2010 if the 2012 deadline were to be met. Delays in obtaining the RCRA permit or some other interruption could also stress an already tight and optimistic schedule.

Figure 3-***4*** illustrates the Planning Basis Option. Although not depicted on the figure, the High-Level Liquid Waste Evaporator, Liquid Effluent Treatment and Disposal Facility, and Process Equipment Waste Evaporator would continue to operate to reduce the volume of mixed transuranic waste/SBW and enable DOE to cease use of the pillar and panel tanks in 2003.

Transportation for this option includes shipping vitrified HLW to a geologic repository and shipping the low-level waste Class A type grout to an offsite facility.

The major facilities and projects required to implement the Planning Basis Option are listed in Appendix C.6, except for transportation projects, which are addressed in Appendix C.5.

3.1.3.3 Transuranic Separations Option

The Transuranic Separations Option would retrieve and dissolve the calcine and would treat the dissolved calcine, the mixed transuranic waste/SBW, and the tank heels flushed out of the tanks with the same process. The process would use a chemical separations facility to remove transuranics from the process stream. The transuranic fraction accounts for most of the long-lived radioactive constituents of HLW and mixed transuranic waste/SBW. The transuranic fraction would then be dried to a powder using a wiped film evaporator or with the addition of a drying additive, then packaged, loaded, and shipped to the Waste Isolation Pilot Plant for disposal.

The process stream remaining after removing the transuranics would be managed as low-level waste. The low-level waste fraction would be solidified in a grouting facility. Because the low-level waste fraction would contain both cesium and strontium components, the concentrations of radioactivity in the grout would be higher than that in the Full Separations Option and would result in its classification as a Class C type low-level waste, suitable for disposal in a near-surface landfill. In addition to the low-level waste fraction from the transuranic separations facility, the grouting facility would receive newly generated liquid waste.

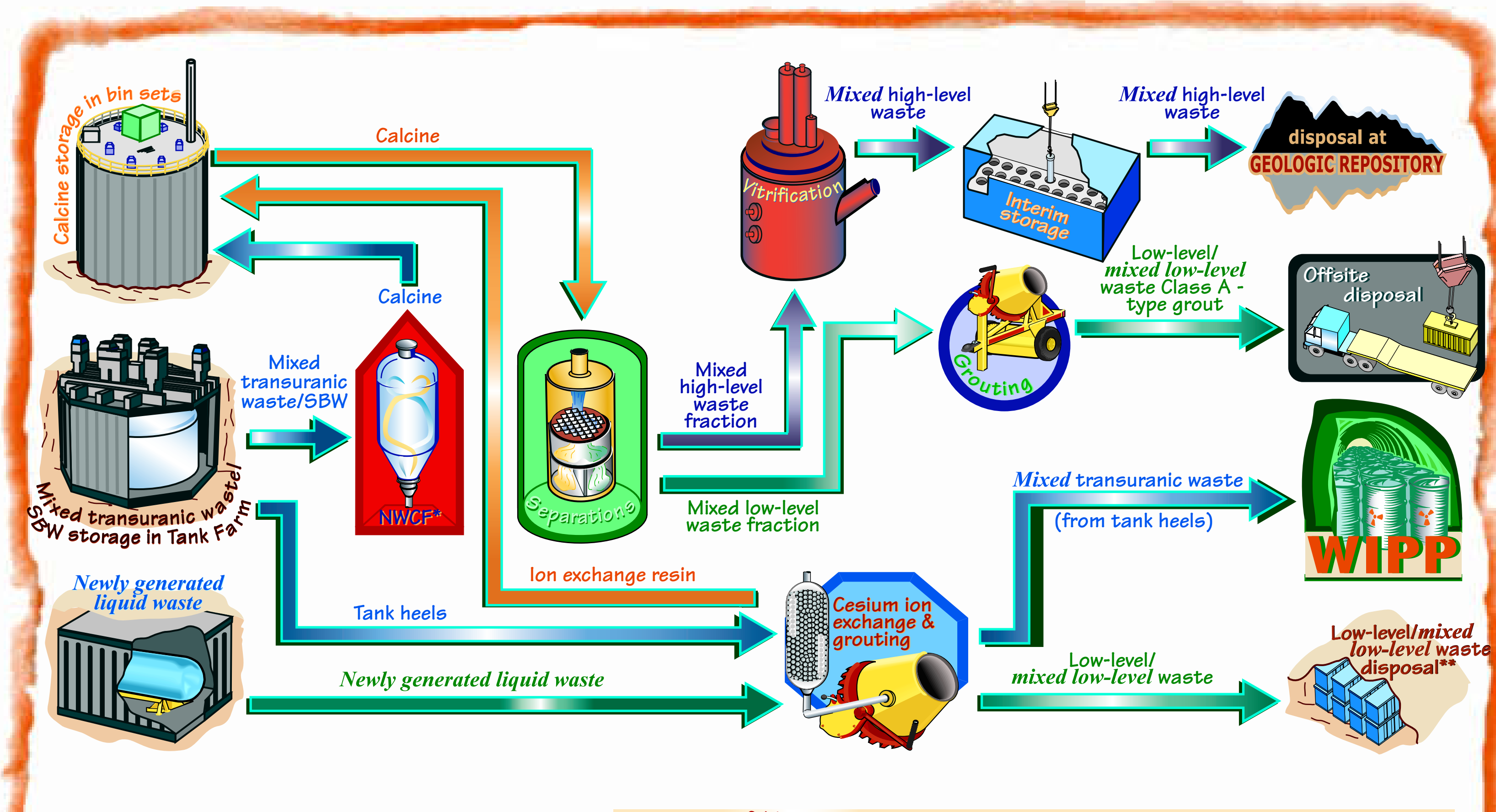
Figure 3-***5*** illustrates some of the details of the Transuranic Separations Option. Although not depicted on the figure, the High-Level Liquid Waste Evaporator, Liquid Effluent Treatment and Disposal Facility, and Process Equipment Waste Evaporator would continue to operate to reduce the volume of liquid mixed transuranic waste/SBW and enable DOE to cease use of the pillar and panel tanks in 2003.

