF at S-Area to facilitate vitrification of HLW canisters containing immobilized plutonium would require minimal additional use of groundwater. No long-term impacts on local or available SRS capacity or groundwater quality are expected.

Operations—No direct discharge of liquid effluents to groundwater would be expected, retention or detention basins would not be used as components of wastewater treatment systems, and NPDES guidelines and Spill Prevention Control and Countermeasures Plans would be used to minimize impacts. DWPF is designed with the capability to monitor water effluents and control discharges, and there would be no direct discharge of liquid effluents to groundwater during facility operation. Water use would be minimal for GWSB storage of HLW canisters containing surplus plutonium; therefore, no impacts on groundwater resources are expected.

No long-term impacts on available SRS capacity or groundwater quality are expected.

G.7.3.2 MOX Fuel

G.7.3.2.1 Surface Water

Construction—No additional construction would be required to fabricate plutonium oxide into MOX fuel at MFFF beyond that previously analyzed (DOE 1999; NRC 2005). Therefore, no impacts on surface waters are expected.

Operations—Stormwater associated with MFFF operations would be discharged to Upper Three Runs at NPDES-permitted outfalls, and noncontact HVAC condensate would be routed directly to CSWTF. Uncontaminated HVAC condensate and stormwater runoff from H-Canyon/HB-Line would be discharged into Upper Three Runs at permitted outfalls (WSRC 2008). Impacts on surface water quality and downstream flow regimes from activities at MFFF or H-Canyon/HB-Line are expected to be minimal.

G.7.3.2.2 Groundwater

Construction—Because no additional facility construction would be required for MOX fuel fabrication at MFFF, no facility construction-related impacts on groundwater are expected.

Operations—The MFFF water supply needs include potable water, firefighting water (hydrants and fire protection systems), utility cooling water, utility and process chilled water, and cooling water. MFFF is designed with the capability to monitor liquid effluents and control discharges (WGI 2005:140; WSRC 2008). No direct discharge of liquid effluents to groundwater during facility operation is expected. Retention or detention basins would not be used as a component of facility wastewater treatment systems. Groundwater contamination could occur from groundwater recharge from indirectly contaminated surface water sources or from infiltration of accidental spills. It is unlikely that groundwater quality would be affected by indirect sources because NPDES guidelines and Spill Prevention Control and Countermeasures Plans would require prompt and thorough cleanup which would limit groundwater contamination (NRC 2005:4-26).

Use of water at H-Canyon/HB-Line (applicable under the MOX Fuel Alternative) is relatively independent of the types of activities conducted. H-Canyon/HB-Line is designed with the capability to monitor liquid effluents and control discharges, and there would be no direct discharge of liquid effluents to groundwater during facility operation.

Processing surplus plutonium at H-Canyon/HB-Line would result in generation of small quantities of waste that would be vitrified with other HLW at DWPF. DWPF is designed with the capability to monitor water effluents and control discharges; there would be no direct discharge of liquid effluents to groundwater during facility operation. Water use would be minimal for GWSB storage of HLW canisters containing surplus plutonium; therefore, no impacts on groundwater resources are expected.

No impacts on groundwater quality or long term impacts on SRS available capacity are expected.

G.7.3.3 H-Canyon/HB-Line and DWPF

G.7.3.3.1 Surface Water

Construction—For this option, minor modifications to existing H-Canyon/HB-Line facilities would be required. Because these modifications would take place within an existing structure, there would be no potential for erosion or sediment loss that could impact surface water quality. No additional construction activities are expected at DWPF to vitrify the dissolved plutonium sent to DWPF from H-Canyon/HB-Line. There would be no need for construction of additional HLW canister storage capacity. Because of the larger quantity of surplus plutonium that would be processed through H-Canyon/HB-Line and DWPF, a buried transfer line may be constructed at the H-Area tank farm, which would cause limited ground disturbance (SRNL 2013). However, surface water resources would be protected using standard techniques such as BMPS and minimal impacts on surface water are expected.

Operations—During operations, the potential for surface water resource impacts would be minimal for H-Canyon/HB-Line (see Section G.7.3.2.1) and for DWPF and the GWSBs (see Section G.7.3.1.1).

