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PERSONNEL TRAINING — HAZARDOUS MATERIALS AND WASTES

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Summary

In the United States, regulations promulgated under the Resource Conservation and Recovery Act require the training of hazardous waste management facility personnel. This training is to be in accordance with job description. Effective training is best achieved when training needs are assessed and training materials are developed on a facility site-specific basis. Resources can be optimized through a phased program approach with outside trainers or in-house personnel (train-the-trainer) as appropriate. Information is presented concerning performance of the training needs assessment, definition of program content, and development and implementation of site-specific programs.

Introduction

Awareness of the hazards and potential adverse environmental effects associated with many chemicals and industrial wastes has increased enormously over the past several years. In the United States, recently enacted State and Federal regulations now require the training of personnel whose duties bring them into contact with hazardous wastes. Regulatory agencies have found that safety and chemical hazard recognition are a critical element of field investigations, especially with respect to the so-called uncontrolled waste sites. Representatives of many aspects of government and private industry are continually seeking training programs and instructional materials in the areas of hazardous materials and wastes.

The existing sources of formal instruction in hazardous materials/wastes management are relatively limited. While the situation is anticipated to improve in the near future, training is needed now. Also, it is typically the case that information provided in general or generic courses must be supplemented with site-specific materials and hands-on training to be effective.

In the remaining sections of this paper, information is provided concerning the performance of a hazardous materials training needs assessment and subsequent training program development and implementation. As is the case with any training strategy, job analysis is a critical success factor.

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Training needs assessment

While the temptation to plunge immediately into a full blown training program is often strong, it is prudent to begin with the performance of a training needs assessment. The training needs assessment should provide answers to the following types of questions:

- Who should be trained?
- What are the existing levels of training?
- What additional areas of training are needed?

These questions are best answered through a job analysis approach which should result in job descriptions and a correlation of essential areas of training to the job descriptions. Figure 1 provides an example correlation for hazardous waste management facility personnel. Figure 2 shows selected elements of a job analysis for a field technician with sampling and field measurement responsibilities.

The training needs assessment can be put into the context of a facilities or personnel audit. Typically four phases are required as follows:

Phase I — Define group parameters with respect to overall organization and goals, job descriptions, and internal requirements and limitations.

	Training For Personnel Safety	Release Prevention and Response	Decontamination Procedures	Facility Operation and Maintenance	High Hazard Operations	Maintaining Documentation
Site Manager	B	B	B	B	B	B
Chief Chemist	B	B	B	B	B	B
Safety Officer	B	B	B	B	B	B
Supervisor - Foreman	B	B	B	B	B	B
Laboratory Technician	L	L	L	L	L	
Equipment Operator - Waste Handler	L	L	L	L	L	
Treatment Plant Operator	L	L	L	L	L	
Record Keeper		L				B
Maintenance Staff		L	L	L	L	
Driver		L	L			
Clerical Staff		L				
Security Guard		L	L			

B = Broad Instruction
L = Limited Instruction

Fig. 1. Job classifications and corresponding training recommendations.

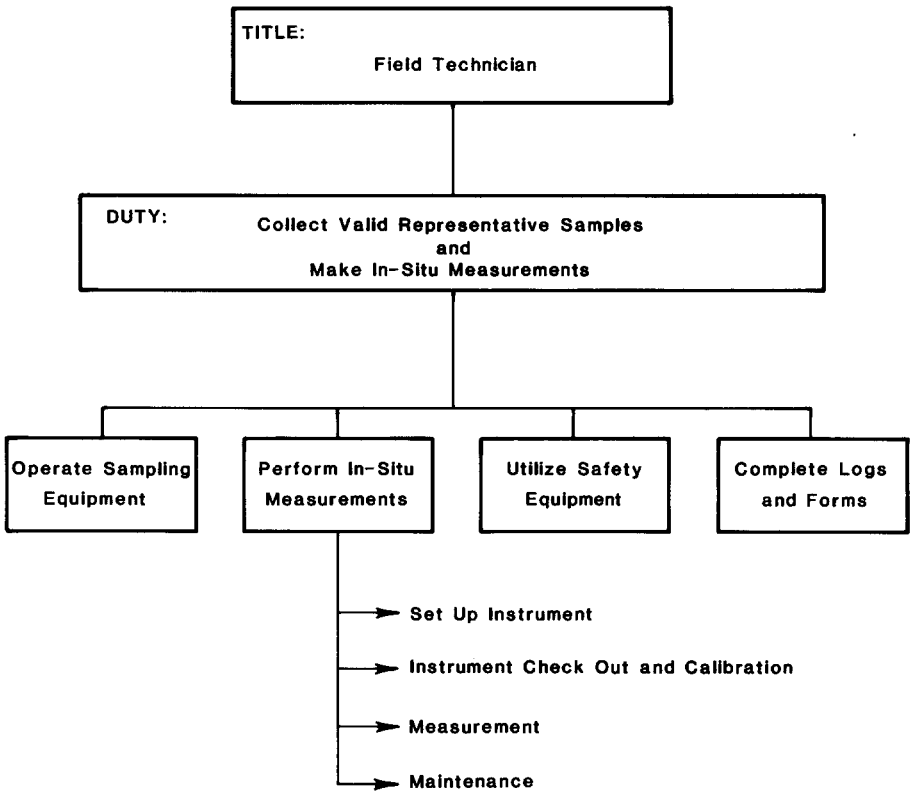

Fig. 2. Example job analysis.

