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HAZARDOUS MATERIALS MANAGEMENT AND CONTROL PROGRAM AT
OAK RIDGE NATIONAL LABORATORY - ENVIRONMENTAL PROTECTION

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Abstract

In the Federal Register of May 19, 1980, the U.S. Environmental Protection Agency promulgated final hazardous waste regulations according to the Resource Conservation and Recovery Act (RCRA) of 1976. The major substantive portions of these regulations went into effect on November 19, 1980, and established a Federal program to provide comprehensive regulation of hazardous waste from its generation to its disposal.¹ In an effort to comply with these regulations, a Hazardous Materials Management and Control Program was established at Oak Ridge National Laboratory. The program is administered by two Hazardous Materials Coordinators, who together with various support groups, ensure that all hazardous materials and wastes are handled in such a manner that all personnel, the general public, and the environment are adequately protected.

INTRODUCTION AND BACKGROUND

The congressional enactment of the Resource Conservation and Recovery Act (RCRA) of 1976 restricted what can be done with waste by-products with defined hazardous characteristics. Approximately 700,000 generators, transporters, and disposal site operators are affected by this law and its subsequent regulations.² The complexity of these regulations has stimulated many questions, some of which will not be answered until time and human ingenuity change the circumstances, but because of the urgency of the problem, the proper management of hazardous wastes must be dealt with now.

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Prior to enactment of RCRA in 1976, the management of hazardous wastes was closely integrated with the solid waste disposal industry. More often than not, local municipal landfills served as "dumping grounds" for both types of wastes. In many instances, this improper management of hazardous waste resulted in the leaching of toxic materials from these landfills and the contamination of groundwater -- the source of drinking water for about half of the U.S. population. The Environmental Protection Agency (EPA) has on file hundreds of documented cases of damage to life and the environment, resulting from the indiscriminate and/or improper management of hazardous wastes. EPA has identified 400 "top priority" sites designated for clean-up under Superfund. However, hundreds of other such sites are known to exist, and the numbers of unknown areas are even greater. The search for abandoned sites will be a continuing process.

In May 1980, the EPA, as required by RCRA of 1976, took steps to establish a national hazardous waste management system. Since November 19, 1980, the compliance date of these regulations, many problem areas have surfaced for individuals involved in the management of hazardous wastes. At Oak Ridge National Laboratory (ORNL), these problems are enhanced due to ongoing research activities at this facility. Many of the chemicals, utilized by the various laboratories at ORNL, are regulated by EPA/RCRA and are considered hazardous, either because they are listed wastes from nonspecific or specific sources or a commercial product. Other wastes are considered hazardous because of specific characteristics (e.g., ignitable, corrosive, reactive or EP toxic).

HAZARDOUS MATERIALS PROGRAM

In an attempt to respond to the many definitions of hazardous materials and their ever increasing multitude of legal requirements in a uniform, orderly manner, a Hazardous Materials Management and Control Program was established at the Laboratory. Its mission is to simplify

the responsibilities of the Laboratory staff when dealing with hazardous materials and to make every effort to comply with all applicable laws and regulations.

The Hazardous Materials Program is administered by two Hazardous Materials Coordinators -- a Hazardous Materials Coordinator for environmental protection (HMC-Environmental) and a Hazardous Materials Coordinator for health protection (HMC-Health). The HMC-Environmental is concerned with the storage, transportation, and disposition of hazardous materials/wastes, while the main areas of concern to the HMC-Health is the procurement and use of these materials. Prior to the establishment of the program, the user of hazardous materials at ORNL was required to make numerous personal contacts with the various Laboratory departments responsible for the materials: Health Physics, Fire Safety, Industrial Safety, Industrial Hygiene, Environmental Management, and others. With the implementation of this program, the user contacts only the Hazardous Materials Coordinators for any information he/she may require concerning hazardous materials. The other departments now serve as support groups and provide information in their areas of expertise to the Hazardous Materials Coordinators upon request (Figure 1).

In order to accomplish the above stated mission of the program, guidelines for the procurement, use, storage, transportation, and disposal of hazardous materials/wastes were established. These guidelines have been incorporated into a manual which is available to all Laboratory personnel. To ensure that Laboratory personnel are familiar with and abide by the guidelines and procedures set forth by the program, each division at the Laboratory has appointed an individual to serve as the Environmental Protection Officer (EPO) for his/her respective division. Via the EPO, the Hazardous Materials Coordinator and his department are kept informed of hazardous materials activities in all divisions at the Laboratory. This is very important since several divisions which are controlled by the program are not on-site, but at distant locations.

