JUPITER PRIME
Consulting • Training • Advisory
جوبيتر برايم للاستشارات والتدريب

COURSE BROCHURE

Safety Critical Elements and Barrier Integrity Training Course

1 – 5 August 2027
Muscat

jupiterprime.uk
info@jupiterprime.uk
Registered in the United Kingdom and Saudi Arabia

Safety Critical Elements and Barrier Integrity Training Course

Ref: 1354_50729 **Date:** 1 – 5 August 2027 **Location:** Muscat **Fees:** 6500 GBP

Safety Critical Elements and Barrier Integrity is a 1-week training course for integrity, process safety and operations engineers that produces a barrier assurance matrix linking each major hazard to its safety critical elements and their verified condition. Hydrocarbon releases, fires and toxic leaks still trace back to degraded barriers that nobody saw fail. Jupiter Prime Training delivers this Safety Critical Elements and Barrier Integrity course.

Why Safety Critical Elements and Barrier Integrity Matters Now

Three groups now ask harder questions about barriers. Boards and insurers want proof that the equipment preventing major accidents works on demand, not just that it was installed. Operations leaders face ageing plant and deferred maintenance, which quietly erode relief valves, shutdown valves and fire protection. Integrity and process safety teams often keep separate records, so a corroded line and an overdue trip test are never seen together. Sites that join these views catch barrier decay early; sites that do not learn from incidents. The course builds on ISO 55001 asset management and EN 13306 maintenance terminology.

Who Gains Most from Safety Critical Elements and Barrier Integrity

- Integrity engineers who own inspection results for pressure envelopes and piping
- Process safety engineers who maintain hazard studies and bow-tie diagrams
- Operations engineers who manage overrides, bypasses and operating limits
- Instrument and electrical engineers responsible for trip and shutdown function tests
- Maintenance planners who schedule safety critical tasks and track deferrals

Joint integrity and process safety groups from the same facility gain most when they attend together and agree one barrier status language.

Safety Critical Elements and Barrier Integrity Capabilities

Participants learn to trace a hazard to the hardware that stops it, define how that hardware must perform and prove it still does.

- Build bow-tie diagrams that show threats, consequences and barriers — the site's major hazard picture
- Specify safety critical elements and their performance standards — maintenance and inspection planners
- Assess barrier health from test, inspection and deferral data — the decision to continue or restrict operation
- Design integrity operating windows with alarm and action limits — control room operators
- Weigh overrides and deferred tasks against residual risk — operations managers who approve them
- Apply incident learning to strengthen barrier verification — process safety leadership

Key Safety Critical Elements and Barrier Integrity Terms

- Safety critical element — any equipment or system whose failure could cause or fail to prevent or limit a major accident.
- Performance standard — a written statement of the functionality, reliability and survivability a safety critical element must achieve.
- Bow-tie diagram — a picture linking threats through a top event to consequences, with preventive and mitigating barriers on each path.
- Integrity operating window — limits on process variables such as temperature or pH beyond which equipment damage accelerates.
- Barrier degradation — loss of a barrier's ability to perform, through wear, corrosion, bypass or untested function.
- Deferral — a decision to postpone a safety critical maintenance or test task, requiring risk review and approval.

Safety Critical Elements and Barrier Integrity Day by Day

Day 1: Major Hazards and Barrier Thinking

- Major Accident Hazard Identification — Listing Top Events per Unit
- Swiss Cheese and Barrier Models — Explaining How Defences Fail
- Lessons From Refinery and Offshore Incidents — Patterns of Barrier Decay
- Linking Integrity and Process Safety Records — Ending Parallel Registers
- ISO 55001 Asset Objectives — Placing Barriers in the Asset Plan

Day 2: Bow-Ties and Safety Critical Elements

- Bow-Tie Construction Steps — Threats, Consequences and Escalation Factors
- Preventive and Mitigating Barrier Types — Hardware Versus Human Barriers
- Safety Critical Element Selection — Screening Equipment Against Top Events
- Hazard Study Outputs as Inputs — Using HAZOP and LOPA Findings
- Barrier Ownership Assignment — Naming Accountable Engineers

Day 3: Performance Standards and Verification

- Functionality, Reliability and Survivability Criteria — Writing Measurable Standards
- Inspection and Test Task Mapping — Linking Standards to Work Orders
- Relief, Shutdown and Fire Protection Tests — Acceptance Criteria
- Pressure Envelope Integrity Checks — Corrosion and Thickness Evidence
- Independent Verification Schemes — Assurance Beyond the Maintenance Team

Day 4: Operating Limits, Deferrals and Learning

- Integrity Operating Windows — Setting Standard, Critical and Informational Limits
- Override and Bypass Control — Time-Limited Approvals and Compensating Measures
- Deferral Risk Review — Deciding When a Postponed Task Is Acceptable
- Barrier Health Dashboards — Showing Status to Operations Leaders
- Incident and Near-Miss Barrier Analysis — Feeding Lessons Into Standards

Day 5: Practising the Barrier Assurance Matrix

- Bow-Tie for a Case Unit — Applying Barrier Identification
- Performance Standards for Selected Elements — Applying Verification Criteria
- Operating Window and Deferral Scenarios — Applying Decision Rules
- Barrier Status Briefing for Management — Communicating Residual Risk
- Barrier Assurance Matrix — Completing the Unit Record

Applying Safety Critical Elements and Barrier Integrity After the Course

- Draw a bow-tie for one top event on a live unit and confirm each barrier has a named owner and performance standard.
- Review all open safety critical deferrals and overrides against the residual risk rules taught.

Safety Critical Elements and Barrier Integrity Questions FAQ

What is Safety Critical Elements and Barrier Integrity and why does it matter now?

It is the practice of identifying the equipment that prevents major accidents, setting its performance standards and proving it works. It matters now because ageing plant and deferred tasks erode barriers without obvious warning.

Which roles gain most from Safety Critical Elements and Barrier Integrity training?

Integrity, process safety and operations engineers gain most. Instrument engineers and maintenance planners who test and schedule barrier tasks also benefit.

How does Safety Critical Elements and Barrier Integrity differ from a hazard analysis and LOPA course?

It starts where hazard studies end. Instead of identifying scenarios, you define barrier hardware, write performance standards and verify condition through inspection, testing and deferral control.

What do you bring back from Safety Critical Elements and Barrier Integrity training?

You bring back a barrier assurance matrix for one unit. It links top events to safety critical elements, performance standards, owners and current status.

Safety Critical Elements and Barrier Integrity: The Way Forward

The barrier assurance matrix first informs which degraded barriers need action before the next operating period. Integrity and process safety engineers maintain it, while operations managers use it when approving overrides and deferrals. After its first quarter of use, revisit whether performance standards are measurable enough to show real barrier health.