Phase II — Select and implement data acquisition techniques to confirm existing levels of training and identify deficiencies, e.g., personal interviews, telephone interviews, questionnaires, etc.

Phase III — Analyze data.

Phase IV — Determine training needs.

Training program development and implementation

Table 1 shows the major components in the overall training program evolution. The first and second components constitute the training needs assessment. Components III and IV concern the preparation of training materials and program implementation and Component V concerns routine program monitoring and revision as needed.

Personnel training under RCRA

Background

Regulations promulgated under the Resource Conservation and Recovery Act (RCRA) require that owners or operators of hazardous waste treatment,

TABLE 1

Evolution of a training program

I. *Personnel/facilities audit*
- Job analysis
- Identify site-specific factors
- Identify nature and extent of existing training
- Determine availability of pertinent training materials
- Determine feasible mechanism of training

II. *Data analysis*
- Determine deficiencies

III. *Program design* — Preparation of training materials
- Utilize existing materials as appropriate
- Develop new materials
- Develop methods for documenting training and tracking training effectiveness

IV. *Program implementation*
- Participation in existing Programs
  - — short courses
  - — university programs
- On-site training/train the trainer
  - — OJT
  - — self-instruction modules

V. *Program monitoring and modification*

storage, or disposal facilities train their personnel. The regulations cover both off-site and on-site hazardous waste management facilities and apply also to generators of hazardous waste if they accumulate the waste on-site before transport to an off-site facility. The complete text of the regulations can be found in Ref. [1].

The training must be conducted by a person trained in hazardous waste management procedures and should be approached on the basis of job description and associated duties. The regulations specify that, at a minimum, the training must cover the following six areas, if applicable.

- Procedures for using, inspecting, repairing and replacing facility emergency and monitoring equipment.
- Key parameters for automatic waste feed cutoff systems.
- Communications or alarm systems.
- Response to fires or explosions.
- Response to groundwater contamination incidents.
- Shutdown of operations.

Information is provided in the regulations concerning when the training must be performed and an annual upgrading requirement is specified.

The regulations merely state that training is required, that it should be performed by qualified persons and approached on the basis of job description. The regulations do not provide criteria for "acceptable" training programs. The authors of this paper assisted the United States Environmental Protection Agency in the preparation of a Personnel Training Guidance Manual. This manual is intended to identify suggested areas of training and provide information concerning mechanisms by which the training can be implemented. Two levels of training are suggested and an approach by job description is presented. It was intended in all cases that sufficient flexibility in approach exist so that training could be implemented in a cost-effective manner.

Basic training issues

In the development of the Guidance Manual, several fundamental questions were addressed. In the first place, it was necessary to consider the types of training which were needed. Here it was clear that training should be provided not only in routine waste handling, storage, treatment, and disposal operations, but also in emergency response procedures in accordance with the facility site-specific contingency plan. Secondly, who should be trained and what levels of training are necessary? It was felt that all personnel handling, storing, treating, or disposing of hazardous waste should be trained, including supervisors. Furthermore, it was recommended that personnel impacting on facility design and operation participate as well in the training program. As regards the level of training, at least two levels are needed — one for supervisors and decision-makers (broad training) and one for employees (limited training). Lastly, what areas of training are recommended and how can the training be implemented? Several areas were defined including:

- training for personnel safety;
- release prevention and response;
- decontamination procedures;
- facility operation and maintenance;
- high hazard operations;
- maintaining documentation.

Finally, the best mechanism for training implementation will vary from facility to facility. Several options exist and will be discussed further in the following sections.

Training in accordance with job description

It goes without saying that there is an enormous variability in the kinds of facilities, operations, and personnel covered under the RCRA regulations. Since many wastes have been classified as hazardous because of low levels of selected toxic chemicals, many otherwise "clean" industries are now covered by the RCRA regulations. Also, it must be recognized that hazardous wastes are merely mixtures of hazardous materials and many companies

have implemented extensive training programs for personnel handling hazardous materials. Finally, there are also several industries where some routine operations can be more hazardous than the accompanying waste materials. Nevertheless, the risk associated with handling hazardous materials is clearly dependent upon the exposure to the material, so that a good starting point in the development of any training program is a clear identification of job descriptions and associated duties. This, together with a training needs assessment, will form the basis for development of a personnel training program.

