



INSTITUTE OF HAZARDOUS MATERIALS MANAGEMENT
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TABLE OF SPECIFICATIONS (BLUEPRINT) FOR THE CERTIFIED HAZARDOUS MATERIALS MANAGER (CHMM) EXAMINATION *(Effective January 2009)*

I. Recognize, Identify and Characterize Hazards of Materials _____ 15%

Understanding the chemical and physical properties of materials, and the dangers they pose, is a hazardous materials manager's primary responsibility. It is possible for any material, no matter how benign or essential to life, to pose a hazard to life or the environment, depending on its chemical, biological, nuclear or toxicological properties, and the amount involved. As with all potential hazards, the better we understand them, the better we can prepare for or circumvent their dangers. Understanding begins with recognition, identification, and classification or characterization of the hazards involved.

This category may include questions on:

- A. Properties of Materials
 - 1. General
 - 2. Chemistry
 - a. Chemical elements, nomenclature
 - b. Atoms, isotopes, ions, bonding and polarity
 - c. Mass, volume, density, specific gravity
 - d. Mixtures and solutions
 - e. Acid/base
 - f. Chemical reactions
 - 3. Physical properties of matter (incl. Radiation)
 - a. Compatibility/incompatibility of substances
 - b. Physical hazards: pressure, engulfment, thermal, fire, explosion, corrosion, polymerization, combustion, radiation, reactivity
 - 4. Biological properties
 - a. Bioaccumulation/bioconcentration
 - b. Exposure vectors: indoor air, waterborne, food, animal carrier
 - c. Biological warfare and terrorism
 - 5. Weapons of mass destruction (CBRNE)
- B. Characterization of materials, wastes
- C. Math & Statistics
 - 1. General
 - 2. Statistical methods
 - 3. Calculating concentrations
 - 4. Conversions
- D. Laboratory Analysis
 - 1. General
 - 2. Equipment and Instruments
 - 3. Sampling and Data Collection
 - 4. Analysis

II. Assess Risks Related to Hazardous Materials _____ 10%

Hazardous materials enter the environment in many ways, through emissions to the air, waste water discharges, solid waste disposal, and accidental releases from radiation sources, storage containers, vehicles, or during use. Once they enter an environmental medium (such as air) they can contaminate other media (such as groundwater or soil), increasing the risks to property, human health and the environment. A hazardous materials manager must be able to make reasonable predictions about what will happen when a chemical substance or radiation is released, so that he or she can make sound judgments about how best to minimize or eliminate its impacts. Risk assessment is the formal process that qualifies and quantifies potential threats to human health and the environment. This process also involves utilization of sampling and analysis plans, instruments and techniques, and the use of statistical models and measurement.

This category may include questions on:

- A. Physiology & Toxicology, as they relate to Health & Safety
- B. Risk Assessment
 - 1. Hazard identification
 - 2. Exposure assessment
 - 3. Toxicity assessment
 - 4. Risk characterization
- C. Risk Management Plans
- D. Math & Statistics, for calculating probabilities, risks

III. Mitigate and/or Eliminate Hazards of Materials _____ 15%

Hazardous materials can pose risks throughout their life cycles: during production, shipment, storage, distribution, use, and disposal. Additional risks exist if they are not properly controlled or secured against unintended or unscrupulous use. Once the risks have been identified, hazardous materials managers must be continually alert to opportunities to eliminate or mitigate those risks. This requires a blend of technical skill and regulatory knowledge, employing life-cycle management of these materials by: designing processes using safer materials; utilizing proper packaging, storage and shipping methods; controlling expected discharges and emissions; implementing controls to prevent accidental releases and exposures; planning for safe and secure disposal; reusing or recycling when possible; protecting the materials against unauthorized access; and planning for and responding to emergencies and incidents that may occur.

