ISSUEANCE (INITIATOR)

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

Abnormality Report

AR Number	:	OPR-F2222-2023-07-1
Title	:	UCC1 Rate down from 25.5 to 22 TPH due to Sheeting at PDS#1 and OG High FI after return PDS#1 to service of 99.75 T
Recurrence case from AR No.	:	
Date Occurrence	:	July 03rd, 2023
Date Reported	:	July 04th, 2023
Immediate Action	:	Take out of service PDS#1, rate down from 25.5 to 22 TPH, remove sheeting

AR Type	EPR	OPR	EXT	Non-OPEDR	TAM	PMS	II	CCR	CoRA	PM		MSA				
		X								No. AP: 001	No. TL: 4	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				X			

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

Severity	Slight	Minor	Moderate	Major	Catastrophic
		X			

People	Assets/Property Damage (USD)	Environment	Loss (KUSD)
			4.09

***MSA Severity	OFI	Minor	Major	Critical

**RCA Complexity	Low	Medium	High
			X

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: Nur Fatchuri
Date : Jul 12, 2023	Date: Jul 12, 2023

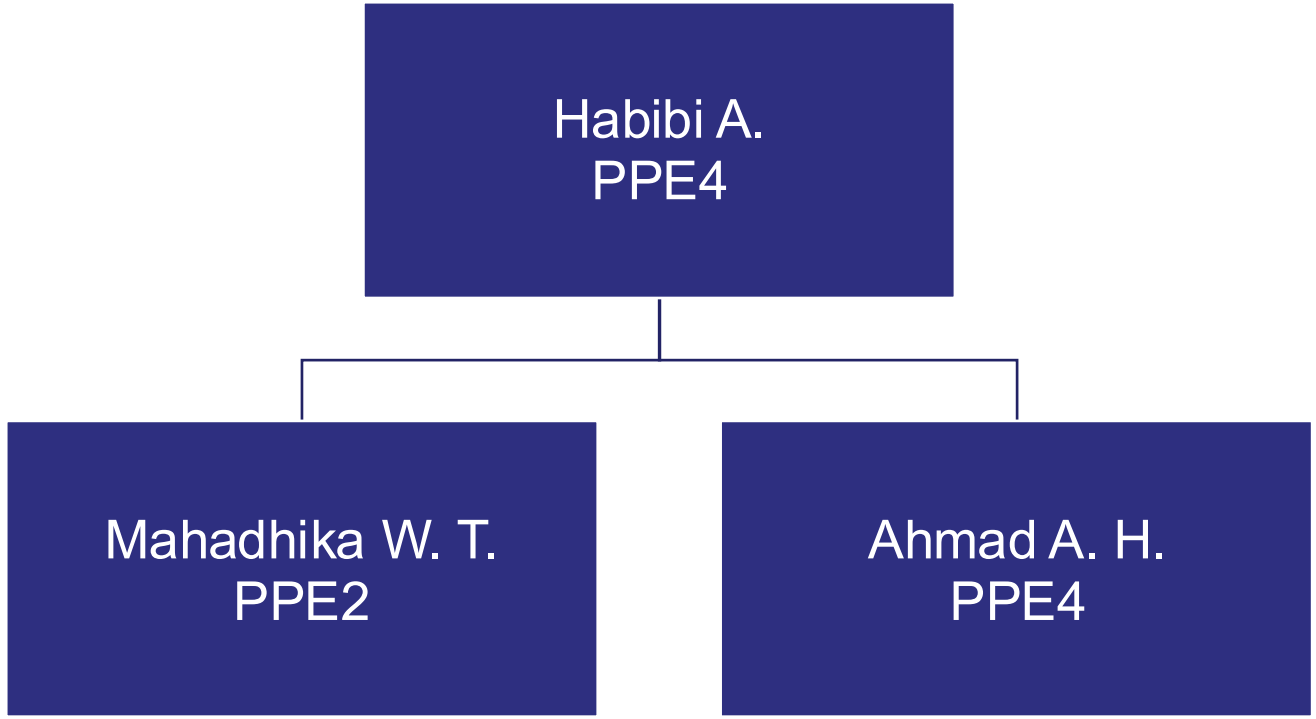
Problem Identification

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

Reviewer	Approver
Name: Joko Pramono/ Nur Fatchuri	Name: Mahyudanil B.

Verifier
Name: Hamim T.

RCA Executor Team



Problem Identification

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

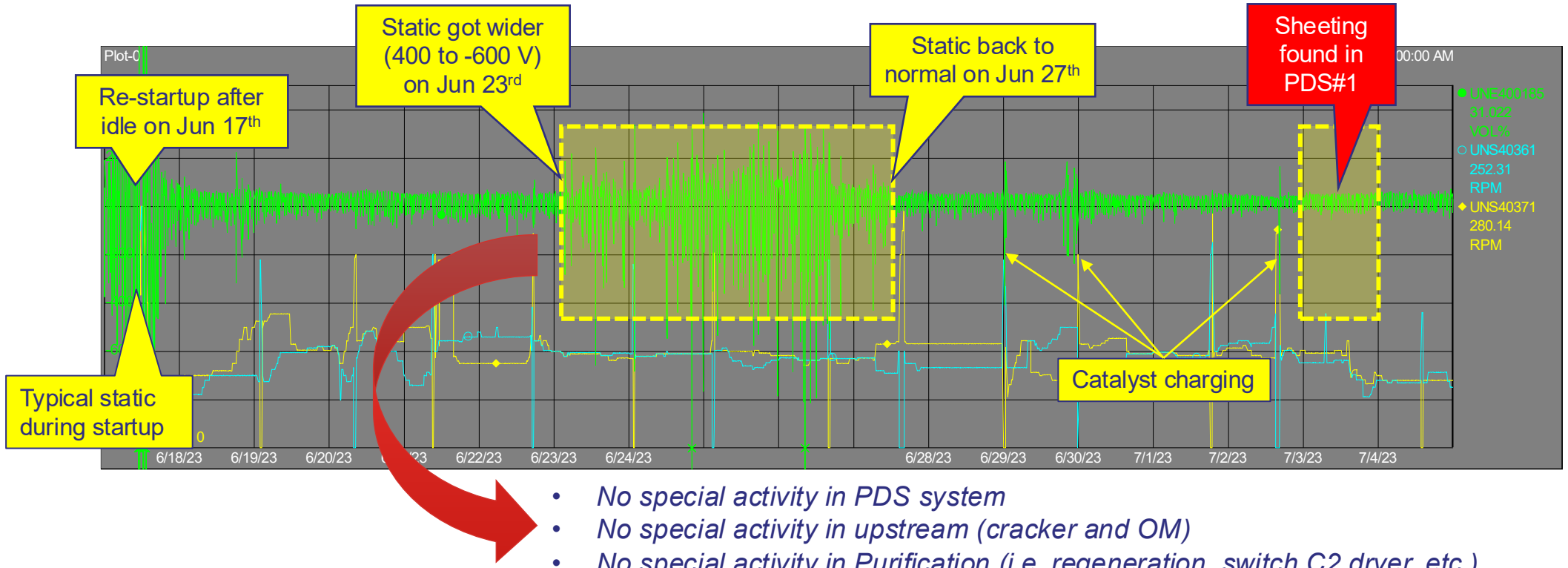
- **June 17th, 2023**
  - 10:40 Catalyst IN after Reactor idle with bed intact
- **June 20th, 2023**
  - 01:47 Valve KV-4106-1F close error (actuator problem) → make clear. Running with PDS#1 in AUTO mode.
  - 02:49 Reactor bed level started increase up to 16.5 m
  - 02:53 PDS#2 out of service due to KV-4106-1F hard moving & cannot full close, manual valve K valve PDS#2 is closed
  - 03:00 Rate down due to use one PDS
  - 03:10 Take out actuator for ball valve tighten check
  - 08:16 Replace SOV of KV-4106-1F, take out spring, replace with double acting
- **July 3rd, 2023**
  - 00:25 Make clear KV-4101-1F due to close error
  - 08:48 Make clear KV-4101-1F → repositioning proximity
  - 12:00 KV-4101-1F failed to close → check actuator by instrument
  - 14:00 **KV-4101-1D failed to close** → reposition proximity sensor.
  - 14:30 Close M/V A & G of PDS#1. Continue HC free PC and PBT of PDS#1. Rate down gradually to 22 TPH
  - 23:00 Continue cleaning PC and PBT. **Found sheeting stuck at KV-4101-1D valve.**
- **July 4th, 2023**
  - 00:05 Take out actuator KV-4101-1B
  - 00:52 Take out ball valve KV-4101-1B
  - 01:40 Drain resin from PC of PDS#1
  - 03:00 Take out ball valve KV-4101-1E

Sheeting found

Problem Identification

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

Two weeks before the case…



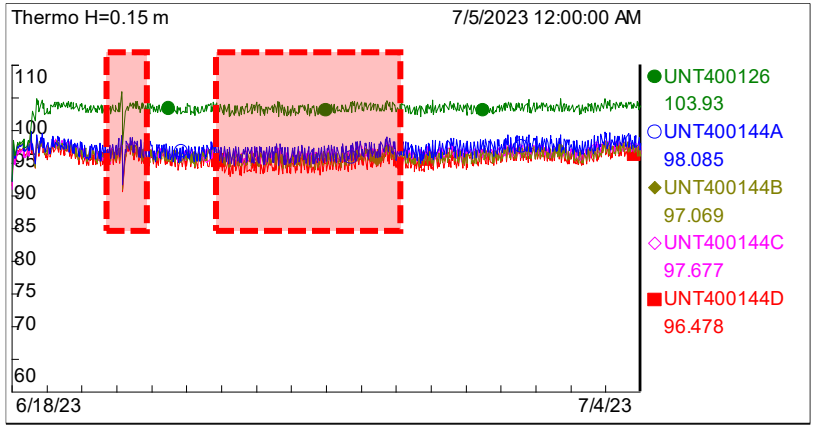
Why static immediately wider?

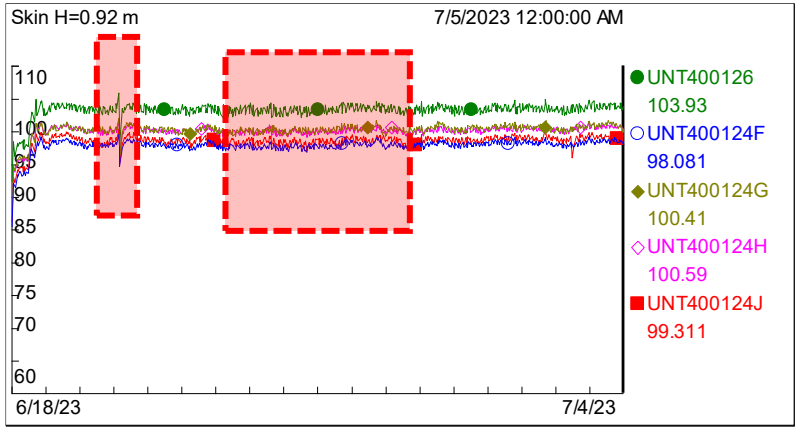
- *No special activity in PDS system*
- *No special activity in upstream (cracker and OM)*
- *No special activity in Purification (i.e. regeneration, switch C2 dryer, etc.)*
- *All raw materials in good condition (moisture, O_2 and other impurities are on spec)*
- *No catalyst feeder problems*
- *Reactor parameters are good and stable*

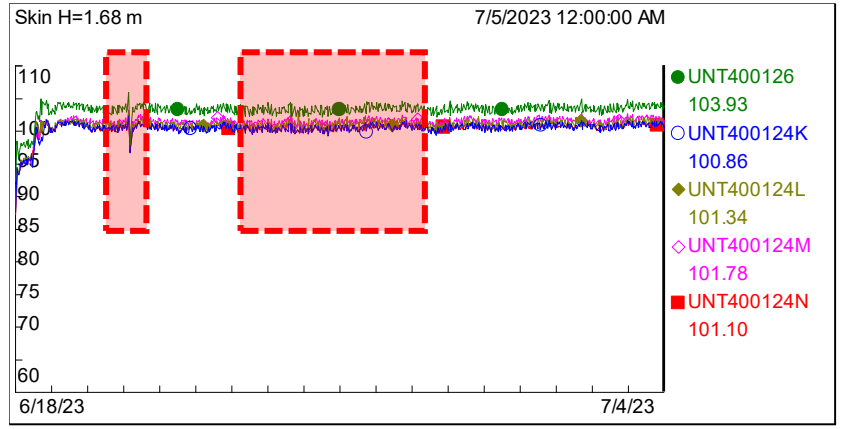
Problem Identification

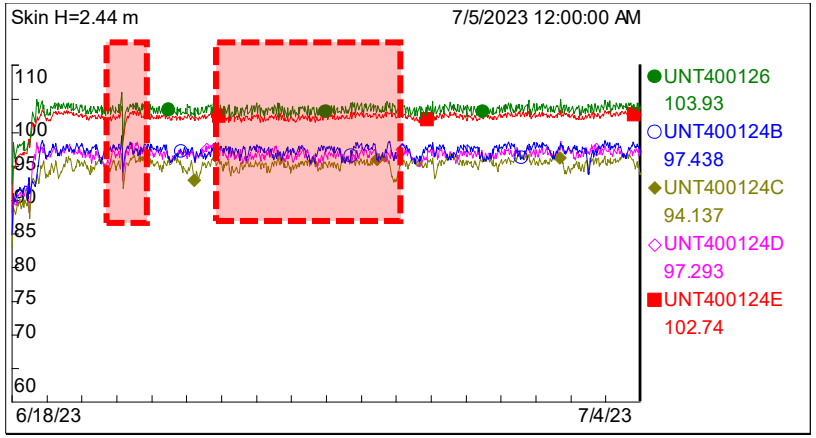
Detailed Observation (Chronology, Process Flow Diagram, Drawing, Other Evidence)

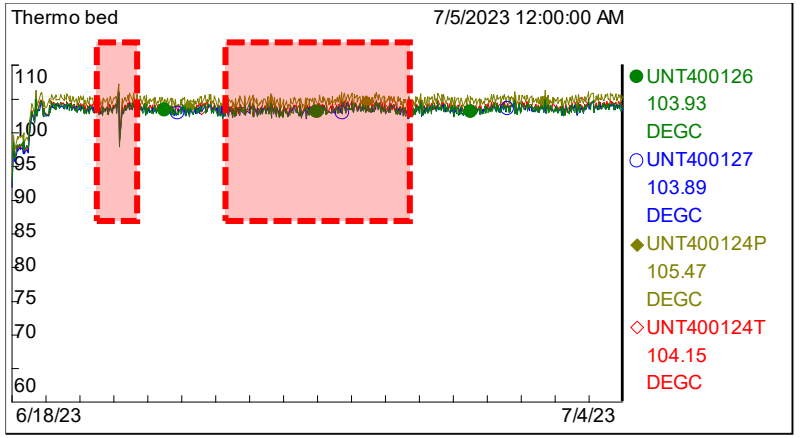
Reactor skin temperatures…

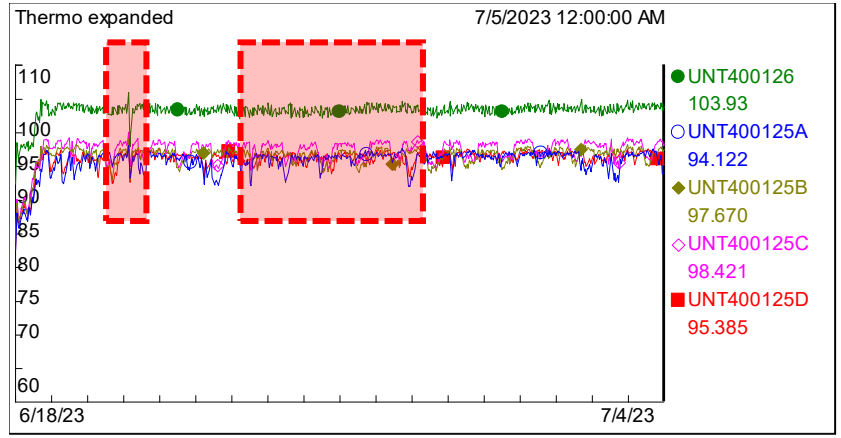












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PDS trend on July 03rd, 2023

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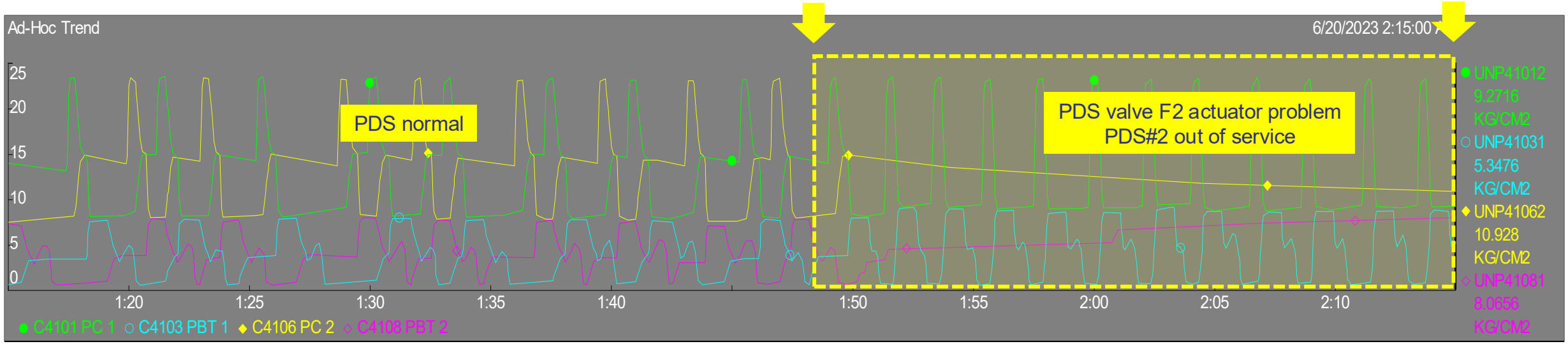

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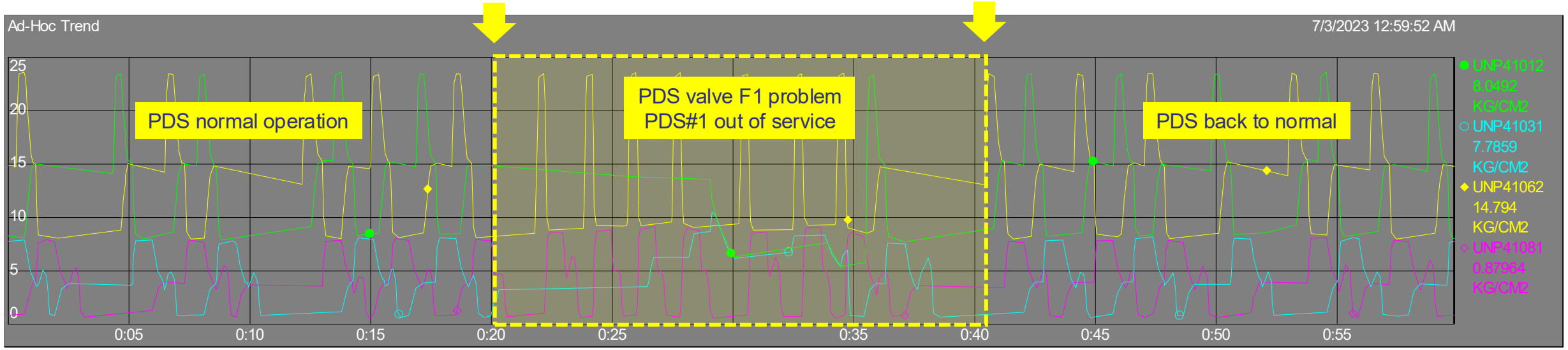

