Facilitator Guide Book

FUNDAMENTALS OF OCCUPATIONAL RISK MANAGEMENT IN CHEMICAL INDUSTRY.

Sector:- Hydrocarbon, Iron & steel, Mining, Power, Automotive, Construction, Chemicals & Petrochemicals and others

NSQF Level: 4.0

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About this Guide Book
The Micro-credential program in Fundamentals of Occupational Risk Management in the Chemical Industry equips professionals with the core competencies required to identify, assess, and manage occupational risks specific to chemical environments. It focuses on enhancing safety and ensuring compliance with international standards through the integration of risk assessment methodologies, hazard control strategies, chemical safety protocols, emergency preparedness, waste handling, and sustainable practices. Emphasis is placed on recognizing chemical hazards, understanding exposure routes, implementing control measures, and fostering a safety culture. This guide is intended to indicate how to proceed in covering a topic and includes additional information that may help the trainer develop a better understanding of the following aspects:

Knowledge and Understanding:
Operational learning and safety practices related to chemical hazard identification, risk assessment, control measures, and regulatory compliance in the chemical industry.

Performance Criteria:
Gaining practical skills to identify chemical risks, apply control measures, respond to emergencies, and ensure compliance with safety standards.

Professional Skills:
For the course "Fundamentals of Occupational Risk Management in the Chemical Industry," required skills include chemical hazard identification, use of PPE, risk mitigation, emergency response, compliance with safety regulations, and understanding of health checks, workplace hygiene, ergonomic practices, and sustainability.

This Facilitator Guide is designed based on the Qualification Pack (QP) under the National Skill Qualification Framework (NSQF) and comprises the following topics:
• Occupational Risks & Hazards in the Chemical Industry
• Identification & Evaluation of Risks & Hazards and Mitigation Steps
• Worker Protection, PPE Use, Accident Prevention & Regulatory Compliance
• Emergency Planning & Management

This guide focuses on the fundamental competencies that apply to occupational risk management in the chemical industry, including safety protocols, regulatory standards, risk assessment, and operational procedures that must be followed to prevent accidents and hazardous exposures in chemical processing environments. Trainers will be equipped to enhance the knowledge and skills of trainees in ensuring safety in chemical handling, storage, and operations across various industrial settings.

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By mastering the core principles of occupational risk management in the chemical industry, trainers will be able to effectively impart knowledge to trainees on identifying and mitigating chemical hazards, complying with safety regulations, and implementing proper procedures to maintain a safe and compliant working environment for all personnel involved in chemical-related activities.

Symbols Used:

1. Unit 1 Introduction

1.1. Key Learning Outcomes

At the end of this module, the trainees will be able to:

• Describe the role and importance of the chemical industry in occupational safety.

• List the roles and responsibilities of professionals managing chemical hazards.

• Discuss career progression opportunities in the field of chemical risk management.

1.2. Unit 1.1: Overview of the Industry

1.2.1. Unit Objectives

At the end of this unit, students will be able to:

• Identify chemical hazards and conduct risk assessments.

• Understand the application of engineering and administrative control measures.

• Use appropriate PPE for chemical-related tasks.

• Develop and follow emergency response procedures and first aid measures.

• Comply with national and international safety regulations.

1.2.2. Resources to be used

• Available objects such as Projection screen, whiteboard, projection screen, laptop, speaker, notebook, pen, participant handbook, etc

• Flip chart

• Attendance sheet

• Activities (role plays and games)

1.2.3. Ask

• What types of chemical hazards might be found in your workplace?

• How can engineering controls help in managing chemical risks?

• What PPE is necessary when handling corrosive or toxic substances?

• How would you respond to a chemical spill or exposure incident?

• What regulations (OSHA, REACH, etc.) do you know that apply to chemical safety?

• Why is regular health monitoring important for workers exposed to chemicals?

• What are the responsibilities of a chemical safety officer?

• How does chemical waste management support environmental safety?

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1.2.4. Do

- Introduce yourself to the participants.
- Give an overview of the program to the participants - duration of the program, objective etc.
- Give an overview of the capital goods sector in India.

1.2.5. Explain

• Explain chemical hazard identification and risk assessment methods.

• Describe safety regulations and global standards for chemical risk management.

• Discuss proper use of PPE and engineering controls.

• Outline emergency response steps for chemical incidents.

• Explain waste management procedures and health surveillance protocols.

• Highlight the importance of fostering a safety culture in chemical workplaces.

