



IRPC Alarm management

*By SAKDA.A
05 Nov 2020*



- 1. Alarm management principle**
- 2. IRPC before alarm system installation.**
- 3. IRPC alarm management system architecture.**
- 4. Alarm elimination.**
- 5. IRPC alarm performance.**
- 6. Problem and troubleshooting**
- 7. Way forward**
- 8. Alarm benefit**

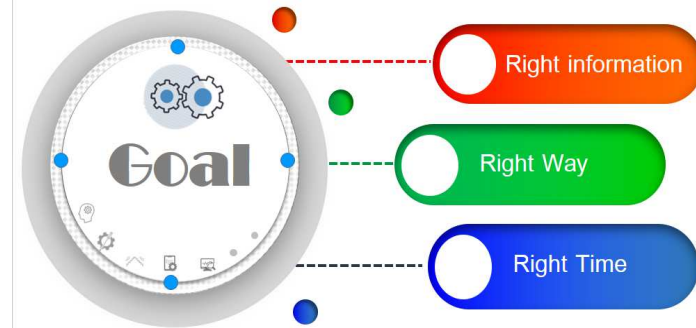
1. Alarm management principle

What is Alarm ?

- ❑ An **audible or visible** means of indicating to the operator an equipment malfunction, process deviation or abnormal condition

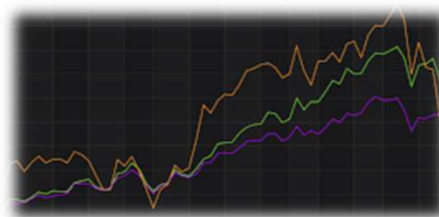


Design and manage alarm system to achieve:



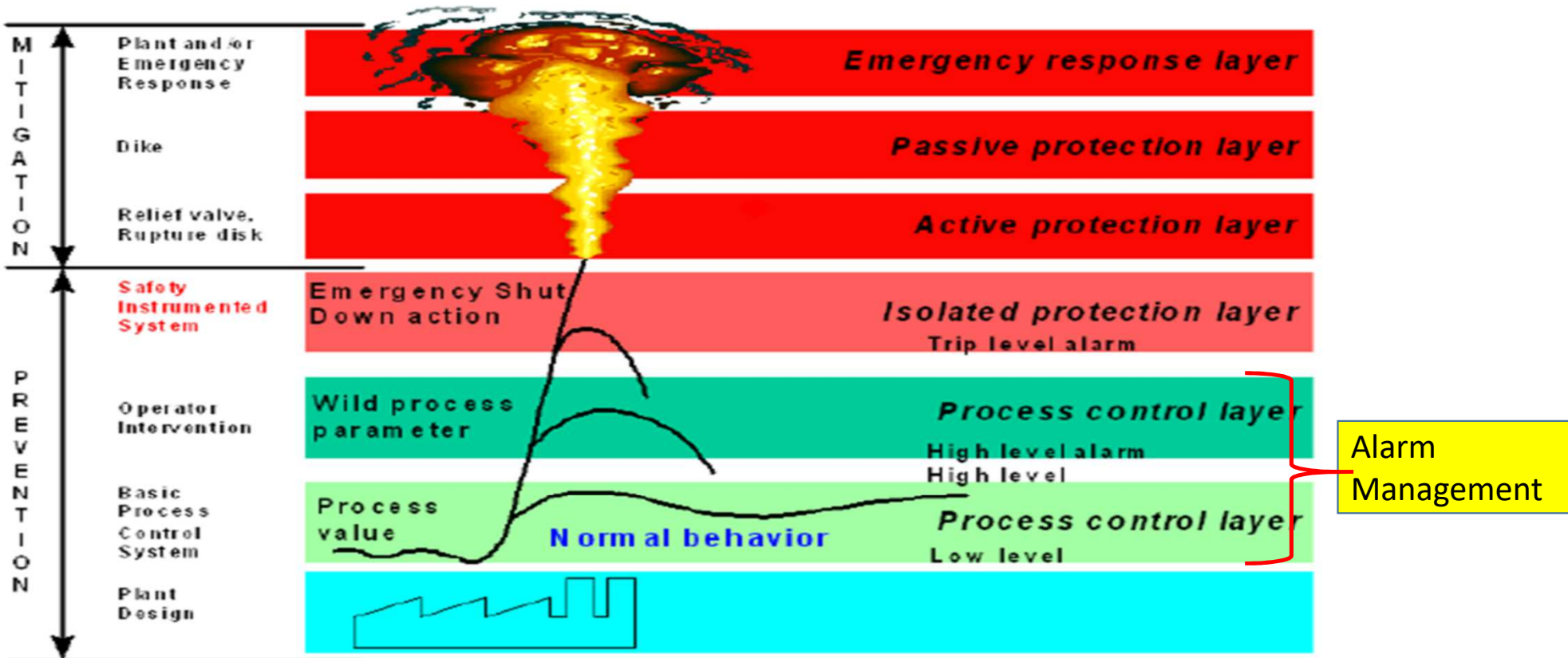
Requiring a response an action.