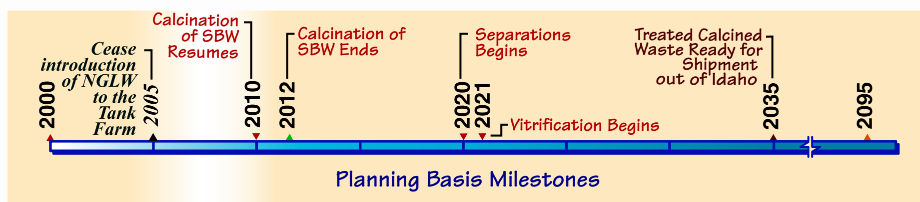
DOE analyzed three potential methods for disposing of the low-level waste Class C type grout: (1) in the empty vessels of the closed Tank Farm and bin sets (see Section 3.2.1); (2) in a new INEEL Low-Activity Waste Disposal Facility; and (3) in an offsite low-level waste disposal facility. For purposes of analysis, this option assumes that the new INEEL Low-Activity Waste Disposal Facility would be located approximately 2,000 feet east of the INTEC Coal-Fired Steam Generating Facility. The actual location would depend on further evaluation. For purposes of the transportation analysis, DOE used the commercial radioactive waste disposal site operated by Chem-Nuclear Systems in Barnwell, South Carolina. The inclusion of this facility in this EIS is for illustrative purposes only.

The major facilities and projects required to implement the Transuranic Separations Option, including the variations in implementation are listed in Appendix C.6, except for transportation projects which are addressed in Appendix C.5.