1.2.6. Tips

- Go slow with information flow with participants.
- Observe each participant's body language.
- Keep a positive and supportive approach towards the candidates

1.2.7. Activity: Team Spot

• Divide participants into small groups and give them scenarios or images of typical chemical industry settings.

• Ask groups to identify potential chemical hazards and propose control measures (e.g., PPE, ventilation, spill containment).

• After 15–20 minutes, have each group present their analysis.

• Facilitate a class discussion on effective chemical risk management strategies.

1.2.8. Notes for Facilitation

- Revise the important points discussed in this unit.
- Clear the doubts of the students, if any. Encourage them to ask questions.
- Discuss the question with the class and answer their queries satisfactorily.
- Help participants identify how to apply the skills taught in the course to their work
- Praise participants and the group on improving their performance and developing new skills.
- Encourage participants to move through the initial difficulties of learning new skills, by focusing
- on steps in their progress and the importance of what they are learning to do.

1.2.9. Summary

The *Fundamentals of Occupational Risk Management in the Chemical Industry* course provides a foundation in identifying, assessing, and mitigating chemical hazards. In this unit, trainees explore real-world examples of chemical risk scenarios, collaborate to suggest safety measures, and engage in group learning to build awareness of risk management principles. The unit emphasizes PPE use, emergency response, regulatory compliance, and the importance of cultivating a culture of safety in chemical environments.

1.2.10. Exercise

• **Which of the following is the best method for managing chemical risks in the workplace?**

a) Ignoring low-risk chemicals

b) Regular risk assessments and control implementation

c) Handling chemicals with bare hands

d) Relying solely on experience without training

• **What is the primary reason for using PPE in chemical handling?**

a) To match the lab dress code

b) To reduce exposure to harmful chemicals

c) To increase production output

d) To clean up spills quickly

• **What is a key step in emergency response to a chemical spill?**

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a) Leaving the site immediately

b) Notifying supervisors and initiating spill containment

c) Ignoring the spill if small

d) Continuing work as usual

• How does proper waste disposal impact chemical safety?

a) It increases costs

b) It reduces environmental and health hazards

c) It slows down production

d) It makes audits harder

• Why is periodic health monitoring necessary for chemical workers?

a) To improve morale

b) To detect early signs of exposure-related illness

c) To manage wages

d) To promote better teamwork

2. Unit 1: Chemical Hazard Identification and Control Measures

2.1. Key Learning Outcomes

At the end of this module, the trainees will be able to:

• Explain the types of chemical hazards commonly found in industrial workplaces.
• Conduct basic risk assessments for chemical substances and processes.
• Identify and recommend suitable engineering and administrative control measures.
• Select and correctly use appropriate personal protective equipment (PPE).
• Evaluate the effectiveness of control measures and suggest improvements to minimize risks

2.2. Unit Objectives

At the end of this unit, students will be able to:
- **Identify various chemical hazards in the workplace.**
- **Conduct risk assessments, including for new chemicals or processes.**
- **Apply appropriate engineering and administrative controls.**
- **Utilize personal protective equipment (PPE) effectively.**
- **Evaluate and improve the effectiveness of control measures.**

2.3. Resources to be used

- Available objects such as Projection screen, whiteboard, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Attendance sheet
- Activities (role plays and games)

2.4. Ask

- What types of chemical hazards have you encountered or heard about in industrial settings?
- How do you assess the level of risk associated with a new chemical or process?
- What control measures (engineering or administrative) do you think are most effective in your workplace?
- How do you determine which PPE is suitable for a specific chemical task?
- What factors would make you adjust or improve an existing safety measure?

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2.5. Do

- Give a brief introduction on the job description of Hammer and Tool Kit Maker outlining their personal attributes to the participants.
- Provide the participants with a List of Roles and Responsibilities of Hammer and Tool Kit Maker.
- Talk about the skills and knowledge which are essential to become a Hammer and Tool Kit Maker.

2.6. Explain

- Describe how many types of chemical hazards have you encountered or heard about in industrial settings?
- Describe How do you assess the level of risk associated with a new chemical or process?
- Describe What control measures (engineering or administrative) do you think are most effective in your workplace?
- Describe How do you determine which PPE is suitable for a specific chemical task?
- Describe What factors would make you adjust or improve an existing safety measure?