DISCUSSION OF PROGRAM - ENVIRONMENTAL PROTECTION

Storage of Hazardous Materials/Wastes

The HMC-Environmental has been delegated certain responsibilities by the program to ensure the proper storage, transportation, and disposal of hazardous materials/wastes.

At Oak Ridge National Laboratory, large numbers and quantities of hazardous materials and/or wastes must be retained for use or disposition at a later time. During this "holding period", precautions must be taken to protect Laboratory personnel and the environment. The Hazardous Materials Coordinator, with assistance from the appropriate support groups, ensure that hazardous materials are stored according to established guidelines (OSHA, RCRA, ORNL Safety Guidelines for Chemical Storage, etc.). Such parameters as material classification by hazard group (e.g., organic acids, inorganic acids, flammable liquids, reactive materials, etc.), separation based on chemical compatibilities, shelf life, and other special storage requirements are examined. There are two areas of hazardous materials storage at ORNL which are of concern. One is the storage of hazardous chemicals within individual laboratories and the other is the storage of hazardous wastes, destined for off-site disposal, in a centralized facility.

Hazardous materials stored in the typical research laboratory consist mainly of virgin laboratory reagent chemicals, both hazardous and nonhazardous. Improper storage of these chemicals with waste chemicals can create serious safety, health, environmental, and disposal problems. Additionally, improper waste storage can contribute heavily to unnecessary costs in clean-up, repacking, identification, and disposal. In an effort to deal effectively with the above-mentioned problems associated with chemical storage in the individual laboratory, a laboratory inspection program was initiated by the Department of Environmental Management. The inspection of individual laboratories is a means of ensuring that established

storage guidelines set forth by the Hazardous Materials Program are followed. It also presents the opportunity to identify potential environmental problems (e.g., possible spill areas within the lab; the identification of old, unused chemicals in need of disposal; proper storage of virgin chemicals; proper waste segregation and storage; and the identification of hazardous chemicals with expired shelf-life) which may be corrected before serious situations might occur.

The Federal RCRA of 1976 provided specific design and operating standards and permit requirements for the storage of hazardous wastes. At ORNL, the storage of hazardous wastes involves many of the safety considerations presented above for the storage of hazardous chemicals. In addition, specific RCRA requirements pertaining to storage building security, weekly inspections, and the development of plans for emergency response and spill clean-up, must be met.

After positive identification at the point of generation, hazardous wastes are transported to a centralized storage facility. Here they are segregated into their particular hazard class (poison, corrosive, flammable liquid or solid, oxidizer, etc.) and packaged according to the U.S. Department of Transportation (DOT) regulations. The greatest majority of wastes remain in storage for a short time; however, there are some for which no treatment and/or disposal method is currently available. The fact that some wastes must be stored indefinitely makes the aspect of proper storage all the more important.

Transportation of Hazardous Materials/Wastes

The movement of hazardous materials/wastes is governed by specific U.S. Department of Transportation (DOT) and EPA requirements. Compliance with these regulations must be met regardless of the mode of transportation (e.g., roadways, water, air). Under RCRA, EPA issued standards for hazardous waste transporters which prescribe procedures for recordkeeping, acceptance of waste, manifest system compliance, and delivery and spill clean-up. RCRA specifically notes

that these standards are to be consistent with those developed by DOT under the Hazardous Materials Transportation Act of 1974. Although the DOT regulations were not intended to govern transportation of hazardous wastes, but rather the shipment of pure, virgin hazardous materials, the EPA transporter regulations require that when a material is a hazardous waste as defined by EPA, then DOT regulations must be complied with for intrastate and interstate transportation of hazardous wastes.

The transportation of hazardous materials/wastes between ORNL and other Oak Ridge Operations facilities and to facilities outside the Oak Ridge Operations area is governed by regulations set forth by DOT and EPA and standard practice procedures mandated by Union Carbide - Nuclear Division management. Before a shipment of hazardous materials can be offered to a permitted transporter, it is the responsibility of the generator to identify his/her material. Once identification is made, the material is properly containerized, the appropriate hazard class and correct hazardous material shipping name is selected per specifications of applicable regulations. No further information is required if only hazardous materials are being transported. The vehicle is placarded for the type material it is carrying, and the required shipping papers accompany the shipment during transport.

Materials considered to be hazardous by the EPA/RCRA guidelines, i.e., they are a listed hazardous waste or are hazardous due to some unique characteristic, require a detailed manifest shipping document for transportation (Figure 2). Besides the information that is needed for the shipment of hazardous materials (e.g., hazardous class, proper shipping name, etc.), the manifest also identifies the hazardous waste generator, the licensed transporter or carrier, and the treatment/storage/disposal (TSD) facility for which the waste is destined. By identifying all parties involved, the proper management of the hazardous waste can be better ensured.

