

Guidelines on Training Programs Used to Satisfy Hazardous Materials/Dangerous Goods¹ Transportation Training Requirements²

Chapter 1 Introduction

1.1 Need for training

1.1.1 Safe transportation of hazardous materials depends on their being properly prepared for transportation and properly handled while in transportation. Employees affecting safe transportation need to be aware of the hazards of such materials, their potential for causing incidents and accidents and how they should be safely prepared and transported. Effective training of hazmat employees is important to the safe transportation of these materials. Properly planned and maintained training programs are essential to ensuring that those concerned receive an initial and continuing appreciation of the risks involved in transporting hazardous materials, the relevant requirements that have to be met and the need for complying strictly with them at all times.

1.1.2 U.S. domestic and international regulations on the transportation of hazardous materials recognize this need for training through specific requirements to train employees engaged in all aspects of hazardous materials transportation. Relevant regulations³ for purposes of these guidelines include:

US Department of Transportation, Hazardous Materials Regulations (HMR) in Title 49 of the US Code of Federal Regulations (CFR) in Parts 105 to 180 (see training requirements in §172.700 - .704);

International Maritime Organization (IMO), International Maritime Dangerous Goods (IMDG) Code (see training requirements in Chapter 1.3);

International Civil Aviation Organization (ICAO), Technical Instructions on the Safe Transport of Dangerous Goods by Air (Technical Instructions or TI) (see training requirements in Part 1, Chapter 4). The ICAO TI requirements are most commonly available to hazmat employees in the International Air Transport Association (IATA) Dangerous Goods Regulations (DGR). They may also be available through other publications approved by ICAO.

¹ The terms “hazardous materials,” “hazmat” and “dangerous goods” are used interchangeably in this document and should be considered to have the same meaning.

² These guidelines have been prepared based on a partnership agreement between the U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA) and the Dangerous Goods Advisory Council (DGAC) with input from the hazmat community.

³ The Federal Aviation Administration has issued hazmat training requirements for air carriers and entities performing hazmat air transport related functions in 14 CFR. These regulations contain some requirements additional to those described by these guidelines.

1.1.3 The training requirements in the hazardous materials regulations are performance based. They acknowledge the diversity of hazmat employee functions and the consequent diversity of training needs. The requirements are not prescriptive and permit the hazmat employer considerable discretion in the type and extent of training provided to employees. Training may be provided directly by the employer or by an independent training provider. While the form of the regulations permits the affected industries considerable discretion in tailoring training programs to meet the needs of employees commensurate with their responsibilities, incident data and experience in enforcing the regulations suggests the quality of training provided may vary widely. A primary goal of these guidelines is to improve the consistency and overall quality of hazmat training that is provided and to ensure hazmat employees are fully qualified for the hazmat functions they perform.

1.2 Purpose of these guidelines and recommended use

1.2.1 The purpose of these guidelines is to clarify the intent of the regulations and to assemble best training practices in a single document with the objective of improving the overall quality and consistency of training provided to hazmat employees with the ultimate goal of enhancing transportation safety.

1.2.2 The recommendations in these guidelines are voluntary. Compliance with regulatory requirements cited in these guidelines is mandatory and subject to enforcement by governmental personnel.

1.2.3 Persons engaged in training activities should consider the contents of these guidelines with a view to enhancing training effectiveness.

1.3 Definition of terms

1.3.1 The following terms are used in these guidelines and have the meaning provided:

General awareness training. Training that is aimed at providing familiarity with the general requirements of the regulations.

Function specific training. Training that is aimed at providing a detailed study of the requirements of the regulations applicable to the function for which the person is responsible.

In-house training. Training provided to the employees of a single company by a company employee or an independent training provider.

Recurrent training. Training given at intervals (usually not more than two or three years) to ensure a hazmat employee's knowledge remains at the required level so they can continue to carry out their responsibilities fully and to provide an update on regulatory changes.

Safety training. Training that covers the hazards presented by hazardous materials, safe handling, emergency response information and methods and procedures for accident avoidance.

Security awareness training. Training that is intended to provide a general understanding of the security risks associated with hazardous materials transportation and the methods designed to enhance transportation security. It should identify possible practical indicators of a potential security threat.

In-depth security training. Training related to a required company security plan. It should cover company security objectives, specific security procedures, employee responsibilities, actions to take in the event of a security breach and the organizational security structure.

