nition of a Class A low-level waste. Under ***the Planning Basis*** Option, DOE would dispose of the Class A-type grout in an offsite low-level waste disposal facility.

- Tank heels would be flushed out of the ***Tank Farm*** tanks, dried ***in a new facility***, packaged, and sent to the Waste Isolation Pilot Plant for disposal.

Under this option DOE ***would be able*** to cease use of the Tank Farm by ***December 31***, 2012 ***(using an accelerated schedule)*** or 2014 and ***would be able*** to make its mixed HLW ready for shipment to a storage facility or repository outside of Idaho by a target date of 2035.

Transuranic Separations Option

There would be no ***mixed*** HLW after ***separations*** under this option (Figure ***S-6***). Rather, the resulting ***fractions*** would be managed as ***mixed*** transuranic waste ***and mixed low-level waste***. Under this option:

- DOE would retrieve the calcine and mixed transuranic waste/SBW ***and treat the waste in*** a new chemical separations facility. The process would remove transuranics, resulting in ***a mixed*** transuranic ***waste fraction*** and ***remaining mixed*** low-level waste fraction.

- The ***mixed*** transuranic ***waste*** fraction would be solidified, packaged, and shipped to the Waste Isolation Pilot Plant for disposal.

- The mixed low-level waste fraction would be solidified in a new grouting facility along with newly generated liquid waste. Because the mixed low-level waste fraction would contain both cesium and strontium, 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.

- DOE would dispose of the Class C-type grout in the empty vessels of the closed Tank Farm and bin sets, in a new INEEL low-level waste disposal facility, or at an offsite ***DOE or commercial*** Class C disposal facility.

Implementing this option would enable DOE to cease use of the Tank Farm by 2016 and make the ***mixed*** transuranic waste fraction ready for shipment to the Waste Isolation Pilot Plant by a target date of 2035.

NON-SEPARATIONS ALTERNATIVE

The Non-Separations Alternative ***includes four options for solidifying*** mixed HLW and mixed transuranic waste/SBW. ***These four*** treatment options ***are***:

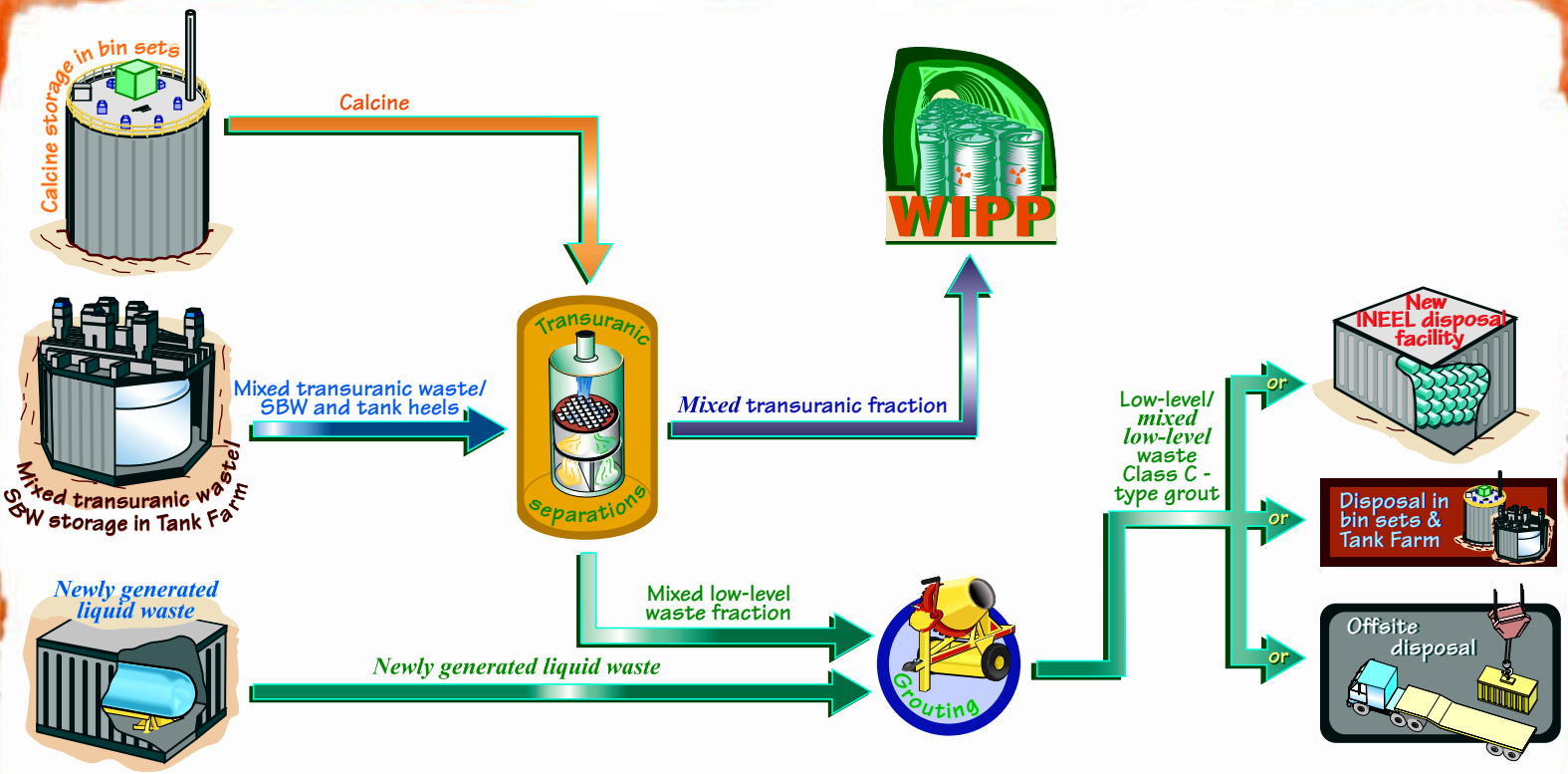
- Hot Isostatic Pressed Waste Option
- Direct Cement Waste Option
- Early Vitrification Option
- ***Steam Reforming Option***

In the Hot Isostatic Pressed Waste Option and Direct Cement Waste Option, all the liquid mixed transuranic waste/SBW would be removed from the Tank Farm and calcined in the New Waste Calcining Facility calciner following high-temperature and Maximum Achievable Control Technology upgrades. In the Early Vitrification Option ***and Steam Reforming Option***, the mixed transuranic waste/SBW would be retrieved from the Tank Farm and sent directly to a ***treatment*** facility, bypassing calcination.

