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AN OVERVIEW OF THE WASTE HANDLING & PACKAGING PLANT, A MAJOR PROCESSING FACILITY FOR REMOTE-HANDLED TRANSURANIC WASTE*

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ABSTRACT

The Waste Handling & Packaging Plant (WHPP) is a FY 1991 line item project proposed for construction at the Oak Ridge National Laboratory (ORNL). The purpose of the facility is to receive, package, certify and ship remote-handled (RH) and special case (SC) transuranic (TRU) waste to the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. The scope of the facility includes the mobilization of liquids and sludges from the Melton Valley Storage Tanks, transport of these liquids and sludges to the WHPP, solidification to a certifiable waste form, and final packaging and shipment to WIPP. Various solid hot cell wastes will be received at the WHPP from storage at ORNL and from other Department of Energy (DOE) sites. The solid wastes will be removed from the storage or shipping container, examined, processed as required, certified and packaged for shipment to WIPP. All packages coming from the processing cell will be in 55 gallon drums, and the facility will have the capability to load these directly into a shielded drum shipping cask, or to load these into the RH TRU canister for remote welding and shipment to WIPP using the RH TRU canister cask.

INTRODUCTION

The WHPP is a proposed FY 1991 line item project. This project is to be constructed at ORNL, and is currently estimated to cost $130 million. Solid RH TRU is stored at ORNL in concrete casks in a bunker and in trenches in Solid Waste Storage Area 5. The inventory of RH TRU waste in storage at ORNL awaiting processing in the WHPP is about 90% of the RH TRU currently in storage in the DOE system. RH and SC TRU waste that can not be certified for shipment to WIPP at the other DOE sites may be shipped to WHPP for processing and certification. The solid wastes hot cell wastes from storage at ORNL and from other DOE sites will be removed from the storage or shipping container, examined, processed as required, certified and packaged for shipment to WIPP. An illustration of the WHPP flowsheet for processing the solid wastes is shown in Fig. 1.

MOBILIZATION AND SOLIDIFICATION OF LIQUIDS AND SLUDGES

The scope of the WHPP project also includes the mobilization of TRU-contaminated liquids and sludges from the Melton Valley Storage Tanks