G.7.3.3.2 Groundwater

Construction—The minor expected modifications to existing H-Canyon/HB-Line facilities would require a negligibly small quantity of water. No impacts on groundwater resources are expected from the possible construction of a buried transfer line at the H-Area tank farm. No impacts on groundwater quality or long term impacts on SRS available capacity are expected.

Operations—Use of water at H-Canyon/HB-Line is relatively independent of the types of activities conducted. H-Canyon/HB-Line is designed with the capability to monitor liquid effluents and control discharges, and there would be no direct discharge of liquid effluents to groundwater during facility operation.

The surplus plutonium processed at H-Canyon/HB-Line would be vitrified with other HLW at DWPF. Only a fraction of the water use at DWPF would be attributable to vitrification of immobilized plutonium. DWPF is designed with the capability to monitor water effluents and control discharges, and there would be no direct discharge of liquid effluents to groundwater during facility operation. Water use would be minimal for GWSB storage of HLW canisters containing surplus plutonium.

No impacts on groundwater quality or long-term impacts on SRS available capacity are expected.

G.7.3.4 WIPP Disposal

G.7.3.4.1 Surface Water

Construction—At SRS, existing H-Canyon/HB-Line structures may undergo minor modifications to facilitate preparation of surplus plutonium for shipment to WIPP for disposal as CH-TRU waste. These facility modifications, however, would take place within an existing structure, with no potential for erosion or sediment loss that could impact surface water quality. At LANL, modifications to provide an enhanced capability to prepare surplus plutonium for potential WIPP disposal would likely occur within the footprint of existing TA-55 facilities, with no impacts on surface waters. No long-term impacts on surface waters are expected at SRS or LANL.

Operations—At SRS, uncontaminated HVAC condensate wastewater and stormwater runoff from H-Canyon/HB-Line would be discharged at permitted outfalls (see Section G.7.3.2.1) and sanitary wastewater would be routed to CSWTF. At LANL, preparation of surplus plutonium for potential WIPP disposal would likely occur within the footprint of existing TA-55 facilities with no direct discharge of industrial effluent, and with sanitary wastewater directed to an appropriate treatment facility for disposal. No surface water sources would be used to supply water for operations. Therefore, no impacts on surface water quality or downstream flows are expected at SRS or LANL.

G.7.3.4.2 Groundwater

Construction—At SRS, minor modifications of existing H-Canyon/HB-Line structures as necessary for surplus plutonium preparation for potential WIPP disposal would result in a negligible increase in water consumption and would have negligible impacts on groundwater resources. At LANL, modification of existing TA-55 facilities to provide an enhanced capability to prepare surplus plutonium for potential WIPP disposal would occur concurrently with modifications to enhance LANL's pit disassembly and conversion capability in PF-4, but could require a minor increase in construction employment. In this event, there could be additional water use associated with the additional personnel. This additional water use, however, is expected to be small and within LANL's existing capacity for water use (see Section G.7.7.4). No long-term impacts on available capacity or groundwater quality are expected at SRS or LANL.

Operations—At SRS, use of water at H-Canyon/HB-Line is relatively independent of the types of activities conducted. H-Canyon/HB-Line is designed with the capability to monitor liquid effluents and control discharges, and there would be no direct discharge of liquid effluents to groundwater during facility operation. At LANL, preparation of surplus plutonium for potential WIPP disposal could require additional employment, with additional water use associated with the additional site personnel. This additional water use, however, is expected to be within LANL's existing capacity for water use (see Section G.7.7.4). No long-term impacts on available capacity or groundwater quality are expected at SRS or LANL.

G.7.4 Noise

Activities under the plutonium disposition options would result in noise from vehicles, construction equipment, and facility operations. The change in noise levels was considered for modification and operation of the plutonium disposition facilities.

Construction—At SRS, noise during the optional construction of the K-Area immobilization capability would include bulldozers, graders, dump trucks, and other vehicles. Impacts would be small, and construction traffic noise impacts would be unlikely to result in increased public annoyance. Any change in traffic noise associated with construction would occur onsite and along offsite local and regional transportation routes. Noise sources during optional modifications to H-Canyon/HB-Line or MFFF (to add metal oxidation furnaces) would be primarily indoors and would have minor impacts on the public and wildlife. There would be no noise impacts from optional modifications to DWPF. Construction noise impacts from MFFF were addressed previously (DOE 1999; NRC 2005).