Training program. A systematic method that has been developed for providing training, which consists of associated material (such as handouts, overheads, videos, exercises, etc.), tests and quizzes and, where there is an instructor, the instructor's notes or course outline. The training program may be led by an instructor or be a self-study course, including interactive computer based self study.

Training provider. Any person or organization that offers or provides hazmat training, including a hazmat employer.

Independent training provider. A person or organization, independent of a hazmat employer, that offers hazmat training.

Chapter 2 National and International Training Requirements and Responsibilities Relevant to Training Regulations

2.1 The requirement to train hazmat employees in the United States stems from the training requirements in the Hazardous Materials Regulations in 49 CFR §172.700 to §172.704. It is the duty of each hazmat employer to ensure that its employees are trained in accordance with the training regulations. Hazmat employers should familiarize themselves with the regulatory text. These guidelines are intended as a supplement to the regulations – not a substitute.

2.2 Under the HMR, a hazmat employer includes:

(1) A person who employs or uses at least one hazmat employee on a full-time, part time, or temporary basis; and who:

(i) Transports hazardous materials in commerce;

(ii) Causes hazardous materials to be transported in commerce; or

(iii) Designs, manufactures, fabricates, inspects, marks, maintains, reconditions, repairs or tests a package, container, or packaging component that is represented, marked, certified, or sold by that person as qualified for use in transporting hazardous materials in commerce;

(2) A person who is self-employed (including an owner-operator of a motor vehicle, vessel, or aircraft) transporting materials in commerce; and who:

(i) Transports hazardous materials in commerce;

(ii) Causes hazardous materials to be transported in commerce; or

(iii) Designs, manufactures, fabricates, inspects, marks, maintains, reconditions, repairs or tests a package, container, or packaging component that is represented, marked, certified, or sold by that person as qualified for use in transporting hazardous materials in commerce; or

(3) A department, agency, or instrumentality of the United States Government, or an authority of a State, political subdivision of a State, or an Indian tribe; and who:

(i) Transports hazardous materials in commerce;

(ii) Causes hazardous materials to be transported in commerce; or

(iii) Designs, manufactures, fabricates, inspects, marks, maintains, reconditions, repairs or tests a package, container, or packaging component that is represented, marked, certified, or sold by that person as qualified for use in transporting hazardous materials in commerce.

Each hazmat employer is responsible for training its hazmat employees (see §171.8 for the definition of a hazmat employee).

- 2.3 The training requirements of the HMR apply to hazmat employers and their hazmat employees operating in the United States, those carrying hazardous materials into the United States and those outside the United States affecting hazardous materials transportation in the United States as described in the definition. To the extent that the HMR allows transport in accordance with the ICAO Technical Instructions and the IMDG Code, the HMR also permit training on hazardous materials functions described in these international regulations as an alternative to function specific training related to the HMR. Both the ICAO Technical Instructions and the IMDG Code (note that the training requirements in the IMDG Code are expected to be made mandatory requirements of the Code in 2010) include requirements for training. Hazmat employees transporting

materials in accordance the ICAO TI and the IMDG Code must be trained on their relevant requirements. In addition to the requirement to train on the ICAO Technical Instructions and the IMDG Code stemming from the HMR training requirement, other countries, including the country in which the aircraft or vessel is registered and countries to which hazardous materials originating in the US are bound may additionally require training in accordance with the requirements of the ICAO Technical Instructions and the IMDG Code.

2.4 Hazardous material employee training must include:

- .1 general awareness training;
- .2 function specific training;
- .3 safety training; and
- .4 security awareness training.

In addition a hazmat employee working for a company required to have a security plan and who has responsibilities identified in the plan must also receive in-depth security training commensurate with those responsibilities.

2.5 The HMR require a new hazmat employee to be trained on the regulations within 90 days of employment and require that each hazmat employee receive recurrent training at least every three years. The training requirements in the ICAO regulations require recurrent training at least every two years. The IMDG Code does not specify a required frequency for recurrent training so that the three year recurrent training requirement of the HMR applies. Additionally, air carriers and related industries subject to the Federal Aviation Administration hazmat training requirements in 14 CFR are required to provide recurrent training at least every two years.

2.6 It is the hazmat employer's responsibility to ensure that employees are appropriately trained. Training may be provided directly by the hazmat employer or through an independent training provider.

2.7 While the regulations require that training be provided at certain intervals, it is good business practice to view training as a continuous process of monitoring and evaluating employees carrying out their hazmat functions and correcting noted deficiencies as they are identified on the job; periodically reinforcing safe practices through safety meetings; assessing the company performance through audits; review of incidents and inspection results and providing remedial instruction as appropriate; and updating employee knowledge on regulatory changes or changes in company practices as they become effective.