This category may include questions on:

- A. Proper Storage and Handling
 - 1. Developing and using MSDS
 - 2. Material separation and segregation
 - 3. Process Safety Management
 - 4. Site Safety & Security Plans
 - 5. Fire Safety, NFPA standards
 - 6. Storage methods
 - a. Accumulation areas
 - b. Underground storage tanks
 - 7. Reporting
- B. Shipping
 - 1. General
 - 2. Packaging/Marking/Labeling/Placarding
 - 3. Shipping Documentation
 - 4. Hazard Classes
 - 5. DOT Tables
 - 6. Dangerous Goods

- C. Waste Stream Management
 - 1. Air
 - 2. Water
 - 3. Hazardous Waste
 - 4. Universal Wastes
 - 5. Radioactive Wastes
 - 6. Mixed Wastes
- D. Pollution Prevention
 - 1. General
 - 2. Source Reduction
 - 3. Recycling & Recovery
 - 4. Greening
 - 5. Sustainability

IV. Manage Impacts of Hazardous Materials on the Environment _____ 18%

Among the most important responsibilities of a hazardous materials manager are the prevention of accidental or uncontrolled releases to the environment and the proper disposal of wastes resulting from the use of hazardous materials. Typical issues involve emissions to the air, discharges to surface or groundwater, and treatment and disposal methods. When spills or other uncontrolled releases do occur, the hazardous materials manager must be prepared to initiate specific emergency plans to minimize potential environmental impact. When past releases have left their mark, hazardous materials managers must be prepared to assess the threats, investigate remedial alternatives, and take corrective action.

This category may include questions on:

- A. Geology/Hydrology
 - 1. General
 - 2. Fate and Transport
- B. Biology/Ecology
 - 1. General
 - 2. Ecosystem Impacts
- C. Emergency Planning & Response
 - 1. General
 - 2. Preparing for Incidents and Emergencies
 - 3. Responding to Incidents and Emergencies
- D. Engineering Technology & Treatment Methods
 - 1. General
 - 2. Chemical
 - 3. Physical
 - 4. Biological
- E. Disposal & Releases
 - 1. Air emissions and releases, NAAQS, NESHAP, greenhouse gases, etc.
 - 2. Discharges to groundwater, storm water discharges, NPDES, POTW, etc.
 - 3. Solid and hazardous waste management, characteristic and listed wastes, generator status, disposal alternatives
 - 4. Toxic Release Inventory Reporting
- F. Site Assessment
 - 1. General
 - 2. Phase I Assessments
 - 3. Phase II Assessments
 - 4. Phase III Assessments
- G. Remediation
 - 1. General
 - 2. Corrective Actions

3. Techniques/Technologies
4. Decontamination
5. Brownfields
- H. Environmental Impacts of Substances with Specific Standards
 1. Asbestos
 2. Lead
 3. PCBs
 4. Stratospheric Ozone-Depleting Substances
 5. Radioactive Materials
 6. Pesticides

V. Manage Impacts of Hazardous Materials on Human Health _____ 10%

A hazardous materials manager's goal must be to ensure that these materials do not pose a threat to those who encounter them in the workplace or to the public at large. The impacts of hazardous materials on human health can be immediate or long-term. On the job, workers must be protected through process analysis and monitoring of hazardous conditions; prevention of exposure when possible; use of personal protective equipment when exposures cannot be avoided; and training of workers in appropriate use and care around hazardous materials. Protecting the public involves increasing awareness; outright bans of some substances and controlled use of others; maintaining quality standards for air and water supplies; and prompt response to accidental releases or other incidents.

This category may include questions on:

- A. Health & Safety
 1. General
 2. Basic toxicology
 - a. Routes of entry
 - b. Target organs
 - c. Acute, chronic exposures
 3. Hazard Communication
 4. HAZWOPER
 5. Confined space
- B. Controlling Exposures
 1. General
 2. Warning properties
 3. Methods of control
 - a. Engineering controls
 - b. Administrative controls
 - c. PPE: respirators, clothing
 4. Sampling and monitoring
 5. Levels and standards (PEL/OEL, etc.)
 6. Radiation protection
 7. Bloodborne Pathogens
- C. Health Impacts of Substances with Specific Standards
 1. Asbestos
 2. Lead
 3. PCBs
 4. Stratospheric Ozone-Depleting Substances
 5. Radioactive Materials
 6. Pesticides
 7. Infectious Substances

