5.2.13 WASTE AND MATERIALS

This section presents the potential impacts from implementing the proposed waste processing alternatives described in Chapter 3 on the generation and management of wastes that would result from modifications or expansions to facilities, and from new facilities being constructed at the INEEL as part of the proposed action. This information is presented for each of the alternatives, including the No Action Alternative, to support comparisons where appropriate. The information is presented first for the construction phase, then for operations. The operations phase discussion also presents a summary of the key ingredient materials that would be dedicated to treatment processes involved in each of the waste processing alternatives in order to obtain disposable waste products. Finally, this section provides an overview of the potential impacts to treatment, storage, or disposal facilities that would receive waste from the proposed action.

5.2.13.1 Methodology

Each of the alternatives (and, where appropriate, options within the alternatives) being considered has been broken down into a series of projects or activities that would have to be completed if the alternative were to be implemented. Project descriptions and data sheets developed for each project include projections of waste generation (by quantity and type) and ***are*** the source of the waste and material data summarized in this section. For example, waste generation was tabulated for each project making up an alternative and the totals, by waste type, are presented in this section. Additionally, the data sheets provide waste projections by project phase, which normally consists of construction, operations, and decontamination and decommissioning. Although waste volumes as provided in the project descriptions and data sheets have generally been conservatively estimated, they are based on current regulations and laws which determine waste types and to some extent waste volumes. Future regulations and laws could change predicted waste volumes and in the worst case, could require some reanalysis to show that predicted impacts are bounding. Such analyses would generally be provided as an addendum to this EIS at some future date.

In general, the types of waste discussed in this section are industrial waste, hazardous waste, mixed low-level waste, low-level waste, transuranic waste, and HLW. Industrial waste, in this case, is used to designate all the non-hazardous and non-radiological waste that might be generated during a project. The waste summaries presented in this section also use another category: "product waste." This term is being used for waste that is derived directly from the waste materials being addressed by the proposed action; that is the mixed HLW and the mixed transuranic waste (SBW and newly generated liquid waste). Product wastes are the direct result of the management or processing of these materials and would be generated only during the operations phase of a project. Product wastes are further categorized as HLW, transuranic waste, and low-level waste fraction. The "process" waste (that is, all other waste) is produced indirectly as a result of the waste processing activities and would include, for example, waste from offgas treatment, as well as waste generated from normal facility operation and maintenance, and construction wastes. ***This EIS further describes product and process wastes in terms of their classification (e.g., hazardous constituents, radioactive waste classification in accordance with DOE Order 435.1 and Manual 435.1-1) and associated management requirements.*** Although more likely to be encountered during the facility disposition phase, any waste identified in the project descriptions as being CERCLA or environmental restoration program waste is not included in these discussions.

Planned disposition of the product waste is defined under the various alternatives, while plans for the ultimate disposition of the process wastes generated from the proposed action are conceptual in nature. In general, the ultimate treatment or disposal strategies for the various waste types would be as follows:

- Industrial waste would be managed onsite, with material not recycled or retrieved ultimately being disposed of at the INEEL disposal facility.
- Hazardous waste would be shipped off-site to commercial facilities.

- Mixed low-level waste would be treated onsite or shipped offsite to commercial facilities or another DOE site.

- Low-level waste would be disposed of onsite or shipped offsite to commercial facilities or another DOE site. Per Section 4.14.4, DOE expects ***to stop accepting contact-handled low-level waste and remote-handled low-level waste*** at the Radioactive Waste Management Complex in ***2020***.

- Transuranic waste would be sent to the Waste Isolation Pilot Plant.

- HLW would be sent to a geologic repository.

- The low-level waste fraction would be disposed of onsite in a facility prepared as part of the applicable alternative (i.e., either in a new near-surface disposal facility or in emptied Tank Farm and bin sets) or would be shipped offsite.

Because there is limited information on the ultimate disposition of much of the waste identified in this section, the discussion on impacts to facilities that would receive waste from the various waste processing alternatives (5.2.13.4) is also limited.

5.2.13.2 Construction Impacts

Waste would be produced as a result of modifying or constructing new HLW management facilities. Table 5.2-3***1*** summarizes the annual average and total volumes of waste that would be generated during construction. The annual average values represent the average over the duration of all projects generating the specific waste type.

The Full Separations Option includes three separate disposal options for the low-level waste Class A type grout that would be produced: (1) construction of a near-surface disposal facility at the INEEL, (2) use of existing INTEC facilities such as the Tank Farm and bin sets, and (3) transportation to an offsite disposal location. The larger amount of industrial waste associated with disposal in the near-surface disposal facility is attributed directly to the construction of that facility. The disposal option involving use of the Tank Farm and bin sets would require that these facilities be closed prior to receiving the low-level Class A type grout. This action would involve the production of waste that is not included in Table 5.2-3***1*** because it is addressed as part of the overall facility disposition process in Section 5.3.10.

