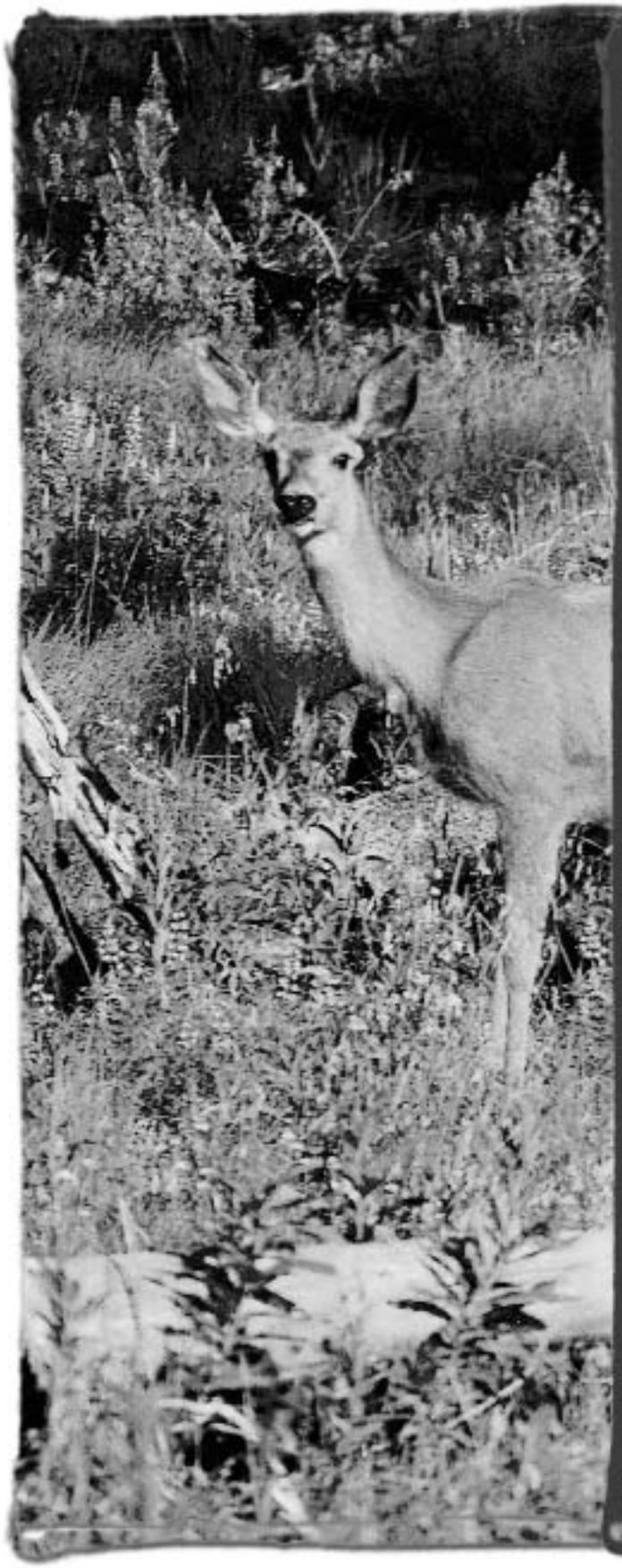
5.0

Environmental Consequences



5.0 Environmental Consequences

5.1 Introduction

Chapter 5 describes the potential environmental consequences of implementing each of the alternatives described in Chapter 3. ***This Final EIS analyzes the alternatives in the Draft EIS and provides corrections and updates as needed. In addition, it analyzes the State of Idaho's Preferred Alternative, Direct Vitrification, and a new option of the Non-Separations Alternative, the Steam Reforming Option. Furthermore, the Minimum INEEL Processing Alternative has been modified, and other changes have been made to the analyses based on information received during the public comment period.***

Environmental consequences of actions could include direct physical disturbance of resources, consumption of affected resources, and degradation of resources caused by effluents and emissions. Potentially affected resources include air, water, soils, plants, animals, cultural artifacts, and people, including workers and people in nearby communities. Consequences may be detrimental (e.g., wildlife habitat lost as a result of new construction) or beneficial (e.g., ***reducing the risk of contamination to the Snake River Plain Aquifer by removing and treating hazardous and radioactive waste from underground tanks***).

DOE prepared engineering studies that identify activities required under the various alternatives and supply data necessary for the impact analysis. Operating parameters for existing facilities and on-going operations were determined by examining historical data and impacts associated with these operations. If new processes or facilities ***are*** required under a particular alternative, the operating parameters for it were extrapolated from similar processes or facilities, or from the scientific literature, or developed by engineering scoping studies.

In general, conservative assumptions were used in this EIS to prepare impact assessments for normal operations and facility accidents. Consequently, the identified impacts tend to exceed in magnitude and intensity those that can realistically be expected to occur. For routine operations, estimates from actual operations provide a reasonable basis for predictions of impacts. ***Estimates based on scientific literature or engineering scoping studies provide a reasonable basis for predicting impacts for new facilities.*** For accidents there is more uncertainty because the estimates are based on events that have not occurred. In this EIS, DOE selected hypothetical accidents that would produce impacts as severe or more severe than any reasonably foreseeable accidents.

To ensure that small potential impacts are not over-analyzed and large potential impacts are not under-analyzed, analysts have assessed potential impacts in a level of detail that is commensurate with their significance. This methodology follows the recommendation for the use of a "sliding scale" approach to analysis described in *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements* (DOE 1993).

This EIS is concerned with two kinds of potential impacts, impacts from ***processing*** (i.e., retrieving, treating, and packaging) mixed HLW and mixed transuranic waste (SBW and newly generated liquid waste) and impacts from the ***disposition*** of facilities used to manage these wastes. Potential impacts from the ***six*** waste processing alternatives are discussed in Section 5.2. Potential impacts from the ***six*** facility disposition alternatives are discussed in Section 5.3. ***Section 5.3 also presents long-term impacts associated with the waste processing alternatives such as storage of untreated waste under the No Action Alternative.***

Impacts that are cumulative with other past, present, or reasonably foreseeable actions are discussed in Section 5.4, Cumulative Impacts. Section 5.5, Mitigation Measures, describes measures that could reduce or offset the potential environmental consequences of the alternatives presented in this EIS. Unavoidable adverse environmental impacts are summarized in Section 5.6. Section 5.7 compares the potential short-term influences of each alternative with the resultant long-term productivity of the environment. Irreversible and irretrievable resource commitments are discussed in Section 5.8.

When DOE calculates numbers in this EIS, two significant digits are used to report the results. Rounding off numbers can make it appear that the totals of a column of figures are inaccurate because they are inexact, but the slight variance is due to the rounding of the values.

5.2 Waste Processing Impacts

Section 5.2 presents a discussion of potential environmental impacts from retrieving, analyzing, treating, and preparing mixed transuranic waste/SBW and mixed HLW for disposal. These are relatively short-term actions because DOE has committed to preparing all of the calcined waste by a target date of December 31, 2035 ***so that it can be shipped to a storage or disposal facility outside of Idaho.*** After 2035, ***if a storage or disposal facility outside of Idaho is not available,*** storage of road-ready waste forms ***at the INEEL*** would ***generate*** impacts ***which are presented*** on an ***annualized*** basis. ***Altogether there are six*** waste processing alternatives, ***which are*** described in detail in Section 3.1 ***and*** evaluated ***for impacts in this section:*** the No Action Alternative, the Continued Current Operations Alternative, the Separations Alternative, the Non-Separations Alternative, the Minimum INEEL Processing Alternative***, and the State of Idaho's Preferred Alternative, Direct Vitrification. As described in Section 3.1.6, the Direct Vitrification Alternative includes two options: Vitrification without Calcine Separations and Vitrification with Calcine Separations.***

Potential impacts are presented by work phase, with the discussion of construction impacts preceding the discussion of operational impacts. Construction impacts would be those associated with (1) development of new waste processing facilities and (2) modification, refurbishment, or expansion of existing waste processing facilities. A representative construction impact would be noise-related disturbance to wildlife. Operational impacts would be those associated with the actual processing of mixed HLW and mixed transuranic waste/SBW within the various facilities. A representative operational impact would be air concentrations of hazardous substances from facility emissions.

Section 5.2 presents impacts of treating newly generated liquid waste as mixed transuranic waste/SBW under all waste processing alternatives. However, DOE may decide to treat this waste separately from the mixed transuranic waste/SBW after 2005. The EIS also presents the impacts for a remote-handled grout facility (see Project P2001 in Appendix C.6) that could be used to treat the liquid waste generated after 2005. This project could be included as part of any of the waste processing alternatives. The treated waste would be packaged and disposed of on- or off-site as low-level waste or disposed of at the Waste Isolation Pilot Plant as transuranic waste, depending on its characteristics. For purposes of assessing transportation and waste management impacts, DOE assumed that the grouted waste would be characterized as remote-handled transuranic waste and transported to the Waste Isolation Pilot Plant for disposal. These transportation and waste management impacts are presented in Sections 5.2.9 and 5.2.13.