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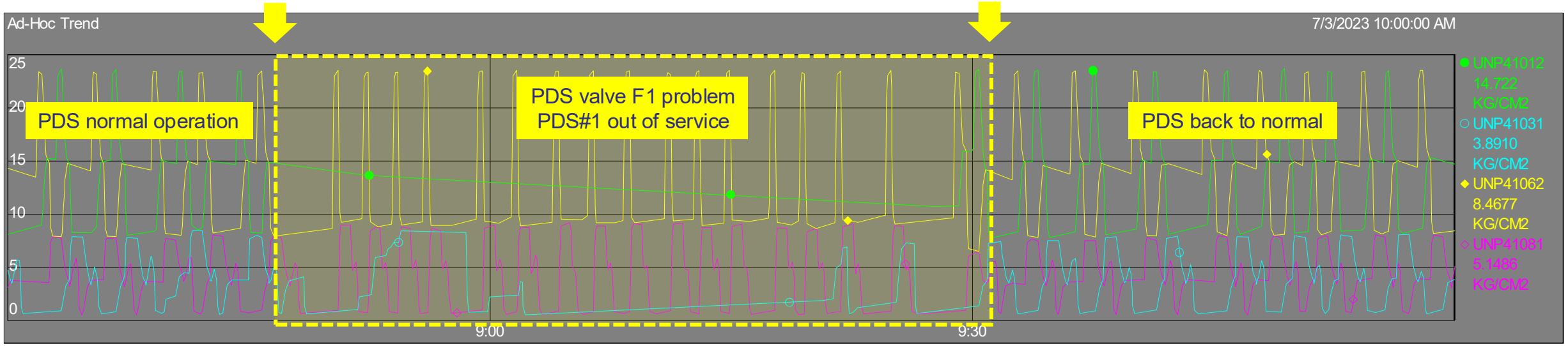

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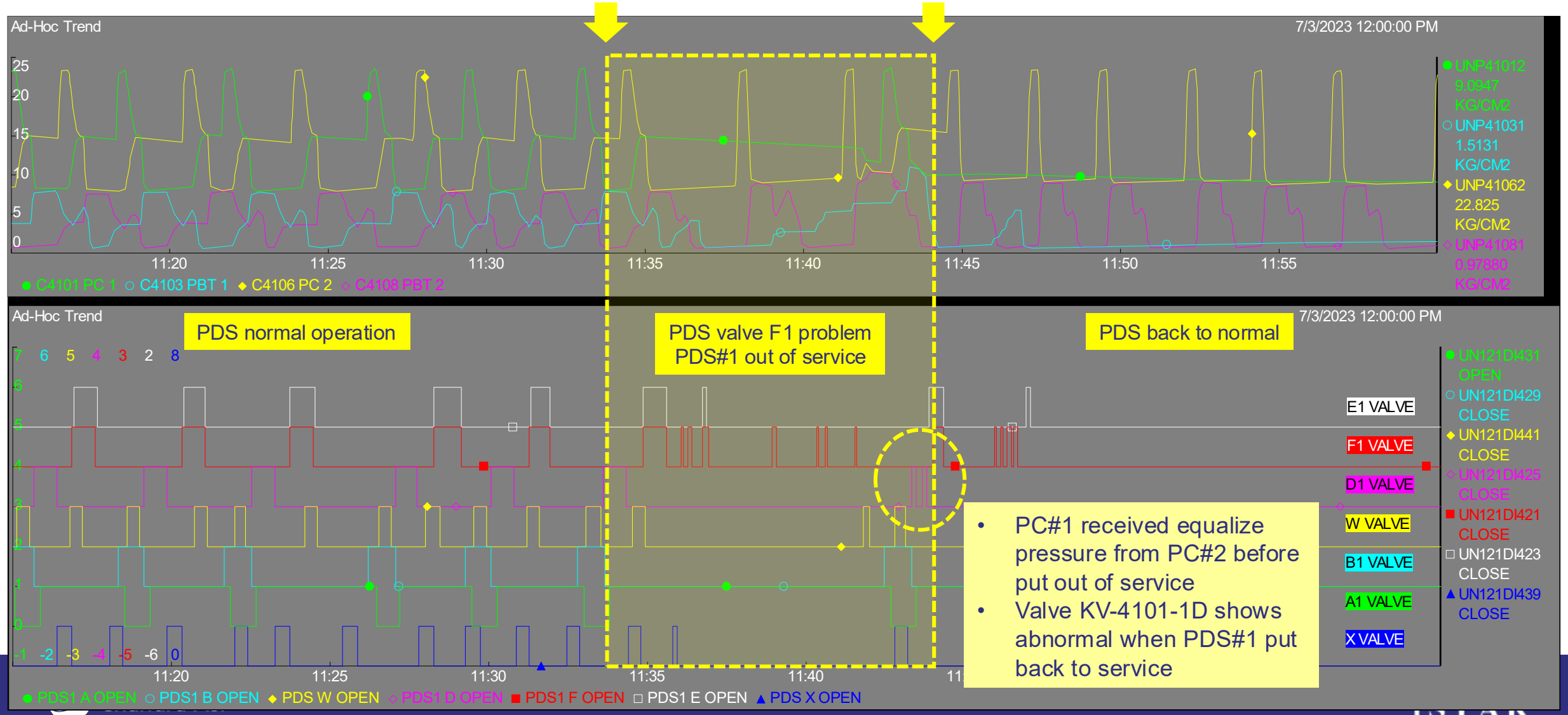
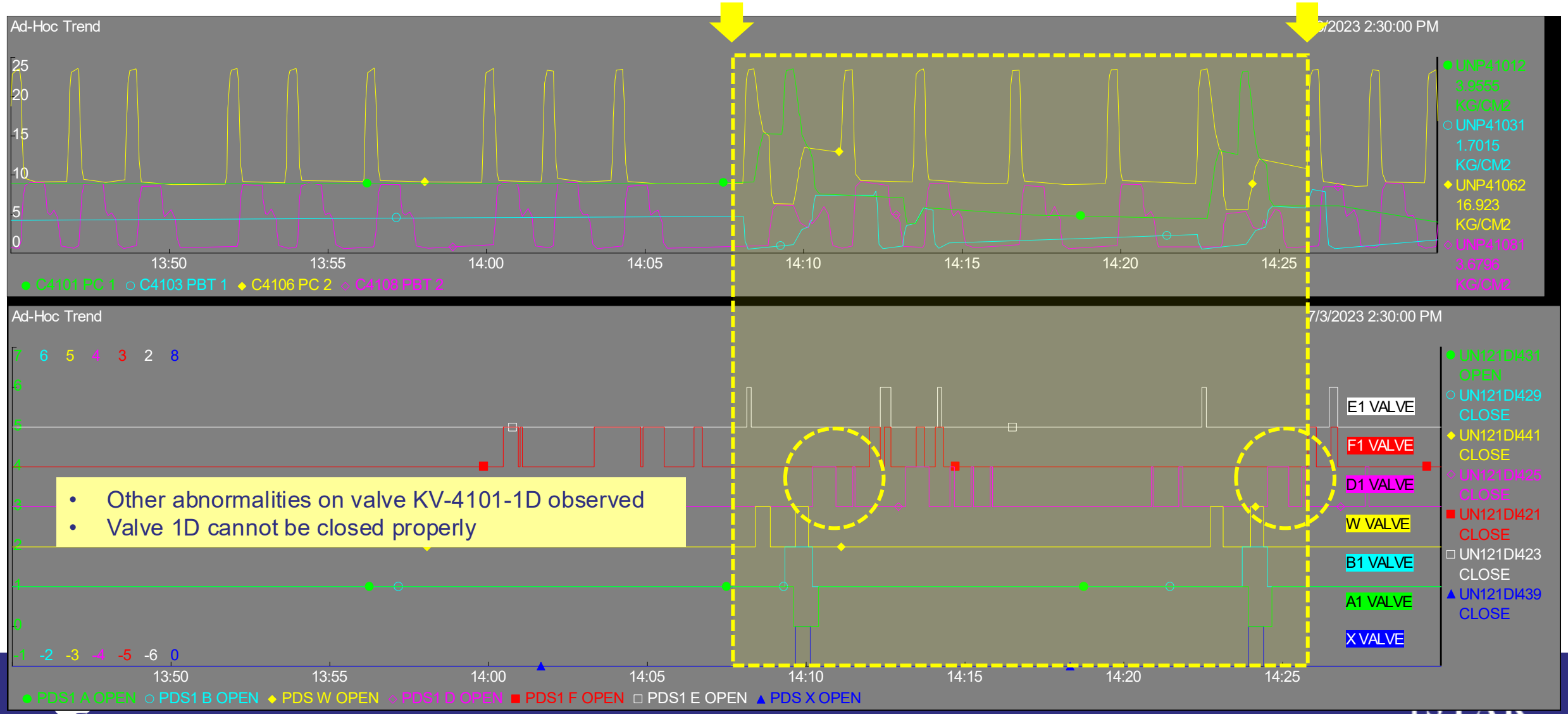


- PC#1 received equalize pressure from PC#2 before put out of service
- Valve KV-4101-1D shows abnormal when PDS#1 put back to service

Problem Identification

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

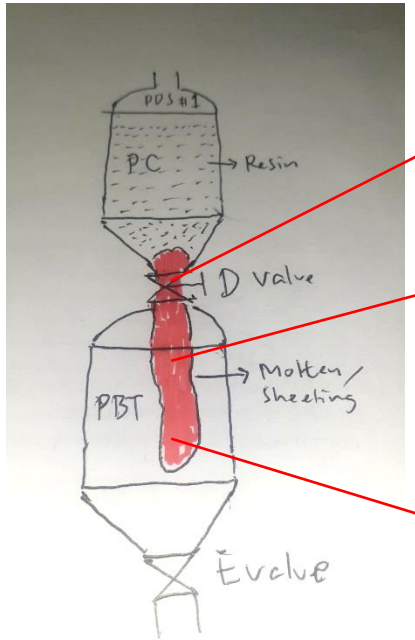


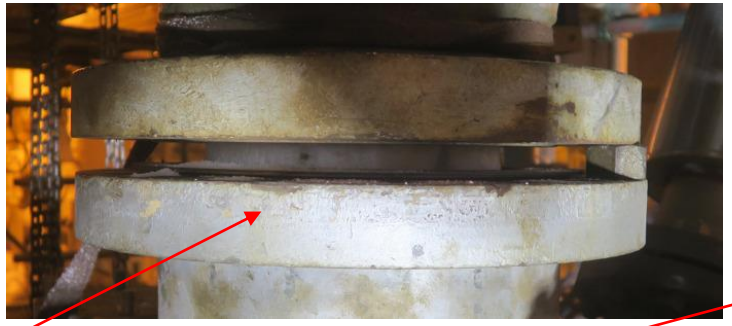
- Other abnormalities on valve KV-4101-1D observed
- Valve 1D cannot be closed properly

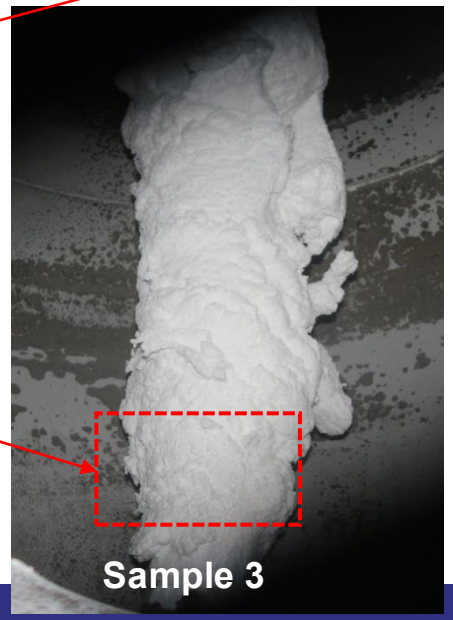
Problem Identification

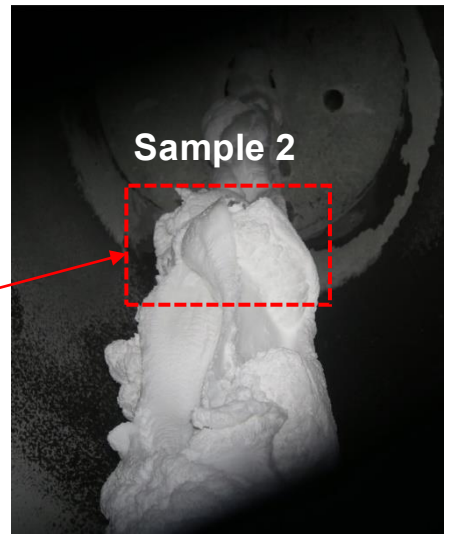
Detailed Observation (Chronology, Process Flow Diagram, Drawing, Other Evidence)

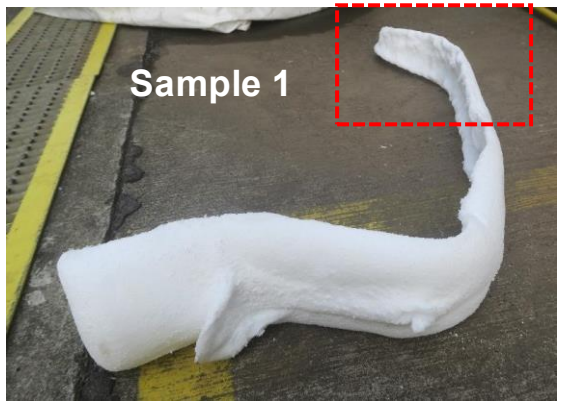
Sheeting at Product Chamber and Product Blow Tank











No	Analysis Item	Unit	Result		
			Sheeting 1	Sheeting 2	Sheeting 3
1	HLMI	gr/10 min	12.69	9.23	11.11
2	Density	gr/cm3	0.9488	0.9465	0.9433
6	Catalyst Residu				
	Ti	ppm	0	0	0
	Al	ppm	0	0	0
	Cr	ppm	0.11	0.17	0.25

Assess

Past Performance Analysis (Data Historical, NC Evidence)

Previous cases in PDS (2014-YTD 2023)

Month	Grade	Description	Location	Photo	Remark/Additional Information
November 2014	S2	PDS#1 valves (A & E) stuck & line plugging due to sheeting	KV-4101-1A/1E, PDS line & reducer		Sheeting generated from Reactor, transition to S2
February 2015	M1 Film	PDS#2 valve E stuck & PDS line plugging due to sheeting	KV-4106-1E, PDS line & reducer		Sheeting from Reactor, before the incident, there was H2 loss and power failure (type 3 and 2 kill), catalyst tube plugged after re-startup, Rx die off, re-CATA IN several times, P/H plugged
		Chunk at Product Chamber C-4106	C-4106		Chunk formed due to failed transfer resin from PC when PDS line plugging
June 2015	S2	PDS#1 valve A failure due to sheeting	KV-4103-1A		Sheeting generated from Reactor, transition to S2
September 2016	M1 Inj.	PDS line plugging due to sheeting	PDS line & reducer		Sheeting from Reactor, found HE in VRS leaked
Feb 2023	S2	PDS purge line plugging	PDS purge line to C and G from disch. K-4003		Resin accumulation from several previous startups

Assess

Past Performance Analysis (Data Historical, NC Evidence)

Theoretical Review

Expanded Section Sheeting

Generally caused by improper bed level / inadequate scrubbing

- Bed Level Too Low
  - Expanded section not adequately scrubbed allowing reacting particles to remain on the surfaces without sufficient cooling
- Bed Level Too High
  - Bed is in expanded section with reduced velocity and limited heat transfer

Sheets are thicker & larger than static-induced sheets & not "oriented"

Sheets or slabs can suddenly and unexpectedly fall to the distributor plate causing;

- Damaged & bent thermowells and support tubes;
- Blocked PDS ports; and
- Loss of fluidization at the distributor plate resulting in agglomerate formation

Example of expanded section sheeting (UT, 2019)

Assess

Past Performance Analysis (Data Historical, NC Evidence)

Theoretical Review

Induced Sheeting/Agglomerate Formation

Sheets and/or Agglomerate Formation due to:

- Mal-distribution of Catalyst
  - **Dry Catalyst feeder "Force feeding"** is one of the most common causes
    - » If suspected immediately take feeder out of service and repair
    - » Catalyst can be carried into the expanded section
- Poor reaction variable control
  - C2PP, Reactor Temperature, Cx/C2, H2/C2, O2
- Plate Fouling
  - Excess carryover, low condensing levels
- Improper Cycle Gas Flow
  - Fluidization pattern dead spots (e.g. partially plugged plate, earlier sheet/rubble formation, etc.)
- Improperly executed transitions
  - Temp or Cx/C2 too high, sticking temperatures
  - Very low MI, static generation

Poisons & Impurities can also affect Continuity by:

- Loss of Catalyst Productivity
  - Higher Level of Small Particles (Fines)
- Altering of Product Properties
- Introduction of Static Agents to Reactor
  - Build-up of static-producing agents in the cycle
- Corruption of the Wall Film

Loss of Control in other systems can lead to chunk in reactor

- Failure in kill system action

Assess

Past Performance Analysis (Data Historical, NC Evidence)

Theoretical Review

"Classical" Sheeting

Polyethylene is a ***dielectric material***

- It can hold a charge but doesn't conduct very well

Reactor Static Generation

- Particle to particle transfer
- Particle impingement on reaction cycle surfaces
- Reactions of TEAL with impurities

