cussed below. Options excluded from DOE's Preferred Alternative are, storage of calcine in the bin sets for an indefinite period under the Continued Current Operations Alternative, the shipment of calcine to the Hanford Site for treatment under the Minimum INEEL Processing Alternative, and disposal of mixed low-level waste on the INEEL under any alternative. The selection of any one of, or combination of, technologies or options used to implement the proposed action would be based on performance criteria that include risk, cost, time, and compliance factors. The selection may also be based on the results of laboratory and demonstration scale evaluations and comparisons using actual wastes in proof of process tests.

Proposed Action

- ***Select*** *appropriate technologies and construct facilities necessary to* ***prepare*** *INTEC mixed transuranic waste/SBW* ***for shipment to the Waste Isolation Pilot Plant****.*
- ***Prepare*** *the mixed HLW calcine so that it will be suitable for disposal in a repository.*
- *Treat and dispose of associated radioactive wastes.*
- *Provide safe storage* ***of*** *HLW destined for a repository.*
- *Disposition INTEC HLW management facilities when their missions are completed.*

3.2.2 FACILITY DISPOSITION ALTERNATIVES

The waste processing alternatives and treatment options described in the ***Draft*** EIS do not include disposition options for specific facilities except when they are ***part of treatment and disposal options*** (e.g., disposal of Class A-type or Class C-type low-level waste grout in the Tank Farm and bin sets). The facility disposition alternatives address the final risk component of ***actions DOE could take after waste processing missions are complete***. The facility disposition alternatives are as follows:

- No Action
- Clean Closure
- Performance-Based Closure
- Closure to Landfill Standards
- Performance-Based Closure with Class A Grout Disposal
- Performance-Based Closure with Class C Grout Disposal.

Implementing any of the waste processing alternatives would involve a variety of different facilities ***that will need to be properly closed when missions are complete***. Chapter 5 of the EIS identifies ***any*** major new facilities and ***any*** existing facilities that would be needed for each waste processing alternative, all of which would be closed in accordance with regulatory requirements.

Except for the No Action Alternative, the rest of the facility disposition alternatives can be implemented in accordance with regulatory requirements. Clean Closure and Performance-Based Closure methods are based on how much contamination can be left in the environment. With Clean Closure, contaminated residuals must be at or below background levels; with Performance-Based Closure, residual contaminant levels are based on risk. Closure to Landfill Standards differs from Performance-Based in that design, construction and operation of the landfill is dictated by specified requirements rather than risk calculations that determine how much can be left in the environment. Regulations require that monitoring be conducted to ensure contaminants have not migrated to the environment at levels that exceed established standards.

The general time frame for waste processing actions is through 2035. From 2035 through 2095 (the assumed end of institutional control for the INEEL), DOE would be implementing facility disposition actions, maintaining road-ready waste pending shipment to a repository, and shipping waste. Where there may be post-closure impacts (i.e., to health and safety or ecological resources), the analysis of impacts is

extended for 10,000 years. This time frame is consistent with the period of analysis for long-term impacts in other DOE EISs. It also represents the longest time period for the performance standards in potentially applicable regulations and DOE Orders governing facility disposition activities.

This EIS considers the requirements and constraints on each alternative in order to comply with environmental regulations and agreements. Applicable requirements include those under the Atomic Energy Act, the Nuclear Waste Policy Act, RCRA, CERCLA, a 1992 Notice of Noncompliance Consent Order (plus modifications), and the Settlement Agreement/Consent Order.

3.2.2.1 RCRA Closure of Facilities

The facility disposition analysis considers closure of existing facilities and those facilities that would be constructed for HLW storage, treatment, and disposal. However, because of technological, economic, and health risks, it may not be practical to remove all residual material from the tanks, decontaminate all equipment, and remove all surrounding soils to achieve clean closure. RCRA regulations state that if all contaminated system components, structures, and equipment cannot be adequately decontaminated, then tank systems must be closed in accordance with the closure and post-closure requirements that apply to landfills.

3.2.2.2 CERCLA Coordination

The CERCLA program divides the INEEL into 10 Waste Area Groups. INTEC, where the facility disposition actions would occur under this EIS, is in Waste Area Group 3. Except for the contaminated soils surrounding the Tank Farm, DOE has completed a comprehensive evaluation for the cleanup program at INTEC under the requirements of CERCLA. Under the CERCLA cleanup program, the Federal government and the State of Idaho have made decisions in the Operable Unit 3-13 ROD, which was approved in October 1999, regarding disposition of contaminated soils and other environmental media. While the CERCLA cleanup program is not the subject of this EIS, decisions regarding disposition of HLW facilities have been and will continue to be coordinated with decisions under the CERCLA program.