Integrity Operating Windows



Alarm management principle(Continue)

Why is Alarm management necessary?



Independent Protection Layers

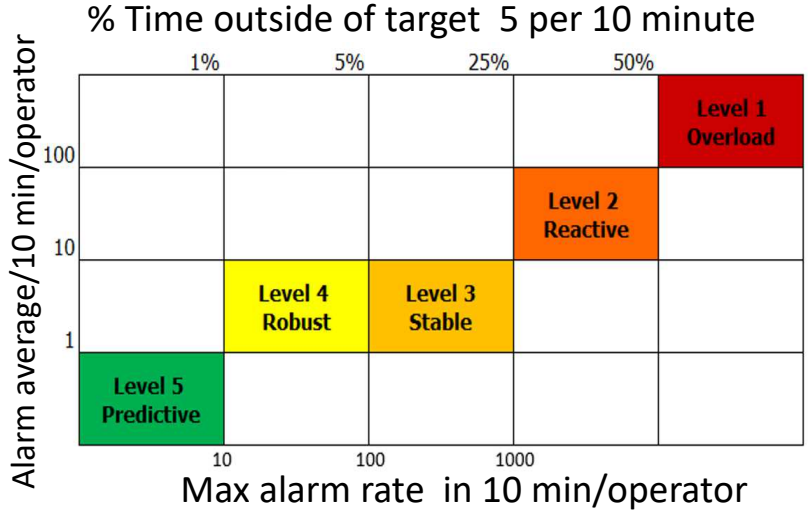
Alarm management principle(Continue)

Alarm management Benchmark Target

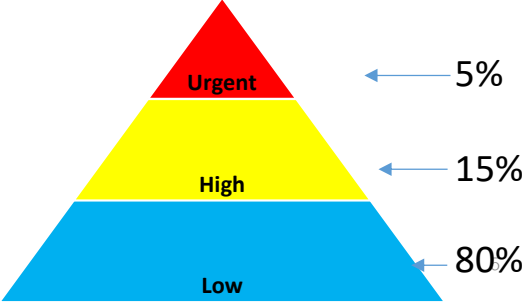
Reference:

1. Engineering Equipment and Materials Users' Association (EEMUA 191)
2. The International Society of Automation (ISA-18.2)

Alarm Performance index (API)	EEMUA 191	ISA 18.2
Alarm/day/Operator	144	~ 150
Alarm/10 Min/Operator	1	~ 1
Max alarm/10 min/Operator	<10	≤ 10
% Distribution Alarm (Priority) (Low/High/Urgent)	80/15/5	80/15/5
% Time alarm outside of target	<1%	<1%