3.1.4 NON-SEPARATIONS ALTERNATIVE

The Non-Separations Alternative would not separate the waste into high-level and low-level fractions, but would process all the waste by the year 2035 for subsequent shipment to a geologic repository. The ***four*** options considered in the Non-Separations Alternative are: (1) Hot Isostatic Pressed Waste Option, (2) Direct Cement Waste Option, (3) Early Vitrification Option***, and (4) Steam Reforming Option***. ***In the Hot Isostatic Pressed Waste and Direct Cement Waste Options***, all liquid mixed transuranic waste/SBW would be calcined





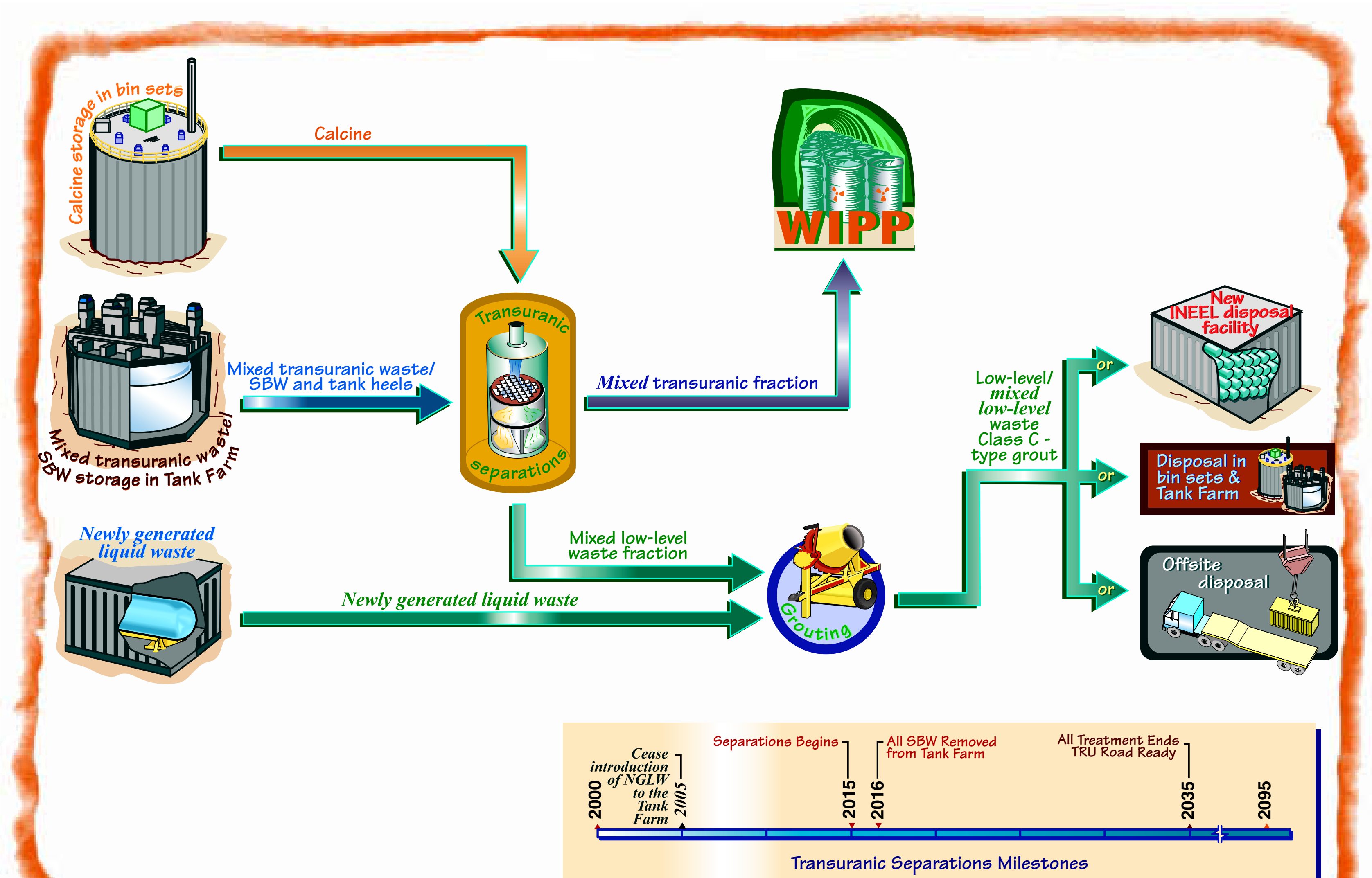
LEGEND

NGLW	Newly generated liquid waste
NWCF	New Waste Calcining Facility
SBW	Mixed transuranic waste/ sodium-bearing waste
WIPP	Waste Isolation Pilot Plant

* Including high-temperature and maximum achievable control technology upgrades.

