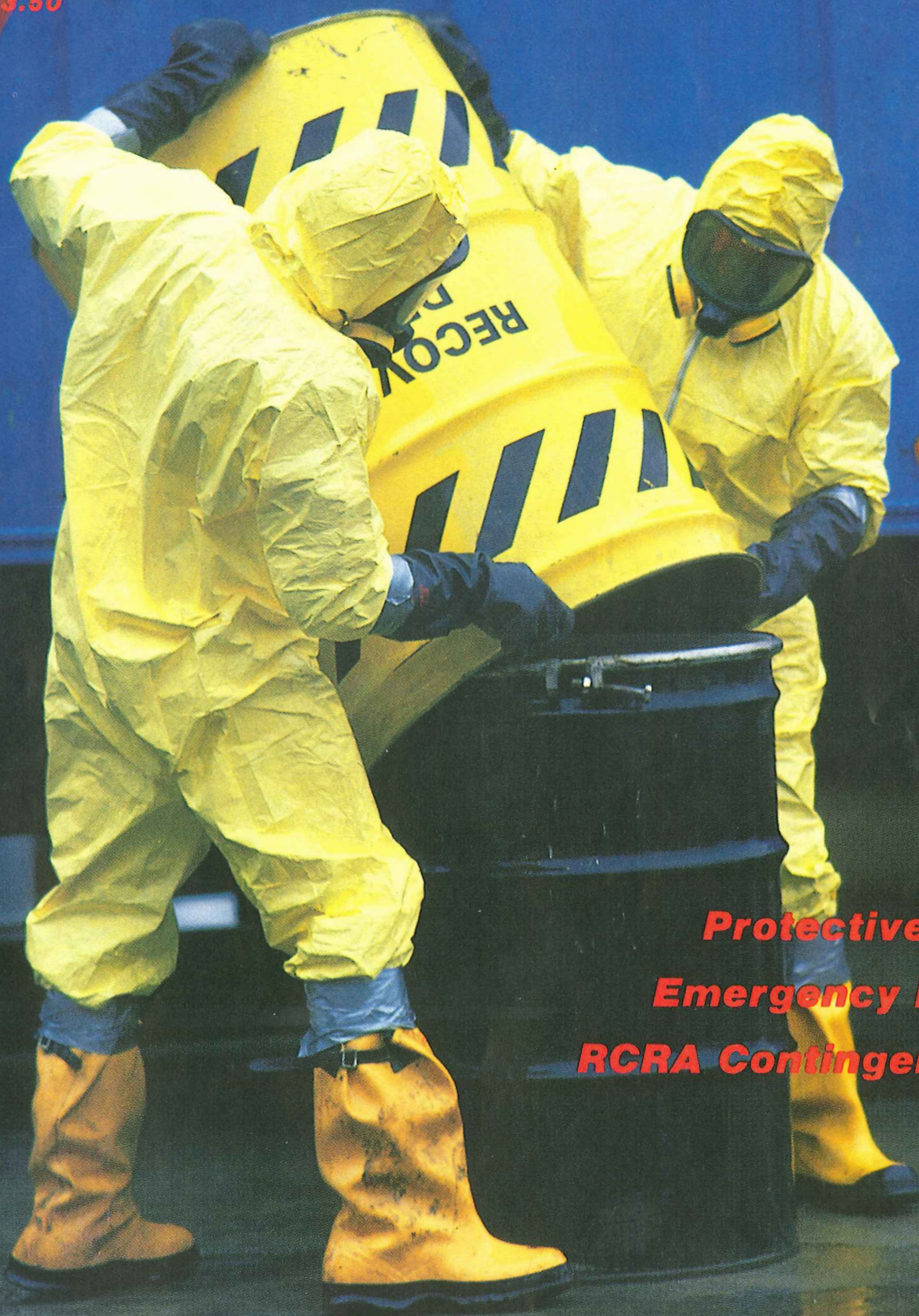


HAZARDOUS

MATERIALS & WASTE MANAGEMENT

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Protective Clothing
Emergency Response
RCRA Contingency Plans



Emergency Response Company Employs Arsenal Of Protective Clothing And Equipment To Safeguard Its Workers

By Bill Warner

At O.H. Materials Co., a Findlay-Ohio based firm specializing in hazardous materials cleanup and emergency response/environmental restoration, an array of protective clothing and equipment is deployed to protect more than 250 workers scattered throughout the U.S. Nothing is left to chance and the subject of personal protective clothing and equipment is firmly embedded in the company's safety and training programs.