Hot Isostatic Pressed Waste Option

This option (Figure ***S-7***) would calcine the liquid mixed transuranic waste/SBW and add the calcine to the mixed HLW calcine. All ***of the*** calcine would then be ***treated in a high pressure, high temperature process that would convert the calcine*** to an impervious, non-leaching, glass-ceramic waste form. ***This process has the capability to reduce*** waste ***volumes by*** about 50 percent. Under this option:

- ***After*** receipt of a RCRA permit from the State and upgrades to air emission controls



LEGEND

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

FIGURE S-6.
Transuranic Separations Option.

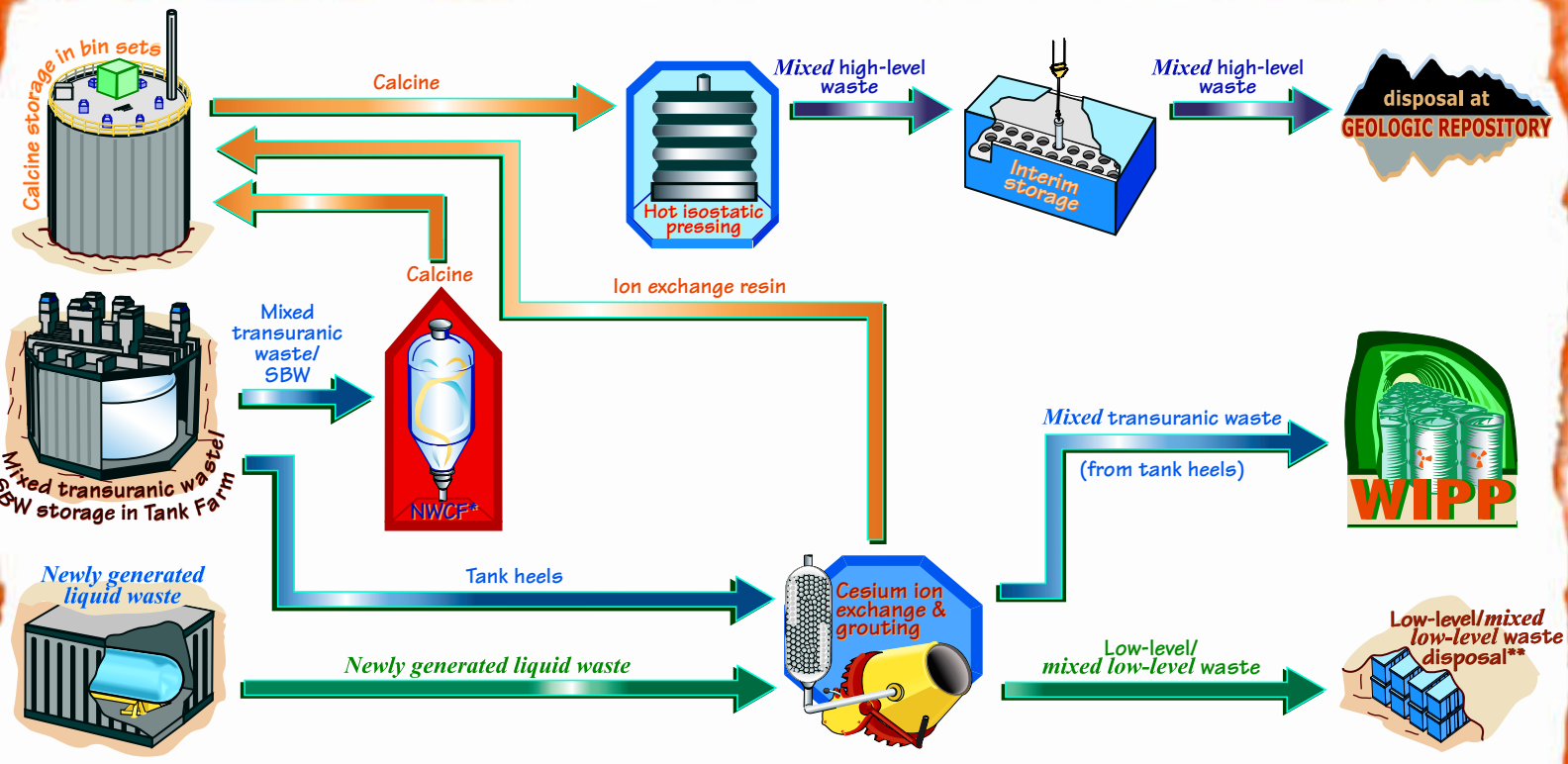


FIGURE S-7.
Hot Isostatic Pressed Waste Option.

required by EPA, the calciner would operate from 2011 through 2014 to calcine the remaining liquid mixed transuranic waste/SBW, which would be stored in the bin sets. After 2014, the calciner would operate as needed until the end of 2016 ***to treat newly generated liquid waste.***

- The calcine would be retrieved from the bin sets, blended with silica and titanium powder, ***added to special cans,*** and subjected to high temperature and pressure in ***a hot isostatic press*** to form a glass-ceramic product.

- The final product would be packaged in canisters for storage and subsequent disposal in a ***HLW*** repository.