The Transuranic Separations Option includes two disposal options for the low-level Class C type grout that would be produced: (1) construction of a new near-surface disposal facility at the INEEL and (2) use of existing INTEC facilities such as the Tank Farm and bin sets. Again, the larger amount of industrial waste associated with disposal in the new near-surface disposal facility is from the construction of that facility.

Table 5.2-3***2*** is based on the same project information used to generate Table 5.2-3***1*** but presents estimated waste generation in terms of peak annual volumes. It also shows the year or years in which the peaks would occur.

5.2.13.3 Operational Impacts

This section describes the waste generation that would be expected as a result of the operation of waste processing facilities. Discussions of wastes that would be generated indirectly as a result of the waste processing activities are presented separately from the product waste itself. Also discussed in this section are the key input materials that would be dedicated to treatment processes involved in each of the waste processing alternatives. The input or process feed materials are either consumed or become part of the product wastes during treatment.

Process Waste - Table 5.2-3***3*** summarizes the annual average and total process waste volumes generated indirectly during the operations phase of the waste processing alternatives. The annual average values represent the average over the duration of the projects generating the specific waste type. For example, if a single project within the alternative or option is the only one that would generate hazardous waste, the average is over the duration of that project even if its duration is shorter than that of the overall alter-

Table 5.2-31. Annual average and total process waste volumes (cubic meters) generated during construction.[a]

		Industrial waste		Hazardous waste		Mixed low-level waste		Low-level waste	
Alternatives	Schedule[b]	Average	Total	Average	Total	Average	Total	Average	Total
No Action Alternative	2005-2011	220	1.4×10^{3}	0	0	35	220	0	0
Continued Current Operations Alternative	2005-2014	680	6.8×10^{3}	3	30	38	240	3	20
Separations Alternative									
Full Separations Option									
New INEEL disposal option	2005-2034	3.6×10^{3}	5.5×10^{4}	52	790	180	1.1×10^{3}	30	330
Tank Farm, bin set disposal option	2005-2015	4.4×10^{3}	4.8×10^{4}	71	780	180	1.1×10^{3}	30	320
Offsite facility disposal option	2005-2015	4.4×10^{3}	4.9×10^{4}	71	790	180	1.1×10^{3}	30	330
Planning Basis Option									
Offsite facility disposal option	2006-2020	3.7×10^{3}	6.0×10^{4}	55	880	99	1.1×10^{3}	13	210
Transuranic Separations Option									
New INEEL disposal option	2005-2034	2.6×10^{3}	3.9×10^{4}	19	280	180	1.1×10^{3}	21	210
Tank Farm, bin set disposal option	2005-2014	3.2×10^{3}	3.2×10^{4}	27	270	180	1.1×10^{3}	20	200
Offsite facility disposal option	2005-2014	3.3×10^{3}	3.3×10^{4}	28	280	180	1.1×10^{3}	21	210
Non-Separations Alternative									
Hot Isostatic Pressed Waste Option	2005-2014	2.6×10^{3}	2.6×10^{4}	79	790	99	1.1×10^{3}	26	260
Direct Cement Waste Option	2005-2014	3.0×10^{3}	3.0×10^{4}	56	560	99	1.1×10^{3}	34	340
Early Vitrification Option	2005-2014	2.3×10^{3}	2.3×10^{4}	64	640	180	1.1×10^{3}	31	310
Steam Reforming Option	***2006-2015***	2.4×10^{3}	2.4×10^{4}	***20***	***200***	***110***	1.1×10^{3}	***0***	***0***
Minimum INEEL Processing Alternative									
At INEEL	2005-2020	1.7×10^{3}	2.6×10^{4}	22	340	270	1.1×10^{3}	10	110
At Hanford[c]	2010-2027	NA[d]	1.9×10^{4}	NA	20	0	0	0	0
Direct Vitrification Alternative									
Vitrification without Calcine Separations Option	***2005-2022***	1.4×10^{3}	2.3×10^{4}	***33***	***570***	***63***	1.1×10^{3}	***97***	1.6×10^{3}
Vitrification with Calcine Separations Option	***2005-2022***	2.5×10^{3}	4.3×10^{4}	***49***	***840***	***62***	1.1×10^{3}	***100***	1.7×10^{3}

a. Source: Project Data Sheets in Appendix C.6.
b. Schedules shown include construction and systems operations testing performed prior to releasing the facility for operations.
c. Source: Project Data Sheets in Appendix C.8.
d. NA = not applicable because annual generation varies greatly due to intermittent construction activity.

