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IMPACTS OF DOE ORDER 5820.2A ON OAK RIDGE NATIONAL LABORATORY

by

Sharon M. Robinson
Chemical Technology Division
Oak Ridge National Laboratory*
Oak Ridge, Tennessee 37831

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INTRODUCTION

The Department of Energy (DOE) is responsible for promulgating regulations, guidelines, and performance standards relative to the operations of DOE facilities. DOE establishes orders and guidelines for the conduct of operations at contractor-operated sites which manage radioactive, hazardous, and mixed waste. These sites are regulated through DOE Orders which are written, implemented, and enforced through DOE Headquarters in Washington, DC. In addition, DOE sets the policy for complying with applicable public laws.

Waste management activities in general have been subjected to increased scrutiny over the past eight years. Federal and state laws and regulations covering all aspects of hazardous and radioactive waste management have been promulgated. As state and federal regulations have become increasingly strict, DOE sites have been exempt from the restrictions imposed on their neighboring industrial plants. In addition, the news media has begun to focus on DOE's past waste management practices which have led to environmental contamination problems at various sites throughout the United States. As a result, DOE has received criticism for the manner in which it regulates its own waste and environmental management activities. Meanwhile, technical advancements have been made to allow more effective waste treatment and isolation from the environment. These criticisms and technical advancements have prompted DOE to pass several new orders containing much stricter requirements for waste handling, treatment, and disposal.

Although these new policies will have far-reaching effects on most DOE sites, this paper will focus on the details of DOE Order 5820.2A and its impact on waste management operations at Oak Ridge National Laboratory (ORNL). DOE Order DOE 5820.2A establishes policies and guidelines for the management of radioactive waste and contaminated facilities.

In contrast to its predecessor, DOE Order 5820.2A is quite prescriptive and "puts the teeth into" previously generic guidelines for radioactive waste management at DOE facilities. It is being seen as DOE Headquarter's attempt to prove to the federal government and environmental regulatory agencies that it is competent to regulate waste management practices at its own sites. Details of the DOE Order and its impact on ORNL are discussed in the remainder of this paper.

DOE ORDER 5820.2A REQUIREMENTS

DOE Order 5820.2A, issued in September 1988, establishes "policies, guidelines, and minimum requirements by which the Department of Energy manages its radioactive and mixed waste and contaminated facilities." The Order specifies "the generation, treatment, storage, transportation, and/or disposal of radioactive wastes, and the other pollutants or hazardous substances they contain, shall be accomplished in manner that minimizes the generation of such wastes across program office functions and complies with all applicable Federal, State, and local environmental, safety, and health laws and regulations and DOE requirements." Specific requirements are summarized below.

High-Level Radioactive Waste

The Order specifies that liquid and solidified high-level radioactive waste be characterized by chemical composition, physical properties, radionuclide concentration, and pH which are to be documented in a safety analysis report. All active high-level waste handling, transfer, and storage facilities are to be doubly contained, shall be equipped with cathodic corrosion protection systems, and have monitoring and leak detection capabilities. Contingency plans for emergency situations and spills, operator training programs, and quality assurance programs are required. Waste minimization programs must be implemented and all waste generation/management systems must be technically assessed to assure compatibility and retrievability. Solidification and disposal requirements are also specified.

Transuranic Waste

DOE Order 5820.2A specifies that all wastes containing transuranic radioisotopes should be processed to meet the Waste Isolation Pilot Plant (WIPP)-Waste Acceptance Criteria, packaged according to Department Of Transportation requirements, and transported to WIPP for permanent disposal. Generators are required to implement technical and administrative controls for reducing gross volume and/or amount of radioactivity requiring disposal. Quality assurance plans are also required. Mixed transuranic waste shall be treated, where feasible and practice, to destroy the hazardous waste component. Interim storage facilities at the generator sites must meet RCRA regulations. Inactive waste sites containing buried transuranic wastes must be closed according to NEPA, DOE, EPA, and State requirements.

Low-Level Radioactive Waste

DOE requires performance assessments, waste minimization programs, waste characterization, and waste acceptance criteria for low-level radioactive waste (LLW) facilities. Each DOE reservation is required to prepare and maintain an overall waste management systems performance assessment supporting waste management practices used in generation reduction, segregation, treatment, packaging, storage, and disposal of LLW. Technical and administrative controls shall be directed at reducing the gross volume of waste generated and/or the amount of radioactivity requiring disposal. All DOE LLW generators are required to establish auditable programs (goals, incentives, procedures, and reports) to assure minimization of LLW and to separate uncontaminated waste from radioactive waste to facilitate cost effective treatment and disposal. All new processes or process changes must be reviewed for waste minimization.

