

**A COMPARISON OF OSHA HAZWOPER, OSHA HAZCOM, OSHA HAZMAT
AND DOT HAZMAT TRAINING REQUIREMENTS
AS THEY APPLY TO WASTE MANAGEMENT FIELD OPERATIONS**

T. Davis
Bechtel-Jacobs, Inc.
761 Veterans Avenue, Kevil, Ky 42053

A. Thompson, J.M. Hylko²
WESKEM, LLC
297 Kentucky Avenue
Kevil, Kentucky 42053
2-Author for correspondence.

ABSTRACT

The primary regulations governing WESKEM, LLC field-response activities are the Occupational Safety and Health Administration's (OSHA's) 29 CFR 1910.120 - *Hazardous Waste Operations and Emergency Response (HAZWOPER)* and 29 CFR 1910.1200 - *Hazard Communication (HAZCOM)*. Regarding off-normal events, hazardous materials response (OSHA HAZMAT) is covered in 29 CFR 1910.120(q). Many of these same activities are regulated by the Department of Transportation (DOT) which addresses the transportation of hazardous materials (DOT HAZMAT) either in commerce or at on-site locations. Fortunately, HAZWOPER, HAZCOM and OSHA HAZMAT can be used to supplement DOT HAZMAT on the basis of equivalent training. However, all four acronyms can be, and are often used interchangeably throughout training or contractual documentation. Because of the differences between OSHA and DOT, it is essential that employees receive the proper training as applied to a comprehensive waste management program. To resolve these differences and to eliminate acronym confusion, this paper 1) clarifies the fundamental differences and training requirements of OSHA HAZWOPER, OSHA HAZCOM, OSHA HAZMAT, and DOT HAZMAT; and 2) demonstrates how OSHA resources, because of equivalency, can be used to supplement 49 CFR 172 - *Subpart H: Training* for DOT HAZMAT employees. Although utilizing existing training information offered by HAZWOPER and HAZCOM eliminates duplication, the information provided by OSHA should neither be all-inclusive, nor a comprehensive substitute for DOT HAZMAT. Both HAZWOPER and HAZCOM do not necessarily train to the specific elements of 49 CFR 172 such as the hazardous materials table, appropriate packaging, segregation and securement, or loading/unloading in preparation of a hazardous materials shipment. DOT HAZMAT focuses on the work functions covered by the *Hazardous Materials Regulations* to ensure that shipments are completed according to regulation and accomplished safely without incident.

INTRODUCTION

WESKEM, LLC is a field-response waste management company located in Paducah, Kentucky, and Oak Ridge, Tennessee. The company is responsible for the collection, database inventory, characterization, sorting, treatment, packaging, interim storage and transportation of Department

of Energy (DOE) hazardous, radioactive and mixed wastes. These types of activities, their related source terms, and required actions to mitigate employee exposure are regulated by 29 CFR 1910.120 - *Hazardous Waste Operations and Emergency Response (HAZWOPER)* (1). For these types of site-specific activities involving hazardous waste operations, employees as well as their supervisors and managers are required to have appropriate training. For example, 29 CFR 1910.120(e)(1)(i) states in part that...“All employees working on site...exposed to hazardous substances, health hazards, or safety hazards and their supervisors and management responsible for the site shall receive training meeting the requirements...before they are permitted to engage in hazardous waste operations that could expose them to hazardous substances, safety, or health hazards...”

In addition, there are employees who are neither involved with invasive field activities, nor required to wear respirators, but still require training to address hazards in the work environment. These employees, usually providing technical support rather than performing invasive field activities, are not required to take the 40-hour HAZWOPER class. Instead, they are required to complete site-specific training consisting of *Hazard Communication (HAZCOM)* found in 29 CFR 1910.1200 (2). This standard comprehensively addresses chemical hazards, communicating information to employees, accessing Material Safety Data Sheets (MSDS) and using appropriate measures to protect employees in their work environment.

Essentially, HAZWOPER and HAZCOM provide the basis for all training involving hazardous waste operations (e.g., remediation) regulated by the Occupational Safety and Health Administration (OSHA). Regarding off-normal events (i.e., emergencies), hazardous materials (HAZMAT) response is covered in 29 CFR 1910.120(q) (1).