Table 5.2-32. Peak annual process waste volumes (cubic meters) generated during construction and the year(s) they would occur.[a]

Alternatives	Industrial waste		Hazardous waste		Mixed low-level waste		Low-level waste	
	Peak	Year(s)	Peak	Year(s)	Peak	Year(s)	Peak	Year(s)
No Action Alternative	220	2005-2010	0	NA[b]	35	2005-2010	0	NA[b]
Continued Current Operations Alternative	1.2×10^3	2008-2010	5	2008-2010	39	2006-2010	3	2008-2014
Separations Alternative								
Full Separations Option								
New INEEL disposal option	8.5×10^3	2011-2014	140	2011-2014	180	2010-2015	48	2011-2014
Tank Farm, bin set disposal option	7.7×10^3	2011-2014	140	2011-2014	180	2010-2015	47	2011-2014
Offsite facility disposal option	7.9×10^3	2011-2014	140	2011-2014	180	2010-2015	48	2011-2014
Planning Basis Option								
Offsite facility disposal option	8.5×10^3	2016-2019	140	2016-2019	180	2014-2019	24	2016-2019
Transuranic Separations Option								
New INEEL disposal option	6.1×10^3	2011-2014	63	2011-2014	180	2009-2014	29	2011-2014
Tank Farm, bin set disposal option	5.3×10^3	2011-2014	62	2011-2014	180	2009-2014	28	2011-2014
Offsite facility disposal option	5.5×10^3	2011-2014	63	2011-2014	180	2009-2014	29	2011-2014
Non-Separations Alternative								
Hot Isostatic Pressed Waste Option	3.9×10^3	2011-2014	140	2011-2014	180	2009-2014	40	2011-2014
Direct Cement Waste Option	4.5×10^3	2011-2014	98	2011-2014	180	2009-2014	53	2011-2014
Early Vitrification Option	3.8×10^3	2011-2014	110	2011-2014	180	2009-2014	46	2011-2014
Steam Reforming Option	***4.1×10^3***	***2010***	***42***	***2010***	***180***	***2010-2015***	***0***	***-***
Minimum INEEL Processing Alternative								
At INEEL	2.8×10^3	2007-2008	59	2011-2014	270	2007-2010	20	2007-2008
At Hanford[c]	3.4×10^3	2024-2027	3	2009-2010[d]	0	NA	0	NA
Direct Vitrification Alternative								
Vitrification without Calcine Separations Option	***2.7×10^3***	***2012***	***94***	***2012-2013***	***180***	***2017-2022***	***220***	***2017-2022***
Vitrification with Calcine Separations Option	***5.9×10^3***	***2019-2020***	***92***	***2012-2013***	***180***	***2017-2022***	***240***	***2019-2022***

a. Source: Project Data Sheets in Appendix C.6.
b. NA = Not applicable.
c. Source: Project Data Sheets in Appendix C.8.
d. Peak hazardous waste generation also occurs during 2014-2015 and 2019-2020 construction periods.

Table 5.2-33. Annual average and total process waste volumes (cubic meters) generated during operations through the year 2035.[a]

Alternatives	Industrial waste		Hazardous waste		Mixed low-level waste		Low-level waste	
	Average	Total	Average	Total	Average	Total	Average	Total
No Action Alternative	390	1.4×10^4	0	0	37	1.3×10^3	5	190
Continued Current Operations Alternative	660	1.9×10^4	0	0	110	3.2×10^3	330	9.5×10^3
Separations Alternative								
Full Separations Option								
New INEEL disposal option	2.0×10^3	5.3×10^4	58	1.6×10^3	210	5.8×10^3	45	1.2×10^3
Tank Farm, bin set disposal option	1.9×10^3	5.0×10^4	58	1.6×10^3	220	5.9×10^3	45	1.2×10^3
Offsite facility disposal option	1.9×10^3	5.1×10^4	58	1.6×10^3	210	5.8×10^3	45	1.2×10^3
Planning Basis Option								
Offsite facility disposal option	2.0×10^3	5.2×10^4	57	1.2×10^3	300	7.9×10^3	400	1.0×10^4
Transuranic Separations Option								
New INEEL disposal option	1.6×10^3	4.3×10^4	36	960	190	5.2×10^3	36	960
Tank Farm, bin set disposal option	1.5×10^3	4.1×10^4	35	940	200	5.3×10^3	36	960
Offsite facility disposal option	1.5×10^3	4.2×10^4	36	960	190	5.2×10^3	36	960
Non-Separations Alternative								
Hot Isostatic Pressed Waste Option	1.6×10^3	4.3×10^4	<1	4	230	6.4×10^3	370	1.0×10^4
Direct Cement Waste Option	1.9×10^3	5.0×10^4	<1	4	320	8.6×10^3	370	1.0×10^4
Early Vitrification Option	1.2×10^3	4.2×10^4	<1	4	170	6.0×10^3	21	750
Steam Reforming Option	***690***	$\boldsymbol{2.5\times10^4}$	***2***	***58***	***110***	$\boldsymbol{4.1\times10^3}$	***16***	***560***
Minimum INEEL Processing Alternative								
At INEEL	960	3.5×10^4	1	40	160	5.7×10^3	20	700
At Hanford Site[b]	NA[c]	6.7×10^3	NA	23	0	0	NA	1.5×10^3
Direct Vitrification Alternative								
Vitrification without Calcine Separations Option	***850***	$\boldsymbol{3.0\times10^4}$	***0.11***	***4.0***	***170***	$\boldsymbol{6.0\times10^3}$	***21***	***700***
Vitrification with Calcine Separations Option	$\boldsymbol{1.2\times10^3}$	$\boldsymbol{4.2\times10^4}$	***41***	$\boldsymbol{1.4\times10^3}$	***210***	$\boldsymbol{7.5\times10^3}$	***37***	$\boldsymbol{1.3\times10^3}$