At LANL, modifications to provide an enhanced capability to prepare surplus plutonium for potential WIPP disposal would likely occur within the footprint of existing TA-55 facilities, with no additional noise impacts.

Operations—At SRS, noise impacts due to operation of the K-Area immobilization capability, MFFF, DWPF, and/or H-Canyon/HB-Line would be similar to those described for existing conditions at SRS in Chapter 3, Section 3.1.4.3. Noise sources during operations could include emergency generators, cooling systems, vents, motors, material-handling equipment, and employee vehicles and trucks. Given the distances to site boundaries (about 5.4 miles [8.7 kilometers] from F-Area, for example), noise from facility operations is not expected to result in annoyance to the public. Non-traffic noise sources are far enough away from offsite areas that the contribution to offsite noise levels would continue to be small. Noise from traffic associated with the operation of facilities is expected to increase by less than 1 decibel as a result of the increase in staffing. Some noise sources could have onsite noise impacts, such as the disturbance of wildlife. However, noise would be unlikely to affect federally listed threatened or endangered species or their critical habitats. Some change in the noise levels to which noninvolved workers are exposed could occur. Appropriate noise control measures would be implemented under

DOE Order 440.1B, *Worker Protection Program for DOE (Including the National Nuclear Security Administration) Federal Employees*, to protect worker hearing.

At LANL, preparation of surplus plutonium for potential WIPP disposal would likely occur using existing TA-55 facilities with no additional noise impacts.

G.7.5 Ecological Resources

This section analyzes impacts on ecological resources–including terrestrial, aquatic, and wetland resources, and threatened and endangered species–resulting from construction or modification of facilities at SRS or LANL for plutonium disposition. Operational activities at these facilities would not further affect ecological resources. Terrestrial resources would not be further affected because additional land would not be disturbed during facility operations, and any artificial lighting and noise-producing activities would occur in areas that are already in industrial use. Aquatic and wetland resources, and threatened and endangered species, would not be further affected because additional land would not be disturbed during facility operations.

Construction of the K-Area immobilization capability at SRS under the Immobilization and DWPF Option has the most potential to affect ecological resources by disturbance of the land surface. The other plutonium disposition options evaluated in this appendix would have no to minimal potential for land disturbance.

G.7.5.1 Immobilization and DWPF

Construction—

Terrestrial resources. Several structures would be constructed to support the K-Area immobilization capability. These structures would be built on 2 acres (0.8 hectares) of land already classified as disturbed or developed, and would not result in impacts on terrestrial resources (WSRC 2008). Minor modifications to DWPF at S-Area to support filling can-in-canisters with vitrified HLW would occur within the existing DWPF structure, resulting in no impacts on terrestrial resources. No additional HLW canister storage capacity would be required. Therefore, implementing this plutonium disposition option would not impact terrestrial resources at SRS.

Aquatic resources. No aquatic resources exist within the area required for the construction of new structures supporting the K-Area immobilization capability. An SWPPP would be implemented during construction to minimize the amount of soil erosion and sedimentation that could be transported into nearby water bodies. Control measures could include sediment fences and minimizing the amount of time that bare soil would be exposed. Therefore, any impacts on aquatic resources, including streams, lakes, or ponds, would be minimized. As with terrestrial resources, there would be no impacts on aquatic resources from modifying DWPF to accommodate can-in-canisters received from K-Area, because all construction would be internal to the structure, with no potential for erosion and sediment loss that could impact aquatic resources. No additional HLW canister storage capacity would be required. Therefore, implementing this plutonium disposition option would have no to minimal impacts on aquatic resources.

Wetlands. No wetlands exist within the portion of K-Area required for the construction of the structures supporting the immobilization capability; as discussed above, measures would be taken to minimize erosion and sediment loss, with consequently minimal impacts on wetlands. As with aquatic resources, there would be no impacts on wetlands due to minor modifications to DWPF, and there would be no need for additional HLW canister storage capacity. Therefore, implementing this plutonium disposition option would have no to minimal impact on wetlands.