Because two of the alternatives, the Separations Alternative and the Minimum INEEL Processing Alternative, could require construction of an onsite disposal facility for the low-level waste fraction, the potential impacts of building and operating this facility and transporting wastes to it for disposal are discussed in Section 5.2. Section 5.3 presents potential post-closure impacts from disposal of the low-level waste fraction in this new facility.

Section 5.2 summarizes the potential environmental impacts of treating INEEL's mixed HLW at the Hanford Site under the Minimum INEEL Processing Alternative. The incremental Hanford Site impacts for treatment of the INEEL mixed HLW were obtained by scaling impacts for similar activities presented in the Tank Waste Remediation System EIS. The "at Hanford" impacts are not directly comparable to those reported for the waste processing activities at INEEL because the impacts would affect different environments and populations and because of differences in the scope of the analyses in the Tank Waste Remediation System EIS and this EIS.

A more detailed analysis of ***potential "at Hanford"*** impacts, along with a description of the Hanford Site Affected Environment, may be found in Appendix C.8. Decontamination and decommissioning activities at the Hanford Site would be carried out in accordance with site-specific plans and waste accords (e.g., Tri-Party Agreement) and are not discussed in this EIS.

Tables in Appendix C.6 list projects to be implemented under each waste processing alternative. Appendix C.6 also contains project summaries and project data sheets, which are the primary sources of information for the impact analysis. Appendix C.10 presents a compilation of environmental consequence data for each ***resource area*** by alternative, identifying acres disturbed, resources used (energy, services, and so forth), personnel required, and other important attributes. These attributes were used to determine the potential impacts of each alternative as discussed in this chapter.

Some waste processing alternatives would generate service waste water. DOE currently discharges this service waste water to existing percolation ponds, but has made a decision to move the discharge of the existing service waste water to replacement ponds by December 31, 2003, as identified in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Record of Decision for Waste Area Group 3 (the Idaho Nuclear Technology and Engineering Center (INTEC)). The service waste water discharges will need to meet the requirements established by the Waste Water Land Application Permit issued by the State of Idaho as well as DOE Order 5400.5, "Radiation Protection of the Public and the Environment."

If the waste processing alternatives generate a significant quantity of additional service waste water, DOE may have to modify its service waste water system such as by adding pretreatment to reduce the volume or by further recycling. Since DOE has not made a selection of a waste processing alternative, the waste water system's impacts are not included as part of the waste processing alternative impact analysis. Once an alternative is identified, the service waste water requirements will be estimated, the waste water system options will be considered, and the impacts will be assessed against the impacts analyzed in the CERCLA Waste Area Group 3 Remedial Investigation/Baseline Risk Assessment/Feasibility Study. Depending on the results, an additional assessment may be performed under the National Environmental Policy Act, as appropriate.

The structure of Section 5.2 closely parallels that of Chapter 4, Affected Environment. Thirteen sections of Chapter 4 have corresponding sections in Section 5.2. The sections discuss methodology and present the potential impacts of each waste processing alternative evaluated. In addition, for five key ***resource areas*** more details on methodology are provided in Appendix C. These ***resource areas*** are Socioeconomics (Appendix C.1), Air Resources (Appendix C.2), Health and Safety (Appendix C.3), Facility Accidents (Appendix C.4), and Transportation (Appendix C.5).

5.2.1 LAND USE

This section presents potential land use impacts from implementing the waste processing alternatives described in Chapter 3. Potential impacts were assessed by reviewing project plans for the ***six*** alternatives to determine if (1) project activities are likely to produce land use changes on the INEEL or surrounding region and (2) project plans conform to existing DOE land use plans and policies. Because one of the alternatives (Minimum INEEL Processing) would involve shipment of INEEL's mixed HLW to the Hanford Site for treatment, possible land use changes at the Hanford Site were also evaluated (see Appendix C.8). Unless otherwise noted, the discussion of impacts presented in this section applies specifically to the INEEL.

Most of the activities associated with waste management would take place inside the secure perimeter fence at INTEC, an area that has been dedicated to industrial use for more than 40 years. Because proposed activities would be conducted within or immediately adjacent to INTEC, land use on government-owned and privately-owned lands surrounding the INEEL (see Section 4.2.2) would not be affected. Construction activities (e.g., development or expansion of facilities) have the greatest potential for affecting land use. Because none of the anticipated operational impacts (e.g., emissions from waste processing facilities) are expected to affect land use, no operational impacts are discussed in this section. Table 5.2-1 compares new facility and land requirements for the ***twelve*** options under

Table 5.2-1. New facilities and land requirements by waste processing alternative.[a]

Waste Processing Alternative	New INTEC facilities	New INEEL facilities outside of INTEC	Open land converted to industrial use (acres)
No Action Alternative	Calcine Retrieval and Transport System (bin set 1 only)	None	None
Continued Current Operations Alternative	Calcine Retrieval and Transport System (bin set 1 only), Newly Generated Liquid Waste Treatment Facility	None	None
Separations Alternative			
Full Separations Option	Calcine Retrieval and Transport System, Waste Separations Facility, Vitrification Plant, Class A Grout Plant, Vitrified Product Interim Storage Facility, New Analytical Laboratory, Waste Treatment Pilot Plant	Low-Activity Waste Disposal Facility[b]	22
Planning Basis Option	Calcine Retrieval and Transport System, Waste Separations Facility, Vitrification Plant, Class A Grout Plant, Vitrified Product Interim Storage Facility, Newly Generated Liquid Waste Treatment Facility, New Analytical Laboratory, Waste Treatment Pilot Plant	None	None
Transuranic Separations Option	Calcine Retrieval and Transport System, Transuranic Separations Facility, Class C Grout Plant, New Analytical Laboratory, Waste Treatment Pilot Plant	Low-Activity Waste Disposal Facility[b]	22
Non-Separations Alternative			
Hot Isostatic Pressed Waste Option	Calcine Retrieval and Transport System, Hot Isostatic Press Facility, HLW Interim Storage Facility, Newly Generated Liquid Waste Treatment Facility, New Analytical Laboratory, Waste Treatment Pilot Plant	None	None
Direct Cement Waste Option	Calcine Retrieval and Transport System, Direct Cement Facility, HLW Interim Storage Facility, Newly Generated Liquid Waste Treatment Facility, New Analytical Laboratory, Waste Treatment Pilot Plant	None	None
Early Vitrification Option	Calcine Retrieval and Transport System, Early Vitrification Facility, HLW Interim Storage Facility, New Analytical Laboratory, Waste Treatment Pilot Plant	None	None
Steam Reforming Option	***New Storage Tanks, Calcine Retrieval and Transport System, Calcine and Steam-Reformed Product Packaging Facility, Newly Generated Liquid Waste Treatment Facility, Steam Reforming Facility***	***None***	***None***
Minimum INEEL Processing Alternative			
At INEEL	Calcine Retrieval and Transport System, Calcine Packaging Facility, SBW and Newly Generated Liquid Waste Treatment Facility, Vitrified Product Interim Storage Facility, New Analytical Laboratory, Waste Treatment Pilot Plant	Low-Activity Waste Disposal Facility[b]	22
At Hanford[c]	Canister Storage Buildings[d], Calcine Dissolution Facility	NA[e]	52
Direct Vitrification Alternative			
Vitrification without Calcine Separations Option	***Calcine Retrieval and Transport System, Vitrification Facility, Interim Storage Facility, Waste Treatment Pilot Plant, New Analytical Laboratory, New Storage Tanks***	***None***	***None***
Vitrification with Calcine Separations Option	***Calcine Retrieval and Transport System, Waste Separations Facility, Vitrification Facility, Grout Plant, Interim Storage Facility, Waste Treatment Pilot Plant, New Analytical Laboratory, New Storage Tanks***	***None***	***None***

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

b. Applicable to disposal of low-activity waste in a new INEEL disposal facility.

c. Source: Appendix C.8 of this EIS.

d. Applicable to the Interim Storage Shipping Scenario only.

e. NA = not applicable. For the onsite disposal facility only.

the ***six*** proposed waste processing alternatives. All activities would be consistent with DOE policy on land use and facility planning (DOE 1996a) and existing INEEL land use plans (DOE 1997).

