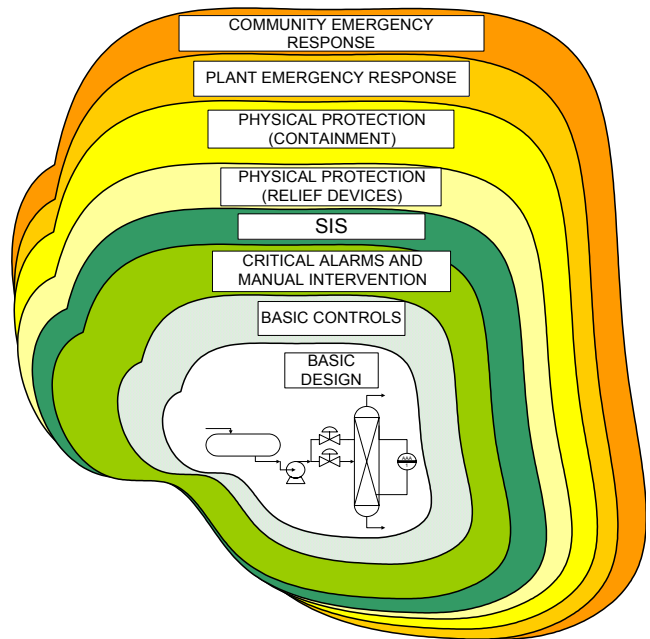
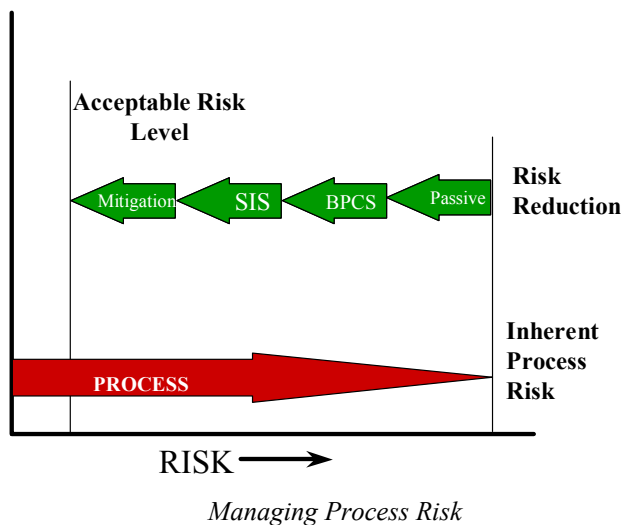


Safety Instrumented Systems (SIS) are often cited as the “last line of defense” to prevent an accident from occurring. They are generally utilized when the severity of an accident is considered HIGH and reduction of likelihood is the only viable risk management option.

Baker Engineering and Risk Consultants, Inc. (BakerRisk) professionals actively participate in the national standard-setting committee for Safety Instrumented Systems, providing access to the most current information, tools, and trends. Our understanding of the elements of the SIS Safety Life Cycles presented in ANSI/ISA S84.01-1996, IEC 61508, and IEC 61511 makes us an excellent partner to help you with:

- The development of internal standards and practices,
- The facilitation of SIL target assignment, and
- The quantitative evaluation of SIS performance.

Due to the complexity in assigning the Safety Integrity Level (SIL) target for the SIS, many



Layers of Protection

organizations end up with improperly designed SIS systems. SIS performance evaluation studies, when conducted by BakerRisk, are optimization studies. Once we ensure that all of the risk management requirements are met, our analysts investigate opportunities for potential savings by minimizing the impact on process operability and eliminating any system over-design. Operating cost savings are achieved through the reduction of nuisance trips and the reduction of testing requirements, while capital cost reductions are achieved through the elimination of excess redundancy provided in the original design.

BakerRisk analysts have been deeply involved in SIS related work for nearly a decade, conducting over 100 SIS related studies. These studies have addressed SIS throughout the process industries, including onshore and offshore exploration and production, refining, LNG, LPG, gas processing, reactive systems, specialty chemicals, polymers, pipelines, fire and gas systems, and high integrity pressure protection systems (HIPPS).



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About BakerRisk

Baker Engineering and Risk Consultants, Inc. is one of the world's leading explosion analysis, structural design, and risk engineering companies. BakerRisk provides comprehensive consulting, engineering, laboratory and range testing services to government agencies and private companies who are involved with dangerous, highly hazardous, reactive, or explosive materials.



Blast Effects & Explosion Testing



**Dynamic Structural Analysis
and Design**



Risk Engineering



Process Safety



Incident Investigations



**Reactive Chemicals Testing &
Management Systems**

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SAFETY INSTRUMENTED SYSTEM *Specification And Evaluation*

BAKER RISK SIS SUPPORT SERVICES

DEVELOPMENT OF CORPORATE ENGINEERING PRACTICES

- SIL assignment methodology
- Integration of SIL assignment into existing systems
- Approaches to existing SIS
- Methods for managing functional safety

ASSIGNMENT OF SAFETY INTEGRITY LEVEL

- Qualitative, semi-quantitative or quantitative methods, e.g., risk matrix, risk graph, & LOPA
- Integration with API 14C
- Alignment of risk tolerance with existing corporate statements of risk acceptability
- Facilitation of SIL assignment meetings

DEVELOPMENT OF SAFETY REQUIREMENTS SPECIFICATION (SRS)

- Safety Functional Specification
- Safety Integrity Requirements

SIS CONCEPTUAL DESIGN

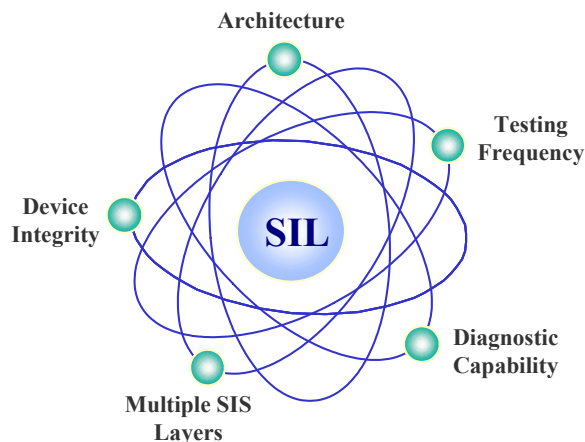
- SIS Overview
- Cause & Effect Matrix
- Testing and Bypassing

VERIFY SIS MEETS SRS

- Quantitative SIS Performance Evaluation using Fault Tree Analysis

RECOMMENDATIONS FOR OPTIMIZING SIS DESIGN

- Reduce spurious tripping
- Minimize testing intervals
- Eliminate over-design



Achieving Performance Targets