Safety Basics

OHM's safety program is patterned after the U.S. Coast Guard's

Hazardous Materials Response Manual and EPA's *Interim Standard Operating Safety Procedures*, both of which represent state-of-the-art guidelines for protecting workers at hazardous waste sites. From these guidelines, we developed our response criteria into a four-part program: personnel health monitoring and training, equipment, project management and site procedures. The following is a brief description of each of these program components.

Personnel Health Monitoring And Training – All response personnel participate in a medical and health

monitoring program. Complete physical and medical histories are developed and updated regularly. A medical doctor educated in toxicology is assigned to direct and maintain the program. Consultants are retained when additional expertise is required.

Medical examinations include: visual acuity and tonometry, pulmonary function and audiometry test, electrocardiogram, chest x-ray, urinalysis, dermatology, and blood analysis. Blood samples taken during an employee's initial examination are frozen and periodically analyzed against subsequent blood tests.

In cooperation with regulatory agencies, required training is provided through a series of regular sessions attended by both new employees and experienced personnel. Experienced personnel are called upon for special demonstrations and to conduct small study groups.

New employees are instructed on the proper use of personal protective clothing and equipment, such as respiratory and hearing protection, hard hats, gloves, boots suits, etc. As they gain tenure, they are trained on other safety equipment, including air monitoring tubes and explosion and oxygen meters.

Safety and training data sheets for each employee document both the type and hours of specific training received. This ensures that all workers are adequately trained for specific job assignments.

Worker Review Serves As Double Check

Before a new worker sets foot on a cleanup site, he or she is reviewed to ensure: 1) completion of required training program; 2) safety conscious; and 3) a good general attitude toward the importance of adhering to company policies and procedures.

Daily planning and safety meetings are conducted at the project site to inform each work team of all site activities and pertinent safety considerations. Workers are encouraged to report potential and actual problems to foremen and/or supervisors during the workday, as well as during these sessions.

Hazard identification, warning and contingency plans are developed in advance and evaluated daily. Workers are constantly briefed on their involvement with these factors.

Equipment— Basic equipment inventoried at corporate headquarters and all seven regional offices includes a wide variety of body/respiratory protection to address many different types of potential hazards associated with the handling of hazardous materials and wastes. Personal protective clothing and equipment

are stocked in all decontamination trailers and mobile pollution-control units. We maintain a full inventory of replacement parts for all equipment at each site and employ factory-authorized service to repair this personal protective gear. *(See companion article on these pages for more specifics on personal protective clothing and equipment used to protect OHM workers.)*



The manufacturer, NIOSH and other government agencies provide resources for the selection of safety equipment. First-hand experiences/preferences by workers are, of course, considered when purchasing clothing and equipment. However, before any decision is made, a hazard surveillance is conducted. This surveillance represents a joint effort between the chemical manufacturer and OHM technical services, operations and the safety departments. The safety equipment is chosen according to:

1. The contaminant which has been spilled.
2. Concentration of the spilled contaminant.
3. Particular properties of the spilled contaminant.
4. Ambient condition around the site spill.

The spilled contaminant must be considered before selecting proper personal protective clothing and equipment; *i.e.* gloves, boots, suits, face shields, hard hats, respirators, etc. The concentration also dictates respiratory protection that must be worn. For instance, when high concentrations of a contaminant

are present, self-contained breathing apparatus would also be necessary. For lower concentrations, an air-filtering respirator, half or full-faced, may be adequate. The properties of the contaminant also affect the choice of safety gear as the contaminant could change when it is introduced to water, air, static electricity or other commodities. The ambient, or outside work conditions around the spill site, could change the potential hazards due to oxygen content, explosive hazards or weather conditions.

