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.

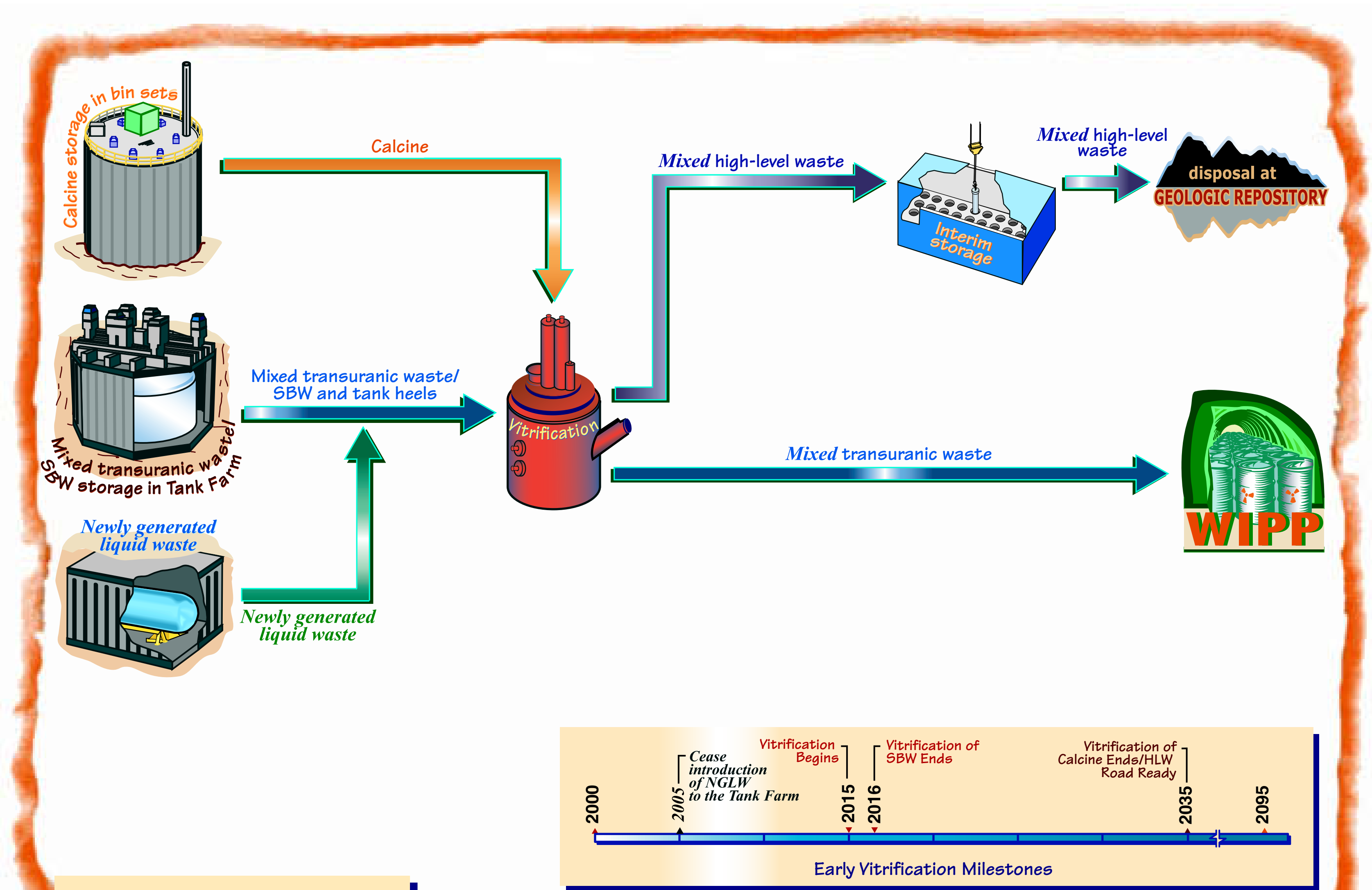
Figure 3-9 shows the Steam Reforming Option. The steam reforming, calcine retrieval and packaging, and treatment of newly generated liquid waste are not interdependent and could be implemented separately. The major facilities and projects required to implement the Steam Reforming Option are listed in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



LEGEND

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

FIGURE 3-8.
Early Vitrification Option.