a. Source: Project Data Sheets in Appendix C.6.
b. Source: Project Data Sheets in Appendix C.8.
c. NA = not applicable. Except for Canister Storage Buildings, the operating period for the Hanford Site facilities is short (about 2 years), making average annual values not applicable.

native. The average and total values shown in the table are, however, restricted by the period of analysis, which ends in the year 2035. In some cases, project descriptions include work that extends beyond the year 2035. These projects are primarily those involving interim storage of HLW and its eventual transportation to the national geologic repository. Those projects show an extended duration to address the possibility that the repository may be unable to receive the waste as it is produced. The amounts of waste that would be produced from these post-2035 activities are discussed on an annual, rather than total basis later in this section.

Table 5.2-3***4*** is based on the same project information as Table 5.2-3***3*** but presents estimated waste generation in terms of peak annual volumes. It also shows the year or years in which the peaks would occur.

Several of the projects that make up the alternatives and their options show durations that extend beyond the 2035 period of analysis. Each of the options under the Separations, Non-Separations, and Minimum INEEL Processing alternatives include a laboratory project that would continue its operations into 2040. This activity is projected to continue production of industrial waste, mixed low-level waste, and low-level waste during these post-2035 years in the amounts of 580, 56, and 1 cubic meters per year, respectively. Some of the alternatives and options that would produce disposable HLW forms at the INEEL include projects that would provide interim storage, packaging and loading for that HLW. The No Action and Continued Current Operations Alternatives would each have a similar situation due to continuing industrial waste production (approximately 17 cubic meters per year) as a result of long-term storage and monitoring of the calcine in the bin sets. Depending on the alternative, the duration of these activities is shown extending to some point beyond the year 2050. Annual production of waste during this interim storage period is shown in Table 5.2-3***5***. ***The Transuranic Separations and Steam Reforming Options are not listed in this table because there would be no interim storage of final waste forms produced under these options.*** Packaging and shipping activities that would ultimately remove waste from interim storage under the Separations, Non-Separations, and Minimum INEEL Processing Alternatives would produce waste types and quantities very similar to those shown in Table 5.2-3***5***.

Product Wastes - Table 5.2-3***6*** summarizes the estimated volumes of product wastes that would be generated for each of the alternatives that would produce disposable waste forms. No product waste generation is shown for the No Action Alternative because it is not configured to treat the waste materials of primary concern into disposable waste forms. The Continued Current Operations Alternative would include processing of tank-heel waste from the Tank Farm, which would result in the generation of 7,000 cubic meters of low-level waste (included in the process waste summaries in Tables 5.2-3***3*** and 5.2-3***4***, and 110 cubic meters of remote-handled transuranic waste (included in Table 5.2-3***6***). The other waste processing alternatives would result in varying amounts of product waste that would be classified as low-level waste, transuranic waste, or high-level waste as shown in Table 5.2-3***6***.

Process Feed Materials - The waste processing approaches described in the different options would require the addition of various materials to support the processes and enable the production of a stable, disposable form for the product waste. Table 5.2-3***7*** provides a summary of the key feed materials that would be committed to each of the alternatives.

5.2.13.4 Impacts to Facilities that Would Receive Waste from the Waste Processing Alternatives

This section addresses possible impacts resulting from the disposition of wastes at facilities that are not part of the Idaho HLW & FD EIS waste processing alternatives. This includes waste that would go to other INEEL facilities such as the industrial waste disposal facility, as well as waste that would go offsite for final disposition at commercial facilities or other DOE-operated sites such as the Waste Isolation Pilot Plant. DOE assumes that facilities receiving these wastes would be operated in full compliance with all existing agreements and regulations. Therefore, the impacts of primary concern are whether appropriate facilities exist and have adequate capacity to support disposition of the waste. With the exception of the offsite disposal

Table 5.2-34. Peak annual waste volumes (cubic meters) generated during operations and the year(s) they would occur.[a]

