Irish Water

HAZOP Procedure

Revision Number	Description of Change	Author(s)	Approved By	Date of Approval
1.0	First Approval	Timmy Harnett	James Cullen	26/06/2019

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1 INTRODUCTION

Irish Water (IW) is committed to the delivery of high quality water services in a safe and environmentally responsible manner to our customers. In order to deliver this Irish Water is constantly developing new assets and upgrading existing assets through its Asset Delivery team and delivery partners. Irish Water recognises that a strong design process including extensive consultation and design reviews as well as a formal process hazard analysis process is essential in ensuring safe and fit for purpose designs for its assets. IW has chosen the Hazard and Operability or (HAZOP) technique as its process hazard analysis technique of choice. Hazard and Operability Studies (HAZOPs) are a form of hazard identification used to identify potential hazards and operational problems in terms of plant design and human error. The technique is applied to a plant, ideally during final design before construction commences. The study identifies possible deviations from normal operating conditions which could lead to hazardous situations. The process enables a comprehensive evaluation of hazard control systems and produces recommendations for any necessary modifications.

2 PURPOSE

The purpose of this procedure is to outline how IW requires the HAZOP technique to be used in final design of any new process and to determine whether existing or designed safeguards are sufficient, or whether additional actions are necessary to reduce risk to an acceptable level.

3 SCOPE

This document is designed to provide broad guidance on the HAZOP technique; users are required to have good prior understanding of the HAZOP procedure. It follows the standard HAZOP methodology but is intended for use on Irish Water assets as a guide to designers, engineers, and health and safety professionals on how to apply the technique in the design of the waste water and water utility facilities. It does not purport to be a detailed procedure of how the HAZOP methodology is applied. This procedure applies to all projects involving change to existing process or installation of a new process. (Water or waste water treatment plants, pumping stations etc.)

4 DEFINITIONS

Term	Definition
HAZOP	HAZOP study is a procedure used to review the design and operation of a hazardous process facility. It is used to identify all causes of deviations from normal safe operation which could lead to any safety hazard or operability problem.
Hazard	Anything with the potential to cause harm
Risk	The consequences of a hazard being realised combined with the likelihood of its occurrence
Node	A term used to define a distinct section of plant design P&ID diagram that has been identified for the purpose of conducting a HAZOP study
Contract Administrator	The Contract Administrator is a person appointed to administer the Contract on behalf of the Employer and to represent the Employer's interest.
Regional Lead	The person within Irish Water who is responsible for ensuring that the client requirements for the implementation for a project or programme of work are carried out.

5 ROLES AND RESPONSIBILITIES

5.1 Asset Delivery Regional Lead:

- The Asset Delivery Lead is responsible for ensuring that this procedure is adhered to at the appropriate time in the project lifecycle and that the adequate resources are provided.
- Ensuring IW Stakeholders required for the HAZOP STUDY process are invited and receive timely notification to ensure participation as per section 6.1.

5.2 Asset operations

- Make available the appropriate personnel to support in the study as team members as required to execute a successful a HAZOP Study as per the procedure outlined in Section 6.1.

5.3 IW HSQE

- Make available the appropriate personnel to participate in the study as team members as required to execute a successful a HAZOP Study as per the procedure outlined in Section 6.1

5.4 Contract Administrator

- Ensure that the contractor arranges for a HAZOP to be conducted at the appropriate stage of the detailed design process.
- Make available the appropriate personnel to participate in the study as team members as required to execute a successful a HAZOP Study as per the procedure outlined in Section 6.1
- Agree method of recording the HAZOP with the HAZOP Lead in advance of the HAZOP (refer to Section 7)
- On notification form the Contractor, of the intention to conduct a HAZOP study, issue invitations to the relevant personnel (refer to section 6.1)

5.5 Contractor

- Ensure that the Contract Administrator is made aware of their intention to conduct the HAZOP study.

- Ensure that the study is scheduled at the appropriate time and at the appropriate stage of the detailed design process.
- Appoint an experienced and independent HAZOP Lead.
- Make available the appropriate personnel to participate in the study as team members as required to execute a successful a HAZOP Study as per the procedure outlined in Section 6.1
- Arrange a suitable time and venue in which to conduct the HAZOP study with the appropriate facilities as outlined in Appendix 3.
- Provide for a suitable software package for recording the HAZOP such as PHA Pro, which will facilitate output in excel.
- Ensure HAZOP outputs are recorded and communicated in the format agreed by the Contract Administrator and HAZOP Lead (refer to Section 7)

5.6 HAZOP Lead

In advance of the Study:

- Agree method of recording the HAZOP with the Contract Administrator in advance of the HAZOP (refer to Section 7)
- Prior to meeting review P&ID's and decide nodes.

During Study:

- Establish the meeting ground rules.
- Go through Terms of Reference.
- Provide overview of the methodology of the Hazop
- Conduct HAZOP study in the format agreed with by Contract Administrator (Record in full or by exception)

6 PROCEDURE

6.1 In advance of the Hazop:

- Contractor notifies the employer's representative of their intention to schedule a HAZOP Study. The HAZOP study will be scheduled post Workshop 7 and following completion of Contract Administrator review of detailed design submission and having incorporated asset delivery comments.

