Hazard Identification (HAZID) Guidance for fertilizer industry

Document Development Guidance
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AmmoniaKnowHow

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Where the Urea industry meets
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1. SYNOPSIS

AmmoniaKnowHow.com and UreaKnowHow.com support fertilizer manufacturers by providing essential services to the industry, using our syngas technologies and scientific knowledge developed in multiple projects worldwide.

Together we initiate a program to enhance the guidelines and procedures for operation, engineering, maintenance and process safety in the fertilizer industry utilizing the best practices and standards available today.

Using knowledge gained from our industry, historic risk registers, lessons learned from projects and from FIORDA members we are committed to give proper advice to improve safety, reliability and projects performance of fertilizer plants.
2. WHY DEVELOP SPECIFIC GUIDELINES AND PROCEDURES

Guidelines and Procedures are developed to help staff and management teams run the organization. In the best use situations, procedures play a strategic role in an organization. They are developed in light of the mission and objectives of the company and they become the media by which management’s plans, rules, intents, and business and operation processes become documented and communicated to all staff.

Carefully drafted and standardized guidelines and procedures save the company countless hours of management time. Guidelines, procedures and employee handbook should be an important part of the operation. They should be the first thing given to a new employee (either in hard copy or an electronic version). They should also be easily accessible in their most up-to-date version. Hence it is extremely important that an organization’s procedures are a “living document” prepared and saved in Microsoft Word and easily exported into portable versions (like PDF) and made available over the company network.

3. PURPOSE OF THIS DOCUMENT

This document shall provide guidance to personnel carrying out hazard identification (HAZID) studies, within projects or operating facilities in the fertilizer industry.

This document defines the scope of a HAZID study, identifies the requirements for conducting studies and identifies situations for which studies may be appropriate.

4. HAZID STUDY OUTCOME

The result of a HAZID Study is the Hazard Register. The Hazard Register provides:

- A means of recording the hazards associated with the facilities that are identified during the course of design or during operation.
- A means of relating those hazards to a location within the facilities, and where practicable, to a process or utility system and/or a production phase activity (e.g. maintenance, start-up etc.).
- A means of tracking actions arising from the identification of the hazard and of tracking the design of systems provided to deal with the hazard (covering prevention, detection/protection, mitigation and contingency/ recovery).
- A means of tracking the assumptions made in the design of these hardware systems which have procedural implications regarding operations, monitoring, testing and maintenance, start-up etc., and of the actions arising from them.
- A means of recording the development of procedural controls where required by the design in order to provide effective hazard management.

AmmoniaKnowHow.com develop a dedicated software that combine a Risk Register with Action Items Tracking Register. This software is currently used in the fertilizer industry and set the base framework for Fertilizer Industry Operational Risks Database (www.fiorda.eu).

5. HAZID STUDY REQUIREMENTS

The necessity of a HAZID study come from the needs to:

1. To satisfy HSE Performance Standards specified within Company Health, Safety and Environmental Management System.
2. To identify hazards to manage risks within the business and to support the business’ drive for continuous improvement in HSE performance.
6. THE NATURE OF HAZID STUDIES

The HAZID study technique is one of a range of techniques. It is selected, when appropriate, during the lifecycle of an operating site from conception to abandonment.

The primary role of HAZID study is to identify hazards and scenarios which may have the potential to result in an incident of a degree of seriousness. It is not the purpose of the study to assess risk. However, the study team members can be expected to use their own experienced judgement to present their findings organized according to a preliminary rough risk ranking.

The intent of the study method is, by taking an organized and exhaustive approach within a formalized structure, to identify as far as possible all hazards of note. Possible causes of initiating events and their outcomes are recorded, and recommendations made.

7. THE DIFFERENCE BETWEEN HAZOP AND HAZID STUDIES

HAZID and Hazard and Operability (HAZOP) studies are different in nature and are carried out at different points in the development of a design.

They are complementary, and not interchangeable. HAZOP is cause driven and accepts a conclusion that a hazard cannot occur. HAZID is consequence driven and assumes that the hazard can occur.

HAZID studies are very broad in their scope, looking at all possible sources of hazard to a site examining a model at a time and postulate on mechanisms by which chosen hazardous events could occur.

HAZOP studies focus their attention primarily at the hardware of process and utility plant systems, examining a line at a time, and seek out possible specific deviations from the design intent by which a hazard could occur.

8. HAZID TEAM

The composition and numbers of members within a study team will vary with the type of study.

The core of the team can be expected to be reinforced by representatives of the leading engineering and operating disciplines appropriate to the aspects and phases of the development being studied and to the activities which will take place on it.

To keep meetings manageable, the number attending at any time should not exceed about six. The team content may change from day-to-day but frequent changes should be avoided, as there can be some one to two hours learning curve for each member.