Reactor Static Dissipation

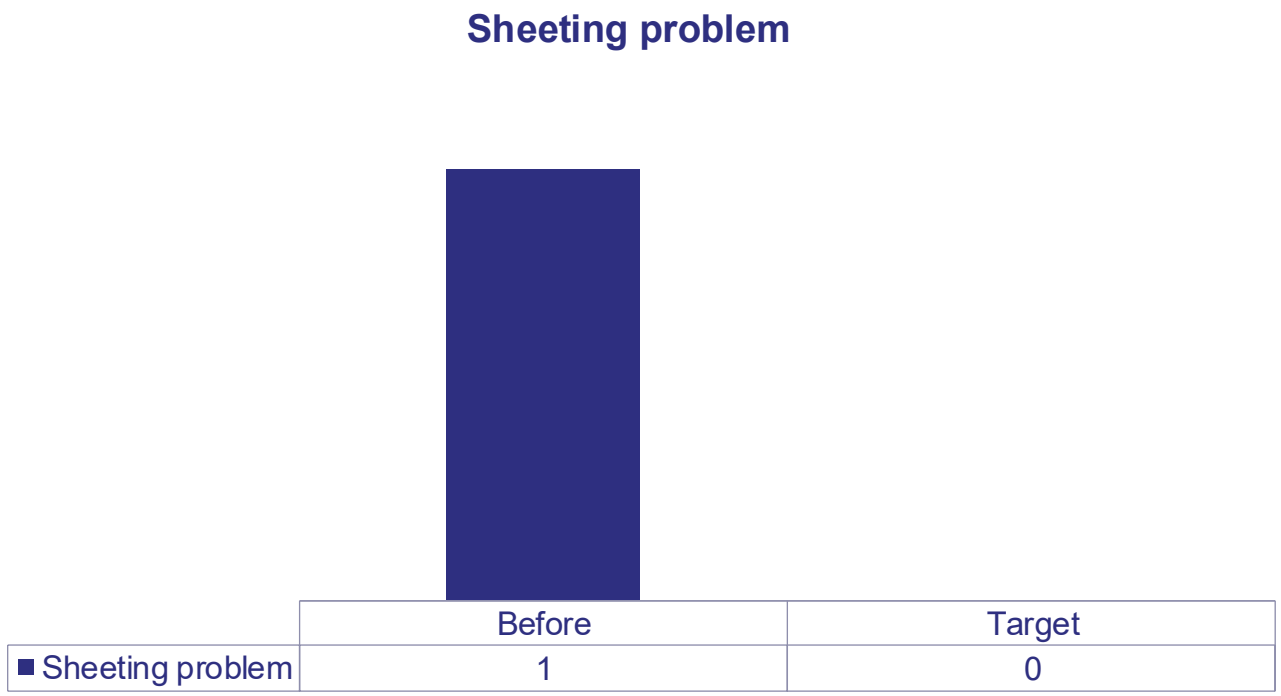
- Particle-to-particle transfer
- Particle impingement on reactor surfaces
- Reactions of TEAL with impurities (neutralization via *RSC system*)
- Removing charged resin via the PDS
- Particle / Liquid transfer (i.e., condensing mode)

"Classical" Sheeting Scenario

- **Limited heat transfer at wall causes rise in resin temperature to sticking or melting point**
- **Sheets slough off wall at some size determined by relative strengths of electric field & drag forces (fluidization)**
- **Other particles are attracted to wall & process repeats itself**
- **Sheet characteristics**
  - Warm sheets are stretched (oriented) by drag forces
  - Side of sheet facing the wall generally has a smoother surface than that facing the bed
  - Much thicker sheets (e.g., expanded-section) are typically not oriented because of their size
  - Rubble formation is not considered to be sheeting (e.g., may be plugged plate)

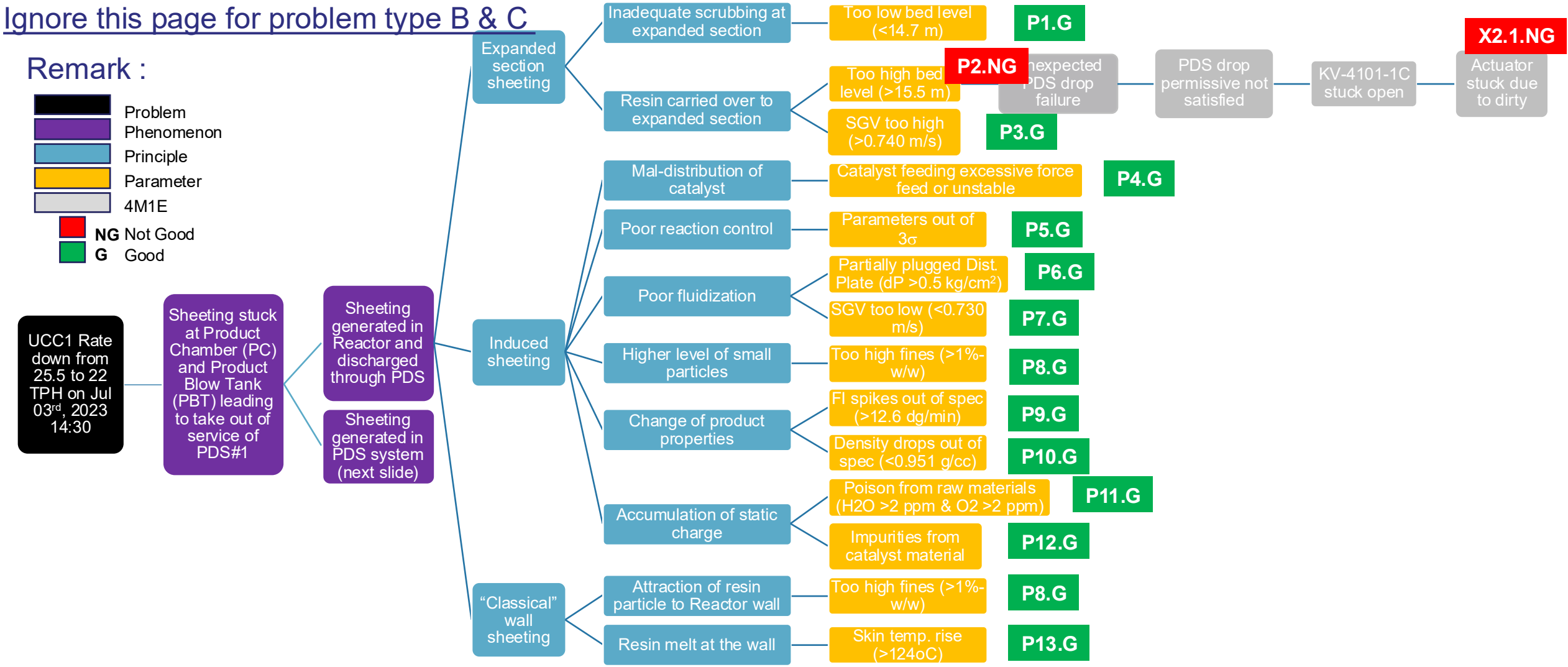
Target Setting

Actual Condition (Before Improvement)	:	**Rate loss by 3.5 T/H due to Sheeting at PDS#1**
Target Condition (Project Y)	:	No rate loss



Root Cause Analysis (RCA)

Ignore this page for problem type B & C

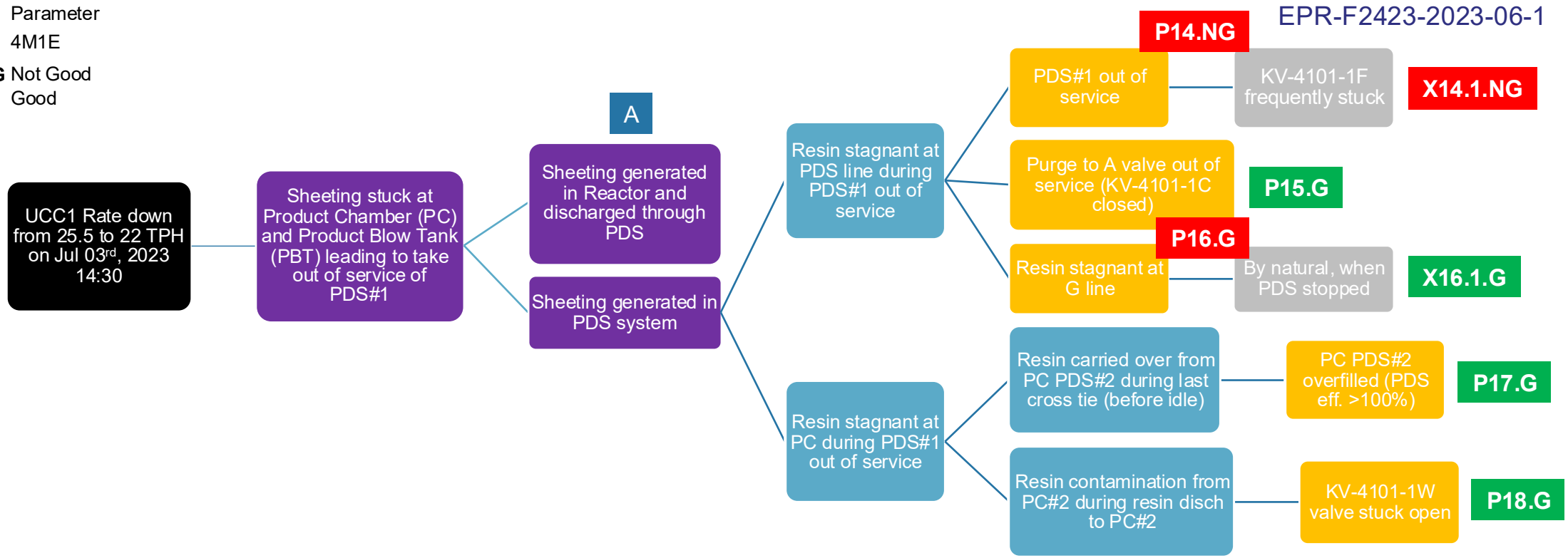


Root Cause Analysis (RCA)

Ignore this page for problem type B & C

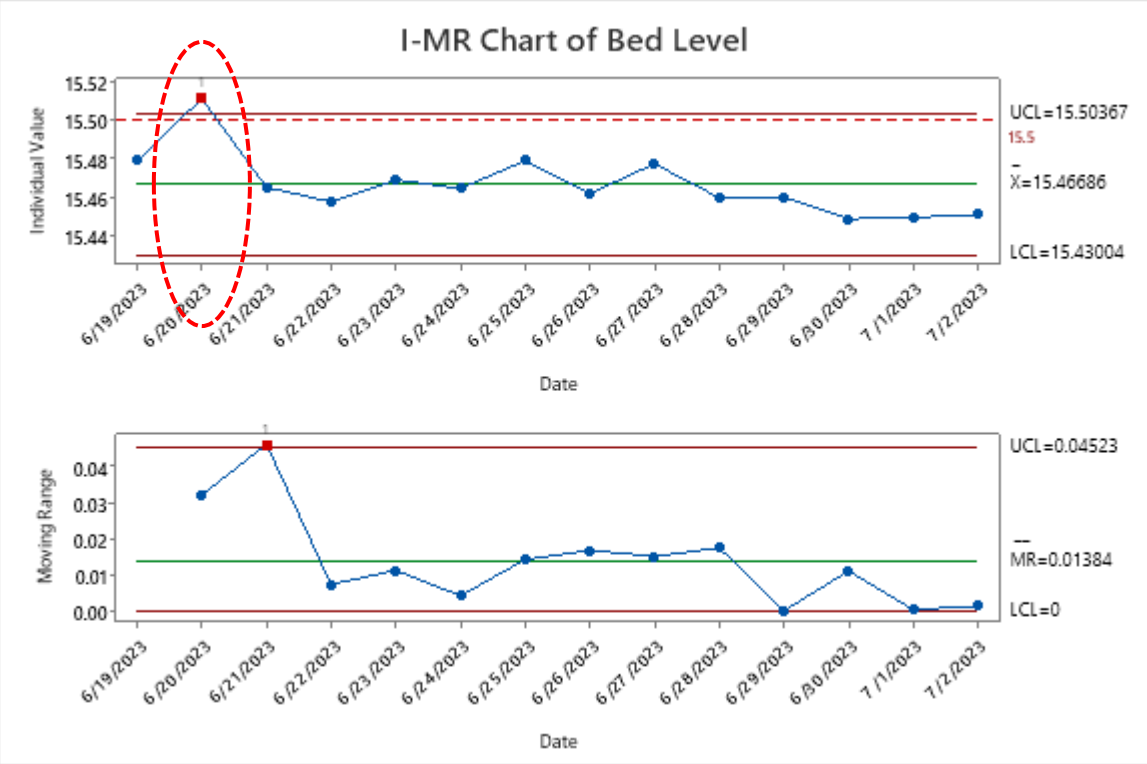
Remark :

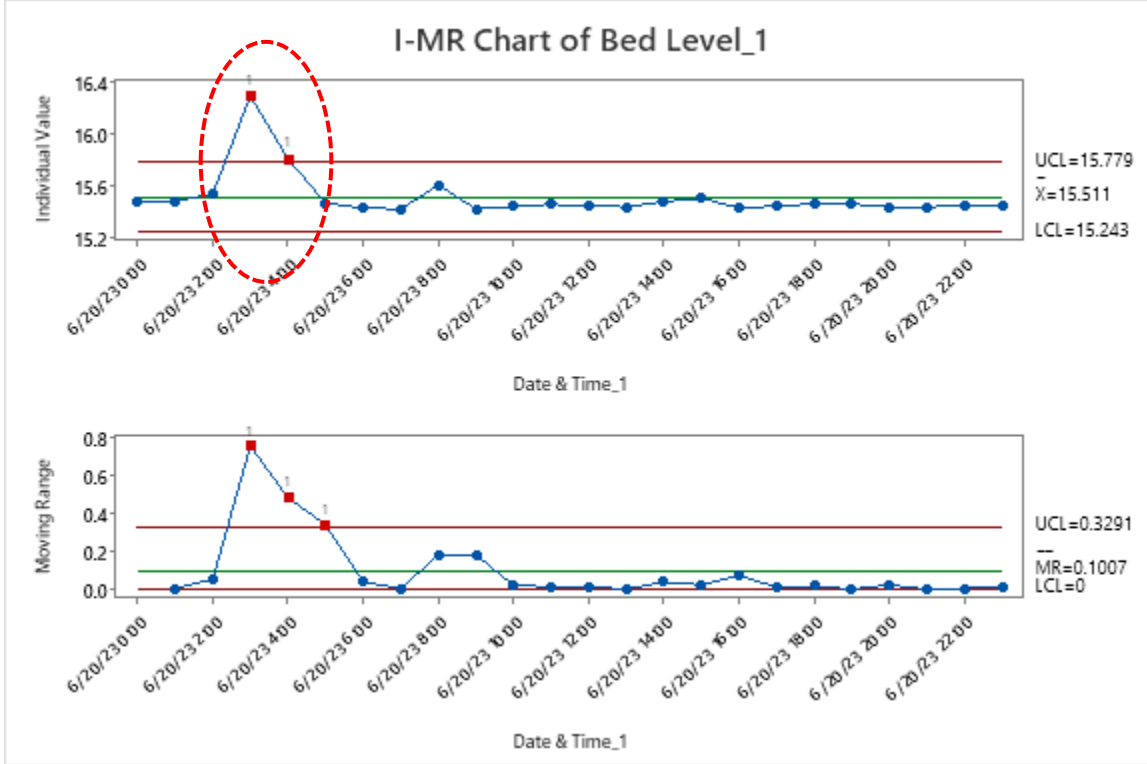
- Problem
- Phenomenon
- Principle
- Parameter
- 4M1E
- **NG** Not Good
- **G** Good



Root Cause Analysis (RCA) - Verification

P1: Too low bed level (<14.7 m) P1.G
P2: Too high bed level (>15.5 m) P2.NG

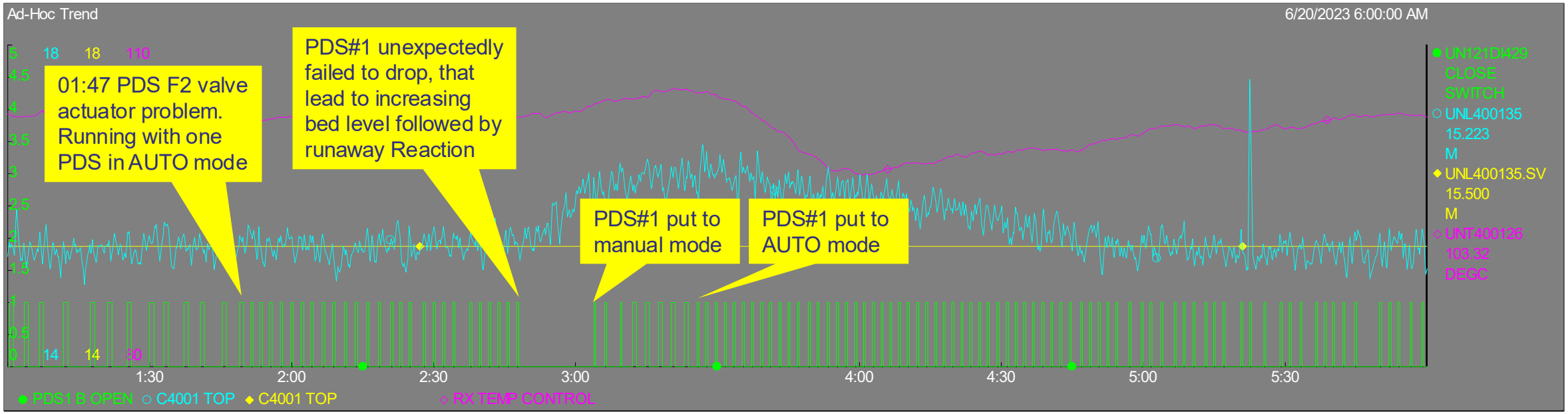




- Control chart shows a spike on bed level on June 20th at around 02:50-04:30 AM.