- Contractor arranges a suitable time and venue in which to conduct the study and with the appropriate facilities. (Refer to Appendix 3 for HAZOP room requirements)
- Contractor appoints an experienced independent HAZOP Lead (pre–approved by the Contract Administrator).
- Contract Administrator issues invitations to all HAZOP study team members to attend the HAZOP:
  - HAZOP Lead
  - HAZOP Secretary(Scribe/Recorder)
  - Designer/ Process Engineer(s) (Contractor)
  - Operations Engineer(Irish water)
  - Operations representative
  - Contractor
  - HSQE representative
  - Employers Representative

- Contractor shall ensure that the following relevant HAZOP study information is available:
  - Terms of reference or scope for the HAZOP study
  - Full description of the process
  - Draft control philosophy.
  - Process and Instrumentation Diagram Drawings
  - Plant layout drawings
  - 3 D Model where required or stipulated in the contract.
  - ATEX Hazardous area drawings(where applicable)
  - Decision on method for recording.
  - Contractor shall ensure suitable facilities are available to conduct the Hazop as per appendix 3

6.2 When HAZOP is being completed:

Hazop Lead will ensure:

- The IW guidewords are adhered to as outlined in appendix 2.
- The study team rigorously follows the HAZOP methodology to maintain a sense of proportion in assessing the seriousness of a hazard and the expenditure of resources in reducing its likelihood

- The team do not attempt to solve identified problems within the HAZOP Study (record & assign action items)
- Conduct HAZOP study and record in the format agreed with Contract administrator.(record in full or by exception)

6.3 HAZOP Report:

- On completion of the HAZOP study, the recorder will issue Preliminary Draft Report containing:
  - Introduction
  - Description of the study method
  - Objectives and scope of the study/terms of reference
  - Description of the unit/process studied
  - List of team members
  - Date and time of Hazop study
  - Major recommendations/actions
    - Appendices
    - Actual HAZOP Study record sheets
    - List of detailed recommendations/actions.
    - Team members and P&ID's by session
    - Marked-up P&ID's actually studied with NODES detailed.
- Preliminary Draft report will be issued to HAZOP Study members by HAZOP Lead Preliminary Draft report is reviewed by the designer to update and issue a draft report to the HAZOP Lead, The Regional Lead, Contractor and the Contractor Administrator.
- This Draft HAZOP report will be issued as a Final Report by the HAZOP Lead at a later stage, when all recommendations are finalised by the Contractor Administrator. It is to contain, in addition to the information above:
    - Major actions taken
    - Design changes
    - Recommendations rejected with reasons
    - Follow up on actions and recommendations

7 RECORDING OF THE HAZOP STUDY

Two main methods of recording:

There are two methods of recording a HAZOP study; either in full or by exception.

If recording in Full is being used then all parameters, deviations, consequences and existing safeguards are recorded whether or not any further action is required. Identical items are assigned separate entries within the record and the record is populated by 'copy & paste' and editing to correct tag numbers, etc.

When Recording by Exception is being used then only deviations that require further action are recorded.

Before commencing a study a decision has to be made as to which type of recording will be used. The advantages and disadvantages of each are contained in appendix 4 of this document. Irish water does not have a position on which method is to be used, this is the decision of the HAZOP Lead and Contract Administrator.

8 REFERENCED DOCUMENTS

Document Name	*Document Number*	*Location*

9 GENERATED DOCUMENTS

Document Name	*Document Number*	*Location*

APPENDIX 1 PERSONS REQUIRED FOR HAZOP

HAZOP Study Team Participants	Required/Optional
HAZOP Lead	Required
HAZOP Recorder/Scripter	Required
Contract Administrator	Required
Contractor (Designer)	Required
Project Manager	Required
Asset Operations	Required
IW HSQE	Required
Asset Delivery Regional Lead	Required
Asset Delivery Engineering Services	Required
Contractor	Required

APPENDIX 2 IRISH WATER STANDARD HAZOP GUIDE WORDS

Basic Guidewords	**Extended Guidewords**	
NO	NO FLOW	CONTAMINATION
	MORE FLOW	RELIEF
LESS	LESS FLOW	INSTRUMENTATION
PART OF	MORE LEVEL	SAMPLING
REVERSE	LESS LEVEL	CORROSION/EROSION
OTHER THAN	MORE PRESSURE	SERVICE FAILURE
	LESS PRESSURE	ABNORMAL OPERATION
	MORE TEMPERATURE	MAINTENANCE
	LESS TEMPERATURE	IGNITION(ATEX)
	MORE VISCOSITY	SPARE EQUIPMENT
	LESS VISCOSITY	SAFETY
	COMPOSITION CHANGE	ISOLATE
		ACCESS

APPENDIX 3 HAZOP STUDY ROOM REQUIREMENTS

A HAZOP is a complex exercise that requires the concentrated and coordinated contribution of all the members of the team. Distractions should be minimized in order to ensure and maintain the team's focus.

- The study location should be conducive to a brainstorming exercise, adequate room, and remote from distractions.
- There should be sufficient space for all members to sit comfortably.
- There should be sufficient table space for the drawings to be spread out.
- Overhead projection should be used to enable all the team members to see the HAZOP record sheets as they are developed.
- Sufficient room to display the 3d model.

APPENDIX 4 RECORDING OPTIONS ADVANTAGES AND DISADVANTAGES:

Advantages of the two recording options	
Recording in Full	**Recording by Exception**
Produces a complete study record.	Much quicker reporting method.
Helps future audits.	A separate secretary (scribe) may not be required.
Will be more useful in any future studies (e.g. LOPA)	Report is significantly shorter.
Can assist in future plant changes.	Emphasises the identified problems.
Provides information for production of the operating manual.	
Disadvantages of the two recording options	
Recording in Full	**Recording by Exception**
Can lengthen the HAZOP study time.	May not be accepted as a true record by e.g. external authorities or insurance companies.
Can become tedious and repetitive. This may be off -putting. Part of the Team Leader's job is to minimise any such effect.	