DEFENSE WASTE DISPOSAL: STATUS REPORT AND HANFORD PLANS

R. D. Prosser, Chairman
J. D. White, Co-Chairman

OVERVIEW OF PLANS FOR DISPOSAL OF DEFENSE WASTES

D. B. Leclaire
U.S. Department of Energy
Office of Defense Waste and Byproducts Management
Washington, DC 20545

J. T. D'Ambrosia
U.S. Department of Energy
Savannah River Operations Office
Aiken, SC 29801

ABSTRACT

The various elements leading to disposal of defense wastes are documented in a defense waste management plan. The plan is publically available and is updated annually. Schedules and facilities are identified, with sites receiving sequential emphasis. The HLW is Savannah River will be immobilized by the Defense Waste Processing Facility which is currently under construction. Processing facilities are under consideration for HLW stored in Richland and Idaho. For transuranic waste, most efforts support operation of the Waste Isolation Pilot Plant with transuranic waste from all DOE storage sites. The fuel cycle for defense low level waste is closed. New initiatives are being taken for disposal of hazardous chemical waste.

The Atomic Energy Commission, and succeeding agencies such as the Department of Energy (DOE), have continued research, development, production and testing of nuclear weapons, as well as the utilization of nuclear materials. Defense nuclear wastes result from atomic energy defense activities of the Secretary of Energy. They generally exclude material under the jurisdiction of the Nuclear Regulatory Commission. The defense waste management program consists, therefore, of three major segments: (1) safe and efficient management of new generation and the existing inventory of low-level (LLW), transuranic (TRU), and high-level (HLW) wastes; (2) technology development, such as required for assaying, and methods for reduced generation, immobilization, treatment and transportation; and (3) eventual disposal. The fuel cycle for defense LLW is closed as these wastes are routinely managed and disposed of by shallow land burial.

In June 1983, the President submitted to Congress the reference plan for disposal of HLW and TRU wastes. The report, known as the Defense Waste Management Plan, outlines specific activities, facilities, schedules, and costs for demonstrating technology, processing waste into suitable forms, and shipment to repositories for permanent disposal. No major technological breakthroughs are required to implement the plan. Actual implementation is, of course, subject to many factors, including the completion of environmental documentation and the availability of resources. The overall strategy is to proceed sequentially at the various sites in a manner that maximizes the protection of public health and safety, provides for efficient use of technology and existing facilities, and that minimizes budget peaks. The Waste Isolation Pilot Plant (WIPP) is the reference disposal facility (assuming a successful demonstration) for the bulk of defense TRU waste. Most defense HLW is destined for disposal in licensed geological repositories.

HIGH-LEVEL WASTE

Defense HLW is stored as sludges, salts and other solids in tanks and bins at the Savannah River Plant in South Carolina, the Hanford Reservation in Washington, and the Idaho National Engineering Laboratory (INEL). At Hanford, most cesium and strontium was removed and is stored as solids. All newly generated HLW is stored as a liquid in double-shell tanks except at INEL where it is retrievably stored as calcine in bins. New and readily retrievable HLW will be processed for disposal in a geologic repository. Other waste will be stabilized in place if, after the requisite environmental evaluation and documentation, it is determined that the risks and costs of retrieval and transportation outweigh the benefits of disposal in a geologic repository. An evaluation of the need for a defense-only repository, performed in response to the Nuclear Waste Policy Act, indicates, as expected, that it is not cost effective to build a repository only for defense HLW.

The plan for preparation of waste for disposal is to proceed sequentially at the three DOE sites. This will allow operating experience to be utilized before major commitments are made at the next site, and will achieve efficient use of resources while maintaining a relatively level budget for capital expenditures.

The HLW at Savannah River, where 70 percent of the activity in tanks is stored, will be processed first because the water table, climate, and population density near the site are less favorable than in Idaho and Hanford. The Defense Waste Processing Facility (DWPF) is now under construction and will begin immobilizing waste from the underground storage tanks into a borosilicate glass form in 1989. Stainless steel canisters of glass will be generated at a rate of about 500 a year and will be stored until a geologic repository is available. Some of these canisters are planned to be used for research at the WIPP.

In a second step, the new and readily retrievable HLW at Hanford will be immobilized in the Hanford Vitrification Plant (HWVP) beginning in the early 1990's. This schedule provides for input from the design, construction, and operating

experience of the DWPF. It will also minimize the duplication of technology development efforts. This optimized transfer of technology, design, and operational experience would be adversely impacted if the HWVP were begun too early or delayed significantly.