Threatened and endangered species. No impacts on threatened and endangered species are expected from construction of support structures for the immobilization capability, which would occur in an industrial area of K-Area. No impacts are expected from minor modifications to DWPF, because the modifications would occur within an existing structure, with no potential for impacts on threatened and endangered species, and there would be no need for additional HLW canister storage capacity. Therefore, implementing this plutonium disposition option would have no impacts on threatened or endangered species.

Operations—Operation of the facilities involved in this option would involve no ground-disturbing activities and, thus, would result in minimal impacts on ecological resources.

G.7.5.2 MOX Fuel

Construction—This option would involve no new construction at MFFF beyond that previously analyzed (DOE 1999; NRC 2005), with no additional land disturbance, and, therefore, no impacts on ecological resources.

Operations—Operation of the facilities potentially involved in this option would involve no ground-disturbing activities and therefore would have no impacts on ecological resources.

G.7.5.3 H-Canyon/HB-Line and DWPF

Construction—As addressed in Appendix B, minor modification of H-Canyon could be required. Some tanks and/or piping may be changed out or reconfigured to increase plutonium storage volume and capacity, and some equipment may be changed or added at HB-Line. These facility modifications, however, would occur within existing structures, so that there would be no potential for erosion and sediment loss that could impact aquatic resources or wetlands, and no potential for impacts on threatened and endangered species. A transfer bypass line may be installed around a diversion box at the H-Area tank farm, on land that is already disturbed and used for industrial purposes; if this bypass line is installed, control measures would be implemented similar to those discussed in Section G.7.5.1 to minimize the potential for erosion and sediment loss that could impact aquatic resources or wetlands outside the construction area. As discussed in Section G.7.5.1, there would be no need for additional HLW canister storage capacity. Therefore, implementing this plutonium disposition option would have no to minimal impacts on terrestrial, aquatic, and wetlands resources, and threatened and endangered species.

Operations—Operation of the facilities involved in this option would involve no ground-disturbing activities and therefore would result in no impacts on SRS ecological resources.

G.7.5.4 WIPP Disposal

Construction—At SRS, minor facility modifications to H-Canyon/HB-Line to support preparation of surplus plutonium for potential WIPP disposal would occur within existing structures. Thus, there would be no impacts on terrestrial resources, no potential for erosion and sediment loss that could impact aquatic resources and wetlands, and no potential for impacts on threatened and endangered species. Therefore, implementing this plutonium disposition option would have no impacts on terrestrial, aquatic, and wetlands resources, and threatened and endangered species. At LANL, modifications to provide an enhanced capability to prepare surplus plutonium for potential WIPP disposal would likely occur within the footprint of existing TA-55 facilities with no impacts on ecological resources.

Operations—Operation of facilities at SRS or LANL under this option would involve no ground-disturbing activities and, thus, would result in no impacts on ecological resources at either site.

G.7.6 Cultural Resources

SRS manages and protects its cultural resources, including prehistoric, historic, American Indian, and paleontological, under the terms of agreements and through a site use review process, to evaluate potential impacts imposed by a scope of work prior to taking action. The Savannah River Archaeological Research Program (SRARP) of the South Carolina Institute of Archeology and Anthropology at the University of South Carolina assists DOE in determining how the project can proceed to minimize or mitigate potential impacts on cultural resources (Wingard 2010). LANL manages and protects its cultural resources as detailed in *A Plan for the Management of the Cultural Heritage at Los Alamos National Laboratory*, *New Mexico* (LANL 2006) and governed by a Programmatic Agreement between DOE, the Advisory Council on Historic Preservation, and the New Mexico State Historic Preservation Office (DOE 2006).

The Immobilization and DWPF, MOX Fuel, and H-Canyon/HB-Line and DWPF Options only involve activities at SRS; the WIPP Disposal Option involves activities at SRS and LANL. At either site, the land area required for construction or modification of facilities is relatively small; would take place primarily in previously disturbed or developed areas; and would be surveyed and monitored, as appropriate, in compliance with existing agreements and procedures. Impacts from operations would be negligible, and are not further addressed, because security measures at both sites would restrict access to any nearby prehistoric, historic, American Indian, or paleontological resources.