- Before 2015, newly generated liquid waste would be concentrated, the effluents stored in new ***RCRA-compliant*** tanks, and then calcined with the mixed transuranic waste/SBW in the New Waste Calcining Facility. Starting in 2015, newly generated liquid waste would be processed through ***a cesium*** ion-exchange column, evaporated, and grouted as ***mixed low-level waste or*** low-level waste for disposal at the INEEL or offsite.

- Tank heels would be flushed out of the ***Tank Farm*** tanks, dried ***in a new facility***, packaged, and sent to the Waste Isolation Pilot Plant for disposal.

This option would require a determination of equivalent treatment from EPA ***since in this case the final waste form (glass ceramic) is not currently an approved RCRA treatment process for HLW exhibiting the hazardous characteristics of corrosivity and toxicity for certain metals*** (as discussed in ***Section 6.2.5*** of the EIS). ***Under this option,*** DOE ***would be able*** to cease use of the Tank Farm by 2014 and make mixed HLW ready for shipment to a storage facility or repository outside of Idaho by a target date of 2035.

Direct Cement Waste Option

This option (Figure ***S-8***) would involve calcining the liquid mixed transuranic waste/SBW and adding the calcine to the mixed HLW calcine. All calcine would be converted to a cement-like solid. Under this option:

- ***After*** receipt of a RCRA permit from the State and upgrades to air emission controls required by EPA, the ***calciner*** would operate from 2011 through 2014 to calcine the remaining ***liquid*** mixed transuranic waste/SBW, which would be stored in the bin sets. After 2014, the calciner would operate as needed until the end of 2016 ***to treat newly generated liquid waste***.

- The calcine would be retrieved and blended with clay, blast furnace slag, caustic soda, and water and the resulting grout would be poured into stainless-steel canisters. The grout would be cured at elevated temperature and pressure.

- ***The final product would be packaged in canisters for storage and subsequent disposal in a HLW repository.***

- Before 2015, newly generated liquid waste would be concentrated, the effluents stored in new ***RCRA-compliant*** tanks, and then calcined with the mixed transuranic waste/SBW in the New Waste Calcining Facility. Starting in 2015, newly generated liquid waste would be processed through ***a cesium*** ion-exchange column, evaporated and grouted as ***mixed low-level waste or*** low-level waste ***for disposal*** at the INEEL or offsite.

- Tank heels would be flushed out of the ***Tank Farm*** tanks, dried ***in a new facility***, packaged, and sent to the Waste Isolation Pilot Plant for disposal.

This option would require a determination of equivalent treatment from EPA ***since in this case the final waste form (cement) is not currently an approved RCRA treatment process for HLW exhibiting the hazardous characteristics of corrosivity and toxicity for certain metals*** (as discussed in ***Section 6.2.5*** of the EIS). ***Under this option,*** DOE ***would be able*** to cease use of the Tank Farm by 2014 and make mixed HLW ready for shipment to a storage facility or repository outside of Idaho by a target date of 2035.