Root Cause Analysis (RCA) - Verification

P2: Too high bed level (>15.5 m) ← Unexpected PDS drop failure

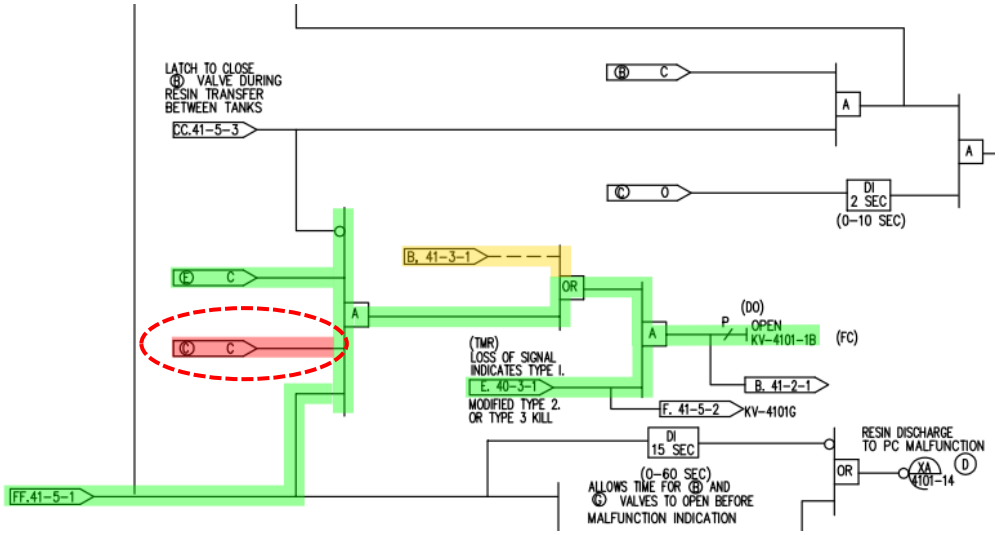


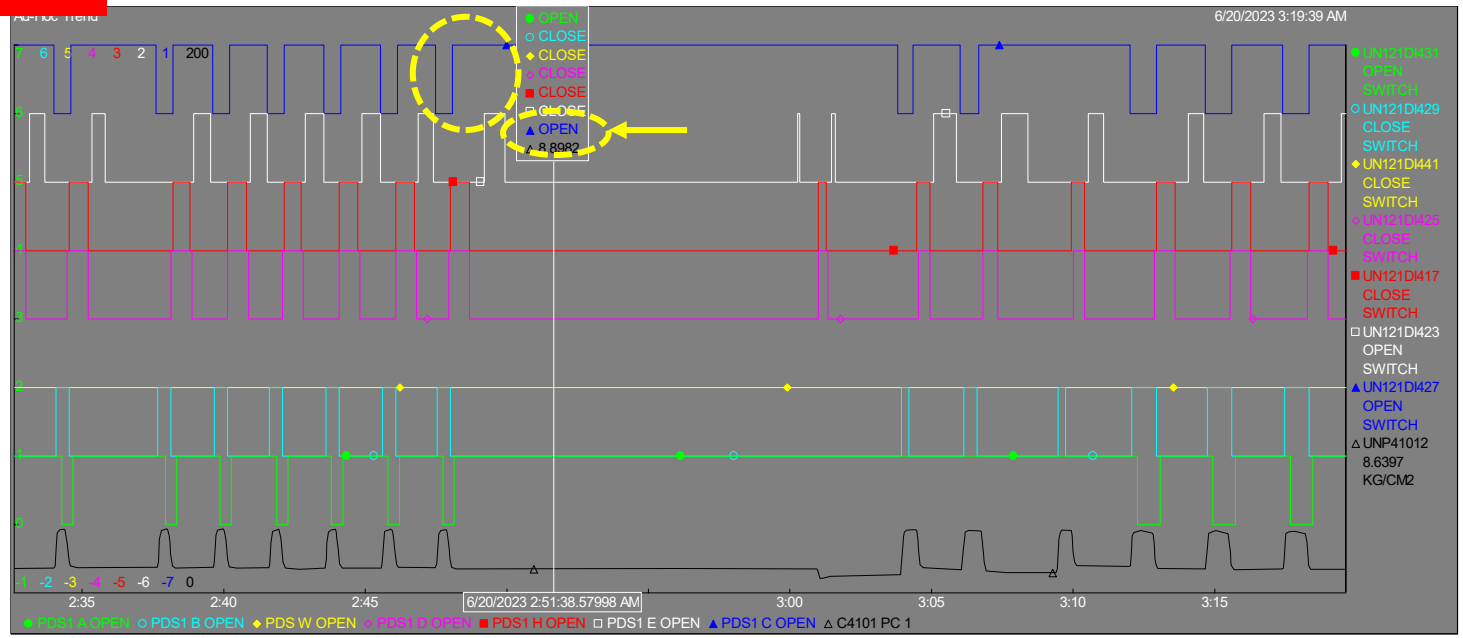
- PDS unexpectedly failed to drop on June 20th at 02:49 AM leading to increasing bed level to >15.5 m (up to 16.5 m)
  - At that time, PDS status is “READY”
  - OPR immediately take over PDS control, change from AUTO to MAN mode
  - PDS put in AUTO mode again after several times of manual discharges
- Too high bed level carried over some resin/fines to expanded section and make it stagnant there
- Stagnant resin at expanded section then suspected as origin of the sheeting
- Failed PDS drop also impact to “almost” runaway reaction due to unreleased heat from reaction

Root Cause Analysis (RCA) - Verification

P2: Too high bed level (>15.5 m) ← Unexpected PDS drop failure ← PDS drop permissive not satisfied ← Valve KV-4101-1C stuck open ← Actuator stuck due to dirty

X2.1. NG



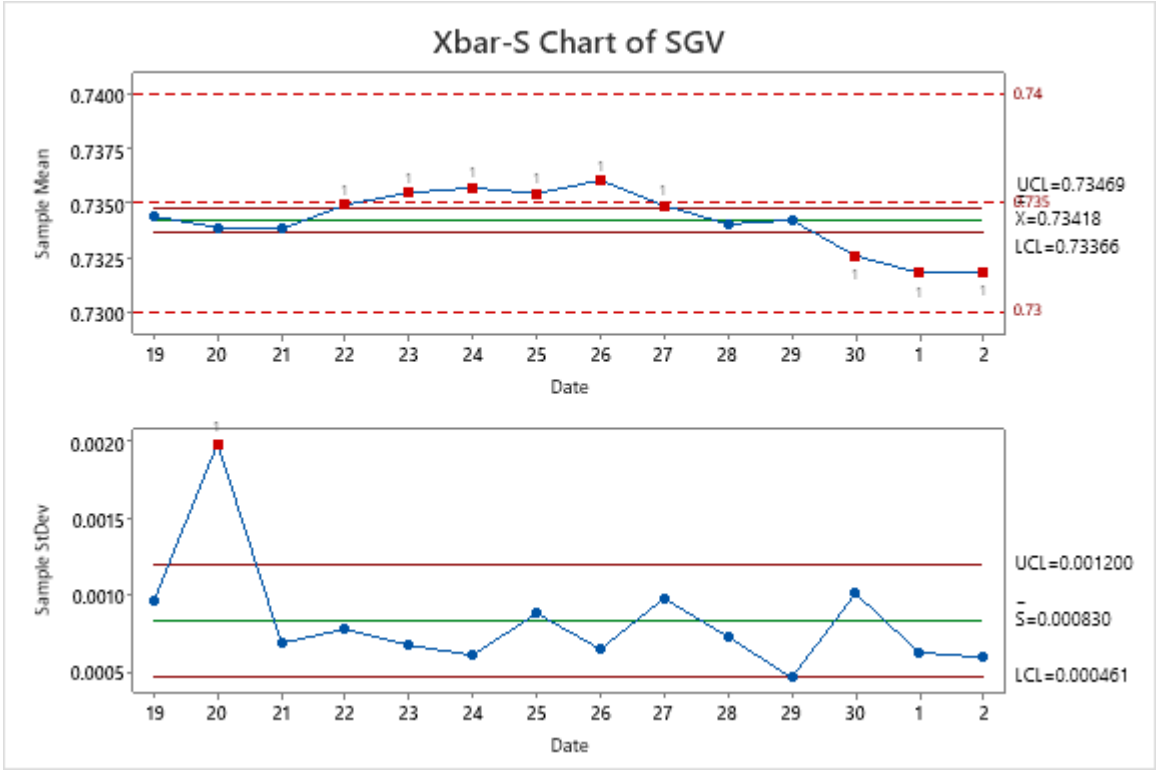


- CLOSE status of valve KV-4101-1C is permissive for valve KV-4101-1B to OPEN
- At that time, valve KV-4101-1C did not CLOSE when it should. Consequently, valve B couldn't OPEN and PDS didn't drop
- All parameters from PPB and Kill system are permissive (indication "PDS READY" at DCS)
- The cause of KV-4101-1C **stuck open was due to actuator randomly stuck** (usually due to dirty). Because it can be re-operated as normal without any repairment
- After discussion with licensor, this problem shouldn't cause expanded section sheeting

Root Cause Analysis (RCA) - Verification

P3: SGV too High (>0.740 m/s) P3.G
P7: SGV too Low (<0.730 m/s) P7.G

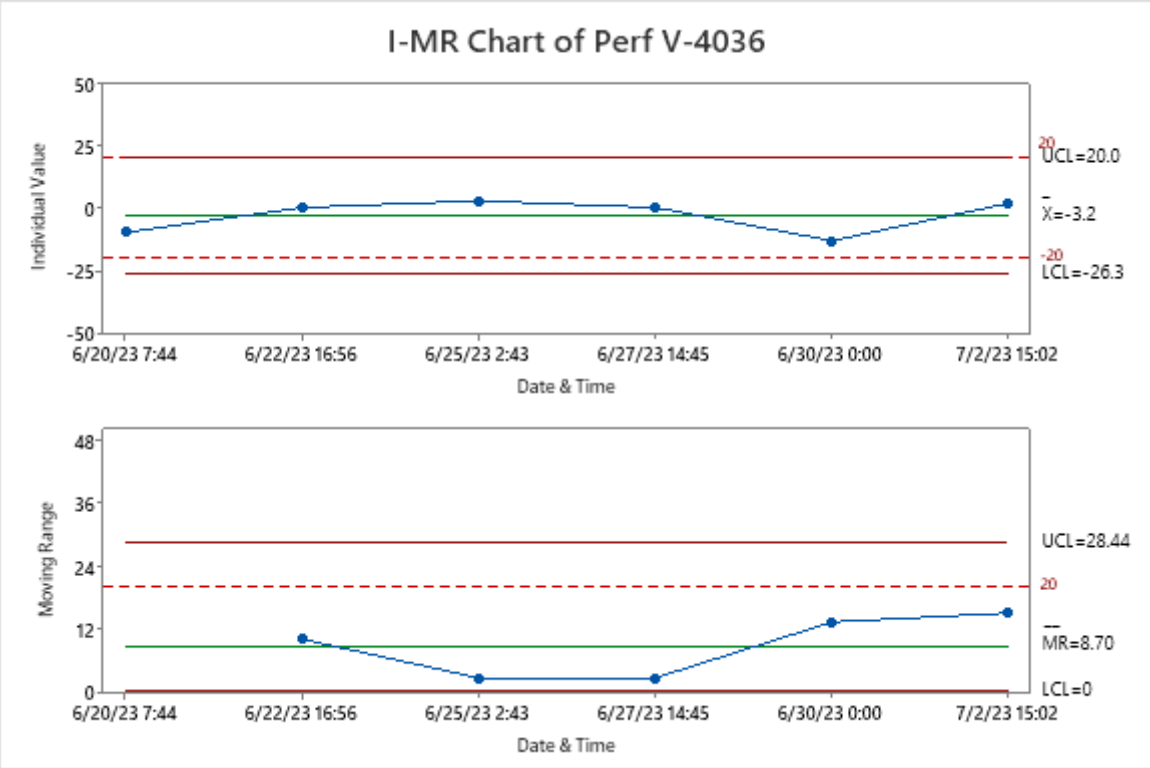
- SGV was maintained stable at desired range (0.730-0.740 m/s)

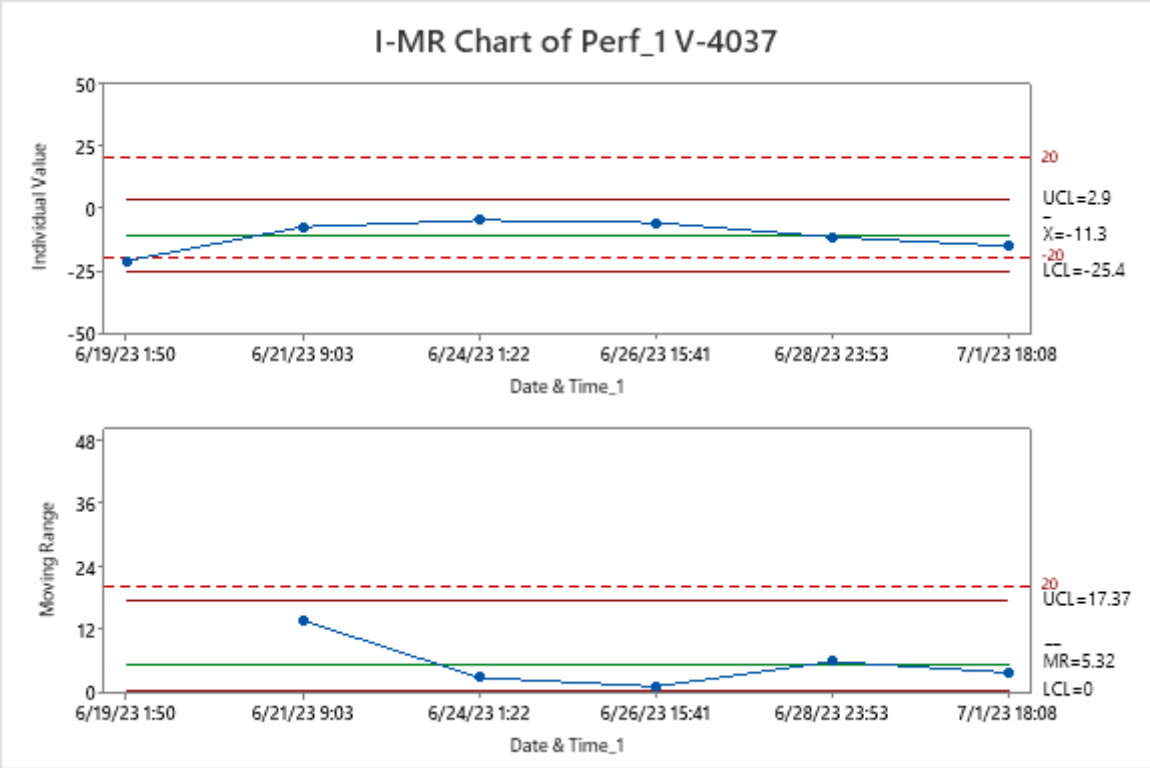


Root Cause Analysis (RCA) - Verification

P4: Catalyst feeding excessive force feed (force >20%) or unstable

P4.G



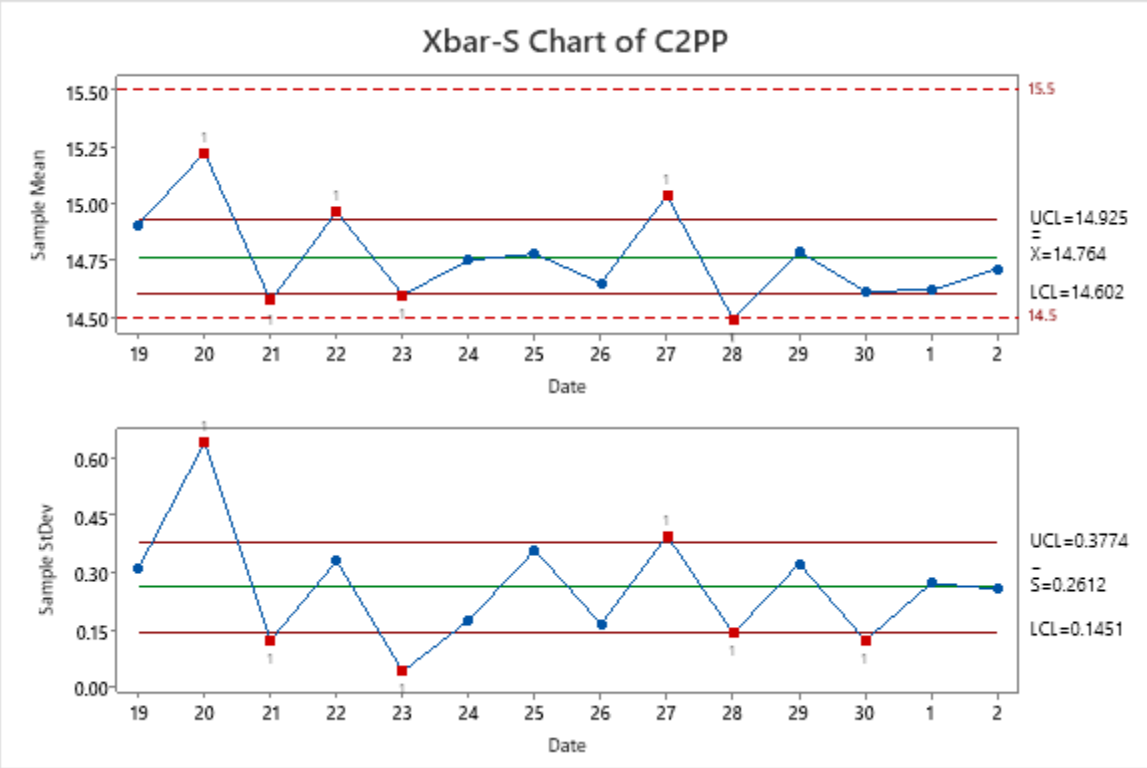


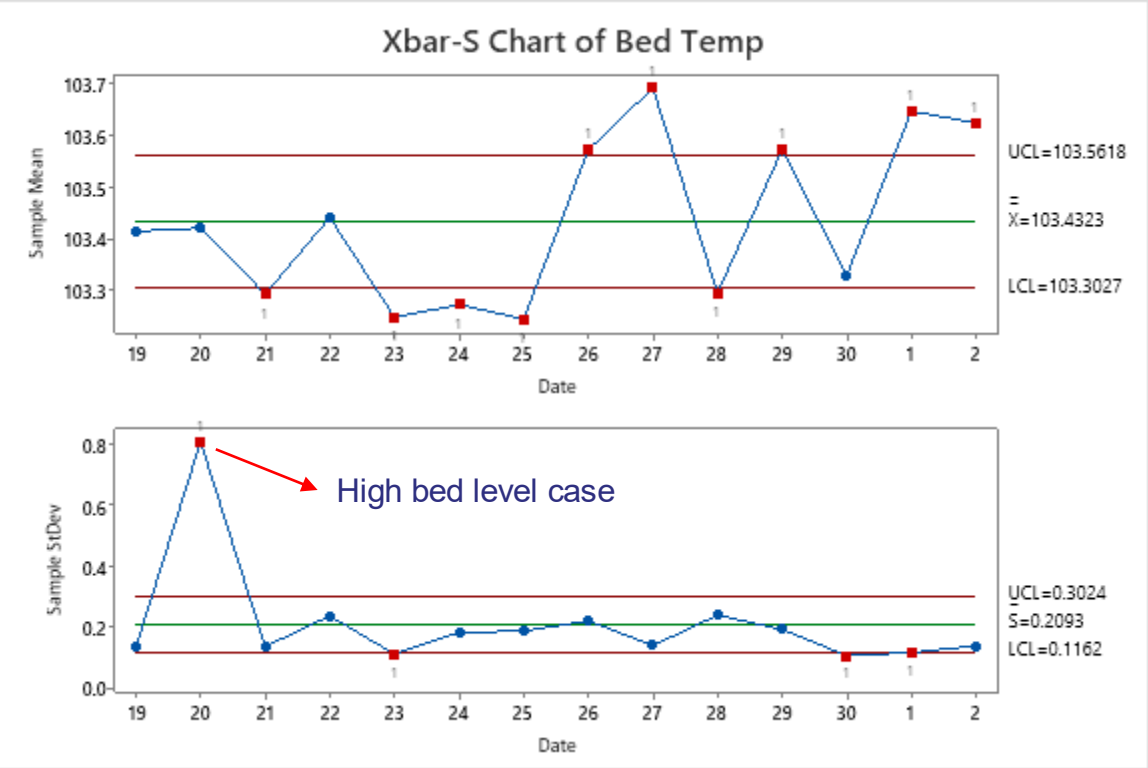
- In day to day scope, control chart shows stable catalyst feeding since June 19th to July 2nd, 2023
- Average perf of V-4036 was FORCE 3.2% and V-4037 was LESS -11.3%
- No possibility of sheeting formation from stable catalyst feeding performance

Root Cause Analysis (RCA) - Verification

P5: Poor/unstable reaction control (parameters out of 3σ) – C2PP, Bed Temp, H2/C2, C6/C2

