Chandra Asri

AR# 117422
Unplanned Shutdown due to High Distributor Plate DP

Oct 2024 case

iSTAR

ISSUEANCE (INITIATOR)

Abnormality Report

AR Number	:	AR# 117422
Title	:	Unplanned Shutdown due to High Distributor Plate DP – Oct 2024
Recurrence case from AR No.	:	-
Date Occurrence	:	October 21, 2024
Date Reported	:	November 08, 2024
Immediate Action	:	Adjust operating parameters, overhaul catalyst feeders, cleaning and replace catalyst tubes, etc.

AR Type	EPR	OPR	EXT	Non-OPEDR	TAM	PMS	II	CCR	CoRA	PM		MSA				
		X										Int:	2nd:	Ext:	TPM:	SMK3 :

H = High Potential ; L = Low Potential

Problem Type	A	B	C	D
				X

Near Miss	Yes		No
	H	L	
			X

Type Incident	PSE	Non PSE
		X

PSMC?		Tag Equipment
Yes	No	

*Uptime Plant	C2 Hot	C2 Cold	BD	B1MTBE	Utility	TY & Jetty	SDK	UCC1	UCC2	PEB	PP1	PP2	PP3	PPU	PPB	SPD1	SPD2
								X									

*Uptime Category	First Pass	Loss of Demand	Loss of Supply	Product Mix	Rate Loss	Schedule Downtime	Transition	Unscheduled Downtime
								X

Severity	Slight	Minor	Moderate	Major	Catastrophic
			X		

Cross (X) for major severity impact, and fill the total loss (KUSD)

People	Assets/Property Damage (USD)	Environment	Loss (KUSD)
			100.6

***MSA Severity	OFI	Minor	Major	Critical

**RCA Complexity	Low	Medium	High

cross (X) on the appropriate column in each item, see guideline in attachment.
**Choose the related item, if AR Type is OPR or EPR;*
***Choose the related item, if severity is slight;*
****Choose the related item, if AR Type is MSA*

cross (X) on the appropriate column in each item, see guideline in attachment.
**Choose the related item, if AR Type is OPR or EPR; ***option for MSA Type only SMK3*
***Choose the related item, if severity is slight; ****Choose the related item, if AR Type is MSA*

Initiator	Severity Verificator
Name : Habibi A.	Name: Joko Pramono
Date : Sep 27th, 2024	Date:

ANALYSIS (RCA EXECUTOR)
CONFIRMATION (REVIEWER)
APPROVAL (APPROVER)

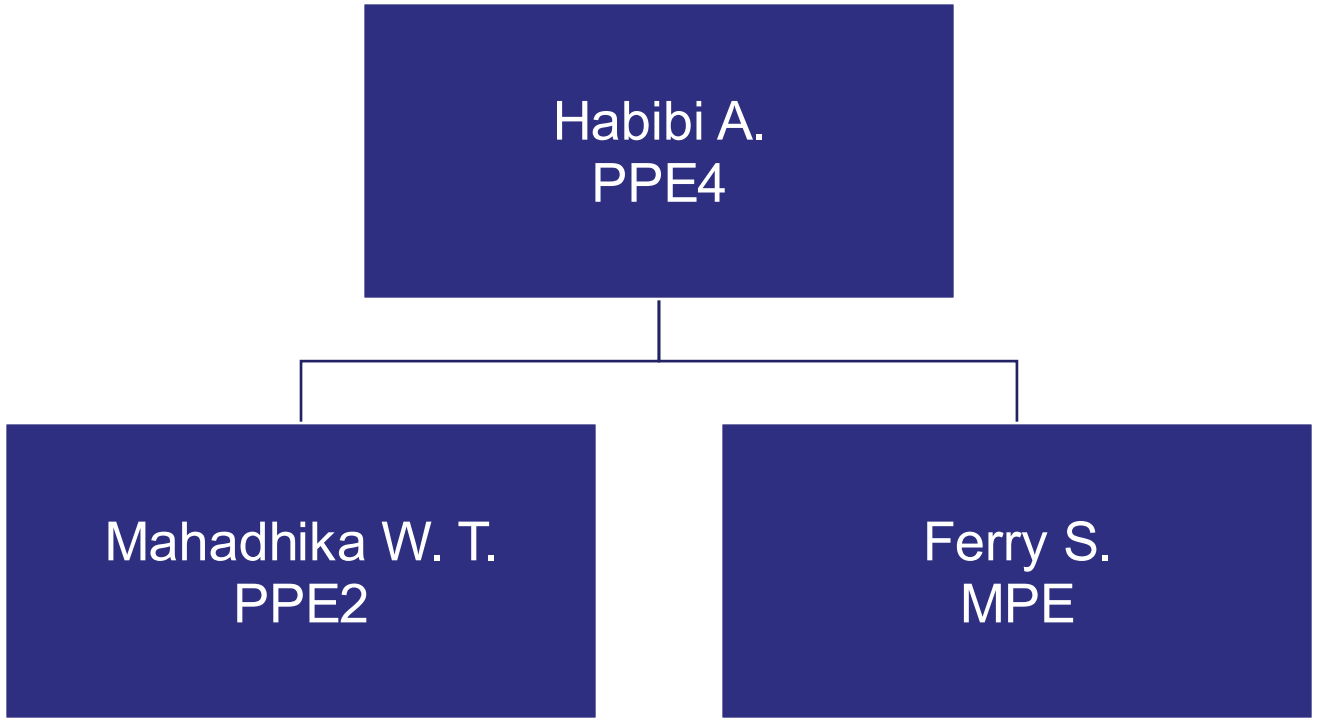
Problem Identification

Initiator	RCA Executor
Name: Habibi A.	Name: Habibi A.

Reviewer	Approver
Name: Mahyudanil B.	Name: Hamim T.

Verifier
Name: Melita T.

RCA Executor Team



Problem Identification

Detailed Observation (Chronology, Process Flow Diagram, Drawing, Other Evidence)

October 3rd, 2024

1 08:00 Catalyst In

October 4th, 2024

2 00:00 SGV from 0.680 to 0.730 m/s

3 08:22 Bed level from 15.5 to 15.0 m

4 16:30 Bed level from 15.0 to 15.2 m

October 7th, 2024

5 08:30 Bed level from 15.2 to 15.0 m

October 8th, 2024

6 13:30 Bed level from 15.0 to 15.2 m & SGV from 0.730 to 0.720 m/s

October 9th, 2024

7 15:52 Bed level from 15.5 to 15.3 m

October 10th, 2024

8 09:00 Bed level from 15.3 to 15.5 m

October 11th, 2024

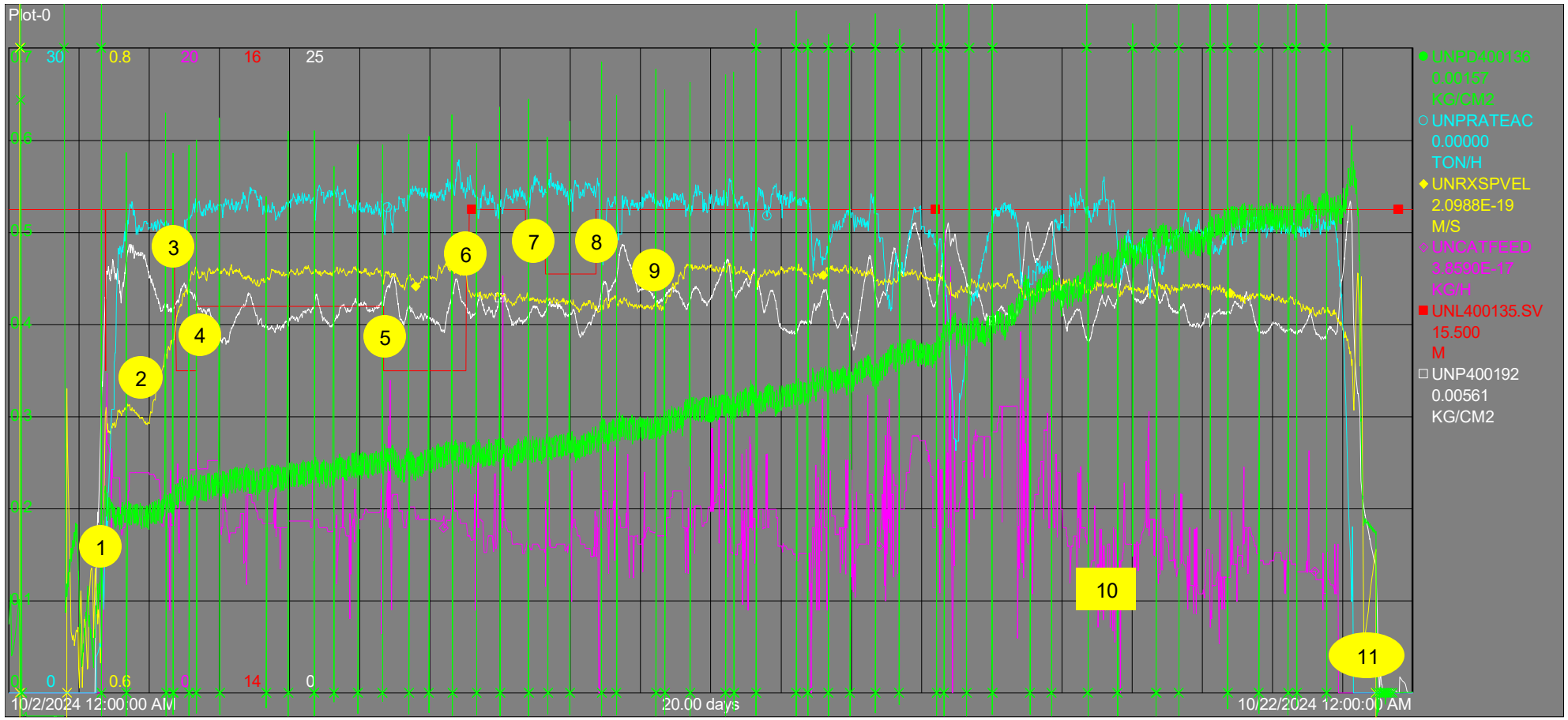
9 15:30 SGV back to 0.730 m/s

October 17th, 2024

10 Overhaul catalyst feeder V-4037

October 20th, 2024

11 22:30 Catalyst Cut



Problem Identification

Detailed Observation (Chronology, Process Flow Diagram, Drawing, Other Evidence)

PEL-PPL/NRT/24-077

RESULTS :

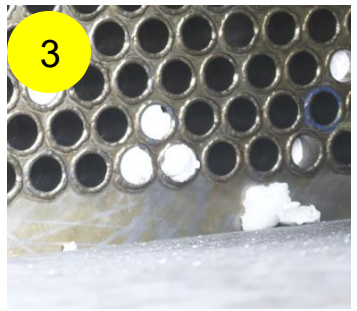
NRT UCC-I sample from Dist Plate/3

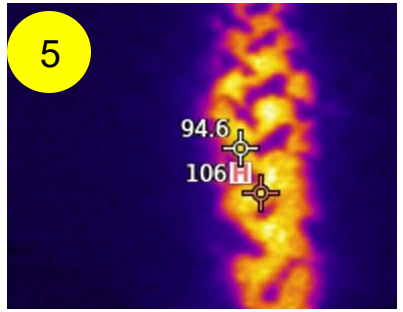
No	Analysis	Unit	1 *Plug dist. plate (porous)*	2 *Plug dist. plate (hard)*	3 *Plug from inlet cooler*	4 *Plug from outlet cooler*	5 *Sheeting in Rx below T2 nozzle*	6 *Remain resin in Reactor*	7 *Resin at manhole*
1	HLMI	gr/10 min	13.37	3.52	5.23	*	3.72	10.34	5.78
2	Density	gr/cm^3	0.9489	0.9501	0.9511	0.9440	0.9498	0.954	0.9528
3	Catalyst Residu								
	AL	ppm	23.89	152.35	3.66	0	16.379,9	29.04	31.34
	CR	ppm	0.67	1.00	0.82	1.10	0	1.17	0.81
	Ti	ppm	0	0	0	0	0	0	0
4	APS	Micron	*	*	*	*	*	1.35	7.91

Note : * - Can't analysis

- Sample 1 with high FI and low density is suspected come from expanded section, generated from fines agglomeration and react continuously at high temperature
- Sample 2 with low FI, bit lower density, and higher AI than sample 1 is suspected formed in dist. plate hole since startup, due to carryover fines that continue react in low temperature due to contains TEAL

- There are 2 suspected phenomenon of distributor plate being plugged by polymer:
  - Startup fines that contains TEAL carry over during startup then sticks and grows at dist. plate holes
  - Normal operation fines that deposits and reacts at expanded section (when bed level low) then scrubbed (when bed level high) and carryover to cycle loop due to its porosity and lightweight.





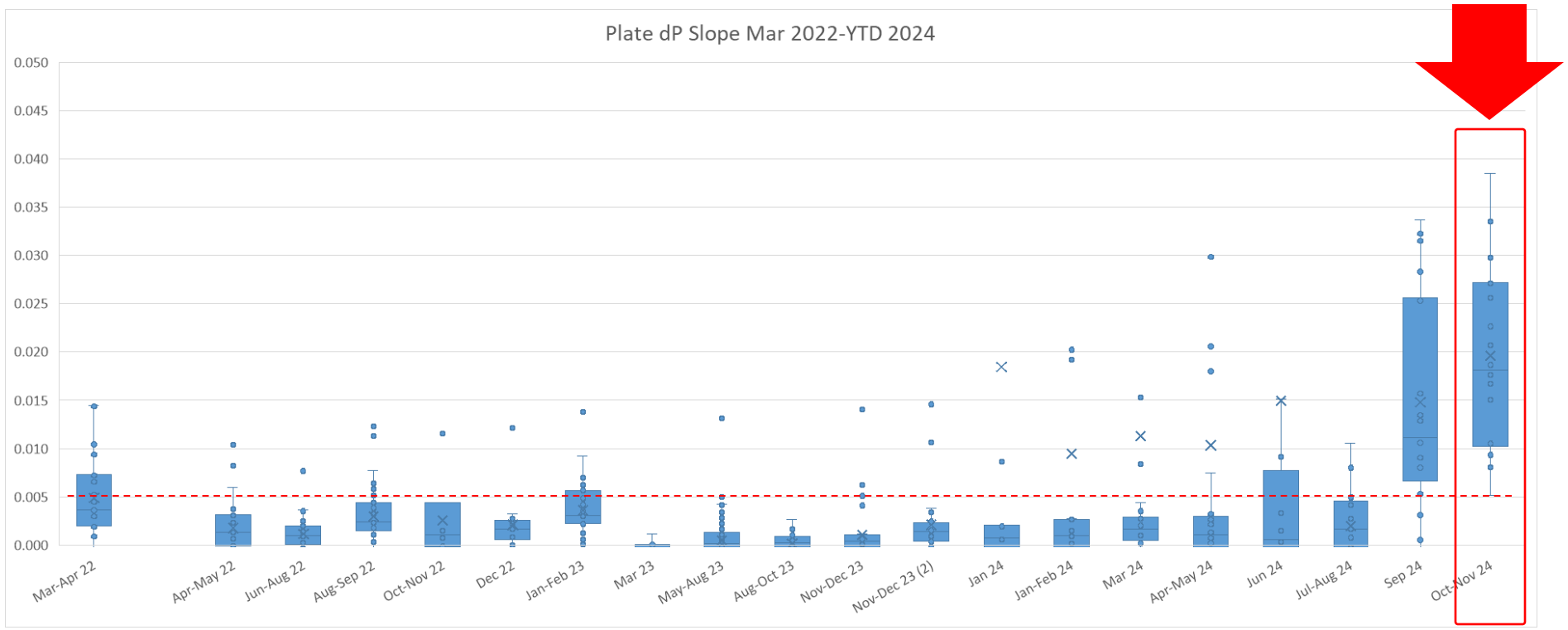
Problem Identification

Problem Statement

What	High distributor plate dP slope (0.0196 ksc/day)
Where	UCC1 plant
Scope	Reactor system
Impact	• Unscheduled downtime • Run length <30 days • Extra cost of USD 100K (shutdown and cleaning)

Assess

Past Performance Analysis (Data Historical, NC Evidence)



- 1st case in 2024 due to carryover refractory ball and unstable reactions due to catalyst feeder problems
- 2nd case in 2024 is suspected also due to unstable reactions impact of catalyst feeder problems and high initial dP

Past Performance Analysis (Data Historical, NC Evidence)

Historical Initial Plate dP after Cleaning

SU Cycle (Month)	Initial Plate DP, ksc	SGV, m/s	C2PP, ksca	Avg. Plate dP slope (First week), ksc/day
23 (June 2022)	0.185	0.732	16.11	0.0024
24 (Oct 2022)	0.186	0.735	15.21	0.0008
25 (Mar 2023)	0.192	0.733	17.60	0.0000
26 (Aug 2023)	0.185	0.731	15.00	0.0001
27 (Jan 2024)	0.202	0.731	15.06	0.0000
28 (Jun 2024-TAM)	0.196	0.732	15.03	0.0003
29 (Oct 2024)	**0.234**	0.730	14.40	0.0118

- Initial Plate dP data taken at similar SGV (0.730-0.735 m/s) and C2PP (14-16 ksca) shows that initial dP at startup October 2024 is relatively higher compared to previous.