Alternatives	Industrial waste		Hazardous waste		Mixed low-level waste		Low-level waste	
	Peak	Year(s)	Peak	Year(s)	Peak	Year(s)	Peak	Year(s)
No Action Alternative	630	2012	0	–	100	2012	17	2012
Continued Current Operations Alternative	1.4×10^3	2015-2016	0	–	250	2015-2016	1.3×10^3	2015-2016
Separations Alternative								
Full Separations Option								
New INEEL disposal option	2.5×10^3	2016-2035	76	2016-2035	260	2016-2035	57	2016-2035
Tank Farm, bin set disposal option	2.4×10^3	2027-2035	76	2016-2035	270	2016-2035	57	2016-2035
Offsite facility disposal option	2.4×10^3	2016-2035	76	2016-2035	260	2016-2035	57	2016-2035
Planning Basis Option								
Offsite facility disposal option	2.8×10^3	2021-2035	80	2021-2035	390	2021-2035	1.0×10^3	2020
Transuranic Separations Option								
New INEEL disposal option	2.0×10^3	2015-2035	46	2015-2035	230	2015-2035	45	2015-2035
Tank Farm, bin set disposal option	1.9×10^3	2015-2035	45	2015-2035	240	2015-2035	45	2015-2035
Offsite facility disposal option	1.9×10^3	2015-2035	46	2015-2035	230	2015-2035	45	2015-2035
Non-Separations Alternative								
Hot Isostatic Pressed Waste Option	2.6×10^3	2015-2016	<1	2009-2035	390	2015-2016	1.4×10^3	2015-2016
Direct Cement Waste Option	2.9×10^3	2015-2016	<1	2009-2035	500	2015-2016	1.4×10^3	2015-2016
Early Vitrification Option	1.8×10^3	2015-2035	<1	2009-2035	240	2015-2035	37	2015-2035
Steam Reforming Option	***930***	***2012***	***29***	***2012***	***160***	***2012***	***42***	***2012***
Minimum INEEL Processing Alternative								
At INEEL	1.8×10^3	2015-2025	2	2016-2035	300	2015-2025	42	2015-2025
At Hanford[b]	4.1×10^3	2029	2	2029	0	–	1.0×10^3	2029
Direct Vitrification Alternative								
Vitrification without Calcine Separations Option	$\boldsymbol{1.5\times10^3}$	***2023-2035***	***0.67***	***2012-2017***	***420***	***2015***	***42***	***2023-2035***
Vitrification with Calcine Separations Option	$\boldsymbol{2.5\times10^3}$	***2023-2035***	***110***	***2023-2035***	***420***	***2015***	***84***	***2023-2035***

a. Source: Project Data Sheets in Appendix C.6

b. Source: Project Data Sheets in Appendix C.8

Table 5.2-35. Annual production of process waste (cubic meters) from storage operations after the year 2035.[a]

Alternatives	Industrial waste	Hazardous waste	Mixed low-level waste	Low-level waste
Separations Alternative				
Full Separations Option	36	2	0	0
Planning Basis Option	36	2	0	0
Non-Separations Alternative				
Hot Isostatic Pressed Waste Option	36	0	0	0
Direct Cement Waste Option	36	0	0	0
Early Vitrification Option	36	0	0	0
Minimum INEEL Processing Alternative				
At INEEL	36	2	0	0
At Hanford	NA[b]	NA	NA	NA
Direct Vitrification Alternative[c]				
Vitrification without Calcine Separations Option	***36***	–	–	–
Vitrification with Calcine Separations Option	***36***	***36***	–	–

a. Source: Project Data Sheets in Appendix C.6.
b. NA = not applicable. There is no storage of HLW associated with this alternative.
c. Impacts were estimated assuming that the vitrified SBW would be managed as HLW and placed in interim storage pending disposal in a geologic repository. If DOE determines through the waste incidental to reprocessing process that the SBW can be managed as mixed transuranic waste, interim storage of vitrified SBW would not be required and the impacts would be reduced from those reported above.

options for the low-level waste Class A and C type grout under the Separations Alternative and the vitrified low-level waste fraction under the Minimum INEEL Processing Alternative, final disposal facilities or sites are identified for each of the product waste types that are put into a disposable form (i.e., product wastes generated from alternatives that include waste processing). For the non-product wastes, a specific disposition site is currently identified only for the industrial waste category. The following paragraphs discuss each of the product (low-level waste, transuranic waste, and HLW) and process (industrial, hazardous, low-level, and mixed low-level waste) waste types that would be produced from the proposed action.