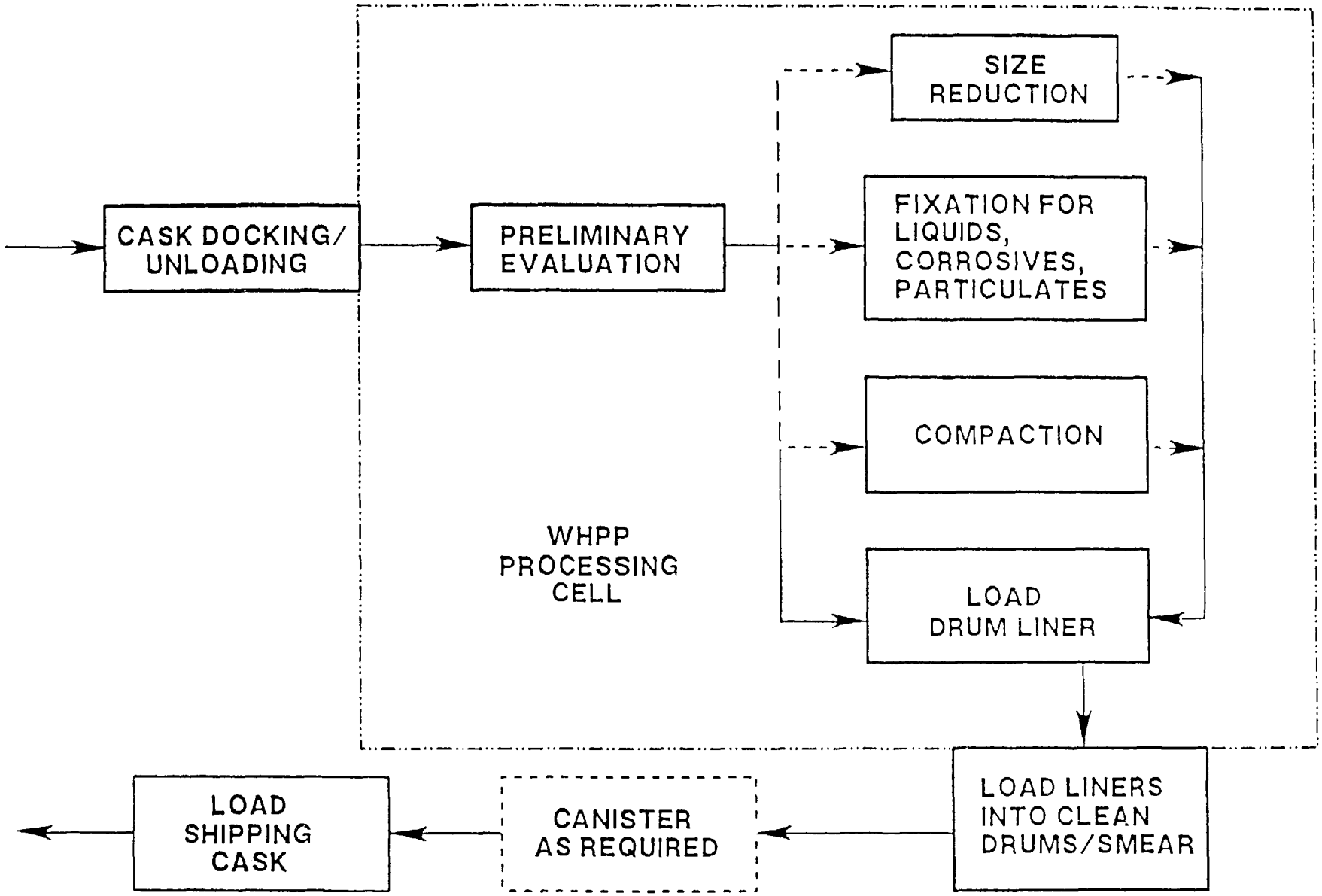

FIGURE 1 WHPP SOLIDS PROCESSING FLOWSHEET

(MVST) at ORNL, transport of these liquids and sludges to the WHPP and solidification to a certifiable waste form. The liquids and sludges stored in the MVST will be mobilized remotely using a low pressure water jet. The resulting slurry will be transported by underground pipeline to the WHPP for solidification. The solidification will be accomplished utilizing an evaporation-type flowsheet. This will involve a combination of evaporation, concentration and melting. The melting is proposed to be accomplished using microwave energy. Since this melting process functions best when the feed stream contains low concentrations of water, the concentration process will involve a mechanically active type of evaporation to drive off most of the water and move the hot fluid to the melting unit. The product from the solidification process must meet the Waste Acceptance Criteria for disposal at WIPP. This solidification process will achieve significant volume reduction by driving off the water content, yet will stay at low temperatures to avoid volatizing radioactive isotopes present in this waste stream. The liquids driven off during the solidification process will be recycled and sent to the MVST for use in sluicing sludges from the storage tanks. An illustration of the WHPP flowsheet for mobilization and solidification of liquids and sludges is shown in Fig. 2.

WASTE PROCESSING AND PACKAGING IN THE WHPP

The WHPP process cell will be remotely operated and maintained. Shielding thickness for the cells will be about 3 ft thick. In the process cell there will be capability to unload incoming waste packages and examine them to determine what processing is required. The conceptual approach is to use a linear accelerator for the high energy source to provide real-time radiography and neutron assay of closed packages to determine what processing is required for certification. The capability to open packages, to size reduce large objects by cutting and to compact light materials is planned in the process cell. There will also be processes available to solidify free liquids, immobilize loose particulates and to neutralize corrosives. All waste will be loaded into "liners" of about 50 gallon capacity in the WHPP process cell. These liners will be transferred out of the process cell into clean 55 gallon drums utilizing a double-lid transfer system, so that the outer package is never exposed to the process cell. The packaging cell will have the capability to load the 55 gallon drums directly into a shielded drum shipping cask, or to load these into the RH TRU canister for remote welding and shipment to WIPP using the RH TRU canister cask. A cutaway illustration of the conceptual WHPP facility is shown in Fig. 3.