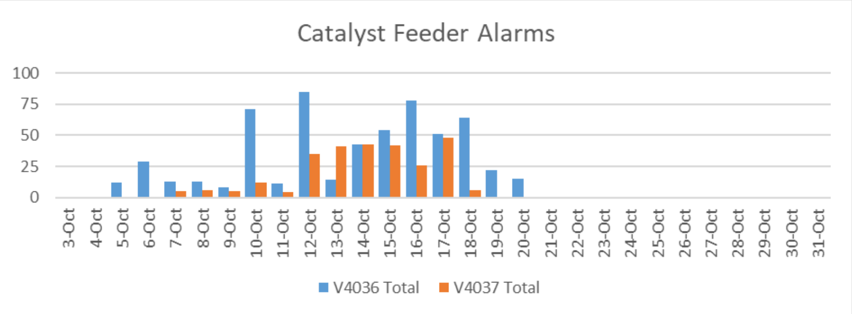
Assess

Past Performance Analysis (Data Historical, NC Evidence)

Historical Alarm from Catalyst Feeder

Daily Alarm Monitoring UCC1

No.	Date	Daily Alarm (Alarm/day)	% of Highest Alarm	System / Top Alarms / Desc.	C-4001 L400137.HI LAH400137	C-4001 PD400146.LO RX E7 Level	C-4001 PD400146.HI RX E7 Level	C-4001 W4001331.HI Bed Weight Int.	C-4001 W4001331.LO Bed Weight Int.	C-4001 W4001331.LL Bed Weight Int.	C-4001 DW4001X.HI Delta Bed Weight	C-4001 L400135.HI C4001 Level	C-4001 PD400136.LO C4001 Plate	C-4001 PD400136.HI C4001 Plate dP	C-4001 PD400136B.LO C4001 Plate	C-4001 PD400134.HI C4001 Up Dens.	V-4036 P40365.LO V4036 Press	V-4036 PD403610.HI V4036 Block #1	V-4036 PD403610.LO V4036 Block #1	V-4036 F40366.LO HPPN to V4036 #1	V-4036 PD403621.HI V4036 Block #2	V-4036 PD403621.LO V4036 Block #2	V-4036 F40367.LO HPPN to V4036 #2	V-4036 L40364.LO V4036 Level Tx	V-4037 P40375.LO V4037 Press	V-4037 P40375.LL V4037 Press LL	V-4037 PD403710.HI V4037 Block #1	V-4037 PD403710.LO V4037 Block #1	V-4037 F40376.LO ...o V4037 #1	V-4037 ...403721.HI	V-4037 ...3721.LO	V-4037 ...0377.LO HPPN to ...	V-4037 L4037... V4037 Level Tx
1	10/3/2024	943	29%	10	88	269					44		72		69		59								70								
2	10/4/2024	271	37%	10	99		4	6			3		4		4	3																	
3	10/5/2024	235	16%	10	38		3	7					3					12															
4	10/6/2024	248	20%	10	49		3	9					3		4			9			20												
5	10/7/2024	226	11%	10	25		3	3							3			9			4									5			
6	10/8/2024	189	6%	10	9			4					3					4			5	4							3				3
7	10/9/2024	212	6%	10			3	8					3		3	3		4			4									5			
8	10/10/2024	394	15%	10														58			6	7								12			
9	10/11/2024	208	5%	10			3	5			4							3			4	4								4			
10	10/12/2024	392	12%	10				12										24			14	47					4		11	16			4
11	10/13/2024	334	6%	10				15								4		10			4						8		7	20		6	
12	10/14/2024	372	5%	10														6			20	17					12		7	18		6	
13	10/15/2024	628	4%	10													11	28			10	16			12				16	13		13	
14	10/16/2024	521	5%	10				13										13			27	28	10				10			16			
15	10/17/2024	489	6%	10																	14	28	9		11	9	10		14	15		9	
16	10/18/2024	376	8%	10				11			6							29		9	14	12					6						
17	10/19/2024	273	5%	10			3	6						3				9			7	6											
18	10/20/2024	353	4%	10				8					6					10			5												
19	10/21/2024	2147	2%	10					14	8	9	23																					



- Historical alarm records in Oct 2024 shows high frequency of catalyst feeder problems
- Below 25 alarm/day on first week
- 25-75 alarms/day afterwards

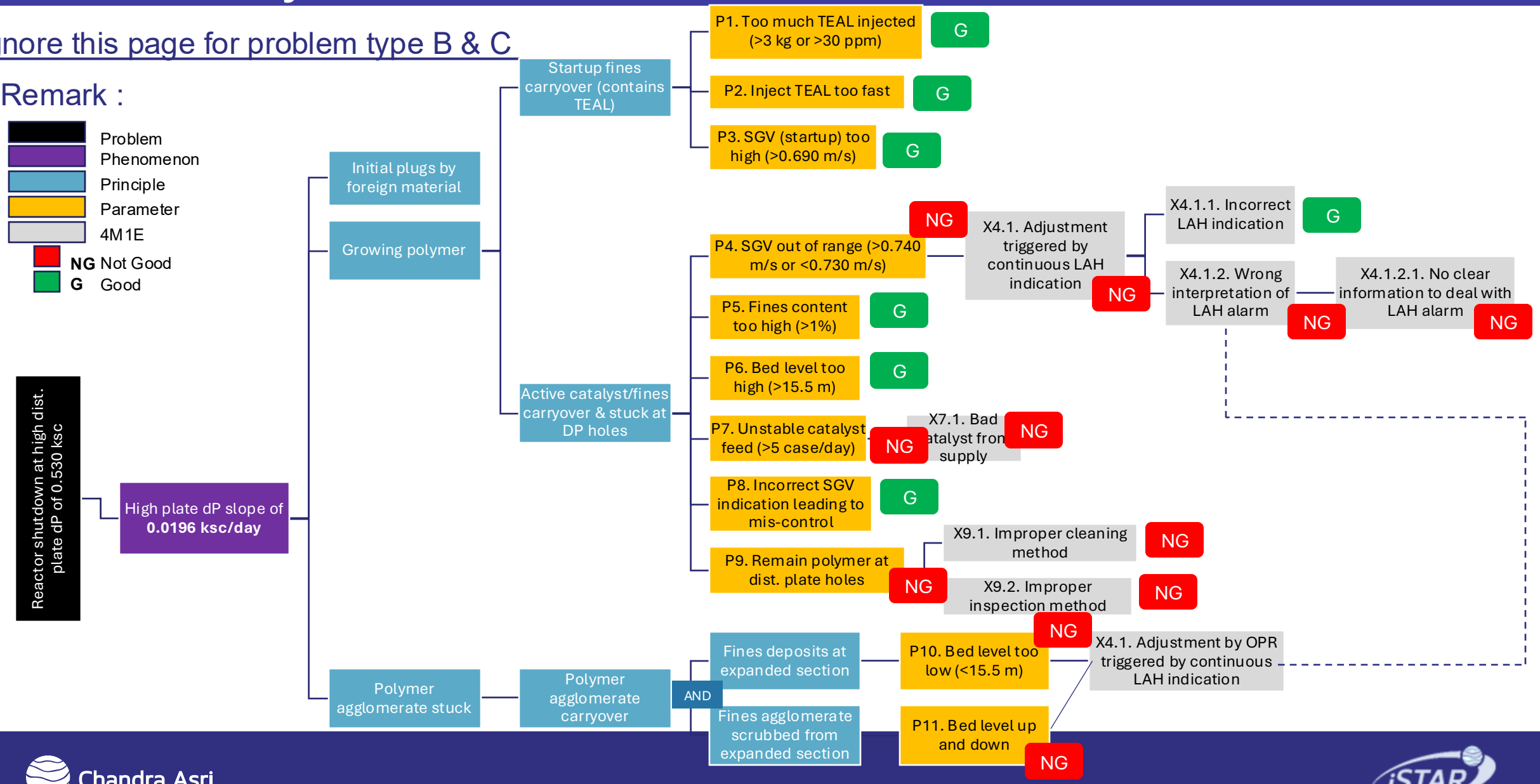
Target Setting

Actual Condition (Before Improvement)	:	Dist. Plate dP slope 0.0196 ksc/day
Target Condition (Project Y)	:	Dist. Plate dP slope <0.005 ksc/day

Before	Target
0.0196	0.005

Root Cause Analysis

Ignore this page for problem type B & C



Root Cause Analysis

P1. Too much TEAL injected (>3 kg) G

P2. Inject TEAL too fast G

- Injecting TEAL too much could increase TEAL concentration in resin and fines and increase potential of polymer growing at dist. plate when fines carryover to cycle gas
- Injecting TEAL too fast could lead to not-homogenous TEAL concentration in the bed leading to carryover by the cycle gas
- Data shows that high plate dP slope is **not correlated** with both factors

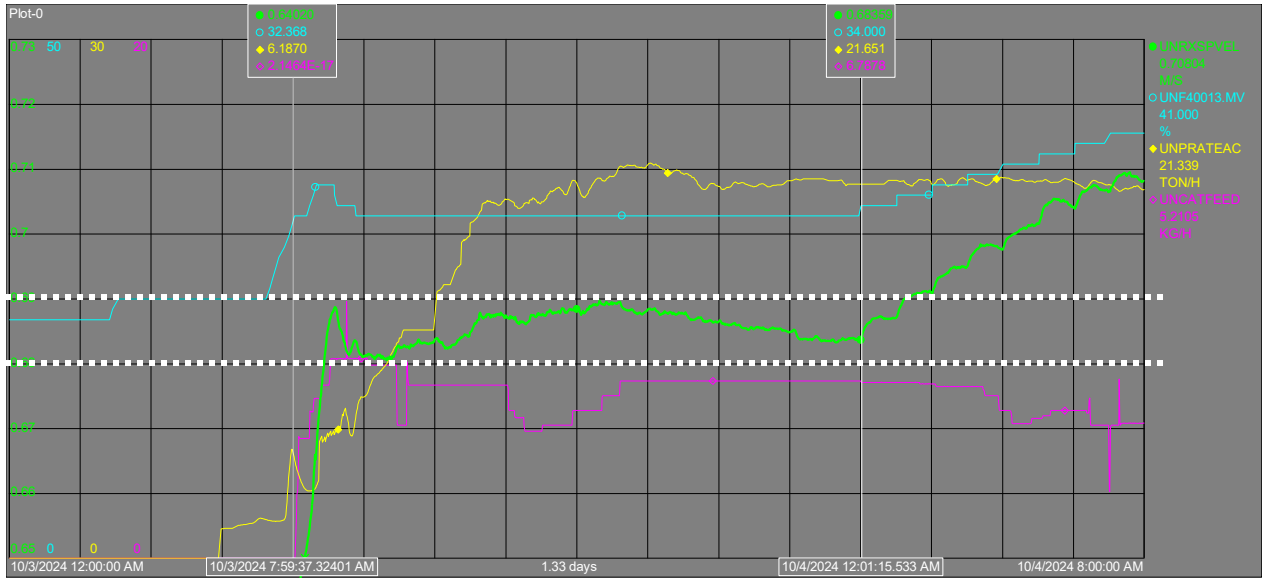
Cycle	Start	End	Duration	T2 Flow	Quantity	Plate DP slope
27	1/11/2024 11:17	1/11/2024 11:52	35	5.70	3.33	0.0003
27B	1/29/2024 19:15	1/29/2024 19:42	27	6.67	3.00	0.0007
27C	3/7/2024 9:05	3/7/2024 9:37	32	5.60	2.99	0.0017
27D	4/4/2024 8:55	4/4/2024 9:22	27	6.66	3.00	0.0015
28	6/11/2024 16:00	6/11/2024 16:30	30	5.65	2.83	0.0001
28B	7/22/2024 7:34	7/22/2024 8:21	47	3.75	2.94	0.0015
28C	9/4/2024 8:22	9/4/2024 8:47	25	7.47	3.11	0.0032
28C(2)	9/12/2024 11:45	9/12/2024 11:58	13	7.80	1.69	0.0186
29	10/3/2024 7:30	10/3/2024 8:00	30	5.32	2.66	0.0195

Root Cause Analysis

P3. SGV startup too high (>0.690 m/s)

G

Cycle	Plate DP slope	SGV startup
27	0.0003	0.682
27B	0.0007	0.687
27C	0.0017	0.686
27D	0.0015	0.680
28	0.0001	0.678
28B	0.0015	0.686
28C	0.0032	0.679
28C(2)	0.0186	0.686
29	0.0195	0.684

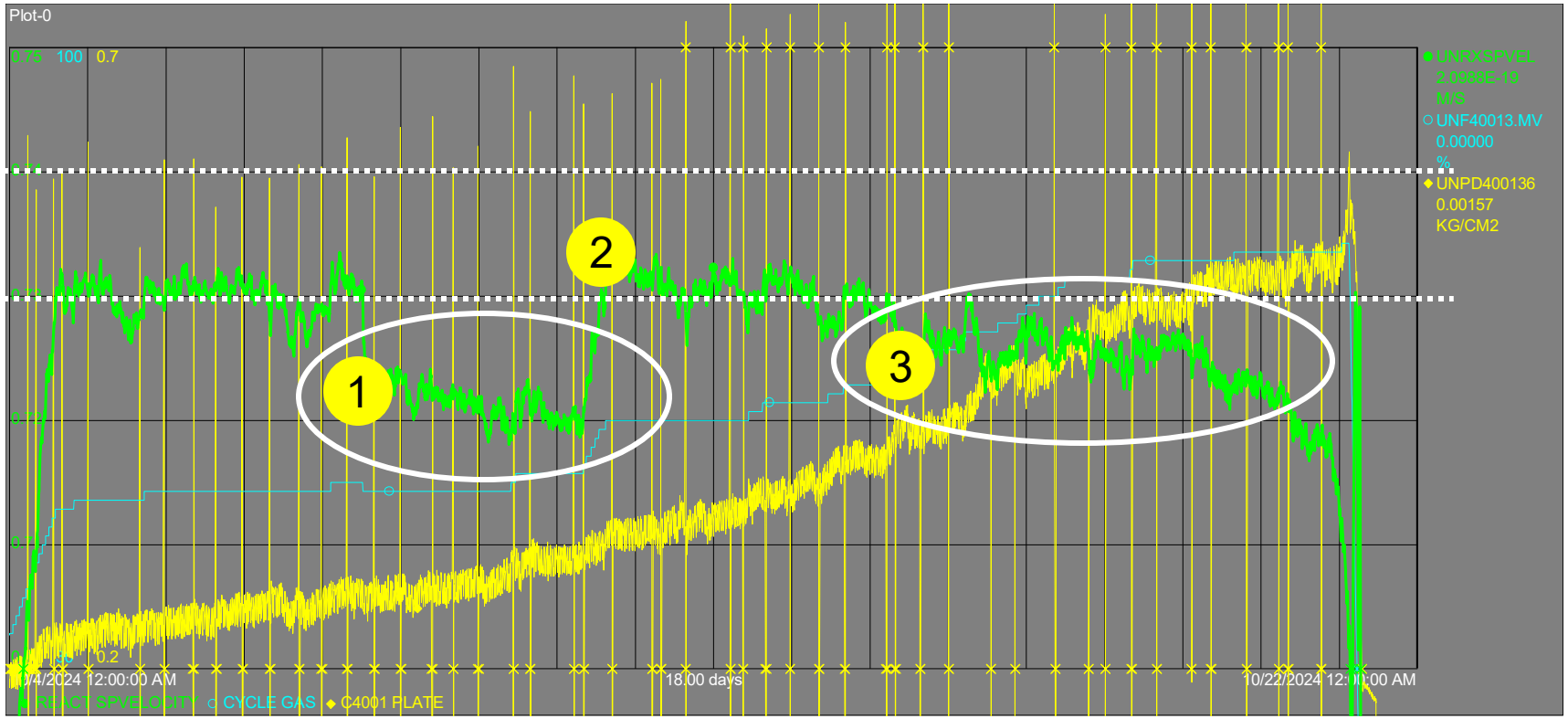


- Too high SGV during startup period could lead to carryover startup fines to cycle gas and deposit at distributor plate
- SGV during startup was maintained **on range** 0.680-0.690 m/s.