** Location determined by Waste Management Programmatic EIS decision and may be on or off the INEEL.

FIGURE 3-4.
Planning Basis Option.



LEGEND

NGLW	Newly generated liquid waste
SBW	Mixed transuranic waste/ sodium-bearing waste
WIPP	Waste Isolation Pilot Plant

FIGURE 3-5.
Transuranic Separations Option.

before the end of 2014 in the New Waste Calcining Facility with the high-temperature and Maximum Achievable Control Technology upgrades. In the Early Vitrification Option, the mixed transuranic waste/SBW would be retrieved from the Tank Farm and sent directly to a vitrification facility, bypassing calcination. ***In the Steam Reforming Option, the mixed transuranic waste/SBW would be sent directly to the steam reformer.***

The ***four*** options would use different technologies to treat the INEEL waste to produce an immobilized waste form.

- The Hot Isostatic Pressed Waste Option ***would*** use a treatment method that has been studied at INEEL for several years. Like vitrification, it is a high temperature process. The mixed transuranic waste/SBW would be calcined, then a combination of high temperature and pressure ***would be*** used to immobilize the mixed HLW and mixed transuranic waste calcine. The hot isostatic press technology differs from vitrification in that waste ***would be*** treated in individual containers rather than melted in batches and then containerized and allowed to harden.

- ***In*** the Direct Cement Waste Option, ***the mixed transuranic waste/SBW would be calcined and a*** non-thermal process ***would be used*** to immobilize the mixed HLW and mixed transuranic waste calcine. The calcine ***would be*** blended with additives (i.e., clay, slag, and caustic soda), poured into canisters, and cured. The material ***would*** then ***be*** baked to remove any free water prior to sealing the containers. Although heat ***would be*** used in the curing and water removal processes, the temperatures involved (around 250ºC) ***would be*** much lower than those associated with vitrification or hot isostatic press. The resulting waste form ***would be*** structurally sound but of considerably greater volume than the waste forms produced under the other options.

- The Early Vitrification Option would use the same technology (vitrification) as the Separations Alternative. Rather than separating the mixed HLW calcine and mixed transuranic waste/SBW into high-level and low-level ***waste*** fractions, the two wastes would be treated separately by processing first mixed transuranic waste/SBW and then mixed HLW calcine in a vitrification facility.

- ***In the Steam Reforming Option, all of the existing mixed transuranic waste/SBW would be converted to a solid form using steam reforming. The steam-reformed product would be managed as remote-handled transuranic waste. The mixed HLW calcine would be retrieved from the bin sets and packaged in Savannah River Site-type stainless steel canisters for disposal in a geologic repository.***

The hot isostatic pressed and hydroceramic cemented waste forms ***presumed containerized calcine*** would not meet EPA's treatment standard for disposal of HLW. DOE would have to demonstrate that these technologies produce waste forms with equivalent long-term performance to borosilicate glass vitrification, which is ***approved*** for disposal in a HLW geologic repository. DOE would also need to conduct testing and evaluation to qualify any non-vitrified waste forms under the waste acceptance criteria for a HLW geologic repository (DOE 1996a; 1999).

Except for Steam Reforming, the ***non-separations*** treatment ***processes*** would produce a glass-ceramic, cement, or glass form. ***The steam reforming process would produce a calcine-like waste form, which as with HLW calcine would be containerized.*** The waste would be stored in a road-ready condition at an INEEL storage facility before shipment to a geologic repository. The High-Level Liquid Waste Evaporator, the Liquid Effluent Treatment and Disposal Facility, and the Process Equipment Waste Evaporator would continue to operate to allow the pillar and panel tanks to be taken out of service in 2003. The following sections describe the ***four*** options of the Non-Separations Alternative.