Product Low-Level Waste Fraction – The product low-level waste consists of the Class A and Class C type grout that would be produced under the Full Separations and Planning Basis Options and Transuranic Separations Option, respectively. Both the Full and Transuranic Separations Options include disposal options where the grout would be disposed of either in a newly constructed disposal facility (the base case), or in the emptied Tank Farm and bin sets. If either of these alternatives/option combinations were to be implemented, the waste would not adversely affect the disposal facility because the facility would have been planned specifically for the proposed usage. Under all three Separations Alternative options, a disposal option for the low-level waste Class A or Class C type grout would call for its disposal at an off-site facility. Currently, DOE has not identified a specific receiving facility for the grout under this disposal option. DOE has evaluated transportation-related impacts based on the Envirocare of Utah, Inc. disposal site, 80 miles west of Salt Lake City for the low-level waste Class A type grout and the Chem-Nuclear Systems disposal site in Barnwell, South Carolina for the low-

Table 5.2-36. Total volumes (cubic meters) of product waste that would result from the alternatives.[a]

Alternatives	Low-level waste	Transuranic Waste: Contact-handled	Transuranic Waste: Remote-handled	High-level waste
No Action Alternative	NA[b]	NA	NA	NA
Continued Current Operations Alternative	0	0	110	0
Separations Alternative				
Full Separations Option	2.7×10^4	0	0	470
Planning Basis Option	3.0×10^4	0	110	470
Transuranic Separations Option	2.3×10^4	0	220	0
Non-Separations Alternative				
Hot Isostatic Pressed Waste Option	0	0	110	3.4×10^3
Direct Cement Waste Option	0	0	110	1.3×10^4
Early Vitrification Option	0	0	360	8.5×10^3
Steam Reforming Option	***0***	***0***	***2.6×10^3***	***4.4×10^3***
Minimum INEEL Processing Alternative				
At INEEL	0	7.5×10^3	0	0
At Hanford[c]	1.4×10^4	0	0	***3.5×10^3***
Direct Vitrification Alternative				
Vitrification without Calcine Separations Option	–	–	–	***8.9×10^{3}[d]***
Vitrification with Calcine Separations Option	***2.4×10^4***	–	–	***910[d]***

a. Source: Project Data Sheets in Appendix C.6, Russell et al. (1998), Fewell (1999), McDonald (1999), Barnes (2000).
b. NA = not applicable.
c. Source: Facilities and projects associated with the Hanford option of this alternative are described in Appendix C.8.
d. Value contains 440 cubic meters of vitrified SBW that could be managed as remote-handled transuranic waste, depending on the outcome of the waste incidental to reprocessing determination.

level waste Class C type grout. DOE assumes that the grout could be managed as low-level waste. Therefore, its potential impact could be estimated by comparing it to the amount of other low-level waste that would be managed within the DOE complex. According to DOE estimates, future waste management activities require the management of approximately 1.5 million cubic meters of low-level waste generated over the next 20 years (DOE 1997a). The 27,000 and 30,000 cubic meters of low-level waste Class A type grout that would be produced under the Full Separations and Planning Basis Options and the 23,000 cubic meters of low-level waste Class C type grout that would be produced under the Transuranic Separations Option, although a sizable quantity, is still a minor portion of the DOE low-level waste that would require disposal independently of the alternatives.

A product low-level waste fraction would also be produced under the Minimum INEEL Processing Alternative. Under this alternative, about 14,400 cubic meters of vitrified low-level waste would be transported from the Hanford Site to the INEEL for disposal in a newly constructed disposal facility at INTEC or at an off-site disposal facility. DOE has evaluated transportation-related impacts based on the Envirocare of Utah, Inc. disposal site. This vitrified low-level waste would represent a minor portion of the DOE low-level waste that would require disposal independently of the waste processing alternatives.

Table 5.2-37. Summary of key material quantities (cubic meters) that would be committed to each of the alternative processes.

Alternatives	Total material quantities (cubic meters)[a]													
	Oxygen gas	Argon gas	Boiler or blast furnace slag	Cement	Clay	Fly ash	Glass frit	***Calcium Oxide***	Silica	***Nitric Acid***	Sodium hydroxide	Titanium or aluminum powder	***Sucrose***	***Carbon***
No Action Alternative	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Continued Current Operations Alternative	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Separations Alternative														
Full Separations Option	–	–	5.6×10^3	5.1×10^3	–	5.4×10^3	420	–	–	–	–	–	–	–
Planning Basis Option[b]	–	–	5.6×10^3	5.1×10^3	–	5.4×10^3	420	–	–	–	–	–	–	–
Transuranic Separations Option	–	–	6.4×10^3	5.8×10^3	–	6.1×10^3	–	–	–	–	–	–	–	–
Non-Separations Alternative														
Hot Isostatic Pressed Waste Option	–	1.2×10^3	–	–	–	–	–	–	2.3×10^3	–	–	240	–	–
Direct Cement Waste Option	–	–	1.3×10^3	–	8.5×10^3	–	–	–	–	–	500	–	–	–
Early Vitrification Option	–	–	–	–	–	–	7.8×10^3	–	–	–	–	–	–	–
Steam Reforming Option	***1.6×10^6***	–	***140***	***38***	***130***	–	–	***130***	***34***	***500***	–	–	***250***	***2.5×10^3***
Minimum INEEL Processing Alternative[c]	–	–	–	–	–	–	9.2×10^3	–	–	–	7.6×10^3	–	–	–
Direct Vitrification Alternative														
Vitrification without Calcine Separations Option	–	–	–	–	–	–	***7.9×10^3***	–	–	–	–	–	–	–
Vitrification with Calcine Separations Option	–	–	***4.9×10^3***	***4.5×10^3***	–	***4.7×10^3***	***810***	–	–	–	–	–	–	–

a. Source: ***Adapted from*** Helm (1998). ***Materials quantities are assumed to be scaleable based on estimated product waste volumes.***

b. Materials quantities committed under the Planning Basis Option are assumed to be identical to those committed under the Full Separations Option.

c. Materials quantities committed under this alternative at the Hanford Site based on Project Data Sheets in Appendix C.8.

