



**EuroMaTech**

Training Seminars & Conferences




An Intensive 5-Day Training Seminar On

# Layers of Protection Analysis (LOPA)

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07 - 11 Nov 2021, Dubai



 View Details

[www.euromatech.com](http://www.euromatech.com)

An ISO 9001:2015  
and ISO 29993:2017  
Certified Company

# Layers of Protection Analysis (LOPA)

## INTRODUCTION

This highly participative Layers of Protection Analysis training course combines both qualitative and quantitative elements of hazard evaluation and risk assessment to analyze and judge the adequacy of existing or proposed safeguards against process deviations and accident scenarios. It uses an order of magnitude approach to quantify the likelihood of causes, likelihood of failure of Independent Protection Layers (IPLs), and estimate the consequences for chosen accident scenarios. These approximations are used to estimate the risk of a scenario.

A key to the success of Layers of Protection Analysis (LOPA) is its rules for judging if protection layers are truly independent. Because of these rules, LOPA helps the analysts make consistent judgments of if the risk of a scenario is "as low as reasonably practical (ALARP)". The training course contents are based and taught on the guidelines from the AIChE / HSE. The training course covers all aspects of how to apply this very useful technique not only in the selection and analysis of Safety Integrated Systems but also for other applications within an organization such as Capital Improvement Planning, Management of Change, Risk Based maintenance programs, Incident Investigations etc.

## WHO SHOULD ATTEND?

- Professionals and leaders who wish to learn more about strategies for improving Process Safety Management and the use of the various Layers of Protection to improve the Safety Integrated Systems and Process Safety of their operations
- Professionals and leaders within an organization responsible for Capital Improvement Planning, Management of Change, Risk Based maintenance programs, Incident Investigations, Emergency planning and response, Facility siting and or design
- Personnel moving into roles that are participating or are responsible for the Safety Integrated Systems and Process Safety of their operations or Capital Improvement Planning, Management of Change, Risk Based maintenance programs, Incident Investigations, Emergency planning and response, Facility siting and or design

## PROGRAMME OBJECTIVES

- When and how to use LOPA
- How to identify which scenarios from a HAZOP or other qualitative analysis could benefit from LOPA
- How to systematically create risk scenarios for new processes or for existing processes under change
- How to establish risk acceptance (risk tolerance) criteria for use within your company (this is also called development of ALARP criteria) and how to depict this in a Risk Matrix or in a formula
- How to calculate "as-is" risk for a cause-consequence pair:
  - » How to estimate the frequency of the initiating event
  - » How to determine the consequence for the scenario (unmitigated)
  - » Understand what is meant by "independence" and "uniqueness" with respect to the safeguard layers (IPLs)
- How to calculate the value of each IPL
- How to determine the risk of a LOPA scenario and how to determine how much further risk reduction (if any) is necessary
- How to use LOPA to determine the Safety Integrity Level (SIL) necessary for an instrument IPL (to comply with the requirements of IEC 61508/61511 for safety instrumented systems)
- How to document LOPA
- How other companies worldwide use LOPA to:
  - » Decide which PHA / HAZOP recommendations to reject and which to accept
  - » Focus limited resources within mechanical integrity departments and operations on what is critical to manage risk to ALARP
  - » Avoid wasting resources on the added cost and unproductive sophistication that often occurs when they instead quantify risk using QRA methods such as fault tree and event tree analysis



# PROGRAM OUTLINE

## TRAINING METHODOLOGY

The EuroMaTech training course will combine presentations with interactive practical exercises, supported by video materials, activities and case studies. Delegates will be encouraged to participate actively in relating the principles of Layers of Protection Analysis to the particular needs of their workplace.

## PROGRAMME SUMMARY

This Layers of Protection Analysis training course covers essential skills such as understanding the principles of Process Safety Management, the developing and analysis of Layers of Protection, determine the safety integrity levels required and developing and implementing Safety Integrated Systems.

## IN-HOUSE TRAINING

EuroMaTech is capable of conducting this training programme exclusively for your delegates. Please e-mail us on [inhouse@euromatech.ae](mailto:inhouse@euromatech.ae) for further information and/or to receive a comprehensive proposal.