5.2.1.1 No Action

Under this alternative, the New Waste Calcining Facility calciner would ***remain*** in standby ***(standby began May 2000)***. Remaining mixed transuranic waste/SBW would be left in the Tank Farm. Maintenance essential for the protection of workers and the environment would continue, but there would be no major facility upgrades. A new Calcine Retrieval and Transport System would be required to retrieve calcine from bin set 1 and transport it to bin set 6 or 7; otherwise, there would be no change in land use within INTEC and no overall change in land use on INEEL.

5.2.1.2 Continued Current Operations Alternative

As described in Section 3.1.2, ***under*** this alternative the New Waste Calcining Facility calciner ***would remain*** in standby ***(standby began May 2000)*** until upgrades are completed to put the facility in compliance with Maximum Achievable Control Technology requirements. Any remaining mixed transuranic waste/SBW would be left in the Tank Farm until 2011, when the New Waste Calcining Facility would resume operation. Other than a Newly Generated Liquid Waste Treatment Facility and a Calcine Retrieval and Transport System, no new facilities would be required. There would be no other change in land use within the INTEC and no overall change in land use on the INEEL.

5.2.1.3 Separations Alternative

Full Separations Option - Under this option, a number of new waste management and support facilities would be built within the developed portion of INTEC, including a Waste Separations Facility, Vitrification Plant, Class A Grout Plant, Vitrified Product Interim Storage Facility, and New Analytical Laboratory. DOE is evaluating three methods for disposing of the low-level waste fraction (Class A type grout) produced by processing mixed HLW and mixed transuranic waste/SBW: (1) offsite disposal, (2) onsite disposal in the Tank Farm and bin sets, and (3) disposal in a new near-surface land disposal facility (see Section 3.1.3). If DOE chooses to dispose of the low-level waste fraction onsite in a land disposal facility, a new Low-Activity Waste Disposal Facility would be built approximately 2,000 feet east of the INTEC Coal-Fired Steam Generating Facility, which is outside the existing security perimeter fence. Appendix A discusses the process DOE used to select this site.

The total area of the Low-Activity Waste Disposal Facility, support facilities (e.g., guardhouse), and open buffer zone would be 22 acres; the disposal facility itself would be a 367-foot by 379-foot reinforced concrete structure with a maximum capacity of 34,800 cubic meters (Kiser et al. 1998). Once filled to capacity, the Low-Activity Waste Disposal Facility would be equipped with an engineered cap sloping from centerline to ground level with a four percent grade (Kiser et al. 1998). If a soil cap is used it would be revegetated with selected native plants to prevent erosion, improve the appearance of the closed facility, and blend in with surrounding vegetation.

This option would be consistent with current and planned uses of INTEC outlined in the *INEEL Comprehensive Facility and Land Use Plan* (DOE 1997). Implementing this option would not affect overall INEEL land use or land use on surrounding areas.

Planning Basis Option - This option is similar to the Full Separations Option, but differs in the way that mixed transuranic waste/SBW would be managed (see Chapter 3) and in the way that the low-level waste fraction (produced by processing mixed HLW and mixed transuranic waste/SBW) would be disposed of. Under the Planning Basis Option, mixed transuranic waste/SBW would be calcined in the New Waste Calcining Facility prior to dissolution and chemical separation rather than being separated directly into mixed high- and low-level waste fractions. Although the timing of processing would be different, the same new waste processing facilities would be required under this option as under the Full Separations Option. Under this

option, the low-level waste Class A type grout fraction would be disposed of offsite at a commercial radioactive waste disposal facility. This option would be consistent with current and planned uses of INTEC outlined in the *Comprehensive Facility and Land Use Plan* (DOE 1997). Implementing this option would not affect overall INEEL land use or land use on surrounding areas.

Transuranic Separations Option - Under this option, a number of new facilities would be built within the developed portion of INTEC, including a Transuranic Separations Facility, Class C Grout Plant, and New Analytical Laboratory. As with the Full Separations Option, a new Low-Activity Waste Disposal Facility would be built if DOE chooses to dispose of the low-level waste fraction onsite in a near-surface land disposal facility, ***which is discussed in detail earlier in this section.*** Implementing this option would not affect overall INEEL land use or land use on surrounding areas.

5.2.1.4 Non-Separations Alternative

If DOE selects one of the ***four*** options under the Non-Separations Alternative, a number of new facilities would be built within the developed portion of INTEC including an immobilization ***facility*** (Hot Isostatic Press, ***Direct*** Cement, Early Vitrification, or ***Steam Reforming***), and a Newly Generated Liquid Waste ***Treatment*** Facility. Development of these new facilities would be consistent with current and planned uses of INTEC outlined in the *INEEL Comprehensive Facility and Land Use Plan* (DOE 1997). No new construction would occur outside of the INTEC security perimeter fence, so there would be no overall change in land use on the INEEL.

5.2.1.5 Minimum INEEL Processing Alternative

This alternative would involve the shipment of calcined HLW to the Hanford Site, where it would be separated into high- and low-level ***waste*** fractions and vitrified (see ***Section 3.1.5***). The vitrified wastes would then be returned to INEEL where the vitrified high-level waste fraction would be placed in storage and the vitrified low-level waste fraction would either be shipped to an offsite disposal facility or placed in a new Low-Activity Waste Disposal Facility east of INTEC. A number of new facilities would be built at INEEL in support of this alternative (see Table 5.2-1) including the Low-Activity Waste Disposal Facility, which is discussed in detail in Section 5.2.1.3. Development of these new facilities would be consistent with current and planned uses of INTEC outlined in the *INEEL Comprehensive Facility and Land Use Plan* (DOE 1997). The Low-Activity Waste Disposal Facility would require 22 acres of previously undisturbed land. Two new waste management facilities (Canister Storage Buildings and Calcine Dissolution Facility) would be built at Hanford under the Interim Storage Scenario. These new facilities would be built in an undisturbed 52-acre area within the 200-East Area at the Hanford Site. The development of these two new Hanford facilities would be consistent with Hanford Site land use plans (DOE 1996b). See Appendix C.8 for a more detailed analysis of at-Hanford impacts.

5.2.1.6 Direct Vitrification Alternative

Vitrification without Calcine Separations Option - ***Under this option, a number of new waste management and support facilities would be built within the developed portion of INTEC, including a Calcine Retrieval and Transport System, Vitrification Facility, Interim Storage Facility, Waste Treatment Pilot Plant, New Storage Tanks, and New Analytical Laboratory. No new construction would occur outside the INTEC security perimeter fence, so there would be no overall change in land use on the INEEL. This option would be consistent with current and planned uses of INTEC outlined in the INEEL Comprehensive Facility and Land Use Plan (DOE 1997).***

Vitrification with Calcine Separations Option - ***Under this option, a number of new waste management and support facilities would be built within the developed portion of INTEC, including a Calcine Retrieval and Transport System, Waste Separations Facility, Vitrification Facility, Grout Plant (mixed low-level waste fraction), Interim Storage Facility, Waste Treatment Pilot Plant, New Storage Tanks, and New Analytical Laboratory. This option is con-***

sistent with current and planned uses of INTEC outlined in the INEEL Comprehensive Facility and Land Use Plan (DOE 1997). Implementing this option would not affect overall INEEL land use or land use on surrounding areas.

5.2.2 SOCIOECONOMICS

This section presents the potential effects of implementing the waste processing alternatives described in Chapter 3 on the socioeconomic factors of the INEEL region of influence as defined in Section 4.3, Socioeconomics. Changes to INEEL-related expenditures and workforce levels have the potential to generate economic impacts that may affect local employment, population, and community services. These potential impacts should be positive in that they would contribute to stabilization of the INEEL workforce and thus the regional economy. Since 1991, INEEL employment levels have declined about 35 percent to approximately 8,100 jobs. Long-range employment forecasts are not available for INEEL missions but indications based on budget forecasts suggest workforce levels have stabilized at current levels and will not fluctuate more than $\pm$ 5 percent (McCammon 1999). Currently about 1,100 of these workers are associated with INTEC (Beck 1998). DOE assumes that these workers are the basis for the HLW workforce. Since comprehensive staffing plans determining the number of employees that would be retrained and reassigned, if necessary, to support the HLW mission have not yet been prepared, it is assumed all 1,100 would be potentially available for HLW work.

Figure 5.2-1 shows projected total direct waste processing job requirements by alternative and option. The projected employment levels include a total of both construction and operations employment in a given year. Workforce levels marginally exceed the baseline for the Planning Basis Option during the operational phase.

Following a short discussion on methodology, potential impacts for both the construction and operational phases are discussed in terms of employment and earnings, population and housing, community services, and public finance. Facility disposition is discussed in Section 5.3.2.

