

Disaster Management for Water and Wastewater Utilities

MGT-343

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Course Description

Overview

The *Disaster Management for Water and Wastewater Utilities* course is designed to provide training to water and wastewater professionals on issues concerning preparing for, responding to, and recovering from natural or human-caused disasters that threaten water and wastewater facilities and systems.

Scope

This course introduces the various natural and human-caused (accidental or intentional) hazards to which water and wastewater systems may be vulnerable and the potential effects of hazards. Planning for and managing incidents are discussed, as well as disaster mitigation, response, and recovery specific to drinking water and wastewater systems. Participants are guided through portions of the Environmental Protection Agency (EPA) *Response Protocol Toolbox* (RPTB) to identify steps in the response and recovery processes. Case studies on a variety of disaster incidents, as well as hypothetical situations for water and wastewater incidents, are examined. Participants are also given the opportunity to practice developing a disaster response and recovery plan for a disaster affecting a drinking water or wastewater facility or system.

Course Goal

Upon successful completion of this course, participants will be able to discuss how to prepare for, respond to, and recover from incidents that threaten water and wastewater facilities and systems.

Target Audience

This course was developed for water and wastewater utility personnel, directors, department heads, supervisors/superintendents, operators, field personnel, customer service, lab personnel, inspectors, and engineers. State, local, city, county, and tribal emergency managers, regulatory personnel, elected officials, senior managers, utility board members, criminal investigators, and public health personnel are also encouraged to attend.

This course was also developed for city and county personnel and heads of the following departments who have interdependencies with water and wastewater services. This includes the following:

- Infrastructure systems (electric power, public works, transportation, environmental, solid waste, natural gas, information technology, and energy)
- City and community planning, housing and urban development, economic development
- Health and medical services and systems
- Fire and law enforcement
- City and county personnel (engineering, facilities and maintenance, planning, and development).



Prerequisites

None

Recommended Training

The following recommended courses can be found online at: https://training.fema.gov/IS/.

- IS-100.C: Introduction to the Incident Command System, ICS 100;
- IS-200.C: Basic Incident Command System for Initial Response;
- IS-700.B: An introduction to the National Incident Management System;
- IS-800.D: National Response Framework, An Introduction; and
- IS-2901: Introduction to Community Lifelines.

Course Length

16 hours

Instructor-to-Participant Ratio

1:15

Required Materials/Facilities

The course materials include:

- Participant Guide
- Participant Packet
- Instructor flip chart
- Pre- and Post-Tests (given electronically via the LMS)
- Course evaluation forms (given electronically via the LMS)
- Name tents
- Dri-erase markers (6–8 black, blue, red)
- Pens
- Laptop
- Projector
- Projector screen
- Extension cord and power strip
- Audio equipment: sound system connections or portable laptop speakers

Facilities should be climate-controlled classroom style with table seating to facilitate team/ participant exchanges and activities.



Learning Environment

This course must be taught in an environment that is conducive for participant success. Instructors must ensure the classroom adheres to the following:

- Adequate lighting is available for participant
- Classroom is at a comfortable temperature (e.g., not too cold or hot)
- Minimal outside noise that could distract participants during the course
- Classroom is set up so that all participants are able to see the content and participate in the course
- Evacuation plan is available in case of emergency
- Emergency systems are operable (e.g., emergency exits, emergency lighting)
- Any environmental and/or safety hazards are identified and eliminated or controlled (e.g., insects, slip/trip/fall hazards)
- All equipment and tools being utilized are operable and in good condition.

Testing/Certification

The instructor will use oral questioning during the presentation of each module to assess participants' mastery of the material. Problem areas identified during questioning will be reviewed in further detail.

The course activities within each module assess participant understanding and apply knowledge obtained during the module. Discussion of responses further allows the instructor to assess mastery of the module's material.

Following DHS standards, a pre-test and post-test are administered to measure participants' understanding of the course material. Participants are required to score 70% or better on the post-test and attend 80% of the course hours in order to receive a course certificate of completion.

If a participant scores below 70% the instructor(s) are available to provide remediation with the student to address specific areas of emphasis. Participants will be allowed up to two additional attempts to pass the post-test; total available attempts on the post-test is three. If the participant still scores below 70% after the two post-test re-takes, no course certificate of completion will be issued and the participant must re-take the course at a future date and pass the post-test to receive the course certificate of completion.