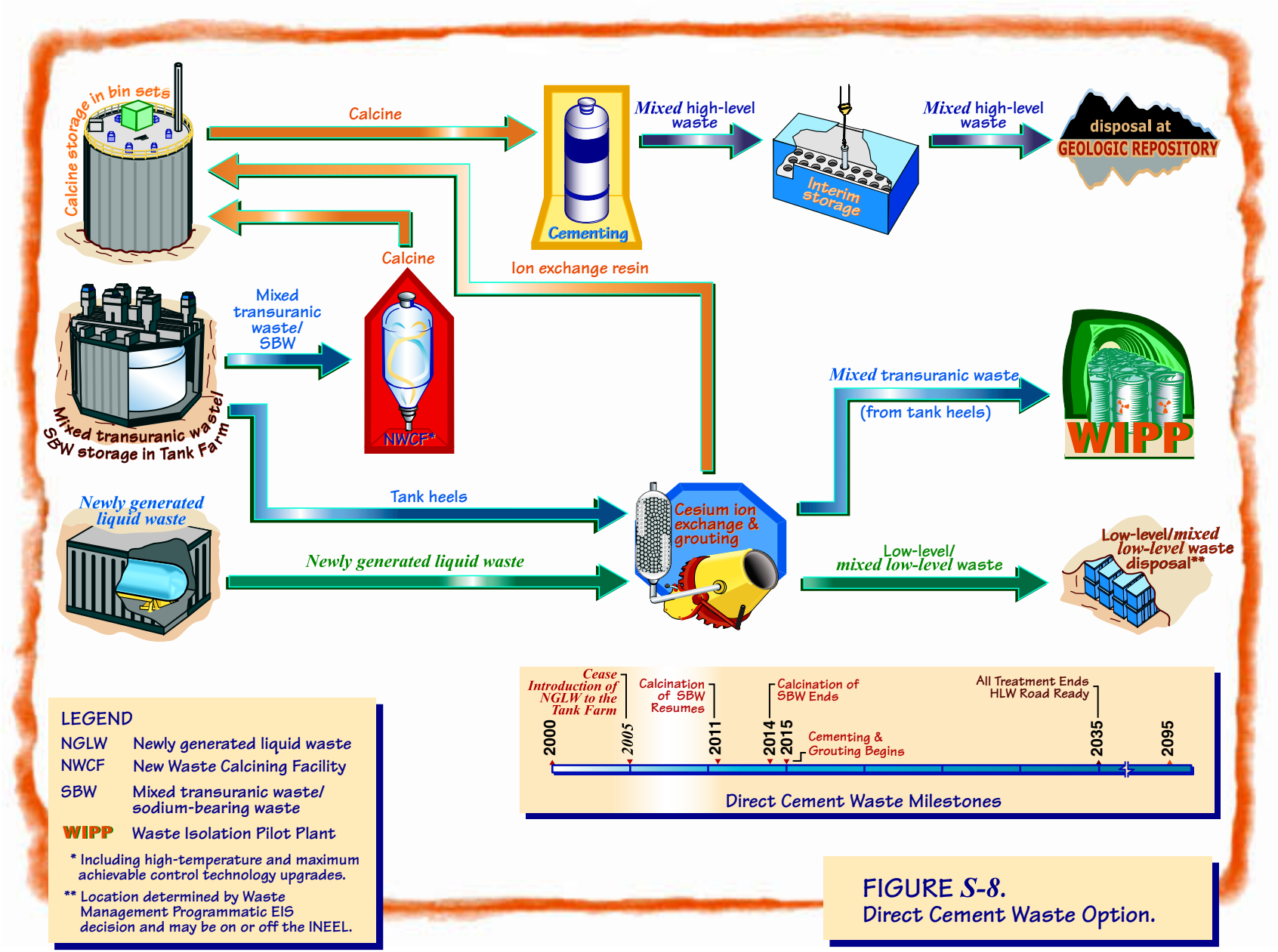


FIGURE S-8.
Direct Cement Waste Option.

Early Vitrification Option

This option (Figure ***S-9***) would involve vitrifying both the mixed HLW calcine and the mixed transuranic waste/SBW into a nonleaching, glass-like solid. Under this option:

- DOE would construct a vitrification facility that would process the mixed transuranic waste/SBW from the Tank Farm and the mixed HLW calcine stored in the bin sets into borosilicate glass suitable for disposal in a repository.
- The mixed transuranic waste/SBW and mixed HLW calcine would be treated in separate vitrification campaigns.
- Mixed transuranic waste/SBW would be blended with one type of glass frit to form a slurry that would be fed to the melter. Glass produced from the mixed transuranic waste/SBW would be ***poured into suitable containers and*** disposed of at the Waste Isolation Pilot Plant as remote-handled transuranic waste, ***provided a waste incidental to reprocessing determination confirms that this waste could be managed as transuranic***.
- Mixed HLW calcine would be blended with another type of glass frit and fed to the melter in a dry state. Glass produced from the mixed HLW calcine would be poured into stainless steel canisters and stored until shipped to a HLW storage facility or repository.
- Newly generated liquid waste would be sent directly to the ***vitrification facility***, bypassing calcination. Glass produced from newly generated liquid waste would be disposed of at the Waste Isolation Pilot Plant ***as remote-handled transuranic waste***.

Under this option DOE ***would be able*** to cease use of the Tank Farm by 2016 and make mixed HLW ready for shipment to a storage facility or repository outside of Idaho by a target date of 2035.

Steam Reforming Option

This option (Figure S-10) would involve treatment of mixed transuranic waste/SBW by steam reforming to a calcine-like powder for subsequent shipment to the Waste Isolation Pilot Plant and packaging of mixed HLW calcine for shipment to the geologic repository. Under this option:

- ***DOE would construct a steam reforming facility that would process the mixed transuranic waste/SBW (including tank heels) from the Tank Farm for shipment to the Waste Isolation Pilot Plant for disposal.***
- ***The calcine would be retrieved from the bin sets and packaged in HLW canisters for ultimate shipment to the geologic repository.***
- ***Newly generated liquid waste would be processed with the mixed transuranic waste/SBW while the steam reformer was operating. When the steam reformer completed its mission for mixed transuranic waste/SBW, the newly generated liquid waste would be grouted for shipment to the Waste Isolation Pilot Plant for disposal.***

This option would require a determination of equivalent treatment from EPA since in this case the final waste form (calcine) is not currently an approved RCRA treatment process for HLW exhibiting the hazardous characteristics of corrosivity and toxicity for certain metals (as discussed in Section 6.2.5 of the EIS). Under this option, DOE would be able to cease use of the Tank Farm by 2013 and make the mixed HLW ready for shipment to a storage facility or repository outside of Idaho by a target date of December 31, 2035.

MINIMUM INEEL PROCESSING ALTERNATIVE

The Minimum INEEL Processing Alternative (Figure ***S-11***) ***involves*** the minimum amount of ***waste treatment*** at the INEEL, ***by including the***

