3.3.9 OTHER TECHNOLOGIES EVALUATED

New technologies and variations of previously studied treatment options were suggested by the public, the National Academy of Sciences, and subject matter experts. These options were evaluated and eventually eliminated from further detailed analysis. Section B.8.3 of Appendix B includes a summary of these technologies and variations, and discusses why they were eliminated from detailed analysis. In addition, operating the calciner in its present interim status configuration was evaluated and eliminated from detailed analysis in the Final EIS. Based on programmatic considerations, DOE has determined that operating the calciner in its current configuration is not a reasonable alternative.

3.4 Preferred Alternatives

When the Draft EIS was published, DOE and the State of Idaho, as a cooperating agency, had not selected a preferred alternative. Subsequently, DOE and the State of Idaho have selected their Preferred Alternatives for this EIS. The process used to select the Preferred Alternatives is described in Appendix B.

3.4.1 WASTE PROCESSING

The State of Idaho's preferred waste processing alternative - The State of Idaho's Preferred Alternative for waste processing is the Direct Vitrification Alternative described in Section 3.1.6. This alternative includes vitrification of mixed transuranic waste/SBW and vitrification of the HLW calcine with or without separations.

Under the option to vitrify the mixed transuranic waste/SBW and calcine without separations, the mixed transuranic waste/SBW would be retrieved from the INTEC Tank Farm and vitrified. Calcine would be retrieved from the bin sets and vitrified. In both cases, the vitrified product would be stored at INTEC pending disposal in a geologic repository.

The option to vitrify the mixed transuranic waste/SBW and vitrify the HLW fraction after calcine separations would be selected if separations were shown to be technically and economically practical. Mixed transuranic waste/SBW would be retrieved from the INTEC Tank Farm and vitrified. Calcine would be retrieved from the bin sets and chemically separated into a HLW fraction and transuranic or low-level waste fractions, depending on the characteristics of the waste fractions. The HLW fraction would be vitrified. The vitrified product from both the SBW and HLW fraction would be stored at INTEC pending disposal in a geologic repository. The transuranic or low-level waste fractions would be disposed of at an appropriate disposal facility outside of Idaho.

In addition, under the Direct Vitrification Alternative, newly generated liquid waste could be vitrified in the same facility as the mixed transuranic waste/SBW, or DOE could construct a separate treatment facility for newly generated liquid waste.

DOE's preferred waste processing alternative - DOE's preferred waste processing alternative is to implement the proposed action by selecting from among the action alternatives, options and technologies analyzed in this EIS. Table 3-1 identifies DOE's preferred options, and also identifies options contained within the action alternatives that DOE does not prefer. Options not included in 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. The elements of the proposed action and how they would be addressed under Preferred Alternative are identified below.

- **Select appropriate technologies and construct facilities necessary to prepare INTEC mixed transuranic waste/SBW for shipment to the Waste Isolation Pilot Plant -** DOE would treat all mixed transuranic waste/SBW stored in the INTEC Tank Farm and ship the product waste to the Waste Isolation Pilot Plant for disposal. A range of potential treatment technologies representative of those that could be used is analyzed in this EIS. The Department's objective is to treat the mixed transuranic waste/SBW such that this waste would be ready for shipment to the Waste Isolation Pilot Plant by December 31, 2012.

- **Prepare the mixed HLW calcine so that it will be suitable for disposal in a repository -** DOE would place all mixed HLW calcine in a form suitable for disposal in a repository. This may include any of the treatment technologies analyzed in this EIS as well as shipment to a repository without treatment as analyzed in this EIS. The Department's objective is to place the mixed HLW calcine in a form such that this waste would be ready for shipment out of Idaho by December 2035.

- **Treat and dispose of associated radioactive wastes -** DOE would treat and dispose of all wastes associated with the treatment and management of HLW and mixed transuranic waste at INTEC. This includes the treatment and disposal of newly generated liquid waste. A range of the potential treatment technologies that could be used is analyzed in this EIS.

- **Provide safe storage of HLW destined for a repository -** DOE would continue to store mixed HLW calcine in the INTEC calcine bin sets until the calcine is retrieved for treatment or placed in containers for shipment to a repository.