Root Cause Analysis

P4. SGV normal running out of range (>0.740 m/s or <0.730 m/s)

NG



- SGV is standardized at range 0.730-0.740 m/s
- Too high SGV increases potential resin/fines carryover
- Too low SGV reduces lifting force to allow carryover resin/fines re-enter the Reactor bed and doesn't attach/stick at dist. plate holes
- On 8/10 at 01 p.m. SGV was reduced to 0.720 m/s for troubleshoot high plate dP increment rate, but it didn't make significant result (1)
- On 11/10 at 3 p.m. SGV was increased back to 0.730 m/s (2)
- On 15/10, at plate dP 0.36 ksc, SGV started continuously decreased even though IGV continuously increased (3)
- This made plate dP increment rate became higher due to more polymer growing at dist. plate at low SGV

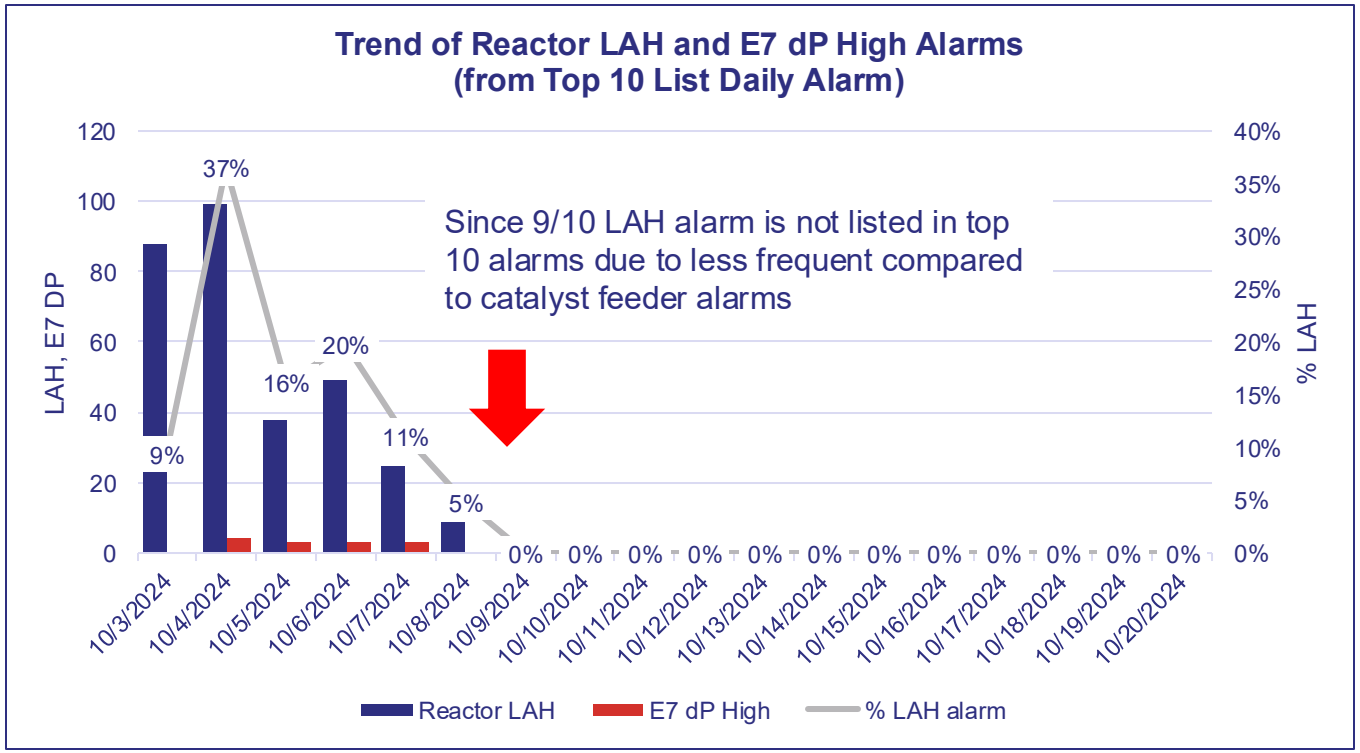
Root Cause Analysis

X4.1. Adjustment triggered by continuous LAH indication NG

X4.1.1. Incorrect LAH indication G

X4.1.2. Wrong interpretation of LAH alarm NG

X.4.1.2.1. No clear information to deal with LAH alarm NG

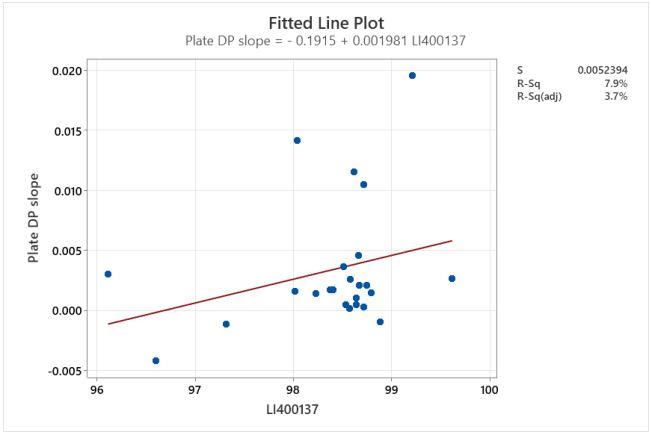


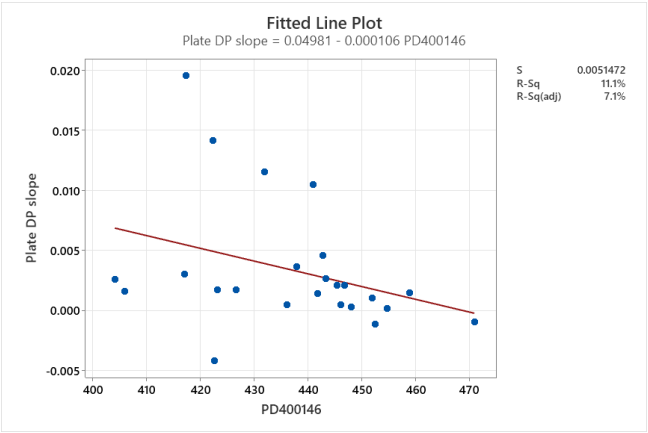
- Many alarms come from LAH400137 during startup until several days after startup up to 37% of total alarm on 4/10
- This impact to SGV adjustment on 8/10
- After SGV adjustment, LAH alarm disappeared from top 10 list alarm (top 10 list dominated by alarms from catalyst feeder problems)
- Even though LAH alarm disappeared from top 10, but plate dP increment rate still high
- OPR ask MTN to check LAH instrument on shutdown. Result: **LAH instrument is in good condition**
- So, the adjustment was caused by wrong interpretation of LAH alarm due to **no clear (limited) information to deal with LAH alarm**
- LAH alarm is not representative enough to represent actual condition in the reactor (see next slide)

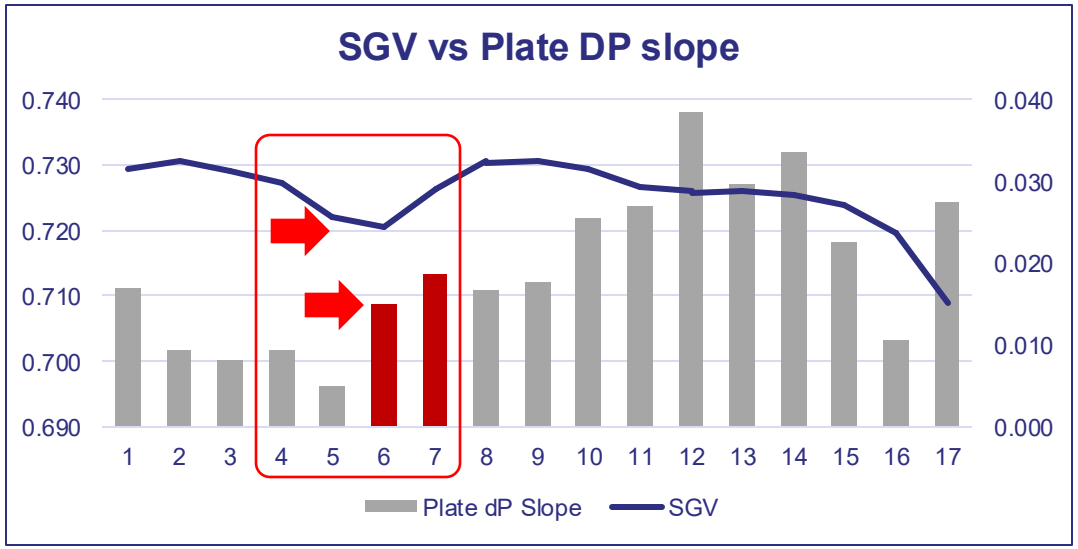
Root Cause Analysis

LI400137 vs PD400146: No one accurately indicating carryover that impact to plate DP increment rate

- Historical data from Oct 2021-Oct 2024 shows that LI400137 and PD400146 didn't represent as causes of high plate dP increment rate
- P-values of both fitted line plot show >0.05, means that the correlation aren't significant to plate dP increment rate
- So, it isn't always necessary to adjust the SGV when the LAH alarm occurs







Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	0.0000519	0.0000519	1.89	0.183
Error	22	0.0006039	0.0000275		
Total	23	0.0006558			

Analysis of Variance

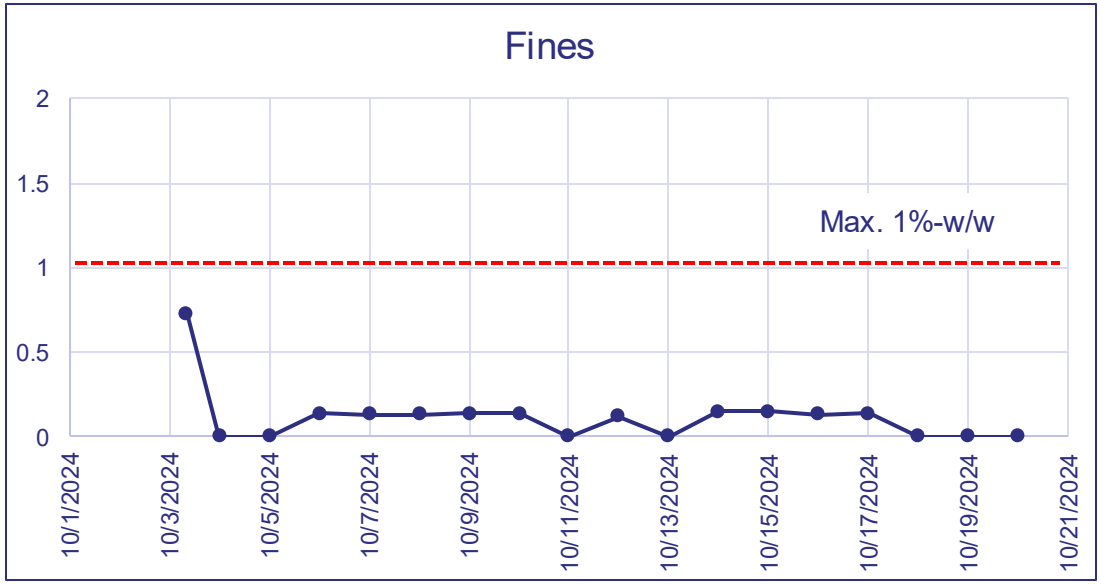
Source	DF	SS	MS	F	P
Regression	1	0.0000730	0.0000730	2.75	0.111
Error	22	0.0005829	0.0000265		
Total	23	0.0006558			

<< Plate dP increment rate increases after adjusting SGV to lower range (from 0.730 to 0.720 m/s)

Root Cause Analysis

P5. Fines content too high (>1%)

G



- Fines content during Oct 3rd-21st, was normal below 1%
- In normal running, max. fines content 0.14%-w/w
- High dist. plate dP increment rate isn't caused by too high fines content

P6. Bed level too high (>15.5 m)

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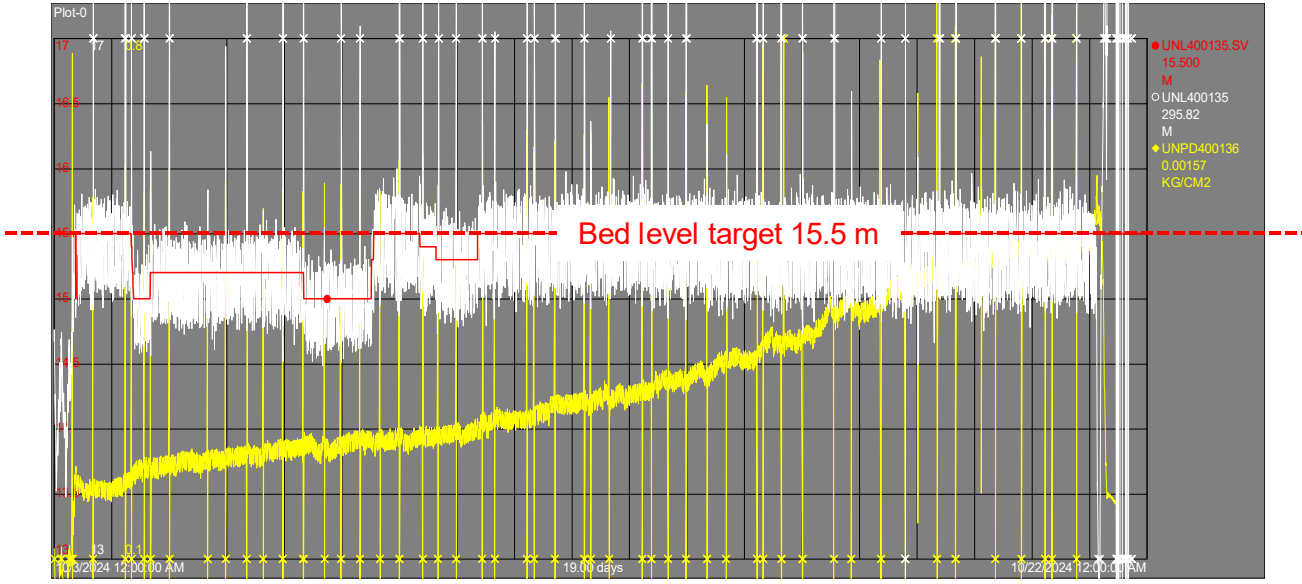
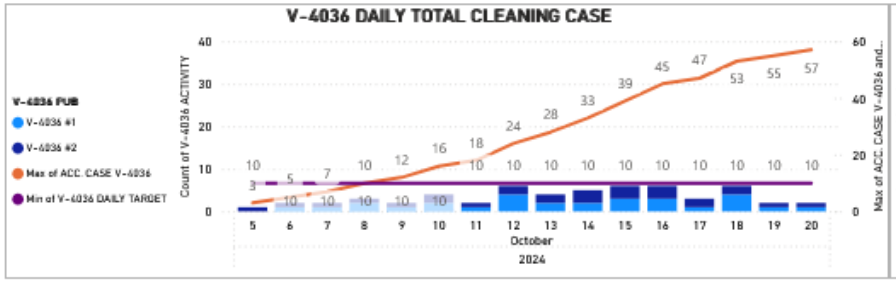