G.7.6.1 Immobilization and DWPF

Prehistoric Resources. While some capabilities would be installed in existing facilities with no impact on prehistoric resources, a number of new facilities would be constructed within the industrial portion of K-Area in support of the immobilization capability. K-Area is classified as site industrial (DOE 2005c:62). These facilities would occupy approximately 2 acres (0.8 hectares) of previously disturbed land. Because construction would take place within the built-up portion of K-Area and previous archeological reviews did not reveal any identified sites where land disturbance would occur, impacts on prehistoric resources are unlikely. Although six archeological sites have been identified in the vicinity of the K-Area boundary, none would be disturbed (Blunt 2010; DOE 2005d:13-14; SRARP 2006:10).

DWPF is located in S-Area, which is classified as site industrial within the Industrial Core Management Area (DOE 2005b:4, 2005c:75). Minor modifications to DWPF would be needed to support filling can-in-canisters with vitrified HLW. Because construction would be within DWPF there would be no impacts on prehistoric resources.

Historic Resources. The K-Area reactor building is a National Register of Historic Places (NRHP)-eligible structure itself and within the context of the Cold War Historic District. The K-Area reactor building is considered highly significant because it was primary to SRS's mission and housed a part or all of one of the site's nuclear production processes and is valued for its good integrity in that the building contains parts of its original equipment and can still provide information about its past.

To accommodate new facilities, the Cooling Water Pump House in K-Area would be removed in accordance with applicable procedures and regulations; in addition, the adjacent Cooling Water Reservoir could be affected, as well as the Filter and Softener Plant (Blunt 2010). These structures were determined to be eligible for listing on the NRHP as contributing members of the Cold War Historic District and were determined to be valued for their good integrity (fair in the case of the Filter and Softener Plant) in that they contain parts of their original equipment and can still provide information about their past, even though they support a process that, in itself, is not unique and could be found in other industrial contexts. As such, proposed changes to the historic fabric of these buildings and structure, or to any intact historically significant equipment, would be studied, discussed with the South Carolina State Historic Preservation Office (SHPO), and avoided, mitigated, or minimized (DOE 2005a:16, 59, 61, 67).

There would be no impacts on historic resources associated with the Cold War era at S-Area because construction of DWPF began in 1983 and operations began in 1996 (SRR 2013).

American Indian Resources. Due to the developed nature of K- and S-Areas, it is highly unlikely that either vegetation important to American Indians, or other resources of concern, would be found within these areas. Thus, impacts on American Indian resources resulting from actions necessary to implement plutonium disposition would be unlikely.

Paleontological Resources. Paleontological resources are unlikely to be found within K- and S-Areas due to the highly disturbed nature of these areas. Thus, impacts on paleontological resources resulting from implementing plutonium disposition would be unlikely.

G.7.6.2 MOX Fuel

No modifications to MFFF would be required to fabricate plutonium oxide into MOX fuel beyond that analyzed in previous National Environmental Policy Act analyses (DOE 1999; NRC 2005); therefore no impacts on cultural resources are expected.

G.7.6.3 H-Canyon/HB-Line and DWPF

Prehistoric Resources. Minor modifications to H-Canyon/HB-Line would be required to support plutonium disposition. In addition, a transfer bypass line may be installed around a diversion box at the H-Area tank farm; however, it would be located on land that is already disturbed and used for industrial purposes. Because these actions would take place within an existing facility and industrial zone, no impacts on prehistoric resources are expected.

Historic Resources. The H-Canyon building, including HB-Line, and any other attached auxiliaries have been identified as NRHP-eligible individually, as well as collectively within the context of the Cold War Historic District. The H-Canyon building and its auxiliary facilities are considered highly significant given that these structures were primary to SRS's mission and housed a part or all of one of the site's nuclear production processes (DOE 2005a:39, 58, 61, 66). Photographic mitigation and oral histories have been initiated and, when completed, will be distributed to the South Carolina SHPO to determine what, if any, further action is required in order to preserve the historical integrity of these facilities (DOE 2008:4). The proposed facility modifications would be assessed in accordance with the Cold War Historic Preservation Program (Sauerborn 2011).

