LOPA Training for LNG Facilities

Service Objectives

- Build a rigorous, repeatable LOPA approach for LNG scenarios (tank overfill, BOG trips, cold-box upsets, jetty loading arm failures, cryogenic releases).
- Quantify initiating event frequencies, apply enabling/conditional modifiers, and test IPL independence and credibility.
- Translate risk reduction needs into SIL targets aligned with IEC 61511, while remaining consistent with NFPA 59A and API 520/521.
- Document clear, auditable decisions: assumptions, proof-test intervals, SRS alignment, and findings registers.
- Rationalise alarms, prioritise risk reduction investments, and set maintainable testing regimes for LNG operations.

> The course connects day-to-day LNG engineering and O&M decisions to the functional safety lifecycle, improving audit readiness and decision quality.

Who This Service Is For

Designed for LNG liquefaction, storage, and regasification teams responsible for risk decisions and safeguard integrity.

- Process safety, instrumentation, and controls engineers setting SIS/ESD design and proof-testing practices.
- Operations and maintenance leaders for LNG tanks, BOG systems, utilities, and turnaround planning.
- HSE and compliance officers preparing for audits and approvals (e.g., AD EHS Center/OSHAD, Dubai Municipality, Fujairah bodies, Civil Defence).
- Marine and terminal teams handling loading arms, jetties, and ship/shore ESD interfaces.
- Project engineers, EPC partners, and MOC coordinators during debottlenecking or expansions.

Duration & Process Overview

- On-site instructor-led: 2–3 days; best for deep casework using plant P&IDs/C&Es (10–16 participants).
- Virtual (live): 4 × 4-hour sessions; digital whiteboarding and breakout calculations (8–12 participants).
- Blended: Half-day eLearning + 1.5–2 days workshop; maximises on-site analysis and walkdowns (12–18 participants).
- Option to schedule in waves (engineering, then O&M/marine) with a capstone workshop to harmonise site assumptions and IPL credits.

Methodology

A modular pathway from foundational LNG LOPA principles to applied casework, alarm rationalisation, and governance.

Module 1 — LOPA Principles in an LNG Context

- Bow-tie thinking, hazard propagation, LNG-specific escalation scenarios.
- Baseline on IPL independence, crediting limits for tanks, BOG, and jetties.

Module 2 — Initiating Event Frequency and Modifiers

- Derive frequencies from site data and credible benchmarks for LNG events.
- Apply enabling/conditional modifiers (berth occupancy, ship presence, weather).

Module 3 — IPL Selection and SIL Target Setting

- Test IPL independence and performance (ESD valves, HH level trips, F&G, diking/impounding, ERCs).
- Convert risk reduction to SIL targets and SRS entries under IEC 61511.

Module 4 — LNG Casework and Workshop Calculations

- Hands-on cases: tank overfill, cold-box overpressure, BOG surge/trip, loading arm failure.
- Calculate RRF, set SIL, and define proof-test intervals reflecting maintenance realities.

Module 5 — Alarm Rationalisation and Human Factors

- Align alarms with LOPA findings; reduce nuisance and flood risk.
- Operator response, bypass management, competence for cryogenic emergencies.

Module 6 — Governance, Documentation, and Audit Readiness

- Traceable registers, assumption management, and integration with MOC/CMMS.
- Evidence packs aligned to NFPA 59A, IEC 61511, and authority expectations.

Phase	Objective / What It Covers	Key Deliverable
Module 1	Establish LNG-specific LOPA principles, hazard flowdown, IPL independence.	Common baseline and criteria reference for LNG LOPA.
Module 2	Build initiating event frequencies; apply enabling/conditional modifiers.	Traceable frequency inputs and modifier justifications.
Module 3	Select/credit IPLs; convert risk reduction to SIL targets and SRS entries.	Draft SIL targets and SRS alignment notes per IEC 61511.
Module 4	Apply LOPA to real LNG cases using site artefacts (P&IDs, C&E).	Calculated RRF/SIL and draft proof-test interval proposals.
Module 5	Align alarms to LOPA; address human factors and bypass rules.	Alarm rationalisation notes and operator response requirements.
Module 6	Governance, documentation, and audit readiness integrated with MOC/CMMS.	Findings register, evidence pack outline, and action plan mapping.