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## TRAINING

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### **Layer of Protection Analysis Workshop**

This 1 day workshop is intended to take participants through the fundamental principles of performing the Layer of Protection Analysis (LOPA) process method of evaluating the effectiveness of independent protection layers (IPL) in reducing the likelihood or severity of an undesirable event.

#### **Who should attend?**

Process plant managers, engineers and operators involved in safety integrity level (SIL) determination for risk assessment of safety instrumented functions.

#### **The objectives of the workshop are to equip participants with:**

The objective of this workshop is to introduce participants to LOPA and instruct them in principles of using this semi quantitative method of risk assessment. Participants will learn how to apply LOPA as a relatively simple risk assessment method to approximate the risk of a scenario, where LOPA is based on order of magnitude categories for cause frequency, consequence severity, and the likelihood of failure of independent protection layers (IPLs). They will understand how to use LOPA as an analysis tool to build on the information developed during a qualitative hazard evaluation, such as a process hazard analysis (PHA), and they will be shown how to implement LOPA using a well defined set of rules.

The LOPA workshop will include:

- Hazards and associated risk;
- The process hazard analysis (PHA) interface with LOPA;
- Initiating events of hazards and likelihoods;
- Multiple event analysis;
- Analysing hazardous scenarios;
- Analysing consequence severities;
- Understanding of the concept and objectives of risk assessment;
- Understanding of the ALARP principles;
- Understanding of the principles of LOPA;
- Setting tolerable risk targets for safety, the asset and the environment;
- Calibration of LOPA risk assessment for different consequences;

- Analysis of cause events and likelihood data;
- Cause and consequence scenarios;
- The probability of failure on demand (PFD);
- Independent protection layers (IPL) and associated rules;
- An understanding of the differences between risk prevention and risk mitigation;
- Assigning values to risk reduction layers;
- Safety, Asset and environmental conditional modifiers;
- Avoiding common cause issues (double dipping);
- Participate in numerous LOPA risk assessment exercises;
- An introduction to a LOPA based software tool.

The workshop will use a number of practical LOPA examples and team exercises to stimulate a realistic risk assessment experience. The methodology will be based on *'Layer of Protection Analysis Simplified Risk Analysis; American Institution of Chemical Engineering ISBN 0-8169-0811-7.*