5.2.2.1 Methodology

Socioeconomic impacts are addressed in terms of both direct and indirect jobs. Direct jobs are the employment levels directly expected to take place under each alternative and include both construction and operations phases. This may also include existing INEEL employees doing work that will transition to a waste processing alternative, especially in operations where existing employees would be expected to be retrained and reassigned, whenever possible. In some cases, the skill mix and the number of personnel available may dictate a reduction in force. The number of workers affected will depend on the alternatives selected and the timing. History has shown that such reductions are generally small. Indirect jobs can result from spending by INEEL employees which in turn generates non-INEEL jobs. The total economic impact to the region of influence is the sum of direct and indirect impacts.

The direct jobs for each option estimated in the socioeconomic analysis are based on the project data provided in Appendix C.6, Project Summaries, for all projects that make up the option. Total employment and earnings impacts were estimated using Regional Input-Output Modeling System (RIMS) multipliers developed specifically for the INEEL region of influence by the U.S. Bureau of Economic Analysis. A discussion of the methodology can be found in Appendix C.1, Socioeconomics.

The conditions described for the affected environment region of influence provide the basis for determining the potential impacts of each alternative. Projected baseline employment and population represent socioeconomic conditions that are likely to exist in the region of influence through 2035, which is the latest information available. Long term baseline projections that would serve as a comparison to long term HLW operations would be too speculative to be meaningful. Every alternative is expected to result in short-term employment for the construction of new facilities and longer-term employment for the implementation of the waste processing alternatives.

Since the publication of the Draft EIS, Census 2000 and related data have been incorporated into the socioeconomic analyses. Population

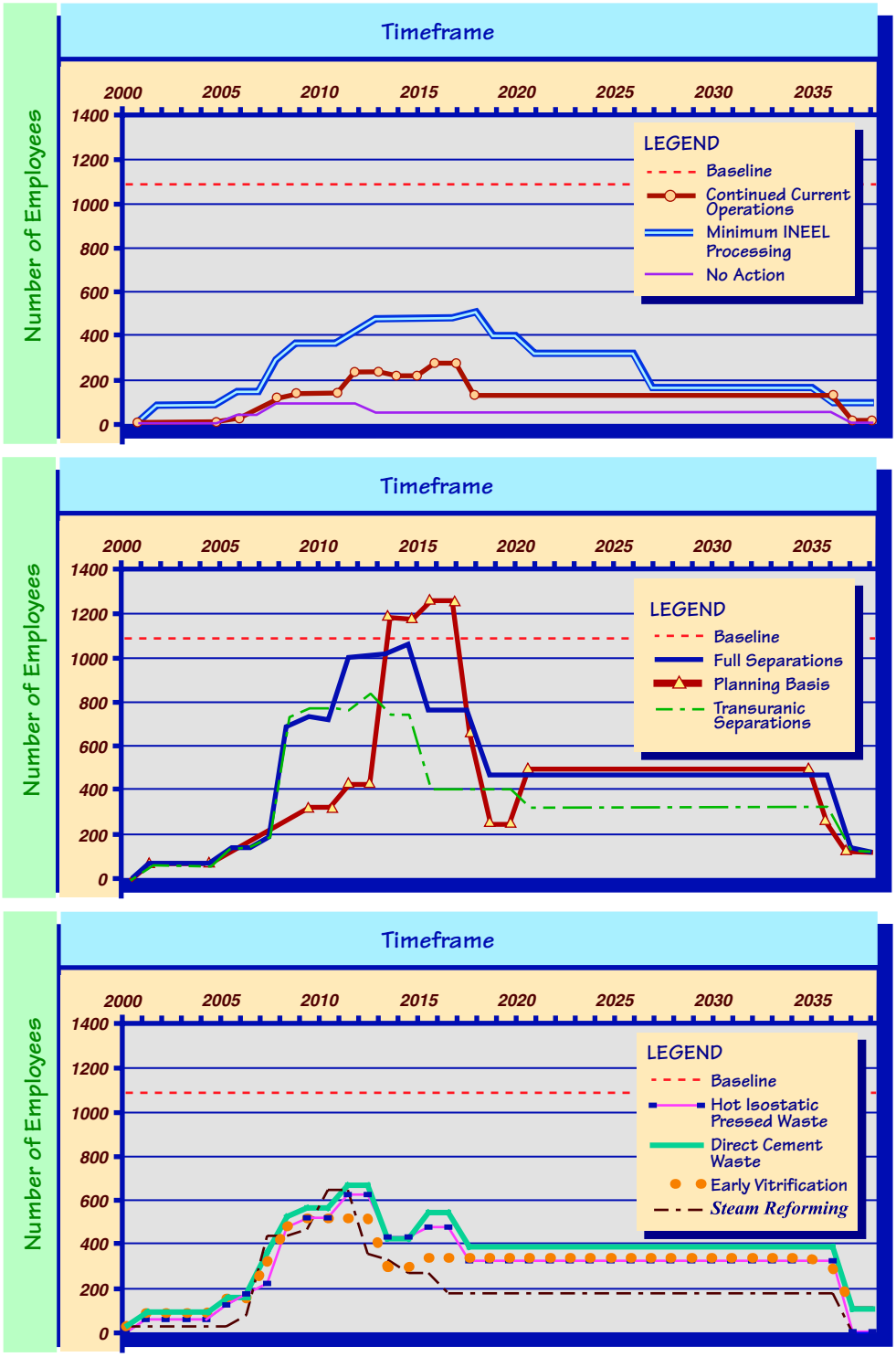


FIGURE 5.2-1. (1 of 2)
Total projected direct employment by alternative compared to projected baseline employment at INTEC.

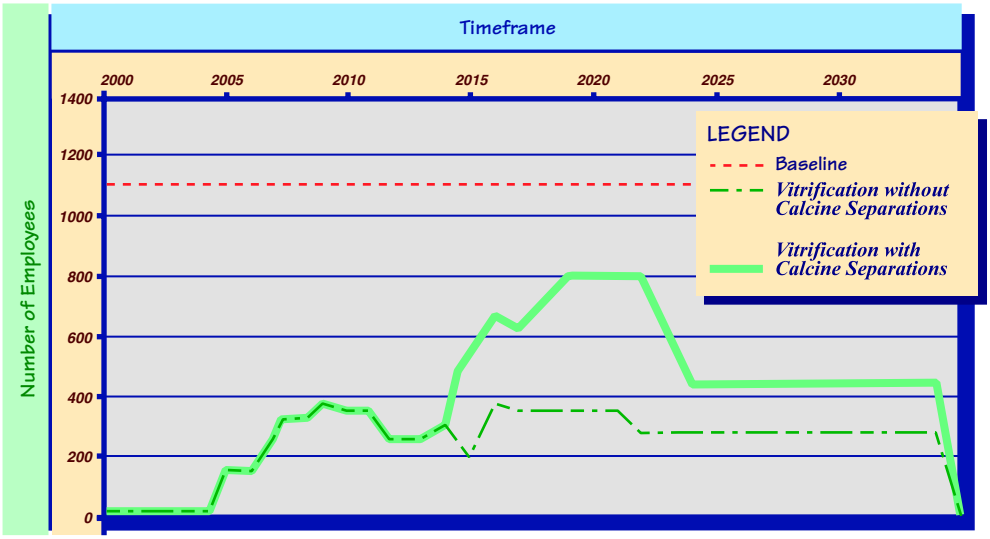


FIGURE 5.2-1. (2 of 2)
Total projected direct employment by alternative compared to projected baseline employment at INTEC.

figures, housing characteristics, labor information, and economic multipliers (such as employment and earnings multipliers) have been updated to reflect the most current socioeconomic environment in the region of influence.

5.2.2.2 Construction Impacts

Employment and Earnings - Table 5.2-2 presents construction phase employment and earnings by alternative. Under the No Action Alternative, minimal construction would occur (a calcine retrieval and transport system) and would have the smallest incremental impact, about 40 jobs contributing ***approximately*** $1 million ***(2000 dollars)*** to the economy. For the construction phase, the Planning Basis Option under the Separations Alternative represents the largest potential impact. A total of ***1,700*** jobs (870 direct and ***840*** indirect) are expected to be retained in the peak year (2013) as a result of implementing this option (Table 5.2-2). For the same peak year, ***the labor force*** in the region of influence is projected to be ***154,000*** (RIMS II). As can be seen, the INEEL employment levels retained by the Separations Alternative would be small compared to the region as a whole. The Continued Current Operations Alternative would result in the smallest number of jobs, except for No Action [180 jobs (90 direct and 90 indirect)]. During their respective peak years, the Planning Basis Option would contribute approximately $***43*** million (***2000*** dollars) in earnings to the local economy, while the Continued Current Operations Alternative would add $***4.4*** million (***2000*** dollars). The Minimum INEEL Processing Alternative at Hanford would result in approximately 290 direct jobs during the peak year. These contributions to the local economy would be temporary, lasting only as long as construction.