2.7. Tips

- Go slow with information flow with participants.
- Observe each participant's body language.
- Keep a positive and supportive approach towards the candidates

2.8. Activity: Team Spot

• Divide trainees into small groups and give them a scenario (e.g., chemical mixing plant, storage area, or lab).
• Ask each group to identify potential chemical hazards within the scenario.
• Then, have them list appropriate engineering/administrative controls and PPE for each hazard.
• After 15–20 minutes, groups will present their findings.
• Facilitate a discussion on the effectiveness of the proposed controls and opportunities for improvement.

2.9. Notes for Facilitation

- Revise the important points discussed in this unit.
- Clear the doubts of the students, if any. Encourage them to ask questions.
- Discuss the question with the class and answer their queries satisfactorily.
- Help participants identify how to apply the skills taught in the course to their work
- Praise participants and the group on improving their performance and developing new skills.
- Encourage participants to move through the initial difficulties of learning new skills, by focusing
- on steps in their progress and the importance of what they are learning to do.

2.10.   Summary

This unit highlighted the core aspects of chemical hazard identification and risk assessment. Trainees explored how to evaluate risks and apply control measures such as engineering solutions, administrative practices, and PPE. The group activity allowed practical application of these principles, reinforcing the importance of a structured approach to hazard management and continuous improvement in control strategies.

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2.11. Exercise

- The process of identifying potential chemical hazards and evaluating their risk before implementing control measures is known as _____.
- Personal Protective Equipment (PPE) should always be the first method used to control chemical hazards. (True/False)
- Which of the following is considered an engineering control in chemical safety management?
  a) Job rotation
  b) Safety signage
  c) Fume hood or local exhaust ventilation
  d) Conducting safety briefings
- A _____ culture within an organization emphasizes continuous improvement in safety practices and encourages employee involvement in identifying and reporting risks.
- Risk assessments should be updated whenever a new chemical or process is introduced in the workplace. (True/False)

3. Unit 2 Emergency Preparedness, Compliance, and Reporting

3.1. Key Learning Outcomes

At the end of this module, the trainees will be able to:

- **Inspect tools and machinery for defects, ensuring they are safe for use.**
- **Apply lockout-tagout procedures during maintenance to prevent accidents.**
- **Demonstrate safe operation around high-risk machinery and equipment.**
- **Participate in fire drills and understand emergency evacuation procedures.**
- **Report unsafe conditions and respond to workplace incidents effectively.**

3.2. Unit Objectives

At the end of this module, the trainees will be able to:
• Develop and implement emergency response plans and procedures.
• Carry out regular testing and evaluation of emergency preparedness.
• Ensure compliance with relevant chemical safety regulations and standards.
• Perform accurate incident reporting and maintain safety-related documentation.
• Monitor and analyse key safety performance indicators such as near-misses, incident rates, and lost-time

3.3. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

3.4. Ask

• Why is it important to have a structured emergency response plan in a chemical facility?
• How often should emergency procedures be reviewed or tested?
• What international standards or laws apply to chemical safety in your workplace?
• How does accurate record-keeping improve overall safety management?
• What do safety performance indicators such as near-miss rates tell you about a workplace?

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3.5. Explain

• Explain the structure and elements of an emergency response plan — including roles, responsibilities, communication protocols, and evacuation routes.
• Describe the importance of regularly testing emergency procedures (e.g., mock drills) and refining them based on observations.
• Provide an overview of major safety regulations and standards (e.g., OSHA, EPA, REACH) that apply to chemical industry practices.
• Discuss internal and external audits, how they are conducted, and their importance in maintaining compliance.
• Explain the process of documenting incidents and tracking performance indicators such as total recordable incidents, lost-time injury rates, and near-misses. Emphasize using data to drive continuous improvement.

3.6. Activity (Emergency Drill Planning)

• Divide the participants into small groups.
• Assign each group a chemical emergency scenario (e.g., gas leak, chemical spill, fire).
• Ask them to create a brief emergency response plan, including steps to take, responsible personnel, communication plan, and follow-up actions.
• After 20 minutes, each group presents their plan.
• Conclude with a discussion on how preparedness can reduce injury, damage, and downtime in real situations.

3.7. Notes for Facilitation

• Summarize the important points and terms explained in the session.
• Ask participants if they have any doubts. Encourage them to ask questions.
• Answer questions, as needed, providing concrete and brief answers.
• Tell participants to complete the questions at the end of the unit.
• Ensure that every participant answers all the questions.