SUMMARY

The effort to plan, develop and design all the systems and components that will comprise the WHPP project involve many different groups at ORNL, at other DOE facilities, at universities and at private companies. Currently, the conceptual design is under way, with the scheduled completion date of May 1989. The technical support

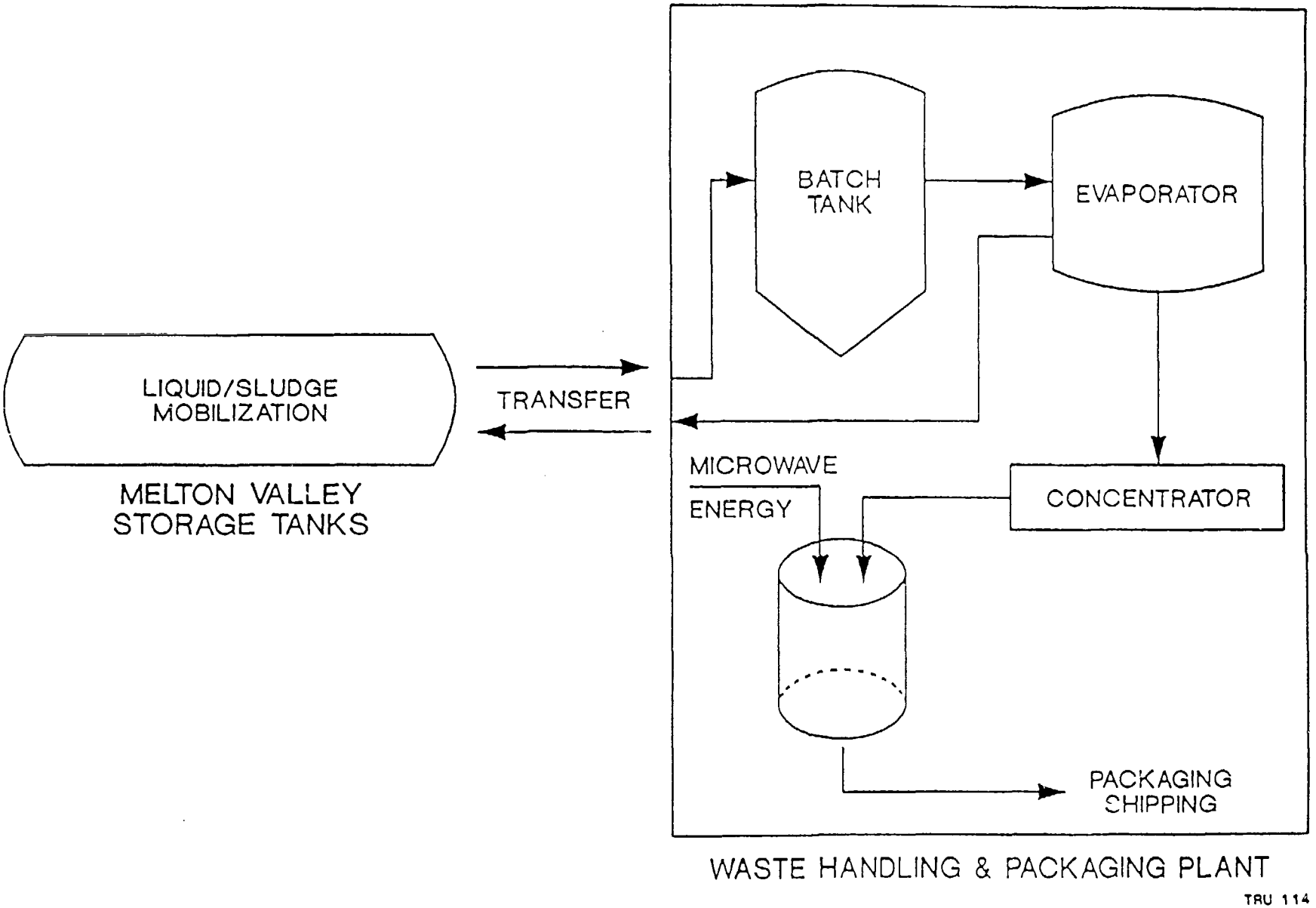

FIGURE 2 WHPP FLOWSHEET FOR LIQUIDS/SLUDGES

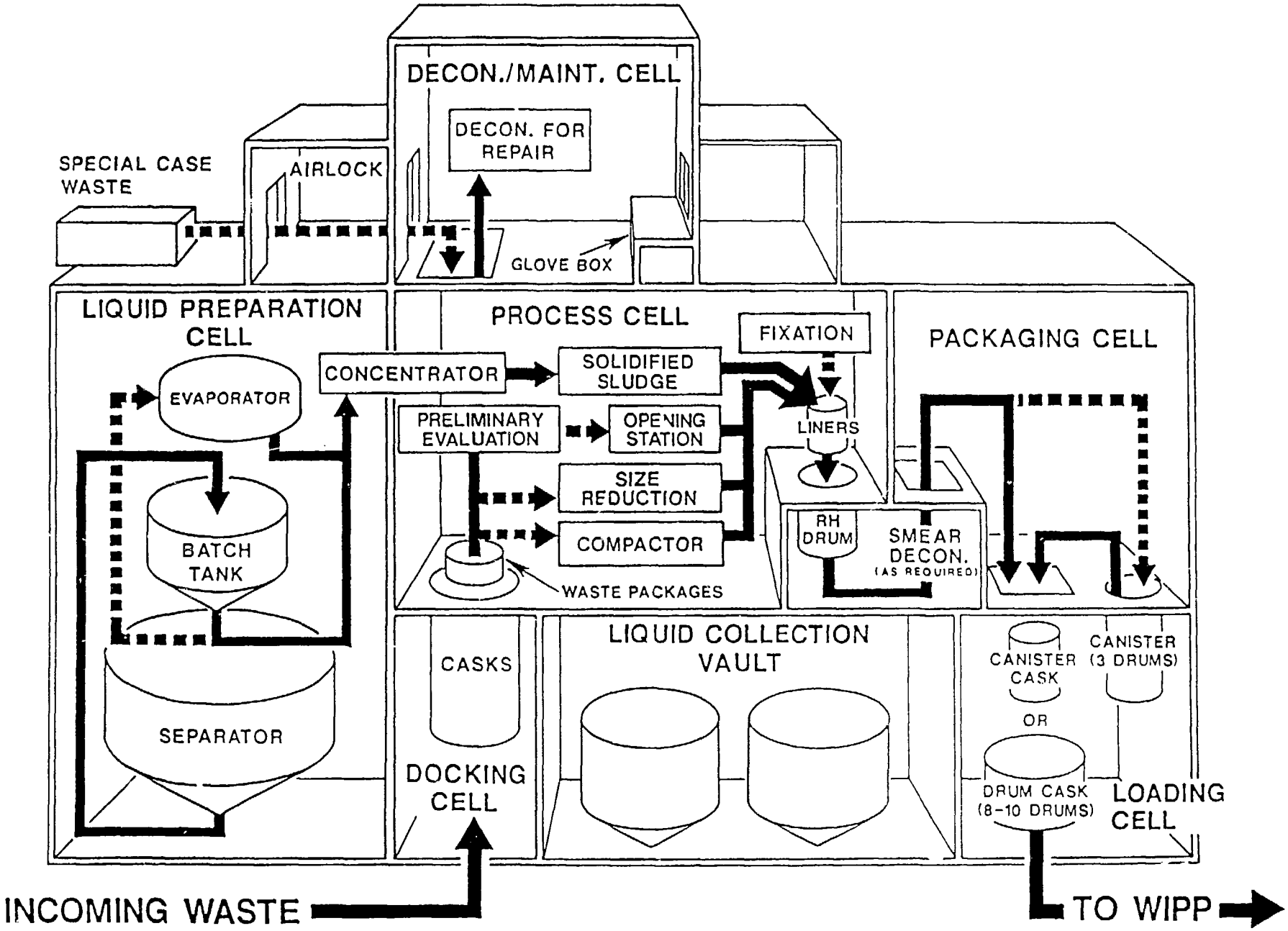

FIGURE 3 CONCEPTUAL WHPP CUTAWAY

activities for mobilization and solidification are currently under way. Much of the development and demonstration information from the technical support activities will be available by the mid-point of the preparation of the design criteria in FY 1990. The WHPP schedule is aggressive, and there are a number of inter-related tasks. An illustration of the project schedule based on the project being funded as a FY 1991 line item is shown in Fig. 4.