In conjunction with supporting a comprehensive waste management program, transportation activities are evaluated against applicable sections of 29 CFR to ensure workplace safety and prevent employee exposure. However, these same activities are also regulated by the Department of Transportation (DOT), which addresses the transportation of hazardous materials. Like OSHA HAZWOPER, OSHA HAZCOM and OSHA HAZMAT, employees as well as their supervisors and managers are required to have appropriate DOT training in accordance with their site-specific activities. This training is covered in 49 CFR 172 - *Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements - Subpart H: Training*; referred to as DOT HAZMAT (3).

Although OSHA HAZMAT and DOT HAZMAT use the same HAZMAT acronym, they are quite different in definition and scope. For example, OSHA HAZMAT training is segregated into four different responsibilities within 1910.120(q); 1) first responder, 2) hazardous material technician, 3) hazardous material specialist, and 4) incident commander. On the other hand, DOT HAZMAT training is based on employees characterizing materials for off-site transport, preparing DOT paperwork, assessing the waste acceptance criteria of the disposal facilities as well as loading, unloading and handling hazardous materials.

Fortunately, HAZWOPER, HAZCOM and OSHA HAZMAT can be used to supplement DOT HAZMAT on the basis of equivalent training (i.e., equivalency) which includes any academic training or the training that existing employees might have already received from actual

hazardous waste site experience. However, all four acronyms can be, and are often used interchangeably throughout training or contractual documentation neglecting their true definitions and applications. Because of the differences between OSHA and DOT, it is essential that employees receive the proper training as applied to a comprehensive waste management program. To resolve these differences and to eliminate acronym confusion, this paper:

- 1) clarifies the fundamental differences and training requirements of OSHA HAZWOPER, OSHA HAZCOM, OSHA HAZMAT, and DOT HAZMAT, and
- 2) demonstrates how OSHA resources, because of equivalency, can be used to supplement 49 CFR 172.704 (*Subpart H*) for DOT HAZMAT employees.

REGULATORY DEFINITIONS AND APPLICABILITY

The following sections summarize how each term is defined within its particular regulatory agency. The regulatory definition provides a precise meaning of the term and its applicability against work scope and employee training.

OSHA HAZWOPER

General site workers, such as equipment operators and supervisory personnel, engaged in hazardous substance removal or other activities, which expose or potentially expose workers to hazardous substances and health hazards receive a minimum of 40 hours of instruction and a minimum of three days actual field experience under the direct supervision of a trained and experienced supervisor. In addition, employees required to wear respirators in exclusion zones are required to have the 40 hours of training. OSHA concluded that this level of training is necessary to protect general site workers because they are engaged in areas with safety and health hazards. Depending on the nature of the site-specific hazards, general employee training is provided and revised as work conditions and scope change via procedures and company policies.

Managers and supervisors directly responsible for or who supervise employees (i.e., a HAZWOPER Supervisor) engaged in hazardous waste operations shall also receive 40 hours of instruction and three days of supervised field experience. In addition, they also receive at least eight additional hours of specialized training on such topics as, but not limited to, the safety and health program, use of personal protective equipment, spill containment, and employee monitoring. Since these managers and supervisors are responsible for directing others, it is necessary to enhance their ability to provide guidance and make informed decisions based on site activities and conditions. WESKEM complies with the applicable elements of 29 CFR 1910.120 by requiring OSHA 40-hour HAZWOPER and applicable supervisor training for those involved with direct, hands-on invasive field operations.

OSHA HAZCOM

To comply with the requirements of this standard, employee training includes provisions for, but is not limited to, developing and maintaining a written hazard communication program for the

workplace, maintaining lists of hazardous chemicals in the workplace, labeling containers, distribution of MSDSs, and employee training programs regarding hazards of chemicals and protective measures. Program content is largely based on the performance-oriented hazard determination of the work environment. WESKEM complies with the applicable elements of 29 CFR 1910.1200 by requiring HAZCOM training for all administrative and field employees.

OSHA HAZMAT

OSHA HAZMAT is implemented through a HAZMAT Team consisting of an organized group of employees expected to handle and control actual or potential leaks or spills of hazardous substances requiring possible direct contact with a substance for the purpose of control or stabilization of the incident. Prior to the commencement of emergency response operations, these anticipated emergencies are handled through an Emergency Response Plan. Certified training shall be based on the duties and functions to be performed by each responder of an emergency response organization. The skill and knowledge levels required for all new responders shall be conveyed to them through training before they are permitted to take part in actual emergency operations during an incident. HAZMAT training is segregated into four different responsibilities within 1910.120(q); 1) first responder, 2) hazardous material technician, 3) hazardous material specialist, and 4) incident commander. Descriptions of training requirements follow:

1. First Responders (§1910.120(q)(6)(ii)) - First Responders at the field operations level are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site to protect nearby persons, property, or the environment from the effects of the release. They are trained to respond in a *defensive fashion* without actually trying to stop the release. Their function is to *contain the release* from a safe distance, keep it from spreading, and prevent exposures. In addition to the training listed for the awareness level, First Responders shall have received at least eight hours of training or have had sufficient experience to demonstrate competency in the following areas:
 - § 1910.120(q)(6)(ii)(A) - Knowledge of basic hazard and risk assessment techniques.
 - § 1910.120(q)(6)(ii)(B) – Knowledge of selecting and using proper personal protective equipment provided to the first responder operational level.
 - § 1910.120(q)(6)(ii)(C) - Understanding basic “hazardous materials” terms.
 - § 1910.120(q)(6)(ii)(D) – Knowledge of basic control, containment and/or confinement operations within available resources and personal protective equipment.
 - § 1910.120(q)(6)(ii)(E) – Knowledge of basic decontamination procedures.
 - § 1910.120(q)(6)(ii)(F) - Understanding standard operating procedures and termination procedures.
2. Hazardous Materials Technician (§1910.120(q)(6)(iii)) - Hazardous Materials Technicians are individuals who respond to releases or potential releases for the purpose of *stopping the release*. They assume a more aggressive role than a first responder at the

operations level, such that they will approach the point of release in order to plug, patch or otherwise stop the release of a hazardous substance. Hazardous materials technicians shall have received at least 24 hours of training equal to the first responder operations level and demonstrate competency in the following areas:

- § 1910.120(q)(6)(iii)(A) – Knowledge of implementing the employer's emergency response plan.
 - § 1910.120(q)(6)(iii)(B) - Knowledge of classifying, identifying and verifying known and unknown materials by using field survey instruments and equipment.
 - § 1910.120(q)(6)(iii)(C) – Functioning within an assigned role in the Incident Command System (ICS).
 - § 1910.120(q)(6)(iii)(D) – Knowledge of selecting and using proper specialized chemical personal protective equipment provided to the hazardous materials technician.
 - § 1910.120(q)(6)(iii)(E) – Understanding hazard and risk assessment techniques.
 - § 1910.120(q)(6)(iii)(F) - Performing advanced control, containment, and/or confinement operations within resource capabilities and personal protective equipment available with the unit.
 - § 1910.120(q)(6)(iii)(G) - Understanding and implementing decontamination procedures.
 - § 1910.120(q)(6)(iii)(H) - Understanding termination procedures.
 - § 1910.120(q)(6)(iii)(I) – Understanding basic chemical and toxicological terminology and behavior.
3. Hazardous Materials Specialist (1910.120(q)(6)(iv)) - Hazardous Materials Specialists are individuals who *respond with and provide support to* Hazardous Materials Technicians. Their duties parallel those of the Hazardous Materials Technician, however, those duties require a more directed or specific knowledge of the various substances they may be called upon to contain. The Hazardous Materials Specialist would also act as the site liaison with Federal, State, local and other government authorities. Hazardous Materials Specialists shall have received at least 24 hours of training equal to the Technician level and demonstrate competency in the following areas:
- § 1910.120(q)(6)(iv)(A) – Knowledge of implementing the local emergency response plan.
 - § 1910.120(q)(6)(iv)(B) – Understanding the classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment.
 - § 1910.120(q)(6)(iv)(C) – Knowledge of the state emergency response plan.
 - § 1910.120(q)(6)(iv)(D) - Selecting and using proper specialized chemical personal protective equipment provided to the hazardous materials specialist.
 - § 1910.120(q)(6)(iv)(E) – Understanding in-depth hazard and risk techniques.
 - § 1910.120(q)(6)(iv)(F) - Performing specialized control, containment, and/or confinement operations within available resources and personal protective equipment.