The fact that training must be site specific cannot be overemphasized. Figure 1 exhibits a possible correlation of job titles with areas of training — B and L denoting broad and limited instruction respectively. Given information concerning job descriptions and previous training, a similar matrix can be assembled for a specific facility.

As stated previously, it was felt that supervisory and upper level management should receive broad training in all areas identified in Fig. 1. Table 2 provides suggested training elements in these areas. Non-supervisory personnel should receive a similar kind of training, which is more specific to their job descriptions. Here the intent is to provide the trainee with information and skills without causing undue concern or alarm. Communication of a healthy awareness of the potential hazards, to both workers and the surrounding community, which could result from improper handling, storage, treatment, and disposal of hazardous waste, together with the needed instruction, provides the training program goals.

Mechanisms for program implementation

A variety of training tools exist, all of which can have merit for a given facility. Training can be conducted formally, classroom style, and "on the job" (OJT). Much of the material lends itself to a package slide/cassette approach. Other elements should be learned through doing, under the supervision of a knowledgeable instructor. In both cases, it is prudent to keep the proper records and documentation that the training has been provided and to develop procedures for testing proficiency.

At this time, there are few formal courses of instruction in the areas of hazardous waste management and hazardous materials handling. Some universities have expressed an interest in this area, however, and have begun to develop and offer courses. Several short courses exist which can be utilized to provide good generic type information concerning chemical hazards, personnel safety, hazardous waste management options, and contingency planning. These are offered by a variety of private and university continuing education groups. Also several audio-visual packages are available commercially which provide good generic information as well.

To be truly successful, the training must incorporate both general and site-specific information. The latter is especially critical and cannot be ob-

TABLE 2

Suggested broad RCRA training elements

Training for personnel safety

- Chemical hazard recognition
  - — chemical properties
  - — chemical classification systems
- DOT placarding and labelling system
  - — sources of information
- Effects on humans — toxicology
  - — basic concepts
  - — types of adverse effects
  - — health effects for frequently encountered materials
  - — toxicity testing
  - — sources of information
- Personal safety
  - — establishing criteria for selecting protective clothing and equipment
  - — establishing a respiratory protection program
  - — standard safety precautions

Release prevention and response

- Regulatory aspects
- Planning for emergencies
- Preparation of the contingency plan
- Emergency equipment
- Duties of the emergency coordinator

Decontamination procedures

- Personal hygiene
- Locations of facilities
- Decontamination procedures
- Spill cleanup

Facility operation and maintenance

- Waste acceptance procedures
- Process operation and controls
  - — routine operation
  - — startup
  - — shutdown
  - — alternate operation
  - — emergency operation
  - — diagrams and manuals
  - — problems and solutions
  - — laboratory controls

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TABLE 2 (continued)

- Maintenance
  - schedules
  - special tools and equipment
  - spill cleanup
  - removing equipment from service
  - power and water failures
  - electric motors and pumps
  - valves and repairs
  - monitoring equipment
- Equipment safety
- Explosion and fire hazards

High hazard operations

- Contingency awareness
- Failure analysis
- Automatic controls
- Emergency alarms
- Failsafe operation
- Simulation emergencies

Maintaining documentation

- Manifest system
- Labeling and placarding
- Incident reporting
- Training records
- Contingency plan

tained utilizing "canned" programs. Rather, it must be developed specifically for the given site. Site-specific elements are especially significant in the area of operation and maintenance and contingency planning and emergency response.

One mechanism, which the authors have used successfully on several occasions, incorporates several training strategies to ensure that the resulting program is both cost-effective and site specific. The approach begins with a site visit and plant audit to develop the information needed to define the training audience and assess training needs. From this point the material is assembled in a modular approach, similar to that shown in Fig. 1, with the preparation of both broad and limited training modules as needed. Those elements, both general and site-specific, which can be communicated well in a classroom-type presentation, are developed and assembled in a slide/cassette package which can be easily updated as needed and which facilitates the training of new hires. Other elements which are best taught in an on-the-job training mode are identified as well.

Once the training materials are assembled, the training can be implemented in whichever manner proves to be the most cost-effective. Clearly at a large

facility where several people may require training, the training can be a very costly and disruptive procedure in lost time alone. In many cases, a "train the trainer" mechanism works well. Here the appropriate supervisors who will become the ultimate facility trainers are identified and provided in-depth training in the areas identified as important in the first phase audit and training needs assessment.

Sources of information

The Guidance Manual provides information concerning training materials and courses which were in existence at the time the manual was prepared. Since that time additional texts, slide packages, and courses have become available. Recently the National Environmental Training Association (NETA) in Valparaiso, Indiana, established a subsection concerned with toxic substances, hazardous materials, and solid waste. This group is assembling information concerning existing training materials in those areas and will begin to function as a clearing house for this information in the near future.

References

1 Title 40 of the Code of Federal Regulations, parts 264.16 and 265.16, Federal Register, May 19, 1980.