

CONTROL TECHNOLOGY ASSESSMENT OF HAZARDOUS WASTE
DISPOSAL OPERATIONS IN CHEMICALS MANUFACTURING

WALK-THROUGH SURVEY REPORT

OF

CHEMICAL WASTE MANAGEMENT, INC.
EMELLE, ALABAMA

SURVEY CONDUCTED BY:
Mazen Anastas, Ph.D.
Michael S. Crandall

DATE OF SURVEY:
February 23, 1982

REPORT WRITTEN BY:
Mazen Anastas, Ph.D.

DATE OF REPORT:
August 1982

REPORT NO.:
103-16a

National Institute for Occupational Safety and Health
Division of Physical Sciences and Engineering
Engineering Control Technology Branch
Chemical Industry Section
Cincinnati, Ohio 45226

PURPOSE OF SURVEY:

To conduct a preliminary study of hazardous waste disposal operations in chemicals manufacturing with a view to documenting exemplary controls.

EMPLOYER REPRESENTATIVES CONTACTED:

Rodger Henson, Assistant Plant Manager
Chip Meder, Industrial Hygiene
Jim Buckley, Chemist

EMPLOYEE REPRESENTATIVES CONTACTED:

None

STANDARD INDUSTRIAL CLASSIFICATION
OF PLANT

Refuse Systems Industry
(SIC 4953)

INTRODUCTION

The Resource Conservation and Recovery Act (RCRA) (PL-94-580) of 1976 was enacted to provide technical and financial assistance for the development of management plans and facilities for the recovery of energy and other resources from discarded materials, for the safe disposal of discarded materials, and to regulate the management of hazardous waste. Under Subtitle C of RCRA, the Environmental Protection Agency (EPA) was required to promulgate regulations on identification and listing of hazardous wastes and regulations affecting the generators, transporters, and owners/operators of facilities for the treatment, storage, and disposal of hazardous wastes. These regulations appeared in the Federal Register on May 8, 1980. Amendments affecting the listing of hazardous wastes appeared in the Federal Register November 12, 1980.

There are between 35 and 60 million tons of hazardous wastes generated annually, of which, about 15 million are generated by industries in the Chemical and Allied Products Sector (SIC 28). These wastes contain toxic substances which may also be carcinogenic, mutagenic, and teratogenic. Some of the companies in SIC 28 treat, store, and dispose of the wastes that they generate. Wastes may also be transported to companies who specialize in the treatment, storage, and disposal of these wastes. This group of companies is classified as "Refuse Systems" (SIC 4953). It is estimated that about 6,200 workers are directly involved in the transportation, treatment, storage, and disposal of hazardous wastes from SIC 28.

There are many companies in both SIC 28 and SIC 4953 which are currently treating and disposing of hazardous wastes from chemicals manufacturing. Many of these companies also have hazard controls in place that are designed to protect the workers from known hazards, both during normal operations and during upsets or emergencies. The objective of this control technology study is to document and disseminate information on effective engineering controls, work practices, monitoring programs, and personal protective equipment. The NIOSH study will result in a technical report which will be designed to assist hazardous waste operators in their efforts to prevent worker exposures to

occupational health hazards. Furthermore, an attempt will be made to present a spectrum of available alternatives for hazard control in various treatment and disposal operations.

The implementation of RCRA regulations has created business opportunities in the area of hazardous waste treatment and disposal. This has also created employment opportunities reflected in a steady rise in the number of workers who are involved in the treatment and disposal of hazardous wastes.

The Occupational Safety and Health Act of 1970 (PL-91-596) was enacted to "assure safe and healthful working conditions for men and women." The Act established the National Institute for Occupational Safety and Health (NIOSH) in the Department of Health and Human Services. NIOSH was charged by this Act with the duty and responsibility to conduct research and develop guidance for preventing exposure of workers to harmful chemical and physical agents. In response to this legislative mandate, NIOSH has conducted major programs to document, develop, and disseminate information regarding the health effects of such agents. To complement these ongoing programs, NIOSH has instituted a major effort to prevent occupational health and safety problems through the assessment and application of control technology in the workplace.

This preliminary survey was conducted as part of a NIOSH project to assess and document effective controls in the routine disposal of hazardous wastes from chemicals manufacturing.

AUTHORITY

Two of the main policy objectives of the 1970 Occupational Safety and Health Act (PL-91-596) are to:

- o Encourage employers and employees in their efforts to reduce the number of occupational safety and health hazards at their places of employment, and to stimulate employers and employees to institute new and to perfect existing programs for providing safe and healthful working conditions.
- o Provide for research in the field of occupational safety and health with a view to developing innovative methods, techniques, and approaches for dealing with occupational safety and health.

Under Section 20 of the Act, the Secretary of Health and Human Services is authorized to conduct special research, experiments, and demonstrations relating to occupational safety and health as are necessary to explore new problems including those created by new technology.

Paragraph (d) requires the dissemination of the information obtained to employers and employees.

The National Institute for Occupational Safety and Health was established to perform the functions of the Secretary of Health and Human Services described in Sections 2 and 20 of the Act. The manner in which investigations of places of employment are conducted by NIOSH and its representatives is outline in the Code of Federal Regulations (Title 42, part 85a).

HAZARDOUS WASTES

The Chemical Waste Management (CWM) facility receives wastes in the form of solids, liquids, and semisolids of all "materials known to man." Typical species include hydrocarbons, aldehydes, chlorinated species, heavy metals, PCB's, etc. CWM is prohibited from handling radioactive materials, garbage, explosives, sulphide and cyanide containing materials, and dioxins.