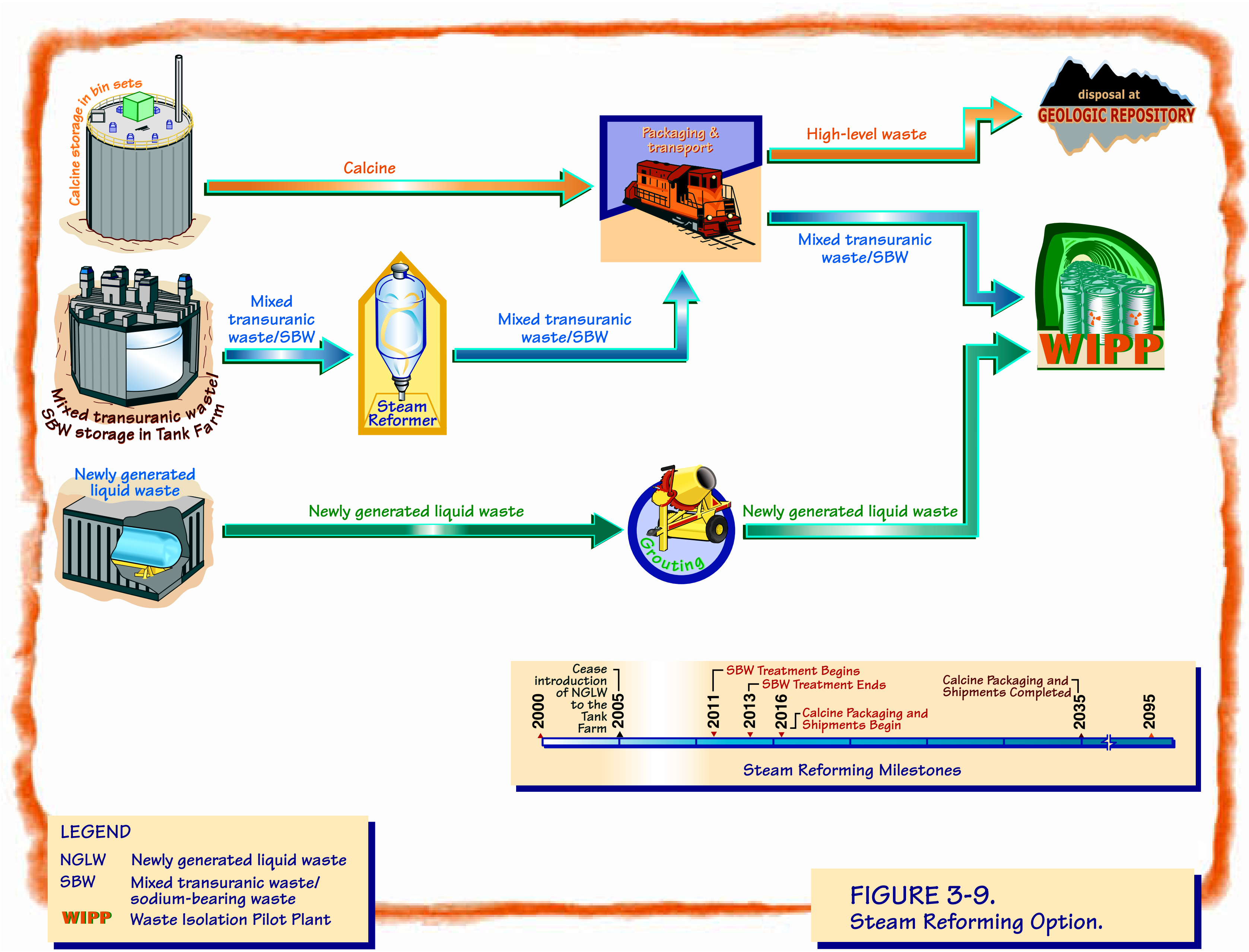


FIGURE 3-9.
Steam Reforming Option.