Low-level waste must be characterized with sufficient accuracy to permit proper segregation, treatment, storage, and disposal. The actual physical and chemical characteristics and the concentrations of major radionuclides must be known during all stages of the waste management process. Waste characterization data must also include volume, weight, and packaging data.

Waste acceptance criteria must be established for each LLW treatment, storage, and disposal facility. Waste certification programs must be implemented to provide assurance that the waste acceptance criteria for any low-level waste treatment, storage, or disposal facility used by the generator are met.

DOE reservations are required to implement waste treatment techniques to reduce volume and provide more stable waste forms. Waste treatment techniques which increase the life of disposal facilities and improve long-term facility

performance, by improved site stability and reduction of infiltrating water, are required to the extent that they are cost effective. Operating and maintenance procedures, personnel training programs, monitoring and emergency response plans and tracking records are required for all treatment facilities.

Long-term storage and disposal programs must be developed for specific waste types and for specific waste compositions for each disposal site through performance assessment models. Additional disposal requirements specify waste disposal containers; require elimination of free liquids, explosive, and pyrophoric materials; and define the amounts of radionuclides in waste which meet below-regulatory-concern levels.

Environmental monitoring and quality assurance programs are required for each LLW treatment, storage, and disposal facility. Each organization is also required to keep historical records of waste generated, treated, stored, shipped, and/or disposed of. Reports should track each waste package from generator through final disposal and shall document proper classification, and assist in determining proper treatment, storage, and disposal of the waste.

Naturally Occurring and Accelerator-Produced Radioactive Material

Small volumes of DOE waste containing naturally occurring and accelerator-produced radioactive material will be managed as LLW. Large quantities of such materials will be disposed of in specially designated DOE sites or tailing disposal sites according to 40 CFR 192 and the Uranium Mill Tailings Radiation Control Act of 1978. Mixed wastes will be treated as RCRA wastes.

Decommissioning of Radioactively Contaminated Facilities

Field organizations must maintain lists and operational records of all contaminated facilities which are either in operation or in excess.

Facilities must be placed in safe storage conditions, have surveillance and maintenance equipment, and must have decommissioning plans developed for them when they become excess. Decommissioning plans will include (1) physical, chemical, and radiological characterization data; (2) a summary of decommissioning alternatives; (3) plans for meeting requirements of environmental review teams and obtaining all necessary permits; (4) projections of occupational exposure; (5) estimates of radioactive waste to be generated by decommissioning activities; and (6) detailed administrative, cost, schedule, and management information.

Waste Management Plan Outline

Among its considerable documentation requirements, DOE Order 5820.2A requires an implementation plan, due in April 1989, which assesses each installation's compliance status and describes how noncompliances will be remedied. An annual waste management plan, due each December, will address treatment, storage, and disposal of all types of radioactive and hazardous wastes and update the installation's compliance status. It will include how waste management operations are conducted and documented, what facilities are being used to manage wastes, what forces are acting to change current waste management systems, and what plans are in store for the future. The document will be used by DOE to determine if waste management operations are being conducted within the framework of the Order and if appropriate supporting documentation is being provided.

IMPACTS ON OAK RIDGE NATIONAL LABORATORY

The most significant impacts of DOE Order 5820.2A on ORNL operations are summarized below. The order requires performance-based assessments of the

complete collection, treatment, storage, and disposal systems for waste streams which contain radioactive materials. Waste operations which do not meet specific performance criteria must be upgraded or shut down. ORNL must develop formal comprehensive waste minimization programs for each type of waste, implement waste classification systems, and optimize waste treatment systems. Documentation will be required to track waste (of known composition) from the generating source through the waste handling/treatment operations.

Many of these programs are in place at ORNL for solid radioactive, transuranic, and RCRA wastes. Similar programs must now be implemented for biological, medical, infectious, and/or liquid radioactive wastes. The approach that ORNL is using to meet these new requirements is discussed below.