The main sources of the waste are chemical and other industries in the Southeast (Louisiana, Texas, and Carolinas). The site also receives some wastes from the Northeast and West.

The PCB-containing liquids that may be handled at the site are those with flashpoints greater than 140°F and with a PCB concentration less than 500 ppm. These liquid wastes result from spills or transformers which have been drained and flushed.

About 50 "movements" or truckloads are received per day. The truck loads may consist of drums on flatbed trucks, roll-on roll-off containers, or a bulk tanker of liquids.

SITE AND PROCESS DESCRIPTION

The Emelle, Alabama, hazardous waste management facility is located in the Demopolis Chalk, a geological formation, in Sumter County. The low permeability formation is a homogeneous, clay-chalk mixture approximately 700 feet thick from the surface to the first aquifer.

Hazardous waste treatment and disposal operations include landfilling, fixation, solar evaporation, and incineration in a stationary liquid injection unit which is used for combustible liquids containing up to 10 percent chlorine. PCB's that are not treated on-site are temporarily stored in a warehouse before shipment to Mobile, Alabama, for at-sea incineration on the ship Vulcanus.

Incoming wastes are sampled to verify analyses reported on the manifest. About 8 to 10 percent of drums are sampled from top-to-bottom using the Composite Liquid Sampling Apparatus. The top of the liquid in bulk tank trucks is sampled using the same apparatus.

In situ fixation is carried out for caustic, acid, and heavy metal-containing liquids. Liquids destined for fixation are taken directly to a lagoon. The trailer is emptied directly into the pit with the end of the hose under the surface to prevent splashing. Liquid waste is then pumped from the lagoon through a pipeline and discharged into the solidification pit. There the wastes are mixed with cement kiln dust using a backhoe (Caterpillar 225) or a dragline.

Drummed wastes destined for landfilling are placed into the bucket of a front end loader which carries them and lays them down in the pit. When the cell is filled, it is covered with earth using a bulldozer and graded using a scraper.

There are a total of 175 workers on-site including administrative and clerical. The two-shift operation is carried out such that the 6:30 a.m. to 3:30 p.m. shift is by far the largest.

The incineration operation was inactive at the time of the survey.

HAZARD CONTROL TECHNOLOGY

GENERAL CONSIDERATIONS

The basic elements of control technology which are implemented to minimize or eliminate hazards in the workplace are: (1) engineering controls; (2) environmental and medical monitoring; (3) training and education that results in effective work practices; and (4) personal protective equipment. Engineering controls include ventilation, enclosure or confinement of operation, substitution of hazardous agent, process modifications, and automation.

HAZARDS

In the absence of controls, the heavy equipment operators are potentially exposed to hazardous vapors and particulates. Noise, heat stress, and fire and explosion are other potential hazards. Material handlers who sample the drums and trailers are also potentially exposed to a variety of inhalation hazards. The same is true of laboratory technicians who analyze the wastes.

ENGINEERING CONTROLS

The heavy equipment operators are protected from exposure to dust by "environmental cabs." Outside air supplied to the cab passes through a dust filter. Protection from potential fire and explosion is provided for by the institution of work practices to be described later. Personal protective equipment is exclusively used to prevent acute inhalation exposures during emergencies.

MONITORING

Air monitoring has been conducted by the company since 1980 to determine the levels and types of exposures of the various job categories. These included site (landfill) workers, laboratory workers, and maintenance shop workers.

Sampling devices used were passive monitors and charcoal tubes. The NIOSH survey team inspected some of the exposure data which show that multiple exposures to substances such as chlorinated hydrocarbons, aliphatic and aromatic hydrocarbons, alcohols, esters, and ethers have occurred at very low levels. The total mass per sample amounted to 100 micrograms per cubic meter.

Medical monitoring of employees is also carried out routinely every year or as needed. The company is sometimes involved in decontamination of plants and equipment at remote locations away from the landfill site. The workers are medically monitored after their return. The pre- and post-employment physicals include blood and urine workups to monitor various organ functions.

WORK PRACTICES

With the advent of RCRA, EPA required that all personnel be trained in recognizing and dealing with the various hazards. An initial training session at the CWM site consists of 15 to 20 workers who are given instruction in chemical hazards for 1/2 day. The training includes familiarizing the workers with hazardous waste placards for various materials (corrosive, reactive, etc.) and educating them in their health effects. Visual aids are used.

Safety meetings are held monthly with a new topic presented each month by the safety engineer. For example, the month before the NIOSH team conducted this survey, the presentation was a refresher on the use of SCBA's. CWM has the capacity for on-the-job training in the operation of heavy earth-moving equipment. The operators are trained in operating the equipment in such a manner that contact of the drummed wastes with earth-moving equipment is avoided. In instances where the drums leak or are accidentally punctured, the operators are instructed to cover them with dirt immediately.

PERSONAL PROTECTIVE EQUIPMENT

It was evident during the survey that CWM makes available to their employees a wide variety of respirators including canister-type gas masks, SCBA's, and

5-minutes escape packs. The latter are attached to equipment or placed in locations for use in emergencies. Qualitative fit tests are performed for the air-purifying respirators (half-mask) using a mercaptan as an indicator.

Hard hats, goggles, and safety shoes are required on site. Protective clothing and gloves are available for special operations such as sampling or transferring wastes.

CONCLUSIONS AND RECOMMENDATIONS

It was evident during the NIOSH survey that CWM management is concerned about the health and safety of their workers at this site. While the engineered safeguards are limited to environmental cabs in heavy earth-moving equipment, other important elements of a hazard control program are in effect, including training and monitoring programs. The use of personal protective equipment is emphasized for special operations and emergencies.

This site is a good candidate for the performance of an in-depth survey.