Process Safety Barrier Analytics with AI Training: Leading Indicators, Plant Data and Change Review

29 November – 3 December 2026
Cairo

Process Safety Barrier Analytics with AI Training: Leading Indicators, Plant Data and Change Review

Ref: 779_36949 **Date:** 29 November – 3 December 2026 **Location:** Cairo **Fees:** 3100 GBP

Programme Summary

Process safety barrier analytics with AI is the subject of this one-week training course for process safety and operations managers at managerial level, ending in a barrier monitoring plan for one unit. Many sites hold plant data, yet overdue tests, bypasses and unreviewed changes can stay hidden until an incident. The programme moves from the barrier register and plant data to diagnosis of weak barriers, then to leading indicators and thresholds, and finally to a plan a site leadership team can adopt. Mars Training Centre UK delivers this programme on process safety barrier analytics with AI to mixed-organisation cohorts.

The Business Case

Refineries, chemical plants and food manufacturers rely on barriers that rarely fail loudly. Machine-assisted tools can scan alarms, test records and bypass logs to flag barriers in poor condition, but they can also miss rare events and give scores that nobody can explain. Managers who test these tools against site history can find weakness earlier and focus inspection effort.

- Barrier Condition Visibility: Improves as test, bypass and alarm records are read together.
- Leading Indicator Usefulness: Rises as thresholds are checked against past events.
- Change Review Quality: Improves as risky temporary and permanent changes are screened before approval.

Principles and Evidence Base

- Leading and Lagging Process Safety Indicator Guidance: Separates early signals from outcome measures, applied in Sessions 1 and 3 to indicator design.
- Process Safety Barrier Concept: Treats engineered and procedural safeguards as barriers whose condition can be monitored, applied in Sessions 2 and 4.
- ISO/IEC 42001 AI Management System: Sets expectations for controlling AI tools used in organisations, applied in Session 4 to the analytics tools.

Intended Participants

- Process safety managers who report on barrier condition and indicators.
- Operations managers who own units with major hazards.
- Maintenance and inspection leads who schedule safeguard tests.
- Engineering managers who approve changes to plant and procedures.

Typical settings include refining, chemicals, gas processing and food manufacturing.

Learning Outcomes

1. Participants will be able to evaluate which monitoring tasks suit machine support.
2. Participants will be able to diagnose weak barriers from test, bypass and alarm records.
3. Participants will be able to construct leading indicators with defined thresholds.
4. Participants will be able to design a screen for management of change records.
5. Participants will be able to prioritise barriers for inspection and repair.
6. Participants will be able to justify a monitoring plan and its safeguards to a site leadership team.

Programme Structure

Day 1: Process Safety Barrier Analytics with AI and the Plant Data

Which monitoring tasks can data support, and which need human judgement?

- Barrier Register Map
- Plant Data Source Inventory
- Indicator Definition Sheet
- AI Task Suitability Grid
- Human Judgement Boundary Sheet

Day 2: Diagnosing Weak Barriers in the Records

Where do the records show barriers losing condition?

- Overdue Test Pattern Chart
- Bypass and Override Log Review
- Near Miss Linkage Scan
- Alarm Flood Reading
- Sensor Data Quality Check

Day 3: Leading Indicators and Thresholds

How are early signals defined, and when should they trigger action?

- Leading Indicator Specification
- Lagging Outcome Pairing Table
- Threshold Setting Sheet
- Signal Triage Rule
- Indicator Review Calendar

Day 4: Change Review and Tool Controls

How are changes screened, and how are the tools controlled?

- Change Record Risk Screen
- Temporary Change Expiry Check
- Approval Evidence Matrix
- ISO/IEC 42001 Control Mapping
- Model Drift Watch Sheet

Day 5: Barrier Monitoring Plan for One Unit

Do the earlier tools combine into one plan that a site leadership team can adopt?

- Applying the Session 1 Barrier Register Map
- Testing the Session 2 Overdue Test Pattern Chart
- Checking the Session 3 Threshold Setting Sheet
- Rehearsing the Session 4 Change Record Risk Screen
- Completing the Barrier Monitoring Plan

Methodology

The programme uses case analysis built on prepared files for two units, one in a refinery and one in a chemical plant, each with a barrier register, test records, bypass logs, alarm extracts and change records. Participants work in small groups, test indicators against past events, and defend thresholds and review rules to peers acting as members of a site leadership team.

- Suggested activity: Tracing three overdue barriers to their causes and naming the missed signal.
- Suggested activity: Adjusting a threshold and judging the effect on false alarms and missed events.
- Suggested activity: Reviewing a sample flag and deciding whether a person should override it.

Capstone Output

Each participant completes a barrier monitoring plan for one unit. It holds a barrier register map, a weakness reading, leading indicator definitions, thresholds, a change screening rule and a tool control note. The plan is used at work to brief a site leadership team and agree duties with engineering owners.

Frequently Asked Questions

Is a course on process safety barrier analytics with AI suitable for managers without a data background?

Yes. Process safety barrier analytics with AI is taught through prepared files and templates. It assumes experience in process safety, operations or maintenance, but no coding.

Which guidance does process safety barrier analytics with AI rest on?

Process safety barrier analytics with AI rests on leading and lagging indicator guidance, the barrier concept in process safety and ISO/IEC 42001 for the control of AI tools.

How is the plan from process safety barrier analytics with AI used at work?

You use the barrier monitoring plan to brief your site leadership team, agree duties with engineering owners and set the rule for which flags a person must review.

How does process safety barrier analytics with AI differ from a general process safety course?

Process safety barrier analytics with AI concentrates on reading plant data to monitor barriers, indicators and changes, while a general process safety course concentrates on the whole management system and hazard studies.