3.2.2.3 Facility Disposition Identification

DOE used the following systematic process to identify the existing facilities that would be analyzed in detail in this EIS:

1. Performed a complete inventory of all INTEC facilities
2. Identified which of these facilities are considered HLW facilities or could be affected by HLW programs
3. Determined which facility disposition alternatives would be most appropriate for analysis for each facility, based on the potential characteristics of the residual waste

DOE included the Tank Farm and bin sets as part of the analysis of all six facility disposition alternatives, because they would contain the majority of the residual radioactivity and would contribute the most to residual risk. Residual risk would vary with the different facility disposition alternatives.

For purposes of bounding the analysis, DOE assumed that it would use a single facility disposition alternative (i.e., Closure to Landfill Standards) for closure of most other HLW facilities. The residual radioactive or hazardous material associated with these facilities would be much less than that of the Tank Farm and bin sets, and the overall residual risk at the INEEL would not increase substantially due to the contribution from these facilities. For new HLW facilities, DOE analyzed the Clean Closure alternative. This assumption is ***consistent with the objectives and requirements of DOE Order 430.1A, Life Cycle Management, and DOE Manual 435.1-1, Radioactive Waste Management Manual, that all newly constructed facilities necessary to implement the waste processing alternatives would be designed and constructed consistent with measures that facilitate clean closure.***

3.2.2.4 ALTERNATIVE DESCRIPTIONS

NO ACTION ALTERNATIVE

Under the No Action Alternative, DOE would not close its HLW facilities at INTEC. Nevertheless, over the period of analysis ***through*** 2035, many of the facilities could be placed in an industrially safe condition (deactivated). Surveillance and maintenance of HLW facilities would be routinely performed to ensure the safety and health of workers and the public until 2095. For purposes of analysis, DOE assumed that institutional controls to protect human health and the environment would not be in effect after 2095.

CLEAN CLOSURE ALTERNATIVE

Under ***the Clean Closure*** Alternative***, facilities would have*** the hazardous wastes and radiological contaminants, including contaminated equipment, removed from the ***site*** or treated so the hazardous and radiological contaminants ***are*** indistinguishable from background concentrations. Clean Closure may require total dismantlement and removal of facilities. ***This may include removal of all buildings, vaults, tanks, transfer piping, and contaminated soil. This alternative would require a large quantity of soil for backfilling and would also require topsoil for revegetation.*** Use of the facilities (or the facility sites) after Clean Closure would present no risk to workers or the public from hazardous or radiological components.

PERFORMANCE-BASED CLOSURE ALTERNATIVE

Under ***the Performance-Based Closure*** Alternative***, contamination would remain that is below the levels that would impact human health and the environment as established by regulations, and*** closure methods would be ***dictated*** on a case-by-case basis. ***These levels, commonly referred to as action levels, are either risk-based (e.g., residual contaminant levels established by RCRA/CERCLA requirements) or performance-based (e.g., drinking water standards). Once the performance-based levels are achieved, the unit/facility is deemed closed according to RCRA and/or DOE requirements. Other activities may then occur to the unit/facility such as decontamination and decommissioning or future operations (where non-hazardous waste can enter the unit/facility).*** Most above-grade ***facilities/units*** would be ***demolished*** and most below-grade ***facilities/units (tanks, vaults, and transfer piping)*** would be ***stabilized*** and left in place. ***The residual contaminants would no longer pose any unacceptable exposure (or risk) to workers, the public, and the environment***.

CLOSURE TO LANDFILL STANDARDS ALTERNATIVE

Under ***the Closure to Landfill Standards*** Alternative***, the*** facilities would be closed in accordance with state, Federal ***and/or DOE*** requirements for closure of landfills. ***For landfill closures, wastes are removed to the extent practicable. However, quantities remaining would not meet clean closure or performance-based closure action levels. Therefore, there is a greater potential risk from a landfill closure when compared to a Performance-Based or Clean Closure. Because of this, capping and post-closure monitoring would be required to protect the health and safety of the workers and the public from releases of contaminants from the facility. Waste residuals within tanks, vaults, and piping would be stabilized in order to minimize the release of contaminants into the environment. Once waste residues were stabilized, protection of the environment would be ensured*** by installing an engineered cap, establishing a groundwater monitoring system, and providing post-closure monitoring and care of the waste containment system, depending on the type of contaminants, ***to protect the health and safety of the workers and the public from releases of contaminants from the facility/unit in accordance with the closure performance standards. The unit/facility cap requires maintenance and ground water monitoring of the landfill for 30 years (a waiver may be applied for after 5 years). Also, a landfill closure is required to have a Corrective Action Plan that would be implemented in the event any contamination is detected beyond the boundary of the landfill. Implementing a corrective action resets the time for maintenance and monitoring for another 30 years.***