While the Hanford Site has been identified as a potential location for treatment of INEEL HLW, DOE recognizes that the ability to make an early decision involving processing INEEL HLW at Hanford is limited. The Hanford Site is in the early stages of acquiring facilities to treat and immobilize its HLW. ***A major objective of the Waste Treatment and Immobilization Plant (WTP) is to immobilize 10 percent of the tank waste by volume and 25 percent of the tank waste by radioactivity by 2018. The facility consists of a Pretreatment Plant, a Low Level Waste (LLW) Vitrification Facility, a HLW Vitrification Facility, as well as an analytical laboratory and support facilities. The facilities have been designed to support production of up to 30 metric tons of glass per day of immobilized LLW and 1.5 metric tons of glass per day of immobilized HLW. The Bechtel National, Inc. contract requires that hot commissioning of the facility begin by December 2007 and conclude by January 2011. After hot commissioning is completed, the WTP will then be turned over to an operations contractor in 2011. The Department is continuing to accelerate the project by providing contractor fee incentives to optimize life-cycle performance, cost, and schedule, including the process design, facility design, and technologies.***

Assuming the ***project*** is successful, the facilities could be ***modified to treat*** the INEEL HLW calcine. DOE will be in a better position to analyze the technical feasibility and cost effectiveness of processing INEEL HLW calcine in Hanford facilities after the Hanford ***process has*** operating experience.

Even if processing of INEEL HLW at the Hanford Site were feasible, DOE would have to consider the potential regulatory implications and any impacts to DOE commitments regarding completion of Hanford tank waste processing. If DOE decides to pursue the Minimum INEEL Processing Alternative, additional National Environmental Policy Act documentation would be prepared in due course on alternatives associated with treatment of INEEL HLW calcine at the Hanford Site.

Under this alternative, DOE could retrieve and transport the HLW calcine to a packaging facility, where it would be placed into shipping containers. The containers would then be shipped to DOE's Hanford Site in Richland, Washington, where the HLW calcine would be separated into high-activity and low-activity fractions. Each fraction would be vitrified.

For purposes of analysis, DOE assumes the vitrified HLW and low-level waste ***would be*** returned to INEEL. (Alternatively, the vitrified wastes could be shipped directly to appropriate offsite facilities rather than returning to INEEL.) The vitrified HLW would be stored in a road-ready condition until transported to a geologic repository. The vitrified low-level waste would be disposed of in an INEEL facility or shipped to an offsite low-level waste disposal facility. Operation of subsidiary waste treatment facilities is the same as discussed in Section 3.2.1.

The mixed transuranic waste (SBW, newly generated liquid waste, and tank heels) would be retrieved, filtered, and transported to a treatment facility, where it would be processed through an ion exchange column to remove cesium. The loaded ion exchange resin would be temporarily stored at INEEL, dried and containerized, and transported to the Hanford Site for vitrification. After cesium removal, the ***mixed transuranic*** waste would be fed to a grouting process. The grout would be packaged in 55-gallon drums and transported to the Waste Isolation Pilot Plant for disposal as contact-handled transuranic waste. As discussed in Section 3.3.6, DOE does not currently consider shipment of mixed transuranic waste (SBW or newly generated liquid waste) to the Hanford Site for treatment to be a reasonable alternative.