VI. Ensure Regulatory Compliance _____ 15%

Statutory laws (passed by Congress and state legislatures) lay out goals; regulations promulgated by government agencies define the rules by which the laws will be implemented. Hazardous materials management is among the most heavily regulated activities in the United States. Not only are there dozens of laws and thousands of pages of regulations, but a single operation may be regulated under several agencies at the same time, both at the federal and local level. And in addition to the general standards for the processing, storage, use and disposal of hazardous materials, there are several substances so prevalent or so hazardous that they are covered under special standards (e.g., asbestos and lead). Hazardous materials managers cannot be expected to know every regulation by heart, but they must have a firm understanding of the basic regulatory standards, and they must know when and where to look for more detailed information. Because the CHMM is a national credential, candidates are tested only on U.S. *federal* laws and regulations.

This category may include questions on:

- A. U.S. Federal Statutory Laws, including: CAA, CWA, SDWA, RCRA, CERCLA, SARA, EPCRA, TSCA, PPA, FIFRA, NEPA, HMTA, AHERA, ASHARA
- B. U.S. Federal Regulatory Process
 - 1. General
 - 2. Regulatory standards (air quality, water quality, waste, radiation, etc.)
 - 3. Enforcement (including civil and criminal penalties)
- C. Major U.S. Federal Regulatory Agencies & Programs
 - 1. EPA (40 CFR)
 - 2. DOT (49 CFR)
 - 3. OSHA (29 CFR)
 - 4. NRC (10 CFR)
 - 5. DHS (6 CFR)
 - 6. Other
- D. International Standards (e.g.: ISO, IATA, IMO)

VII. General Management Practices and Business Skills _____ 17%

The ultimate goal of a hazardous materials manager is to ensure that these materials can be used in a way that furthers the mission of his or her enterprise while at the same time protecting human health and the environment. When hazardous materials are involved in a work process, countless new and varied requirements are introduced. Each requirement adds additional managerial and financial burdens to the organization, and hazardous materials managers must develop effective methods for meeting these burdens within the scope of available resources. Management systems can help to organize the work and ensure that the programs put in place are comprehensive, efficient, effective, and in compliance with applicable standards. The manager will also be responsible for training staff, monitoring personnel performance, keeping records, filing reports, and participating in audits and inspections.

This category may include questions on:

- A. Program Management
 - 1. General Management
 - 2. Policy-making
 - 3. Authority/Responsibility
 - 4. Supervision
 - 5. Training
 - 6. Reporting
 - 7. Documentation and Records Management
 - 8. Information Resources
 - 9. Economic Issues

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- 10. Best Management Practices
 - B. Project Management
 - C. Facility Management
 - D. Security
 - E. Develop & Implement Plans
 - 1. General
 - 2. Health & Safety Plans
 - 3. Process Safety Management Plans
 - Process hazard analysis, management of change, incident investigation, etc.
 - 4. Risk Management Plans
 - Hazard assessment, consequence analysis, worst-case scenarios, etc.
 - 5. Security Plans
 - 6. Corrective Action Plans
 - F. Incident Command
 - G. Public/Community Relations
 - H. Permits and other regulatory interface
 - I. Environmental Management Systems
 - 1. General
 - 2. Audits
 - J. Legal Issues
 - K. International Issues
 - 1. General
 - 2. ISO Standards

Basic Science, Basic Math, and Project Management Skills Required of CHMMs

BASIC SCIENCE	BASIC MATHEMATICS	PROJECT MANAGEMENT SKILLS
Chemistry	Addition	Accounting
Biology	Subtraction	Cost analysis
Microbiology	Multiplication	Budgeting and financial impact analysis
Ecology	Division	Estimating
Geology	Calculus	Production rates
Hydrogeology	Probability	Scheduling
Toxicology	Statistics	Contracts and contracting
Epidemiology		Resourcing (materials, equipment, personnel)
Physics		Deliverables
Radiation		Benchmark allocation
Health Physics		Construction code analysis
Meteorology		Reading blueprints
		Project documentation