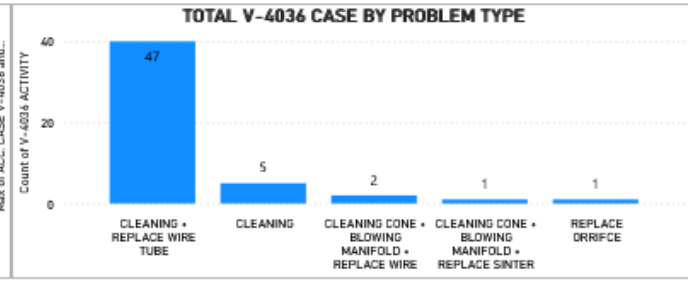
- Bed level during Oct 3rd-21st, was below 15.5 m (setting at 15.5 m)
- High dist. plate dP increment rate isn't caused by too high bed level

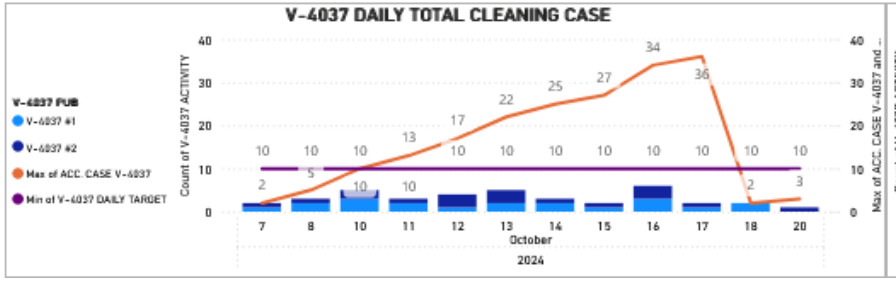
Root Cause Analysis

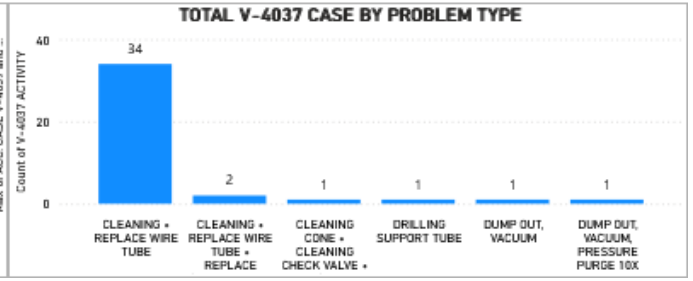
P7. Unstable catalyst feed (>5 cases/day) NG

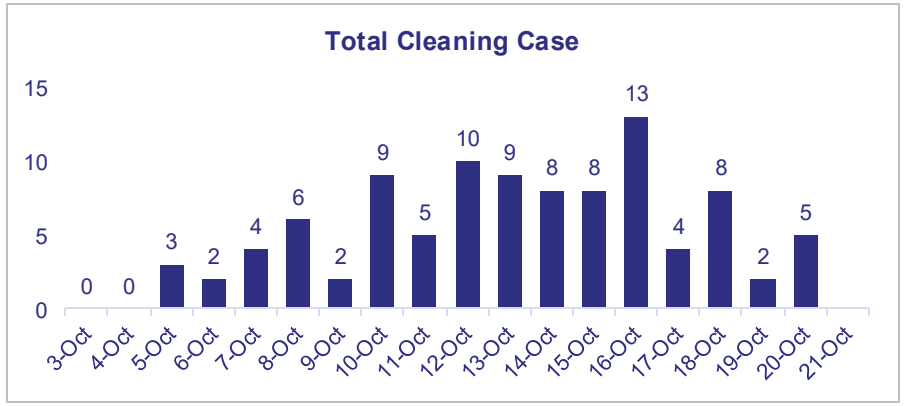
X7.1. Bad catalyst (from supply) NG

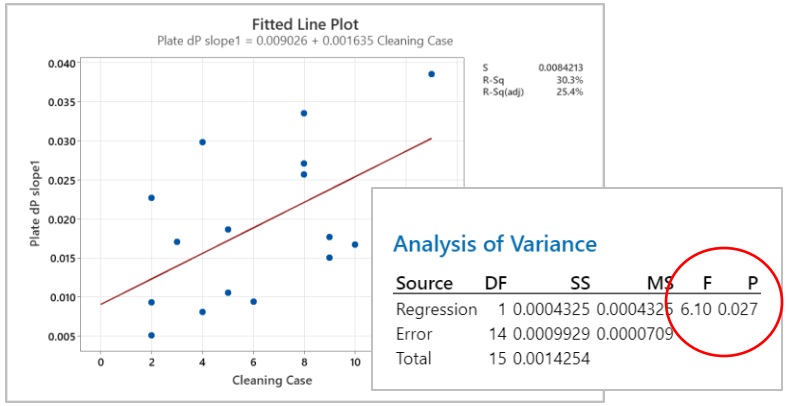












- There were many cases of catalyst feeder unstable feeding in both V-4036 and V-4037 up to 13 cases per day
- The most activity done to tackle the unstable feeding issue is cleaning and replace wire tube (or catalyst tube)
- Correlation analysis using fitted line plot shows significant correlation between number of catalyst feeder cases with the dist. plate dP daily increment rate (p-value 0.027)
- Higher frequency of catalyst feeder cases leading to higher increment rate of distributor plate dP
- Currently it was suspected due to bad catalyst quality (from supply) → still under communication with licensor to check remaining unused catalyst cylinder

Root Cause Analysis

Evidence from catalyst feeder overhaul in Oct 2024

FLOATING COVER PLATE

NOT GOOD Finding
1. Floating coverplate scratch
2. Found packed catalyst at floating cover plate

Action: Replace

FLUFFER

NOT GOOD Finding
1. Found "wet catalyst" / which typically impact to catalyst packed / bridging on fluffer
2. Fluffer still on good condition (no catalyst stick)

WEAR PLATE

NOT GOOD Finding
1. Scratch at surface of wear plate

Action : Replace wear plate

Above Screen & Brush

NOT GOOD Finding
1. Packed catalyst stuck above the screen bar
2. Brush was become stiff (Not flexible)

Action: Replace brush and cleaning screen

METERING DISK

NOT GOOD Finding
1.Found Layer catalyst film at hole of metering disk

Action : Cleaning Metering Disk

Root Cause Analysis

P8. Incorrect SGV indication leading to mis-control

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F2423-FS002

Attachment No 2, Page 1 o
Procedure No. F2423-WS020

MAINTENANCE POLYMER INSTRUMENT

TRANSMITTER CALIBRATION CERTIFICATE

Chandra Asri

☐ SDK ☑ UCC1 ☐ UCC2

MO :		DATE :	22-Oct-24
INSTRUME?	: FLOW TRANSMITTER	MANUFACTURE	: YOKOGAWA
TAG NO	: FT-4001-3	MODEL	: EJX110A
SERVICE	: VENTURI C4001 TO K4003	PART NUMBER	: -
INPUT	: 0 - 3600 mmH2O	SERIAL NUMBER	: -
OUTPUT	: 4-20 mA	ACCURACY	: 0.25% of Full Scale = 3600 mmH2O
RANGE	: 0-3600 mmH2O	CALIBRA1	: HART475 & HAND PUMP

☐ PM ☐ CM ☑ SHUTDOWN

☑ LINEAR ☐ SQUARE

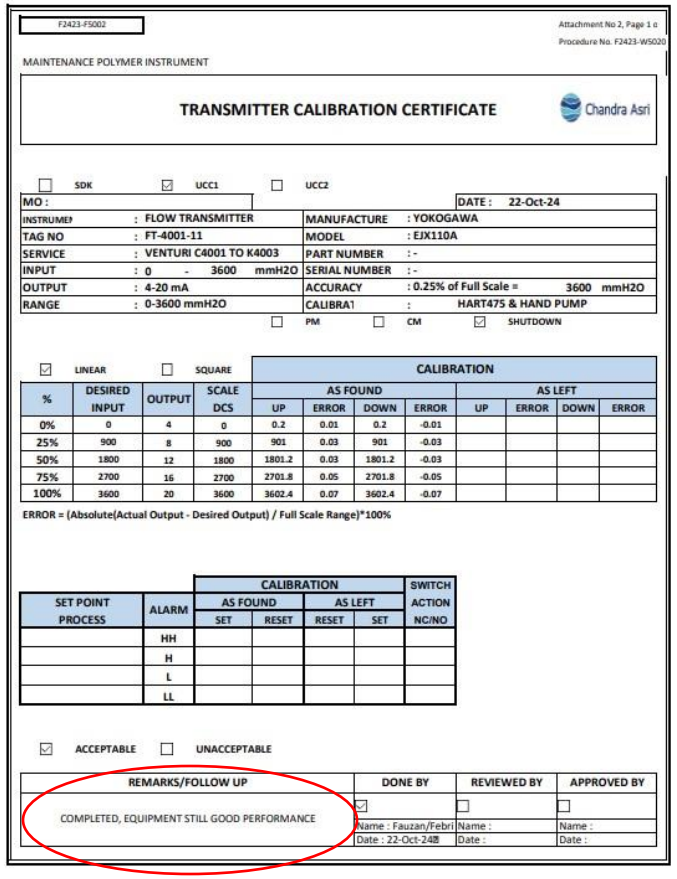
%	DESIRED INPUT	OUTPUT	SCALE DCS	CALIBRATION AS FOUND UP	AS FOUND ERROR	AS FOUND DOWN	AS FOUND ERROR	AS LEFT UP	AS LEFT ERROR	AS LEFT DOWN	AS LEFT ERROR
0%	0	4	0	0.6	0.02	0.6	-0.02				
25%	900	8	900	900.1	0.00	900.1	0.00				
50%	1800	12	1800	1800	0.00	1800	0.00				
75%	2700	16	2700	2700.1	0.00	2700.1	0.00				
100%	3600	20	3600	3600.2	0.01	3600.2	-0.01				

ERROR = (Absolute(Actual Output - Desired Output) / Full Scale Range)*100%

SET POINT PROCESS	ALARM	CALIBRATION AS FOUND SET	AS FOUND RESET	AS LEFT RESET	AS LEFT SET	SWITCH ACTION NC/NO
	HH					
	H					
	L					
	LL					

☑ ACCEPTABLE ☐ UNACCEPTABLE

REMARKS/FOLLOW UP	DONE BY	REVIEWED BY	APPROVED BY
COMPLETED, EQUIPMENT STILL GOOD PERFORMANCE	☑ Name : Fauzan/Febri Date : 22-Oct-24	☐ Name : Date :	☐ Name : Date :



- SGV is a key parameter that controls fluidization and carryover
- MTN instrument team has checked flow meter FT-4001-3 and FT-4001-11 during shutdown. Result: both equipment is still on good performance with error less than 0.1%
- Means that indication of SGV is correct during Oct 3rd-21st, 2024

Root Cause Analysis

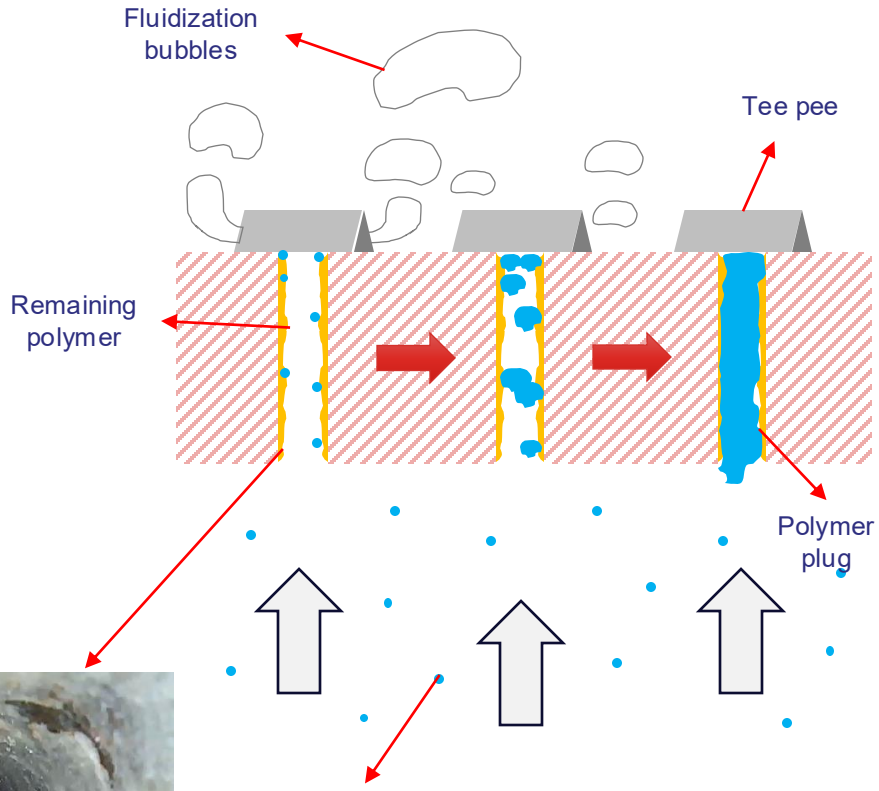
P9. Remain polymer at distributor plate holes — NG

X9.1. Improper cleaning tools — NG

X9.2. Improper inspection method — NG

SU Cycle (Month)	Initial Plate DP, ksc	SGV, m/s	C2PP, ksca	Avg. Plate dP slope (First week), ksc/day
23 (June 2022)	0.185	0.732	16.11	0.0024
24 (Oct 2022)	0.186	0.735	15.21	0.0008
25 (Mar 2023)	0.192	0.733	17.60	0.0000
26 (Aug 2023)	0.185	0.731	15.00	0.0001
27 (Jan 2024)	0.202	0.731	15.06	0.0000
28 (Jun 2024-TAM)	0.196	0.732	15.03	0.0003
29 (Oct 2024)	**0.234**	0.730	14.40	0.0118

- Initial Plate dP data taken at similar SGV (0.730-0.735 m/s) and C2PP (14-16 ksca) shows that initial dP at startup October 2024 is relatively higher compared to previous
- High initial plate dP indicates there was remaining polymer layer in the holes which also impact to higher roughness of hole inner surface
- Higher roughness allows carryover fine particles to attach more easily during flowing through the holes
- Attached fine particles that contain TEAL will catalyze further polymerization during normal running and caused dist. plate dP increase faster (plug samples contains high Al content)
- This condition is due to **improper cleaning method** by MTN and **improper inspection method** by Operation (not thoroughly inspected)



Cycle gas containing fine particles

RESULTS :

