TOP PROJECT NO. :

CTCI PROJECT NO. :

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

FOR FINAL

REV.	DESCRIPTION	BY	CHK.	APPR.	DATE
0	Issue For Final				
Z0	Issue For Design				
A	Issue For Review				

Thai Oil Public Company Limited

CERTIFIED

PROJ. MGR. DATE

Rev. 0

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**	
Design Intent :	x	**System**	
Design Conditions:		**HAZOP Boundary**	
Operating Conditions:			
PFD, PID No. :		**Date**	

Guide Word	Deviation	Causes	Consequences	CAT	Unmitigated Risk Assessment			Major Accident Event	Safety Critical Equipment	Existing Safeguards	Mitigated Risk Assessment Matrix			Recommendations	Equipment Tag No.	Action by
				(P/A/E/R/Q)	S	L	R	(Y/N)	(Y/N)		S	L	R			
Flow	1.4 Reverse Flow	1	11	P	5	4	H	Y	e1	1	4	1	H	r1		Dungrat (TOP-XX)
Flow	1.5 MisdirectedFlow	2	12	A				N	e2	0				r2		ГОР CMDP-Jaruwat P
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))

ระดับความรุนแรง	โอกาสในการเกิดความเสี่ยง 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 differentia	
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 Then	
5.1 Composition Cha	Other Then		
5.10 External Fire/Ex	Other Then		
5.11 Safety&Human	Other Then		
5.12 Optional Guidev	Other Then		
5.2 Contamination	Other Then		
5.3 Leakage(Heat Ex	Other Then		
5.4 Reaction	Other Then		
5.5 Start Up/Shut Do	Other Then		
5.6 Vent/Drain/Purge	Other Then		
5.7 Maintenance/Ins	Other Then		
5.8 Corrosion/Erosio	Other Then		
5.9 Utilities Service F	Other Then		
		Pressure	
2.1 More/High Press	Pressure	Surge problems (line and flange sizes) – relief philosophy (process / fire etc.) – connection to high pressure system – gas breakthrough (inadequa	
2.2 Less/Low Pressu	Pressure	Generation of vacuum condition – restricted pump/ compressor suction line – vessel drainage –etc.	
		Temperature	
3.1 More/High Temp	Temperature	Ambient conditions – fire situation – high than normal temperature – fouled cooler tubes – cooling water temperature wrong –cooling water failure	
3.2 Less/Low Tempe	Temperature	Ambient conditions – reducing pressure – loss of heating – depressurization of liquefied gas – Joule Thompsoneffect – 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			