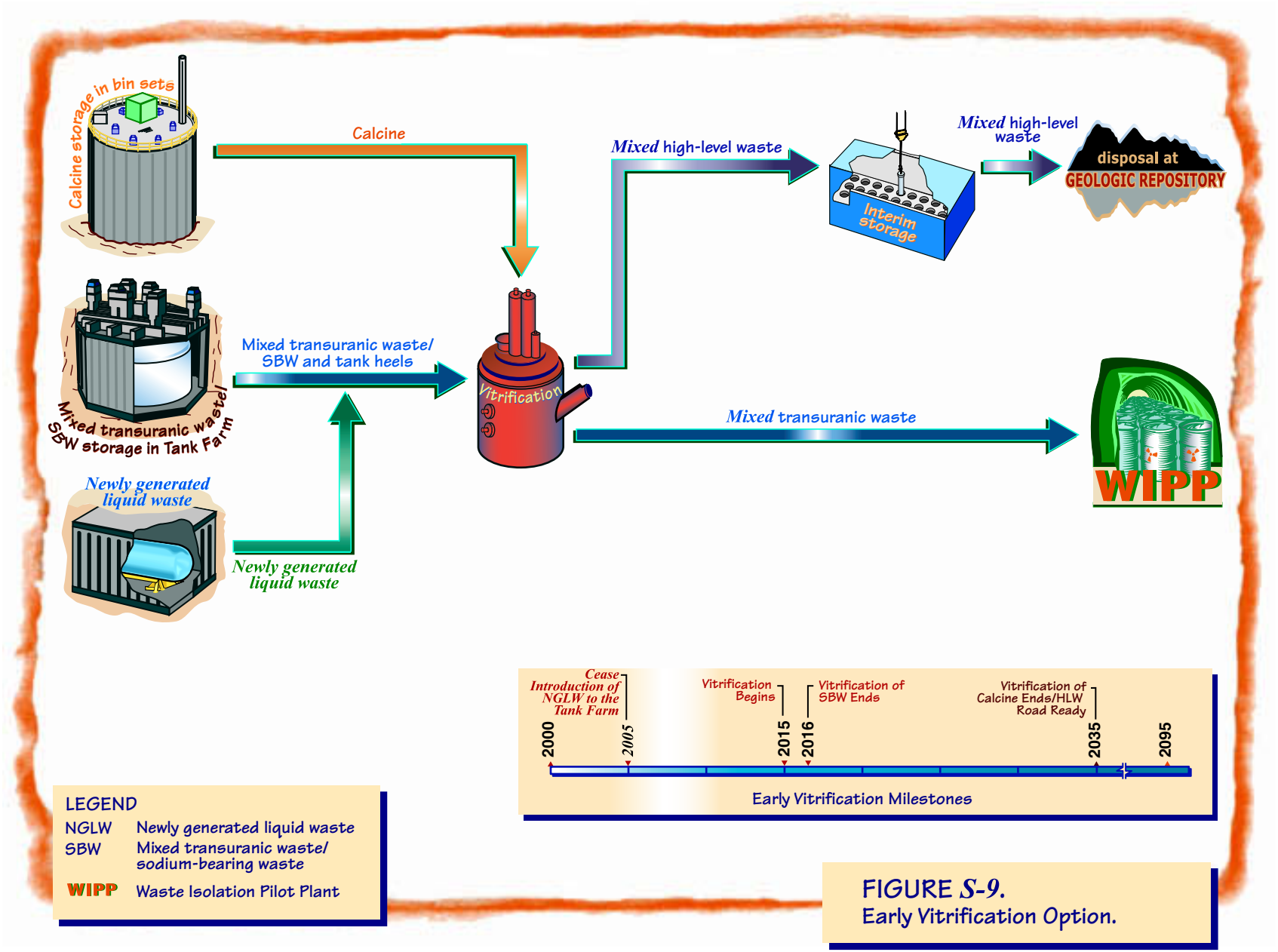


FIGURE S-9.
Early Vitrification Option.

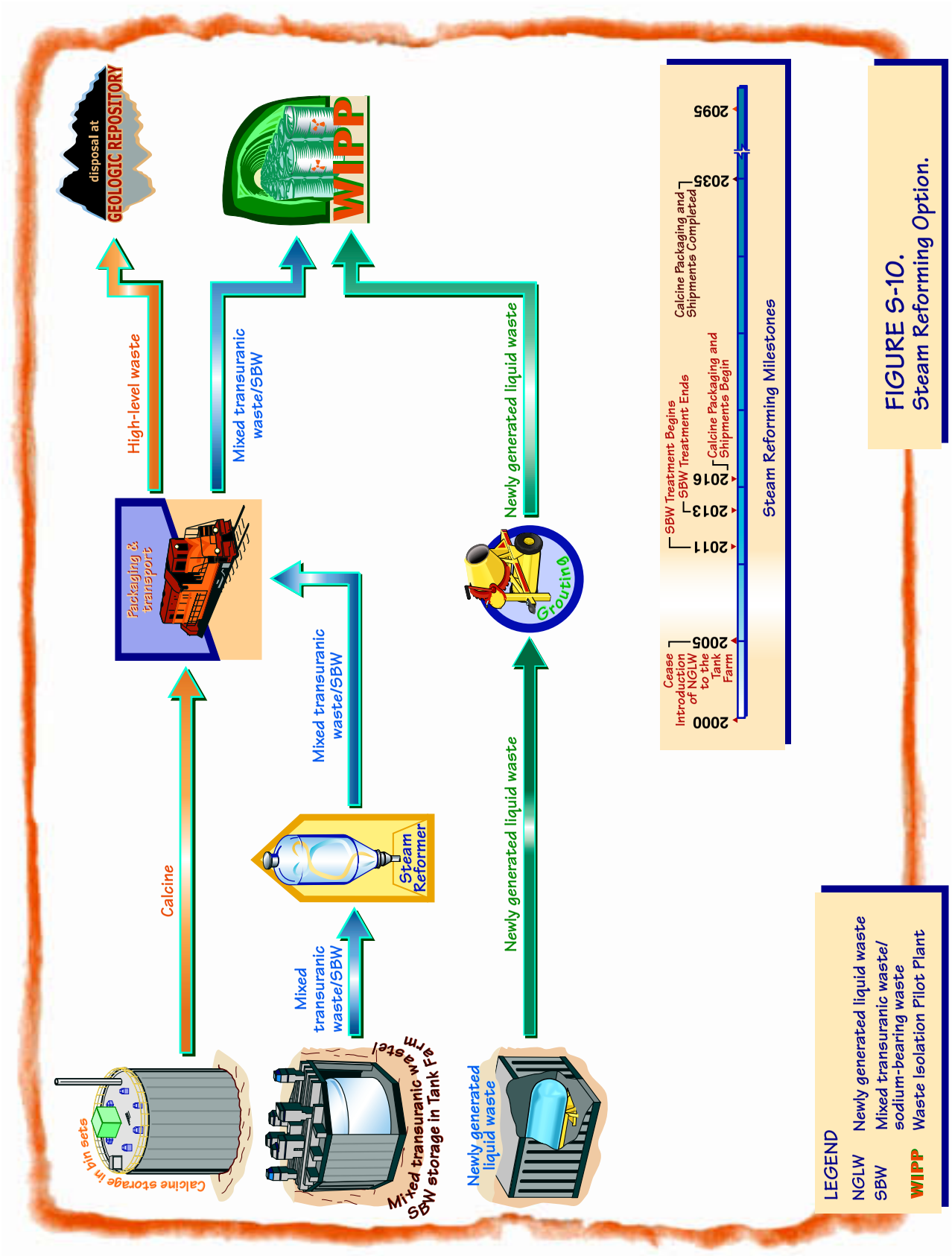


FIGURE S-10.
Steam Reforming Option.