Although a few technical positions (such as iron and steel workers) may be required that would necessitate the in-migration of some workers and their dependents, the vast majority of workers would come from workers at the INEEL or the region of influence unemployment pool. Table 5.2-3 projects regional employment to the year 2025. Sufficient labor resources appear available at the INEEL and in the regional employment pool to accommodate INEEL employment requirements. Should unforeseen major construction activities begin in the future, availability of workers could become more constrained, but given the forecasted needs and projected labor pool, additional in-migration should be minimal. In the construction sector, forecasts

Table 5.2-2. Construction phase employment and income by alternative during respective peak year.

Alternatives	Peak[a]	Employment			Total earnings (Dollars)[c]
		Direct[b]	Indirect	Total	
No Action Alternative	2005	***21***	20	***41***	1,000,000
Continued Current Operations Alternative	2008	***89***	***86***	180	4,400,000
Separations Alternative					
Full Separations Option	2013	850	***830***	***1,700***	***42,000,000***
Planning Basis Option	2013	870	***840***	***1,700***	***43,000,000***
Transuranic Separations Option	2012	680	***650***	***1,300***	***34,000,000***
Non-Separations Alternative					
Hot Isostatic Pressed Waste Option	2008	360	***350***	***710***	***18,000,000***
Direct Cement Waste Option	2008	400	***390***	***790***	***20,000,000***
Early Vitrification Option	2008	330	***320***	***650***	***16,000,000***
Steam Reforming Option	***2010***	***550***	***530***	***1,100***	***27,000,000***
Minimum INEEL Processing Alternative					
At INEEL	2008	200	***190***	***390***	***9,800,000***
At Hanford[d, e]	2024	290	***280***	***570***	***14,000,000***
Direct Vitrification Alternative					
Vitrification without Calcine Separations Option	***2011***	***350***	***340***	***690***	***17,000,000***
Vitrification with Calcine Separations Option	***2019***	***670***	***650***	***1,300***	***33,000,000***

a. Peak represents the first year of construction phase that employs the maximum direct workers.
b. Source: Data from project data sheets in Appendix C.6.
c. Source: IDOL (***2002***) presented in ***2000*** dollars.
d. Source: Data from project data sheets in Appendix C.8.
e. Based on same wage structure and employment multiplier as INEEL.

indicate that about 7,000 construction workers would be in the area (RIMS II). The Planning Basis Option, the bounding case, requires 870 direct jobs which would be 12 to 13 percent of the projected construction workforce. The potential socioeconomic impacts at the Hanford Site would be similar to those described for the INEEL but would be smaller in magnitude (see Appendix C.8).

Population and Housing - As the demand for workers in a region varies, the population also tends to vary depending on the nature of the change in employment demand. For example, as worker demand increases (or decreases) in a region, some potential workers and their families may move into (or out of) the region in search of new jobs. As can be seen from Table 4-1 and Table 5.2-3, both the population and the employment pool are projected to continue growing.

As mentioned in the introduction to this section, indications are the INEEL workforce has stabilized but could vary by about 5 percent. If the variation resulted in downsizing, about 400 jobs could be lost. As noted in the previous section, any in-migration is expected to be minimal and would do little to offset the job losses.

The actual magnitude of the total population effect would depend to a large extent on the future availability of comparable employment opportunities within the region relative to the availability of employment elsewhere and to a variety of subjective criteria. Consequently, the reduction of employment could result in a reduced demand for housing and rental units. Assuming all 400 individuals own or rent housing and all are relocated, based on 1992 housing units, the amount of available housing would increase by ***13*** percent.

Community Services and Public Finance - The situation involving potential impacts to community services and public finance is similar to that described for population and housing. As the demand for workers in a region varies, the pressure on community services and the tax base also

Table 5.2-3. Population and labor projections.[a]

Year	Region of influence population	Labor force	Unemployment	Employment
2000	***250,365***	***131,352***	***5,294***	***126,058***
2001	***254,065***	***133,667***	***6,099***	***127,568***
2002	***257,765***	***135,614***	***6,188***	***129,426***
2003	***261,465***	***137,560***	***6,277***	***131,284***
2004	***265,165***	***139,507***	***6,365***	***133,142***
2005	***268,865***	***141,454***	***6,454***	***134,999***
2006	***270,962***	***142,557***	***6,504***	***136,052***
2007	***273,059***	***143,660***	***6,555***	***137,105***
2008	***275,156***	***144,763***	***6,605***	***138,158***
2009	***277,253***	***145,867***	***6,655***	***139,211***
2010	***279,350***	***146,970***	***6,706***	***140,264***
2011	***283,596***	***149,204***	***6,808***	***142,396***
2012	***287,843***	***151,438***	***6,910***	***144,528***
2013	***292,089***	***153,672***	***7,012***	***146,661***
2014	***296,336***	***155,906***	***7,114***	***148,793***
2015	***300,582***	***158,140***	***7,216***	***150,925***
2016	***304,489***	***160,196***	***7,309***	***152,887***
2017	***308,397***	***162,252***	***7,403***	***154,849***
2018	***312,304***	***164,308***	***7,497***	***156,811***
2019	***316,212***	***166,363***	***7,591***	***158,773***
2020	***320,119***	***168,419***	***7,685***	***160,735***
2021	***324,027***	***170,475***	***7,778***	***162,697***
2022	***327,934***	***172,531***	***7,872***	***164,659***
2023	***331,842***	***174,587***	***7,966***	***166,621***
2024	***335,749***	***176,642***	***8,060***	***168,583***
2025	***339,657***	***178,698***	***8,154***	***170,545***

a. Source: BEA (***1998, 2000***).

varies. Assuming a stabilized INEEL workforce that would not vary by more than 5 percent, a downsizing of 400 jobs as discussed in the previous section would not likely generate discernible impacts on community services and public finance within the region of influence. While the magnitude of the impacts may be small, they could result in reduced school enrollments and similar decreases in demand for other community services. Similarly, revenues received by the county governments within the region of influence may decrease slightly as a result of the declines in regional economic activity.

5.2.2.3 Operational Impacts

Employment and Earnings - For the operations phase, the Direct Cement Waste Option represents the largest potential impact. As shown in Table 5.2-4, a total of ***1,600*** jobs (530 direct and ***1,000*** indirect) are expected to be retained during the peak year (2015) and would contribute about $***42*** million to the economy. Projected Idaho ***labor force*** levels for the region are expected to be about ***158,000*** (RIMS II). Again, the INEEL workforce maintained by the waste processing alternatives would be small when compared to the regional workforce. The No Action

Table 5.2-4. Operations phase employment and income by alternative during respective peak year.

Alternatives	Peak[a]	Employment			Income (dollars)[c]
		Direct[b]	Indirect	Total	
No Action Alternative	2007	***73***	***140***	***220***	***5,800,000***
Continued Current Operations Alternative	2015	280	***550***	***830***	***22,000,000***
Separations Alternative					
Full Separations Option	2018	440	***870***	***1,300***	***35,000,000***
Planning Basis Option	2020	480	***950***	***1,400***	***38,000,000***
Transuranic Separations Option	2015	320	***630***	***950***	***25,000,000***
Non-Separations Alternative					
Hot Isostatic Pressed Waste Option	2015	460	***910***	***1,400***	***37,000,000***
Direct Cement Waste Option	2015	530	***1,000***	***1,600***	***42,000,000***
Early Vitrification Option	2015	330	***650***	***980***	***26,000,000***
Steam Reforming Option	***2012***	***170***	***340***	***520***	***14,000,000***
Minimum INEEL Processing Alternative					
At INEEL	2018	330	***650***	***980***	***26,000,000***
At Hanford[d,e]	2029	740	***1,500***	***2,200***	***59,000,000***
Direct Vitrification Alternative					
Vitrification without Calcine Separations Option	***2015***	***310***	***600***	***910***	***24,000,000***
Vitrification with Calcine Separations Option	***2023***	***440***	***880***	***1,300***	***35,000,000***

a. Peak represents the first year of operations phase that employs the maximum direct workers.
b. Source: Data from project data sheets contained in Appendix C.6.
c. Source: IDOL (***2002***) presented in ***2000*** dollars.
d. Source: Data from project data sheets in Appendix C.8.
e. Based on same wage and employment multipliers as INEEL.

Alternative would have the smallest number of jobs and would contribute about $***5.8*** million to the economy. The ***Steam Reforming Option*** would have the next smallest workforce representing ***520*** jobs (***170*** direct and ***340*** indirect) with an economic contribution of about $***14*** million. As in the case of the construction phase, wages generated during operations could result in additional non-INEEL jobs. In general, operations would contribute less income to the regional economy than would construction, on a peak-year basis.