PERFORMANCE-BASED CLOSURE WITH CLASS A GROUT DISPOSAL ALTERNATIVE

This is one of two alternatives that would accommodate the potential use of the Tank Farm and bin sets for disposal of the low-level waste fraction. The facility would be closed as described for the Performance-Based Closure Alternative. Following completion of those activities, the Tank Farm or bin sets would be used to dispose of low-level waste Class A-type grout produced under the Full Separations Option.

PERFORMANCE-BASED CLOSURE WITH CLASS C GROUT DISPOSAL ALTERNATIVE

This alternative would also accommodate the potential use of the Tank Farm and bin sets for disposal of the low-level waste fraction. The facility would be closed as described above for the Performance-Based Closure Alternative. Following completion of those activities, the Tank Farm or bin sets would be used to dispose of low-level waste Class C-type grout produced under the Transuranic Separations Option.

PREFERRED ALTERNATIVE

Both DOE and the State of Idaho have designated performance-based closure methods as the Preferred Alternative for disposition of HLW facilities at INTEC. These methods encompass three of the six facility disposition alternatives analyzed in this EIS: Clean Closure, Performance-Based Closure, and Closure to Landfill Standards. Performance-based closure would be implemented in accordance with applicable regulations and DOE Orders. However, any of the disposition alternatives analyzed in this EIS, not including the No Action Alternative, could be implemented under performance-based closure criteria. Consistent with the objectives and requirements of DOE Order 430.1A, Life Cycle Management, and DOE Manual 435.1-1, Radioactive Waste Management Manual, all newly constructed facilities necessary to implement the waste processing alternatives would be designed and constructed consistent with measures that facilitate clean closure. Therefore, the Preferred Alternative for disposition of new facilities is Clean Closure.

Waste management activities associated with any of the facility disposition alternatives would be carried out over a long period of time. Disposition actions would be implemented incrementally as the facilities associated with the generation, treatment, and storage of high-level and associated wastes approached the completion of their missions. Disposition actions would be systematically planned, documented, executed, and evaluated to ensure public, worker, and environmental protection in accordance with applicable regulations.

4.0 Areas of Uncertainty

This section discusses uncertainties associated with alternatives and options that are outside the scope of this EIS ***and that remain unresolved at the time of Final EIS issuance.*** DOE will appropriately factor these uncertainties into decisions made pursuant to this EIS.

4.1 Waste Acceptance Criteria

The disposal facility operator or regulator determines what materials can be received for disposal by establishing waste acceptance criteria. These criteria define ***parameters such*** as packaging requirements, waste form requirements, acceptable radiation levels, and limits on radionuclide content.

HLW REPOSITORY

DOE has identified preliminary waste acceptance criteria for disposal of HLW at the proposed Yucca Mountain repository. DOE has used these preliminary criteria in the design of its vitrification facilities at the Savannah River Site and the West Valley Demonstration Project. However, until such time as the criteria are

finalized, some uncertainties remain that could affect process design and system operation of the treatment options for INEEL mixed HLW.

TRANSURANIC WASTE FRACTION

Some of the waste processing alternatives and treatment options (e.g., Transuranic Separations Option) would produce transuranic waste for potential disposal in the Waste Isolation Pilot Plant. The transuranic waste that would be produced by processing INTEC ***mixed*** HLW may contain hazardous constituents currently not ***covered*** in the Waste Isolation Pilot Plant ***RCRA Part B permit. In that case***, additional waste codes would need to be included in ***that permit*** before the ***mixed*** transuranic waste fraction would be acceptable for disposal. ***Alternatively, DOE may consider demonstrating through the delisting process that the treated transuranic waste would not pose a hazard to human health or the environment, and therefore no longer merit regulation under RCRA.***

DETERMINATION OF EQUIVALENT TREATMENT

Vitrification is the treatment process currently identified ***by EPA as the best demonstrated available technology*** for mixed HLW that exhibits the RCRA characteristics of corrosivity or toxicity. This process ***incorporates the waste in*** a glass matrix. However, some of the waste processing options evaluated in this EIS ***produce waste forms*** such as ***ceramic*** (hot isostatic pressed), ***cement, and calcine that*** are not vitrification operations. Before these treated waste forms could be disposed of at a HLW repository, DOE would have to obtain a determination of equivalent treatment from the EPA. Such a determination can be granted when it is demonstrated that the proposed treatment will create a waste form that protects human health and the environment, meets applicable treatment standards, and is in compliance with Federal, State, and local requirements. Alternatively, DOE could submit a variance request to EPA, asking to be exempted from the RCRA vitrification standard.