## DAY 01

### Introduction to Layers of Protection Analysis (LOPA)

- Learning objectives and goals of using the LOPA technique
- What is LOPA? How is LOPA applied?
- Terminology and definitions
- Where does LOPA fit into Process Safety and the other Process hazard Assessment methods?
- How to Implement LOPA
- Introduction to Reliability Technology
- Reliability of components, series and parallel systems
- Types of maintenance and inspection regimes

## DAY 02

### Identification of Initiating Events

- Hazard & Operability 'HAZOP' Study
- HAZOP Workshop
- Risk Assessment & Risk Management
- Analysis of Major Accidents in relation to LOPA:
  - » Piper Alpha
  - » BP Texas Refinery Explosion
  - » Bhopal
  - » Buncfield

## QUALITY CERTIFICATIONS & ACCREDITATIONS

EuroMaTech is proud to be associated with the following accreditation bodies:



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## DAY 03

### Estimating the Consequences and Severity

- Estimating the Consequences and Severity
  - » Mechanics of Fire, Explosion and Toxic Releases
  - » Consequence evaluation approaches for LOPA
- Developing Scenarios
  - » Selecting candidate scenarios from qualitative (brainstorming) hazard evaluations
  - » Scenarios from design questions and from incidents
  - » Deciding on the right cause-consequence pair to define each scenario
- Identifying Independent Protection Layers
  - » Purpose
  - » Definition and Purpose of an IPL
  - » IPL Rules
  - » LOPA IPL Assessment
  - » Examples of IPL's
  - » Preventive IPL vs Mitigating IPL
  - » Continuing Examples
- Protective Systems Design and Reliability
  - » The concept of Fractional Dead Time 'FDT'
  - » High Integrity Protective Systems
  - » Selection of Safety Integrity Levels 'SIL'
- Using LOPA to make risk decisions
  - » Comparing Calculated risk to Scenario Risk Tolerance
  - » Expert Judgement
  - » Using Cost / Benefit Comparisons
  - » Comparison of risk decision approaches
  - » Cumulative Risk Criteria vs. Scenario Criteria
  - » Continuing Examples

## DAY 04

### Implementing LOPA

- Is the company ready for LOPA?
- What is the current foundation for risk assessment
- What data is required?
- Will IPL's remain in place?
- How are risk tolerance criteria established?
- When is LOPA used?
- The Bow-Tie Model
- Discussion: *Typical implementation tasks and implementation barriers*

## DAY 05

### Using LOPA for other applications

- Mechanical Integrity Programs / Risk based inspection / Risk based Maintenance Programs
- Risk based Operator Training
- Emergency Response Planning
- Credible design basis for Overpressure Protection
- Evaluating Facility Siting Risks
- Evaluate the need for Emergency Isolation Valves
- Evaluate taking a safety system out of service
- Incident Investigations
- Incidents and Failure Root-causes
- Programme Evaluation and General Discussion

# Layers of Protection Analysis (LOPA)

✓	Date	Venue	Fee(\$)
	07 - 11 Nov 2021	Dubai	US\$4,950

*This fee is inclusive of instruction materials, documentation, lunch, coffee/tea breaks & snack. All Fees are subject to 5% Value Added Tax (VAT).\**

## Your Details

Name (Mr/Ms):.....

Position:..... Organisation:.....

Address:.....

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City / Country: .....

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## Mode Of Payment

Please find enclosed a cheque made payable to EuroMaTech

Please invoice me

Please invoice my company as follows:

Contact Name: .....

Company Name: .....

Address:.....



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## Documentation

High Quality material has been prepared by the Seminar Leader for distribution to delegates. In addition, a special note pad to facilitate note taking will be provided.

## Certificates

A Certificate of Completion will be issued to those who attend & successfully complete the programme.

## Schedule

Our Course timings commences at 08:30 and concludes at 14:00, followed by lunch on a daily basis.

## Hotel Accommodation

EuroMaTech has negotiated special rates for a limited number of rooms in the hotel. Early registration will help to secure a room at the reduced rate.

## Registration & Payment

Please complete the registration form on this page & return it to us indicating your preferred mode of payment. For Further Information, Contact Your Nearest EuroMaTech Office.

## Cancellation Policy

Request for seminar cancellation must be made in writing & received at EuroMaTech three weeks prior to the seminar date. A U.S.\$250/- processing fee will be charged per delegate for each cancellation. Thereafter, we regret that we are unable to refund any fees due, although in such cases we would be happy to welcome a colleague who would substitute for you.

## Disclaimer

EuroMaTech reserves the right to alter the content, location of the Seminar, or the identity of the speakers in case of events beyond our control.

**\*VAT Announcement:** The Government of UAE have introduced Value Added Tax (VAT) on goods and services from 01-January-2018. In compliance with the legislation issued by the UAE Government, we will be applying a 5% VAT on the fees for all our programs and services offered from January 2018 as applicable and stipulated in the FTA circulars.

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