

TOP PROJECT NO. :  
CTCI PROJECT NO. :

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

FOR FINAL

						<div> Thai Oil Public Company Limited</div>	
						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)
study work scope

รายชื่อผู้เข้าร่วม (Attendee list)							
No.	Name	Company	Date of attendance				
			29 Sep 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	Node-001	desing intent	xx	xx
1	doc name - 001	drawing no - 001	20221202_Developer_https_qasapi_thaioilhub_thaioilgroup_com_.pdf	comment -001

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	Node-001	M	R0001-1	Open	Dungrat (TOP-XX)
2	Node-001	M	R0001-2		Dungrat (TOP-XX)
3	Node-001	L	R0002-1		Dungrat (TOP-XX)
4	Node-001	M	R0002-2		Dungrat (TOP-XX)
5	Node-001	L	R0003-1	Open	TOP CMDP-Jaruwat P.
6	Node-001	M	R0003-2		TOP CMDP-Jaruwat P.

Major Accident Event (MAE)			
No.	Node	Causes	Risk Asseessment Matrix (R)
1	Node-001		

Safety Critical Equipment (SCE)			
No	Equipment Tag No.	ผลกระทบที่เกิดขึ้น (Consequences)	ระดับความเสี่ยง (Risk)
1	Node-001		1.C0002-1
2			1.C0002-2
3			1.CS0001-0-1
4			1.CS0001-0-2
5			1.CS0001-1
6			2.CS0001-1-2



HAZOP STUDY WORKSHEET



Project:	moc title - 00041	NODE	Node-001
Design Intent :	desing intent	System	retest descriptions
Design Conditions:	xx	HAZOP Boundary	
Operating Conditions:			
PFD, PID No. :		Date	

Guide Word	Deviation	Causes	Consequences	Unmitigated Risk Assessment			Major Accident Event (Y/N)	Existing Safeguards	Mitigated Risk Assessment Matrix			Action No	Recommendations	Action by
				S	L	R			S	L	R			
Flow	1.1 No Flow	C0001-0	CS0001-0-1	4	3	H		ES0001-1	4	2	M		R0001-1	Dungrat (TOP-XX)
Flow	1.1 No Flow		CS0001-0-2	4	3	H		ES0001-2	4	2	M		R0001-2	Dungrat (TOP-XX)
Flow	1.1 No Flow	C0001-1	CS0001-1	4	3	H		ES0002-1	4	1	L		R0002-1	Dungrat (TOP-XX)
Flow	1.1 No Flow		CS0001-1-2	4	4	H		ES0002-2	4	2	M		R0002-2	Dungrat (TOP-XX)
Flow	1.2 More/HighFlow	C0002-0	C0002-1	4	3	H		ES0003-1	4	1	L		R0003-1	TOP CMDP-Jaruwat P
Flow	1.2 More/HighFlow	C0002-1	C0002-2	4	4	H		ES0003-2	4	2	M		R0003-2	TOP CMDP-Jaruwat P

Note:

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 Then			
5.1 Composition Change	Other Then		
5.10 External Fire/Explosion	Other Then		
5.11 Safety&Human Error	Other Then		
5.12 Optional Guidelines	Other Then		
5.2 Contamination	Other Then		
5.3 Leakage(Heat Exchanger)	Other Then		
5.4 Reaction	Other Then		
5.5 Start Up/Shut Down	Other Then		
5.6 Vent/Drain/Purge	Other Then		
5.7 Maintenance/Inspection	Other Then		
5.8 Corrosion/Erosion	Other Then		
5.9 Utilities Service Failure	Other Then		
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		

