Proceedings of the 17th International Symposium on the Packaging and Transportation of Radioactive Materials
PATRAM 2013
August 18-23, 2013, San Francisco, CA, USA

TRANSPORTATION EMERGENCY PREPAREDNESS PROGRAM RADIOLOGICAL TRAINING MATRIX

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ABSTRACT

The U.S. Department of Energy Transportation Emergency Preparedness Program (TEPP) offers a variety of training courses to prepare emergency responders for response to radiological transportation accidents. The courses are divided into distinct topic and delivery options. By establishing training prerequisites, each option is designed to target specific types of emergency responder audiences and ensures emergency responders can identify and obtain the appropriate level and type of training to develop necessary skills for response and management of a transportation accident involving radioactive materials.

Target audiences for the training include: fire safety, law enforcement, emergency medical services, environmental and public health, emergency management, medical, public works, dispatch, medical examiners, coroners, and crime scene investigators.

TEPP TRAINING MATRIX

As TEPP has matured over the past 12 years, more advanced training has been added to the program to address specific training needs identified by the responder communities. The matrix was developed to assist potential trainees in identifying the type of training they need and identifies the targeted Occupational Safety and Health Administration (OSHA) level of training offered by the various courses.

Table1. Transportation Emergency Preparedness Program Training Matrix

Awareness	Operations	Technician	Specialist	Name of Course
X				Modular Emergency Response Radiological Transportation Training (MERRTT) Overview • Facilitated: 1-3 hours • Prerequisites: None • Conferences only
X				Understanding Radiological Threats in Your Community • Facilitated: 1-3 hours • Prerequisites: None • Conferences only
X	X	X		Modular Emergency Response Radiological Transportation Training (MERRTT) & TTT

				• Facilitated: 16 hours • Prerequisites: None • The Train-the-Trainer module is conducted at the end of the second day of training
X	X	X		Compressed Modular Emergency Response Radiological Transportation Training (CMERRTT) • Facilitated refresher course: 8 hours • Prerequisites: Students must have previously completed a radiological response training program • Often taught at conferences
		X		Technician Modular Emergency Response Radiological Transportation Training (TMERRTT) • Facilitated: 8 hours • Prerequisite: 16 hour MERRTT within the prior year
		X	X	Advanced Radiation Instrumentation • Facilitated: 3-4 hours • Prerequisites: Students must have previously completed a radiological response training program • Conferences only
			X	Hospital Emergency Department Management of Radiation Accidents Course • Facilitated: 8 hours • Prerequisite: FEMA IS-346
			X	Radiation Specialist • Facilitated: 40 hours • Prerequisite: 16 hour MERRTT course or equivalent

COURSE DESCRIPTIONS
A detailed description of each of the courses offered by TEPP is provided on the following pages.

MERRTT Overview
The overview is designed to be delivered in a 1 to 3 hour block and discusses how emergency responders should prepare for response to a radiological transportation accidents l. The overview presents and explains the Transportation Emergency Preparedness Program (TEPP), which uses a comprehensive approach to planning and training for a radiological transportation incident. The presentation details the available readiness assessment tools, planning tools including model procedures, exercise scenarios, and the various types of training programs.

Prerequisites – None. The overview will assist students in developing an understanding of how to prepare and train for response to a radiological transportation accident.

Target Audiences – This overview is available to all types of emergency responders interested in understanding and planning for response to a transportation accident involving radioactive material.

Host Agency Responsibilities – The sponsoring agency is responsible for recruiting the audience and providing adequate classroom arrangements, including, if possible, a projection system with a speaker system.

Understanding Radiological Threats in Your Community

This program is designed to be delivered during a 1 to 3 hour workshop. The session will review case histories of actual incidents involving radioactive material. Instructors will create an informative and participative learning environment during the discussion about these incidents. Theft, malicious intent, and transportation accident case studies involving radioactive material will be discussed during the session. Through the use of pictures of real incidents, props, and radioactive material sources, students participate in an interactive discussion about how they can recognize, detect, and protect themselves and their community from radiation and contamination.

Prerequisites – None. Students will review case histories to develop an understanding of how to prepare and train for a response to a radiological accident.

Target Audiences – This program is available to all types of emergency responders interested in understanding and planning for response to a transportation accident involving radioactive material.

Host Agency Responsibilities – The sponsoring agency is responsible for recruiting the audience and providing adequate classroom arrangements, including, if possible, a projection system with a speaker system.