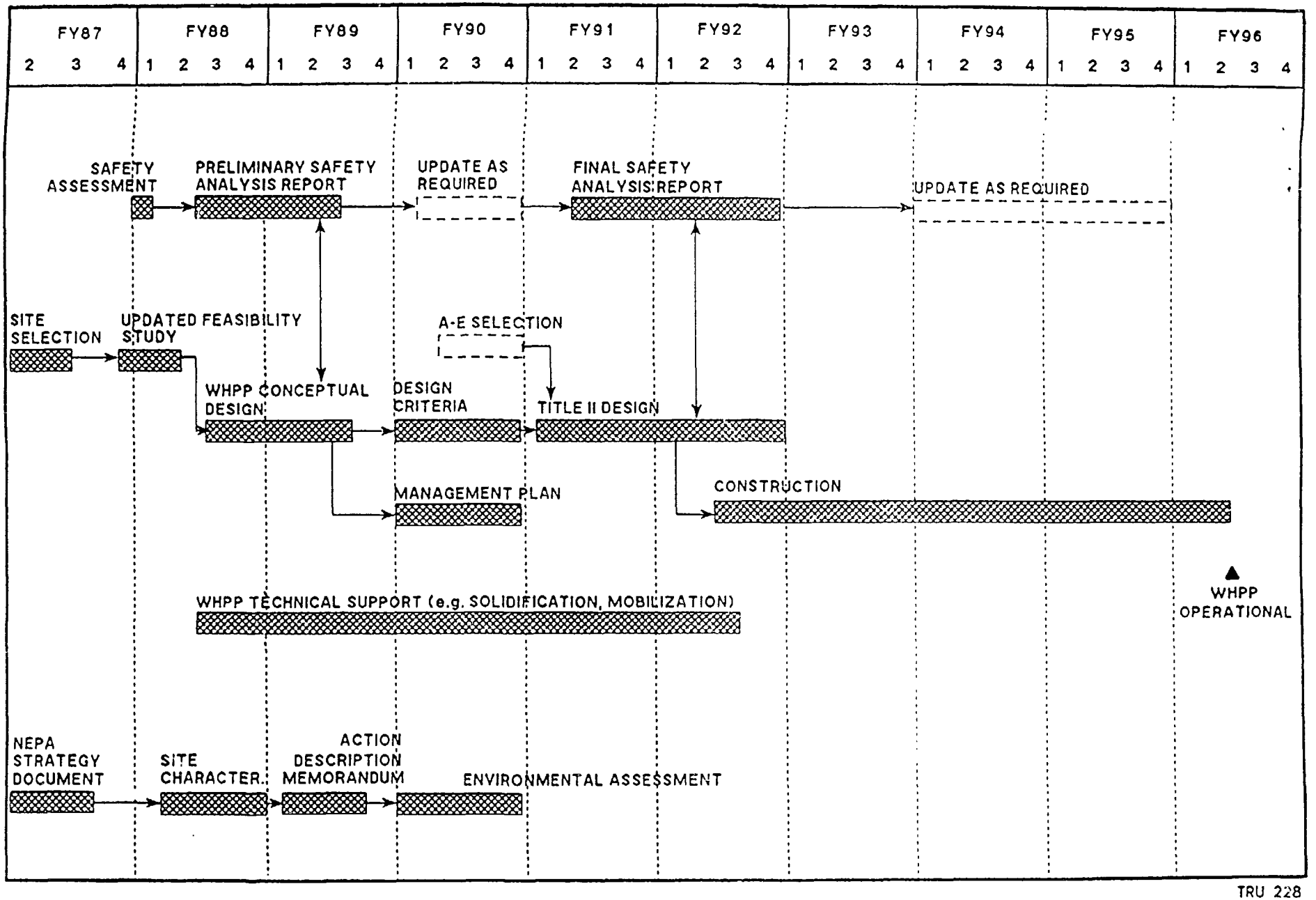

FIGURE 4 WHPP PROJECT SCHEDULE