There are two scenarios for shipping INEEL's HLW calcine to the Hanford Site. The first scenario is to ship the calcine to the Hanford Site on a just-in-time basis, over a three-year period starting in 2028 (or later). The calcine would be shipped to the Hanford Site at the rate it can be introduced directly to the treatment process, so that construction of canister storage buildings would not be necessary. A second scenario is to ship calcine during the years 2012 through 2025, which would require the Hanford Site to build up to three canister storage buildings for interim storage of the INEEL HLW calcine prior to treatment. Chapter 5 presents the environmental consequences at INEEL and Hanford of these scenarios, including transportation.

In Section 3.1.3.1, DOE describes three methods for disposing of the grouted low-level waste fraction: (1) in a new INEEL Low-Activity Waste Disposal Facility; (2) in an offsite low-level waste disposal facility; and (3) in the Tank Farm and bin sets. The vitrified low-level waste fraction returned from Hanford would not be suitable for disposal in the Tank Farm and bin sets. Therefore, only the remaining two disposal methods are analyzed for the Minimum INEEL Processing Alternative.

Figure 3-1***0*** shows the Minimum INEEL Processing Alternative. The major facilities and projects required to implement the Minimum INEEL Processing Alternative are listed in Appendix C.6, except for the transportation projects, which are addressed in Appendix C.5. Appendix C.8 describes the Hanford Site and the activities that would be performed there treating INEEL waste.

3.1.6 DIRECT VITRIFICATION ALTERNATIVE

The Direct Vitrification Alternative is to vitrify the mixed transuranic waste/SBW and vitrify the calcine with or without separations. In addition, newly generated liquid waste could be vitrified in the same facility as the mixed transuranic waste/SBW or DOE could construct a separate facility to grout the newly generated liquid waste. DOE has identified two options for vitrification.

The option to vitrify the mixed transuranic waste/SBW and calcine without separations would be similar to the Early Vitrification Option. Mixed transuranic waste/SBW would be retrieved from the INTEC Tank Farm and vitrified. Calcine would be retrieved from the bin sets, vitrified, and interim stored pending disposal in a geologic repository.

