

DEPARTMENT OF ENERGY DEFENSE ACTIVITIES FOR HAZARDOUS AND MIXED WASTE REDUCTION

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ABSTRACT

The Resource Conservation and Recovery Act of 1976, as amended by the Hazardous and Solid Waste Amendments (HSWA) of 1984, set forth requirements for minimizing the toxicity, mobility, and volume of regulated wastes. The 1984 legislation stated, "The Congress hereby declares it to be the national policy of the United States that, wherever feasible, the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible." HSWA also included the requirement that the transportation manifest "shall contain a certification by the generator that the generator of the hazardous waste has a program in place to reduce the volume or quantity and toxicity of such waste to the degree determined by the generator to be economically practicable."

This paper provides the Department of Energy (DOE) "working" definition of waste minimization, including the specific policy set forth by the Acting Assistant Secretary for Defense Programs. It summarizes the generic waste minimization approaches of the DOE sites and describes some site activities to minimize the volume and toxicity of waste generated by Defense Programs (DP) operations. In addition, two workshops held on this topic are summarized.

INTRODUCTION

The Department of Energy (DOE) must treat, store, and dispose of hazardous and mixed wastes that are a result of Defense Programs (DP) activities. It is the policy of DP "...to first, avoid as far as practicable, the generation of low-level, high-level, transuranic, hazardous, and mixed wastes, and to reduce the toxicity of waste streams containing hazardous components." Minimization of these wastes will decrease the liabilities associated with their treatment, storage, and disposal and the associated costs. It is the practice of DOE to comply with all aspects of the Resource Conservation and Recovery Act regulations.

DOE Order 5820.2A, Radioactive Waste Management, issued September 26, 1988, states that "... waste shall be managed on a systematic basis using the most appropriate combination of waste generation reduction, segregation, treatment, and disposal practices ..."

For new processes, each waste generator is directed to incorporate waste reduction principles into the design such that all waste will be minimized. Each generator is to establish auditable programs (goals, incentives, procedures, and reports) to ensure that the amount of waste generated is minimized.

ACTIVITIES AT DOE-HEADQUARTERS

In October 1988 the Acting Assistant Secretary for DP issued a waste minimization policy. The policy prioritizes waste minimization activities to include, first, "...avoidance as far as practicable, the generation of low-level, high-level, transuranic, hazardous, and mixed wastes, and to reduce the toxicity of waste streams containing hazardous components," and, second, "...recycle or reuse all or part of the

waste stream components." Lastly, "...treat non-reusable wastes to further reduce toxicity or volume." All DP activities, including new facility design, decontamination and decommissioning, and site environmental remedial actions, must consider the opportunity for avoiding waste generation.

As a result of this new policy, a network of DOE-DP field office and contractor contacts has been established. These contacts include representatives from defense waste management, production, and weapons activities. The implementation of waste reduction activities will be a field office responsibility.

Minimization is defined in Hazardous and Solid Waste Amendments (HSWA) as "process substitution, materials recovery, properly conducted recycling and reuse, and treatment." The Environmental Protection Agency (EPA) subsequently defined waste minimization as any source reduction activity (source substitution or process modification) or recycling to reduce total volume, and excluded treatment. DP will be consistent with the EPA definition but has introduced a new term: waste reduction defined as waste minimization plus treatment. Waste reduction activities therefore include materials substitutions, process improvements, administrative controls, employee education, recycle and reuse, plus a wide range of treatment methods.

The Office of Defense Waste and Transportation Management (DWTM) was assigned the responsibility for the coordination of systemwide waste reduction activities. A Waste Reduction Steering Committee has been established to ensure consistency among the DP offices of DWTM, Weapons Safety and Operations (WS&O), Weapons Production (WP), Weapons Research,

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Development, and Testing (WRD&T), and Nuclear Materials Production (NMP).

The goal of this Committee is to reduce the generation of waste, maximize information exchange, identify current and future data needs and reporting requirements, and guide future waste reduction activities between the programs and their respective sites. The Steering Committee will provide the mechanism to assess process and material substitution technologies with emphasis given to maintaining the quality of the product.

To accomplish this goal, the Steering Committee will help guide DP in ensuring that budget submissions, program plans, and other activities include consideration of waste reduction goals; value engineering analyses are conducted on existing processes; cost/benefit analyses are conducted on proposed processes to ensure the volume and toxicity of the waste generated are reduced to the maximum extent practicable while maintaining product quality; and decontamination, decommissioning, remediation, and construction proposals consider reduction of the quantity and toxicity of waste generated as a result of the activity. The Steering Committee established contact and will continue to interface with other relevant groups, including the Materials Management Executive Committee, the Ad Hoc Waste Operating Contractor Committee, and the National Working Group for Reduction in Transuranic (TRU) Waste Arisings.

WASTE MINIMIZATION PROGRAMS AT DEPARTMENT OF ENERGY INSTALLATIONS

All DOE installations have made significant strides in their waste reduction programs in response to these requirements. Table I, Summary of Department of Energy Defense Programs Installation Hazardous and Mixed Waste Minimization Programs, is a summary of the individual programs. The programs, identified as headings, may include many separate programs (i.e., Employee involvement may include training, incentives, suggestion programs, etc.). As seen in Table I, common programs range from education and training to the substitution of chlorinated solvents. The first workshop on hazardous and mixed waste reduction was held in Las Vegas, Nevada, on July 26-28, 1988. The objectives of this workshop were to establish an interchange among DOE Headquarters (HQ) DP, Operations Offices, and contractors on waste reduction strategies and to review in detail site waste reduction successes. Discussions were also centered on pending legislation, specifically, HR 2800, the Hazardous Waste Reduction Act, which would create an Office of Waste Reduction in the EPA and would require standard detailed reporting, data collection, and public disclosure of waste generation in a facility-by-facility fashion. The proposed EPA reporting requirements would require detailed assessments of waste reduction actions in all media: solids, liquids, and gaseous wastes.