Modular Emergency Response Radiological Transportation Training (MERRTT)

This 16-hour training program is designed to take the complex topic of a radiological accident response and break it down into 16 easily understood modules and hands-on practical exercises. Students will be presented with the training to simplify the topic while developing a comprehensive understanding of radioactive material, radiological survey instruments, decontamination techniques for handling radiologically contaminated victims, and resources available to responders during a response. An important element of the training is detailed information on the types of packages used to transport radioactive material. The course includes use of "live" radiation sources in the practical exercises to reinforce learning. By attending the Train-the-Trainer module, one additional hour of instruction delivered at the end of the 16 hours of training, students can be qualified as MERRTT trainers. Upon successful completion of the MERRTT course students will receive a certificate from the Department of Energy's Transportation Emergency Preparedness Program, including up to 10.5 hours of continuing education hours (CEH) for medical response personnel from the Continuing Education Coordinating Board for Emergency Medical Services.

MERRTT is included in the Department of Homeland Security (DHS) Federal Approved Courses Listing. It has been reviewed by OSHA who evaluated it against the requirements of 29 CFR 1910.120 (q) and determined that it relates to a safe response to a radiological transportation incident when presented in conjunction with other hazardous materials training. MERRTT also meets the Waste Isolation Pilot Plant (WIPP) Land Withdrawal Act training requirements.

Prerequisites – None. This training will develop necessary responder skills for all levels and types of responders.

Target Audiences – All types and levels of emergency responders assigned the responsibility to enter the hot zone, perform emergency rescue, identify package types, and isolate the hot zone until advanced level support arrives.

Host Agency Responsibilities – The sponsoring agency is responsible for recruiting the audience and for providing adequate classroom arrangements. A minimum of 15 students are requested to ensure the training is cost effective. The classroom arrangement should include tables for the students, several of which will be used for the practical exercises, and, if possible, a projection system with a speaker system. The host agency is also requested to provide a backboard/spine-board to be used during the patient packaging practical exercise.

Compressed Modular Emergency Response Radiological Transportation Training (CMERRTT)
This 8-hour training program is offered to audiences who have completed pervious radiological response training. The course consists of eight 30-minute modules and five hands-on practical exercises. Students will receive a comprehensive review ensuring their understanding of radioactive material, radiological survey instruments and decontamination techniques for handling radiologically contaminated victims. Hands-on practical exercises verify the student understanding and knowledge of radiological principles, instrument operation, decontamination techniques and employing radiologically contaminated patient treatment practices is solid. The course includes use of "live" radiation sources in the practical exercises to reinforce learning. Upon successful completion of this course students will receive a certificate from the Department of Energy's Transportation Emergency Preparedness Program, including up to 6.5 hours of continuing education hours (CEH) for medical response personnel.

Prerequisites – Students must have previously completed a radiological response training program.

Target Audiences – Emergency responders assigned the responsibility to respond and support first responder activities at radiological transportation accidents.

Host Agency Responsibilities – The sponsoring agency is responsible for recruiting the audience and for providing adequate classroom arrangements. A minimum of 15 students are requested to ensure the training is cost effective. The classroom arrangement should include tables for the students, several of which will be used for the practical exercises, and, if possible, a projection system with a speaker system. The host agency is also requested to provide a backboard/spine-board to be used during the patient packaging practical exercise.

Technician Modular Emergency Response Radiological Transportation Training (TMERRTT)
This 8-hour technician training program is aligned with the specific radiological competencies listed in NFPA 472 for a Technician Level and Agent Specific responder. The training includes a pre-test to verify responder knowledge and understanding of the actions necessary for radiological accident response. The course content includes advanced level training on instrument operation, radiological detector selection and limitations. In addition to the classroom training, students using the incident command system will participate in three field drills. In preparation for the exercises the students will establish an incident command staff, assign positions, and develop objectives for each of the three field drills. Upon completion of the incident command structure, students will discuss the field drill radiation safety plan addressing protective clothing considerations and the process for mapping the

scene. Students will also use a variety of radiological instruments and demonstrate how to conduct both radiation and contamination surveys, identify various types of "live" radiation sources, establishing control zone boundaries, explain and demonstrate contamination controls and decontamination methods. Upon successful completion of this course students will receive a certificate from the Department of Energy's Transportation Emergency Preparedness Program.

Prerequisites – Technician Level Hazardous Materials Certification and completion of the DHS/FEMA Radiological Response Team Initial Course, U.S. Department of Energy's Modular Emergency Radiological Response Transportation Training (MERRTT), or equivalent.

Target Audiences – Emergency responders assigned the responsibility to enter the hot zone, measure and map radiation levels, conduct contamination swipes, perform decontamination, and execute mitigation activities.

Host Agency Responsibilities – The sponsoring agency is responsible for recruiting the audience and for providing adequate classroom arrangements. A minimum of 15 students are requested to ensure the training is cost effective. The classroom arrangement should include tables for the students, several of which will be used for the practical exercises, and, if possible, a projection system with a speaker system.