P5.G



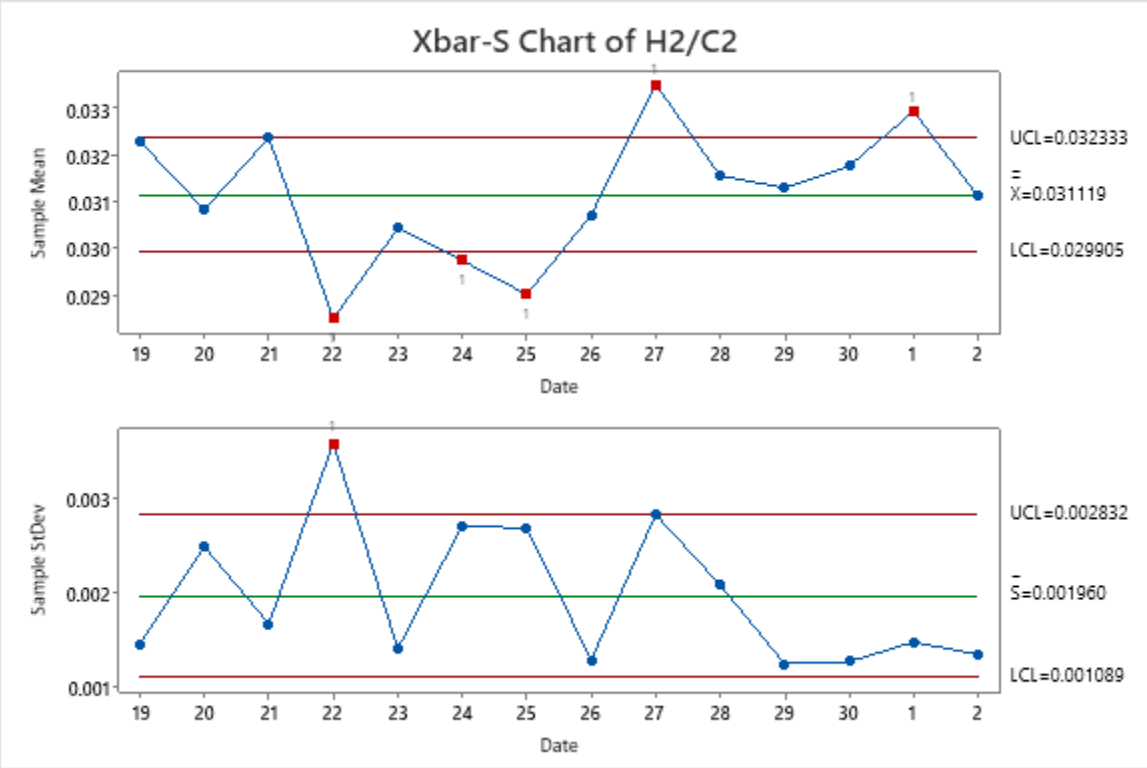


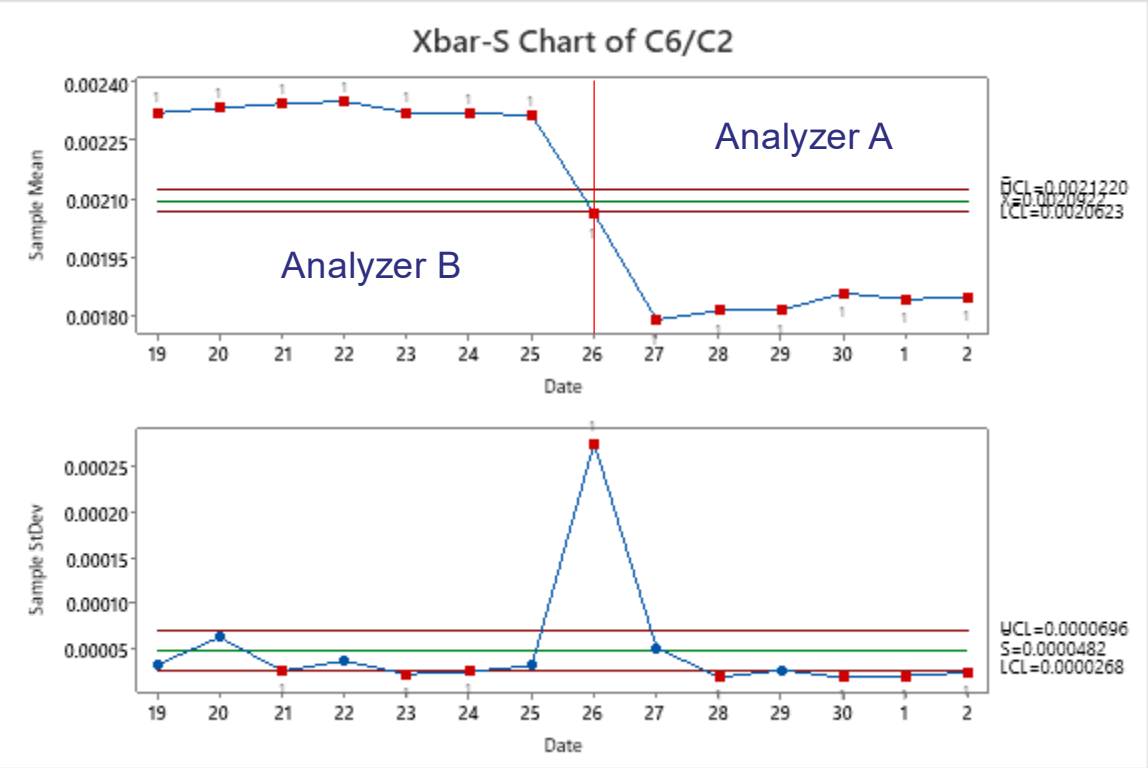
- C2PP was considered stable between desired range (14.5-15.5 ksca) even though sometimes bit higher or lower (impact of catalyst feeder perf.)
- Bed temp was considered stable (up and down based on control by APC)

Root Cause Analysis (RCA) - Verification

P5: Poor/unstable reaction control (parameters out of 3σ) – C2PP, Bed Temp, H2/C2, C6/C2

P5.G





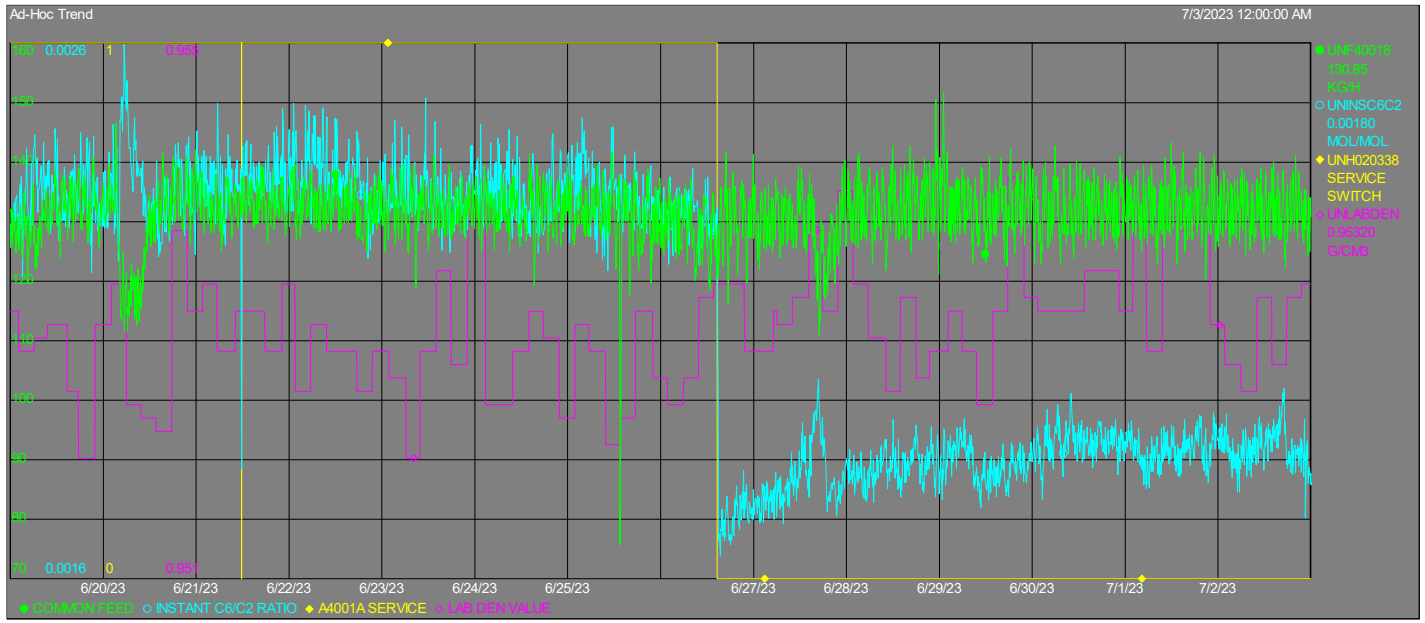
- H2/C2 is quite stable around desired setting (0.03 mole/mole)
- C6/C2 is quite stable even though it looks has different operating range between Jun 19-25 and Jun 26-Jul 02 impact of different analyzer reading
- The density result remains the same between before and after switching

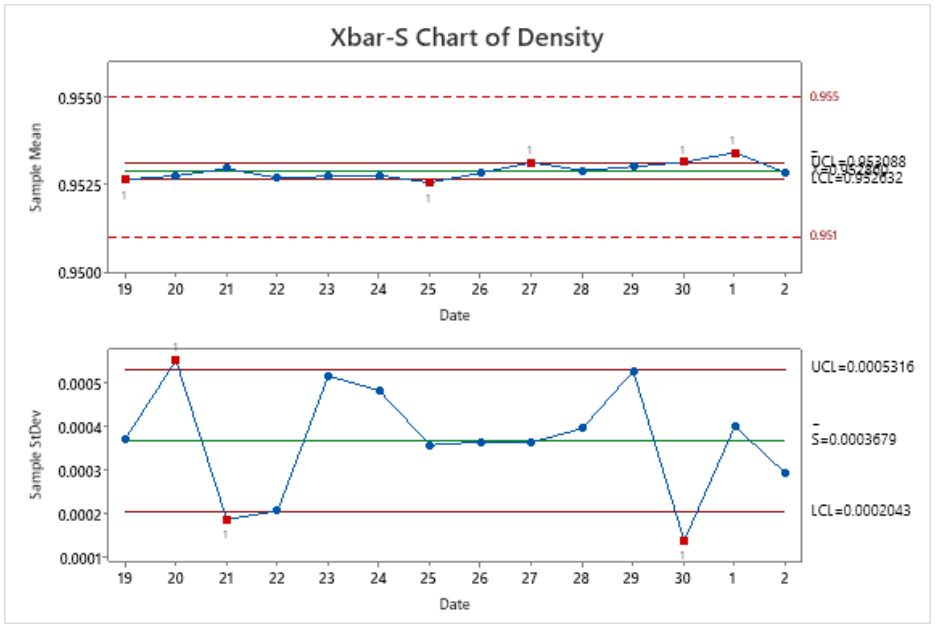
Root Cause Analysis (RCA) - Verification

P5: Poor/unstable reaction control (parameters out of 3σ) – C2PP, Bed Temp, H2/C2, C6/C2

P5.G

Continued…

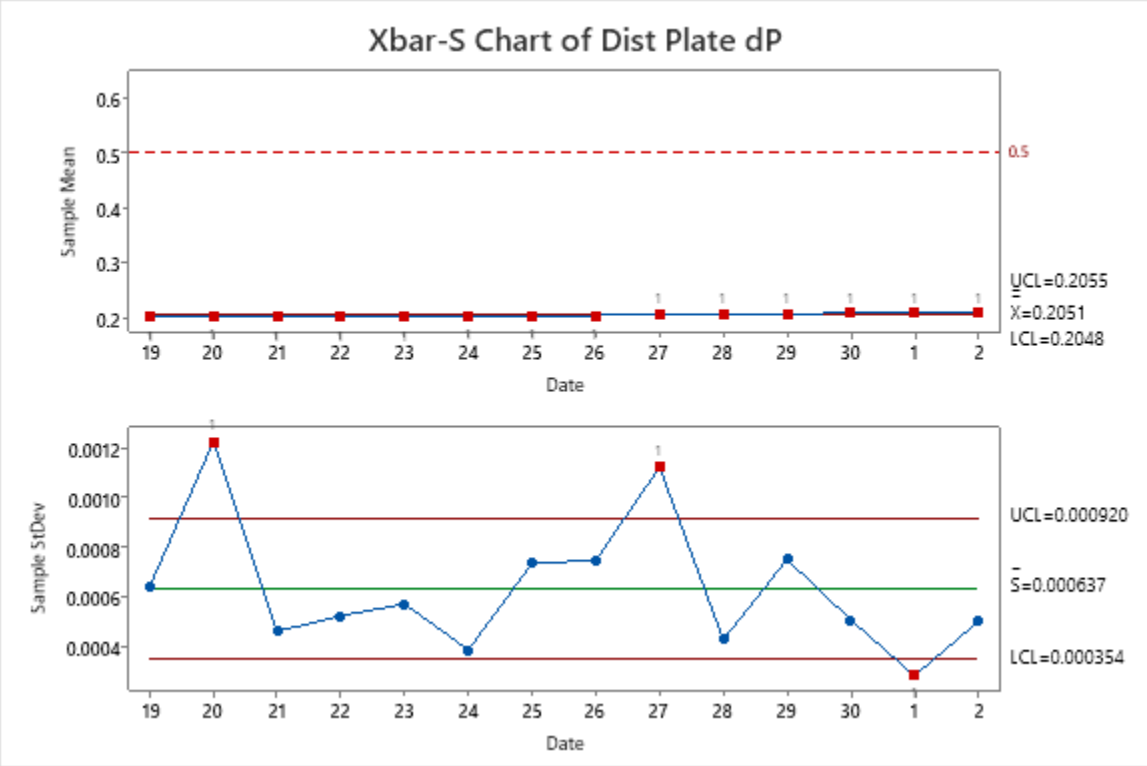




Root Cause Analysis (RCA) - Verification

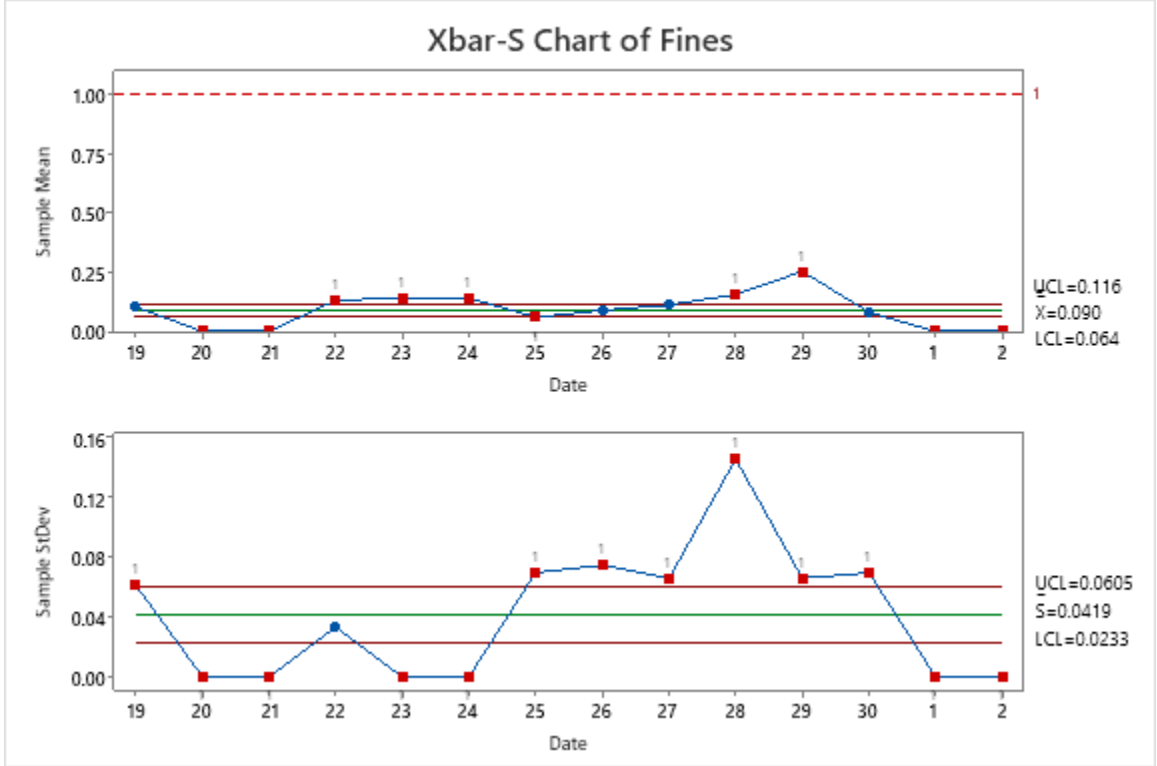
P6.G

P6: Partially Plugged Distributor Plate (dP >0.5 kg/cm^2)



P8: Too High Fines (Fines >1% w/w)

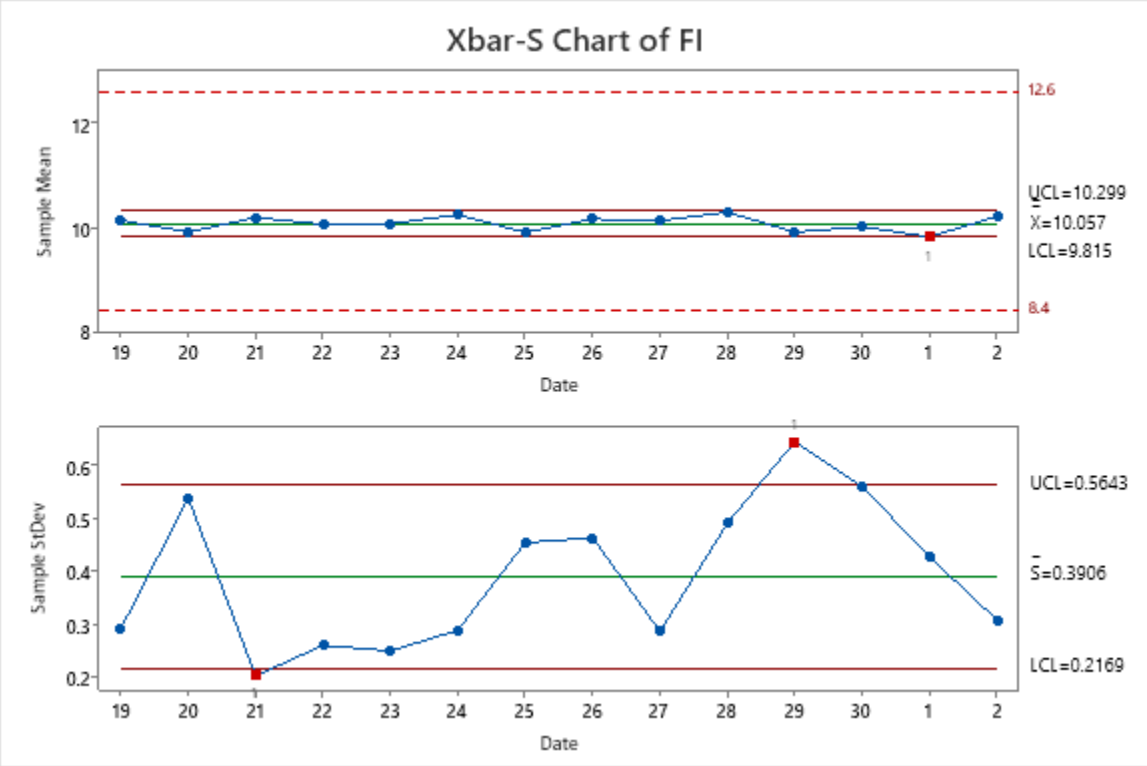
P8.G



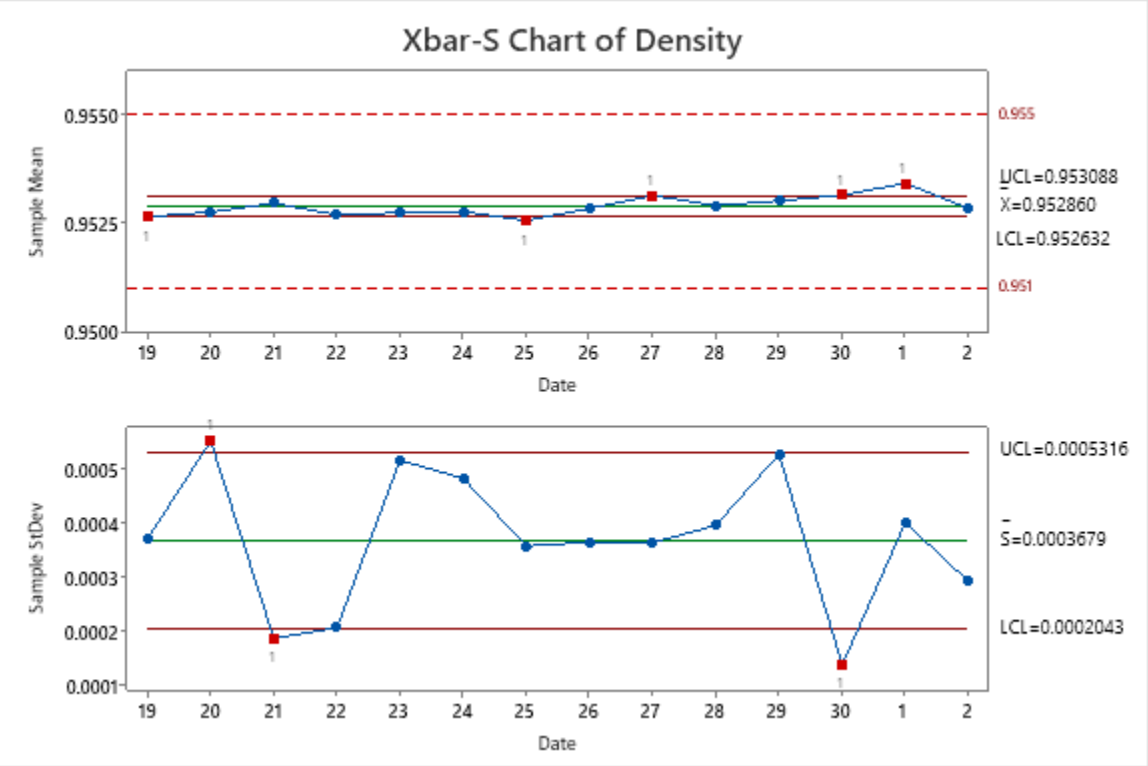
- Reactor distributor plate dP is still good below 0.25 kg/cm^2
- Fines also good and stable below 1%