Safety Checks Performed On Equipment

All equipment is regularly checked and logged so it is always ready for use. On location, equipment is cleaned, decontaminated, and checked after each use. Another safety check is performed prior to the return of the equipment to its inventory point to ensure that no contamination remains. If required, repairs or corrections are made and logged after each check.

Project Management — The corporate safety director is responsible for all safety-related matters, including health monitoring, safety training, development and implementation of safety policies and procedures and development of project safety programs. The safety director also utilizes the expertise of others for assistance and advice on operational matters pertaining to a particular project.

Before a project starts, work sites are inspected to identify particular hazards and define site security. Hazards are evaluated for their potential effect on operations and personnel safety. This process continues on a daily basis once the project begins.

The company minimizes employee exposure to site hazards with these tools: engineering controls, organization, site control and decontamination.

Engineering controls come into play through the use of custom-designed and fabricated equipment. However, such equipment may be very specific to an individual project. In general, however, such equipment and/or procedures are designed to:

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Workers Suited For The Job

At O.H. Materials, where emergencies are a way of life, workers confront a diversity of occupational hazards. For this reason, the company stocks an array of clothing and equipment and deftly matches it to hazards/job operations.

Depending on the hazard/protection needs and in accordance with the safety program/procedures, workers wear:

Fully Enclosed Suits – Constructed of PVC on polyester, they protect against direct contact with acids and alkalis.

Acid Wear Bibs And Jackets – Constructed of PVC on polyester or nylon, they serve as splash suits and protect against direct contact with acids and alkalis.

Butyl Rubber Fully Enclosed Suits – Constructed of butyl rubber on nylon, these suits protect against direct contact with chlorinated solvents.

Rain Gear (Bibs And Jackets) – Constructed of PVC on nylon, these lightweight articles protect against dilute acids and alkalis and are usually worn over other protective clothing; *i.e.* disposal suits.

Chemical Waders – These protect against a wide variety of chemicals and allow workers to wade through pools of materials with maximum protection.

Fire Proximity Suits – Constructed of fire resistant material and fully enclosed, the suits allow wearers to work in close proximity to fire with maximum protection.

Bomb Suits – These suits provide torso, head and leg protection when transporting potential explosive materials. Constructed of heavy gauge metal, the suits give workers maximum protection.

Disposable Coveralls – Constructed of spun-bonded olefin (can be coated with polyvinylidene chloride), these suits protect against a wide variety of chemicals and can be disposed of or laundered. They are available in enclosed models with hoods and boots and are usually worn be-

neath a splash suit.

Boots – Boots constructed of natural rubber protect against acids and alkalis. Boots constructed of neoprene protect against acids, alkalis and solvents.

Gloves – Those constructed of neoprene and worn in conjunction with the acid bib and jacket are sealed to the acid jacket by means of an interlocking glove/ring assembly forming a barrier to chemical hazards. Gloves made of PVC are customarily worn over the acid gloves to protect against rips and tears. Sample gloves, worn beneath the acid or other gloves, serve as a secondary measure of protection. They are used in obtaining samples to prevent any cross-contamination.

Respiratory Protection Equipment

Self-Contained Breathing Apparatus (SCBA) – SCBA consists of a high pressure breathing air tank (5,000 psi) in conjunction with a constant pressure regulator with low pressure alarm and a low pres-

sure air hose connected to a full-face mask. The SCBA allows for 30 minutes of breathing air.

Manifold Breathing Air Supply With Egress Pack – This manifold air system consists of a constant pressure regulator, 5-minute emergency escape bottle and full-face mask. By means of a cascade system, several 100-pound bottles of breathing air are regulated into several air hoses serving to supply several workers with a constant supply of breathing air.

Full-Face Respirator – This respirator protects the worker's face and eyes from chemicals. Cartridges are selected according to potential chemical exposure.

Half-Face Respirator – This unit, combined with appropriate cartridges, protects against a variety of hazards.

