



Process Safety in Operation of Ammonia plants

Process safety in Operation of Ammonia Plants

Investigations of recent incidents have highlighted the importance of having a clear understanding of the principles of process safety management throughout an organisation. This must include staff at all levels from board members through engineers and other technical staff to plant and shift managers and supervisors.

AmmoniaKnowHow intensive three-day course covers the fundamentals and aims to provide an understanding of the key principles of process safety and its management with clear application in the fertilizer industry in particular for ammonia plants.

Course aims

The course is aimed at providing an understanding of the key principles of process safety and its management.

It will share the industry experience of various incidents presented during Safety in Ammonia Plants AIChE forum sessions within the last 50 years and from our practical experience.

At the end of the course delegates should achieve the following key learning outcomes:

- understand the human, environmental and business consequences of poor process safety in Ammonia plants
- be aware of and understand the key factors influencing the basis for process safety within the fertilizer industry. This include corrosion, gas leakages, start-up, shut-down

- understand the key process safety requirements at each stage in the life cycle of process plant based on Ammonia plant ages and technologies
- understand the ways in which your work depends on the knowledge and expertise of others including hazard identification techniques and presentation of various incidents from the fertilizer industry
- understand your limitations and know how to acquire further knowledge and understanding of process safety management, presentation of our tool Risk Register and the way how this can enhance your company knowledge by using people experience.

Who will benefit?

- managers, supervisors, engineers and others involved in the design, operation, modification or maintenance of Ammonia process plants
- young chemical engineers en route to develop their career in the fertilizer industry
- anybody else, including safety personnel, who would like to develop an understanding of chemical process safety

Day 2

Development of the course

The development of the course has been steered by an expert group of process safety professionals drawn from ammonia and oil & gas specialist process safety community with wide experience of best practice in organisations such as ThyssenKrupp Industrial Solution, WorleyParsons, AMEC Foster Wheeler, Wood Group and operators such as Shell, Chevron, SAFCO and others.

The fertilizer industry is well represented with case studies in discussion collated from the last 50 years of Safety in Ammonia Plants and Related Facilities Symposium organized by AIChE.

Throughout the course extensive use will be made of a range of real life case studies and of group discussions.

Course outline

Day 1

- Introductions
- Importance of process safety
- Legislation, Laws, Economics and Insurance:
 - US Legislation
 - EU Legislation
 - Economics and Insurance
- Incidents Statistics in the Fertilizer Industry
- Management Commitment and Leadership
 - Management training
 - The reasonableness test
 - Appropriate leadership at management and supervisory levels
 - Resolving safety issues
- Ammonia technology – the beginning
- Incidents in Ammonia plants operations

- Hazard identification techniques
 - Safety Audits
 - Checklists
 - Pilot Plants
 - Hazards Studies overall
 - HAZID Study
 - SIMOPS Study
 - HAZOP Study (with ammonia plant incident case study application example)
 - SIL Studies (with ammonia plant case study application example)
 - Dispersion Studies (with ammonia plant case study application example)
 - Fire and Explosion Analysis
 - Fault Tree Analysis (with ammonia plant case study application example)
 - Quantitative Risk Analysis (QRA)
 - Emergency System Survivability Analysis (ESSA)
 - Emergency, Muster, Evacuation and Rescue Analysis (EMERA)
 - Bow-tie Analysis (with ammonia plant case study application example)
 - Ammonia plant Risk Register (presentation of ammonia plant incident risk register)
- Group exercise: develop a Fault Tree Diagram for an incident in Ammonia plant

Day 3

- Models of Operator Error
 - The Skills–Rules–Knowledge Model
 - Skill-Based Activities
 - Rule-Based Activities
 - Knowledge-Based Processing
 - Status of the Skills–Rules–Knowledge Model
 - Using the Model
- Hindrances and Inability to Function
 - Operator Absence
 - Error-Reduction Measures for Absence from Work Location
 - Hindrance
 - Incapacitation
 - Error-Reduction Measures for Incapacitation
 - Distraction
 - Error-Reduction Measures for Distraction
 - Attention Failure
 - Error-Reduction Measures for Attention Failure
 - Overload and Priorities
 - Error-Reduction Measures for Overload
 - Priority Error and Focus Error

- Errors in Observation
 - Potential Operational Input Overlooked
 - Complex or Unrecognisable Input
 - Error-Reduction Measures
 - Ambiguity and Misleading Signals
 - Mislarning
 - Failures of Instruments and Alarms
 - Ammonia plant case study application example
- Errors in Performing Standard Procedures: Rule-Based Operation
 - Error Modes in Carrying Out Procedures
 - Causes of Errors in Carrying Out Procedures—Following Cues
 - Causes of Errors in Carrying Out Procedures—Omission
 - Errors in Procedure Execution—WrongProcedure
 - Errors in Procedure Execution—Too Much or Too Little
 - Errors in Action Performance
 - Ammonia plant case study application example
- Operator Error in the Field
 - Omission and Forgetting
 - Errors in Procedure Execution—Wrong Object or Material
 - Too Much Force
- Errors in Procedures
 - Writing Operating Procedures
 - Maintenance Manuals
 - Method Statements
 - Errors in Procedures
 - Checking Written Procedures
 - Procedural Drift
 - Reducing Procedural Error
- Human Error Risk Reduction
 - Operator Error Minimisation
 - Training for Reliable and Safe Operation
 - Good Displays
 - Alarms and Trips
 - Interlocks (Permissives)
 - Permit to Work Systems
 - Human Factors
- Risk-Reduction Measures for Errors in Executing Procedures

Course Chairman

Dan Cojocar

Fertilizer Process Safety Director
Tech Safety Group

A Chartered Chemical Engineer, a Member of The Institution of Chemical Engineers (CEng, MIChemE), a Member of Engineers Australia, a Member of the Safety and Loss Prevention Group of the IChemE, and a Registered Professional Engineer of Queensland (RPEQ).

After university graduation, he started his career as field operator in ammonia plant. He has over 15 years of engineering and consultancy experience in fertilizer and CSG projects from the following countries: Australia, Germany, Vietnam, UAE, Saudi Arabia, Romania and Russia, and was involved in design for projects developed in countries like Egypt, Algeria, Slovak Republic and China.

Dan has extensive experience in engineering and process safety consultancy services to EPCM companies and their clients including the preparation of Safety Reports, hazard identification and analysis, consequence and risk modelling of major accidents using DNV GL PHAST, quantitative risk assessment using DNV GL SAFETI, development of Major Accident Hazard (MAH) bow-tie diagrams, and Hazard and Operability (HAZOP) facilitation.

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