- § 1910.120(q)(6)(iv)(G) – Determining and implementing decontamination procedures.
 - §1910.120(q)(6)(iv)(H) - Developing a site safety and control plan.
 - §1910.120(q)(6)(iv)(I) - Understanding chemical, radiological and toxicological terminology and behavior.
4. On-Scene Incident Commander (1910.120(q)(6)(v)) - Incident Commanders will *assume control* of the incident scene beyond the First Responder awareness level and shall receive at least 24 hours of training equal to the First Responder operations level^a and demonstrate competency in the following areas:
- § 1910.120(q)(6)(v)(A) – Knowledge of implementing the employer's incident command system.
 - § 1910.120(q)(6)(v)(B) – Knowledge of implementing the employer's emergency response plan.
 - § 1910.120(q)(6)(v)(C) – Knowledge and understanding of the hazards and risks associated with employees working in chemical protective clothing.
 - § 1910.120(q)(6)(v)(D) – Knowledge of implementing the local emergency response plan.
 - §1910.120(q)(6)(v)(E) – Knowledge of the state emergency response plan and the Federal Regional Response Team.
 - § 1910.120(q)(6)(v)(F) – Knowledge and understanding of decontamination procedures.

According to the definitions found in the OSHA HAZMAT portion of 1910.120(q), an OSHA HAZMAT Team and its infrastructure would be responsible for responding to and mitigating an emergency situation involving the release of hazardous substances. However, the determination of how much of a spill or release that would represent an emergency is dependent upon many factors. For clarification, an OSHA HAZMAT Team would not be required if a trained employee, understanding the hazards associated with the hazardous substance through training required by HAZCOM, can safely use a “spill kit” to clean up a small localized spill consisting of single-gallon amounts of material. Kits typically contain personal protective equipment (e.g., gloves, protective glasses), absorbent material, and a disposal bag. This type of response and use of a “spill kit” is already part of a field employee’s training requirements. On the other hand, an OSHA HAZMAT Team would be activated following a very extensive spill or release involving, for example, possibly hundred-gallon amounts or greater of material. The spill or release would likely impact site operations and even the contiguous site perimeter areas.

An *OSHA Letter of Interpretation* dated November 8, 1991 – “Emergency situations that fall under Hazwoper” provides guidance as to what constitutes an emergency situation prompting this type of a response (4). OSHA affirms that it is not their intent to define an emergency condition in terms of an arbitrary quantity of material released due to the diversity of workplace conditions, conditions of chemical use, and types of chemicals used. Nevertheless, the following conditions provide common examples of what could normally be considered an emergency situation requiring a HAZMAT Team response effort:

- High concentrations of toxic substances,
- A situation that is life or injury threatening,
- Imminent Danger to Life and Health (IDLH) environments,
- A situation that presents an oxygen deficient atmosphere,
- A condition that poses a fire or explosion hazard,
- A situation that requires an evacuation of the area, or
- A situation that requires immediate attention because of the danger posed to employees in the area.

Because of the staffing and resources associated with fielding a HAZMAT Team, specifically on a multi-contractor site, this type of support is typically provided by a separate site-specific organization such as the fire department and other emergency response points of contact. Employees within the waste management organization may possess equivalent training and experience to participate on a HAZMAT Team. However, in this particular situation, OSHA HAZMAT does not apply such that WESKEM does not have to field a first responder, hazardous material technician, hazardous material specialist or an incident commander.

Regarding emergencies, employees are responsible for complying with the site-wide emergency action plan developed in accordance with 29 CFR 1910.38(a) (5). This information is part of the general employee training. Depending on the emergency (e.g., severe weather, chemical release), all non-essential employees will keep themselves safe until the emergency has been mitigated and avoid interfering with HAZMAT Team activities.

DOT HAZMAT

The U.S. Department of Transportation (USDOT) also provides HAZMAT definitions. According to 49 CFR 171.8, DOT HAZMAT is defined as a hazardous material. A DOT HAZMAT employee is a person who is employed by a DOT HAZMAT employer and who, in the course of employment, directly affects hazardous materials transportation safety. This term includes an owner-operator of a motor vehicle which transports hazardous materials in commerce. Also, this term includes an individual, including a self-employed individual, employed by a DOT HAZMAT employer who, during the course of employment:

- Loads, unloads, or handles hazardous materials,
- Manufactures, tests, reconditions, repairs, modifies, marks, or otherwise represents containers, drums, or packagings as qualified for use in the transportation of hazardous materials (the vendor performs this function and is, therefore, not applicable to WESKEM operations),
- Prepares hazardous materials for transportation,
- Is responsible for safety of transporting hazardous materials, or
- Operates a vehicle used to transport hazardous materials.

For continuity, a DOT HAZMAT employer means a person who uses one or more of its employees in connection with:

- Transporting HAZMAT in commerce (i.e., off the site reservation),

- Causing HAZMAT to be transported or shipped in commerce (i.e., off the site reservation), or
- Representing, marking, certifying, selling, offering, reconditioning, testing, repairing, or modifying containers, drums or packagings as qualified for use in the transportation of HAZMAT (3).