3.4.2 FACILITIES DISPOSITION

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 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 mission. Disposition actions would be systematically planned, documented, executed, and evaluated to ensure public, worker, and environmental protection in accordance with applicable regulations. Performance-based closure may result in some residual wastes being retained within the dispositioned facilities. Residual wastes would be reduced to the extent technically and economically practical. Examples of wastes which may not be totally removed include residuals in the HLW Tank Farm storage tanks, wastes remaining following decontamination of systems, equipment and facility interiors, and unrecoverable calcine in the bin sets. These remaining wastes would be immobilized and the sites would be monitored in accordance with applicable requirements of RCRA, the Idaho Hazardous Waste Management Act, and/or DOE requirements.

In addition, in accordance with DOE Order 435.1, *Radioactive Waste Management*, a Composite Analysis would be developed to determine the allowable accumulated risk to be protective for all pathways resulting from the residual contamination that would be eventually disposed of in-place from all the INTEC facilities. For example, the CERCLA Record of Decision for Waste Area Group 3, INTEC, which

has been provided to the public, committed DOE to restoring the existing contaminated groundwater plume outside the INTEC security fence to meet the current drinking water standard of 4 millirem per year.

A performance assessment would be developed for each facility or group of facilities under consideration for disposition, to determine which of the three disposition alternatives would be implemented. The performance assessment results would be used to identify the impact on the limited cumulative risk in the INTEC area resulting from residual contamination from all facilities. For facilities where a performance assessment is not necessary, residual waste left in place would also be used to identify impacts on the limited cumulative risk in the INTEC area. All residual waste volumes and characteristics would be identified and the accumulation of retained risk tracked to ensure protection adequate for potential receptors. Table 3-3 identifies the facility disposition alternatives analyzed in this EIS for existing facilities. Only one disposition alternative would be selected for each facility. Table 3-1 identifies the major facilities that may be constructed to implement the waste processing alternatives. The analysis of disposition impacts of existing facilities and the new facilities for waste processing alternatives is presented in Section 5.3.

3.5 Summary Level Comparison of Impacts

This section ***provides a summary level comparison of*** the potential environmental impacts of implementing each of the alternatives described in Sections 3.1 and 3.2**.** The comparison of impacts is presented to aid the decisionmakers and public in understanding the potential environmental consequences of proceeding with each of the alternatives under consideration.

The following discussion is based on the detailed information presented in Chapter 5, Environmental Consequences. The environmental impact analyses present a reasonable projection of the upper bound for potential environmental consequences. Discussion of the level of conservatism and degree of uncertainty in these analyses is presented in Chapter 5. ***Table 3-2*** summarizes some of the key attributes of the ***alternatives and options. Figure 3-13 compares the timelines for each of the alternatives and options with the legal requirements timeline. Tables 3-4 and 3-5*** summarize the potential impacts of ***each alternative*** for the various environmental disciplines (see Appendix C.10 for more details).

The Minimum INEEL Processing Alternative includes impacts associated with the treatment of mixed HLW calcine at the Hanford Site. These impacts are denoted by the "at Hanford" entries in Table 3-4. This alternative also includes impacts associated with transportation of the calcine from INTEC to Hanford and transportation of the treated waste forms (vitrified mixed HLW and mixed LLW fractions from calcine) from Hanford to INEEL. Under the Full Separations Option and the Vitrification with Calcine Separations Option of the Direct Vitrification Alternative, DOE could elect to treat the separated mixed HLW fraction from calcine either at INTEC or at the Hanford Site. Impacts associated with transportation of the separated mixed HLW fraction to the Hanford Site under these options are provided in Appendix C.5 and Section 5.2.9. The impacts associated with treatment of the separated mixed HLW fraction at Hanford would be similar to those presented for the Minimum INEEL Processing Alternative, which includes both separating and treating the calcine at Hanford.

Key differences between the impacts for the alternatives and options include:

- The type and quantity of product waste varies with the combination of pretreatment (calcination, radionuclide separations) and immobilization (vitrification, cement, ceramic) technologies that are used. The Separations Alternative, the Minimum INEEL Processing Alternative (which includes separations at the Hanford Site), ***and the Vitrification with Calcine Separations Option of the Direct Vitrification Alternative*** would produce the ***fewest*** HLW canisters. The Non-Separations Alternative ***and the Vitrification without Calcine Separations Option of the Direct Vitrification Alternative*** would significantly