The host organization should also have a wide selection of radiation and contamination detection instruments and personnel should be proficient in their use. This course focuses on different detection technologies and their application and is not designed for agencies that do not have radiation detection equipment or agencies with a limited selection of equipment.

The following requirements must be met in order to host a TMERRTT course. There is some room for negotiation for the drill portion of TMERRTT. The final decision on whether TMERRTT can be conducted at a particular location will be made by TEPP Central Operations. First, the host facility must be configured so that three drills can be conducted simultaneously. These three areas must be in close proximity to one another. Course participants will need to be able to walk from one drill station to the next in a short period of time. These areas may include, but are not limited to:

- A multi-story building or multi-room facility where high activity sources can be hidden, such as a fire department drill tower or a multi-room warehouse
- A high bay or enclosed area where a decontamination tarp can be set up and where patient rescue handling can be simulated
- A large open parking lot or roadway where a mock accident scene can be set up

Additionally, the host agency will need to provide high activity sources for use in the drills. If the host agency does not have access to some of the sources required below, TEPP Central Operations may be able to help provide sources. TEPP assistance will depend on fees and individual state requirements and reciprocity agreements regarding the use of sources. The following is a list of the types of radioactive sources, and their respective activities, needed for the practical exercises:

- Four individual sources that give a reading of at least 50 mR/hour at 1 foot (e.g., 3.5+ millicurie cobalt-60 source or a 15+ millicurie cesium-137 source); 30+ millicurie cesium-137 brachytherapy sources have been used in the past and have worked very well
- Four individual sources that give a reading of at least 10 mR/hour at 1 foot (e.g., 1+ millicurie cobalt-60 source or a 3+ millicurie cesium-137 source)
- Additional sources that would add to the training include a neutron source (e.g., AmBe source), a moisture /density gauge, and/or an industrial radiography camera

Advanced Radiation Instrumentation

This program is designed to be delivered during a 3 to 4 hour workshop. The session will include information on performing instrument and detector operations, large area scene surveys and methods of mapping radiation and contamination at an accident scene involving the release of a radioactive material. Participants are encouraged to bring their jurisdiction's radiological survey instruments to the class. It is recommended that responders planning to participate in this training session be familiar with basic instrument operations, the different types of radiation, and have an understanding of basic radiological terms. Participants will learn to identify the capabilities and limiting factors with gas-filled and scintillation style radiation detectors. Students will also gain an understanding on the importance of radiation energy on detector response. There will be an interactive discussion on radiation detection solutions and review of the fundamental issues important in the selection and operation of all radiation survey meters.

Prerequisites – Students must have previously completed a radiological response training program and come from an agency that has radiation detection equipment.

Target Audiences – Emergency responders assigned the responsibility to enter the hot zone, make decisions on selection of radiation detection instruments, measure and map radiation levels, conduct contamination swipes, perform decontamination, and execute mitigation activities.

Host Agency Responsibilities – The sponsoring agency is responsible for recruiting the audience and providing adequate classroom arrangements, including, if possible, a projection system with a speaker system.

Hospital Emergency Department Management of Radiation Accidents Course

TEPP will typically offer this course in support of TEPP and Waste Isolation Pilot Plant (WIPP) sponsored exercises. This 8-hour course is designed to introduce hospital medical care providers to ionizing radiation, its biological effects, facility preparation, radiological instrumentation, patient decontamination, and patient care/treatment. Upon completion of the classroom training, care providers will participate in a hands-on exercise for handling patients who have been exposed to ionizing radiation and/or are contaminated with radioactive material. The hands-on exercise allows hospital care providers the opportunity to demonstrate prompt and appropriate care for accident victims while minimizing exposure and preventing the spread of contamination. The course is targeted at all medical care providers who may be responsible for managing or treating a patient that has been exposed to radiation or is contaminated with radioactive material. The modular design of the program has been structured so non-medical care providers (e.g., maintenance, security, etc.) can attend the first 3 or 4 modules and then return in the afternoon for the hands-on exercise. Upon successful completion

of this training, hospital personnel will have developed the knowledge and skills necessary to safely perform assigned duties to handle and treat victims from a radiological incident.

Prerequisites – Successful completion of Orientation to Hazardous Materials for Medical Personnel (FEMA IS-346). This training will assist hospital medical care providers in developing an understanding of and the skills needed to handle and treat patients that have been exposed to radiation or are contaminated with radioactive material.

Target Audiences – All type of hospital medical care providers who are interested in expanding their understanding of managing and treating patients that have been exposed to radiation or are contaminated with radioactive material.

Host Agency Responsibilities – The sponsoring agency is responsible for recruiting the audience and for providing adequate classroom arrangements for the lecture portion of the training. A minimum of 15 students are requested to ensure the training is cost effective. The classroom arrangement should include tables for the students, and, if possible, a projection system with a speaker system.