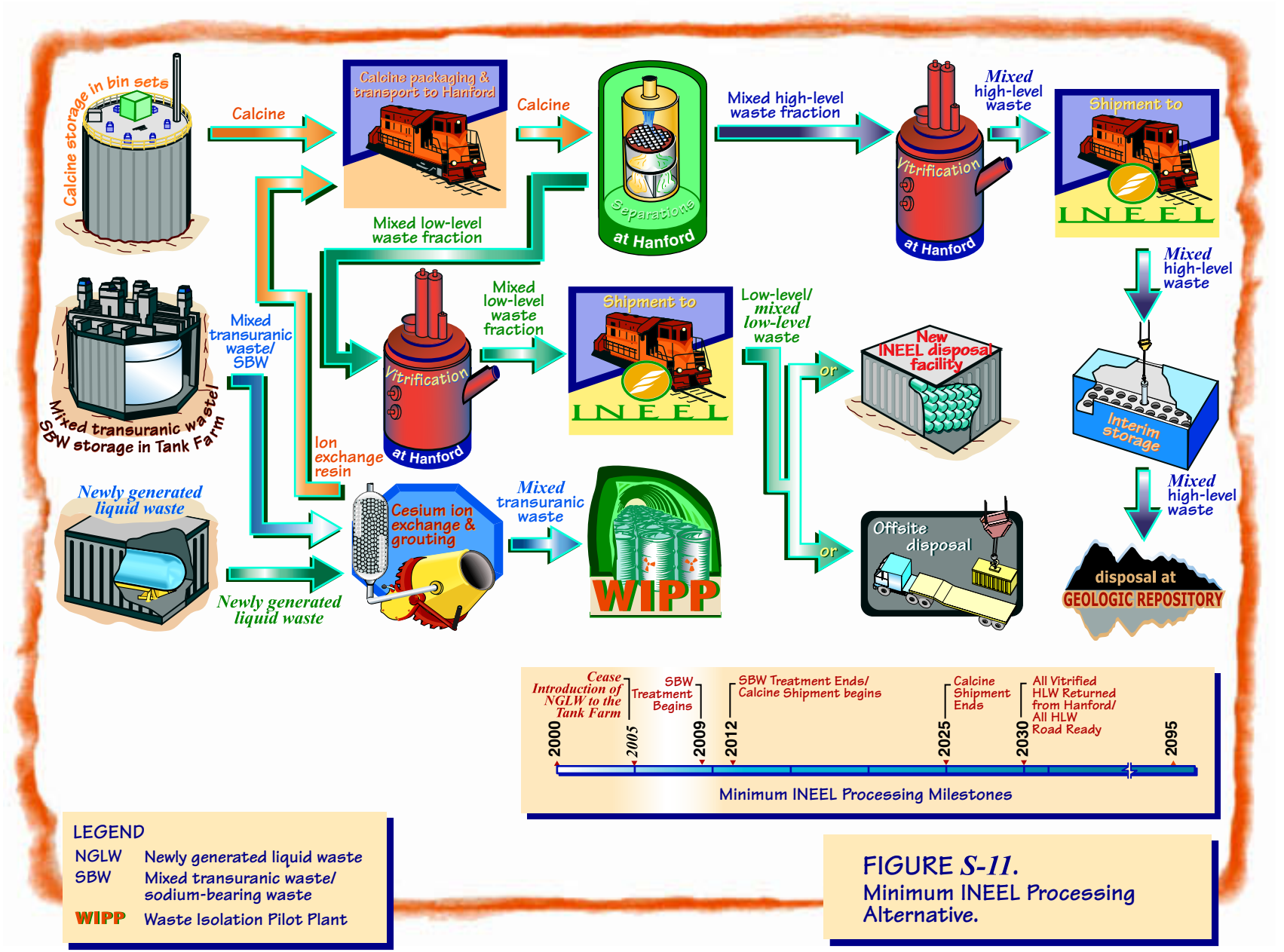


FIGURE *S-11.* Minimum INEEL Processing Alternative.

The Minimum INEEL Processing Alternative

would involve the treatment of INEEL mixed HLW at the Hanford Site near Richland, Washington. Appendix C.8 describes the Hanford Site, focusing on the 200-East Area, where INEEL mixed HLW would be treated under this alternative.

use of a vitrification facility planned for the Hanford Site in the State of Washington. This alternative could substantially reduce the amount of construction, handling, and processing of mixed HLW at the INEEL. ***However, shipment of mixed HLW to the Hanford Site and back to the INEEL adds a transportation component not present in other waste processing options.*** This alternative presents a representative analysis of offsite transport of mixed HLW calcine followed by a return of treated HLW and low-level waste to the INEEL for storage pending disposal. Under this alternative:

- DOE would retrieve and transport the mixed 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 mixed HLW calcine would be dissolved and separated into high-activity and low-activity fractions.
- Each fraction would be vitrified. For purposes of analysis, DOE assumes the treated ***mixed*** HLW and ***mixed*** low-level waste ***fractions would be*** returned to the INEEL. (Alternatively, the treated wastes could be shipped directly to appropriate ***storage or disposal*** facilities rather than returning to the INEEL.)
- The treated ***mixed*** HLW would be stored ***at the INEEL*** until it is shipped to a storage facility or repository.
- The treated ***mixed*** low-level waste ***fraction*** would be disposed of ***at the*** INEEL or shipped to an offsite low-level waste disposal facility.
- The mixed transuranic waste/SBW and newly generated liquid waste, including tank heels, would be retrieved, filtered, and transported to a treatment facility on the INEEL, where it would be processed through an ion exchange column to remove cesium. ***The HLW fraction would be packaged and sent to the Hanford Site. The remaining fraction would be grouted,*** packaged in 55-gallon drums, and transported to the Waste Isolation Pilot Plant for disposal as contact-handled transuranic waste.