Registration and Attendance

Attendance is crucial in order to receive credit for this course. All participants must complete registration prior to the beginning of the course, sign the attendance roster for each day of the course, attend 80% of the course hours, and complete the evaluation at the end of the course in order to receive a certificate of completion.



Participants will register for the course online (<u>https://teex.org/dhs-fema-funded</u>). Under the training tab, participants will:

- 1. Select *DHS/FEMA-Funded*.
- 2. Select the course and click the *Register* button.

Note: Participants will be asked to log into *myTEEX Student Portal* with their existing TEEX account (or create an account if they are new students).

- 3. Read the Class Information page to ensure you are enrolling in the correct session and location. Select *Continue*. On the Class Fees and Options page, select *Continue*.
- 4. Enter your information on the Participant Information page. Select *Continue*.
- 5. Enter the Order Details and Payment Options then select *Finish*.

A FEMA Student Identification Number (SID) is required to register for and participate in any training provided by FEMA agencies. All FEMA training providers, registration systems, and enrollment procedures are required to use this FEMA SID, which can be obtained (<u>https://cdp.dhs.gov/femasid/Register</u>) or with TEEX assistance upon arrival for class.

Participant Photo Identification Requirements

Participants attending face-to-face classroom training events will be required to provide photo identification. Participant identification will be verified by a TEEX designated representative the morning of the first day of class. The proof of identification should include the full name and photograph of the individual. The following are acceptable forms of photo identification:

- State-issued ID such as a Driver's License or Identification Card
- United States or Foreign Passport
- National Identity Card
- U.S. Military Card (front and back)
- Permanent Resident Card
- Certificate of Citizenship
- Certificate of Naturalization
- Employment Authorization Document
- Employee ID or Badge with photo

For more information, please refer to the Participant Handbook on the TEEX website.

Note: Courses delivered online (including instructor-led online training) do not require photo identification if participants log into their personal TEEX Student Portal accounts to access the live training session and/or the course content and materials on the Learning Management System (LMS).



Evaluation Strategy

This course is concluded with a survey of individual participants using the DHS/FEMA National Preparedness Directorate/National Training and Education Division (NPD/NTED) Kirkpatrick Level I evaluation form which utilizes a 5-point Likert-type scale to evaluate the course, instructor performance and course benefit. Kirkpatrick Level II evaluations are conducted through the administration of pre- and post-course exams. Level III evaluations will be conducted by email surveys approximately 90 days following the conclusion of the course.



Course Design Matrix

Module 1 - Introduction

Scope Statement

The purpose of this module is to provide an overview of course topics, administration, and the requirements for course completion credit.

Terminal Learning Objectives (TLO)

This module's function is to provide a course introduction, it does not have a terminal learning objective.

Enabling Learning Objectives (ELOs)

This module's function is to provide a course introduction, it does not have enabling learning objectives.

Lesson Topics

- Course Goal
- Course Target Audience
- Course Delivery Methods
- Course Administration Requirements: Schedule, Safety, Examinations, Evaluations

Instructional Strategy

This module is delivered through facilitated lecture and course discussions.

Assessment Strategy

The Pre-Test establishes a baseline of participant knowledge of course materials. There is no passing score.

Practical Exercise (PE) Statement

A Pre-Test is administered.



Module 2 - Threats to Water and Wastewater Systems

Scope Statement

This module provides an overview of the many types of disasters that could affect a water or wastewater system or facility. The resulting damage to water and wastewater systems is compared to damage caused by a human-caused incident. The characteristics of terrorism are explained and the types of weapons that might be used to contaminate drinking water are also discussed. Treatments for contamination will be introduced.

Terminal Learning Objectives (TLO)

Upon successful completion of the module, participants will be able to characterize all-hazard threats that might affect water or wastewater systems.

Enabling Learning Objectives (ELOs)

Upon successful completion of this module, participants will be able to:

- 1. Discuss the effects of natural disasters on water or wastewater systems.
- 2. Identify potential impacts of human-caused disasters on a water or wastewater facility.
- 3. Describe the characteristics of terrorism.
- 4. Identify potential water or wastewater contaminants.
- 5. Identify treatments for potentially hazardous contaminants.
- 6. Prioritize local hazards in order of severity that affect water and wastewater systems.