DELISTING

INTEC's mixed HLW calcine and mixed transuranic waste/SBW contain listed hazardous ***wastes*** that are ***regulated*** under RCRA. ***The treated waste forms produced*** under the various alternatives in this EIS would continue to be regulated as mixed wastes under RCRA, ***unless they are delisted or otherwise excluded from the regulatory requirements of RCRA.***

There are uncertainties associated with obtaining a delisting. These include difficulties associated with sampling and analyzing the waste due to its radioactive properties, quality of data for analyses of wastes with very low concentrations of listed hazardous constituents, and availability of data from treatability studies when some treatment technologies lack technical maturity. Sufficient data on the listed waste and the performance of the final waste form will be required to successfully demonstrate that the waste would not harm human health or the environment. Finally, difficulties associated with delisting may increase if states having sites proposed as locations for management of delisted waste are reluctant to allow delisting due to the resulting loss of regulatory control over the waste.

Not knowing whether a delisting petition would be approved for treated mixed HLW introduces another uncertainty. ***Under DOE's current waste acceptance criteria, RCRA-regulated HLW would not be accepted at the proposed geologic repository at Yucca Mountain. For this reason, DOE may consider alternative strategies to delisting, under initiatives such as EPA's Project XL (a program that offers flexibility to develop alternative strategies that replace or modify regulatory requirements, on the condition that they produce greater environmental benefits) or pursue a strategy that would exclude the treated mixed HLW from regulation under RCRA.***

4.2 Waste *Incidental to Reprocessing*

Some waste streams associated with HLW generation, treatment, and storage may be managed as transuranic or low-level waste. DOE Order 435.1, *Radioactive Waste Management*, ***and its associated manual provide criteria and a process, called a waste incidental to reprocessing determination, that DOE will use to determine if waste streams associated with HLW can be managed as transuranic or low-level waste.***

A waste incidental to reprocessing determination is being developed to decide whether the final waste form resulting from treatment of the SBW should be managed and disposed of as transuranic waste. At DOE's request, the Nuclear Regulatory Commission performed a technical review of the draft waste incidental to reprocessing determination before DOE makes its decision, which is anticipated in 2002. Until the outcome of the waste incidental to reprocessing process is complete, uncertainties in final waste classification will remain.

4.3 Technical Maturity of Alternative Treatment Processes

Production scale experience in the operation of mixed HLW treatment processes specific to INTEC waste is ***limited to calcination***. Because of differences in waste characteristics among DOE sites, knowledge gained at one site ***may*** not apply to others. Some proposed mixed HLW treatment processes are only in a preliminary stage of technology development; the viability of others has not been demonstrated beyond the bench scale or pilot stage. ***Thus, there is uncertainty regarding technical viability and implementation.*** Although ***selection*** of any of the mixed HLW treatment technologies will require additional technology development ***and demonstration-scale proof of process before implementation, DOE considers vitrification to be a more mature technology to produce a final waste form than others evaluated in this EIS, requiring considerably less investment in development.***

4.4 *Timeframes*

Under all waste processing and facility disposition alternatives there are some uncertainties related to the timeframes for implementation. These uncertainties include:

- ***the technical maturity of technologies and how much development would be necessary before design and construction could begin***
- ***the possibility that new regulatory requirements may be promulgated, which could introduce delays by affecting the design and cost of selected technologies***
- ***the length of time it will take to get agency approvals for actions such as permits to operate, determinations of equivalency, and delisting petitions***
- ***the availability of a geologic repository for INTEC's HLW, which will determine whether DOE will be able to ship this waste out of Idaho or have to store it indefinitely at the INEEL***
- ***the timely appropriation of funds by Congress so that DOE can implement waste processing and facility disposition decisions***

Each of these uncertainties is addressed in this EIS.

4.5 Costs

Although NEPA ***and the Council on Environmental Quality regulations do*** not require agencies to address costs in an EIS, Federal agencies must identify the considerations, including factors not related to environmental quality, that are likely to be relevant and important to a decision. To support the decision process, ***DOE will take into consideration the costs of implementing the alternatives.***