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# ABI5010 – Certificate in Hazard and Operability (HAZOP) / Hazard Identification (HAZID) Studies (HAZOP/HAZIDCert)©

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This course is a dual certification course focusing on Hazard and Operability (HAZOP) study and Hazard Identification (HAZID) as well known and well documented methods. In the first part of the course, participants will be acquainted with HAZOP study used to verify the integrity of design or procedures with respect to safety and operability. HAZOP, or Hazard and Operability Studies is one of a number of risk assessment techniques used to demonstrate compliance with health, safety and environmental standards and legislation

**PRE-REQUISITE:** None

**DURATION:** 1Week

## **TARGET AUDIENCE**

- Safety/environment Professionals
- Regulatory /Enforcement Officers
- Compliance officers
- Engineers (design & process Engineers)
- Facilities, instrumentation & control Engineers
- Operations and safety of process operators
- Production and facilities managers
- Plant operators, Maintenance Personnel

## **COURSE CONTENTS**

# **UNIT HH1: HAZARD OPERABILITY (HAZOP) STUDIES**

## **Element1. Fundamentals of HAZOP**

- Introduction toHAZOP
- Significance of HAZOP
- HAZOP Management
- Planning for HAZOP Study
- Team Characteristics and Questioning Techniques
- Composition of a HAZOP team and Responsibilities
- HAZOP meeting
- HAZOP procedure
- Duration of HAZOP
- Precautions during HAZOP
- Examples of HAZOP

- Computer usage in HAZOP
- Limitations of HAZOP
- Alternatives to HAZOP
- Auditing HAZOP

#### **Element 2. HAZOP Methods**

- HAZOP Inherent Assumptions
- HAZOP Review Applications
- Ideal HAZOP Review Reference Data
- Credible Scenarios or Causes
- non-Credible Scenarios or Causes
- HAZOP Technical Suggestions
- HAZOP Review Suggestions
- HAZOP Recommendations and reporting
- Administrative Controls
- Engineering Controls

#### **Element 3 HAZOP Approaches**

- Approaches of Assigning Protection layers
- Performance Based Approach
- Prescriptive Approach
- Limitation of HAZOP/optimization of HAZAN
- HAZOP case study

## **UNIT HH2: HAZARD IDENTIFICATION (HAZID) STUDIES**

#### **Element 2.1. HAZID Principles**

- Hazard Management Process
- Factors Increases the Hazards Potential for Process Industries
- Risk Concept
- Consequences Analysis
- Voluntary & Involuntary Risk
- Tolerable Risk in the industries
- Evaluating the Risk
- ALARP

#### **Element 2.2. Hazard Evaluations**

- Risk Matrices
- Evaluating the Frequency

- Evaluating the Severity
- Evaluating the Overall Risk
- Principals of Protective Measures
- Risk reduction
- Protection Layers
- Prevention Layers
- Mitigation Layers
- Initiating event
- Process Deviation
- Loss of Containment or Release of Energy
- Undesirable Events
- Process Controls Vs Safety Controls
- Separation of Process Control system and Safety Control System

### **Element 3: Hazard Analysis (HAZAN)**

- Risk Criteria
- Estimating Likelihood
- Failure Modes
- Safe Failures
- Dangerous Failures
- Detected/Undetected Failures
- Random failures
- Common Cause Systematic failures
- Hazard Rate
- Probability of Failure on Demand(PFD)
- Safety Instrumented System(SIS)
- Role of (SIS)

### **Element 4: Safety Integrity Level (SIL) and Layer of Protection Analysis (LOPA)**

- Safety Integrity Requirement
- Safety Integrity Level(SIL)
- Determining Safety Integrity Level (SIL)
- Risk Reduction and Reliability Assessment
- Reliability Analysis
- Voting And Redundancy
- Diversifications and Risk Graph
- Layer of Protection Analysis(LOPA)

- (LOPA)Procedure
- Independent Protection Layers(IPLs)
- Fault Tree Analysis(FTA)
- Failure Mode and Effects Analysis(FMEA)
- Events and Gates

**UNIT HH3:** Students will submit an individual evidenced based HAZOP/HAZID report that includes research and contain at least 1000 words. It will be based on a practical assessment and include research it must be work related. Once the project is complete it must be forwarded to ABIOSH within 21 days of the last exam. This practical must include a cover sheet stating that it is the students own work and signed by the instructor

## **EXAM STRUCTURE**

Unit HH1 and HH2 – 2 hours written exam per unit

Unit HH3 – Individual project work to be submitted not later than 3 weeks after the written exams

### **1. HH1: HAZOP**

**No of Questions-** 8

**Total marks Available-** 100

**Time Allowed-** 2 Hours

**Pass Mark-** 45%

### **2. HH2: HAZID**

**No of Questions-** 8

**Total marks Available-** 100

**Time Allowed-** 2 Hours

**Pass Mark-** 45%

### **3. HH3: PRACTICAL**

**No of Questions-** Maximum 40 Pages

**Total marks Available-** 100

**Time Allowed-** 3 weeks from date of Exams

**Pass Mark-** 50%

## **STUDENT TOTAL RESULT CALCULATIONS**

HH1 + HH2 + HH3