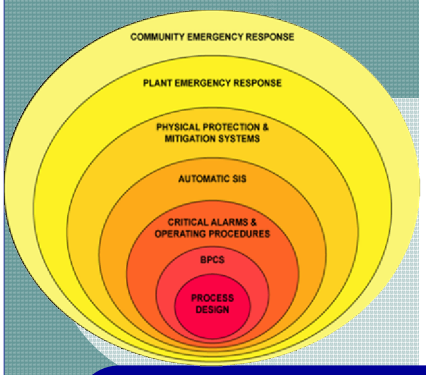
ERSG/Prod/Serv/FS/015/09

SUBJECT:
LAYER OF PROTECTION ANALYSIS (LOPA)

OUR SERVICES COVER THE FOLLOWING AREAS:
Process Hazard Analysis
Enterprise Risk Management
Project Management
RUBI–Software
Business Continuity Systems
Process Safety Management
Risk Training Solutions



LAYER OF PROTECTION ANALYSIS (LOPA)

Introduction

Risk Management Solutions for Dynamic and Progressive Industry

Layer of Protection Analysis (**LOPA**) technique is a methodology for hazard evaluation and risk assessment. On a sliding scale of sophistication and rigor, LOPA lies between the qualitative end of the scale (characterized by methods such as [HAZOP] and what-if) and the quantitative end (characterized by methods using fault trees and event trees). LOPA helps the analyst make consistent decisions on the adequacy of the existing or proposed layers of protection against an accident scenario (see diagram below). This decision-making process is ideally suited for coupling with a company's risk-decision criteria, such as those displayed in a risk matrix. **LOPA is a recognized technique for selecting the appropriate safety integrity level (SIL) of your safety instrumented system (SIS) per the requirements of standards such as ANSI/ISA-84.00.01.**

Services

ERSG provide a range of LOPA related services covering the following:

1. **Risk Judgement Fundamentals**
2. **Risk Acceptance Criteria**
3. **Risk Judgement Techniques**
4. **Special Applications of LOPA**

LOPA can be used for any **risk-based decision**–it is particularly useful for deciding the integrity level necessary for safety interlocks. **LOPA helps provide the basis for a clear, functional specification for an independent protection layer (IPL) (ANSI/ISA-84.00.01-2004, IEC 61511 Mod).**

OUR SERVICE USES THE FOLLOWING METHOD AND SOFTWARE

Methodology

The integrated HAZOP / SIL methodology uses the following approach:

ERSG's LOPA experts can team with your staff or work independently to provide any of the techniques listed below. We will review your goals at the beginning of the project to ensure that the analysis provides information of sufficient relevance, precision, and certainty to meet your decision-making needs.

ERSG uses the BS IEC 61511 and offers the following methods:

- Semi-quantitative method.
- Safety layer matrix method, described as a semi-qualitative method.
- Calibrated risk graph, described in the standard as a semi-qualitative method, but by some practitioners as a semi-quantitative method.
- Risk graph, described as a qualitative method.
- Layer of protection analysis (LOPA). (Although the standard does not assign this method a position on the qualitative / quantitative scale, it is weighted toward the quantitative end.)

LOPA SOFTWARE TOOL

The **Lihou™** software is most frequently employed to record and manage Hazop Studies and easily configured for use in other familiar methodologies such as Process Hazards Analysis (PHA), check-list driven Hazard Identification Reviews (HazId), Risk Assessment Studies, SIL Analysis, Failure Mode and Effect Analysis (FMEA and FMECA), etc.

Requirements: 4Mb RAM, 2Mb Hard Disk, Windows®, 98, NT, 2000, XP.

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