Chapter 3 Development of Training Programs

3.1 General

3.1.1 Development of an effective training program can be accomplished through a step wise systematic process (see Figure 3.1). As discussed below, the steps include a needs analysis, course design, course development, course delivery, evaluation and validation. This development process encompasses a number of best practices.



Figure 3.1 Steps in the systematic approach to training program development.

3.2 Needs Analysis

3.2.1 The purpose of a needs analysis is to assess the level of competency currently held by students and compare this with the desired level of competency at the completion of training. The purpose of the training is to fill the gap between current and desired competency levels.

3.2.2 In conducting a needs analysis, the hazmat employee's knowledge in the following areas should be considered:

.1 general philosophy of the regulations, including the organization and structure of the regulations and authorization to transport hazardous materials in accordance with the ICAO requirements or the IMDG Code;

.2 definitions of terms used in the regulations;

.3 classification of hazardous materials, including criteria for each hazard class/division, packing groups and application of the precedence of hazard requirements;

- .4 assignment of proper shipping names and UN/NA ID numbers, including the use of technical names;
- .5 DOT Hazardous Materials Table, ICAO Dangerous Goods List, and IMDG Code Dangerous Goods List;
- .6 hazardous substances and marine pollutants (environmentally hazardous substances);
- .7 types of authorized packagings, packaging selection for a specific material, applicable packaging requirements;
- .8 preparation of a package for transportation;
- .9 labeling, marking and placarding;
- .10 shipping paper requirements and other documentation requirements;
- .11 emergency response information⁴;
- .12 general awareness on the security of hazardous materials in transportation;
- .13 modal specific operational requirements for transporting hazardous materials;
- .14 training requirements.

The extent to which these subjects are covered will depend on the training needs of the participants and the objectives of the training program. For example, an employee involved in the manufacture of packagings may require in depth training on all aspects of the regulations applicable to packages they are involved in manufacturing whereas someone filling packages may need less comprehensive training on package specification marking and package specification and performance requirements.

- 3.2.3 The needs analysis may take many forms depending on the nature of the training program and the instructor's familiarity with the students. It could involve an analysis of the employee's work environment, a questionnaire completed by students in advance, a self evaluation at the beginning of the class or could be a less formal assessment. More than one individual may be involved in performing a needs analysis. For example, an individual overseeing compliance with training requirements for a large hazmat employer may be responsible for certain aspects of the needs analysis when deciding the level and type of training required for the company's hazmat employees. In any case, the needs analysis provides the basis for the course design. Throughout the training class, the

⁴ Training on emergency response is not intended to replace OSHA 29 CFR §1910.120 training. The training referred to is intended to address transport workers who may have responsibilities such as notifying others of an emergency, using fire extinguishers, or other emergency features for avoiding or mitigating the release of a material.

instructor should continue to assess the needs of students through class interaction and should modify training provided based on the identified needs of the students.

3.2.4 In carrying out a needs analysis, the instructor should consider the following:

.1 What type of work experience do students possess?

.2 What are their function specific responsibilities? The content of training courses for hazmat employees performing certain hazmat transportation functions is provided in Table 1-4 of the ICAO Technical Instructions and paragraphs 1.3.1.5 and 1.3.1.6 of the IMDG Code. This provides a baseline for training for the identified job functions and should be used as guidance when considering the scope of training for hazmat employees performing other functions.

.3 To what level of detail do students need to be familiar with the regulations in order to carry out their responsibilities?

.4 What regulations, company procedures and policies must the students be familiar with in order to carry out their responsibilities? What core competencies does this type of work require?

.5 What types of hazardous materials do students handle?

.6 What level of knowledge on the hazardous materials regulations do they already possess? Is the training provided to fulfill the initial or recurrent training requirements?

.7 What are their backgrounds, including the extent of educational training, the language they are most fluent in, and the type of teaching method that would likely be most effective?

3.3 **Course Design**

3.3.1 Course design is the process of defining how the training course will be organized and the training techniques that will be utilized to fulfilled the desired objectives. The results of the needs analysis provide the basis for designing the course.

