

KENEXIS

Stephen J. Gorrell **Senior Engineer**

Fields of Competence

Process Hazards Analysis / Hazard (PHA)
Layer of Protection Analysis (LOPA)
Safety Instrumented System Engineering
Safety Integrity Level (SIL) Selection
Safety Integrity Level (SIL) Verification
Safety Requirements Specifications (SRS)
Quantitative Risk Analysis
Dispersion Modeling
Chemical Engineering
Fault Tree Analysis
Quantitative Consequence Modeling

Experience Summary

Mr. Gorrell has over 12 years of experience in consequence / hazards analysis studies and safety instrumented systems design. During his time with Kenexis he has facilitated numerous Process Hazard Analyses (PHA), both for PSM compliant re-validations and new project work for upstream oil & gas and refining facilities. Mr. Gorrell has firm experience in the development of Safety Instrumented Systems including LOPA / SIL Selection, SIL Verification, and Safety Requirement Specification Requirements.

Credentials:

B.S., Chemical Engineering, West Virginia University

ISA/IEC 61511 SIS Expert

Completed Dyadem HAZOP Facilitation Course

EIT Certification

Affiliations:

International Society of Automation (ISA)
Columbus Section Chair

Professional Profile

Key Projects:

HAZOP/LOPA study of full Oil Refinery facilities. PHA Study covered all major units of the facilities which include:

- SCANfiner (LSG) Unit
- Distillate Desulfurizer (DDS) Unit
- Hydrodesulphurization (HDS) Unit
- Refinery Flare System
- Hydrocracker Unit
- Naptha Hydrotreater (NHT) Unit
- Parex Unit
- HF Alkylation Unit
- Saturate Gas Unit
- Light Ends Unit (LEU)
- Platformer/Continuous Catalyst Regeneration (CCR) Unit
- Fluid Catalytic Cracking Unit (FCCU)
- Sulfur Recovery Unit (SRU)
- Hydrobon Unit
- ISAL Desulfurization Unit
- Selective Hydrogenation Unit (SHU)
- Sulfolane Unit
- Brine System
- Metaxylene Unit
- Crude Unit
- Gas-Oil Hydrotreater (GOHT) Unit
- Cumene Unit
- Tank Farm
- Vapor Recovery System
- Fuels Rack/Terminals

HAZOP/LOPA study of full facilities including: integrated oil & gas production facilities in Alaska. PHA Study covered all major units of the facilities which include:

- Oil and Gas Separation Systems
- Turbine Driven Gas Compression
- Produced water Injection
- Crude Oil shipping pumps / metering
- Fired Heaters
- Natural Gas Handling
- NGL Recovery System
- Glycol Utility Systems
- Fuel Gas Systems
- Waste Heat Recovery Units
- Heat Media Systems
- Chemical Storage and Injection
- TEG Regeneration System
- Production and Injection Wells
- Miscible/ Water Injection
- Gas Lift
- HP / LP Production
- Production Manifolds and Flowlines
- Flare Systems

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Projects included Layer Of Protection Analysis and SIL Selection.

HAZOP/LOPA facilitation of gas handling and natural gas liquids recovery and gas compression facility. Project included development of an Instrumented Protective Function (IPF) List, SIL selection using HAZOP/Layer of Protection Analysis (LOPA) study results, SIL Verification calculations, Fault Tree Analysis (FTA) to analyze complex systems, identification of performance gaps and recommendations for design / testing of SIS to meet customer objectives. Projects included numerous compressor shutdown functions, identifying independent protection layers to reduce SIL requirements.

Developed SIS Design Basis information for oil, gas and produced water flow gathering / Processing Centers. Performed detailed fault tree analysis calculations for inlet manifold overpressure protection. Performed full facility SIL verification calculations for all safety and equipment protective functions for each facility. Included analysis / selection of appropriate failure data to characterize failure frequencies, calculation of achieved SIL. Developed recommendations to modify SIS design and maintenance to achieve desired SIL targets. Project included the following equipment:

HAZOP/LOPA facilitation of numerous drill sites in Alaska consisting of well heads and production headers. Reviewed safety risks of over and under pressure hazards based upon mode of well head operation (water injection, miscible injection, gas lift injection, and production wells). Project included development of an Instrumented Protective Function (IPF) List, SIL selection using HAZOP/Layer of Protection Analysis (LOPA) study results, SIL Verification calculations, Fault Tree Analysis (FTA) to analyze complex systems, identification of performance gaps and recommendations for design / testing of SIS to meet customer objectives. Projects included numerous high pressure well shutdown functions, identifying independent protection layers to reduce SIL requirements.

HAZOP/LOPA study of waste grinding and slurry injection facility in Alaska. Reviewed safety and environmental hazards of potential loss of containment and release of hydrocarbons and class 1/2 waste. Project included development of an Instrumented Protective Function (IPF) List, SIL selection using HAZOP/Layer of Protection Analysis (LOPA) study results, SIL Verification calculations, identification of performance gaps and recommendations for design / testing of SIS to meet customer objectives.

Professional Profile

Performed SIS design basis study of ammonia production facility. Projects included development of a Safety Instrumented Function (SIF) List, SIL selection using Layer of Protection Analysis (LOPA) study results, SIL Verification calculations, Fault Tree Analysis (FTA) to analyze complex systems, identification of performance gaps and recommendations for design / testing of SIS to meet customer objectives. Units analyzed included the ammonia unit reformer and compressor.

Performed SIS design basis study of refinery units. Projects included development of a Safety Instrumented Function (SIF) List, SIL selection using Layer of Protection Analysis (LOPA) study results, SIL Verification calculations, Fault Tree Analysis (FTA) to analyze complex systems, identification of performance gaps and recommendations for design / testing of SIS to meet customer objectives. Units analyzed include Powerhouse and Sulfur Recovery Units.

Performed fully quantitative risk assessment to provide customers with guidance on installation of active and passive safeguards. Studies included detailed consequence analysis modeling of a Gasoline Tank Overfill.

Developed the Functional Test Plans for the SIS on an olefins facility. Project included test plans for 10+ instrument types covering over 40 SIF.

Performed a Fire Risk Analysis to assess the extent of passive fire proofing requirements for new equipment as part of an expansion project for a natural gas facility in Bangladesh. The project included evaluation of each fire scenario using the Pool Fire and Jet Fire models contained within the PHAST software tool, leak frequency and ignition probability analysis, and event tree analysis to conduct an assessment of the tolerability or risk.

At a major aluminum plant in West Virginia provided engineering support as a member of a seven-person Energy Management department whose primary responsibility was to develop in-house technical and process management resources for improving energy management systems and maintenance processes. Responsibilities included the development of newly designed programs to monitor process performance daily and detect variations in furnace performance. Additional responsibilities included coordination with area maintenance engineers in the planning and execution of major troubleshooting, repair, and equipment/process improvement efforts.