3.1.4.1 Hot Isostatic Pressed Waste Option

Under the Hot Isostatic Pressed Waste Option, all of the existing mixed transuranic waste/SBW stored at the Tank Farm would be calcined by the end of 2014 and added to the blended HLW calcine presently stored in the bin sets. The calcine then would be mixed with amorphous silica and titanium powder and subjected to high temperature and pressure in special cans to form a glass-ceramic product ***with a waste volume reduction of about 50 percent. After cooling, the Hot Isostatic Pressed Waste cans would be loaded into Savannah River Site-type stainless steel canisters, which would be welded closed and placed in an INEEL interim storage facility for*** subsequent disposal in a geologic repository. For the final waste form, this option would require an equivalency determination from the U.S. Environmental Protection Agency as discussed in Section 6.3.2.3.

Figure 3-***6*** illustrates the Hot Isostatic Pressed Waste Option. Beginning in 2015, the mixed transuranic waste (newly generated liquid wastes) would be processed through an ion exchange column, evaporated, and grouted for disposal at INEEL or offsite.

Mercury ***removed directly from the offgas system and treated would be disposed of as mixed low-level waste. Mercury returned to the Tank Farm from the offgas system during operation of the calciner would be treated with*** the tank heels and sent to the Waste Isolation Pilot Plant for disposal.

The major facilities and projects required to implement the Hot Isostatic Pressed Waste Option are listed in Appendix C.6, except for transportation projects, which are addressed in Appendix C.5.

3.1.4.2 Direct Cement Waste Option

Under the Direct Cement Waste Option all of the existing liquid mixed transuranic waste/SBW stored at the Tank Farm would be calcined at the New Waste Calcining Facility by the end of 2014 and added to the mixed HLW calcine presently stored in the bin sets. Beginning in 2015 the calcine would be mixed with ***a grout mixture consisting of*** clay, blast furnace slag, caustic soda, and water and would be poured into Savannah River Site-type stainless-steel canisters. The grout would be cured at elevated temperature and pressure. The cementitious waste form (a hydroceramic) produced under this option requires an equivalency determination from the U.S. Environmental Protection Agency as described in Section 6.3.2.3. Figure 3-*7* ***shows*** the Direct Cement Waste Option.

Beginning in 2015, the mixed transuranic waste (newly generated liquid wastes) would be processed through an ion exchange column, evaporated, and grouted for disposal at INEEL or offsite.

Mercury ***removed directly from the offgas system and treated would be disposed of as mixed low-level waste. Mercury returned to the Tank Farm from the offgas system during operation of the calciner would be treated with*** the tank heels and sent to the Waste Isolation Pilot Plant for disposal.

