

TOP PROJECT NO. :  
CTCI PROJECT NO. :

# HAZOP STUDY REPORT EPC MAIN WORK FOR CFP CRUDE OIL TANK PROJECT

FOR FINAL

						 Thai Oil Public Company Limited	
						CERTIFIED	
0	Issue For Final					PROJ.	DATE
Z0	Issue For Design					MGR.	
A	Issue For Review						Rev. 0
REV.	DESCRIPTION	BY	CHK.	APPR.	DATE		

วัตถุประสงค์การศึกษาและขอบเขตงาน (Study Objective and Work Scope)

รายชื่อผู้เข้าร่วม (Attendee list)							
No.	Name	Company	Date of attendance				
			17 Aug 2023				
1	Dungrat (TOP-XX)		X				
2	TOP CMDP-Jaruwat P.		X				
3	Nuttsuda (ADB)		X				

เอกสารอ้างอิง (Drawing & Reference)				
No.	Document Name	Drawing No	Document File	Comment
1	Node1	x		
1	x1	x2		x3

Node List (PID / PFD และ NODE Marked)							
No.	Node	Design Intent	Design Conditions	Operating Conditions	Node Boundary	Drawing No	Drawing Page (From-To)

RECCOMENDATION STATUS TRACKING TABLE					
REF.	NODE	RR	Recommendation	Status	Action By (Response & Signature)
1	Node1	H	r1	Closed	Dungrat (TOP-XX)
2	Node1		r2	Closed	TOP CMDP-Jaruwat P.

Major Accident Event (MAE)			
No.	Node	Causes	Risk Asseessment Matrix (R)
1	Node1	1	H

Safety Critical Equipment (SCE)			
No	Equipment Tag No.	ผลกระทบที่เกิดขึ้น (Consequences)	ระดับความเสี่ยง (Risk)



HAZOP STUDY WORKSHEET



Project:	d1	NODE	Node1
Design Intent :	x	System	
Design Conditions:		HAZOP Boundary	
Operating Conditions:			
PFD, PID No. :		Date	

Guide Word	Deviation	Causes	Consequences	CAT (P/A/E/R/Q)	Unmitigated Risk Assessment			Major Accident Event (Y/N)	Existing Safeguards	Mitigated Risk Assessment Matrix			Recommendations	Action by
					S	L	R			S	L	R		
Flow	1.4 Reverse Flow	1	11	P	5	4	H	Y	e1	1	4	1	H	r1
Flow	1.5 MisdirectedFlow	2	12	A				N	e2	0				r2
Flow	1.3 Less/Low Flow	3	13	E						0				
Flow	1.1 No Flow	4	14	R						0				
Flow	1.2 More/HighFlow	5	15	Q						0				
Pressure	2.2 Less/Low Pressu	6	16	P						0				
Pressure	2.1 More/High Press	7	17	A						0				

ภาคผนวก ก

ข้อมูลและตารางอ้างอิงสำหรับการประเมินความเสี่ยง

# **APPENDIX A**

## **PHA -WORKSHEETS**

ตารางการประเมินความเสี่ยง ( Risk Assessment Matrix (RAM) )

	โอกาสในการเกิดความเสี่ยง			
ระดับความรุนแรง	4	3	2	1
4	มากที่สุด 4	มากที่สุด 4	มาก 3	ปานกลาง 2
3	มากที่สุด 4	มาก 3	ปานกลาง 2	ปานกลาง 2
2	มาก 3	ปานกลาง 2	ปานกลาง 2	น้อย 1
1	ปานกลาง 2	ปานกลาง 2	น้อย 1	น้อย 1

Risk Assessment Matrix : 4X4

HAZOP Guide Words

Deviations	Guide Word	Process Deviation (Examples of Cause)	Area of Application
Flow			
1.1 No Flow	Flow	Incorrect routing – blockage – burst pipe – large leak – equipment failure (C.V., isolation valve, pump, vessel, etc.) – incorrect pressure differential	
1.2 More/HighFlow	Flow	Increased pumping capacity – reduced delivery head increased suction pressure – static generation under high velocity – pump gland leaks –etc.	
1.3 Less/Low Flow	Flow	Line blockage– filter blockage – fouling in vessels – defective pumps – restrictor or orifice plates –etc.	
1.4 Reverse Flow	Flow	Incorrect pressure differential – two-way flow – emergency venting – incorrect operation – in-line spare equipment –etc.	
1.5 MisdirectedFlow	Flow	Flow directed to stream other than intended due to misalignment of valves –etc.	
Level			
4.1 Less/Low Level	Level		
4.1 More/High Level	Level		
Other Than			
5.1 Composition Change	Other Than		
5.10 External Fire/Explosion	Other Than		
5.11 Safety&Human Error	Other Than		
5.12 Optional Guidelines	Other Than		
5.2 Contamination	Other Than		
5.3 Leakage(Heat Exchanger)	Other Than		
5.4 Reaction	Other Than		
5.5 Start Up/Shut Down	Other Than		
5.6 Vent/Drain/Purge	Other Than		
5.7 Maintenance/Inspection	Other Than		
5.8 Corrosion/Erosion	Other Than		
5.9 Utilities Service Failure	Other Than		
Pressure			
2.1 More/High Pressure	Pressure	Surge problems (line and flange sizes) – relief philosophy (process / fire etc.) – connection to high pressure system – gas breakthrough (inadequate	
2.2 Less/Low Pressure	Pressure	Generation of vacuum condition – restricted pump/ compressor suction line – vessel drainage –etc.	
Temperature			
3.1 More/High Temperature	Temperature	Ambient conditions – fire situation – high than normal temperature – fouled cooler tubes – cooling water temperature wrong –cooling water failure	
3.2 Less/Low Temperature	Temperature	Ambient conditions – reducing pressure – loss of heating – depressurization of liquefied gas – Joule Thompson effect – line freezing –etc.	
Viscosity			
5.1 More Viscosity	Viscosity		
5.2 Less Viscosity	Viscosity		

## ภาคผนวก - **PIDs / PFDs**

HAZOP RECOMMENDATION RESPONSE SHEET			
Project Title:d1			
Project No:HAZOP-2023-0000009			
Node:			
Action By:	Dungrat (TOP-XX)	Response By:	Dungrat (TOP-XX)
Action No.	1		
Drawing and Documents	x2		
Action Description			
Deviation:	1		
Cause:	11		
Consequences:	e1		
Safeguards:	r1		
Recommendation:			
Action Response:			
Action Close-out Details	By whom	Signature	Date
Response			
Ownner Approval			

HAZOP RECOMMENDATION RESPONSE SHEET			
Project Title:d1			
Project No:HAZOP-2023-0000009			
Node:			
Action By:	TOP CMDP-Jaruwat P.	Response By:	TOP CMDP-Jaruwat P.
Action No.	1		
Drawing and Documents	x2		
Action Description			
Deviation:	2		
Cause:	12		
Consequences:	e2		
Safeguards:	r2		
Recommendation:			
Action Response:			
Action Close-out Details	By whom	Signature	Date
Response			
Ownner Approval			