Product Transuranic Waste - Other product waste types identified in this section would be transported offsite for disposal (Waste Isolation Pilot Plant for transuranic waste and a geologic repository for HLW). A primary objective of the processes that would produce these wastes would be to generate a waste form that would meet acceptance criteria for the appropriate repository. These facilities would, therefore, be expected to accept these types of waste unless content or concentration type concerns might exist. The remaining concern would be whether waste from the waste processing alternative would pose capacity issues.

According to the *Waste Isolation Pilot Plant Disposal Phase Final Supplemental EIS*, current limits and agreements place the capacity of the Waste Isolation Pilot Plant repository at 175,600 cubic meters, of which 7,080 cubic meters can be remote handled. DOE (1997b) presents an estimate for the projected amount of transuranic waste that would be sent to the Waste Isolation Pilot Plant which puts the total quantity of remote-handled transuranic waste at slightly less than 5,000 cubic meters and slightly more than 140,000 cubic meters for the contact-handled transuranic waste. Based on these figures, the Waste Isolation Pilot Plant would have adequate capacity for the contact-handled transuranic waste that, depending on the alternative and option selected, could result in as much as 7,500 cubic meters (Minimum INEEL Processing Alternative). ***Under the Steam Reforming Option, DOE could produce up to 2,600 cubic meters of remote-handled transuranic waste. The combination of this waste volume and other remote-handled transuranic waste identified for disposal in DOE (1997b) would exceed by 4 percent the disposal capacity for remote-handled transuranic waste authorized by DOE's Consultation and Cooperation Agreement with the State of New Mexico. The Waste Isolation Pilot Plant would have adequate disposal capacity for the amount of remote-handled transuranic waste produced under the other alternatives and options (up to 360 cubic meters under the Early Vitrification Option).***

Additional restrictions on remote-handled transuranic waste under the Waste Isolation Pilot Plant Land Withdrawal Act (Public Law 102-579) could present problems for transuranic waste generated under the waste processing alternatives. These additional restrictions are as follows:

- Remote-handled transuranic waste containers shall not exceed 23 curies of radioactivity per liter maximum activity level averaged over the volume of the container.

- The total curies of remote-handled transuranic waste shall not exceed 5,100,000 curies of radioactivity.

Under the Transuranic Separations Option, the remote-handled transuranic waste that would be produced would average less than 2 curies per liter. The total radioactivity of this transuranic waste would be about 330,000 curies. Based on this information, the waste would be expected to meet the current Waste Isolation Pilot Plant requirements and limits for remote-handled transuranic waste.

Under the Early Vitrification Option, the remote-handled transuranic waste produced would average less than 2 curies per liter and total about 510,000 curies of activity. The radioactivity would be well below existing limits and the total would consume about one tenth of the 5,100,000 curie limit. The current identified DOE inventory for remote handled transuranic waste does not consume the curie limit for the Waste Isolation Pilot Plant. An estimated 1.3 million curies remains, some of which may be used under this option.

Under the Steam Reforming Option, DOE would treat the post-2005 newly generated liquid waste with the mixed transuranic waste/SBW until the steam reformer's mission is completed in 2013, producing a total of 1,300 cubic meters of remote-handled transuranic waste. The steam-reformed waste would average less than 1 curie per liter and total about 410,000 curies of activity. After 2013, DOE would grout the newly generated liquid waste, producing approximately 1,300 cubic meters of remote-handled transuranic waste. The grouted waste would average less than 1 curie per liter and total about 150,000 curies of activity. Although grouting of newly generated liquid waste is only analyzed under the Steam Reforming Option, DOE could employ this

method for newly generated liquid waste treatment under any of the options analyzed in this EIS. Subsequent studies could determine that the grouted newly generated liquid waste could be classified as low-level waste.

Product High-Level Waste - The final disposition point for the INEEL's HLW is expected to be a geologic repository, and the only site currently being considered for this repository is at Yucca Mountain in Nevada. Planning for this facility includes a base case inventory of spent nuclear fuel and HLW ***as described in Section 2.2.4***. At this time there has been no determination of which waste would be shipped to the repository, or the order of shipments.

