
Major Hazard Safety Case Preparation and Review Training Course

5 – 9 July 2027
Tokyo





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Programme Summary

Major hazard safety case preparation and review is the subject of this one-week training course for HSE directors, process safety leads and operations managers at managerial level, ending in a safety case outline for one major hazard facility. A safety case must show, with evidence, that major accident hazards are identified and risks are controlled. The approach moves from hazard identification, through barrier analysis and risk demonstration, to review and maintenance, and then to a worked outline. Mars Training Centre UK delivers this programme in major hazard safety case preparation and review.

The Business Case

Operators of major hazard facilities must demonstrate that major accident risks are controlled, and a weak safety case exposes them to challenge from regulators, insurers and their own boards. A safety case that is built on clear argument and evidence, and reviewed as operations and equipment change, supports sound decisions on barriers and investment instead of being a document filed once.

- Major Accident Risk: Reduces as barriers are identified, specified and verified.
- Review Findings: Fall as arguments, evidence and assumptions are checked before submission.
- Change Control Quality: Improves as the safety case is updated when plant and operations change.

Principles and Evidence Base

- ALARP: Its test of gross disproportion guides the risk reduction decisions examined in Sessions 3 and 4.
- Bow-tie analysis: Its link between threats, barriers, top event and consequences structures the scenario work in Session 2.
- IEC 61511: Its functional safety requirements for instrumented systems in the process industry inform the safety critical elements in Session 3.
- LOPA: Layer of protection analysis sizes independent layers for the scenarios selected in Session 3.

Intended Participants

- Leaders accountable for demonstrating control of major accident hazards.
- Process safety leads who prepare hazard and risk evidence.
- Operations and engineering managers who own barriers and their maintenance.
- Reviewers who assess safety case arguments and evidence.

The programme serves oil and gas, chemicals, storage terminal and power generation organisations.



Learning Outcomes

1. Participants will be able to construct a facility description and a set of major accident scenarios.
2. Participants will be able to diagnose threats and barriers using bow-tie analysis.
3. Participants will be able to specify safety critical elements and their performance standards.
4. Participants will be able to evaluate risk reduction measures against the ALARP principle.
5. Participants will be able to critique a safety case for gaps in argument and evidence.
6. Participants will be able to justify a safety case outline to senior management.

Programme Structure

Day 1: Safety Case Foundations for Major Hazard Facilities

What must a safety case demonstrate, and to whom?

- Safety Case Content Map
- Facility Description Template
- Hazard Identification Register
- Major Accident Scenario Selection
- Argument and Evidence Structure

Day 2: Scenarios and Barrier Analysis

How are major accident scenarios linked to barriers?

- Bow-Tie Diagram Construction
- Threat and Consequence Screening
- Preventive and Mitigating Barrier Inventory
- Barrier Degradation Review
- Emergency Arrangements Outline

Day 3: Risk Demonstration and Safety Critical Elements

How is it shown that risk is as low as reasonably practicable?

- Risk Assessment Matrix
- LOPA Layer Sizing Worksheet
- IEC 61511 Functional Safety Review
- Safety Critical Elements and Performance Standards
- ALARP Gross Disproportion Test

Day 4: Safety Case Review, Verification and Maintenance

How is a safety case reviewed and kept live?



- Safety Case Review Checklist
- Barrier Verification Plan
- Change Management Triggers
- Periodic Review and Audit Schedule
- Safety Management System Linkage Map

Day 5: Applying Safety Case Preparation and Review to a Facility

Is the safety case outline ready for senior management scrutiny?

- Applying the Session 1 Content Map to the Facility
- Testing the Session 2 Bow-Tie Barriers
- Checking Session 3 Performance Standards and ALARP Arguments
- Applying the Session 4 Review Checklist
- Completing the Safety Case Outline

Methodology

The programme is built around case analysis and peer review. Participants work in small teams with an anonymised major hazard facility profile, build scenarios and barrier diagrams, test risk arguments and critique one another's draft sections, then defend their outline before a simulated review panel. No prior safety case authorship is required.

- Suggested activity: Building a bow-tie diagram for a loss of containment from a storage tank.
- Suggested activity: Critiquing a sample ALARP argument for a missing evidence link.
- Suggested activity: Drafting performance standards for two safety critical elements.

Capstone Output

Each participant completes a safety case outline for one major hazard facility. It contains a facility description, a scenario register, bow-tie diagrams, a schedule of safety critical elements with performance standards, an ALARP argument and a review plan. It is used to brief senior management and to prepare the full safety case for review.

Frequently Asked Questions

Is major hazard safety case preparation and review training suitable for managers who have not written a safety case?

Yes. Major hazard safety case preparation and review training is set at managerial level and assumes responsibility for or involvement with a major hazard facility, not prior authorship of a safety case.



Which standards and models does major hazard safety case preparation and review rest on in this programme?

Major hazard safety case preparation and review rests on ALARP, bow-tie analysis, safety critical elements with performance standards, IEC 61511 and LOPA.

How is the safety case outline from major hazard safety case preparation and review used at work?

You use the safety case outline to brief senior management, direct barrier ownership and prepare the full safety case for review.