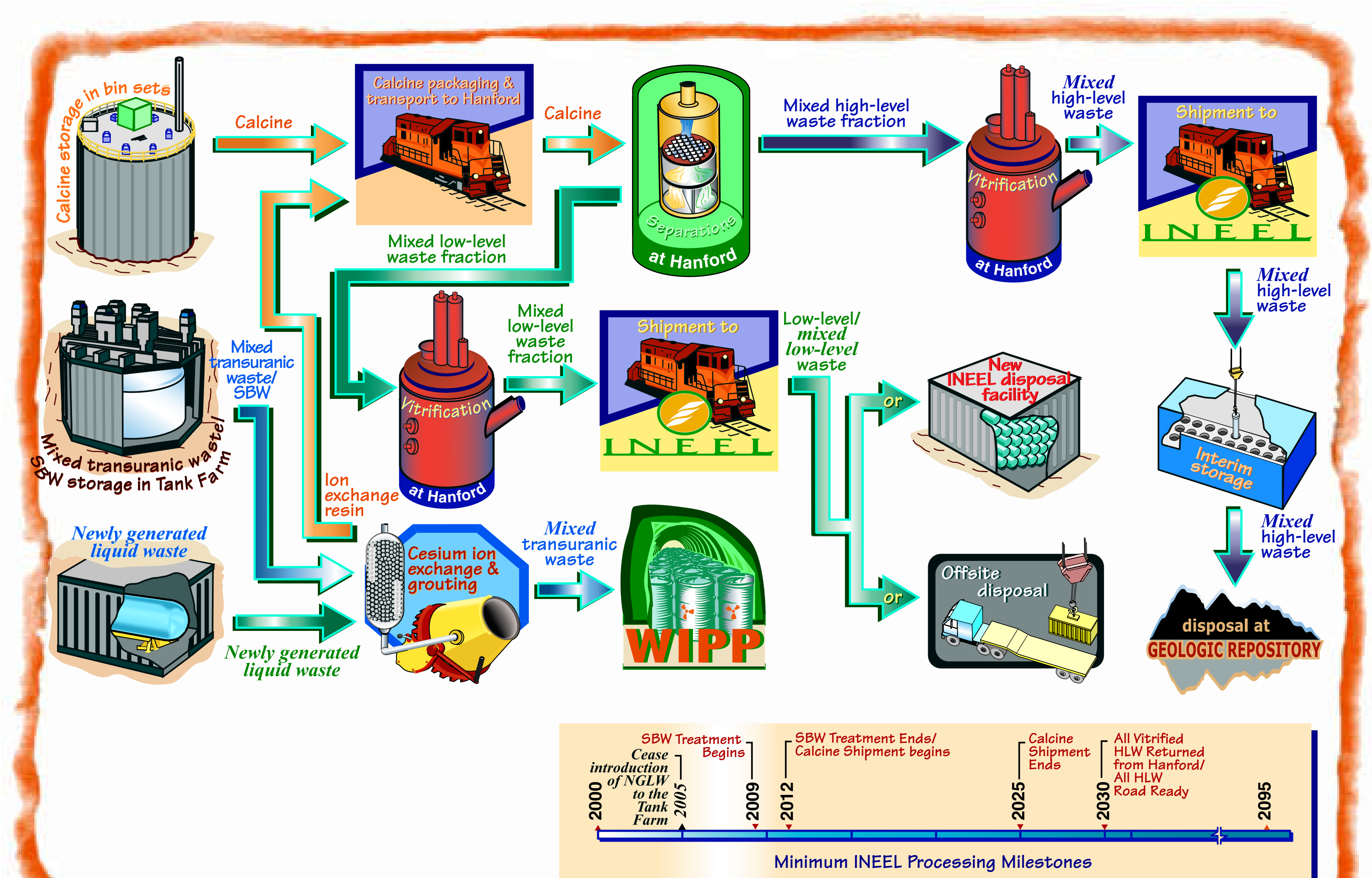
The option to vitrify the mixed transuranic waste/SBW and vitrify the HLW fraction after calcine separations would be similar to the Full Separations Option and would be selected if it were technically and economically practical. Mixed transuranic waste/SBW would be retrieved from the INTEC Tank Farm and vitrified. The calcine would be retrieved and chemically separated into a HLW fraction and transuranic or low-level waste fractions depending on the characteristics. The HLW fraction would be vitrified and interim stored pending disposal in a geologic repository. The transuranic or low-level waste fractions would be disposed of at an appropriate disposal facility.

The waste vitrification facility would be designed, constructed, and operated to treat the mixed transuranic waste/SBW and the calcine. The vitrified glass waste form would be poured into stainless steel canisters for transport and disposal out of Idaho. Although the EIS assumes that treatment of the mixed transuranic waste/SBW under this alternative would not be completed until 2015, it may be possible to either complete treatment or transfer any remaining waste to RCRA-compliant tanks by December 2012 in order to meet the Notice of Noncompliance Consent Order requirement to cease use of the HLW tanks by that date. If it is technically and economically practical, chemical separations would be integrated into the INTEC vitrification facility for the treatment of calcine.

Figure 3-11 shows the Vitrification without Calcine Separations Option under the Direct Vitrification Alternative. Figure 3-12 shows the Vitrification with Calcine Separations Option under this alternative. The major facilities and projects required to implement the Direct Vitrification Alternative are listed in Appendix C.6, except for transportation projects, which are addressed in Appendix C.5.

