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)**
xx

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

เอกสารอ้างอิง (Drawing & Reference)				
No.	**Document Name**	**Drawing No**	**Document File**	**Comment**
1	node1	xx	x	x
1	doc	drawing_no1	Qmossfr67_Bow-Tie Diagram.pdf	xxx

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	M	RECOMMENDATIONS1	Closed	Dungrat (TOP-XX)
2	node1	L	RECOMMENDATIONS2	Closed	Nuttsuda (ADB)

Major Accident Event (MAE)			
No.	**Node**	**Causes**	**Risk Asseessment Matrix (R)**
1	node1		

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

HAZOP STUDY WORKSHEET

Project:	xxxxxxxxxHAZOP-2023-000040	**NODE**	**node1**
Design Intent :	xx	**System**	**xx**
Design Conditions:	x	**HAZOP Boundary**	
Operating Conditions:			
PFD, PID No. :		**Date**	

Guide Word	Deviation	Causes	Consequences	Unmitigated Risk Assessment			Major Accident Event	Existing Safeguards	Mitigated Risk Assessment Matrix			Recommendations	Action by
				S	L	R	(Y/N)		S	L	R		
Flow	1.1 No Flow	x1	xxxx2	4	4	H		x	3	3	M	RECOMMENDATIONS1	Dungrat (TOP-XX)
Flow	1.2 More/HighFlow	xxx2	xxxx2	4	4	H		dd	3	1	L	RECOMMENDATIONS2	Nuttsuda (ADB)
Flow	1.3 Less/Low Flow												
Flow	1.4 Reverse Flow												
Flow	1.5 MisdirectedFlow												
Level	4.1 Less/Low Level												
Level	4.1 More/High 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												
Pressure	2.1 More/High Press												
Pressure	2.2 Less/Low Pressu												
Temperature	3.1 More/High Temp												
Temperature	3.2 Less/Low Tempe												
Viscosity	5.1 More Viscosity												
Viscosity	5.2 Less Viscosity												

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:xxxxxxxxxHAZOP-2023-000040			
Project No:HAZOP-2023-0000040			
Node:			
Action By:	Dungrat (TOP-XX)	**Response By:**	Dungrat (TOP-XX)
Action No.	1		
Drawing and Documents	drawing no1 (Qmossfr67_Bow-Tie Diagram.pdf)		
Action Description			
Deviation:	x1		
Cause:	xxxx2		
Consequences:	x		
Safeguards:	RECOMMENDATIONS1		
Recommendation:			
Action Response:			

Action Close-out Details	**By whom**	**Signature**	**Date**
Response			
Ownner Approval			

HAZOP RECOMMENDATION RESPONSE SHEET

Project Title:xxxxxxxxxHAZOP-2023-000040

Project No:HAZOP-2023-0000040

Node:

Action By:	Nuttsuda (ADB)	**Response By:**	Nuttsuda (ADB)
Action No.	1		
Drawing and Documents	drawing no1 (Qmossfr67_Bow-Tie Diagram.pdf)		
Action Description			
Deviation:	xxx2		
Cause:	xxxx2		
Consequences:	dd		
Safeguards:	RECOMMENDATIONS2		
Recommendation:			
Action Response:			

Action Close-out Details	**By whom**	**Signature**	**Date**
Response			
Ownner Approval			