Root Cause Analysis (RCA) - Verification

P9: FI Spikes Out of Spec (FI >12.6 dg/min) P9.G



P10: Density Drops Out of Spec (Density <0.951 g/cc) P10.G



- FI is very stable and quite narrow in distribution (Cpk 1.41)
- Density is very stable and quite narrow in distribution (Cpk 1.67)

Root Cause Analysis (RCA) - Verification

P11.G

P11: Poisons from Raw Materials (O_2 >2 ppm, H_2O >2 ppm)

General Summarized Indicators

Force | Further details...

A...	R...	S..	Short text for the ins...	Specifications	Inspect	Inspected	Si...	Result	Original Va...	V...
☐	☑	☐	5	Acethylene (C2H2)	0.0 .. 5.0 ppm(V)	1	1		= <0.4	< 0.4	✓
☐	☑	☐	5	Hydrogen (H2)	0.0 .. 5.0 ppm(V)	1	1		= <2.5	< 2.5	✓
☐	☑	☐	5	Carbon Monoxide(CO)	0.00 .. 2.00 ppm(V)	1	1		= <0.10	< 0.1	✓
☐	☑	☐	5	Carbon Dioxide (CO2)	0.00 .. 5.00 ppm(V)	1	1		= <0.10	< 0.1	✓
☐	☑	☐	5	Alcohol	<= 10.0 ppm.wt	1	1		= <1.0	< 1	✓
☐	☑	☐	5	Water	<= 3.0 ppm(V)	1	1		= <1.0	< 1	✓
☐	☑	☐	5	Total sulfur as H2S	0.0 .. 2.0 ppm.wt	1	1		= <0.4	< 0.4	✓
☐	☑	☐	5	Oxygen (O2)	0.0 .. 2.0 ppm(V)	1	1		= 0.6	0.6	✓
☐	☑	☐	5	Total Combined Nitro..	0.0 .. 1.0 ppm(V)	1	1		= <1.0	< 1	✓

General Summarized Indicators

Force | Further details...

A...	R...	S..	Short text for the ins...	Specifications	Inspect	Inspected	Si...	Result	Original Va...	V...
☐	☑	☐	5	Acethylene (C2H2)	0.0 .. 5.0 ppm(V)	1	1		= <0.4	< 0.4	✓
☐	☑	☐	5	Hydrogen (H2)	0.0 .. 5.0 ppm(V)	1	1		= <2.5	< 2.5	✓
☐	☑	☐	5	Carbon Monoxide(CO)	0.00 .. 2.00 ppm(V)	1	1		= <0.10	< 0.1	✓
☐	☑	☐	5	Carbon Dioxide (CO2)	0.00 .. 5.00 ppm(V)	1	1		= <0.10	< 0.1	✓
☐	☑	☐	5	Alcohol	<= 10.0 ppm.wt	1	1		= <1.0	< 1	✓
☐	☑	☐	5	Water	<= 3.0 ppm(V)	1	1		= <1.0	< 1	✓
☐	☑	☐	5	Total sulfur as H2S	0.0 .. 2.0 ppm.wt	1	1		= <0.4	< 0.4	✓
☐	☑	☐	5	Oxygen (O2)	0.0 .. 2.0 ppm(V)	1	1		= 0.5	0.5	✓
☐	☑	☐	5	Total Combined Nitro..	0.0 .. 1.0 ppm(V)	1	1		= <0.2	< 0.2	✓

- C2 purity check on June 22 and June 29, 2023 shows good result on alcohol (<1 ppm), water (<2 ppm), oxygen (<2 ppm) and other impurities

Root Cause Analysis (RCA) - Verification

P11.G

P11: Poisons from Raw Materials (O_2 >2 ppm, H_2O >2 ppm)

Sampling Point
FB-1851 for Monthly

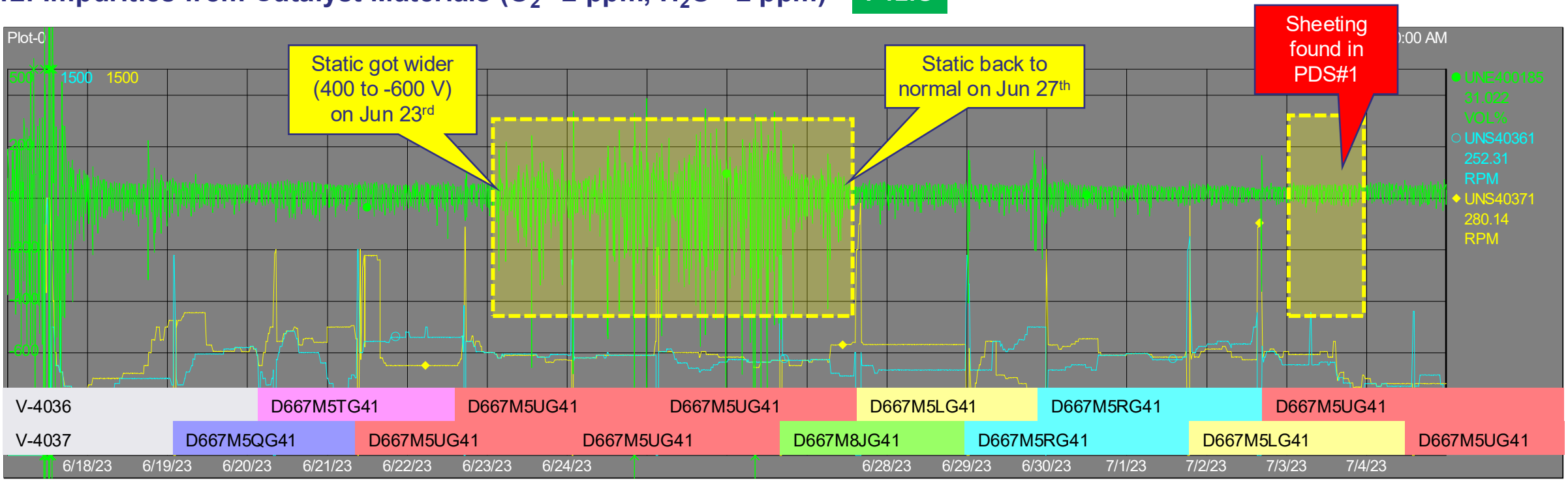
Date : July 01, 2023
Time : M

No.	Item	Unit	Spec.	Result	Test Method
1	Hexene-1	% wt	Min 98.5	99.3248	GC - Method
2	Saturated Hydrocarbon	% wt	Max 1.5	0.6735	GC - Method
3	Peroxides	ppm wt	Max 1	<1	Titration
4	Moisture	ppm wt	Max 25	16.3	ASTM D-6304
5	Color	Saybolt	Min +30	+30	ASTM D-156
6	Total Sulfur	ppm wt	Max 1	<1	ASTM D-5453

- C6-1 check on July 01, 2023, shows good result on moisture (<25 ppm)

Root Cause Analysis (RCA) - Verification

P12: Impurities from Catalyst Materials (O_2 >2 ppm, H_2O >2 ppm) P12.G

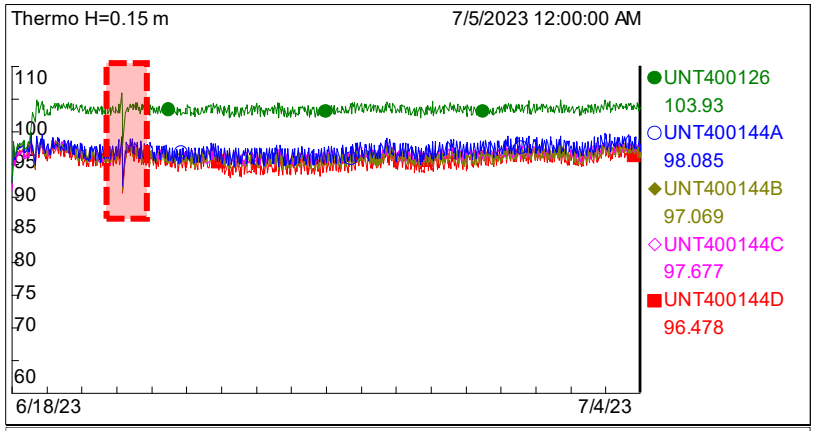


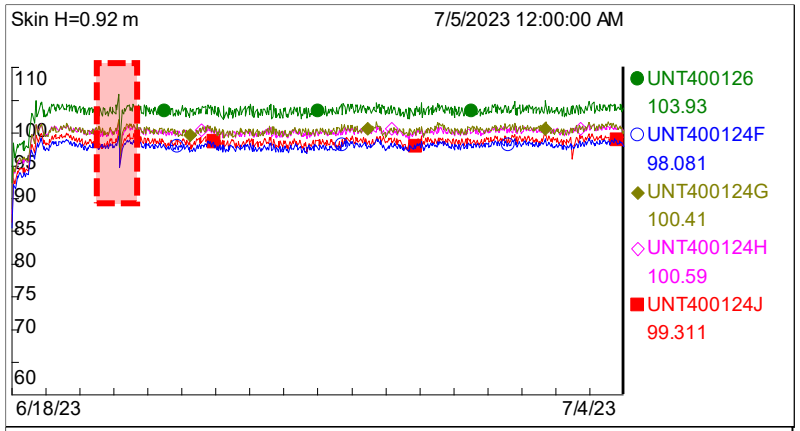
- When impurities come from catalyst, there should be indication of high static when using that contaminated catalyst
- In fact, suspected catalyst (which indicated high static during its use) did not indicate same static pattern when used in different occasions
- Suspected as a false indication (no real contamination occur)

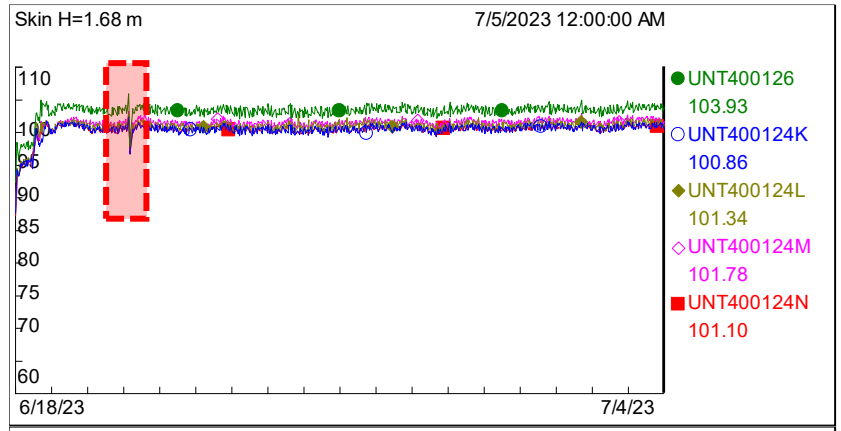
Root Cause Analysis (RCA) - Verification

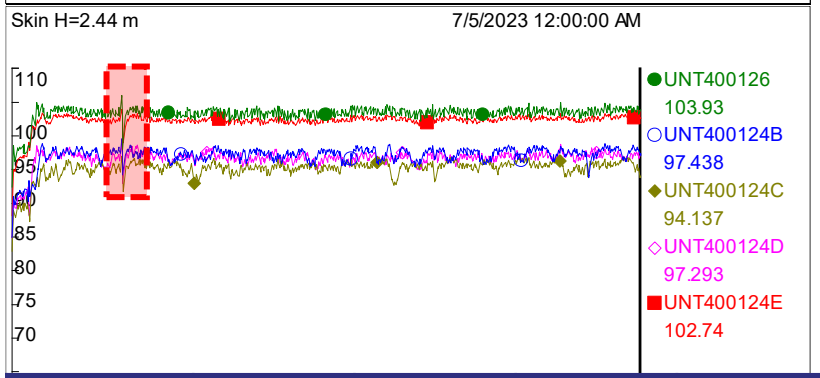
P13: Skin Temperatures rise (Temp >115°C)

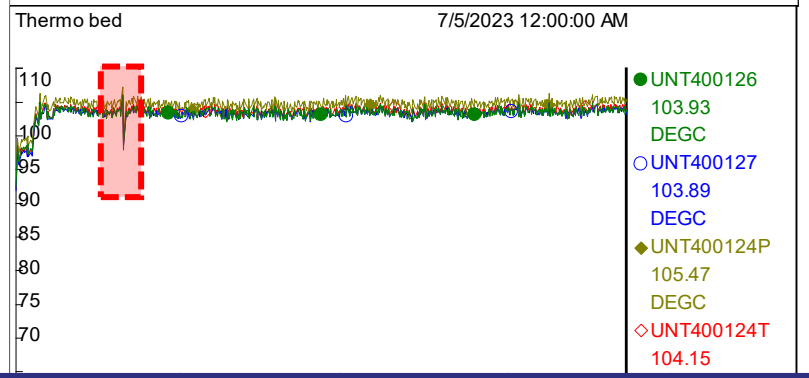
P13.G

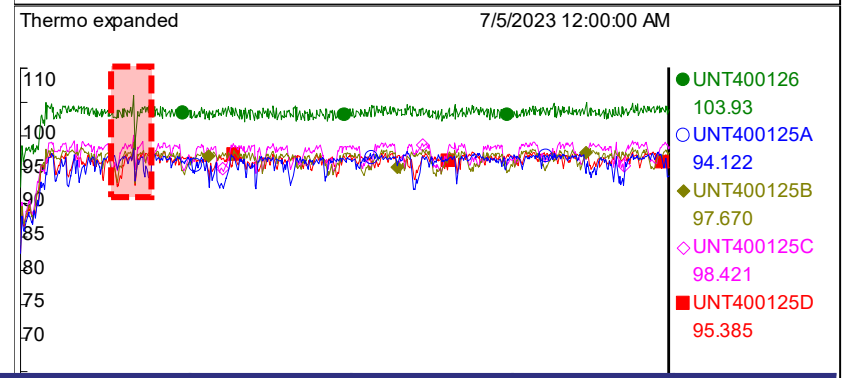












June 20, 2023	UNT400124F	UNT400124G	UNT400124H	UNT400124J	UNT400124K	UNT400124L	UNT400124M	UNT400124N	UNT400124B	UNT400124C	UNT400124D	UNT400124E	UNT400124P	UNT400124T
Average	97.4	99.7	99.6	98.1	99.9	100.3	100.9	99.8	97.2	94.7	96.2	101.7	104.1	103.0
Max	99.5	101.8	101.8	100.2	102.2	102.7	103.2	101.9	99.4	96.9	98.6	103.8	107.1	106.0

- The only temp rise at skin and bed was on June 20, 2023 (during Reactor high level case), see p23
- None of skin temps rise up to 115°C

Root Cause Analysis (RCA) - Verification

P15: Purge to A valve (KV-4101-1A) out of service (KV-4101-1C closed) during PDS#1 out of service

P15.G

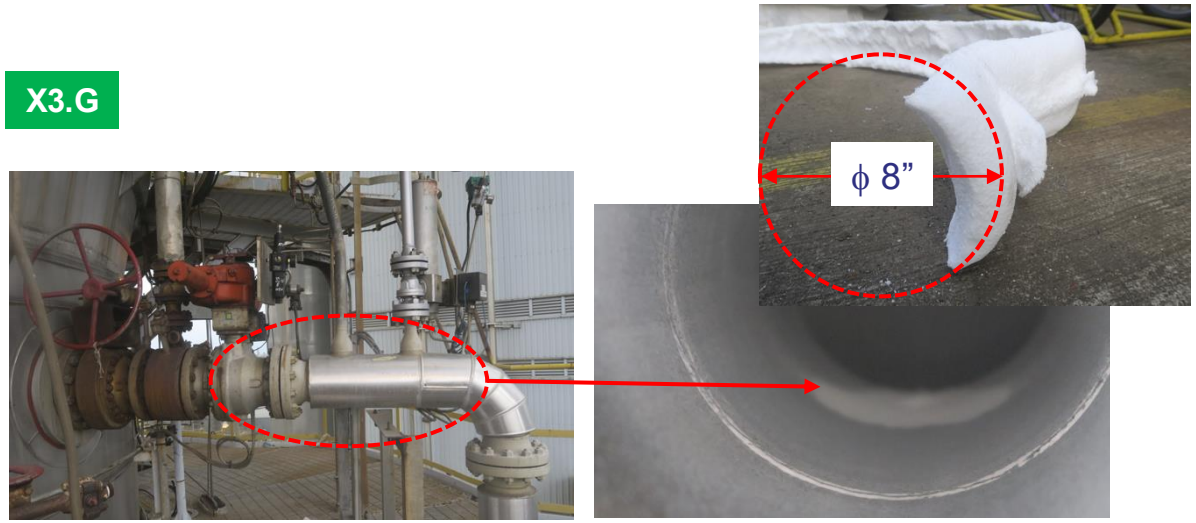
- Purge to A valve shown normal flow (9.6 kg/h) during PDS#1 out of service