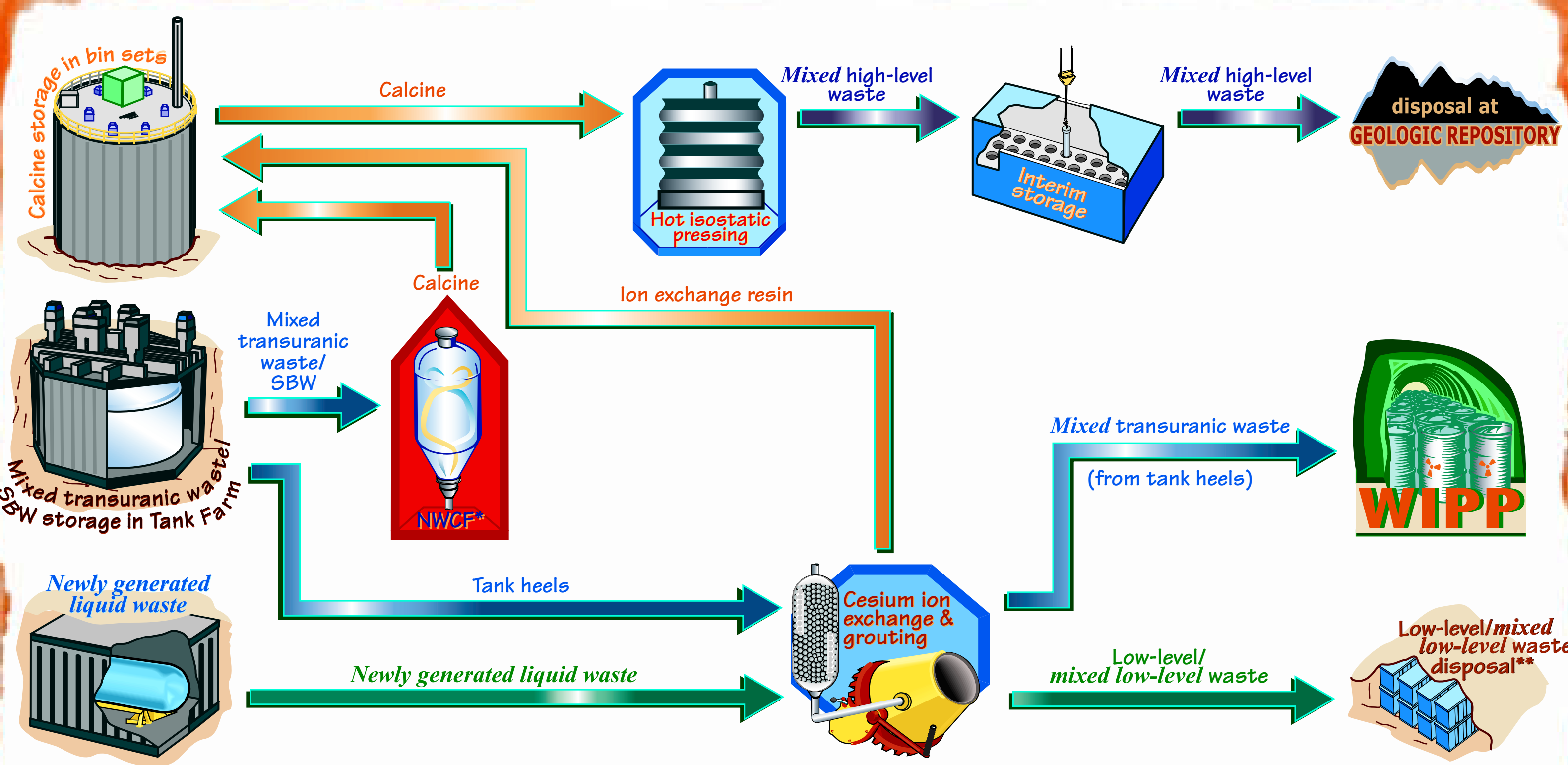
The major facilities and projects necessary to implement the Direct Cement Waste Option are listed in Appendix C.6, except for transportation projects, which are addressed in Appendix C.5.

3.1.4.3 Early Vitrification Option

This option would require the construction of a vitrification facility to process the mixed transuranic waste (SBW, newly generated liquid waste, and tank heels) from the INTEC Tank Farm and the mixed HLW calcine stored in the bin sets into a borosilicate glass suitable for disposal in a geologic repository. The glass produced from vitrifying the waste would be remote-handled ***mixed*** transuranic waste that would be disposed of at the Waste Isolation Pilot Plant. The glass produced from vitrifying the calcine would be classified as HLW that would be disposed of at a geologic repository.

The mixed transuranic waste/SBW and calcine would be treated in separate vitrification operations. The mixed transuranic waste/SBW would be processed from early 2015 through 2016. The waste would be blended with glass frit to form a slurry that would be fed to the melter at the Early Vitrification Facility. Glass would be poured into standard transuranic waste remote-handled containers for disposal at the Waste Isolation Pilot Plant.

The HLW calcine would be processed from 2016 through 2035. ***The calcine would be blended with glass frit and fed to the melter in a dry state.*** Glass from the HLW calcine would be



LEGEND

NGLW	Newly generated liquid waste
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* Including high-temperature and maximum achievable control technology upgrades.