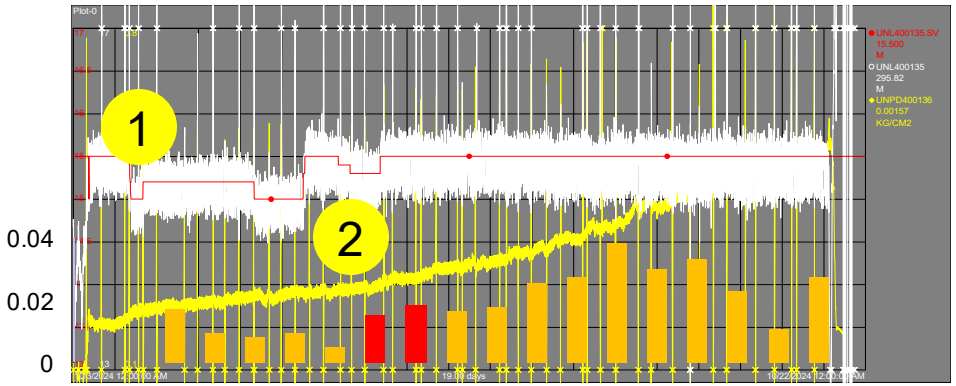
NRT UCC-I sample from D

No	Analysis	Unit	Plug dist. plate (porous)	Plug dist. plate (hard)
			1	2
1	HLMI	gr/10 min	13.37	3.52
2	Density	gr/cm³	0.9489	0.9501
3	Catalyst Residu			
	AL	ppm	23.89	152.35
	CR	ppm	0.67	1.00
	Ti	ppm	0	0
4	APS	Micron	*	*

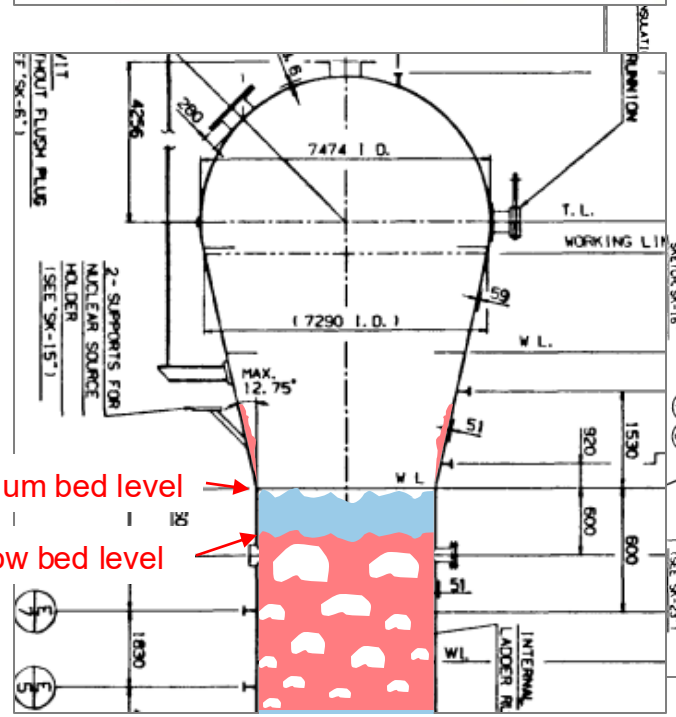
Root Cause Analysis

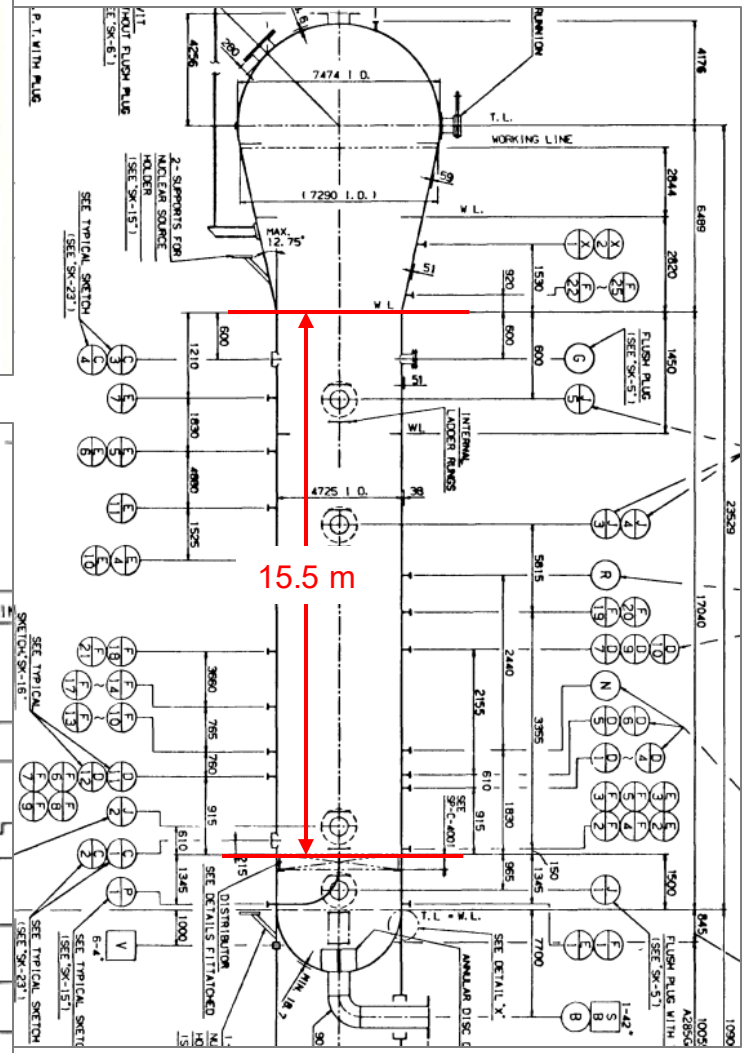
P10. Bed level too low (<15.5 m) NG
P11. Bed level up and down NG

- Bed level must be optimum so it can scrub fines at expanded section
- Team has experienced optimum bed level at 15.5 m (at the neck) which can perform well to reactor reliability
- Operating at lower bed level potential creates deposit fines at expanded section (1)
- When return bed level to 15.5 m, deposit are scrubbed and light & porous fines agglomerate are carried over to cycle gas leading to higher plate dP increment rate on Oct 9th-10th, 2024 (2)
- High FI of some plugs at distr. Plate is the evidence of this phenomenon, which is the result of continuous reaction at higher temperature (expanded section temperature is typically higher than bed temperature) – *see sample analysis result in page 7*



- THE REACTOR CONTAINS THE BED FOR PROPER FLUIDIZATION AND BACK MIXING
  - SPECIFIC BED LEVEL IS REQUIRED
    - TOO HIGH - RESIN CARRY OVER
    - TOO LOW - BUILD UP AND ENTRAINMENT
- EXPANDED SECTION
  - SHAPED WITH SLOPED SIDES, SO THAT RESIN SCRUBS AND SLIDES BACK DOWN INTO THE BED
  - WIDER AT THE TOP TO SLOW THE TRANSPORT VELOCITY OF THE RESIN TO PREVENT CARRY OVER.





Root Cause Analysis

Root Causes Summary:

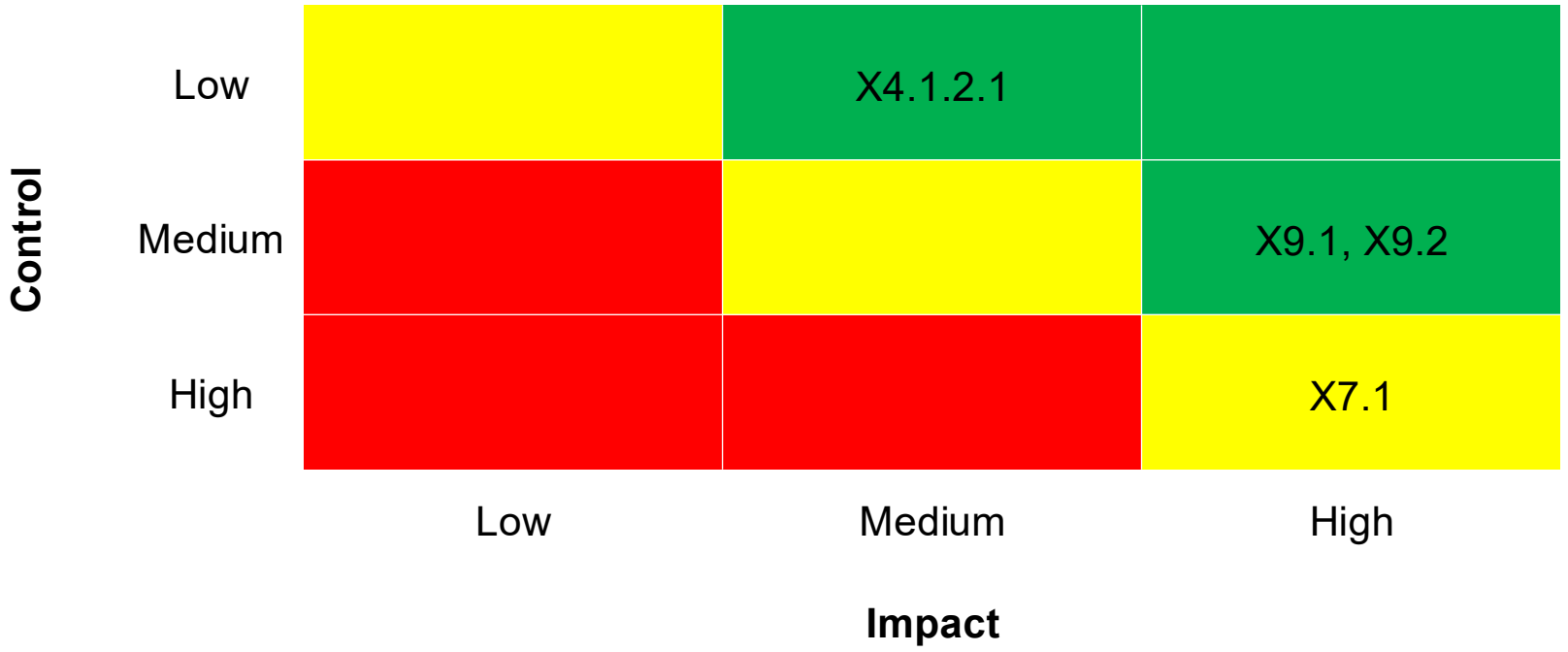
High distributor plate dP increment rate on Oct 3-21 by 0.0196 ksc/day is caused by:

1. **Growing polymer** at distributor plate due to
   - SGV out of range which is triggered by
     - no clear information to deal with continuous LAH alarm (X4.1.2.1), and
   - active catalyst carried-over during catalyst feeder problem due to
     - bad catalyst (X7.1); and
   - remain polymer at holes due to
     - Improper cleaning (X9.1) and
     - Improper inspection (X9.2)
2. **Stuck polymer** at distributor plate, due to
   - polymer agglomerate from expanded section carried-over after scrubbed due to
     - bed level too low and
     - adjusting down & up bed level triggered by
       - ❑ no clear information to deal with continuous LAH alarm (X4.1.2.1)

Root Cause Analysis – Matrix Priority

Ignore this page for problem type B & C

Prioritize improvement planning by matrix impact vs control



Impact can be defined by correlation value (statistic) or basic theoretical

Control can be defined based on effort, budget, resources, etc.

Improve - Corrective, Proactive Action (CAPAA) for Root Causes

No.	Root Cause	Corrective Action	PCD (Plan Completion Date)	PIC (Name of person)	Status	Pro-Active Action (If Applicable)	PCD (Plan Completion Date)	PIC (Name of person)	Status
1	No clear information to deal with LAH alarm	• Create OPLS how to deal with continuous LAH alarm • Temporarily, put LAH400137 to AOF so it didn't make distraction to the Board Operators (BO)	Dec 06. 2024	Habibi	CLOSED	Adjust range of LAH indicator so it represent real alert situation when LAH appear	Shutdown Jan 2025	Iwan P.	OPEN
2	Bad catalyst from supply	Use newer batch of catalyst for charging (delivery 2024)	Dec 06, 2024	Mahadhika	CLOSED	Create SOR to conduct special treatment to catalyst feeder after charging of after overhaul to hold catalyst and increase speed gradually	Dec 19th, 2024	Habibi	CLOSED
3	Improper cleaning method	Use proper triangle shaped cleaning tools for tee pee and repeated cleaning for dist. plate holes	Oct 25, 2024	Ferry S.	CLOSED				
4	Improper inspection method	Inspect thoroughly by more man powers	Oct 25, 2024	Mahadhika Habibi	CLOSED				

Corrective Action: to eliminate the cause of a non-conformity and to prevent recurrence.
Pro-Active Action: to prevent undesirable potential situations in other areas of similar nature (roll out to other similar system/items)

Executor: Operator / Supervisor / Engineer / Sr. Engineer / SI / Staff
Reviewer: Sr. Engineer/ SI / SM
Approver : SM / DM / GM
CSO Acknowledge : CSO1 Engineer/ Sr. Engineer & SM for OPR, EPR, CCR, Non-OPEDR

Executor	Reviewer	Approver	CSO Acknowledge
			
Name : Habibi A.	Name : Mahyudanil B.	Name : Hamim T.	Name : Ani Oktavi L
Date :	*Date :*	*Date :*	*Date :*

Improve - Preventive Action (PA) and Pro-Active Action (PAA) for Good Condition

No.	Item	Potential Failure	Possible root cause	Preventive Action	PCD (Plan Completion Date)	PIC (Name of person)	Status	Pro-Active Action (if applicable)	PCD (Plan Completion Date)	PIC (Name of person)	Status
P1	Too much TEAL injected	Miss calculation of TEAL	Lack of awareness	Create guideline for best practices during startup through OPLS	Dec 31, 2024	Habibi	CLOSE				
P2	Inject TEAL too fast	Miss adjustment of TEAL flow	Lack of awareness	Create guideline for best practices during startup through OPLS	Dec 31, 2024	Habibi	CLOSE				
P3	SGV startup too high	Miss adjustment of IGV at fluctuating C2PP	Lack of awareness, No guideline	Create guideline to adjust IGV at fluctuating C2PP through OPLS	Dec 6, 2024	Habibi	CLOSE				
P5	Fines content too high	Miss analysis by Lab	Improper sampling procedure	Send more than one sample if found fines higher (already covered by procedure)	Dec 6, 2024	Mahadhika	CLOSE				
P6	Bed level too high	Bed level indicator incorrect	Plugged bed level instruments (L400135)	PM inspection in every plant shutdown	Shutdown Dec-Jan '25	Iwan P.	CLOSE				
P8	Incorrect SGV indication leading to mis-control	Incorrect CG flow indication	Plugged CG flow transmitters (FT40013/11)	PM inspection in every plant shutdown	Shutdown Dec-Jan '25	Iwan P.	CLOSE				

Preventive Action: to eliminate the cause of potential non-conformity or other potential undesirable situation

Executor: Operator / Supervisor / Engineer / Sr. Engineer / SI / Staff
Reviewer: Sr. Engineer/ SI / SM
CSO Reviewer : CSO1 Engineer/ Sr. Engineer & SM
Approver : SM / DM / GM

Executor	Reviewer	Approver	CSO Acknowledge
			
Name : Habibi A.	Name : Mahyudanil B.	Name : Hamim T.	Name : Melita T.P.
Date :	*Date :*	*Date :*	*Date :*