The second waste reduction workshop centered on employee education and training because many of the early successes are a result of these activities. The workshop participants held discussions on the implementation and

administration of employee incentive and training programs, procurement control and awareness in reducing hazardous materials, and the use of pamphlets, posters, books, magazines, employee communications, and publicity.

HAZARDOUS WASTE REMEDIAL ACTIONS PROGRAM SUPPORT CONTRACTOR OFFICE WASTE MINIMIZATION ACTIVITIES

The Hazardous Waste Remedial Actions Program Support Contractor Office (HAZWRAP SCO) supports the DOE HQ waste minimization effort by concentrating its efforts on the planning of systemwide waste minimization, technology requirements, technology transfer, and demonstrating technology for defense hazardous and mixed waste reduction. This course of action is intended to assist DP sites as it implements compliance agreements and deal with regulators. The goal of HAZWRAP SCO is to develop and promote an integrated approach to DP installation compliance with RCRA requirements that conserves DP resources for its primary missions, while providing a technically sound and socially acceptable response that meets the intent of relevant hazardous waste regulations. The Hazardous Waste Compliance

Technology Program coordinates waste reduction activities for DOE-HQ by providing resources for the research, development, and demonstration of waste reduction technologies. In FY 1989 several research and development and demonstration projects are being funded to address waste minimization. The Idaho National Engineering Laboratory (INEL) is investigating chlorinated solvent usage at DOE installations, developing a data base of these processes, and evaluating what alternative solvents are presently available for replacement. Discussions will be held with commercial industry to encourage the development of nonhazardous replacements. The Savannah River Plant (SRP) is investigating the use of an aqueous degreaser to replace 1,1,1-trichloroethane (TCA), currently used as a degreaser at the plant. Elimination of this hazardous waste stream will eliminate the need for the treatment, storage, and disposal of more than 28,000 lb/year of waste at SRP and is expected to eliminate similar quantities of waste at other installations. This fiscal year, Pacific Northwest Laboratory (PNL) will demonstrate a process to reduce the volume, quantity, and toxicity of metal-bearing waste acids generated from metal-finishing operations. The goal is to (1) remove principal metal ions such as zirconium, copper, and uranium from waste acid without reducing acid concentration; (2) recycle the resulting rejuvenated acid; (3) reclaim anions such as nitrates and fluorides as acid from wastes by distillation; and (4) produce a residual sulfate waste with low concentrations of nitrates, heavy metals, and radionuclides.

In addition, a Waste Reduction Bulletin Board is under development to facilitate the exchange of ideas, successes, and failures in implementing various aspects of waste reduction programs. The bulletin board allows the reader to "post" issues, suggestions, or ideas. In response, other users may respond to the "posted" items. If the issue generates

TABLE I
Summary of Department of Energy Defense Programs Installation
Hazardous and Mixed Waste Minimization Programs.

Installation	Employee involvement program	Procurement control	New Project control	Chemical Exchange Program	Chargeback system	Tracking system	Program coordination/ participants	Contaminated Lead Program
ORNL	X	X	X	X	X ^a	X	X	X
LANL	P	P	X	X	b		X	X
RFP	X	X	P	b		P	X	
WHC	X		X	X	X	P	X	P
SRP	X	P		P		P	X	X
FMPC	X	P	X ^c		P	X	X	
INEL	X	X	P	X	X	X	X	X
Pinellas	X		P	X			X	
LLNL	X	P	X ^c		P		X	X
SNLA	X			X	P ^d	P		
Mound	P			P		P		
Pantex	X	P		X				P
SNLL		X	X ^c					
Allied KC	X	P		X		P	P	

NOTE: This table is meant to serve strictly as a summary of individual activities. It does not assess the degree to which each strategy has been implemented and is not intended to direct future activities or strategies.

LANL - Los Alamos National Laboratory, FMPC - Feed Materials Production Center (Fernald), INEL - Idaho National Engineering Laboratory, KC - Kansas City, LLNL - Lawrence Livermore National Laboratory, MSDS - Material Safety Data Sheets, ORNL - Oak Ridge National Laboratory, RFP - Rocky Flats Plant, SARA - Superfund Amendments and Reauthorization Act, SNLA - Sandia National Laboratory-Albuquerque, SNLL - Sandia National Laboratory-Livermore, SRP - Savannah River Plant, WHC - Westinghouse-Hanford Corporation, Y-12 - Y-12 Plant (Martin Marietta Energy Systems, Inc.).

^a Considers toxicity.

^b Has been evaluated, not to be implemented.

^c Administered informally.

^d Will evaluate "front-end" loading of waste management costs to purchase.

P = Planned activity

X = Existing program

significant input, a summary can be written and a general consensus formed on the issue.

The HAZWRAP SCO will continue to provide technical support and information services to DOE-HQ, Operations Offices, and contractor organizations.

FUTURE ACTIVITIES

Future waste reduction activities will include a review of site waste reduction program plans to ensure consistency

between facilities, setting of waste reduction goals and schedules for their achievement, establishment of a reporting system to take advantage of all waste reduction successes, consideration of budgeting requirements for waste reduction activities, and continued use of technology and information exchange.