P16.NG

P16: Resin stagnant at G line during PDS stopped ← by natural (when PDS stopped)

- Stagnant resin at horizontal section of G line (near nozzle) is hardly observed during shut down, because PDS system is operating normally until bed empty (equalizing line or G line is always used)
- Actual observation shows there was little amount of resin remained at horizontal line during shutdown, means that during normal operation, when PDS stopped, amount of remain resin should be more
- During PDS#1 stopped, with less cooling, sheeting possibly generated at that horizontal line then fall to Product Chamber or back to Reactor bed when PDS#1 put back to service
- Other evidence is that sheeting diameter closely matched to G line piping diameter of 8 inch
- After discussion with Licensor, they suggests that the sheeting is originated from G line
- This case looks relate to current PDS logic that G valve open at the same time as B valve open --> high probability for resin carried over to G line when dropping resin to product chamber (B open)

X3.G

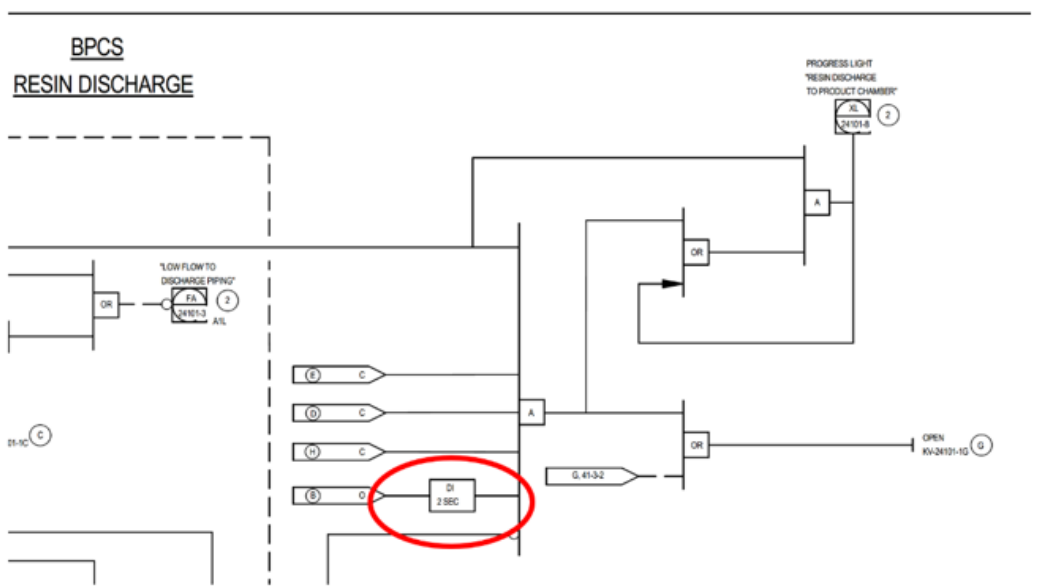


Process / Maintenance / Production Discussion

No	Theme	Y23	Expected Feedback	UNIVATION RESPONSE (blue text)
1		Sheeting stuck at PDS system (PC#1) on Jul 3, 2023. Reactor has been re-started up on June 17 after 5 days idle with bed intact on June 11-16. On June 20, there was incident Reactor high bed level up to 16.5 m for 2 hours due to PDS accidentally not drop due to C valve stuck open. On Jun 23-27, Rx static become wider while there was no problem in catalyst feed, no activity in purification/upstream, all raw material were in good purity, and all reactor parameters were good and stable. We suspect the sheeting originated from Rx high bed level event, which impact to some resin carried over and stagnant at expanded section, agglomeration, then fall off to Reactor bed and moving around on Jun 23-27 (indicated by wider static), then stuck at PDS	Is it possible for sheeting originated from high level Reactor even only 2 hours? Or it was generated during bed intact? In fact, no any continuity issues from re-startup (17/6) until sheeting stuck at PDS#1 (3/7). What makes density of sheeting sample too low while the FI is close enough to normal resin? Are there any possible causes?	Based on photograph (Sample 1) sheet originated in the G line. The polymer sheets, which originated in the expended section of the reactor are typically very thick please refer to picture in the attached PPT file.

Source: Consultation to UT related to sheeting issue on GTEC 2023

Root Cause Analysis (RCA) - Verification

8	For item No. 6. We have checked the PDS filling efficiency for 5 seconds resin timer to Product Chamber (at prod rate 23-26 TPH), still got below 100% (+- 98%). **Do we need to reduce further lower**	Univation Adjust "G" valve delay timer to 1 -3 seconds and evaluate the result. The timer is shown on the snapshot below. The snapshot of a logic diagram 41-5-2 was taken from CAPs line 2 PDP. Line 1 probably does not have this timer in the logic (PDP issued in ~1993). Consider adding this timer into the PDS logic on line 1.
	(i.e. to 4 seconds) or keep at this setting?	

Considering the phenomenon and the fact that without PDS valve problems, sheeting problem won't occur by current PDS logic, so this factor logically can not be concluded as the root cause.

Previous communication with UT (Feb 2023) shows correlation to June 2023 sheeting case. Source: UTM-CA-E-1134: Response to CA/UT-E-1134: PDS Purge Line Plugging in Line1

Root Cause Analysis (RCA) - Verification

P17: Product Chamber of PDS#2 (C-4106) overfilled P17.G

- Product Chamber filling efficiency is between 60-62% before the incident
- Means possibility of resin carryover during last equalizing (from PC#2 to PC#1) is small

P18: KV-4101-1W valve stuck open P18.G

- KV-4101-1W is properly in CLOSE position during PDS#1 out of service
- No possibility of resin flowing to PC#1 (out of service) during resin discharge from Reactor to PC#2

Root Cause Analysis (RCA) - Verification

Possible Sequence of Events

High bed level and bed temp. make some resin carried over to expanded section and accumulated there.

<5min

PDS#2 F valve problem (inst.), made PDS#2 out of service several times. Remain resin at G line PDS#2 agglomerates into sheeting.

3d

Sheeting displaces from G line to Reactor and continue growing over time. Indicated by wide static band in Reactor while there is no special activity/impurities.

2w

PDS#1 F valve problem (inst.), made PDS#1 out of service several times. Remain resin at G line PDS#1 agglomerates into sheeting.

4h

Sheeting displaces from G line to product chamber when PDS#1 put in service.

2h

Relatively big sheeting from in product chamber then stuck at PDS#1 D valve several hours after PDS#1 put in service.

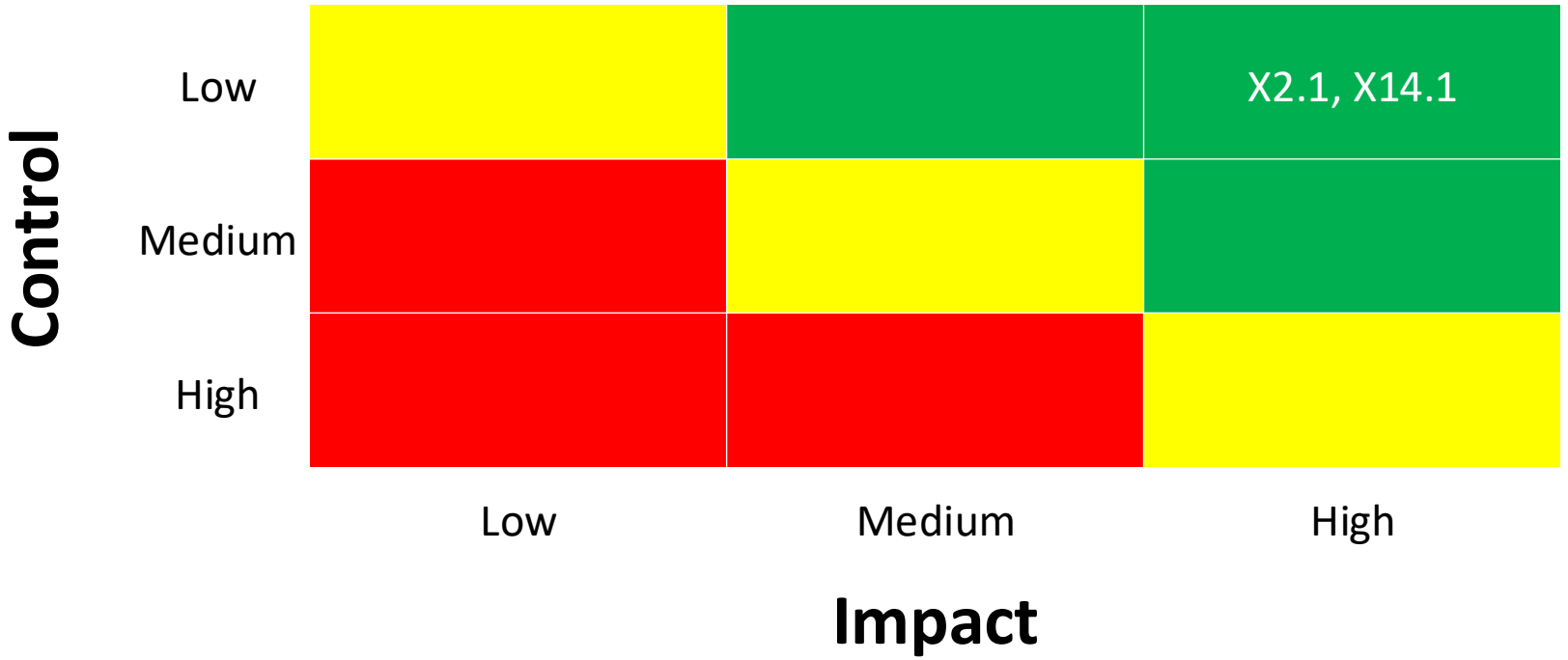
But this event unlikely to cause sheeting in PDS system. No indication afterwards.

Sheeting from this period may be not too big so that can be transfer to PPB as normal

Root Cause Analysis (RCA) - 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
X2.1	KV-4101-1C actuator stuck due to dirty	- Replace Actuator - PM check KV-4101-1C valve every shutdown window	Apr 3, 2024	Iwan P.	CLOSE	- PM check all PDS valves every shutdown window	Aug 2024	Iwan P.	CLOSE
X14.1	KV-4101-1F valve stuck (EPR-F2423-2023-06-1)	Follow report EPR-F2423-2023-06-01							

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 : Melita T.P.
Date :	*Date :*	*Date :*	*Date :171024*

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 low bed level	Bed level indication abnormal	Plugged instrument taps (e-nozzles)	Regular blow back of E-nozzles every shift	Aug 2023	Habibi	CLOSE				
P3	SGV too high (>0.74 m/s)	Wrong SGV adjustment, SGV indication abnormal	Plugged instrument taps at venturi, dirty venturi and IGV	- Follow updated guideline for SGV - Regular blow back of E-nozzles and venturi every shift - Cleaning venturi in TAM 2024	Jul 2024	Habibi	CLOSE				
P4	Catalyst feeding excessive force feed (force >20%) or unstable	Catalyst feeder force feed >20% or unstable	Catalyst packing at internal part of cat. feeder	Regular PM overhaul and cleaning catalyst feeder (every 2 months)	Aug 2023	Ferry S.	CLOSE				
P5	Poor/unstable reaction control (parameters out of 3σ)	Unstable raw material flow control	Control valve failure, analyser failure	- PM check and calibrate control valves every shutdown window - PM check and calibrate analyser every shutdown window	Aug 2024	Iwan P.	CLOSE				
P6	Partially Plugged Distributor Plate (dP >0.5 kg/cm^2)	Distributor plate dP >0.5 ksc	High resin/fines carryover, improper startup	- Conduct startup with updated guideline - Adjust SGV based on updated guideline	Aug 2024	Habibi	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

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
P7	SGV too Low (<0.730 m/s)	Wrong SGV adjustment, SGV indication abnormal	Plugged instrument taps at venturi, dirty venturi and IGV	- Follow updated guideline for SGV - Regular blow back of E-nozzles and venturi every shift - Cleaning venturi in TAM 2024	Jul 2024	Habibi	CLOSE				
P8	Too High Fines (Fines >1% w/w)	High fines	Unstable catalyst feed, low catalyst activity	- Compare to G-drop sample - Compare to indication at E-7	Aug 2023	Habibi	CLOSE				
P9	FI Spikes Out of Spec (FI >12.6 dg/min)	FI fluctuates	Unstable catalyst feed, low catalyst activity, wrong temp. adjustment	- Adjust temp based on FI result - Resample if FI result doubtful - Selective catalyst batch	Aug 2023	Habibi	CLOSE				
P10	Density Drops Out of Spec (Density <0.951 g/cc)	Density fluctuates	Unstable catalyst feed, low catalyst activity, wrong C6/C2 adjustment, C6-1 control valve failure	- Selective catalyst batch - PM control valve - Put APC on flow ratio control for C6/C2	Aug 2023	Habibi	CLOSE				
P11	Poisons from Raw Materials (O_2 >2 ppm, H_2O >2 ppm)	High moisture/ oxygen from raw material	Saturated C2 deoxo and dryer bed, too high impurities	- Regularly regen C2 deoxo and dryer bed - Check RM purity at SAP/confirm to OM	Aug 2023	Habibi	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

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
P12	Impurities from Catalyst Materials	Catalyst contains impurities	Impurities from vendor, broken valves	- Selective catalyst batch - Check cylinder condition before use	Aug 2023	Habibi	CLOSE				
P13	Skin Temperatures rise	Bed temperature runaway	Bad temperature control, control valve failure, temp. setting failure, kill system failure	- PM control valve as per schedule - Routine patrol kill system	Aug 2023	Iwan P. Mahadhika	CLOSE				
P15	Purge to A valve out of service during PDS#1 out of service	Valve failure, stuck	Actuator failure or stuck, valve stuck by sheeting, shaft broken	- PM PDS valves every shutdown window	Aug 2023	Iwan P.	CLOSE				
P16	Resin stagnant at G line during PDS stopped	Many resin stuck at G line	Direct open equalize valve (G) during resin drop to product chamber (B open)	- Issue TCR for add delay timer (DI) to G valve open 1-3 seconds after B valve open	Dec 2024	Habibi	OPEN				
P17	Product Chamber of PDS#2 (C-4106) overfilled	Product chamber overfilled and resin packed	Timer for resin drop to product chamber too long	- Periodic review for PDS timers - Follow updated guideline for PDS timer	Aug 2023	Habibi	CLOSE				
P18	KV-4101-1W valve stuck open	W valve stuck	Actuator failure or stuck	- PM PDS valves every shutdown window	Aug 2023	Iwan P.	CLOSE				

Executor	Reviewer	Approver	CSO Acknowledge
			
Name : Habibi A.	Name : Mahyudanil B.	Name : Hamim T.	Name : Melita T.P.
Date :	*Date :*	*Date :*	*Date :171024*

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

Improve - Risk Analysis

No.	Corrective Action	Potential Risk	Countermeasure	PCD (Plan Completion Date)	PIC (Name of person)	Status
X2.1	PM check KV-4101-1C valve every shutdown window	Miss assembly, misconnection of instrument air, hand pinched, backpain, miss calibration	Skilled instrument personnel, put marking on instrument air connection tubing, use standard PPE, use proper tools for lifting and moving valves, close communication with UCC1 board operators	Aug 2023	Iwan P.	CLOSED

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

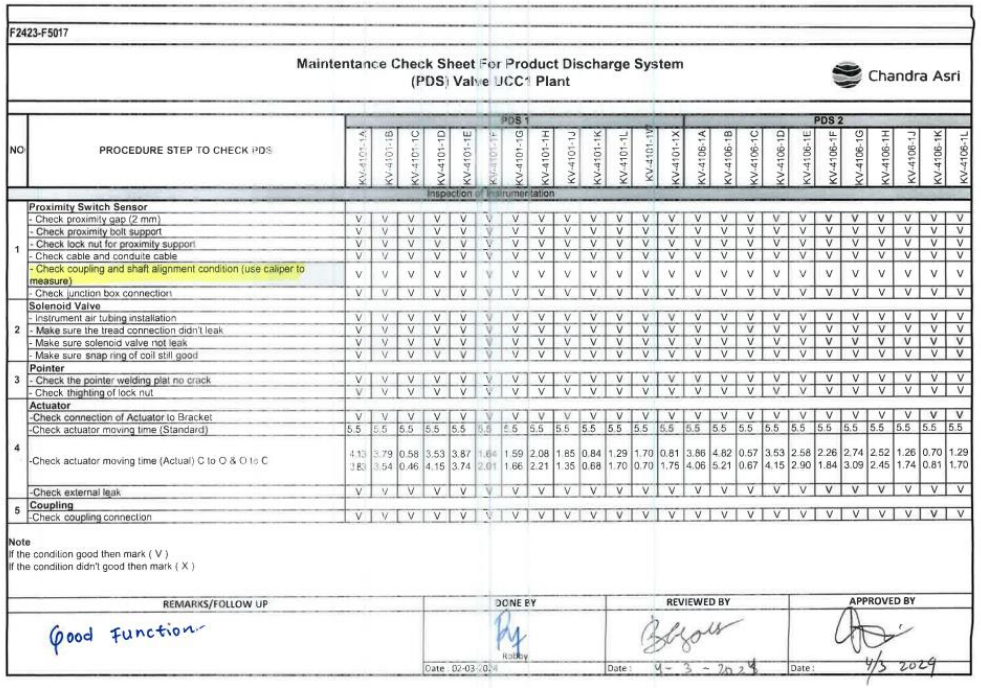
Executor: Operator / Supervisor / Engineer / Sr. Engineer / SI / Staff
Reviewer: Sr. Engineer/ SI / SM
Approver : SM / DM / GM