DOE cannot determine at this time whether treating INEEL mixed HLW calcine in Hanford facilities would be technically feasible or cost effective. Even if it were feasible to process INEEL mixed HLW at the Hanford Site, DOE would have to consider the potential regulatory implications and any impacts to DOE commitments regarding completion of Hanford tank waste processing. ***Before making a decision to pursue the Minimum INEEL Processing Alternative, DOE would determine if additional NEPA documentation were needed associated with treatment of INEEL mixed HLW calcine at the Hanford Site.***

Under this alternative ***DOE*** would ***be able*** to cease use of the ***INTEC*** Tank Farm by ***December 31,*** 2012 and make mixed HLW ready for shipment to a storage facility or repository outside of Idaho by a target date of 2035.

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 this alternative: Vitrification without Calcine Separations (Figure S-12) and Vitrification with Calcine Separations (Figure S-13).

The option to vitrify the mixed transuranic waste/SBW and calcine without separations

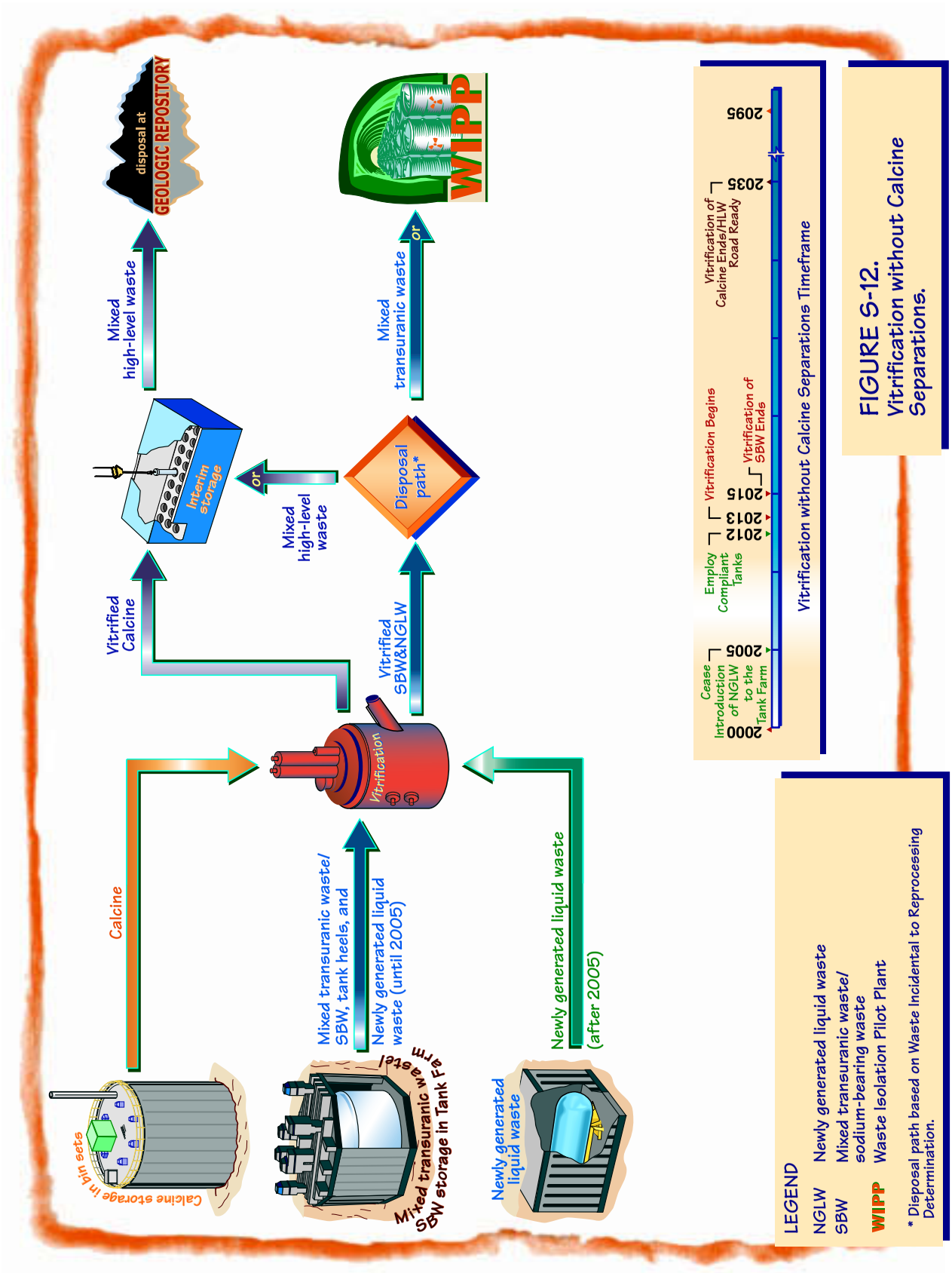


FIGURE S-12.
Vitrification without Calcine Separations.