American Indian Resources. There would be no impacts on American Indian resources associated with modifications to H-Canyon/HB-Line.

Paleontological Resources. There would be no impacts on paleontological resources associated with modifications to H-Canyon/HB-Line.

G.7.6.4 WIPP Disposal

At SRS, minor modifications to H-Canyon/HB-Line would be required to support plutonium preparation for potential WIPP disposal. Impacts on prehistoric, historic, American Indian, and paleontological resources would be the same as those in Section G.7.6.3. At LANL, modifications to provide an enhanced capability to prepare surplus plutonium for potential WIPP disposal would likely occur within the footprint of existing TA-55 facilities with no impacts on cultural resources.

G.7.7 Infrastructure

This section analyzes impacts of plutonium disposition options on infrastructure resources at SRS and LANL, including electricity, fuel oil and water.

G.7.7.1 Immobilization and DWPF

Construction—**Table G–17** summarizes the peak annual infrastructure requirements at SRS that would be generated by construction of the K-Area immobilization capability. This capability would be constructed over a 6-year period. Construction of the immobilization capability would use less than 1 percent of SRS's available electrical and water capacity (annually about 4.1 million megawatt-hours and 2.63 billion gallons [9.96 billion liters], respectively). Fuel oil usage is not limited by site capacity because fuel oil is delivered to the site as needed. However, construction of the K-Area immobilization capability is estimated to require 5,000 gallons (19,000 liters) per year, representing about 1 percent of SRS's current annual fuel usage of about 410,000 gallons (1,600,000 liters) (see Chapter 3, Section 3.1.9).

There would be some minor modifications at DWPF to receive the can-in-canisters, but minimal additional infrastructure resources would be required to support these modifications.

Operations—**Table G–18** summarizes the annual operational infrastructure requirements at SRS generated by the K-Area immobilization capability and DWPF operations associated with immobilized plutonium. The K-Area immobilization capability would operate for 10 years to process 13.1 metric tons (14.4 tons) of plutonium. Peak annual operations would use approximately 1 percent of SRS's available electrical capacity, and less than 1 percent of the site's available water capacity. Fuel oil use is estimated at 18,000 gallons (68,000 liters) per year, approximately 4 percent of SRS's current annual fuel usage.

Operations at DWPF would continue at their current rate and would have a minimal impact on infrastructure resources related to SRS's available capacity because DWPF's annual infrastructure requirements would not change as a result of immobilization activities. Only about 3 percent of the annual electricity and water use at DWPF would be attributable to plutonium disposition activities. If all 13.1 metric tons (14.4 tons) of plutonium materials were immobilized, DWPF would need to remain operational an additional 6 years, from 2026 to 2031, to accommodate the timing of can-in-canister transfers from the K-Area immobilization capability to DWPF. In this case, infrastructure requirements associated with DWPF operations from 2026 to 2031 would represent approximately 30 percent of normal full-scale operations because a smaller number of canisters would be filled at DWPF each year (approximately 80 compared to approximately 300).

G.7.7.2 MOX Fuel

Construction—No modifications would be required at MFFF, as it is currently being constructed to support this disposition option, and no modifications would be needed at H-Canyon/HB-Line or DWPF to support conversion of some non-pit plutonium to plutonium oxide; therefore, there would be no impacts on current infrastructure requirements.

Operations—Table G–18 summarizes the annual infrastructure requirements at SRS that would be generated by disposition activities. While most disposition activities would occur at MFFF, conversion of 4 metric tons (4.4 tons) of non-pit plutonium to plutonium oxide would occur at H-Canyon/HB-Line as part of the MOX Fuel Alternative and would result in a small amount of waste needing to be sent to DWPF annually. Infrastructure requirements from these possible activities are conservatively included in the values in the table under the MOX Fuel Option.

Annual operations at MFFF would use approximately 3 percent of SRS's available electrical capacity. Annual water usage would be less than 1 percent of the site's available capacity. Fuel oil use is estimated at 110,000 gallons (420,000 liters) per year, approximately 27 percent of SRS's current annual fuel usage of about 410,000 gallons (1.6 million liters).