Based on these definitions and activities, WESKEM, LLC is a DOT HAZMAT employer who must train and test, certify, and develop and retain records of current training (inclusive of the preceding three years) for each DOT HAZMAT employee during the period of employment and 90 days thereafter. Special circumstances are addressed by 49 CFR 172.704(c) - *Initial and Recurrent Training*. According to DOT, any test method that ensures that the employee can perform the assigned duties in compliance with the *Hazardous Materials Regulations (HMR)* is acceptable. Training and testing may be accomplished through performance, written, verbal, or a combination of these. The requirements do not state that the employee must "pass" a test. However, an employee may only be certified in areas in which he/she can successfully perform their HAZMAT duties (6).

The DOT HAZMAT training developed internally ensures that an employee has knowledge of hazardous materials, the regulations, and performs assigned functions properly in accordance with 49 CFR 172.704, *Subpart H - Training*, as follows:

General Awareness/Familiarization Training of 49 CFR 172 enables the DOT HAZMAT employee to become familiar with the requirements of this regulation, and perform their DOT-related tasks in connection with recognizing and identifying HAZMAT consistent with the hazard communication standards. These tasks consist of ordering containers for off-site shipments, packaging waste for off-site disposal, loading trailers or rail cars with waste containers for off-site shipment, and driving company-owned commercial motor vehicles off site. This training is required for every DOT HAZMAT employee who affects the shipping, handling, or transporting of hazardous materials, which applies to operators up through their managers involved with DOT operations. To make this training readily available, the Office of Hazardous Materials Safety has prepared the following training modules that include an instructor manual, student manual and Microsoft® PowerPoint slides. This training meets the requirements for General Awareness Training as prescribed in 49 CFR 172, *Subpart H (7)*:

- MOD 1 --- The Hazardous Materials Table
- MOD 2 --- Shipping Papers
- MOD 3 --- Marking and Labeling
- MOD 4 --- Placarding
- MOD 5 --- Packaging
- MOD 6A - Carrier Requirements (Highway).

In addition to the DOT HAZMAT training, HAZCOM training already ensures that the hazards of all chemicals produced or imported are evaluated and that information concerning their hazards is transmitted to employers and employees. Training covered under the Resource Conservation and Recovery Act (RCRA) identifies the role of waste generators, the types of waste generated, and guidelines for the treatment, storage, and disposition of waste.

Function-Specific Training focuses on the specific job tasks that a DOT HAZMAT employee performs such as shipping, handling and transporting HAZMAT. Training associated with operating fork trucks to load/unload hazardous materials is already covered in the WESKEM, LLC Powered Industrial Truck (PIT) training module.

Additional tasks performed by operators up through their managers involved with DOT operations include classifying hazardous materials, preparing DOT shipping documentation, completing shipping papers, selecting proper packages, labeling and marking packages and providing placards to carriers. This latter group obtains extensive training consisting of 24-32 hours every 2 years as mandated by contracts/procedures, whereas, the DOT requires recurrent training every 3 years.

A separate group (e.g., samplers and DOT transportation specialists) responsible for sampling constituents for characterization receives International Air Transport Association (IATA)/International Civil Air Organization (ICAO) training that certifies them for packaging sample shipments. This training, required every 2 years, satisfies the DOT requirements found in 49 CFR 172, *Subpart H* and IATA/ICAO training requirements which are linked to the DOT through 49 CFR 171.11 – *Use of ICAO Technical Instructions* (3).

Safety Training includes emergency response in accordance with 49 CFR 172 - *Subpart G – Emergency Response Information*, safe work practices and controls used to protect employees from hazardous materials and avoid accidents, and handling packages containing hazardous materials. Most of these elements are covered under the Integrated Safety Management System (ISMS) training. This training includes the Activity Hazard Review (AHR)/Activity Hazard Analysis (AHA) process for systematically identifying, assessing, and controlling hazards associated with project work activities during work planning and execution. Depending on the scope of a project, information from field walkdowns and table-top meetings are collected on an AHR form. The AHA then documents the potential failure and consequence scenarios for a particular hazard. Also, the AHA recommends whether the type of mitigation appears appropriate or whether additional controls should be implemented (8).