Although a few technical positions may be required that would necessitate the in-migration of some workers and their dependents, the vast majority of workers would come from the local unemployment pool in the region of influence. Unemployment in the region of influence ranged between ***4*** and 6 percent in the 1990s ***and 2000*** (BLS 1997***, 2002***). As was the case for construction, sufficient labor resources appear available at the INEEL and in the regional employment pool to accommodate INEEL employment requirements. However, as can be seen on Figure 5.2-1, the operational peak marginally exceeds the baseline employment level. These additional employees would have to be reassigned from other INEEL missions or obtained from the regional employment pool. Again, as with the construction phase, in-migration should be minimal. The Direct Cement Waste Option is projected to require 530 direct employees. During the peak year of operations, forecast indicates about 7,000 to 7,500 operational sector employees would be in the area.

Population and Housing - Potential impacts would be the same as for the construction phase.

Community Services and Public Finance - Potential impacts would be the same as for the construction phase.

5.2.3 CULTURAL RESOURCES

This section presents potential impacts to cultural resources from implementing the proposed waste processing alternatives described in Chapter 3. The analysis of potential impacts to cultural resources, which is based on the ***six*** waste processing alternatives described in Chapter 3, focuses on archaeological and historic sites, areas of cultural or religious importance to local Native Americans, and paleontological localities on the INEEL. Because one of the alternatives (Minimum INEEL Processing) involves shipment of mixed HLW to the Hanford Site for treatment, possible impacts to Hanford cultural resources were also evaluated (see Appendix C.8). Unless otherwise noted, however, the discussion of impacts presented in this section specifically applies to the INEEL. DOE assessed potential impacts by (a) identifying project activities that could directly or indirectly affect cultural resources, (b) identifying the known or expected cultural resources in areas of potential impact, and (c) determining whether a project activity would have an adverse effect on these resources.

DOE evaluated both direct and indirect potential impacts. Direct impacts to archaeological resources are usually those associated with ground disturbance from construction activities. Direct impacts to archaeological sites may result from vandalism due to increased access to sites. Direct impacts to existing historic structures could result from demolition, modification, or deterioration of the structures; isolation from or alteration of the property's setting; or the introduction of visual, auditory, or atmospheric elements that are out of character with, or alter, the property's setting. Direct impacts to traditional Native American cultural resources could occur through land disturbance, vandalism, or alteration of the environmental setting of traditional use and sacred areas.

Indirect impacts to traditional Native American cultural resources could occur from an overall increase in activity brought about by the construction and operational workforces employed under the waste processing alternatives. The Shoshone-Bannock Tribes embrace a holistic approach to protection of Native American cultural resources and land. This approach encompasses all the components of the environment, such as the air, soils, plants, and animals, and ascribes greater value to the whole than would be found by adding the individual components. Section 4.4 discusses the holistic approach in greater detail. Non-traditional activities in the region (e.g., construction and operation of waste processing activities) are considered by the Shoshone-Bannock Tribes to diminish the quality of the cultural setting when they can be seen or heard from sacred or traditional-use areas. The broad, open expanse of the Eastern Snake River Plain allows a high degree of visibility for long distances, thus increasing the potential for impacts of this nature. From the tribal perspective, the ideal level of non-traditional activity in the region would be zero; however, because activity is on-going in the region, DOE has established the current level of activity as the baseline for the analysis.

5.2.3.1 Construction Impacts

Most of the activities associated with HLW management at INEEL would take place inside the perimeter security fence at INTEC, an area that has been highly altered by development and dedicated to industrial use for more than 40 years. Because extensive ground disturbance has already occurred within the fenced perimeter of the INTEC, it is unlikely that new construction or remediation activities would disturb archaeological resources. There are no existing known archaeological sites within the fenced perimeter at INTEC. Therefore, none of the alternatives is likely to result in direct or indirect impacts to archaeological sites within the fenced perimeter at INTEC. Activities outside the fence are more likely to result in impacts to archaeological sites.

Under the Separations and Minimum INEEL Processing Alternatives, DOE may choose to dispose of the low-level waste fraction onsite. If

so, a new Low-Activity Waste Disposal Facility could be built in a previously undisturbed area approximately 2,000 feet east of the INTEC Coal-Fired Steam Generating Facility, outside the existing security perimeter fence. Prior to construction, this area would be surveyed for archaeological resources. If any archaeological resources are located during the survey, DOE would work in consultation with the State Historic Preservation Office, the Advisory Council on Historic Preservation, and the Shoshone-Bannock Tribes. Upon completion of disposal activities, an engineered cap would be placed over the disposal facility and if a soil cap is used it would be revegetated with native species. The waste disposal facility would blend naturally into the landscape over time.

The INEEL has implemented strong "Stop Work" stipulations in the event that archaeological resources or human remains are discovered during any project implementation. These stipulations include provisions for notification of, and consultation with, the State Historic Preservation Officer, the Advisory Council on Historic Preservation, and the Shoshone-Bannock Tribes in accordance with National Historic Preservation Act and Native American Graves Protection and Repatriation Act (Ringe-Pace 1998, Yohe 1995). Additionally 36 CFR 800.13(b) (regarding inadvertent discoveries) mandates that a reasonable effort be made to avoid, minimize, or mitigate adverse effects to any discovered items.

There are 38 known historic properties within the INTEC fence, but none are expected to be directly or indirectly affected. Reuse of historic structures must be considered prior to acquiring, constructing, or leasing new structures (National Historic Preservation Act Section 110). Under the Continued Current Operations Alternative, DOE would modify the New Waste Calcining Facility. The New Waste Calcining Facility would also be modified under the Planning Basis, Hot Isostatic Pressed Waste, and Direct Cement Waste Options. DOE would disposition these facilities at the conclusion of waste processing activities. These buildings were determined in 1997 to be too recently built to be evaluated for their historic significance. They will be reassessed for their eligibility for nomination to the National Register of Historic Places at a later date, or prior to modification or demolition. Also, these buildings could be eligible for nomination to the National Register of Historic Places under Criterion G, "exceptional significance"; however, this eligibility must be conducted in consultation with the Idaho State Historic Preservation Office and the Advisory Council on Historic Preservation. If the buildings are determined to be eligible for nomination to the National Register of Historic Places, a Memorandum of Agreement would be required to ensure the mitigation of impacts. Stipulations to mitigate adverse impacts contained within this Agreement would be negotiated by DOE with the State Historic Preservation Office. Therefore, the only sources of potential impacts to cultural resources during construction on the INEEL are from emissions and overall increases in worker numbers and traffic under the alternatives.

5.2.3.2 Operational Impacts

No Action Alternative – This alternative assumes the New Waste Calcining Facility calciner would be placed ***in*** standby ***by*** June 2000 ***(completed May 2000)***. A new Calcine Retrieval and Transport System would be required to move calcine from bin set 1 to bin set 6 or 7; no other HLW facilities would be built. The calciner would be shut down; therefore, minimal process emissions would be generated. There would be fewer workers employed at INTEC (see Section 5.2.2) and a corresponding decrease in traffic (see Section 5.2.9) under this alternative. DOE expects that no potential impacts to cultural resources would occur from this alternative. No adverse visual or auditory impacts would occur to the archaeological, historic, or cultural resources setting on the INEEL or along the transportation routes as a result of the implementation of the No Action Alternative at INTEC.

Continued Current Operations Alternative – Under this alternative, current HLW management activities would continue after the New Waste Calcining Facility has been upgraded. Several INTEC facilities, including the New Waste Calcining Facility, would be upgraded or expanded, and the remaining mixed transuranic waste/SBW would be calcined beginning in 2011. Air emissions from the existing calciner stack would continue at a reduced level after

Maximum Achievable Control Technology upgrades, resulting in decreased visual degradation of the cultural setting of the INEEL and adjacent lands. Stack emissions from the calciner would be substantially reduced upon completion of mixed transuranic waste/SBW calcining operations in 2014. Calcining operations and associated stack emissions would cease after 2016. After 2016, no potential impacts to cultural resources would occur from emissions. Section 5.2.6, Air Resources, discusses emission levels in greater detail. There would be approximately the same number of workers employed at INTEC (see Section 5.2.2) and no change in the level of traffic (see Section 5.2.9) under this alternative; therefore, DOE expects that impacts to cultural resources other than the facility modifications would not occur from this alternative. The modifications would be mitigated through an agreement with the State Historic Preservation Office.

Separations Alternative – This alternative would require a number of new waste management and support facilities within the developed portion of INTEC under the Full Separations, Planning Basis, or Transuranic Separations Options (see Table 5.2-1). Some temporary visual degradation of the cultural setting of the INEEL and adjacent lands would occur from process air emissions under this alternative. Stack emissions from all waste processing operations would cease upon completion in 2035. Section 5.2.6, Air Resources, discusses emission levels in greater detail. In general, this alternative would employ the greatest number of workers at INTEC (see Section 5.2.2). This would result in the highest increase in traffic (see Section 5.2.9) among the alternatives on the INEEL property. This increase, however, would be small relative to existing levels; therefore, DOE does not expect impacts to cultural resources from this alternative.