3.3.2 In designing a course, the following should be considered:

.1 time allocated to various aspects of the regulations should be balanced taking into account the needs of the students;

.2 exposure of participants to a variety of learning experiences to ensure that the information being provided is presented in a manner conducive to understanding by those in attendance;

.3 extent of participation by students during training;

.4 use of course materials that are relevant to the real world of the students, for example, by using hazardous materials transport scenarios involving transport experiences they are likely to encounter in the work place or providing examples of hazmat incidents and asking students to identify the root cause;

.5 use of repetition to confirm key points are well understood;

.6 use of exercises with class participation to ensure understanding of what has been taught. An example of an exercise would be to identify a quantity of a hazardous material that must be transported and asking the students to identify the appropriate packaging, relevant package markings, labels, placards and shipping paper entries and any modal specific limitations;

.7 training should be progressive by, for example, starting with simple case studies and building on what is learned to deal with increasingly complex cases; and

.8 comprehension of course materials should be confirmed throughout the training programs through group exercises, quizzes and tests.

3.3.3 Sufficient time should be allocated to the length of a training course to effectively cover the subject matter and ensure that participants understand the material presented. Additional time should be incorporated to repeat training on selected topics when it is clear that students have not fully understood what was presented.

3.4 **Course Development**

3.4.1 Course development is the preparation of instructional materials, exercises and lesson tools as well as attending to the logistics of the training program. Course materials are an essential element of an effective training program. They should be easy to understand and appropriate for the audience. A sampling of training materials to consider may include the following: the hazardous materials regulations, PowerPoint presentations, flip charts, videos, photographs, and handouts. In computer based training, similar training aids should be integrated into the training program.

3.4.2 In planning the training program, sufficient flexibility should be built into the program to enable the instructor to devote time to issues raised in class discussions.

3.5 **Course delivery.**

3.5.1 Course delivery is the actual presentation of the training course. The instructor should strive to make participants comfortable by creating a positive learning environment. Students should be encouraged to ask questions and to actively participate through lectures, group discussions, and individual and group

exercises. The instructor should be accessible during class breaks, after class and even by telephone or email after the completion of the training program.

3.6 Evaluation

- 3.6.1 Course evaluation involves the evaluation of student performance as well the evaluation of the instructor, and the training program. The student's progress throughout the course should be evaluated through observation in class exercises, quizzes and by a test at the conclusion of the training course. At the conclusion of each exercise, quiz or test, the instructor should review the results with the students, highlighting any areas of confusion or misunderstanding for additional training emphasis. The content of the test is discussed in Chapter 5. The instructor and the training program may be evaluated by survey questionnaires completed by class participants at the conclusion of the training program. Comments obtained in the evaluation process should be considered in the redesign of the training program.

At the conclusion of the training program, the instructor should communicate student results to the hazmat employer and, if appropriate, provide an assessment of the student's ability to perform intended hazardous materials transportation functions.

3.7 Validation

- 3.7.1 The validation step is used to ensure that the training program's objectives were achieved. Validation involves the hazmat employer, the hazmat employee, the instructor and the training provider as applicable.
- 3.7.2 A hazmat employee's performance on the job is a good method of validating training effectiveness. One method of gauging performance on the job is to have the newly trained employee assigned to a mentor and to have the employee perform the hazardous materials transportation functions covered by the training program. Periodically thereafter the hazmat employee's proficiency should be reconfirmed through a similar process. Findings of the validation process should be conveyed back to the training provider and its instructor to improve the content of the training program.
- 3.7.3 Students should be encouraged to provide feedback to the instructor on the effectiveness of the training program by completing questionnaires at the conclusion of the training program and through informal communications.
- 3.7.4 Hazmat employers should provide feedback to the training provider based on observations of employee performance following completion of training.

