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การศึกษา HAZOP เกี่ยวกับการติดตั้งอุปกรณ์และเครื่องจักรสำหรับนําน้ำคอนเดนเสท (condensate)  
จากกับดักไอน้ำ (steam trap) กลับมาใช้ในระบบผลิตไอน้ำ

Plant <b>UL-119</b>	Client <b>PTT Asahi Chemical Co., Ltd.</b>	Code <b>Steam Condensate Recovery</b>	Doc ID Code <b>PTH-PRE-G000-QB-00001</b>	Project No. <b>03-3107</b>
	<b>HAZOP STUDY REPORT</b>			 Page <b>1</b> of <b>13</b>

# HAZOP STUDY REPORT (CLOSED OUT)



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## EXECUTIVE SUMMARY

The Hazard and Operability Study (HAZOP) performing on the Process P&IDs, was conducted on 10th September 2021. The documentation under review were the P&IDs of the UL-119 Steam Condensate Recovery Project.

This report documents the proceedings and recommendations from the HAZOP workshop study. The objective of the HAZOP was to verify the safety, integrity and operability of the process design and to identify any further modifications to the design.

In total there were 11 actions raised during the HAZOP Session.

- 3 items – Responsible by PTTAC.
- 1 items – Responsible by PTTAC/tkIS
- 7 items – Responsible by tkIS

The actions will be transferred to the concerned parties for progressive closeout.

## 1 INTRODUCTION

### 1.1 Scope of Document

This report presents the findings of the Hazard and Operability (HAZOP) workshop conducted for the associated equipment, instrument and piping relevant to the UL-119 Steam Condensate Recovery Project as on the P&IDs (See Appendix 3).



### 1.2 Objectives

The objectives of the study are to:

- Identify safety-related hazards and operability problems associated to the process that could directly threaten the safety of personnel, environment and asset or cause operational problems;
- Determine the consequences for the identified hazard and operability issues;
- Identify engineering and procedural safeguards already incorporated into the design;
- Evaluate the adequacy of existing engineering and procedural safeguards; and
- Recommend additional safeguards or operational procedures, where necessary.

## 2 Abbreviations

C	Consequence
HAZOP	Hazard and Operability Study
SC4	Steam Condensate (4 kg/cm <sup>2</sup> g)
SC15	Steam Condensate (15 kg/cm <sup>2</sup> g)
SC35	Steam Condensate (30 kg/cm <sup>2</sup> g)
P	Probability

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PFD	Process Flow Diagram
P&ID	Process and Instrument Diagram
PPE	Personal Protective Equipment
R	Risk
S	Severity
PTTAC	PTT Asahi Chemical Company Limited.
tkIS	thyssenkrupp Industrial Solutions Thailand Company Limited

### 3 HAZOP METHODOLOGY

#### 3.1 Overviews

Hazard and Operability Study (HAZOP) is the one of a PHA and hazard identification techniques. Most chemical process applications use the technique to determine what risk are addressed and mitigated. The technique was developed over 30 years and widely recognized and accepted in process industry as the way to systematically identify hazards in complex processes.

#### 3.2 HAZOP Approach

A HAZOP study is one of the techniques used in risk management and Process Hazard Analysis which allows the study team to review the design and assess the causes and consequences of each deviation from normal operating conditions. These deviations are generated using a combination of parameters and guidewords. For each deviation, existing safeguards are evaluated and if they prove to be inadequate, recommendations are made to lower the risk to tolerable level. These recommendations are then properly assessed by the designated action and implemented where practicable.

The steps taken during the study session are summarized below:

1. Selection of a node or appropriate section of the plant.
2. Definition of the node's intended design and operating conditions.
3. Application of the deviation.
4. Determination of potential causes are deviated from normal operation.
5. Assessment of the subsequent consequences and likelihood by engineering judgement. PTT Risk Matrix or process safety target (Appendix 1) was utilized during the study session to carry out a qualitative risk assessment of potential risks associated with the hazards to people, environment and asset.
6. Evaluation of the adequacy and effectiveness of the existing safeguards by assessing risk by the Risk Matrix (Appendix 1) after safeguards allocated again. If the risk is tolerable, going to item 8.
7. Recommendation of actions to be taken of further consideration of the problem in order to reduce risk to tolerable level.