A new waste minimization policy has been adopted by ORNL management which expands waste minimization efforts from hazardous wastes to reducing all types of wastes to levels that are as low as reasonably achievable (ALARA). The objective of the waste reduction program are to eliminate or minimize the generation of wastes, particularly those which present a potential danger to employees, the public, or the environment. These objectives may be accomplished through recycle, reuse, substitution, segregation, and process innovation. Waste minimization will be practiced during all activities at ORNL, and this principle will be incorporated into the design of all new ORNL projects and/or processes. An approved project waste management plan will be required for each new ORNL project which addresses the characterization, segregation, packaging, disposal requirements, and transport of all anticipated wastes. Control and monitoring of waste generation activities will be established through waste certification programs, waste tracking systems, environmental documentation for new projects, and other activities as

necessary. Procedures and guidelines for personnel who generate or handle wastes and for waste treatment facilities will be established. Reinforcement will be provided through regular training programs.

Research, development, demonstration, and construction projects are under way to define and implement improved treatment processes for liquid radioactive and hazardous wastes. A Nonradiological Waste Treatment Plant is being installed to remove heavy metals and organics from process wastewater. Flowsheets for an improved Process Waste Treatment Plant are being developed for more efficient removal of Cs-137 and Sr-90 from slightly contaminated wastewaters. Processes are being developed to treat, solidify, and package low-level radioactive and/or transuranic liquid waste streams.

The low-level liquid waste (LLLW) collection and transport (CAT) system is being upgraded to met DOE Order 5820.2A standards for LLW storage systems. Three capital projects totaling $88 million are being implemented to provide double-contained, cathodically protected, pressure testable, remote-handled LLLW piping and tanks for the major portions of the CAT system. Portions of the CAT which do not meet these requirements will be deactivated by these projects and will be closed through the remedial action program.

Formal characterization, documentation, and tracking programs are being initiated for processes that generate liquid waste streams. The data from these characterization and tracking programs will be used as input for an ongoing liquid waste systems analysis to technically evaluate the liquid waste system upgrades which should result in best management practices and reduced waste generation rates. The data will also be used to formally develop waste acceptance criteria for each liquid waste treatment facility. On-line

monitors and control systems will be used to segregate wastewaters by concentration of radionuclides, heavy metals, and regulated chemicals.

In order to meet performance-based criteria in the DOE Order, ORNL will implement structured, auditable waste classification and segregation systems for on-site handling of wastes. Certification programs will be implemented to assure that wastes are properly segregated, treated, and disposed of. Training programs for generators and waste-handling personnel will be the backbone of the ORNL certification program.
Appropriate personnel will be trained in proper segregation, minimization, and handling techniques for each type of waste generated at ORNL.

Generator certification officials (GCO) will be identified for each waste-generating area. These GCOs will be responsible for assuring that their personnel have received waste management training. The generators, the GCOs, and their management will be responsible for violations of waste management guidelines. The GCOs will also provide the basic information for waste characterization, segregation, source reduction, and treatment required for tracking purposes and system analyses.

A classification system for solid radioactive waste is also being developed which defines waste categories by radionuclide concentrations. Detailed packaging, transportation, storage, and disposal restrictions will be developed for each category of waste based on the environmental and health hazard, leachability, and transportability associated with each radionuclide. This classification system will require elimination of current "suspect" waste of unknown composition.

An auditable waste minimization program will be implemented which will eventually include training of all waste generators, making local waste

minimization GCOs and their management responsible for implementing waste minimization practices in their groups and promoting employee participation through the use of posters, employee suggestions, contests, and awards. The chargeback of waste collection, treatment, and disposal costs to the waste generators will also promote waste minimization activities.

The waste certification/tracking program will greatly increase waste characterization requirements at the source of generation. Detailed analyses for radioactive and hazardous components will be required for tracking and segregation purposes in treatment systems. The general composition of the nonhazardous components in each waste stream will also be required in order to determine if the stream meets the waste acceptance criteria for treatment facilities. The generator will be required to document waste generation rates and segregation techniques. They will also be forced to implement ALARA procedures to minimize waste generation and personnel exposures.

Some waste streams which are presently generated at ORNL will no longer be handled in the existing treatment/disposal facilities. These waste streams will have to be eliminated by changes in the generators' processes, construction of new treatment/handling facilities, or implementation of off-site disposal options.

SUMMARY

DOE Order 5820.2A establishes DOE's waste management philosophies which include waste classification systems and system optimization concepts. It requires performance-based assessments of radioactive waste systems for all DOE sites. It also requires formal, comprehensive waste certification and minimization programs for these wastes. Implementation of the Order will

greatly impact ORNL waste management operations and waste generator activities. Increased waste management costs are inevitable, with an increasing share being borne by the generators.