To conduct the practical exercises in conjunction with this class, various emergency room (ER) supplies are required. These requirements can vary depending on whether the practical exercises are conducted in an actual ER or if they are conducted in a classroom. TEPP representatives will coordinate with the host medical agency/hospital prior to the conduct of the training to ensure the necessary supplies are available.

Radiation Specialist

This 40-hour training program is designed to meet National Fire Protection Association (NFPA) 472, *"Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents,"* Chapter18: *Competencies for the Hazardous Materials Technician with a Radioactive Material Specialty*. Technicians with a radioactive material specialty are responders who provide support to the hazardous materials technician on the use of radiation detection instruments, and they are expected to have the ability to manage the control of radiation exposure and conduct hazards assessment at an incident involving radioactive material. This training program discusses the scientific principles about the nature of radioactivity and relates it to the underlying technical performance of radiological detection instruments, the results of medical effects, exposure control methods, decontamination techniques and instrument operations. Completion of this training program will provide the technician with a radioactive material specialty that provides the knowledge and skills necessary to safely perform assigned duties at a radiological incident.

Prerequisites – Students interested in obtaining a radioactive material specialty must have completed MERRTT or equivalent training, hold an organizational position that requires the development of the radiation specialist skills, and be trained to meet all competencies of 29 CFR 1910.120 first responder awareness, operations, and hazardous materials technician levels. Additional training to meet Department of Transportation, Environmental Protection Agency, Occupational Safety and Health Administration, and other applicable state, local, or provincial occupational health and safety regulatory requirements will greatly improve the student's ability to successfully complete this training.

Target Audiences – Emergency responders and radiation authorities assigned the responsibility to respond and provide guidance and recommendations on safety and methods to execute mitigation activities for radiological incidents.

Host Agency Responsibilities – The sponsoring agency is responsible for recruiting the audience and for providing adequate classroom arrangements for the lecture portion of the training. A minimum of 15 students are requested to ensure the training is cost effective. The classroom arrangement should include tables for the students, and, if possible, a projection system with a speaker system.

The following requirements must be met in order to host a Radiation Specialist class. There is some room for negotiation on the following requirements for the drill portion of the. The final decision on whether the course can be conducted at a particular location will be made by TEPP Central Operations. First, the host facility must be configured so that three drills can be conducted simultaneously. These three areas must be in close proximity to one another. Course participants will need to be able to walk from one drill station to the next in a short period of time. These areas may include, but are not limited to:

- A multi-story building or multi-room facility where high activity sources can be hidden, such as a fire department drill tower or a multi-room warehouse
- A high bay or enclosed area where a decontamination tarp can be set up and where patient rescue handling can be simulated
- A large open parking lot or roadway where a mock accident scene can be set up

Additionally, the host agency will need to provide high activity sources for use in the drills. If the host agency does not have access to some of the sources required below, TEPP Central Operations may be able to help provide sources. TEPP assistance will depend on fees and individual state requirements and reciprocity agreements regarding the use of sources. The following is a list of the types of radioactive sources, and their respective activities, needed for the practical exercises:

- Four individual sources that give a reading of at least 50 mR/hour at 1 foot (e.g., 3.5+ millicurie cobalt-60 source or a 15+ millicurie cesium-137 source); 30+ millicurie cesium-137 brachytherapy sources have been used in the past and have worked very well
- Four individual sources that give a reading of at least 10 mR/hour at 1 foot (e.g., 1+ millicurie cobalt-60 source or a 3+ millicurie cesium-137 source)
- Additional sources that would add to the training include a neutron source (e.g., AmBe source), a moisture/density gauge, and/or an industrial radiography camera

CONCLUSION

The U.S. Department of Energy's Transportation Emergency Preparedness Program offers a variety of training courses to prepare emergency responders for response to transportation accidents involving radioactive material. Courses are divided into distinct topic and delivery options. By establishing training prerequisites, each option is designed to target specific types of emergency responder audiences and ensures emergency responders can identify and obtain the appropriate level and type of training to develop necessary skills for response and management of a transportation accident involving radioactive materials.

The overall goal of TEPP is to address the emergency response needs of state, tribal, and local governments. This is accomplished by meeting emergency first responders' training and knowledge needs, and by reducing the concerns of first responders about responding to any accident or incident involving DOE radiological materials shipments.

TEPP has employed an ongoing effort to meet federal regulations, national trade association expectations, and standards for competency for various response disciplines by providing advanced level courses. TEPP is now able to coordinate training and exercises utilizing high activity radiological sources. The result of these enhancements for those who have participated is a first response community better trained and prepared to manage any radiological transportation incident.