Driver Training is required for DOT HAZMAT employees and their supervisors involved with operating commercial motor vehicles off the site reservation. The training is conducted in accordance with 49 CFR 177.816 – *Driver Training* (3). DOE policies and Orders require that on-site transportation be performed in accordance with the DOT or an equivalent program. For example, employees who drive a semi-tractor trailer on site must still have a Commercial Driver's License (CDL). In addition, both HAZWOPER and HAZCOM training supplements DOT HAZMAT by informing workers of the chemical and physical hazards that may be encountered during hazardous waste operations, how to control and minimize those hazards through safe work practices, personal protective measures, and cleaning up minor spills.

Security Awareness Training and **In-Depth Security Training**, also required by DOT HAZMAT, is provided by a separate organization.

CONCLUSION

The two primary regulations that govern the collection, database inventory, characterization, sorting, treatment, packaging, interim storage and transportation of hazardous, radioactive and mixed wastes are HAZWOPER and HAZCOM. Both regulations supplement DOT HAZMAT training in accordance with 49 CFR 172.704(b) in order to avoid unnecessary duplication of training. Although utilizing existing training offered by HAZWOPER and HAZCOM eliminates duplication, the information provided by OSHA should neither be all-inclusive, nor a comprehensive substitute for DOT HAZMAT. For example, the intent of HAZWOPER is to protect employees from exposure to the health and physical hazards of hazardous substances, and HAZCOM is to ensure that chemical hazards are evaluated and the information is transmitted accordingly. Both HAZWOPER and HAZCOM do not necessarily train to the specific elements of 49 CFR 172 such as the hazardous materials table found in 49 CFR 172 - *Subpart B: Table of Hazardous Materials and Special Provisions*. DOT HAZMAT training and recurrent training focuses on those employees who perform work functions covered by the *Hazardous Materials Regulations* (HMR; 49 CFR 171-180) and specific DOT HAZMAT job tasks (e.g., characterizing, shipping, handling and transporting HAZMAT).

Therefore, the employees that must receive DOT HAZMAT training consist of: 1) operators that perform actual hands-on field operations, come in direct contact with the waste containers, operate the equipment used to load/unload waste containers for off-site shipment, block and brace hazardous materials, or operate vehicles carrying hazardous materials; and 2) managers who supervise or are directly affiliated with the characterization, disposal and transportation, prepare DOT shipping documentation, complete shipping papers and emergency response information, select packages, mark and label packages, and provide placards to carriers. The training elements discussed herein ensure that shipments are completed according to regulation and accomplished safely without incident.

REFERENCES

- 1 Title 29 of the Code of Federal Regulations, Part 1910.120 - Hazardous Waste Operations and Emergency Response (HAZWOPER), Occupational Safety and Health Administration, Department of Labor, Washington, DC, November 7, 2002.
- 2 Title 29 of the Code of Federal Regulations, Part 1910.1200 – Hazard Communication (HAZCOM), Occupational Safety and Health Administration, Department of Labor, Washington, DC, February 13, 1996.
- 3 Title 49 of the Code of Federal Regulations, Parts 171-180, Department of Transportation, Washington, DC.
- 4 “Emergency situations that fall under Hazwoper,” <http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=20454>, Occupational Safety and Health Administration Standard Interpretations, Department of Labor, Washington, DC, November 8, 1991.

- 5 Title 29 of the Code of Federal Regulations, Part 1910.38 – Emergency Action Plans, Occupational Safety and Health Administration, Department of Labor, Washington, DC, November 7, 2002.
- 6 Welcome to the HAZMAT Safety Homepage – Got a Question?, <<http://hazmat.dot.gov/question.htm>>, Office of Hazardous Materials Safety, Research and Special Programs Administration, U.S. Department of Transportation, Washington, DC.
- 7 Hazardous Materials Transportation Training Modules, <<http://hazmat.dot.gov/pubtrain/mod.htm>>, Office of Hazardous Materials Safety, Research and Special Programs Administration, U.S. Department of Transportation, Washington, DC.
- 8 T.T. Potts, J.M. Hylko and T.A. Douglas, “An Advanced Tool for Applied Integrated Safety Management,” <\wm03\pdfs\307.pdf>, Waste Management '03 Proceedings, WM Symposia, Inc., Tucson, AZ. February 23-27, 2003.

ACKNOWLEDGEMENT

The authors want to thank Doris Becker for her review and contribution to this paper.

FOOTNOTES

^a First Responder awareness level (1910.120(q)(6)(i)) - First responders at the awareness level are individuals who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response sequence by notifying the proper authorities of the release. They would take no further action beyond notifying the authorities of the release.