Improve - Risk Analysis

No.	Corrective Action	Potential Risk	Countermeasure	PCD (Plan Completion Date)	PIC (Name of person)	Status
1	• Create OPLS how to deal with continuous LAH alarm • Temporarily, put LAH400137 to AOF so it didn't make distraction to the Board Operators (BO)	Un-announced operator while real LAH appeared leading to resin carryover to cycle gas loop	Close monitoring for other indication such as bed level, change of lower and upper FBD, and cooler DP	Dec 6th, 2024	Habibi	CLOSED
2	Use newer batch of catalyst for charging (delivery 2024)	Same catalyst quality leading to similar problems will occur	Create SOR to conduct special treatment to catalyst feeder after charging of after overhaul to hold catalyst and increase speed gradually	Dec 19th, 2024	Habibi	CLOSED
3	Use proper triangle shaped cleaning tools for tee pee and repeated cleaning for dist. plate holes	Ergonomic risk leading to back injury	Longer time for cleaning (not too tight)	Dec 6th, 2024	Ferry S.	CLOSED
4	Inspect thoroughly by more man powers	Ergonomic risk leading to back injury	Ask support to PdM team to inspect also with borescope parallel with visual inspection	Dec 6th, 2024	Mahadhika Habibi	CLOSED

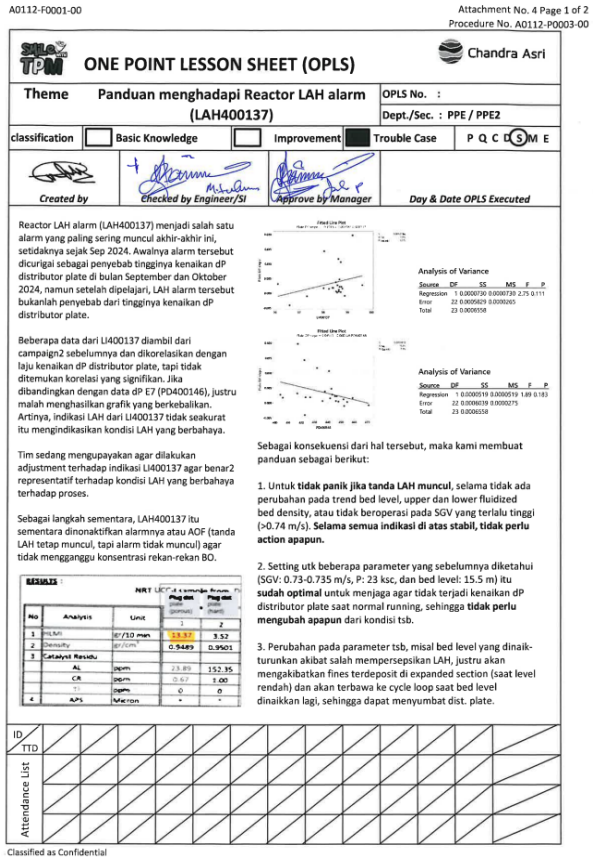
Potential Risk : to identify potential problem that occur when implemented Corrective Action
Countermeasure : do risk mitigation plan

Executor: Operator / Supervisor / Engineer / Sr. Engineer / SI / Staff
Reviewer: Sr. Engineer/ SI / SM
Approver : SM / DM / GM

Executor	Reviewer	Approver
Name : Habibi A.	Name : Mahyudanil B.	Name : Hamim T.
Date :	*Date :*	*Date :*

FOLLOW UP CA/PA/PAA (PIC) VERIFICATION (VERIFIER)

CA1. Create OPLS how to deal with LAH alarm



A0112-F0001-00

Attachment No. 4 Page 1 of 2
Procedure No. A0112-P0003-00

ONE POINT LESSON SHEET (OPLS)

Chandra Asri

Theme	Panduan menghadapi Reactor LAH alarm (LAH400137)	OPLS No. :
		Dept./Sec. : PPE / PPE2

classification: ☐ Basic Knowledge ☐ Improvement ■ Trouble Case — P Q C D (S) M E

Created by | Checked by Engineer/SI | Approve by Manager | Day & Date OPLS Executed

Reactor LAH alarm (LAH400137) menjadi salah satu alarm yang paling sering muncul akhir-akhir ini, setidaknya sejak Sep 2024. Awalnya alarm tersebut dicurigai sebagai penyebab tingginya kenaikan dP distributor plate di bulan September dan Oktober 2024, namun setelah dipelajari, LAH alarm tersebut bukanlah penyebab dari tingginya kenaikan dP distributor plate.

Beberapa data dari LI400137 diambil dari campaign2 sebelumnya dan dikorelasikan dengan laju kenaikan dP distributor plate, tapi tidak ditemukan korelasi yang signifikan. Jika dibandingkan dengan data dP E7 (PD400146), justru malah menghasilkan grafik yang berkebalikan. Artinya, indikasi LAH dari LI400137 tidak seakurat itu mengindikasikan kondisi LAH yang berbahaya.

Tim sedang mengupayakan agar dilakukan adjustment terhadap indikasi LI400137 agar benar2 representatif terhadap kondisi LAH yang berbahaya terhadap proses.

Sebagai langkah sementara, LAH400137 itu sementara dinonaktifkan alarmnya atau AOF (tanda LAH tetap muncul, tapi alarm tidak muncul) agar tidak mengganggu konsentrasi rekan-rekan BO.

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	0.0000730	0.0000730	2.75	0.111
Error	22	0.0005929	0.0000265		
Total	23	0.0006658			

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	1	0.0000519	0.0000519	1.89	0.183
Error	22	0.0006139	0.0000275		
Total	23	0.0006658			

Sebagai konsekuensi dari hal tersebut, maka kami membuat panduan sebagai berikut:

1. Untuk **tidak panik jika tanda LAH muncul**, selama tidak ada perubahan pada trend bed level, upper dan lower fluidized bed density, atau tidak beroperasi pada SGV yang terlalu tinggi (>0.74 m/s). **Selama semua indikasi di atas stabil, tidak perlu action apapun.**

2. Setting utk beberapa parameter yang sebelumnya diketahui (SGV: 0.73-0.735 m/s, P: 23 ksc, dan bed level: 15.5 m) itu **sudah optimal** untuk menjaga agar tidak terjadi kenaikan dP distributor plate saat normal running, sehingga **tidak perlu mengubah apapun** dari kondisi tsb.

3. Perubahan pada parameter tsb, misal bed level yang dinaik-turunkan akibat salah mempersepsikan LAH, justru akan mengakibatkan fines terdeposit di expanded section (saat level rendah) dan akan terbawa ke cycle loop saat bed level dinaikkan lagi, sehingga dapat menyumbat dist. plate.

RESULTS :

No	Analysis	Unit	Plug dist. plate (bonus)	Plug dist. plate (ham)
1	MI,MI	g/10 min	13.37	3.52
2	Density	gr/cm³	0.9489	0.9501
3	Catalyst Residu			
	Al	ppm	23.89	152.35
	Cr	ppm	0.67	1.00
	Ti	ppm	0	0
4	APS	Micron	-	-

ID / TTD / Attendance List

Classified as Confidential

- OPLS has been created and socialized to operation member especially board operators and supervisors
- Temporarily alarm LAH400137 put to AOF to reduce distraction to BO

Executor CAPA/PAA	Verifier
Name : Habibi A.	Name : Hamim T.
Date :	*Date :*

Executor: Operator / Supervisor / Engineer / Sr. Engineer / SI / Staff
Verifier : SM / DM / GM

Improve – CAPA/PAA Implementation

CA2. Use newer batch of catalyst for charging (delivery 2024)

515	Oct 24	10	10/19/24 2:44	UG-300	D667N8SG41	340325	2.56	75	85	Less	-13.11
516	Nov 24	11	11/6/24 0:15	UG-300	D667N8QG42	478121	#N/A	52	74	Less	-42.31
517	Nov 24	11	11/7/24 7:30	UG-300	D667NA9G41	600379	2.55	61	115	Less	-88.52
518	Nov 24	11	11/8/24 6:10	UG-300	D667N8TG41	298711	2.78	50	60	Less	-20.00
519	Nov 24	11	11/9/24 9:39	UG-300	D667NA9G41	540728	2.55	110	126	Less	-14.55
520	Nov 24	11	11/11/24 19:50	UG-300	D667NA9G41	600377	2.55	112	174	Less	-55.36
521	Nov 24	11	11/14/24 2:00	UG-300	D667NA7G41	U-5706	2.54	116	128	Less	-10.34
522	Nov 24	11	11/15/24 22:07	UG-300	D667N8JG41	316549	2.54	117	136	Less	-16.24
523	Nov 24	11	11/17/24 23:00	UG-300	D667N8SG41	613709	2.56	120	134	Less	-11.67
524	Nov 24	11	11/20/24 2:10	UG-300	D667NA7G41	U-3664	2.54	120	150	Less	-25.00
525	Nov 24	11	11/22/24 8:45	UG-300	D667N8QG42	314707	#N/A	120	145	Less	-20.83
526	Nov 24	11	11/24/24 10:15	UG-300	D667NA7G41	338497	2.54	128	145	Less	-13.28
527	Nov 24	11	11/26/24 13:12	UG-300	D667N8TG41	600404	2.78	114	155	Less	-35.96
528	Nov 24	11	11/28/24 23:52	UG-300	D667N8TG41	U-2140	2.78	112	223	Less	-99.11
529	Nov 24	12	12/2/24 23:00	UG-300	D667N8SG41	613583	2.56	60	64	Less	-6.67
530	Nov 24	12	12/4/24 6:37	UG-300	D667N8SG41	600557	2.56	112	150	Less	-33.93
531	Nov 24	12	12/6/24 21:00	UG-300	D667N4QG41	337300	2.94	110	126	Less	-14.55
532	Nov 24	12	12/8/24 15:15	UG-300	D667N4QG41	540050	2.94	112			
533	Nov 24	12	12/9/24 8:45	UG-300	D667N8JG41	338398	2.54	70	230	Less	-26.37
534	Nov 24	12	12/12/24 4:45	UG-300	D667N4QG41	347813	2.94	55	100	Less	-81.82
535	Nov 24	12	12/14/24 13:44	UG-300	D667N4QG41	347813	2.94	52	55	Less	-5.77
536	Nov 24	12	12/15/24 11:25	UG-300	D667N8NG41	347739	2.67	118	174	Less	-47.46
537	Nov 24	12	12/17/24 8:25	UG-300	D667N8JG41	339502	2.54	115	130	Less	-13.04
538	Nov 24	12	12/19/24 2:06	UG-300	D667N8MG41	538520	2.63	118	215	Less	-81.95
539	Nov 24	12	12/21/24 19:20	UG-300	D667N8KG41	314165	2.8	110	236	Less	-114.55
540	Nov 24	12	12/25/24 5:10	UG-300	D667N8NG41	584190	2.67	40			

505	Oct 24	10	10/19/24 9:52	UG-300	D667N4QG41	516495	2.94	75	77	Less	-3.20
506	Nov 24	11	11/6/24 0:00	UG-300	D667N8QG41	478121	2.61	60	85	Less	-40.83
507	Nov 24	11	11/7/24 4:50	UG-300	D667NA9G41	600379	2.55	60	119	Less	-98.33
508	Nov 24	11	11/8/24 6:05	UG-300	D667N8TG41	298711	2.78	60	101	Less	-68.33
509	Nov 24	11	11/9/24 3:35	UG-300	D667N8TG41	613515	2.78	111	174	Less	-56.76
510	Nov 24	11	11/10/24 20:30	UG-300	D667NA9G41	600434	2.55	105	120	Less	-14.29
511	Nov 24	11	11/12/24 12:30	UG-300	D667N8SG41	584392	2.56	113	122	Less	-7.96
512	Nov 24	11	11/14/24 7:00	UG-300	D667N8TG41	613628	2.78	109	117	Less	-7.34
513	Nov 24	11	11/16/24 8:15	UG-300	D667N8TG41	346601	2.78	113	118	Less	-4.42
514	Nov 24	11	11/18/24 13:00	UG-300	D667NA7G41	314169	2.54	109	134	Less	-22.94
515	Nov 24	11	11/20/24 12:20	UG-300	D667N8QG41	340284	2.61	113	129	Less	-14.16
516	Nov 24	11	11/22/24 16:50	UG-300	D667NA7G41	298730	2.54	112	127	Less	-13.39
517	Nov 24	11	11/24/24 18:20	UG-300	D667NA7G41	532749	2.54	111	183	Less	-64.86
518	Nov 24	11	11/26/24 22:40	UG-300	D667N8SG41	U-4443	2.56	113	146	Less	-29.20
519	Nov 24	11	11/29/24 6:30	UG-300	D667N8SG41	517381	2.56	116	130	Less	-12.07
520	Nov 24	11	11/30/24 21:30	UG-300	D667NA9G41	477910	2.55	118	113	Force	4.24
521	Nov 24	12	12/2/24 0:15	UG-300	D667NA9G41	309308	2.55	112	169	Less	-50.89
522	Nov 24	12	12/3/24 16:33	UG-300	D667N8SG41	613583	2.56	56	42	Force	25.00
523	Nov 24	12	12/4/24 8:11	UG-300	D667N4QG41	478189	2.94	113	166	Less	-46.90
524	Nov 24	12	12/6/24 16:32	UG-300	D667N4QG41	478170	2.94	110	267	Less	-142.73
525	Nov 24	12	12/9/24 22:48	UG-300	D667N8JG41	338398	2.54	45	73	Less	-62.22
526	Nov 24	12	12/10/24 18:00	UG-300	D667N4QG41	541157	2.94	109	120	Less	-10.09
527	Nov 24	12	12/12/24 10:00	UG-300	D667N4QG41	298816	2.94	106	349	Less	-62.33
528	Nov 24	12	12/15/24 3:44	UG-300	D667N4QG41	298717	2.94	75	275	Less	-266.71
529	Nov 24	12	12/20/24 4:15	UG-300	D667N8NG41	584246	2.67	115	119	Less	-3.30
530	Nov 24	12	12/22/24 9:57	UG-300	D667N8MG41	359706	2.63	120	148	Less	-23.33
531	Nov 24	12	12/25/24 4:10	UG-300	D667N8NG41	360461	2.67	119			

- Use latest catalyst batch based on delivery (June 2024) since startup Nov 6th, 2024
- D667N4QG41, ...N8QG41, ...N8SG41, ...N8TG41, ...NA7G41, ...NA9G41
- Unfortunately, after using catalyst with newer batches, problems in catalyst feeder still occur, means the catalyst quality almost the same with previous
- Feeder performance become better after applying special procedure on catalyst feeder as mitigation for bad catalyst (next slide)

Executor: Operator / Supervisor / Engineer / Sr. Engineer / SI / Staff
Verifier : SM / DM / GM

Executor CAPA/PAA	Verifier
Name : Mahadhika	Name : Hamim T.
Date :	*Date :*

PAA2. Create SOR for catalyst feeder operation after overhaul and charging (PPE2-SOR-2024-10)

Doc. No. : PPE-10-2024-00
Section : PPE2

SPECIAL OPERATION REQUEST

Chandra Asri

Part I: Description part by Originator

Title	Guideline for Catalyst Feeder Operation after Overhaul		
SOR Request date:	SOR Start date:	SOR Finish date:	
26-Dec-24	26-Dec-24	W2 Jan 2025	

Description of Request:

Follow this guideline as trial for Catalyst Feeder reliability improvement.

Result of Hazard Identification (HAZID):

[X] Need to Conduct Process Hazard Analysis

[ ] Need to Conduct Job Hazard Analysis (JOHAN) or HIRADC

Instruction of Request by including Caution, Risk and Troubleshooting Instruction

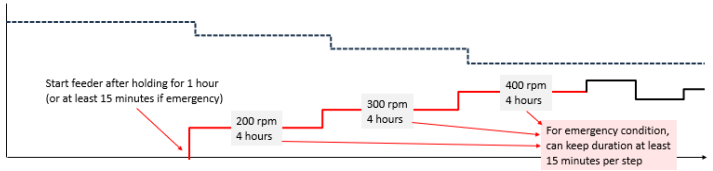
Latar Belakang

The catalyst feeder has important role to maintain reaction stability in UCC1 Reactor. Since TAM 2024, UCC1 Operation team has struggled with many problems in the catalyst feeder, either in V-4036 or V-4037. Both feeders shows similar problems such as frequent plugging at catalyst tube, catalyst blocking the PUB cone, or even worse such as plugged PUB holes and plugged screen.Almost all problems lead to the most suspected cause which is poor quality of the catalyst.