Conversion of plutonium material to an oxide at H-Canyon/HB-Line for use at MFFF would require minimal additional electricity, water, and fuel oil beyond current infrastructure requirements associated with continued operation of H-Canyon/HB-Line. These requirements are already reflected in SRS's baseline operations so there would not be any additional impact on SRS's available electrical or water capacity.

Operations at DWPF would continue at their current rate and would have no impacts on resources related to SRS's available capacity because DWPF operations are already accounted for in site infrastructure requirements. Less than 1 percent of the annual electricity and water use at DWPF would be attributable to plutonium disposition activities.

Table G–17 Peak Annual Construction Infrastructure Requirements from Plutonium Disposition Options at the Savannah River Site

Resource	SRS Facilities								Plutonium Disposition Options			
			H-Canyon/HB-Line [b]			DWPF [b]						
	MFFF [a]	K-Area Immobilization Capability	Prepare Pu for WIPP Disposal	Prepare Pu for MFFF	Prepare Pu for DWPF Vitrification	Immobilized Pu	Waste from Pu Prepared for MFFF	Pu Prepared for Vitrification	Immobilization and DWPF	MOX Fuel	H-Canyon/ HB-Line and DWPF	WIPP Disposal
Electricity (MWh)	N/A	9,000	minimal	0	minimal	minimal	0	0	9,000	minimal	minimal	minimal
Water (gallons)	N/A	2,000	minimal	0	minimal	minimal	0	0	2,000	minimal	minimal	minimal
Fuel Oil (gallons) [c]	N/A	5,000	minimal	0	minimal	minimal	0	0	5,000	minimal	minimal	minimal

DWPF = Defense Waste Processing Facility; MFFF = Mixed Oxide Fuel Fabrication Facility; MOX = mixed oxide; MWh = megawatt-hours; N/A = not applicable; Pu = plutonium; SRS = Savannah River Site; WIPP = Waste Isolation Pilot Plant.

[a] Construction requirements associated with MFFF are not included in this *SPD Supplemental EIS* because the building is already under construction and its infrastructure requirements fall within SRS's current infrastructure requirements.

[b] Possible modifications to H-Canyon/HB-Line and DWPF to support plutonium disposition activities are expected to result in no to minimal additional infrastructure requirements and to fall within SRS's current infrastructure requirements.

[c] Construction fuel oil includes gasoline.

Note: To convert gallons to liters, multiply by 3.7854.

Source: SRNL 2013; SRNS 2012.

Table G–18 Peak Annual Operational Infrastructure Requirements from Plutonium Disposition Options at the Savannah River Site

Resource	SRS Facilities								Plutonium Disposition Options			
			H-Canyon/HB-Line [a]			DWPF [b]						
	MFFF	K-Area Immobilization Capability	Prepare Pu for WIPP Disposal	Prepare Pu for MFFF	Prepare Pu for DWPF Vitrification	Immobilized Pu	Waste from Pu Prepared for MFFF	Pu Prepared for Vitrification	Immobilization and DWPF	MOX Fuel [c]	H-Canyon/ HB-Line and DWPF [b]	WIPP Disposal
Electricity (MWh)	130,000	44,000	minimal	minimal	minimal	960	46	390	45,000	130,000	390	minimal
Water (gallons)	8,900,000	16,000,000	minimal	minimal	minimal	720,000	35,000	300,000	17,000,000	8,900,000	300,000	minimal
Fuel Oil (gallons)	110,000	18,000	minimal	minimal	minimal	0	0	0	18,000	110,000	minimal	minimal

DWPF = Defense Waste Processing Facility; MFFF = Mixed Oxide Fuel Fabrication Facility; MOX = mixed oxide; MWh = megawatt hours; Pu = plutonium; SRS = Savannah River Site; WIPP = Waste Isolation Pilot Plant.

[a] Annual operations at H-Canyon/HB-Line to support plutonium disposition activities are expected to result in minimal additional infrastructure requirements beyond those already included in SRS's current infrastructure requirements as described in Chapter 3, Section 3.1.9.