Some older waste at Hanford is stored in 149 single-shell tanks from which retrieval may not be warranted. Most of this waste has been processed to remove strontium and cesium which were encapsulated and stored separately in water basins. Liquids are being removed from the single-shell tanks, concentrated, and transferred to double-shell tanks. Following liquid removal, the single-shell tanks are isolated by disconnecting all pipelines and by sealing openings to prevent the inadvertent entry of liquids. Later, if the Environmental Impact Statement (EIS) process supports stabilization in place, tank voids will be filled with cement-based grout or gravel to provide structural support for the tank dome, and an engineering barrier will be placed over the surface above the tank to prevent moisture from reaching the tanks, prevent disturbance of the waste by plants or animals, and to enhance safety and minimize environmental effects.

At Idaho the HLW is stored as calcine in concrete encased stainless steel bins and is readily retrievable. The calcine form is exceptionally stable but will require immobilization before shipment for permanent disposal. This waste will be processed after the waste in Richland, and a facility to immobilize stored and new HLW at Idaho is planned for operation by 2008. Economy dictates consideration of new waste forms with higher waste loadings.

TRANSURANIC WASTE

Defense TRU is in retrievable storage at the Savannah River Plant, the Hanford reservation, and the Idaho National Engineering Laboratory, as well as the Oak Ridge National Laboratory, the Los Alamos National Laboratory, and the Nevada Test Site.

The objective for these TRU wastes is to end retrievable storage and achieve permanent disposal. Newly generated defense TRU waste will be certified for compliance with the WIPP waste acceptance criteria, stored separately, and then sent to the WIPP. Upon completion of the NEPA process, waste in storage at sites will be retrieved, examined, processed if necessary, certified for acceptance, and transported for disposal at WIPP.

Suspect TRU-contaminated solid waste material was disposed of by burial as LLW before 1970. The National Academy of Sciences and others have found that retrieval of this waste can be more hazardous than leaving it in place. The reference plan for such disposed waste is to monitor it, take such remedial actions as may be necessary, and to reevaluate its safety periodically. Major evaluations will be performed about every 10 years, and as otherwise necessary.

As with HLW, the transition to permanent disposal at the different sites will proceed sequentially. Activities will begin first at Idaho because it has the largest inventory of retrievably stored TRU waste. The NEPA process has already been completed for the waste in storage at this site.

At Idaho, the Stored Waste Examination Pilot Plant (SWEPP) will begin certification of retrievably stored TRU waste late in calendar year 1985. Experimental operations will begin in the Processing Experimental Pilot Plant (PREPP) late in calendar year 1986 to demonstrate processes used to immobilize TRU waste. An active technology transfer program is underway so that design, construction, and operation of these facilities will provide design and operational data for TRU waste certification and processing facilities at other locations.

The certification of newly generated TRU waste has already begun at all generating sites. Examination and certification of retrievably stored TRU waste will begin in the late 1980's. New facilities will be available beginning in the early 1990's for that waste that cannot be certified without processing. These facilities will include incinerators, size reduction and large item disassembly facilities, and other equipment and facilities that will convert non-certifiable waste into waste that is acceptable to WIPP.

WASTE ISOLATION PILOT PLANT

The WIPP, now under construction near Carlsbad, New Mexico, is a research and development facility to demonstrate the safe disposal of radioactive waste from atomic energy defense activities. The WIPP will be used to retrievably emplace defense TRU waste and to conduct experiments with HLW. A limited quantity of HLW is planned to be emplaced for experimental purposes and be removed from the WIPP before decommissioning. After 5 years of emplacement operations and evaluations, a "leave or retrieve" decision for the TRU waste will be made.

SUMMARY

The activities and facilities described above assure that defense-generated HLW and TRU wastes will be processed and disposed of safely. These activities do not require any technological breakthroughs, and all will be subject to the NEPA process prior to implementation. Additionally, all disposal activities will comply with applicable standards of the Environmental Protection Agency. The Defense Waste Management Plan is a "living" document and will be periodically updated to allow refinement of cost and schedule information. The policy and goals outlined in the original Plan are expected to continue. An update of the Plan will be available later this year.

BIBLIOGRAPHY

"The Defense Waste Management Plan," U.S. Department of Energy, Assistant Secretary for Defense Programs (June 1983).