Disposal of Hazardous Waste

The final phase of the Hazardous Materials Management and Control Program is the disposal of the waste materials generated by the

facilities. It is the responsibility of the HMC-Environmental to ensure that all hazardous wastes, which cannot be further utilized, processed, or recycled, be disposed of in an environmentally safe manner (Figure 3).

RCRA regulations governing hazardous waste management, have specific operating standards with which owners and operators of treatment, storage, and disposal facilities (TSDF) must comply. As a minimum, these standards assure that the facilities operate safely, both from a personnel and environmental standpoint.

ORNL is permitted, under RCRA interim status, as a storage and treatment facility. Hazardous wastes which must be disposed of via the secure landfill route are transported off-site to a commercial facility for ultimate disposal. Approximately 75-80% of the Laboratory's total hazardous waste is general laboratory chemicals ranging from gram to gallon quantities. Disposal costs vary, depending on the hazard nature of the chemical waste.

The management of hazardous waste means more than careful disposal. It implies the consideration of alternate methods to reduce the amount and the hazardousness of the wastes. Reuse, energy recovery, and material recovery are desirable alternatives to chemical landfill disposal. Several projects dealing with waste separation and concentration, energy/material recovery, and waste incineration are currently under study at the Oak Ridge facilities. One such project has been the development of a highly efficient recovery system for silver recovery from photographic and photoreproduction operations at the Laboratory. The process is also able to destroy cyanide ions which are contained in some of the silver-bearing wastes. By eliminating the hazardous constituents in this waste stream, we are able to legally discharge the remaining solution into on-site sewage treatment facilities. Other waste streams are being investigated as possible candidates for detoxification processes and for material recovery.

CONCLUSIONS

The management of hazardous materials/wastes is very complex. There is probably no issue in the media about which more is said and less understood. Past episodes, e.g., Love Canal, Valley of Drums and numerous others, have focused attention on what can happen when hazardous waste is managed improperly. In many cases, the technology has existed for environmentally sound management, but because of high costs and/or no legal requirements, this technology has not been widely used.

At ORNL every effort is being made to comply with all laws and regulations governing hazardous materials/wastes with the least possible impact on research activities. The Hazardous Materials Management and Control Program has been instrumental in accomplishing this goal.

ACKNOWLEDGEMENTS

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REFERENCES

1. U.S. Government Printing Office, "Hazardous Waste and Consolidated Permit Regulations," Federal Register, 45, May 19, 1980.
2. U.S. Environmental Protection Agency, Everybody's Problem: Hazardous Waste, 1980.

Figure 1. Former and Present User/Departmental Interaction

HAZARDOUS WASTE MANIFEST

OAK RIDGE NATIONAL LABORATORY

MANIFEST DOCUMENT NO.
PAGE 01

GENERATOR/SHIPPER INFORMATION		TRANSPORTER INFORMATION		TREATMENT/STORAGE/DISPOSAL FACILITY	
NAME		NAME		NAME	
ADDRESS		ADDRESS		ADDRESS	
EPA ID NUMBER		EPA ID NUMBER		EPA ID NUMBER	
CONTACT		CONTACT		CONTACT	

WASTE INFORMATION							
HM	PROPER DOT SHIPPING NAME	HAZARD CLASS	UN NO. OR NA NO.	TOTAL QUANTITY	TYPE OF CONTAINER	CONTAINER NUMBER	OTHER INFORMATION

COMMENTS/SPECIAL HANDLING INSTRUCTIONS

SHIPPER'S CERTIFICATION			T/S/D FACILITY CERTIFICATION		
<p>This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation and the EPA.</p>			<p>This is to certify that the above-named materials were delivered to this facility, and that any differences between manifest and shipment, or any rejected materials, have been indicated in the "Comments" section of this manifest.</p>		
SHIPPER (GENERATOR) AUTHORIZED REPRESENTATIVE			T/S/D FACILITY AUTHORIZED REPRESENTATIVE		
NAME	SIGNATURE	DATE	NAME	SIGNATURE	DATE
TRANSPORTER AUTHORIZED REPRESENTATIVE					
NAME	SIGNATURE	DATE			

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WHITE → GENERATOR (CONTINUATION COPY)
 GREEN → GENERATOR
 CANARY → TRANSPORTER
 PINK → T/S/D FACILITY
 BLUE → (RC DEPT OF ENVIRONMENTAL MANAGEMENT ORNL G 260 45005)
 BLUE → CONTAINER

Figure 2. Hazardous Waste Manifest

Figure 3. Management Scheme for Hazardous Wastes