Lesson Topics

This module introduces, through lecturing and discovery learning techniques, the following:

- Effects of Natural Disasters
- Impacts of Human-Caused Disasters
- Characteristics of Terrorism
- Potential Water and Wastewater Contaminants
- Treatments for Potentially Hazardous Contaminants
- Severity of Local Hazards

Instructional Strategy

This module is delivered through facilitated lecture and interactive discussions. Key concepts are reinforced through an activity that contains appropriate examples and current events.

Assessment Strategy

The instructor will observe participant contributions and reinforce module objectives by applying lesson topics to the activity. Problem areas identified will be discussed in further detail.



Practical Exercise (PE) Statement

Participants will apply their knowledge through the module activity that provides the opportunity to prioritize local hazards in order of severity that affect water and wastewater systems.



Module 3 - Disaster Planning and Management

Scope Statement

This module provides an overview of disaster planning and management practices. Key federal legislation for disaster management that pertains to the water and wastewater industries will be explained. The development of an Emergency Response Plan (ERP) is discussed, along with its implementation within the National Incident Management System (NIMS) and the Incident Command System (ICS). Additional guidance in emergency response from the American Water Works Association (AWWA) is also presented.

Terminal Learning Objectives (TLO)

Upon successful completion of the module, participants will be able to discuss disaster planning and management solutions for water and wastewater incidents.

Enabling Learning Objectives (ELOs)

Upon successful completion of this module, participants will be able to:

- 1. Describe key federal policies and guidance pertaining to the water and wastewater industry.
- 2. Identify the goals of a comprehensive Emergency Response Plan (ERP).
- 3. Identify elements of the National Incident Management System (NIMS).
- 4. Discuss American Water Works Association (AWWA) guidance on emergency response.
- 5. Assess areas where a utility may improve their disaster management planning.

Lesson Topics

This module includes the following topics:

- Federal Policies and Guidance
- Comprehensive Emergency Response Plans
- National Incident Management System
- American Water Works Association Guidance
- Improving Disaster Management Planning

Instructional Strategy

This module is delivered through facilitated lecture and interactive discussions. Key concepts are reinforced through an activity that contains appropriate examples and current events.

Assessment Strategy

The instructor will observe participant contributions and reinforce module objectives by applying lesson topics to the activity. Problem areas identified will be discussed in further detail.



Practical Exercise (PE) Statement

Participants will apply their knowledge through the module activity that provides the opportunity to assess areas where a utility may improve their disaster management planning.



Module 4 - Disaster Mitigation

Scope Statement

This module presents safeguards or mitigation measures that may be put into place to reduce the impact and protect the assets. Mitigation includes efforts to improve the resilience of critical infrastructure. Mitigation guidance is critical to the protection of the water supply and the community water and wastewater infrastructure.

Terminal Learning Objectives (TLO)

Upon successful completion of the module, participants will be able to interpret methods to mitigate disasters that threaten water and wastewater facilities and systems.

Enabling Learning Objectives (ELOs)

Upon successful completion of this module, participants will be able to:

- 1. Identify mitigation methods that may reduce the effects of natural disasters.
- 2. Discuss mitigation methods that could reduce the effects of human-caused incidents.
- 3. Identify water and wastewater policies and procedures for disaster mitigation.
- 4. Assess possible pre-disaster mitigation actions for water and wastewater facilities.

Lesson Topics

This module includes the following topics:

- Natural Disaster Mitigation
- Human-Caused Mitigation
- Mitigation Policies and Procedures
- Disaster Mitigation Actions

Instructional Strategy

This module is delivered through facilitated lecture and interactive discussions. Key concepts are reinforced through an activity that contains appropriate examples and current events.

Assessment Strategy

The instructor will observe participant contributions and reinforce module objectives by applying lesson topics to the activity. Problem areas identified will be discussed in further detail.

Practical Exercise (PE) Statement

Participants will apply their knowledge through the module activity that provides the opportunity to assess possible pre-disaster mitigation actions for hazards identified that affect water and wastewater facilities.



Module 5 - Disaster Response

Scope Statement

This module introduces participants to procedures and resources available in the response to a disaster. Modules from the Environmental Protection Agency (EPA) *Response Protocol Toolbox* (RPTB) pertaining to contamination threat management, site characterization and sampling, and public health response are discussed. Federal and state resources to aid in response actions are also identified. Also, a case study of an accidental water contamination response and recovery is examined.

Terminal Learning Objectives (TLO)

Upon successful completion of the module, participants will be able to discuss appropriate response actions to an actual or threatened incident.