General Safety Equipment

Head And Eye Safety Equipment – Hard hats, face shields and goggles are standard safety equipment offering maximum head and eye protection to workers.



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- Reduce the potential for explosions by using tools and parts made with non-sparking alloys.
- Establish barriers or shields between products and workers.
- Reduce the number or amount of handling incidents through the use of remote handling equipment.

One example of custom-designed and fabricated equipment is a barrel grappler which was developed to reduce workers' manual handling of drums containing waste/hazardous materials. It positions the operator at least 20 feet from the drums, inside the tractor's cab. Safe inside, the worker gets bolstered protection from the cab's 1-inch thick, bullet-proof, plexiglas shield, and a source of breathing air. Not only does the grappler increase project safety, but it also greatly increases productivity. Mobile fume scrubbers, decontamination trailers and portable vacuum-skid units are other examples of custom-designed equipment.

The number of workers, organizations and activities involved in incident response depends on the requirements imposed by a specific response situation. The primary goal is to establish an *organization* capable of effectively managing and directing response activities to successfully mitigate an incident. In addition to designating those in charge; *i.e.* on-scene coordinator, scientific coordinator, safety officer, etc., function and responsibilities are clearly defined for all workers at a given site.

An organization chart, clearly drawn, links the various functions, establishes communication channels at the site and leaves nothing to chance. Key points considered in this chart are:

- Clearly defined functions and responsibilities.
- Established chain of custody (quality control/assurance procedures).
- Delegation of authority.
- Effective working relationships.

Site control involves two major activities: 1) physical arrangements and control of the site's work areas, and 2) methods for

removal of contaminants from workers and equipment.

Every effort is made to reduce the possibility of transporting contaminants from the site which may be carried *via* workers and/or equipment. The means of accomplishing this include:

- Physical barriers to exclude unnecessary personnel.
- Checkpoints with limited access to the site or areas within the site.
- Minimizing personnel and equipment on site, consistent with effective, safe operations.
- Establishment of containment zones.
- Decontamination procedures.
- Conducting operations in a manner to reduce possibility of contamination.

Zones Control Traffic

An effective way of reducing the potential for transfer of contamination is to delineate zones or work areas within the vicinity of the incident based upon expected or known levels of contamination. Within these zones, prescribed operations utilize appropriate personal protective equipment. Movement between areas is controlled at checkpoints. Three contiguous zones are recommended:

1. Exclusion area (contaminated).
2. Contamination reduction area.
3. Support area (non-contaminated).

The "exclusion area" is the innermost area and is considered contaminated or "hot." Within this area, prescribed levels of protection *must be worn* by all workers who enter that area. An entry checkpoint, established at the periphery of the exclusion area, controls the flow of workers and equipment between contiguous zones and ascertains that all entrance and exit procedures are followed. The exclusion area boundary is established initially based on the type of the pollutant(s)/spilled materials, initial instrument reading and safe distance from any potential exposure.

Subsequently, the boundary may be readjusted based on additional observation and/or measure-

ments. The boundary is physically secured, fenced, posted or well defined by geographical boundaries.

An exclusion area could be further subdivided into three separate zones based on each zone's known or potential level of contamination. This would allow for more flexibility in operations, decontamination procedures, resources, etc.

Site Analysis Plays Pivotal Role

Basic air monitoring and site sample analyses are the governing factors for determining the range of specific boundary perimeters. Extensive testing in the field contributes to the final classification of the boundary type and size.

