

## Practical Solutions for Today's HSE Challenges

# HAZOP Budgeting Tool

Both operating companies and EPC's find it difficult to effectively budget for HAZOP (Hazard & Operability) studies. There are many factors to consider – what type of HAZOP is appropriate (coarse, detailed, procedural); the condition and availability of accurate Process Safety Information (PSI); the availability of participants; the preferred duration; the funding; etc.

ACM's experience in facilitating HAZOP studies has provided us with some practical insight into how to budget your time effectively. Here is a 3-step approach for budgeting for your next HAZOP.

### Step 1 – Determine what type of HAZOP is appropriate for the project.

The stage of the project will influence what type of HAZOP can be considered.

HAZOP Type	HAZOP Description
Coarse HAZOP	Early study to identify design flaws, which if not caught, would be costly to fix later. (Front End Engineering Design or FEED Phase)
Detailed HAZOP	Conducted when the engineering design has progressed so that all systems have sufficient detail to warrant focused discussion.
Procedural HAZOP	Used to identify hazards and operability problems arising from commissioning, maintenance or start-up procedures.

### Step 2 – Determine limitations.

Often there are significant limitations that will influence how or if a HAZOP can be conducted. For example, project schedule can limit the HAZOP time window, key participants may not be available, vendor information is missing, or P&IDs are outdated.

HAZOP Type	Process Safety Information Input Requirements
Coarse HAZOP	Basic layouts, PFDs, operating & control philosophies
Detailed HAZOP	P&IDs, PFDs, vendor drawings, cause & effect diagrams, operating & control philosophies
Procedural HAZOP	Same as for detailed HAZOP, plus Operating Procedures

If time is the major limitation, ACM suggests:

1. Limit the HAZOP review to only the main process nodes and no utilities;
2. Reduce the number of deviations studied per node;
3. Pre-populate the worksheets prior to the HAZOP team meeting;
4. Switch to a different PHA methodology (I.e. What-If?).

If there are missing P&IDs or vendor information, ACM suggests:

1. Switch to a different PHA methodology (I.e. What-If?);
2. Reduce the scope of work.

## HAZOP Budgeting Tool (cont'd)

### Step 3 – Determine the facilitation time and budget.

As a general rule of thumb, the following matrix can be used to budget the time required for the facilitated HAZOP session. This matrix assumes that all the relevant process safety information is available to the HAZOP team and that 6-8 participants experienced in the areas of process, operations, maintenance, instrumentation and safety are present throughout the HAZOP.

**Table 1 – HAZOP Time Budgeting Tool**

(Average # of P&IDs Reviewed Per Day\*)




HAZOP Type	Complexity of P&IDs		
	High	Medium	Low
Coarse	8	10	12
Detailed	5	7	9

\* One day is assumed to be an 8-hour facilitated session, with breaks for lunch and refreshments.

#### Example:

It will take approximately eight days to complete a Coarse HAZOP on a project with 80 P&IDs of medium complexity. (80 P&IDs/10 per day = 8 days)

#### In addition, the total HAZOP time estimate needs to include:

-  Data Gathering Time – to collect the required Process Safety Information
-  HAZOP Preparation Time – to identify nodes and enter project data into PHA software
-  Report Time – to prepare report of HAZOP study findings

Please call ACM if you would like more information about our HAZOP process or a time and cost estimate.

#### Suggestions to ensure your HAZOP goes well:

1. Prepare
2. Prepare
3. Prepare
4. Conduct the HAZOP

## Corporate Information

ACM provides objective third party safety and automation expertise to Canadian and international clients, including oil and gas producers, engineering companies and vendors in the heavy oil, pipelines and terminals, offshore, petrochemicals, upstream oil and gas processing and telecommunications and utilities sectors.

To discuss how ACM can bring value to your organization, please contact Murray Macza via phone at 403 264 9637 or email at [murray.macza@acm.ca](mailto:murray.macza@acm.ca)

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