Enabling Learning Objectives (ELOs)

Upon successful completion of this module, participants will be able to:

- 1. Explain how to use the EPA Contamination Threat Management Guide.
- 2. Discuss procedures for site characterization and sampling.
- 3. Explain the steps outlined in the EPA *Public Health Response Guide*.
- 4. Identify testing and support service available from the state and federal governments.
- 5. Explain the purpose of the Water Information Sharing and Analysis Center (ISAC).
- 6. Discuss response considerations for identified hazards.

Lesson Topics

This module includes the following topics:

- EPA Contamination Threat Management Guide
- Site Characterization and Sampling
- EPA Public Health Response Guide
- State and Federal Testing and Support Services
- Water Information Sharing and Analysis Center (ISAC)
- Interpreting Response Considerations

Instructional Strategy

This module is delivered through facilitated lecture and interactive discussions. Key concepts are reinforced through an activity that contains appropriate examples and current events.



Assessment Strategy

The instructor will observe participant contributions and reinforce module objectives by applying lesson topics to the activity. Problem areas identified will be discussed in further detail.

Practical Exercise (PE) Statement

Participants will apply their knowledge through the module activity that provides the opportunity to interpret response considerations for hazards affecting water and wastewater facilities.



Module 6 - Disaster Recovery

Scope Statement

This module offers participants guidance for the recovery stage of a disaster. Goals of recovery are discussed, along with steps for remediation and recovery from the Environmental Protection Agency's (EPA) *Response Protocol Toolbox* (RPTB), and a case study of an intentional water contamination response and recovery is examined. Public assistance for recovery will also be introduced.

Terminal Learning Objectives (TLO)

Upon successful completion of the module, participants will be able to articulate principles of managing disaster recovery for water and wastewater systems.

Enabling Learning Objectives (ELOs)

Upon successful completion of this module, participants will be able to:

- 1. Identify the actions required for cleanup and restoration of water and wastewater services.
- 2. Explain the steps for remediation and recovery from a water or wastewater incident.
- 3. Examine the response and recovery methods used in an intentional contamination case study.
- 4. Identify federal public assistance programs.
- 5. Assess post-incident mitigation measures that support recovery.

Lesson Topics

This module includes the following topics:

- Disaster Cleanup and Service Restoration
- Remediation and Recovery
- Intentional Contamination Case Study
- Federal Public Assistance Programs
- Assessing Post-Incident Mitigation Measures

Instructional Strategy

The instructor will observe participant contributions and reinforce module objectives by applying lesson topics to the activity. Problem areas identified will be discussed in further detail.

Assessment Strategy

This module is delivered through facilitated lecture and interactive discussions. Key concepts are reinforced through an activity that contains appropriate examples and current events.



Practical Exercise (PE) Statement

Participants will apply their knowledge through the module activity that provides the opportunity to assess post-incident mitigation measures that support recovery.



Module 7 - Course Summary

Scope Statement

This module is a brief summary of the course. Participants will also complete the course evaluation and take the Post-Test.

Terminal Learning Objective (TLO)

This module's function is to provide a course summary, it does not have a terminal learning objective.

Enabling Learning Objectives (ELOs)

This module's function is to provide a course summary, it does not have enabling learning objectives.

Lesson Topics

This module includes the following topics:

- Course Summary
- Course Evaluation
- Post-Test

Instructional Strategy

This module is delivered through facilitated lecture and interactive discussion.

Assessment Strategy

The Post-Test measures participants' acquisition of knowledge in this course. Participants are required to score a 70% or better on the post-test in order to receive a course certificate of completion.

Practical Exercise (PE) Statement

A Post-Test is administered.



Course Agenda

The course includes eleven distinct modules incorporating lecture, discussion, and group exercises. There are activities and exercises designed to allow participants to apply the information covered during the module. A concluding table-top exercise is the final module of the course and allows participants to apply the materials covered during the course.

Day 1

Introduction	30 minutes
Threats to Water and Wastewater Systems	2 hours, 30 minutes
Disaster Planning and Management	1 hour
Lunch	1 hour
Disaster Planning and Management (continued)	2 hours
Disaster Mitigation	2 hours
	Introduction Threats to Water and Wastewater Systems Disaster Planning and Management Lunch Disaster Planning and Management (continued) Disaster Mitigation

Day 2

Module 5	Disaster Response	4 hours
	Lunch	1 hour
Module 6	Disaster Recovery	3 hours
Module 7	Course Summary and Course Post-Test	1 hours



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