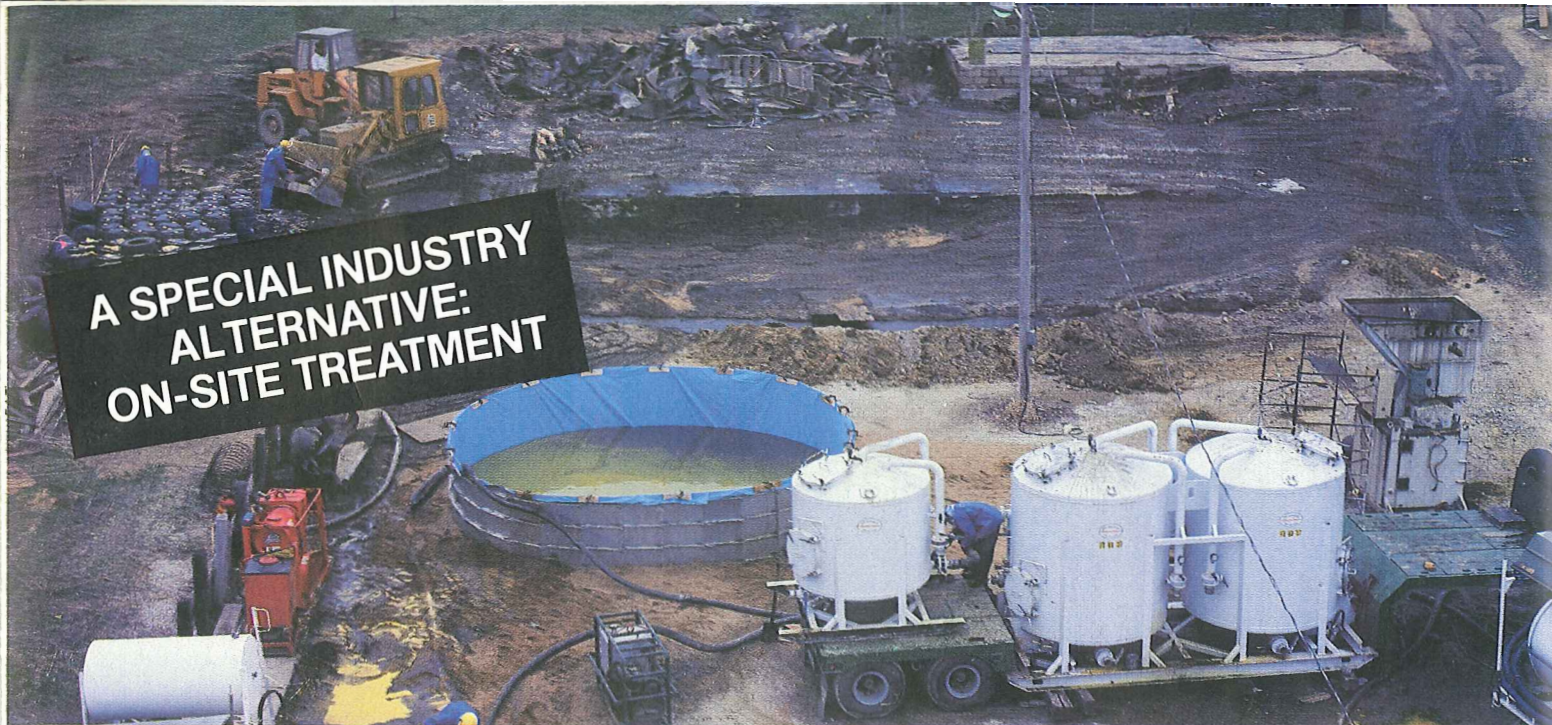
In emergency situations, project management is the key to a successful cleanup; project managers act as the liaison between the client, regulatory agencies and the cleanup crew. They assure compliance with all EPA and state regulations governing waste disposal and worker safety.

The professional, experienced contractor supervises each phase of the site operation to ensure that all workers are provided a protected environment. (Cleanup activities may include client employees and others.) The contractor provides information regarding the company's safety record, formal safety program and work policy to a client, upon request, and will also allow the client's inspection of all equipment to be used at the job site.

At O.H. Materials, safety is by design – not by accident. The safety program is the result of precise definition, development and dedication to safety policies and procedures.

About The Author

Bill Warner is corporate safety director for O.H. Materials Co., a hazardous materials containment and cleanup, emergency response and environment restoration contractor. A member of the National Safety Council, National Environmental Training Association and American Society of Safety Engineers, Warner has attended numerous safety training and management programs.



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EMERGENCY RESPONSE

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