

# FAQ SHEET

## - MAJOR HAZARD ANALYSIS / DIRECT HAZARD ANALYSIS (MHA / DHA)

### ***Acronyms and Abbreviations Used***

DHA	-	Direct Hazard Analysis
HAZOP	-	Hazard and Operability
MHA	-	Major Hazard Analysis
PHA	-	Process Hazard Analysis
PSM	-	Process Safety Management

### ***What is MHA / DHA?***

MHA is a process hazard analysis (PHA) method that directly and exclusively addresses the *major hazards* of fires, explosions, toxic releases that must be addressed to comply with OSHA's PSM standard. These major hazards result from specific chemicals and they may adversely impact employees, the public and the environment. DHA is an extension of MHA that includes other types of process hazards such as over-pressurization and entrapment by moving equipment.

MHA qualifies as "an appropriate equivalent methodology" under OSHA's PSM standard as it meets the requirements of the regulations for PHA methods.

### ***Why was MHA / DHA developed?***

Process hazard analysis (PHA) studies are commonly conducted using the Hazard and Operability (HAZOP) Study and the What-If or What-if/Checklist approaches. However, users of these techniques often find the studies tedious and time-consuming which can compromise the quality of the work performed. Major Hazard Analysis (MHA) overcomes these disadvantages.

### ***What are the problems with HAZOP?***

The HAZOP method requires PHA teams to consider a variety of deviations from design intent and brainstorm causes of the deviations. The method depends for its success on the proper identification of design intent for the process. There are many aspects of design intent that may be important and it is a considerable challenge for teams to be sure they have addressed the important parts. Unfortunately, the more

thorough the attempt made at performing a complete study, the more likely it is that the team will burn out and lose their motivation.

Furthermore, it is difficult for PHA teams to select only those aspects of design intent that will result in the identification of issues within the scope and objectives of the PHA. Consequently, effort is often expended in HAZOP studies on issues that turn out to be unimportant. This wastes resources, distracts from identifying the important scenarios, adds to the time required to complete the study, and frustrates team members.

Also, the HAZOP method was developed to address both safety and operability scenarios. Some companies do not want to spend time identifying operability scenarios. Unfortunately, it is difficult to divorce their identification from the identification of safety scenarios. In a typical HAZOP study, at least half the time is spent on operability scenarios.

Moreover, the HAZOP method identifies initiating events for hazard scenarios in an indirect way by first postulating a deviation from design intent. Novice team members sometimes have difficulty understanding this approach and are more comfortable with methods that directly address initiating events.

These issues often make process plant personnel reluctant to participate in HAZOP studies.

### ***How does MHA address these problems?***

MHA follows the natural progression of hazard scenarios by starting with the identification of initiating events, progressing to the identification of intermediate events including safeguard failures, optionally including the identification of enablers, and concluding with the identification of scenario consequences and the performance of risk ranking. Operability scenarios are eliminated from consideration.

Scenarios of interest that result from major hazards originate with loss of process containment. Causes of loss of containment can be direct, for example, valves left open or ruptures in lines or vessels. They may also be indirect, for example, runaway reactions resulting in releases through pressure relief devices or vessel and piping rupture. Therefore, MHA constrains brainstorming to such scenarios using a structured approach and thus helps preserve the most precious resource available to the team, namely their intellectual energy.

The MHA structure provides more specific guidance than the HAZOP method but without restricting brainstorming of major hazard scenarios. The structured approach provides confidence in the relative completeness of MHA compared to the HAZOP method.

PHA teams using MHA find it a more sensible and understandable approach. In addition, they are more willing to participate in the study since immediate dividends are evident from their work. Inexperienced PHA practitioners are likely to do a better job with it.

***Can you tell me more about MHA / DHA?***

All PHA methods subdivide the process so that individual parts can be analyzed. MHA can use the systems and subsystems typical of What-If studies or it can employ nodes (process lines and major vessels) as used by HAZOP. This allows MHA to be conducted at various levels of detail according to the user's needs.

In order to provide guidance to the PHA team and help assure completeness, MHA focuses brainstorming on specific categories and common examples of initiating events (causes) that can result in loss of containment. This focuses the team's brainstorming without narrowing their vision. Typical lists of initiating event categories and examples have been published (see below). Such lists can be customized for specific facilities or types of processes. The scheme also prompts consideration of items not included in the lists.

The categorization includes equipment and human failures as well as external events. The logic of the approach is that there is a limited number of categories of initiating events that result in loss of containment and within each category there is a limited number of ways this may commonly happen. This enables the PHA team to use the scheme without being overburdened, while preserving their energy to consider items not in the scheme.

***Can you summarize the benefits of MHA compared to HAZOP?***

- 1) The time required for MHA is substantially less than for HAZOP.
- 2) Generally, more major hazard scenarios are identified.
- 3) MHA is more readily understood by PHA teams.
- 4) MHA provides more flexibility than HAZOP.
- 5) There is less ambiguity in MHA.
- 6) MHA study worksheets are simpler to use.
- 7) MHA is more readily accepted than HAZOP.

### ***How can I switch to MHA?***

Current PHA studies can easily be converted into MHA format. The format of MHA worksheets is very similar to those of other PHA techniques and information can be copied easily into the MHA format. This can be done when PHAs are revalidated. The revalidation can then address the analysis of process changes as well as the enhancement of the original PHA results by the use of MHA.

For PHAWorks users, MHA and DHA templates are available from Primatech.

### ***How can I get more information?***

Technical papers on MHA and DHA are available on Primatech's web site:

<http://www.primatech.com/technical/>

You may also contact Primatech at:

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