



CASE STUDY 2:
HAZARDOUS WASTE
CHARACTERIZATION AT A DOE
LABORATORY TREATMENT AND
STORAGE FACILITY

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SITUATION AND BACKGROUND

The DOE Hypothetical National Laboratory (HNL) is located about 15 miles from a city of 3 million people, and, although originally built in a rural, remote area, is now adjacent to a rapidly growing suburban population. The HNL is located on 5 square miles of land, much of which is forested. The HNL supports a variety of research programs in nuclear non-proliferation, energy, environmental science, physics, biomedicine, and other scientific and technical fields.

Because HNL is a research facility, it generates a wide variety of waste streams, many of them hazardous. HNL's hazardous waste generation and management is regulated by the State's Department of Environmental Quality under the State's RCRA authority delegated from EPA. In general, the State's hazardous waste regulations are more stringent than the Federal RCRA program.

THE PROBLEM

Under RCRA Subtitle C (the hazardous waste management program), waste generators and facilities that treat, store, or dispose of hazardous waste must be able to properly identify and characterize wastes and waste streams they are generating or managing. Proper waste characterization is necessary to meet RCRA requirements for labeling, packaging, storing, segregating, and disposing of waste. Waste characterization is also necessary for the health and safety of workers generating or handling the waste. For RCRA treatment, storage or disposal facilities (TSDFs), one of the requirements for being granted a waste management permit (a "Part B" permit) is a demonstrated ability to properly characterize hazardous waste entering and being managed by the facility.

Under RCRA, waste can be characterized in either of two ways. Samples can be taken and analyzed (according to strict EPA-approved protocols), or the waste can be characterized through "acceptable knowledge." Acceptable knowledge includes "process knowledge," whereby detailed information on the waste is obtained from existing published or documented waste analyses data or studies conducted on hazardous waste generated by processes similar to that which generated the waste. For example, nickel electroplating generally produces a certain kind of hazardous waste. Nickel electroplating firms need not sample each batch of waste electroplating liquid, they can simply assume that the resulting waste has certain characteristics, and manage it accordingly.



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However, unlike most industrial waste generators, DOE laboratories, by nature of the research work they do, continually generate new wastes and waste streams. Indeed, the HNL manages more different kinds of hazardous waste in a year than any other permitted hazardous waste management facility in the state. HNL generates hazardous waste from nuclear, chemical, physical, and biomedical research, from metal fabricating and finishing processes, from materials testing, from vehicle and facility maintenance operations, and a variety of other activities.

At HNL, hazardous waste is stored for up to 90 days in several Waste Accumulation Areas located throughout the site, and then transported to the on-site hazardous waste management facility. At the facility, some waste processing occurs (for example, neutralization of acid wastes and bulking of compatible wastes), and wastes are stored for up to one year for off-site disposal. HNL does not dispose of any waste on site. The HNL's hazardous waste management facility operates under a "Part A" permit (interim status under the RCRA regulations), and has applied for a long-term, Part B permit.

CLASS DISCUSSION

In preparation for the class discussion, think about how to design a system for characterizing wastes before they enter HNL's hazardous waste management facility. Keeping in mind the four issues listed below, balance characterization costs with HNL's need to assure regulators that it really does know what kinds of wastes it is receiving, and managing at its on-site hazardous waste management facility.

The issues are:

1. In applying for its Part B permit (to operate a hazardous waste management facility), HNL must assure the State DEQ that the Lab can properly characterize its waste.
2. The regulations require waste characterization by either process knowledge (from regular, recurring processes), or sampling. HNL generates many one-time, non-recurring wastes.






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3. Because HNL generates about 1,500 tons of hazardous and mixed waste a year, using sampling as the sole method of determining waste characteristics would be prohibitively expensive (a single sample can cost as much as \$1,000 to analyze).
4. On the other hand, relying exclusively on process knowledge would require all HNL scientists and technicians (waste generators) to become experts in predicting waste streams from research projects, and in understanding, interpreting, and applying complex RCRA hazardous waste regulations.

Failure to assure state regulators of proper characterization policies and procedures could lead to non-approval or revocation of the Part B permit—which would likely close HNL for a significant period of time, if not permanently. Moreover, violations of RCRA regulations, or permit conditions can result in fines of up to \$25,000 per occurrence, plus incarceration.

Hints

-  Many research programs conduct on-going research in a limited technical area.
-  Some operations (such as vehicle maintenance shops) generate predictable wastes.
-  Not all programs or physical facilities on the site generate all possible hazardous wastes.