Chapter 4 Instructor Qualifications

- 4.1 **General.** An instructor engaged in providing training on the hazardous materials regulations must be well versed in the regulations and hazmat transportation processes and must also have good public speaking and training skills.
- 4.2 **Hazardous materials specific experience.** A hazardous material instructor must have received training to be sufficiently versed in the subject matter to be covered. There are no prescribed qualifications for hazardous materials trainers and among highly qualified trainers there is a range of career experiences. The instructor must have an understanding of the “real world” of shipping hazardous materials. The instructor should have a competence beyond the level provided in training courses provided so that he/she is able to address most questions that arise in the training program. Experience in hazardous materials transportation may be gained by first working along side a seasoned training professional and actual experience in transporting hazardous materials or a combination of the two. Ideally, those new to the field of training on the hazardous materials regulations, will gain experience by first working under the tutelage of an experienced hazardous materials training professional and given increasing levels of responsibility as they gain experience. Once qualified, instructors should continue to stay abreast of regulatory changes, and changes in company practices affecting their training programs.
- 4.3 **Training skills.** In addition to knowledge of the regulations and an understanding of transportation practices, a trainer must have general skills of an educator, including good communication skills, an ability to listen and a mannerism that evokes class participation and interest. In training, success is not measured by what the instructor knows, but in how well students can carry out their responsibilities.
- 4.4 **Management of training professionals.** Training providers should establish quality programs to ensure the effectiveness of all instructors and to ensure the competency of new instructors. The quality program should specify the minimum qualifications for a new instructor. Initially the new instructor should work under the supervision of an experienced instructor. New instructors should be given step wise increases in responsibility as they gain and demonstrate increased experience. Training providers should ensure that instructors are provided with updates of the regulations. The performance of instructors should be periodically monitored and student evaluations made at the conclusion of training courses should be routinely reviewed to continually gauge instructor performance.

Chapter 5 Testing

- 5.1 The HMR training regulations require that as part of the required training each student is tested on the subjects covered. Detailed requirements on testing are not provided in the regulations and the contents of the test(s) and the manner in which

it is administered are at the discretion of the training provider. Testing should show that the course participant has satisfactorily completed training by demonstrating an understanding of the key knowledge areas taught. When appropriate, this should be demonstrated through questions setting out realistic examples of hazardous materials transportation scenarios.

- 5.2 Tests, quizzes or exercises interspersed throughout the training program are often an effective means of gauging whether students have a firm understanding of the information provided.

Chapter 6 Record Keeping

- 6.1 The regulations require that the hazardous material employer maintain a record of the hazmat training each employee has received. The training records must include:

- .1 the hazmat employee's name;
- .2 the most recent training completion date;
- .3 a description of, copy of or reference to training materials used to meet the training requirements;
- .4 the name and address person (i.e., the instructor and training provider) providing the training; and
- .5 a certification that the person has been trained and tested as required.

- 6.2.1 A common misconception is that the training provider must certify that the employee has been trained in accordance with the regulations. While some training providers regularly issue a certificate of training upon satisfactory completion of a training course, the certification by the hazmat employer (see 6.1.5) kept as part of the training records satisfies the regulatory requirement.
- 6.2.2 Training records must be retained for a minimum period of thirty-six months from the most recent training completion date or for 90 days post-employment.

Chapter 7 Management of employee hazmat training

- 7.1 The regulations permit required training to be provided through training personnel employed by the hazmat employer or by an independent training provider. Hazmat employers may fulfill their training obligations with a combination of these two approaches. Hazmat employers should determine training based on the responsibilities and knowledge required by their employees selecting the training options that work best for them and their employees. Hazmat employers should select training options that work best for them and their employees.
- 7.2 Each hazmat employer should appoint one or more individuals as a training coordinator to oversee compliance with the hazmat training requirements. Their

responsibilities should include ensuring that each hazmat employee is trained in accordance with the regulations, and maintaining training records. The training coordinator should have an in depth knowledge of the hazardous materials regulations as they apply to the company's operations and should keep abreast of regulatory changes as they develop.

- 7.3 The hazmat employer's training coordinator should:
- .1 monitor and evaluate the effectiveness of outside training programs;
 - .2 ensure the quality of training provided by auditing prospective training programs to ensure that the needs of company employees are met and by consulting with other industry professionals on the best quality training available;
 - .3 institute formal evaluation programs of training provided;
 - .4 ensure that training provided is effective by arranging for newly trained employees to be evaluated upon completion of a training program and periodically thereafter; and
 - .5 where appropriate, provide feedback to in-house instructors and any independent training providers used.
- 7.4 When necessary the training coordinator should work with independent training providers to customize training programs to meet company specific needs.
- 7.5 The training coordinator should be responsible for company training programs and keep them up to date with regulatory changes. They should work to cultivate and maintain a corporate culture that places a heavy emphasis on hazmat transportation safety and recognizes the need for an effective training program.
- 7.6 The training coordinator should establish the qualifications for in – house trainers and, as needed, should ensure they are provided training outside the organization, such as train the trainer programs, to ensure they have the required depth of knowledge and appropriate teaching skills.
- 7.7 The training coordinator should ensure company specific procedures and policies are incorporated in in-house training programs. They should ensure outside training is supplemented by training on company specific policy and procedures, unique function specific activities, and safety training, including emergency response training, as appropriate, and, where applicable, in-depth security training.

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