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

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

Improve – CAPA/PAA Implementation

1. PM Check all PDS valves in every shutdown window



F2423-F5017

Maintenance Check Sheet For Product Discharge System (PDS) Valve UCC4 Plant

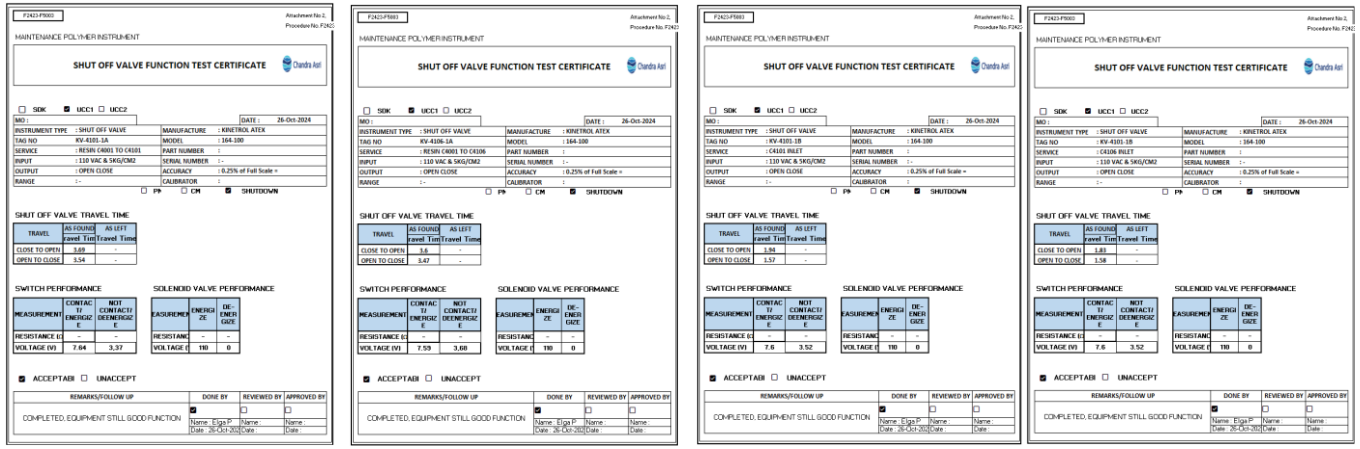
Chandra Asri

NO	PROCEDURE STEP TO CHECK PDS	PDS 1												PDS 2											
		KV-4101-1A	KV-4101-1B	KV-4101-1C	KV-4101-1D	KV-4101-1E	KV-4101-1F	KV-4101-1G	KV-4101-1H	KV-4101-1J	KV-4101-1K	KV-4101-1L	KV-4101-1W	KV-4101-1X	KV-4106-1A	KV-4106-1B	KV-4106-1C	KV-4106-1D	KV-4106-1E	KV-4106-1F	KV-4106-1G	KV-4106-1H	KV-4106-1J	KV-4106-1K	KV-4106-1L
	Inspection of Instrumentation																								
1	**Proximity Switch Sensor**																								
	- Check proximity gap (2 mm)	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	- Check proximity bolt support	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	- Check lock nut for proximity support	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	- Check cable and conduite cable	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	- Check coupling and shaft alignment condition (use caliper to measure)	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	- Check junction box connection	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
2	**Solenoid Valve**																								
	- Instrument air tubing installation	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	- Make sure the tread connection didn't leak	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	- Make sure solenoid valve not leak	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	- Make sure snap ring of coil still good	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
3	**Pointer**																								
	- Check the pointer welding plat no crack	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	- Check thighting of lock nut	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
4	**Actuator**																								
	-Check connection of Actuator to Bracket	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	-Check actuator moving time (Standard)	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
	-Check actuator moving time (Actual) C to O & O to C	4.13 3.83	3.79 3.54	0.58 0.46	3.53 4.15	3.87 3.74	1.64 2.01	1.59 1.66	2.08 2.21	1.85 1.35	0.84 0.68	1.29 1.70	1.70 0.70	0.81 1.75	3.86 4.06	4.82 5.21	0.57 0.67	3.53 4.15	2.58 2.90	2.26 1.84	2.74 3.09	2.52 2.45	1.26 1.74	0.70 0.81	1.29 1.70
	-Check external leak	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
5	**Coupling**																								
	-Check coupling connection	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V

Note
If the condition good then mark (V)
If the condition didn't good then mark (X)

REMARKS/FOLLOW UP	DONE BY	REVIEWED BY	APPROVED BY
Good Function	Robby Date : 02-03-2024	Date : 4-3-2024	Date : 4/5 2024

Example of PM check PDS valve in March 2024



SHUT OFF VALVE FUNCTION TEST CERTIFICATE

Example of PM check PDS valve in shutdown Nov 2024

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

Executor CAPA/PAA	Verifier
Name : Iwan P. / Bagus	Name :.
Date :	*Date :*

Improve – CAPA/PAA Implementation

CA2 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

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

Improve – CAPA/PAA Implementation

PAA2 etc

- Evidence implementation

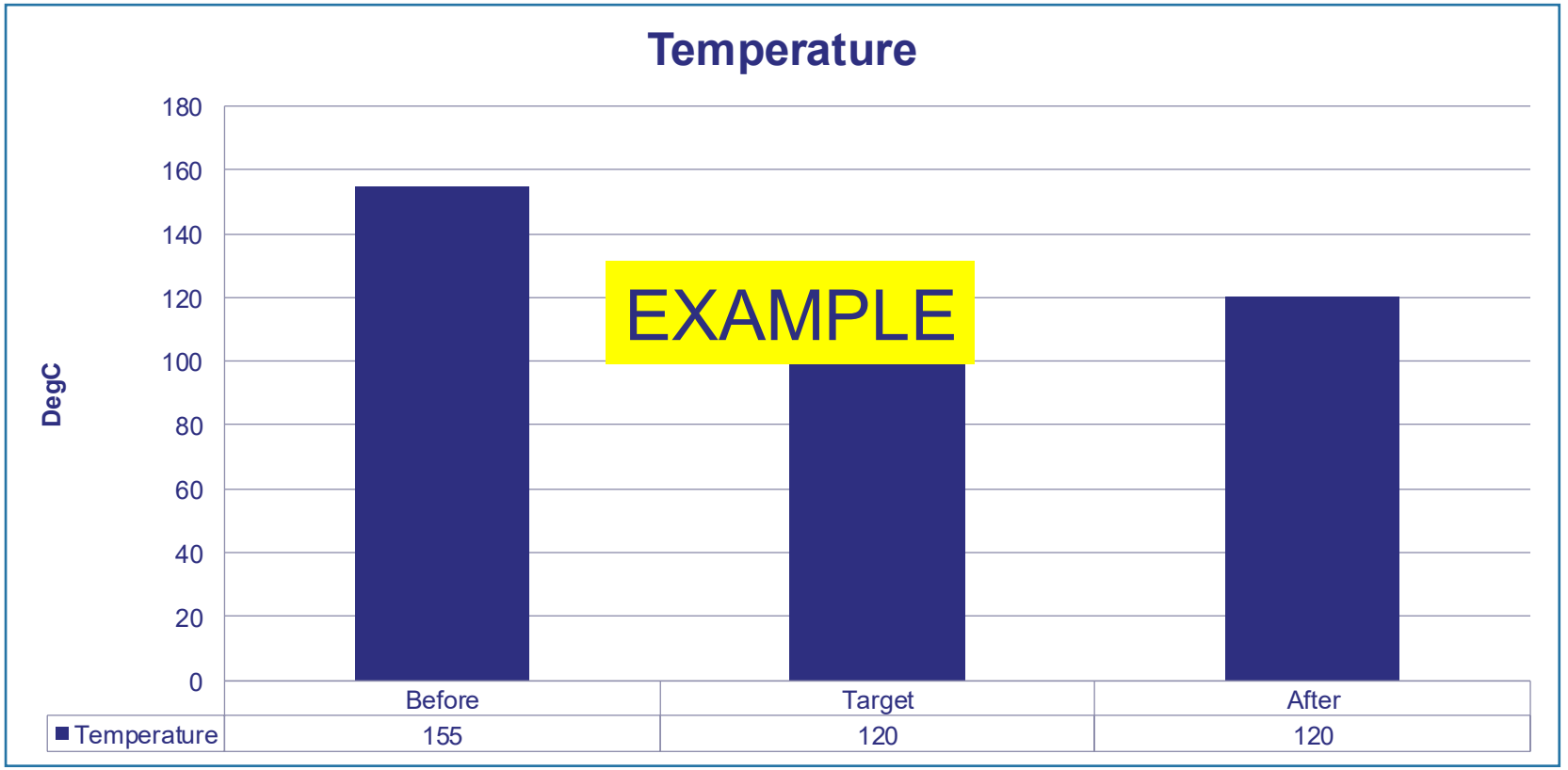
Executor CAPA/PAA	Verifier
Name :	Name :.
Date :	*Date :*

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

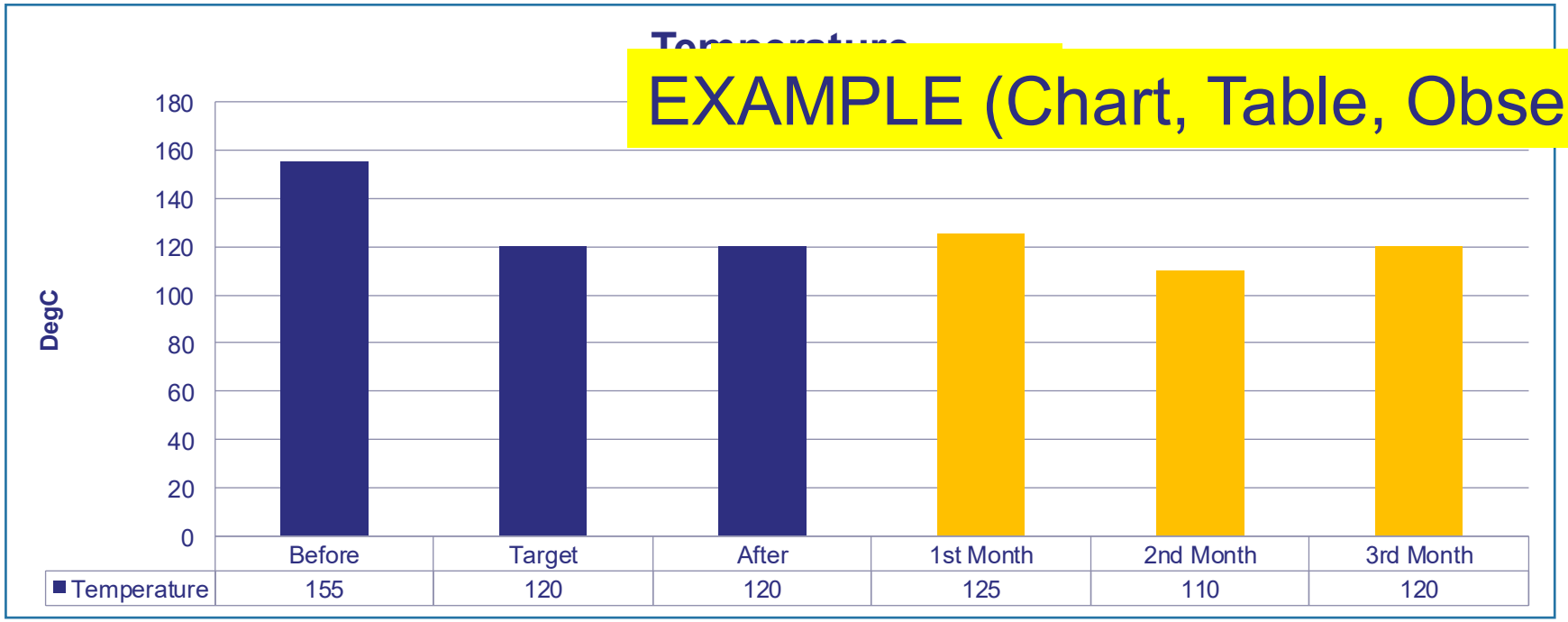
ESIC* MONITORING (REVIEWER)

*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		



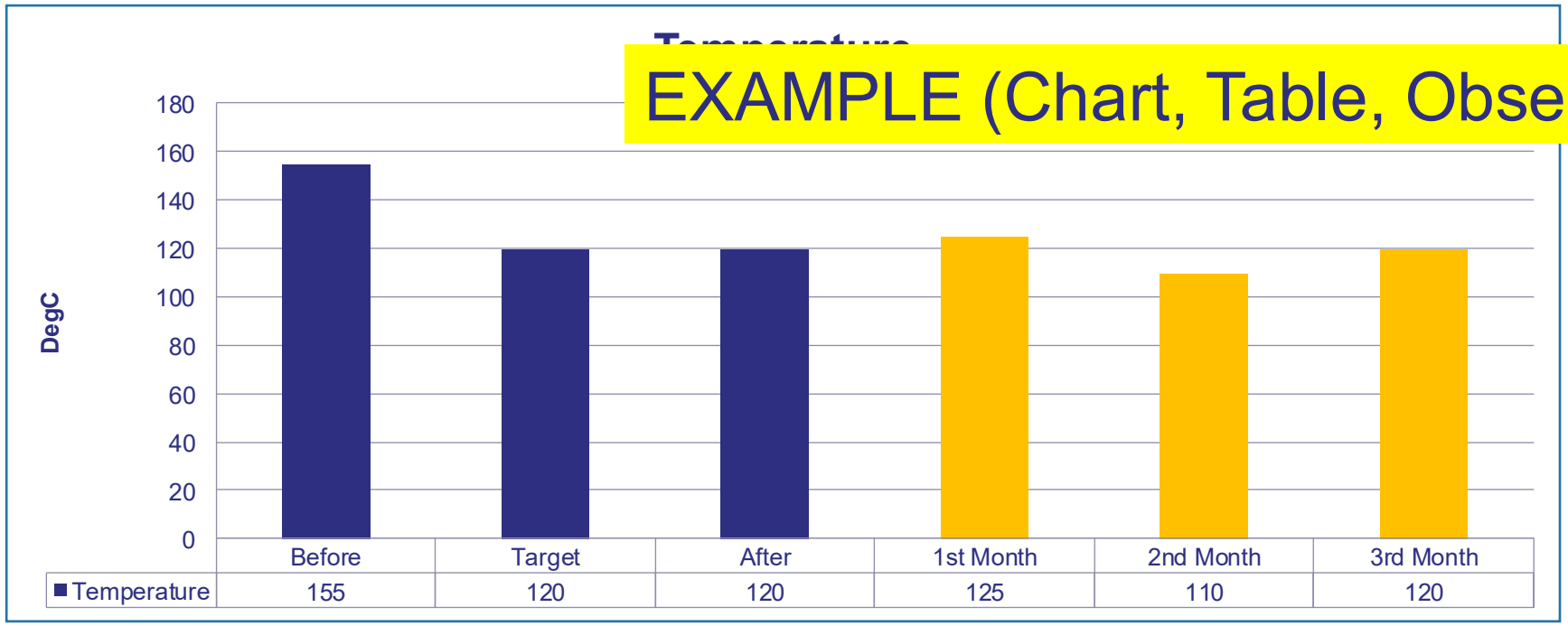
EXAMPLE (Chart, Table, Observation)

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	:	



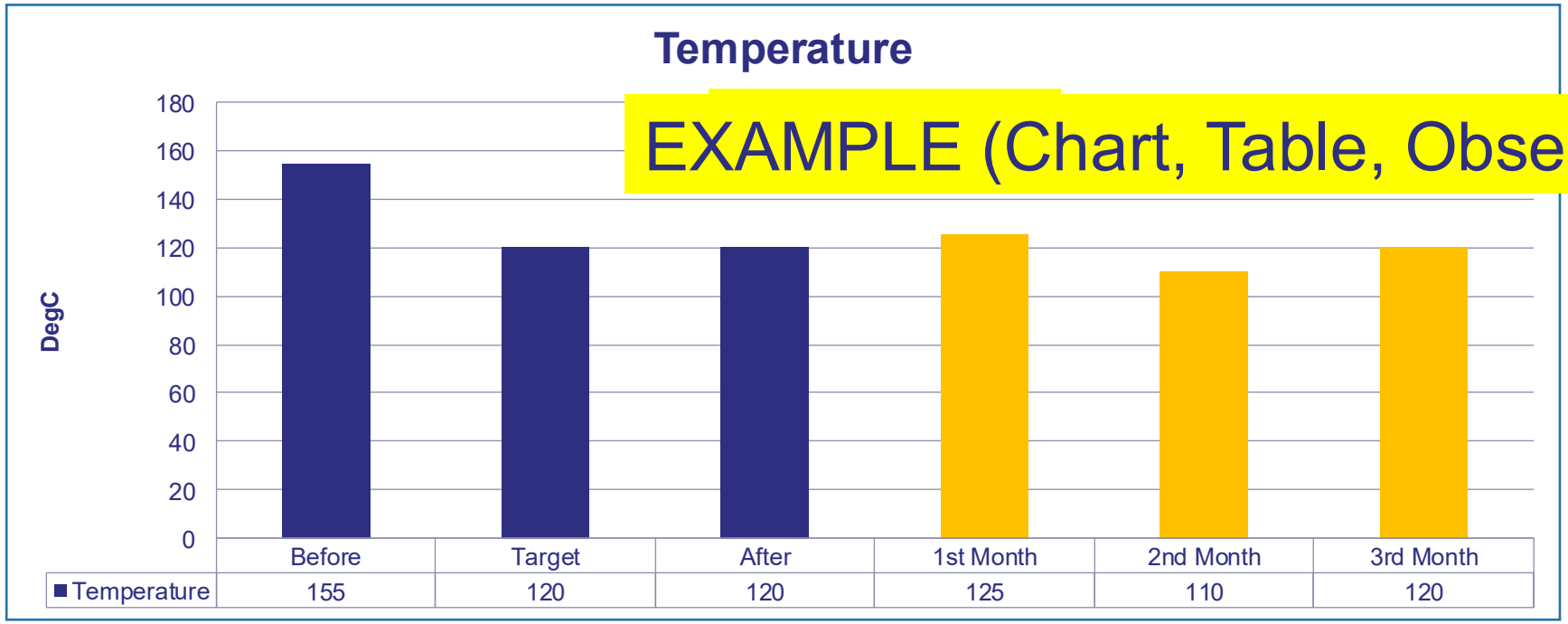
EXAMPLE (Chart, Table, Observation)

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 :*

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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

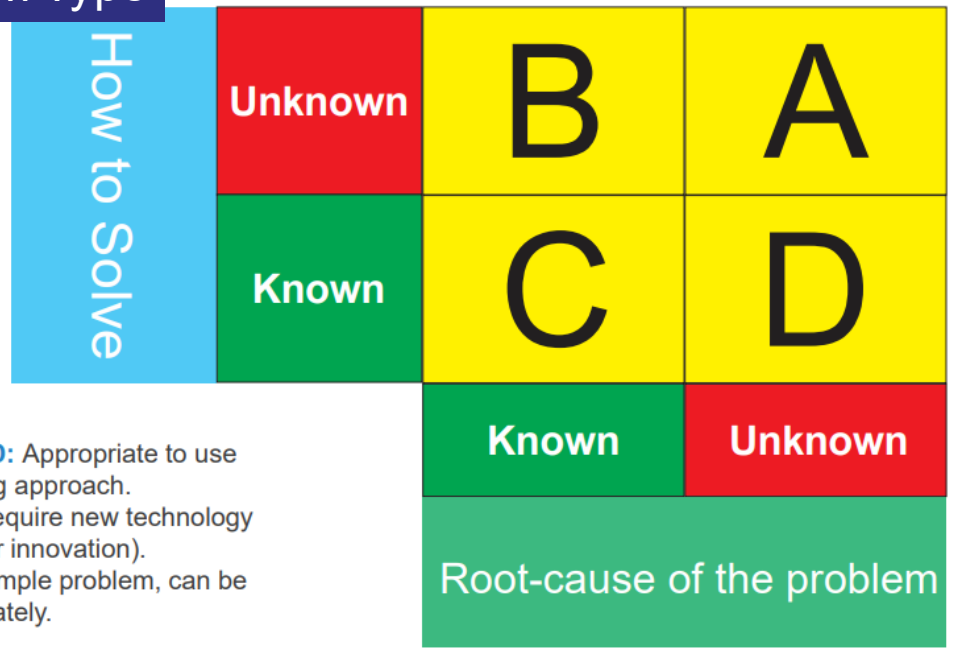
tania

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)