HAZOP RECOMMENDATION RESPONSE SHEET			
Project Title:moc title - 00041			
Project No:HAZOP-2023-0000041			
Node:			
Action By:	Dungrat (TOP-XX)	Response By:	Dungrat (TOP-XX)
Action No.	1		
Drawing and Documents	drawing no - 001 (20221202_Developer_https_qasapi_thaioilhub_thaioilgroup_com_.pdf)		
Action Description			
Deviation:	C0001-0		
Cause:	CS0001-0-1		
Consequences:	ES0001-1		
Safeguards:	R0001-1		
Recommendation:			
Action Response:			
Action Close-out Details	By whom	Signature	Date
Response			
Ownner Approval			

HAZOP RECOMMENDATION RESPONSE SHEET			
Project Title:moc title - 00041			
Project No:HAZOP-2023-0000041			
Node:			
Action By:	Dungrat (TOP-XX)	Response By:	Dungrat (TOP-XX)
Action No.	1		
Drawing and Documents	drawing no - 001 (20221202_Developer_https_qasapi_thaioilhub_thaioilgroup_com_.pdf)		
Action Description			
Deviation:			
Cause:	CS0001-0-2		
Consequences:	ES0001-2		
Safeguards:	R0001-2		
Recommendation:			
Action Response:			
Action Close-out Details	By whom	Signature	Date
Response			
Ownner Approval			

HAZOP RECOMMENDATION RESPONSE SHEET			
Project Title:moc title - 00041			
Project No:HAZOP-2023-0000041			
Node:			
Action By:	Dungrat (TOP-XX)	Response By:	Dungrat (TOP-XX)
Action No.	1		
Drawing and Documents	drawing no - 001 (20221202_Developer_https_qasapi_thaioilhub_thaioilgroup_com_.pdf)		
Action Description			
Deviation:	C0001-1		
Cause:	CS0001-1		
Consequences:	ES0002-1		
Safeguards:	R0002-1		
Recommendation:			
Action Response:			
Action Close-out Details	By whom	Signature	Date
Response			
Ownner Approval			

HAZOP RECOMMENDATION RESPONSE SHEET			
Project Title:moc title - 00041			
Project No:HAZOP-2023-0000041			
Node:			
Action By:	Dungrat (TOP-XX)	Response By:	Dungrat (TOP-XX)
Action No.	1		
Drawing and Documents	drawing no - 001 (20221202_Developer_https_qasapi_thaioilhub_thaioilgroup_com_.pdf)		
Action Description			
Deviation:			
Cause:	CS0001-1-2		
Consequences:	ES0002-2		
Safeguards:	R0002-2		
Recommendation:			
Action Response:			
Action Close-out Details	By whom	Signature	Date
Response			
Ownner Approval			



HAZOP RECOMMENDATION RESPONSE SHEET			
Project Title:moc title - 00041			
Project No:HAZOP-2023-0000041			
Node:			
Action By:	TOP CMDP-Jaruwat P.	Response By:	TOP CMDP-Jaruwat P.
Action No.	1		
Drawing and Documents	drawing no - 001 (20221202_Developer_https_qasapi_thaioilhub_thaioilgroup_com_.pdf)		
Action Description			
Deviation:	C0002-0		
Cause:	C0002-1		
Consequences:	ES0003-1		
Safeguards:	R0003-1		
Recommendation:			
Action Response:			
Action Close-out Details	By whom	Signature	Date
Response			
Ownner Approval			

HAZOP RECOMMENDATION RESPONSE SHEET			
Project Title:moc title - 00041			
Project No:HAZOP-2023-0000041			
Node:			
Action By:	TOP CMDP-Jaruwat P.	Response By:	TOP CMDP-Jaruwat P.
Action No.	1		
Drawing and Documents	drawing no - 001 (20221202_Developer_https_qasapi_thaioilhub_thaioilgroup_com_.pdf)		
Action Description			
Deviation:	C0002-1		
Cause:	C0002-2		
Consequences:	ES0003-2		
Safeguards:	R0003-2		
Recommendation:			
Action Response:			
Action Close-out Details	By whom	Signature	Date
Response			
Ownner Approval			

## ภาคผนวก - **PIDs / PFDs**