3.1.6.1 <u>Mixed Transuranic Waste/ SBW Treatment</u>

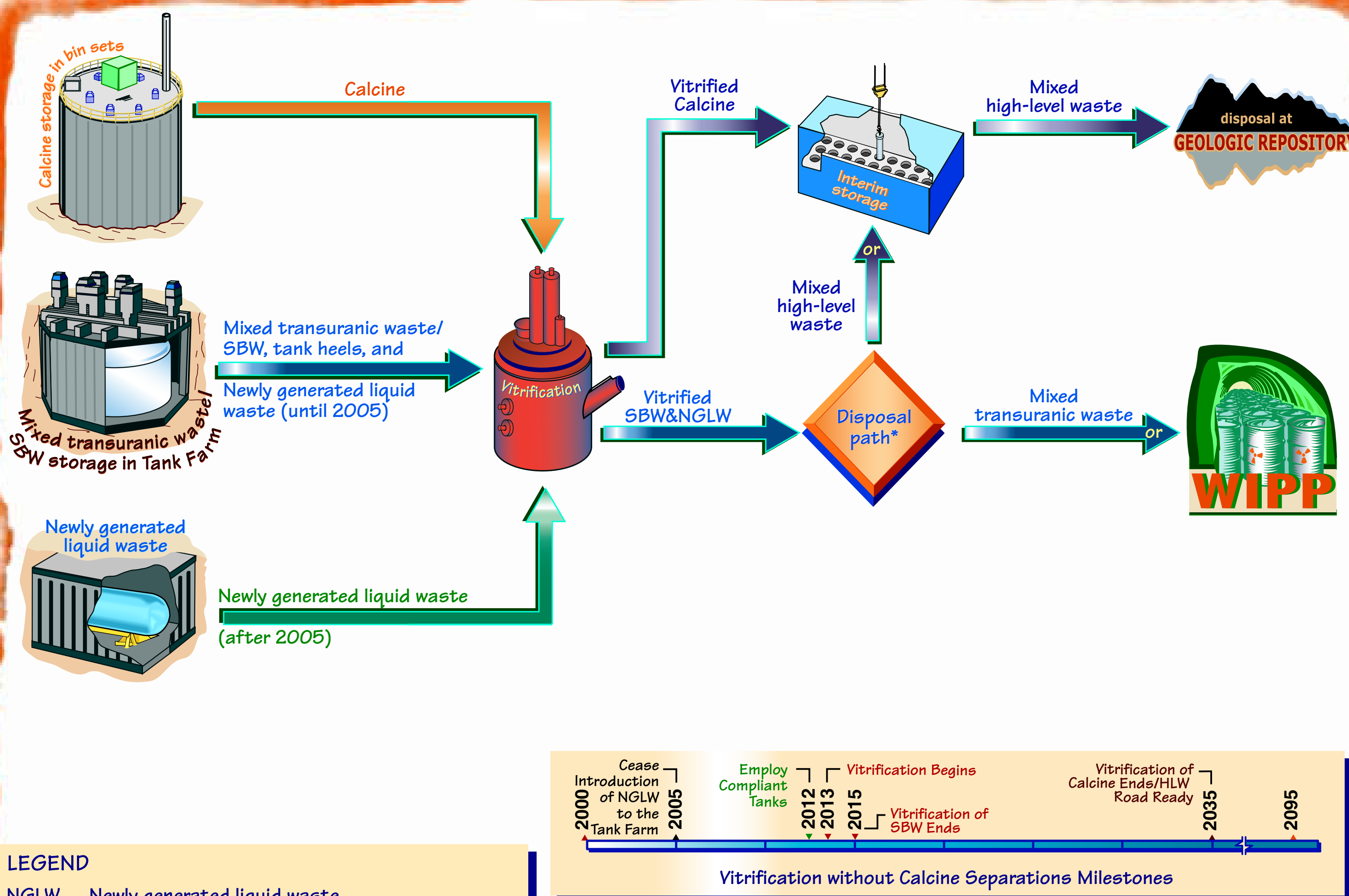
A program would be implemented to determine the specific vitrification technology to be used and would result in the design and construction of a facility with module(s) or unit(s) sized to treat the mixed transuranic waste/SBW and removable tank heels. DOE would cease use of the 11 tanks that comprise the INTEC Tank Farm by December 31, 2012. All mixed transuranic waste/SBW would be vitrified and placed in a road-ready form suitable for transport out of Idaho by a target date of 2035. This would satisfy the Notice of Noncompliance Consent Order (modified on August 18, 1998)



LEGEND

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

FIGURE 3-10.
Minimum INEEL Processing Alternative.