[b] The values represent the annual infrastructure requirements for DWPF that can be attributed to plutonium processing activities, and not the annual infrastructure requirements for processing all waste at DWPF. Processing plutonium at DWPF, or waste associated with plutonium conversion at H-Canyon/HB-Line, is not expected to increase annual infrastructure requirements for DWPF operation, which are already included in SRS's current infrastructure requirements. Fuel oil is not used to support DWPF operations.

[c] Listed impacts for the MOX Fuel Option for plutonium disposition conservatively include those from processing 4 metric tons (4.4 tons) of non-pit plutonium at H-Canyon/HB-Line (and vitrification of waste resulting from this processing at DWPF) as a precursor for fabrication of the plutonium into MOX fuel at MFFF. This processing step for non-pit plutonium is applicable under the MOX Fuel Alternative; for all other alternatives the impacts under the MOX Fuel Option would be those from operation of MFFF alone.

Note: To convert gallons to liters, multiply by 3.7854.

Source: SRNL 2013; SRNS 2012.

G.7.7.3 H-Canyon/HB-Line and DWPF

Construction—Only minor facility modifications would be needed at H-Canyon/HB-Line to support disposition of surplus plutonium, and no modifications would be needed at DWPF. Therefore, construction infrastructure use under this option would be minimal.

Operations—Table G–18 summarizes the annual infrastructure requirements at SRS generated by operation of H-Canyon/HB-Line and DWPF for plutonium disposition. Under this disposition option, 6 metric tons (6.6 tons) of plutonium would be processed through H-Canyon/HB-Line so that it could be sent to DWPF for vitrification. Operations at H-Canyon/HB-Line would require minimal additional electricity, water, and fuel oil beyond current infrastructure requirements associated with continued operation of H-Canyon/HB-Line. Operations at DWPF would not require any additional electricity, water or fuel oil beyond current infrastructure requirements associated with continued operation of this facility. About 1 percent of the annual electricity and water use at DWPF would be attributable to plutonium disposition activities. Therefore, implementation of this option would not impact SRS's available electrical and water capacities.

G.7.7.4 WIPP Disposal

Construction—Table G–17 shows that infrastructure requirements at SRS related to required process modifications at H-Canyon/HB-Line to support potential plutonium disposition at WIPP would be minimal. Modifications to TA-55 facilities to enhance LANL's capability for preparation of surplus plutonium for potential WIPP disposal could require a minor increase in construction employment (see Section G.3.4), with additional water use associated with the additional personnel. This additional annual water use is expected to be small and within LANL's existing capacity.

Operations—At SRS, Table G–18 summarizes the annual infrastructure requirements that would be generated by H-Canyon/HB-Line operations in support of plutonium disposition via potential WIPP disposal. H-Canyon/HB-Line operations related to this plutonium disposition option would require minimal additional electricity, water, or fuel oil beyond current infrastructure requirements associated with continued operation of this facility. These requirements are already reflected in SRS's baseline operations so there would not be any additional impacts on SRS's available electrical and water capacities.

At LANL, to the extent under the PF-4 and MFFF and PF-4, H-Canyon/HB-Line, and MFFF Options for pit disassembly and conversion that pit plutonium was prepared at LANL for potential WIPP disposal, there could be an increased annual requirement for water at TA-55 facilities commensurate with possible additional operational employment (see Section G.3.4), as well as potentially additional requirements for other infrastructure resources such as electricity. These additional infrastructure requirements, however, are expected to be within LANL's existing capacity.[6]

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[6] *The most significant resource use is expected to be that for water. Although detailed design and operational information is not available, it is expected that the number of additional workers at TA-55 at LANL would be enveloped by the number of additional workers (130) performing the same WIPP preparation activities at H-Canyon/HB-Line at SRS. Assuming an annual water use of about 5,500 gallons per worker (LANL 2013), 130 additional workers at TA-55 would annually require approximately 715,000 gallons (2.7 million liters) of water, which would represent less than 1 percent of LANL's available water capacity (conservatively estimated at 114 million gallons [430 million liters] per year – see Chapter 3, Section 3.2.9).*

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