Non-Separations Alternative – This alternative would require a number of new waste management and support facilities within the developed portion of INTEC (see Table 5.2-1). Some temporary visual degradation of the cultural setting of the INEEL and adjacent lands would occur from process air emissions under this alternative. Stack emissions from all waste processing operations would cease upon completion in 2035. After 2035, no potential impacts to cultural resources would occur from emissions. Section 5.2.6, Air Resources, discusses emission levels in greater detail. In general, increased employment would result in approximately the same number of workers employed at INTEC under this alternative as under the Separations Alternative (see Section 5.2.2). Similarly, the increased traffic on INEEL would be approximately the same as the traffic under the Separations Alternative (see Section 5.2.9) and would be small relative to existing levels; therefore, DOE does not expect impacts to cultural resources from this alternative.

Minimum INEEL Processing Alternative – Under this alternative, a small number of new waste management and support facilities would be built within the developed portion of INTEC. Some minor temporary visual degradation of the cultural setting of the INEEL and adjacent lands would occur from air emissions under this option. Emissions from all waste processing operations would cease upon completion in 2035. After 2035, no potential impacts to cultural resources would occur from emissions. Section 5.2.6, Air Resources, discusses emission levels in greater detail. In general, this alternative would result in fewer workers employed at INTEC (see Section 5.2.2) than under the Separations or Non-Separations Alternatives. Similarly, the increased traffic on the INEEL would be substantially less than the traffic under the Non-Separations Alternative and would be small relative to existing levels; therefore, DOE does not expect impacts to cultural resources at INEEL from this alternative.

In addition, two new facilities could be built within the 200-East Area of the Hanford Site under the Interim Storage Scenario. These activities would be carried out in accordance with the *Hanford Cultural Resources Management Plan* (Chatters 1989) to identify and evaluate cultural resources associated with the project locations and mitigate possible damage to those cultural resources. Employment and the corresponding increase in traffic at Hanford would be substantially higher under this alternative (see Appendix C.8) than they would be at INEEL under all the other alternatives. The increase in traffic, however, would still be small in comparison with existing levels; therefore, DOE expects no impacts to cultural resources at Hanford under this alternative.

Direct Vitrification Alternative – This alternative would require a number of new waste management and support facilities within the developed portion of INTEC (see Table 5.2-1). The greatest number of new facilities would be associated with the Vitrification with Calcine Separations Option. Some temporary visual degradation of the cultural setting of the INEEL and adjacent lands would occur from process air emissions under the Direct Vitrification Alternative. Stack emissions from all waste processing operations would cease upon completion in 2035. Section 5.2.6, Air Resources, discusses emission levels and air impacts in greater detail. In general, increased employment would result in approximately the same number of workers employed at INTEC under this alternative as under the Separations Alternative (see Section 5.2.2). This would result in the Direct Vitrification Alternative having the highest increase in traffic. This increase, however, would be small relative to existing levels. Therefore, DOE does not expect impacts to cultural resources from the Direct Vitrification Alternative.

5.2.4 AESTHETIC AND SCENIC RESOURCES

5.2.4.1 Methodology

This section presents potential aesthetic and scenic resource impacts from implementing the proposed waste processing alternatives described in Chapter 3. DOE assessed potential impacts by reviewing project plans for the ***twelve*** proposed options that define the ***six*** alternatives to determine if (1) project activities would be likely to produce aesthetic and scenic resource changes and (2) those changes would likely result in significant impacts to the aesthetic and scenic resources of the INEEL and its adjacent lands. Because one of the alternatives (Minimum INEEL Processing) would involve shipment of calcined HLW to the Hanford Site for treatment, possible impacts to Hanford's aesthetic and scenic resources were also evaluated (see Appendix C.8). Unless otherwise noted, however, the discussion of impacts presented in this section applies specifically to the INEEL. DOE did not analyze separately the ***twelve*** individual options within the ***six*** alternatives because there are no significant distinctions between them for the purposes of the aesthetics analysis. In order to keep the discussions clear, concise, and easy to compare, this analysis presents only the differences between the alternatives.

Most of the waste processing activities would take place inside the perimeter security fence at INTEC, an area that has been highly altered by development and dedicated to industrial use for more than 40 years. Potential impacts to aesthetic and scenic resources include (a) the addition or modification of structures and (b) the addition of construction and process emissions that could alter the view. Determination of significant visual resource degradation from new or modified structures is based on the extent of modification to the area. The definition of the degree of acceptable modification considers the nature, density, and extent of sensitive visual resources that contribute to the visual character of an area. If construction activities and ground disturbances associated with the alternative could result in a visual impact that is incompatible with the general setting and the Bureau of Land Management Visual Resource Management Class designation for the area, DOE would consider the impacts to be significant.

DOE used conservative screening-level methods to quantitatively assess impacts to visibility at Craters of the Moon National Wilderness Area, which at ***27*** miles ***west-***southwest of INTEC is the nearest Class I area. The results (see Appendix C.2 for numerical results) indicate that predicted levels of particulate matter and oxides of nitrogen from any of the HLW processing alternatives would be well below the numerical criteria that represent a threshold for perceptible impacts. ***Additional modeling using the Park Service-recommended CALPUFF model, indicates that numerical visibility criteria (namely, a 5% change in 24-hour light extinction) could be exceeded on 8 days out of a 5-year simulation period. This would occur at Craters of the Moon under the Planning Basis Option; all other options would have less impact, and there would be no impacts on visibility at Yellowstone or Grand Teton National Parks.***

Visual resources include the natural and man-made physical features that give a particular

landscape its character and value. There are four visual resource classes in the Bureau of Land Management inventory (BLM 1986). Classes I and II are the most valued; Class III is moderately valued; and Class IV is of least value (see Table 5.2-5). The industrialized area of INTEC has a Bureau of Land Management Visual Resource Management rating of Class IV.

Within the region of influence, potential impacts to aesthetic and visual resources include factors resulting from waste processing activities that would be detrimental to the available views, such as visibility degradation caused by air emissions from INTEC operating plants. Emissions released into the atmosphere during both the construction and operation of waste processing facilities have the potential to result in visual resource degradation by reducing contrast and causing discoloration. In particular, emissions of oxides of nitrogen and particulate matter may decrease contrast, such as that of a dark object against the horizon, and/or cause a discoloration of the sky or viewed objects. Visibility has been specifically designated as an air quality-related value under the 1977 Prevention of Significant Deterioration Amendments to the Clean Air Act.

The visual setting, particularly in the Middle Butte area located in the southern portion of the INEEL, is regarded by the Shoshone-Bannock Tribes as an important Native American visual resource. The Shoshone-Bannock Tribes would be consulted before projects were developed that could have impacts to resources of importance to the tribes.

5.2.4.2 Construction Impacts

Under the Separations and Minimum INEEL Processing Alternatives, DOE ***could*** choose to dispose of the low-level waste fraction onsite in a new Low-Activity Waste Disposal Facility. ***This facility is described in Section 5.2.1.3.*** The facility would be equipped with an engineered cap sloping from the center to ground level with a 4-percent grade (Kiser et al. 1998). The cap would be revegetated with selected indigenous species to minimize erosion and restore appearance. From U.S. 20, the nearest public access, the revegetated cap would blend in with the rolling topography of the area and would not be visible.

Table 5.2-5. Bureau of Land Management Visual Resource Management objectives.[a]

Rating	Management objectives
Class I	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
Class II	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
Class III	The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
Class IV	The objective of this class is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

a. Source: BLM (1986).

Construction activities under all the alternatives would produce fugitive dust that could affect visibility temporarily in localized areas; however, it would not be visible from lands adjacent to the INEEL or beyond and would not exceed the Class III objectives. Heavy equipment would produce some exhaust emissions; however, these emissions would not be expected to produce any significant visual impacts. Section 5.2.6, Air Resources, discusses emission levels in greater detail. Construction activities would be limited in duration, and DOE would follow standard best management practices (e.g., spraying or misting) to minimize both erosion and dust; therefore, DOE does not expect significant visual impacts from construction activities.

5.2.4.3 Operational Impacts

No Action Alternative – Under this alternative, a new Calcine Retrieval and Transport System would be the only new facility. The New Waste Calcining Facility calciner would be placed in standby mode ***by*** June 2000 ***(completed May 2000)***, and would not be upgraded and returned to service; therefore, no further stack emissions would occur from calcining operations. Using emission levels from calcining operations prior to June 2000 as the baseline for no impacts, this alternative would not exceed the Bureau of Land Management Visual Resource Management Class III or Class IV objectives of the INEEL or the Class I or Class II objectives of adjacent lands.