** Location determined by Waste Management Programmatic EIS decision and may be on or off the INEEL.

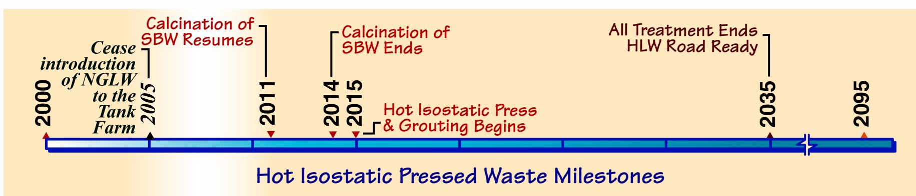

FIGURE 3-6.
Hot Isostatic Pressed Waste Option.

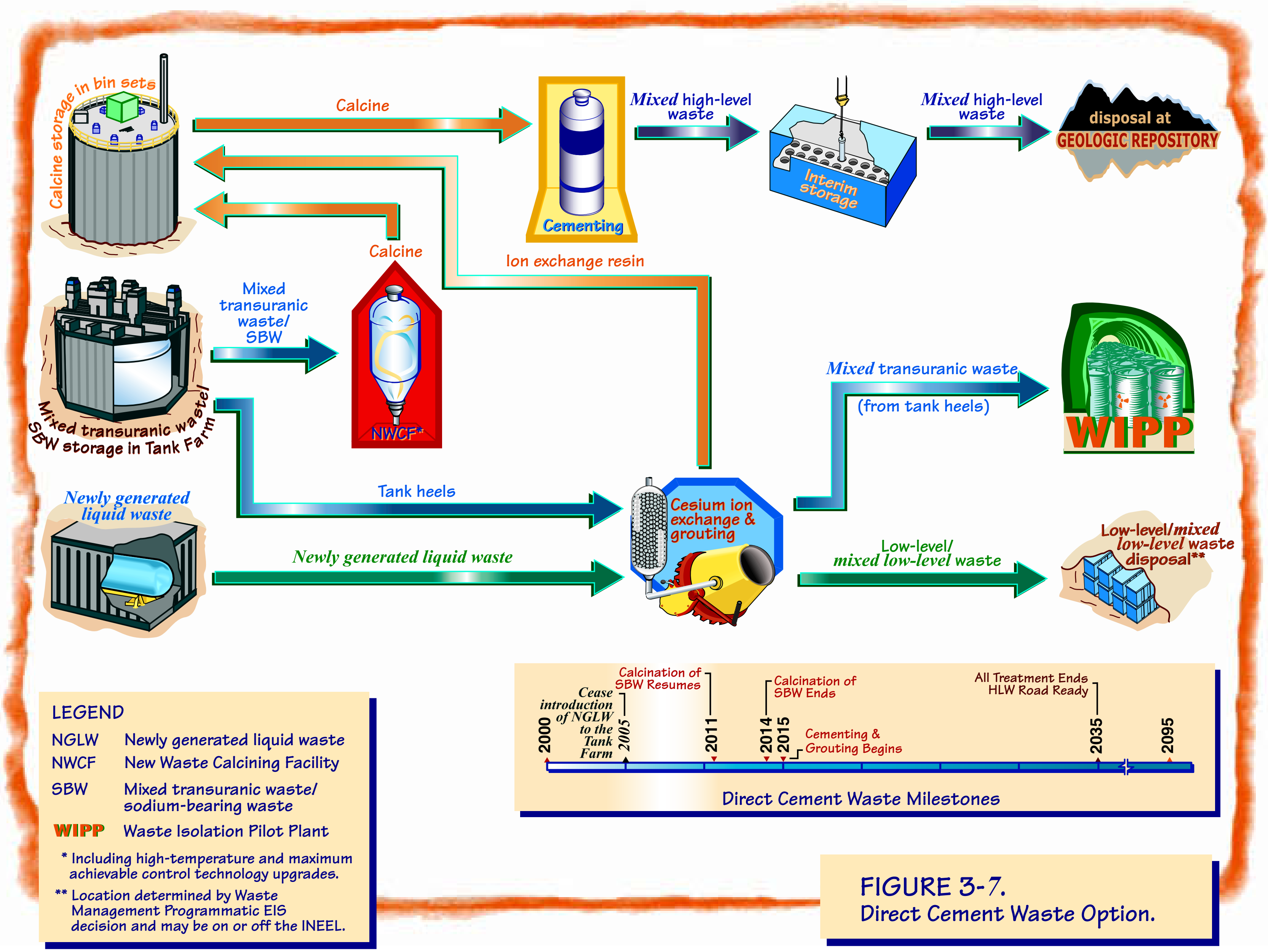

FIGURE 3-7.
Direct Cement Waste Option.