To mitigate this condition, lets do some new procedure to treat the Catalyst Feeder after overhaul (fresh) in order to make it has longer operation and more reliable.

Procedure:

1. Charge the catalyst to the fresh catalyst feeder as per normal procedure.
2. Still at low pressure, **hold the catalyst in the feeder for 1 hour** to dissipate static charge in the catalyst. Too high static charge is suspected cause the catalyst attach to the wall of reservoir or agglomerate and later will fall and packed the screen.
3. If before 1 hour, the running feeder has problem and need to be backed up, fresh feeder can be started after **at least 15 minutes of holding time.**
4. **Start the new (fresh) catalyst feeder with speed of 200 rpm and keep for 4 hours, then increase to 300 rpm and keep for 4 hours, then increase to 400 rpm and keep for 4 hours.** Another feeder speed will be adjusted to maintain the reaction at targetted rate (max. 1000 rpm). The fresh catalyst feeder speed can be adjusted as normal operation afterwards. **For emergency condition as stated in point 3, duration for keep at 200, 300, or 400 rpm can be shorten to at least 15 minutes.**
5. Close monitor performance and record abnormalities as usual.



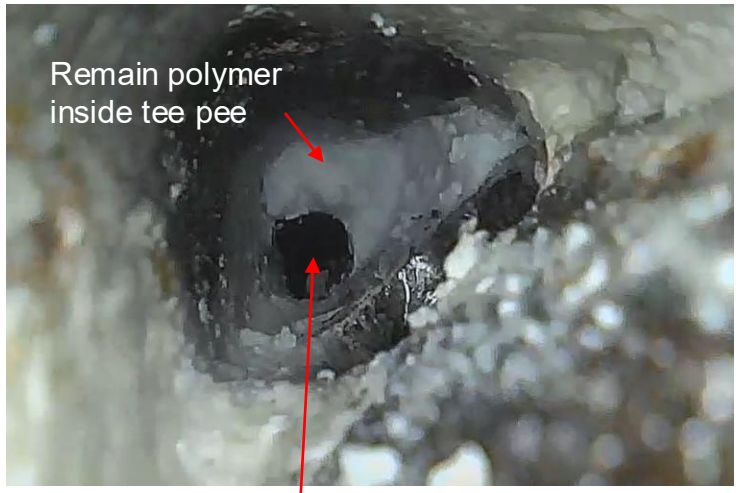
- After implementing new procedure, catalyst feeder problems/cleaning cases significantly reduced

Executor: Operator / Supervisor / Engineer / Sr. Engineer / SI / Staff
Verifier : SM / DM / GM

Executor CAPA/PAA	Verifier
Name : Mahadhika	Name : Hamim T.
Date :	*Date :*

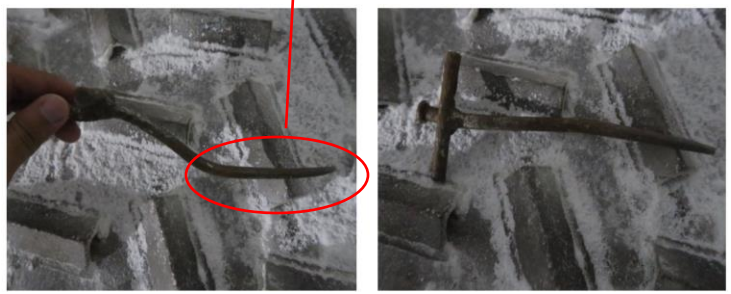
Improve – CAPA/PAA Implementation

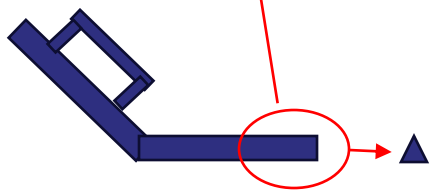
CA3. Use proper triangle shaped cleaning tools for tee pee and repeated cleaning for dist. plate holes



If not using triangle shaped cleaning tool

Using triangle shaped cleaning tool





- Cleaning tee pee using triangle shaped cleaning tool resulted better with no remaining polymer inside
- Repeated cleaning for dist. Plate holes to ensure holes are cleaner than previous

Executor: Operator / Supervisor / Engineer / Sr. Engineer / SI / Staff
Verifier : SM / DM / GM

Executor CAPA/PAA	Verifier
Name : Ferry S.	Name : Hamim T.
Date :	*Date :*

Improve – CAPA/PAA Implementation

CA4. Inspect thoroughly by more man powers

- Inspection after cleaning by more man powers from operation, maintenance, and inspection
- Inspection by visual (without tools) and by borescope in parallel
- Inspect bottom side and upper side at the same time for time efficiency

Executor CAPA/PAA	Verifier
Name : Mahadhika/Habibi	Name : Hamim T.
Date :	*Date :*

Executor: Operator / Supervisor / Engineer / Sr. Engineer / SI / Staff
Verifier : SM / DM / GM

Improve – CAPA/PAA Implementation

PA1

- Evidence implementation

Executor CAPA/PAA	Verifier
Name :	Name :.
Date :	*Date :*

Executor: Operator / Supervisor / Engineer / Sr. Engineer / SI / Staff
Verifier : SM / DM / GM

Improve – CAPA/PAA Implementation

PA2 etc

- Evidence implementation

Executor CAPA/PAA	Verifier
Name :	Name :.
Date :	*Date :*

Executor: Operator / Supervisor / Engineer / Sr. Engineer / SI / Staff
Verifier : SM / DM / GM

Improve – CAPA/PAA Implementation

PAA1

- Evidence implementation

Executor CAPA/PAA	Verifier
Name :	Name :.
Date :	*Date :*

Executor: Operator / Supervisor / Engineer / Sr. Engineer / SI / Staff
Verifier : SM / DM / GM

PAA2 etc

- Evidence implementation

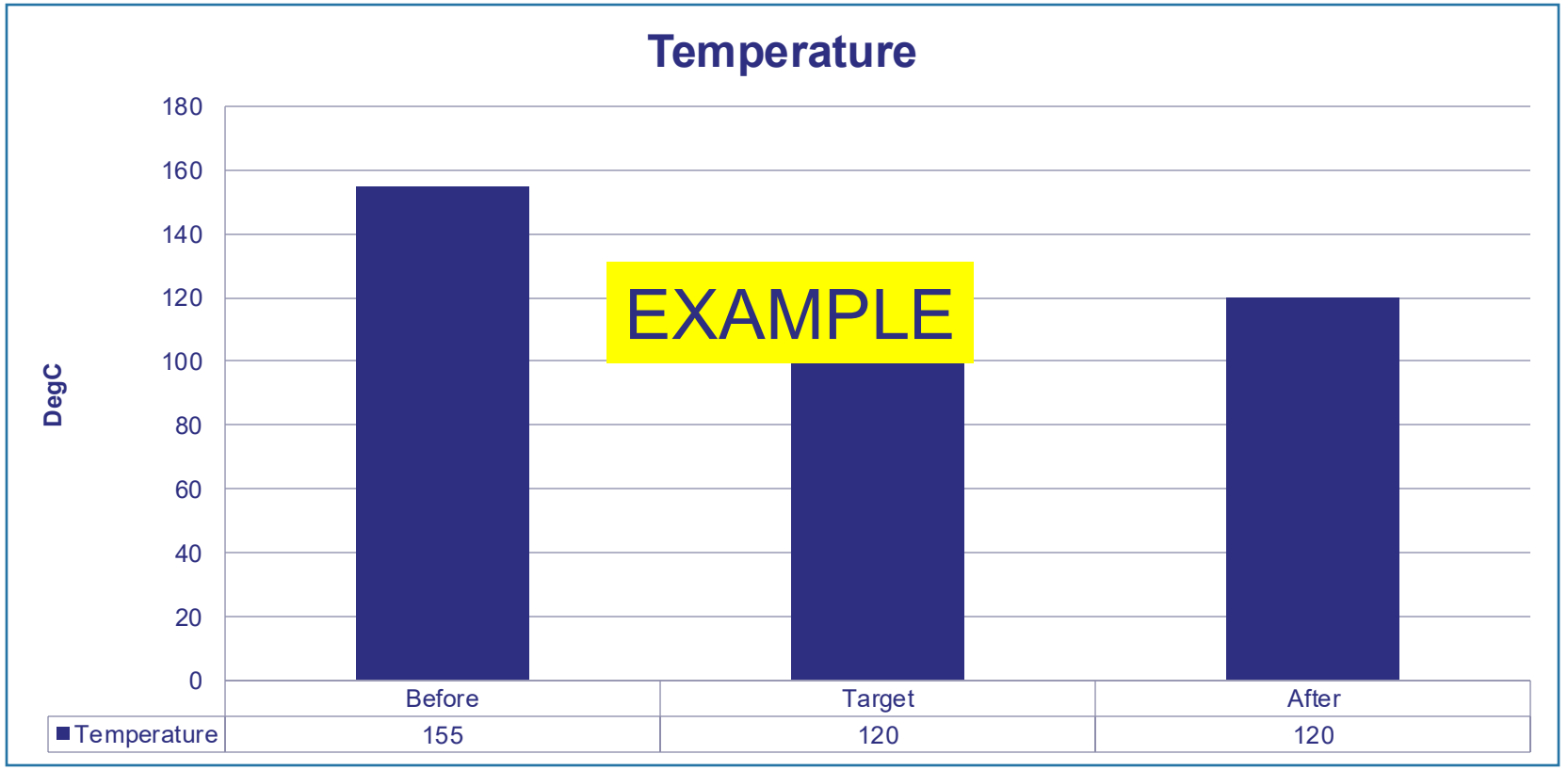
Executor CAPA/PAA	Verifier
Name :	Name :.
Date :	*Date :*

Executor: Operator / Supervisor / Engineer / Sr. Engineer / SI / Staff
Verifier : SM / DM / GM

CONFIRM RESULT (EXECUTOR)

Confirm Result

Before Improvement (Problem Condition)	:	
Target Condition (Project Y)	:	
After Improvement		



Standardization

Item / Activity	Procedure / Work Instruction Number
Example : Maintain temperature max 120 DegC	A0XXX-PXXX-XX

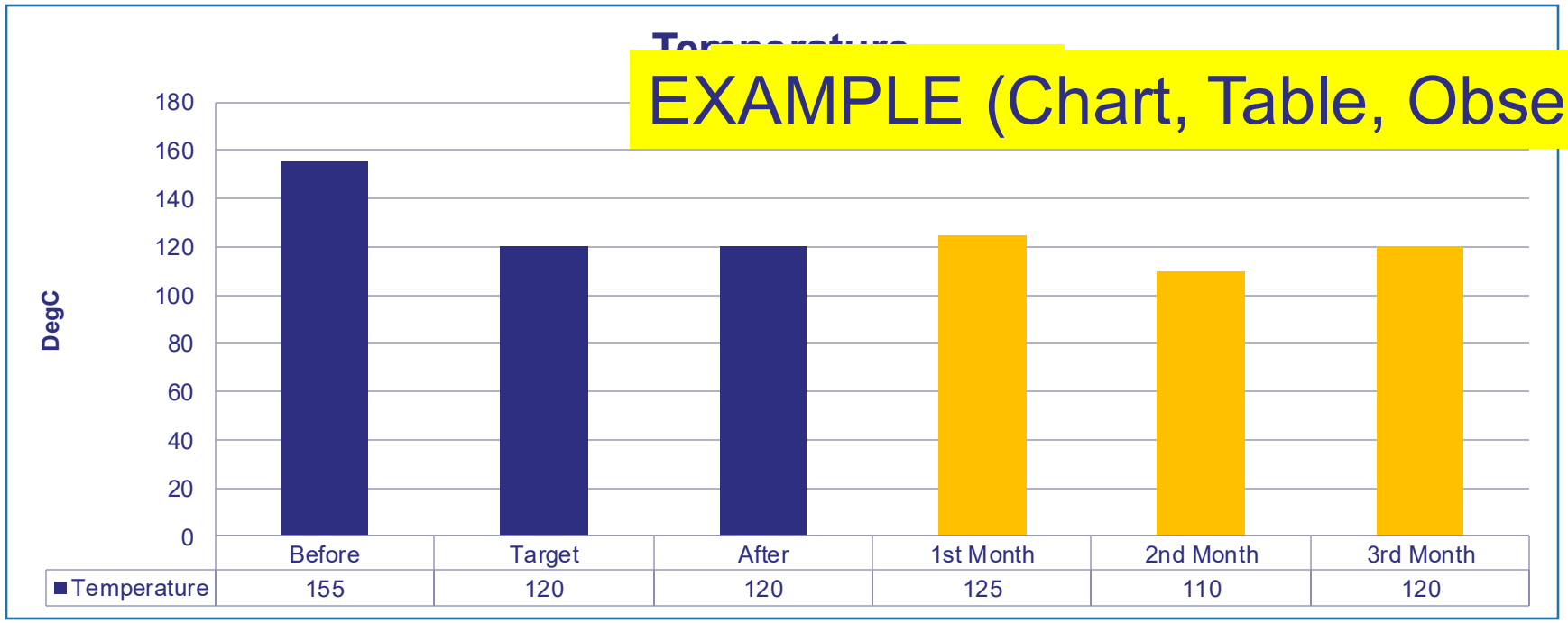
ESIC* MONITORING (REVIEWER)

*ESIC: Effectiveness and Sustainability Improvement Checking

ESIC MONITORING-END RESULT

Verified Each NG Parameter - for continual event min 3 Month
- for not continual event min 1x next cycle/ next event

Before Improvement (Problem Condition)	:	
Target Condition (Project Y)	:	
After Improvement		



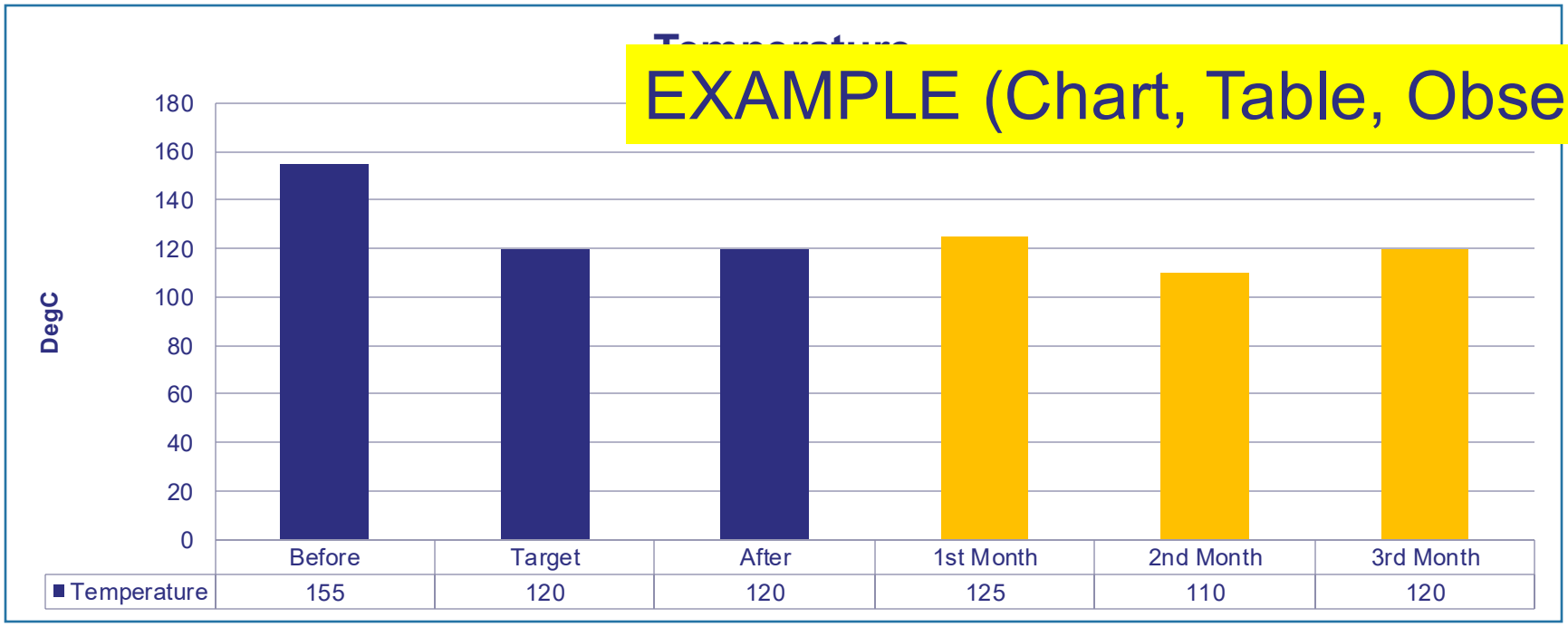
EXAMPLE (Chart, Table, Observation)