Continued Current Operations Alternative – Under this alternative, ongoing HLW management activities would continue and there would be two new facilities (see Table 5.2-1). Section 5.2.6, Air Resources, discusses in greater detail emissions associated with on-going HLW management activities at INTEC. Maximum Achievable Control Technology upgrades to the calciner as well as abatement devices on other processing equipment would reduce emissions affecting visibility. These improvements could be partially offset by an increase in visibility related emissions from fuel-burning steam generator equipment, but no perceptible change in the visual resource is expected to occur.

Separations Alternative – This alternative would have the highest number of new facilities (see Table 5.2-1). The dimensions of the new facilities would not significantly exceed the dimensions of the existing facilities. New emissions stacks, if any, are not expected to exceed the height of the existing INTEC main stack.

Stack emissions would result from operation of an offgas treatment process and a Separations Organic Incinerator. These emissions would be limited to the requirements set by their respective permits. Section 5.2.6, Air Resources, discusses emission levels in greater detail. New facilities and emissions resulting from implementation of this alternative would not exceed the Bureau of Land Management Visual Resource Management Class III or Class IV objectives of the INEEL or the Class I or Class II objectives of adjacent lands.

Non-Separations Alternative – This alternative would have the second highest number of new facilities (see Table 5.2-1). The new facilities would not significantly exceed the dimensions of the existing facilities. New emissions stacks, if any, are not expected to exceed the height of the existing INTEC main stack. Stack emissions would result from operation of the waste immobilization plant. These emissions would be limited to the requirements set by their respective permits. Section 5.2.6, Air Resources, discusses emission levels in greater detail. New facilities and emissions resulting from implementation of this alternative would not exceed the Bureau of Land Management Visual Resource Management Class III or Class IV objectives of the INEEL, or the Class I or Class II objectives of adjacent lands.

Minimum INEEL Processing Alternative – This alternative would have approximately the same number of new facilities as the Non-Separations Alternative (see Table 5.2-1). The new facilities would not significantly exceed the dimensions of the existing facilities. New emissions stacks, if any, are not expected to exceed the height of the existing calciner stack. Stack emissions would result from operation of the new facilities. These emissions would be limited to the requirements set by the facility permit. Section 5.2.6, Air Resources, discusses emission levels in greater detail. New facilities and emissions resulting

from implementation of this alternative would not exceed the Bureau of Land Management Visual Resource Management Class III or Class IV objectives of the INEEL, or the Class I or Class II objectives of adjacent lands. In addition, two new facilities could be built within the 200-East Area of the Hanford Site. The dimensions of the new facilities, including stacks, would not exceed the dimensions of the existing 200-East Area facilities.

Direct Vitrification Alternative – ***The Vitrification with Calcine Separations Option would have a number of new facilities similar to the Separations Alternative (see Table 5.2-1). The dimensions of the new facilities would be of the same relative size and scale as the existing facilities. New emission stacks, if any, are not expected to exceed the height of the existing INTEC main stack.***

Under this alternative, stack emissions would result from operations associated with the vitrification facility. These emissions would be limited to the requirements set by their respective permits. Section 5.2.6, Air Resources, discusses emission levels and air impacts in greater detail. New facilities and emissions resulting from implementation of this alternative would not exceed the Bureau of Land Management Visual Resource Management Class III or Class IV objectives of the INEEL or the Class I or Class II visual resource objectives of adjacent lands.

5.2.5 GEOLOGY AND SOILS

This section presents potential impacts to geological resources from implementing the proposed waste processing alternatives described in Chapter 3. Potential impacts were assessed by reviewing project plans for the ***twelve*** proposed options to determine impacts to geologic resources and soils. Potential impacts to the Snake River Plain Aquifer, a unique hydrogeological resource, are discussed in Section 5.2.7. Because the Minimum INEEL Processing ***Alternative*** involves shipment of mixed HLW to the Hanford Site for treatment, possible impacts to geological resources at Hanford were also evaluated (see Appendix C.8). Unless otherwise noted, the discussion of impacts presented in this section specifically applies to INEEL.

Most of the waste processing activities would take place inside the perimeter fence at INTEC, an area that has been dedicated to industrial use for more than 40 years. Table 5.2-1 of Section 5.2.1 lists new facilities that would be built inside and outside of the INTEC perimeter fence and acreage of new areas that would be disturbed. No mineral deposits or unique geologic resources have been found in the INTEC area (see Section 4.6.2); therefore, no impacts are expected to these resources under any of the alternatives. Most of the impacts to soils are expected to be associated with construction activities (e.g., excavating, earthmoving, and grading). Waste management facilities would be designed with safeguards to minimize operational impacts (e.g., spills of toxic substances) to soils. Consequently, no operational impacts are discussed.

Potential seismic activity was discussed in Section 4.6***.3***. Potential impacts to HLW facilities from seismic events and volcanism are evaluated in Section 5.2.14, Facility Accidents, and thus are not discussed further in this section.

5.2.5.1 No Action

Under this alternative, DOE would build a Calcine Retrieval and Transport System to move calcine from bin set 1 to bin set 6 or 7. No other new facilities would be required; therefore, there would be minimal impact to soils and no impact to geologic resources.

5.2.5.2 Continued Current Operations Alternative

Under this alternative, current HLW processing activities would continue, and several INTEC facilities, including the New Waste Calcining Facility, would be upgraded or expanded. DOE would build a Newly Generated Liquid Waste Treatment Facility and a Calcine Retrieval and Transport System to move calcine from bin set 1

to bin set 6 or 7. No other new facilities would be required; therefore, there would be minimal impact to soils and no impact to geologic resources.

5.2.5.3 Separations Alternative

Full Separations Option – Under this option, a number of new waste management and support facilities would be built within the developed portion of INTEC. If low-level waste Class A type grout is disposed of in an onsite land disposal facility, a Low-Activity Waste Disposal Facility would be built ***as described in Section 5.2.1.3.*** Soil would be excavated for new structures extending beneath the ground surface including the Low-Activity Waste Disposal Facility. Because the INTEC area is relatively flat and rainfall in the region is light (annual precipitation averages less than 9 inches), the potential for erosion is small. DOE would employ standard soil conservation measures (e.g., reseeding disturbed areas) in construction areas to limit soil loss and further reduce impacts. This area does not contain any unique geologic resources.

Planning Basis Option – This option is similar to the Full Separations Option, but differs in the way that mixed transuranic waste/SBW is managed and in the way that the low-level waste fraction is disposed of (see Chapter 3). The same new waste processing facilities would be required under this option, but low-level waste Class A type grout would be disposed of offsite at a commercial radioactive waste disposal facility. As noted in the previous section, the potential for erosion is small in the INTEC area because it lies in a flat floodplain in a region that receives limited rainfall.

Transuranic Separations Option – New facilities for this option would include the Transuranic Separations Facility, Class C Grout Plant, New Analytical Laboratory, and the Waste Treatment Pilot Plant. As previously described, a Low-Activity Waste Disposal Facility would be required if the low-level waste fraction is disposed of onsite. This option would have the same potential impacts on geologic resources and soils as described for the Full Separations Option.

5.2.5.4 Non-Separations Alternative

None of the ***four*** options comprising this alternative would require new construction outside of INTEC. Table 5.2-1 of Section 5.2.1 lists new facilities that would be built inside the developed portion of the INTEC under each of the ***four*** Non-Separations Alternative options. There would be some soil excavation for these new facilities, but as noted in ***Section 5.2.5.3***, the potential for erosion is small in the area of the INTEC. No impacts to geologic resources are expected.

5.2.5.5 Minimum INEEL Processing Alternative

Under this alternative, several new facilities would be built ***at*** INTEC to package calcine for shipment to the Hanford Site. If DOE disposes of the vitrified low-level waste fraction (returned from the Hanford Site) in an onsite land disposal facility, a Low-Activity Waste Disposal Facility would be built ***as described in Section 5.2.1.3.*** At the Hanford Site, new Canister Storage Buildings (under the Interim Storage Scenario) and a Calcine Dissolution Facility would be built in the 200-East Area. Soil would be excavated for foundations of buildings at both INTEC and Hanford, but impacts to soils would be small and impacts to geologic resources would not be expected at either site.

5.2.5.6 Direct Vitrification Alternative

Under this alternative, a number of new waste management and support facilities would be built within the developed portion of INTEC (see Table 5.2-1). There would be some soil excavation for these new facilities, but the potential for erosion is small in the area of INTEC. No impacts to geologic resources during construction or operation are expected under the Direct Vitrification Alternative.