3.8. Summary

This unit provided practical insights into managing emergencies, complying with legal requirements, and monitoring safety performance in chemical operations. Trainees learned how to develop and test emergency plans, understand relevant national and global safety standards, and ensure accurate documentation of incidents and safety data. The group activity reinforced the real-world application of emergency preparedness strategies and highlighted the role of proactive compliance in preventing major incidents.

3.9. Exercise

• An emergency response plan must be _____ regularly to ensure it remains effective and relevant to current workplace conditions.
  (Fill in the blank)
• Which of the following is **not** typically a component of an emergency response plan?
  a) Roles and responsibilities
  b) Communication methods
  c) Production targets

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       d) Evacuation procedures
       (MCQ)

- OSHA and REACH are examples of international standards that guide chemical safety and compliance. (True/False)
- One of the key indicators used to monitor safety performance is the number of _____, which helps identify and correct unsafe practices before incidents occur.
(Fill in the blank)
- Regular safety audits help:
a) Increase profit margins
b) Reduce training time
c) Ensure compliance and improve safety practices
d) Eliminate the need for PPE
(MCQ)

4. Unit 3 Safety Culture, Training, and Health Monitoring

4.1. Key Learning Outcomes

At the end of this module, the trainees will be able to:

• **Conduct and participate in regular safety training and emergency response drills.**

• **Ensure health checks for workers exposed to hazardous chemicals.**

• **Promote a culture of safety and accountability within the organization.**

• **Recognize the link between proactive safety practices and organizational performance.**

• **Support long-term improvements in occupational risk management.**

4.2. Unit Objectives

At the end of this unit, students will be able to:

• Plan and deliver effective training on chemical safety and emergency procedures.

• Schedule and manage periodic health check-ups for chemical-exposed workers.

• Encourage team participation in creating a safe and compliant work environment.

• Understand the importance of leadership and worker involvement in building safety culture.

• Contribute to organizational efforts toward sustainable and responsible risk management.

4.3. Resources

- Whiteboard, erasable marker, board cleaner, projection screen, laptop, speaker, notebook, pen, participant handbook, etc
- Flip chart
- Participant Manual
- Projection screen and PowerPoint presentations.
- Activities (role plays)

4.4. Ask

• Why is regular safety training necessary in a chemical plant?

• How can you ensure workers remember and follow emergency procedures?

• What types of health checks are required for employees exposed to hazardous substances?

• How can you encourage others to take responsibility for safety?

• What does a strong safety culture look like in the workplace?

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4.5. Explain

- Stress the need for regular safety training to handle chemical hazards and emergencies.
- Outline required health checks for workers exposed to hazardous substances.
- Highlight leadership, worker involvement, and communication as key to a strong safety culture.
- Show how safety culture reduces incidents and boosts accountability.
- Emphasize continuous training and health monitoring for lasting risk management.

4.6. Activity (Safety Commitment Wall)

• Ask each participant to write one commitment or safety message on a sticky note (e.g., "I will wear PPE always," or "I will report unsafe practices").
• Post all notes on a large sheet labelled "Our Safety Commitment Wall."
• Discuss common themes and how small actions contribute to a larger safety culture.
• Reinforce the message: "Safety starts with you."

4.7. Notes for Facilitation

- Summarize the important points and terms explained in the session.
- Ask participants if they have any doubts. Encourage them to ask questions.
- Answer questions, as needed, providing concrete and brief answers.
- Tell participants to complete the questions at the end of the unit.
- Ensure that every participant answers all the questions

4.8. Summary

This unit emphasized the human aspect of occupational risk management in the chemical industry. Trainees explored how regular training, employee health monitoring, and shared responsibility contribute to a safer workplace. A strong safety culture not only reduces incidents but also fosters collaboration and accountability. The group activity reinforced that individual commitment is key to collective safety.

4.9. Exercise

- Training employees on chemical safety should be conducted _____ to keep knowledge and skills updated.
  (Fill in the blank)
- Health check-ups for employees exposed to hazardous chemicals are optional unless symptoms appear. (True/False)
- Which of the following is a sign of a strong safety culture in the workplace?
  a) Workers ignore minor hazards
  b) Managers discourage safety feedback
  c) Employees actively report unsafe conditions
  d) Safety rules change frequently
  (MCQ)
- Safety culture is shaped by both _____ and worker participation.
  (Fill in the blank)
- Why is it important to promote a strong safety culture?
  a) It helps employees feel more relaxed
  b) It encourages shortcuts to complete tasks
  c) It reduces incidents and improves teamwork
  d) It delays productivity