LEGEND

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

* Disposal path based on Waste Incidental to Reprocessing Determination.

FIGURE 3-11.
Vitrification without Calcine Separations Option.

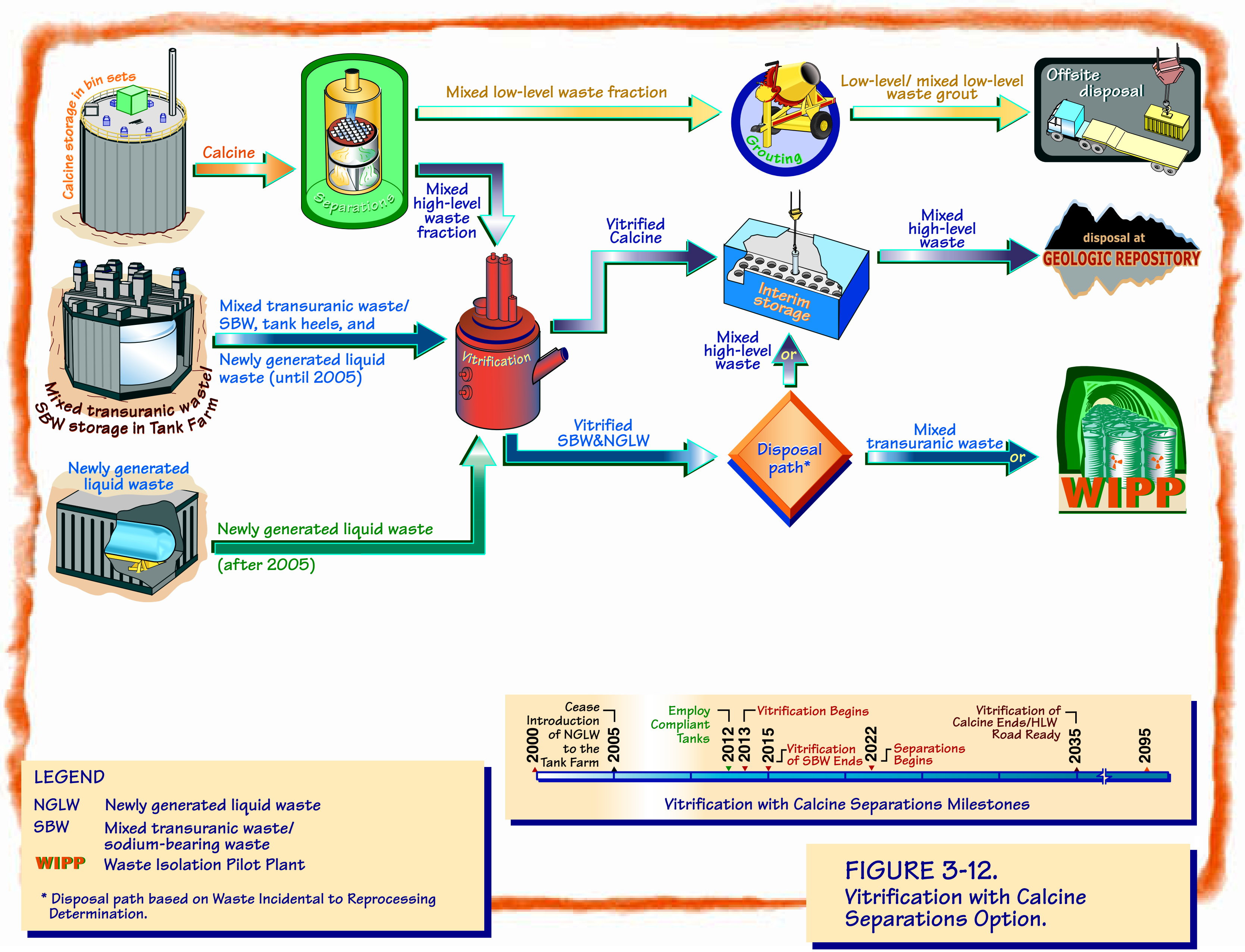


FIGURE 3-12.
Vitrification with Calcine Separations Option.