<table>
<thead>
<tr>
<th>Core Group Members</th>
<th>Additional Engineering and Technical Support Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chairman</td>
<td>HSE</td>
</tr>
<tr>
<td>Secretary</td>
<td>Machinery</td>
</tr>
<tr>
<td>Independent Engineer</td>
<td>Pipelines</td>
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<td></td>
<td>Instrument</td>
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<td></td>
<td>Operations</td>
</tr>
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<td></td>
<td>Process Design</td>
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</tbody>
</table>

9. HAZID STUDIES IN OPERATION FACILITIES

A HAZID study of all or parts of an existing installation ideally should be carried out onsite and fully exploit operating experience of appropriate personnel. The team should have at least one senior operator who
knows all the idiosyncrasies of how the process has to be operated. The benefit of a fresh view as seen by recent recruits can also be useful.

A possible drawback when carrying out studies on site is the risk that operations personnel may frequently be called away to deal with on-plant problems that arise. Proper delegation of responsibilities is needed to allow their attendance.

10. HAZID STUDY METHOD

This section of the guidelines details a method to be employed for carrying out a HAZID study.

Having specified the boundary conditions for the extent of injury or physical damage to be addressed by a study, the purpose of the study is to provide, in tabulated form, a catalogue of scenarios whereby the boundary conditions could occur or be exceeded.

To do this, a suitable team must be able to:

A. Generate a comprehensive list of hazards through an understanding of:
   • the physical and chemical processes associated with the materials handled
   • the other activities associated with the site and its activity
   • the physical location, layout and environment of the site
   • the disposition of target populations

B. Identify mechanisms whereby, loss of control or deviations from the desired intent could occur, through an understanding of:
   • equipment failure modes
   • human errors
   • environmental factors

C. Develop and catalogue any scenarios with the potential, in principle, to escalate to consequences breaching the boundary conditions of concern.

HAZID study teams should not be constrained by thinking “this cannot happen”. The probability of a significant accident taking place will be calculated after carrying out the study, in the next stage of the review process.

A good approach consists in using your company internal Risk Register when developing the your own HAZID Methodology. Additional sources of information like Fertilizer Industry Operational Risks Database may be useful since contain case studies and incidents already happen in the fertilizer industry.
11. HAZID STUDY ACTIVITY DIAGRAM

12. UPDATING THE HAZARD REGISTER

Following the HAZID study, a Hazard Register should be updated when:

- significant changes are made to the facility such that additional hazards are introduced,
- a hazard is identified that is not already included in the Hazard Register, and could lead to a new accident scenario with different consequences,
- errors are detected in the Hazard Register.

Identification of hazards and subsequent updating of the Hazard Register becomes a function of the design process. The Design Engineer will record the requirements or assumptions made in the design of a hardware system regarding procedural controls, precautions, monitoring, testing and maintenance. The Hazard Register will record their close out, thus providing an effective link between design and procedure development.

13. APPLICABILITY

The HAZID Study Methodology is a document owned by the Process Safety / HSEQ department within the organization. They are responsible to assess the necessity of performing HAZID studies depending on project complexity and scope of work.
14. DEVELOP YOUR OWN ORGANIZATION PROCEDURES

Although templates can give you a head start on procedures development, other factors must be considered as you write your own internal documents.

One factor is your organization’s culture. Organizational attitudes toward procedures determine the spectrum. On one end of the scale are companies that have a procedure for everything. At the other end of the spectrum are companies that only have only a few guidelines (only those required by the laws that are relevant to that company). Most companies fall somewhere in between these two extremes. The manager writing any guideline needs to understand where on the spectrum the company it falls and how the policy can be made to fit the organization’s culture to enhance compliance.

Other two factors to be consider when developing guidelines and procedures are the fertilizer technology that company employs and local and international standards applicable to the industry. Internal standards and procedures must be developed in line with these factors, being applicable for your own plants and in line with regulatory requirements.

The last, but not least, factor when developing your own procedures is the best industry practice that you need to employ. Liaison with your fertilizer association, participation in industry meetings and conferences and using fertilizer industry consultants can bring a fresh eye, new ideas and enhance the quality of your own guidelines and procedures.

15. DEFINITIONS

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<tr>
<th>Acronym</th>
<th>Definition</th>
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<tr>
<td>FIORDA</td>
<td>Fertilizer Industry Operational Risks Database</td>
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<tr>
<td>HAZID</td>
<td>Hazard Identification Study</td>
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<tr>
<td>HAZOP</td>
<td>Hazard and Operability Study</td>
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<tr>
<td>HSEQ</td>
<td>Health Safety Environmental Quality</td>
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