Executor RCA	Verifier
Name :	Name :.
Date :	*Date :*

ESIC MONITORING - PARAMETER 1

Verified Each NG Parameter - for continual event min 3 Month
- for not continual event min 1x next cycle/ next event

Parameter (Problem Condition)	:	
Parameter Standard	:	
After Improvement	:	



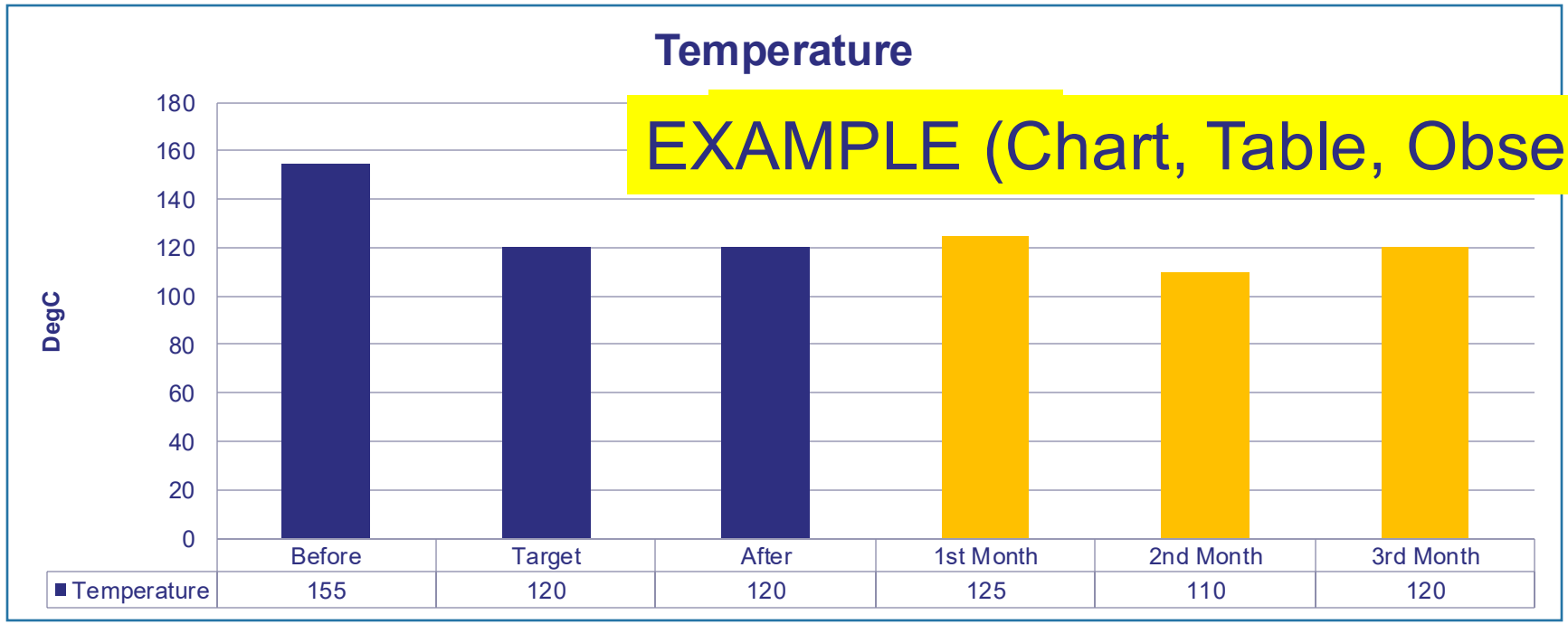
EXAMPLE (Chart, Table, Observation)

Executor RCA	Verifier
Name :	Name :.
Date :	*Date :*

ESIC MONITORING - PARAMETER 2

Verified Each NG Parameter - for continual event min 3 Month
- for not continual event min 1x next cycle/ next event

Parameter (Problem Condition)	:	
Parameter Standard	:	
Parameter (After Improvement Condition)	:	



EXAMPLE (Chart, Table, Observation)

Executor RCA	Verifier
Name :	Name :.
Date :	*Date :*

Chandra Asri

ISTAR
Live It

GUIDELINES

Guidelines

1. AR Numbering

AR Type-Code number DIVDEPTSEC-year-month-no.

Ex: MSA-A0111-2022-12-1

Number (No.) Should be accumulation in each month

Code number DIVDEPTSEC b*ased on* A0111-P0018-15 Att 4 - Organizational Code for Document Control Rev 15

1. AR Type

No	AR Type
1	Policy Management (PM)
2	Daily Management • Operation Problem Report (OPR) • Equipment Problem Report (EPR) • Non OPEDR • Turn Around Maintenance (TAM) • Performance Management (PMS) • Incident Investigation (II) • Customer Concern Report (CCR) • Process hazard Analysis (PHA) • Pre Start-up Safety Review (PSSR) • Countermeasure of Risk Assessment (CoRA)
3	Management System Audit (MSA)
4	Governance Risk Control Audit (GRCA)

Guidelines

3. Management System

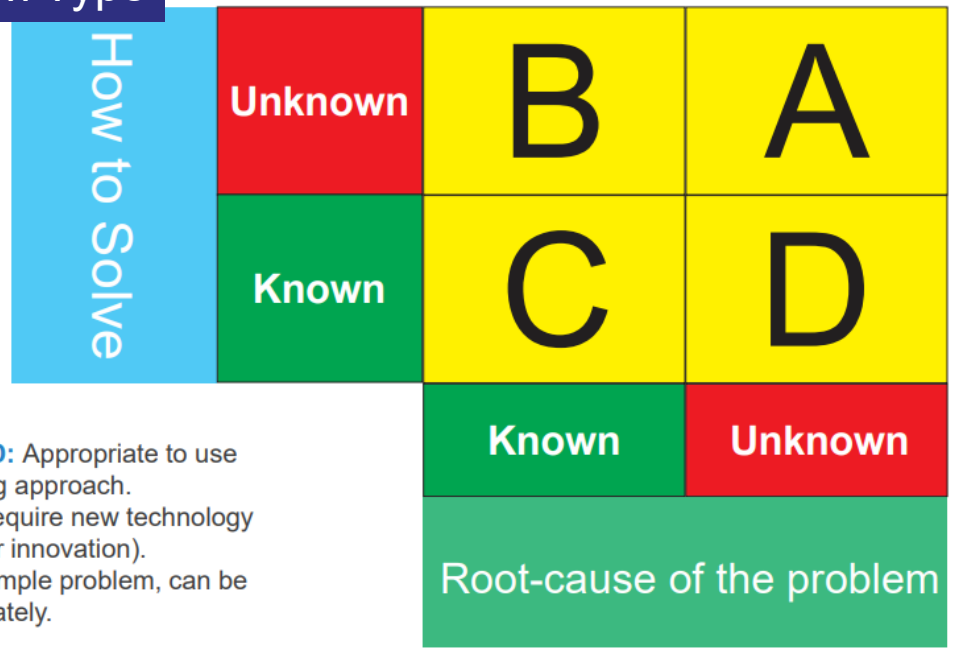
tania

Guidelines

3. RCA Complexity

Factor		Complexity Level & Handling RCA Period		
		Low (1 – 14 Days)	Medium (15 – 30 Days)	High (31 – 90 Days)
Urgent	Normal	V	V	V
	Urgent	V	V	
	Emergency	V	V	
Team Involvement	Developing by Internally	V		
	Developing by within two or more Dept.		V	
	Developing by within two or more Dept. and required vendor			V
Availability Data	Available in online	V		
	Available in manual		V	
	Not available due to limited tool			V

4. Problem Type



- **Problem A & D:** Appropriate to use problem solving approach.
- **Problem B:** Require new technology (appropriate for innovation).
- **Problem C:** Simple problem, can be solved immediately.

Type A & D need to analyse the root cause;
Type B & C no need analyse the root cause
(ignore "ROOT CAUSE ANALYSIS" section)

Guidelines

5. Severity Level

Severity Level	People (Health & Safety)	Assets/ Property Damage (USD)	Environment (definition see next slide)
Slight	• FAA - Non recordable • Single/multiple over exposure causing noticeable irritation but no actual health effects	< 2.5K	Tier 3
Minor	• MTA – Recordable • single/multiple health effects from common source/effect	2.5 - 25K	Tier 2
Moderate	• LTA • Permanent partial disability • Several non-permanent injuries of health impacts	25 - 100K	Tier 1
Major	• Single fatalities (1 fatality) • ≥ 10 health effects either permanent or requiring hospital more than 24 hours	100K - 10M	Tier 1
Catastrophic	• Multiple fatalities (> 1 fatalities) • ≥ 30 health effects either permanent or requiring hospital more than 24 hours	> 10M	Tier 1

Guidelines

6. Severity Level (cont.)

Tier Environment	*Definitions of Environment: (include Reputation)
Slight (Tier 3)	No significant environmental impact
Minor (Tier 2)	Some damage: Discharges to air, land and/or water that impact only on-site areas and only have very short-term (i.e. day or less) impacts on plants, wildlife, soil, or water. Only limited on-site remediation efforts required.
Moderate (Tier 2)	Some damage with media coverage: Discharges to air, land and/or water that impact only on-site areas and only have very short-term (i.e. day or less) impacts on plants, wildlife, soil, or water. Only limited on-site remediation efforts required. Exceedance of site environmental permit limit and/or result in release of a reportable quantity of chemical, but not enough to cause effects warranting a higher consequences category classification. Local media/news reporter participate in this events.
Major (Tier 1)	Significant damage with media coverage: Discharges to air, land and/or water that impact only on-site areas and some off-site areas that are not deemed environmentally sensitive and have short-term (2-7 days) impacts on plants, wildlife, soil, or water. Moderate remediation efforts required
Catastrophic (Tier 1)	Severe environmental damage: Discharges to air, land and/or water having moderate to long-term (i.e. 1 to 6 months) impacts on plants, wildlife, soil, or water on the large areas; or shorter term (i.e. less than a month) on environmentally sensitive areas. Includes shorter duration events having severe community impact (e.g) adverse impact on local drinking water supply or other essential services. Effects reversible in long-term. Extensive on-site or offsite remediation efforts required.

Guidelines

6. Severity Level (cont.)

Example of severity level definition.

Problem Definition: any fire in Ethylene pipe during sampling activity.
Fact: (1)People >> no causalities >> Slight
(2)Asset >> 10.000 USD >> Minor
(3)Environment >> no spill >> Slight
Refer to Severity Level (page 35)

Severity Level of Problem >> Minor (choose the highest level of 3 categories)

Guidelines

7. AR Duration based on Severity Level

			Problem occurred**	Initiator	Executor (RCA)	Review	Approve	Follow up CAPA	Verification
Std. Duration	Slight	Low Complexity (RCA up to 14 Days)	D 0	D + 7	D + 21	D + 28	D + 35	N*	D + N* + 42
		Medium Complexity (RCA up to 30 Days)	D 0	D + 7	D + 37	D + 44	D + 51	N*	D + N* + 58
		High Complexity (RCA up to 90 Days)	D 0	D + 7	D + 97	D + 104	D + 111	N*	D + N* + 118
	Minor		D 0 7days	D + 7 21days	D + 28 3days	D + 31 4days	D + 35	N*	D + N* + 42
	Moderate		D 0 7days	D + 7 14days	D + 21 3days	D + 24 4days	D + 28	N*	D + N* + 35
	Major		D 0 5days	D + 5 10days	D + 15 3days	D + 18 3days	D + 21	N*	D + N* + 28
	Catastrophic		D 0 3days	D + 3 7days	D + 10 2days	D + 12 2days	D + 14	N*	D + N* + 21

*) Execution time for CA/PA are different by considering availability of spare parts, procurement, schedule, etc.
**) Interval time between Problem Occurred (D0) and Initiator (D+7) used for escalation problem within 1x24 hour, execute immediate action, and determine Executor that will be develop RCA.

Guidelines

8. Matrix of Severity Verification

	Severity Verificator	Assignor (RCA Executor's Superior)
Slight	SM	SM
Minor	SM	SM
Moderate	DM	DM
Major	DM	GM
Catastrophic	DM	Related BOD

9. Matrix of RCA CA/PA Approval

Issuance (Initiator)	Analysis (Executor)	Confirmation (Reviewer)	CSO Acknowledge	Approval (Approver)	Ver (V
Daily Management (OPEDR type)					
Engineer/ Sr. Eng/ SI	OPR Justification:				
	Operation/ PI Eng./ Sr. Eng./ SI	Operations DM	CSO1 SM	Operation	
	Operation/ PI SM	Operations DM	CSO1 SM	Operation	
	Operation DM	Operation GM	CSO DM	Direct BO	
	Operation GM		CSO DM	Direct BO	
	EPR Justification:				
	MTN/TEC Eng./ Sr. Eng/ SI	MTN/TEC DM	CSO1 SM	1. Operatio 2. MTN/TEC	
	MTN/ TEC SM	MTN/ TEC DM	CSO1 SM	1. Operatio 2. MTN/TEC	
	MTN/ TEC DM	MTN/ TEC GM	CSO DM	1. MFG B 2. MTN/ TEC	
	MTN/ TEC GM		CSO DM	1. MFG B 2. MTN/ TEC	
Daily Management (Non-OPEDR type)					
Operator/ Technician/ Lab. Analyst/ SV	Operator/ Technician/ Analyst/ SV	SI / Sr. Eng / Sr. Officer	CSO1 SM	SM	
Officer/ Analyst/ Eng./ Chemist/ Sr. Eng./ Sr. Chemist/ / Sr. Officer/ SI	Officer/ Analyst/ Eng./ Chemist/ Sr. Eng./ Sr. Chemist/ Sr. Officer/ SI	SM	CSO1 SM	DM	
	SM	DM	CSO1 SM	GM	
	DM	GM	CSO DM	Direct Dire	

Guidelines

10. Definition of PSE, Non-PSE, Nearmiss, High Potential Nearmiss

Process Safety Event (PSE) is an unplanned or uncontrolled release of any material including non-toxic and non-flammable materials (e.g. steam, hot water, nitrogen, compressed CO2 or compressed air) from a process, or an undesired event or condition that, under slightly different circumstances, could have resulted in a release of material.

Non-Process Safety Event (Non-PSE) is an event that not meet or fall outside the scope (see API RP 754 PSE Applicability Exclusions in attachment 14) of Process Safety Event (PSE) criteria.

Nearmiss is any unplanned event, or unplanned series of events where No injury, No Loss of Primary Containment (LOPC), No Fire or explosion occurs, but has the potential worst-case scenario might happen

High Potential Nearmiss which has potential severity level Tier 1 & 2 in Incident Classification table in Attachment 9., while for potential severity level Tier 3 only recorded on Incident Investigation Log. (refer to API 754)