poured into Savannah River Site-type stainless steel canisters. Figure 3-***8 illustrates*** the Early Vitrification Option.

Elemental mercury from the offgas scrubbing system would be amalgamated and packaged for disposal as low-level waste. Soluble mercury (less than 260 mg/kg) from the offgas system would be precipitated, evaporated, and grouted for disposal as low-level waste.

The major facilities and projects required to implement the Early Vitrification Option are listed in Appendix C.6, except for transportation projects, which are addressed in Appendix C.5.

3.1.4.4 Steam Reforming Option

Under the Steam Reforming Option, the mixed transuranic waste/SBW stored in the Tank Farm would be converted to a solid form using steam reforming. The Steam Reforming Option would require approximately two years to process all remaining mixed transuranic waste/SBW after the necessary facilities were constructed. The steam reformed product would be packaged in Savannah River Site-type stainless steel canisters. This material would be managed as remote-handled transuranic waste suitable for disposal at the Waste Isolation Pilot Plant.

The mixed HLW calcine would be retrieved from the bin sets and packaged in Savannah River Site-type stainless steel canisters for disposal in a geologic repository. The retrieval and packaging of HLW calcine would occur from 2016 to 2035 on a "just-in-time" basis to avoid the need for interim storage pending disposal in a geologic repository. This requires an equivalency determination from the U.S. Environmental Protection Agency as described in Section 6.3.2.3.

After September 30, 2005, DOE intends to segregate newly generated liquid waste from the mixed transuranic waste/SBW. The post-2005 newly generated liquid waste could be steam reformed in the same facility as the mixed transuranic waste/SBW or DOE could construct a separate facility to grout the newly generated liquid waste. The steam reformed or grouted waste would be disposed of as low-level or transuranic waste, depending on its characteristics. For purposes of assessing transportation impacts, DOE assumed the grouted waste would be characterized as remote-handled transuranic waste and transported to the Waste Isolation Pilot Plant for disposal.

Figure 3-9 shows the Steam Reforming Option. The steam reforming, calcine retrieval and packaging, and treatment of newly generated liquid waste are not interdependent and could be implemented separately. The major facilities and projects required to implement the Steam Reforming Option are listed in Appendix C.6, except for transportation projects, which are addressed in Appendix C.5.

3.1.5 MINIMUM INEEL PROCESSING ALTERNATIVE

DOE has included analysis of an off-INEEL processing location for HLW in this EIS in order to ensure that a full range of reasonable treatment, storage and transportation alternatives has been considered. Treating INEEL HLW at Hanford (e.g., because of economies of scale, avoiding the cost for two major facilities, etc.) is a reasonable alternative in the context of the National Environmental Policy Act.

The Minimum INEEL Processing Alternative represents the minimum amount of HLW processing at INEEL. Sufficient information is not available for DOE to make a decision on selection of this alternative. This alternative is being evaluated at a programmatic level to help determine whether it is prudent to wait until the alternative can be evaluated in more detail. If treatment at Hanford looks promising, DOE could decide, based on this EIS, to defer decisions on new waste immobilization facilities at INEEL until more information is available.

The Minimum INEEL Processing Alternative could substantially reduce the amount of onsite construction, handling, and processing of HLW at INEEL. The alternative includes transport of HLW calcine to Hanford followed by a return of treated HLW and low-level waste to INEEL for storage and disposal, respectively. It provides an opportunity to evaluate the use of comparable DOE or privatized waste treatment facilities in the region.