and comply with requirements of the Settlement Agreement/Consent Order.

If the waste incidental to reprocessing determination results in a decision to treat and dispose of the SBW as transuranic waste, DOE would vitrify the waste and transport it to the Waste Isolation Pilot Plant. However, if the waste incidental to reprocessing determination results in a decision to treat, store, and dispose of the SBW as HLW, then DOE would vitrify the waste and dispose of it in a geologic repository. If a repository is not immediately available, the treated HLW would be stored at INTEC in an interim storage facility until a repository was available. Chapter 5 presents the impacts associated with interim storage and transportation of the treated SBW for both possible outcomes of the waste incidental to reprocessing determination.

3.1.6.2 Calcine Treatment

The Direct Vitrification Alternative for calcine treatment is to retrieve the calcine presently stored in the six bin sets at INTEC, vitrify it, and place it in a form to enable compliance with the current legal requirement to have HLW road ready by a target date of 2035. Concurrent with the program to design, construct, and operate the vitrification facility for mixed transuranic waste/SBW, DOE would initiate a program to characterize the calcine, and develop methods to construct and install the necessary equipment to retrieve calcine from the bin sets. DOE would focus technology development on the feasibility and benefits of performing calcine separations as well as refine cost and engineering design. Conditioned on the outcome of future technology development and resulting treatment decisions, DOE may design and construct the appropriate calcine separations capability at INEEL.

For calcine vitrification at INEEL, the mixed transuranic waste/SBW vitrification facility could be scaled-up by a new modular addition or modification of unit(s) to accommodate calcine treatment. The size of the vitrification facility would depend on whether the entire inventory of calcine or only a separated mixed HLW fraction would need to be vitrified. Vitrified calcine or any vitrified mixed HLW fraction resulting from calcine separations would be stored in an interim storage facility to be constructed at INTEC pending transport to a storage facility or national geologic repository outside of Idaho. Alternatively, if calcine were separated at INEEL, DOE could decide to send the HLW fraction to Hanford for vitrification. DOE would evaluate the advantages of this option as the Hanford vitrification facility is being developed (see Appendix C.8 and Section 3.1.5).

If separations technologies are used, DOE would make a waste incidental to reprocessing determination under DOE Order 435.1 and Manual 435.1-1 to determine if the non-HLW fractions would be managed as transuranic waste or low-level waste. If it were determined that a waste fraction was transuranic, then it would be treated, containerized, and shipped to the Waste Isolation Pilot Plant. Low-level or mixed low-level waste fractions would be packaged and disposed of at licensed commercial facilities or at the Hanford Site or Nevada Test Site in accordance with the DOE's Record of Decision for the Final Waste Management Programmatic EIS (65 FR 10061, February 25, 2000). For purposes of the transportation analysis, DOE used the commercial radioactive waste disposal site operated by Envirocare of Utah, Inc., located 80 miles west of Salt Lake City.

3.1.6.3 Newly Generated Liquid Waste Treatment

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 vitrified 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 vitrified or grouted waste would be packaged and disposed of as low-level or transuranic waste, depending on its characteristics.

Under this alternative, DOE analyzed impacts of treating newly generated liquid waste as mixed transuranic waste/SBW (by vitrification). This was done for comparability of impacts with the other waste processing alternatives, which assumed newly generated liquid waste would be treated in the same manner as the mixed