The planning for a repository at Yucca Mountain also includes analyses of modules for "reasonably foreseeable future actions" that include accepting additional quantities of spent nuclear fuel and HLW. One of the modules being considered includes accepting all of the current inventory of HLW. As shown in Table 5.2-3***6***, the volume of HLW that would be generated by the INEEL from the various options ranges from 0 to 13,000 cubic meters.

Current planning for the repository is based on the premise that HLW will be in a vitrified form. This could represent another issue with regard to the repository's receipt of INEEL HLW because options being considered include the generation of HLW in non-vitrified forms. This issue is addressed further in Section 6.3.

Industrial Waste - Each of the alternatives would involve generation of industrial (non-hazardous and non-radiological) waste, and in each case this waste would be disposed of at the INEEL. The INEEL's industrial/commercial disposal facility complex annually receives between 46,000 and 85,000 cubic meters of solid waste for disposal or recycling (LMITCO 1998). Under the waste processing alternatives, production of industrial waste could be as high as about 8,500 cubic meters per year during construction (Table 5.2-3***2***) and about 3,000 cubic meters per year during operations (Table 5.2-3***4***). The large quantities generated during construction would be for a relatively short period, and some of these waste materials may be disposed of as clean construction rubble rather than take up room in the disposal facility. The operations phase represents by far the longer duration activity. The peak annual production of industrial waste during this phase is small in comparison to the volumes currently disposed of at the INEEL disposal facility. DOE expects that the quantities of solid industrial waste that would be produced under any of the alternatives would not cause problems for the existing INEEL disposal facility operations (EG&G 1993).

Hazardous Waste - Hazardous waste has been generated, or is projected to be generated, at most DOE sites. Much of this waste, particularly hazardous wastewater, is stored and treated onsite. However, based on fiscal year 1992 data, about 3,440 cubic meters of hazardous waste were sent to commercial facilities from DOE sites (DOE 1997a). In the Waste Management Programmatic EIS (DOE 1997a), DOE assumes that this quantity of hazardous waste (3,440 cubic meters or an equivalent 3,440 metric tons per the EIS's one-to-one conversion factor) is representative of DOE's current hazardous waste treatment requirements. This document identifies another 6,600 cubic meters of Toxic Substances Control Act, State-regulated hazardous waste, and environmental restoration generated hazardous waste that was shipped to commercial treatment in fiscal year 1992. As shown in Table 5.2-3***4***, the peak annual quantities of hazardous waste that would be produced at the INEEL from the waste processing alternatives vary from 0 to 80 cubic meters depending on the alternative and option. These quantities are minor in comparison to those produced throughout the DOE complex and sent to commercial facilities for treatment and disposal. It is unlikely these additional wastes would adversely impact the ability of commercial facilities to manage hazardous waste. The Waste Management Programmatic EIS also makes the assumption that if additional capacity is needed, new DOE facilities or offsite commercial facilities will be available (DOE 1997a).

Mixed Low-Level Waste - Mixed low-level waste is either generated, projected to be generated, or stored at 37 DOE sites. DOE estimates that approximately 137,000 cubic meters of mixed low-level waste will be generated over the next 20 years (DOE 1997a). Analysis in the Waste Management Programmatic EIS assumes use of existing and planned facilities in the management of this waste until their capacities are met.

Then if additional capacity is needed, DOE assumes new facilities would be constructed. Total quantities of mixed low-level waste produced during construction and operations under the proposed action would be about 10,000 cubic meters or less. These estimated quantities are small enough in comparison to DOE's 20-year projection of mixed low-level waste generation that they should not adversely impact DOE's plans for the management of this type waste. This is more evident when it is realized that personal protective equipment would make up most of the mixed low-level waste in Tables 5.2-3***2*** and 5.2-3***3***. This material could easily be subjected to significant reductions in volume through compaction and is normally amenable to treatment through incineration for even greater reduction in volume.

Low-Level Waste - Low-level waste is routinely generated at the INEEL and will continue to be generated in the future. As identified in Section 4.14 (Table 4-***30***), annual production of low-level waste at the INEEL is currently about ***2,900*** cubic meters. Although the peak annual quantity of low-level waste generated under the proposed action could be as high as 1,400 cubic meters, the highest annual average would be only about 400 cubic meters. These quantities should not overload the site's capacity and capability to accumulate, manage, and transport this type waste.

On a DOE complex-wide basis, low-level waste is generated, projected to be generated, or stored at 27 DOE sites. According to DOE estimates, approximately 1.5 million cubic meters of low-level waste will be generated over the next 20 years (DOE 1997a). Estimates of low-level waste generation from the proposed action vary from about ***190*** to $\boldsymbol{1.0\times10^4}$ cubic meters over the ***operating*** life of the project, depending on the alternative (see Table 5.2-3***3***). These quantities are minor in comparison to the amount that would be produced from other DOE activities and should have no more than a minor impact on the ability of the DOE complex facilities to manage low-level waste. The Waste Management Programmatic EIS (DOE 1997a) assumes that new facilities will be constructed if additional capacity is needed.