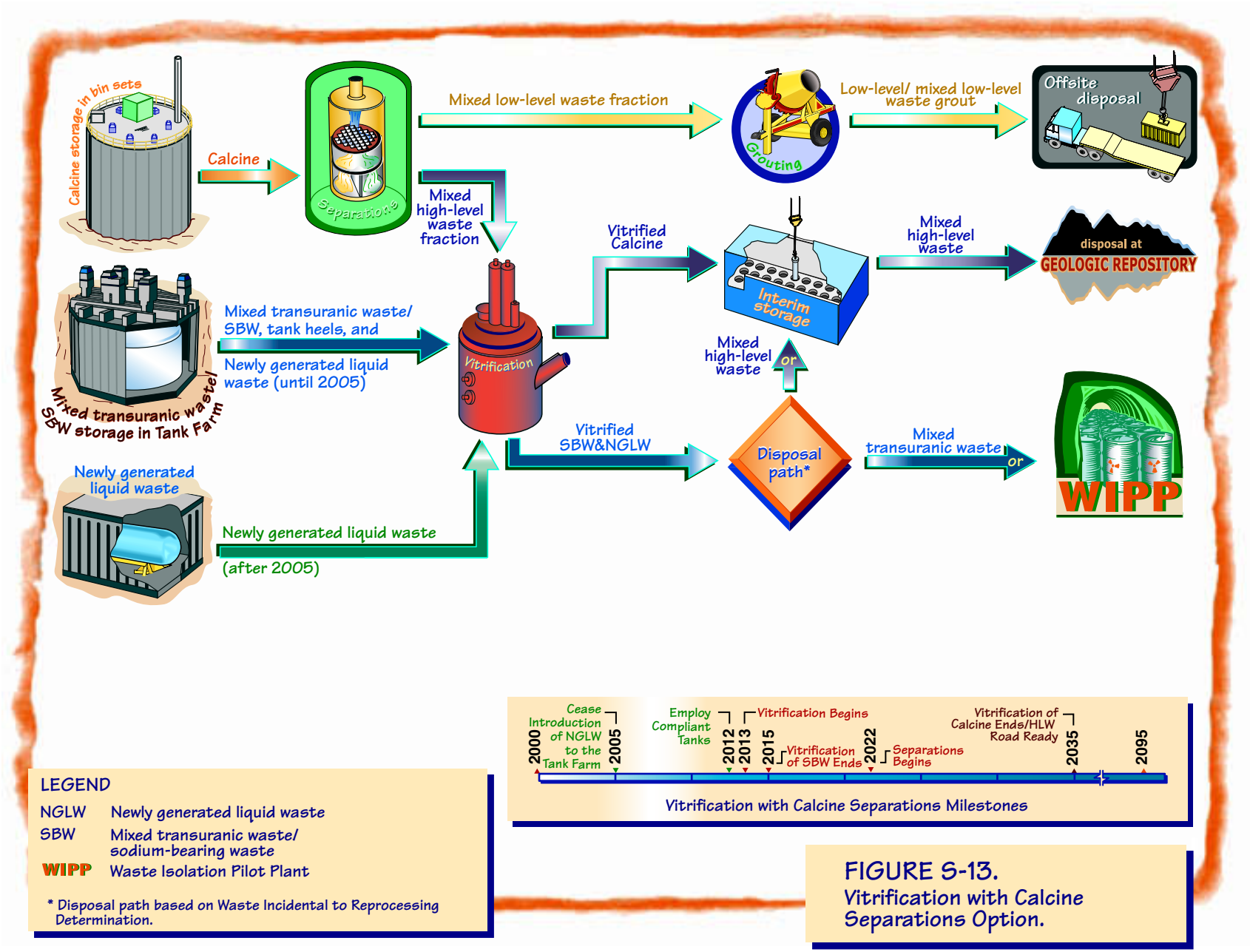


FIGURE S-13.
Vitrification with Calcine Separations Option.

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. 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 31, 2012 in order to meet the Notice of Noncompliance Consent Order requirement to cease use of the HLW Tank Farm 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.

Mixed Transuranic Waste/ SBW Treatment

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.

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 HLW geologic repository. If a repository were 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.

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 costs and engineering designs. Conditioned on the outcome of future technology development and resulting treatment decisions, DOE could design and construct the appropriate calcine separations capability at the INEEL.

For calcine vitrification at the 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 the INEEL, DOE could decide to send the HLW fraction to Hanford for vitrification. DOE would evaluate the advantages of this option as the Hanford treatment facility is being developed (see Appendix C.8).

If separations technologies were 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, packaged, 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 Waste Management Programmatic EIS (65 FR 10061, February 25, 2000). For purposes of assessing risks associated with transportation of low-level waste, DOE used the commercial radioactive waste disposal site operated by Envirocare of Utah, Inc., located 80 miles west of Salt Lake City.

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 transuranic waste/SBW. This EIS also presents the impacts for a grout facility (see Project P2001 in Appendix C.6) that could be used to treat the waste generated after 2005. 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 (see Appendix C.5).

PREFERRED ALTERNATIVE

DOE and the State of Idaho have jointly undertaken a process to select the Preferred Alternative for waste processing and have reached separate conclusions. Consequently, this EIS presents two Preferred Alternatives: one for DOE and one for the State of Idaho. The Preferred Alternatives were developed after consideration of public comment; factors such as environmental impacts, programmatic needs, safety and health, technical viability, ability to meet regulatory milestones and agreements, and cost; and information received after the Draft EIS was published. This information included the National Research Council report on *Alternative High-Level Waste Treatments at the Idaho National Engineering and Environmental Laboratory*, DOE Tanks Focus Area findings, DOE Office of Project Management review of the *Cost Analysis of Alternatives for the Idaho High-Level Waste and Facilities Disposition EIS*, and public comments from the commercial sector supporting various treatment technologies.

Among the choices from which the preferred waste processing alternatives were selected are the five alternatives (comprised of nine major choices including the options) identified in the Draft EIS, a new option under the Non-Separations Alternative called Steam Reforming, and a new alternative called Direct Vitrification, which is comprised of two options: Vitrification without Calcine Separations and Vitrification with Calcine Separations.

The Direct Vitrification Alternative was ultimately selected by the State of Idaho as its Preferred Alternative for waste processing. DOE's preferred waste processing alternative is to implement the proposed action (see text box on next page) by selecting from among the action alternatives, options and technologies analyzed in this EIS based on the criteria dis-