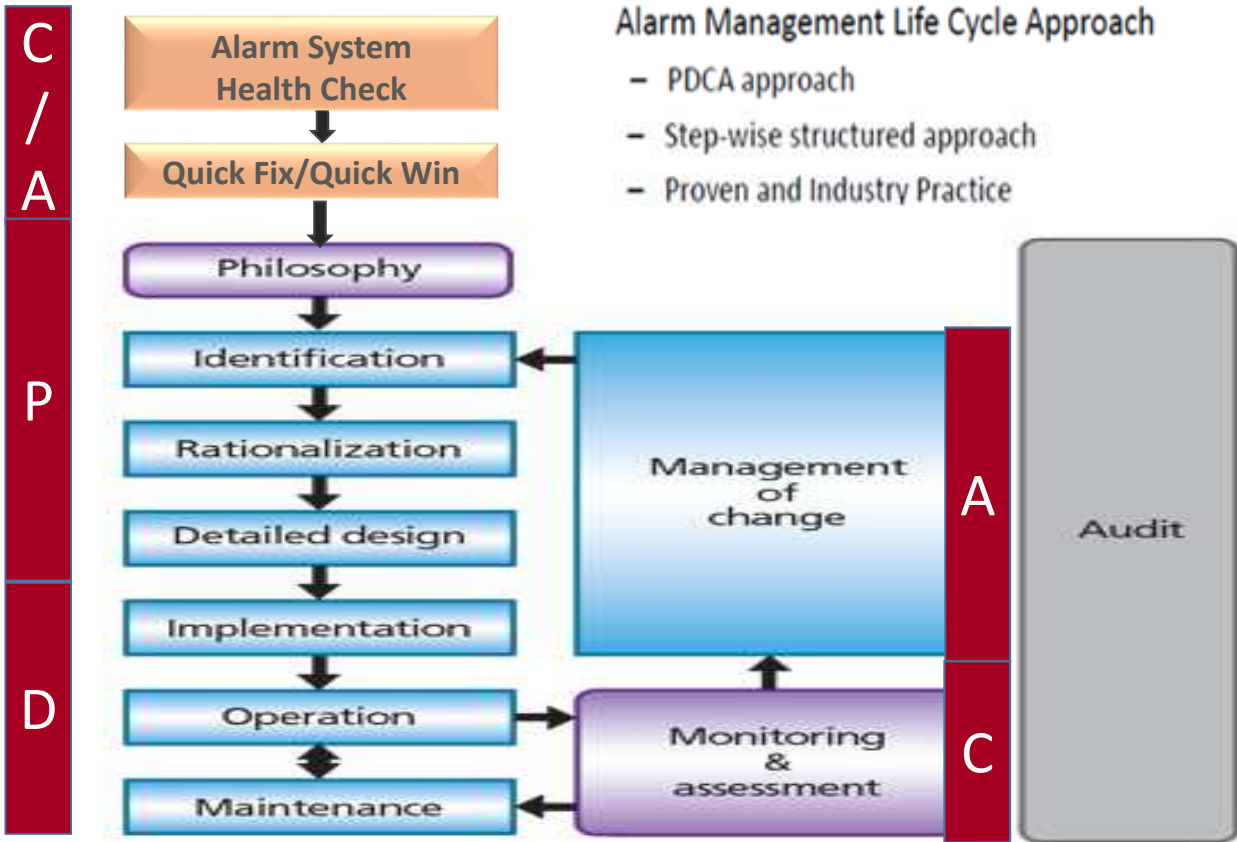


Alarm priority distribution



Alarm management principle(Continue)

Alarm Management Methodology



ISA18.2 Alarm Management lifecycle model

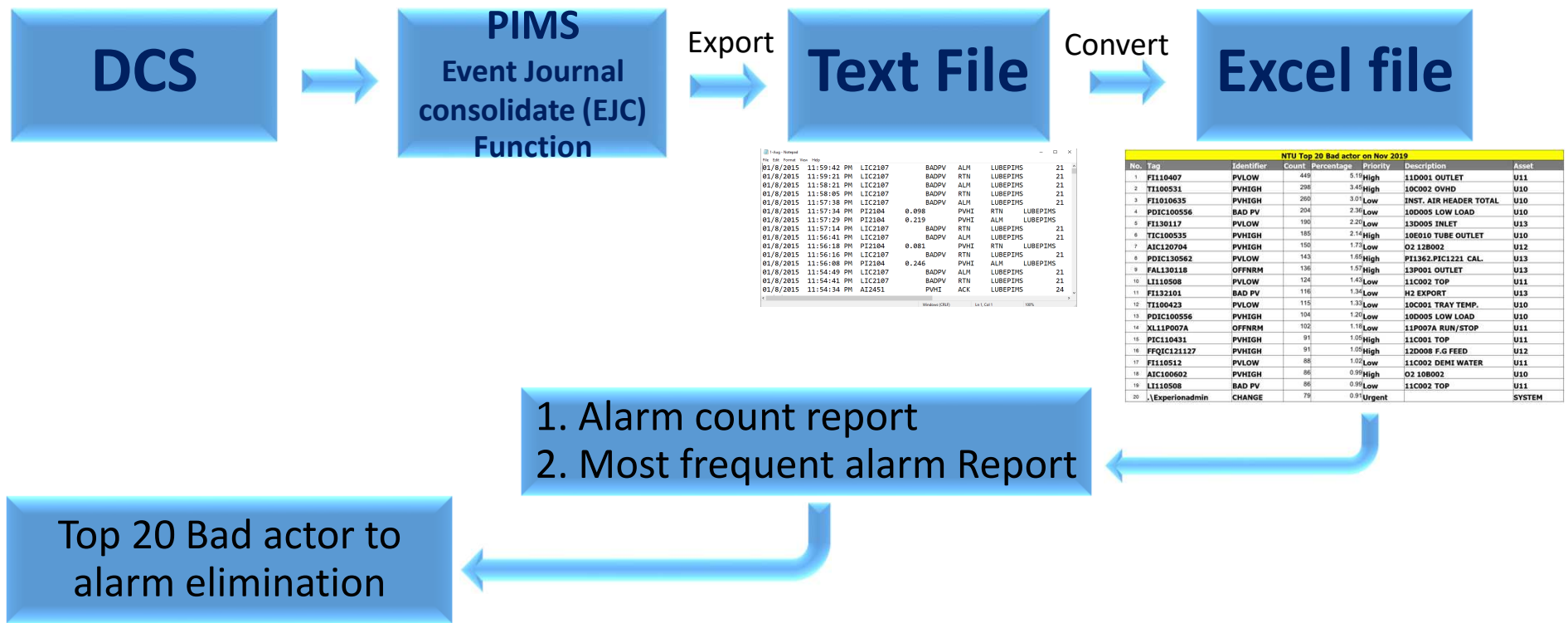
Team work



2. IRPC before alarm system installation

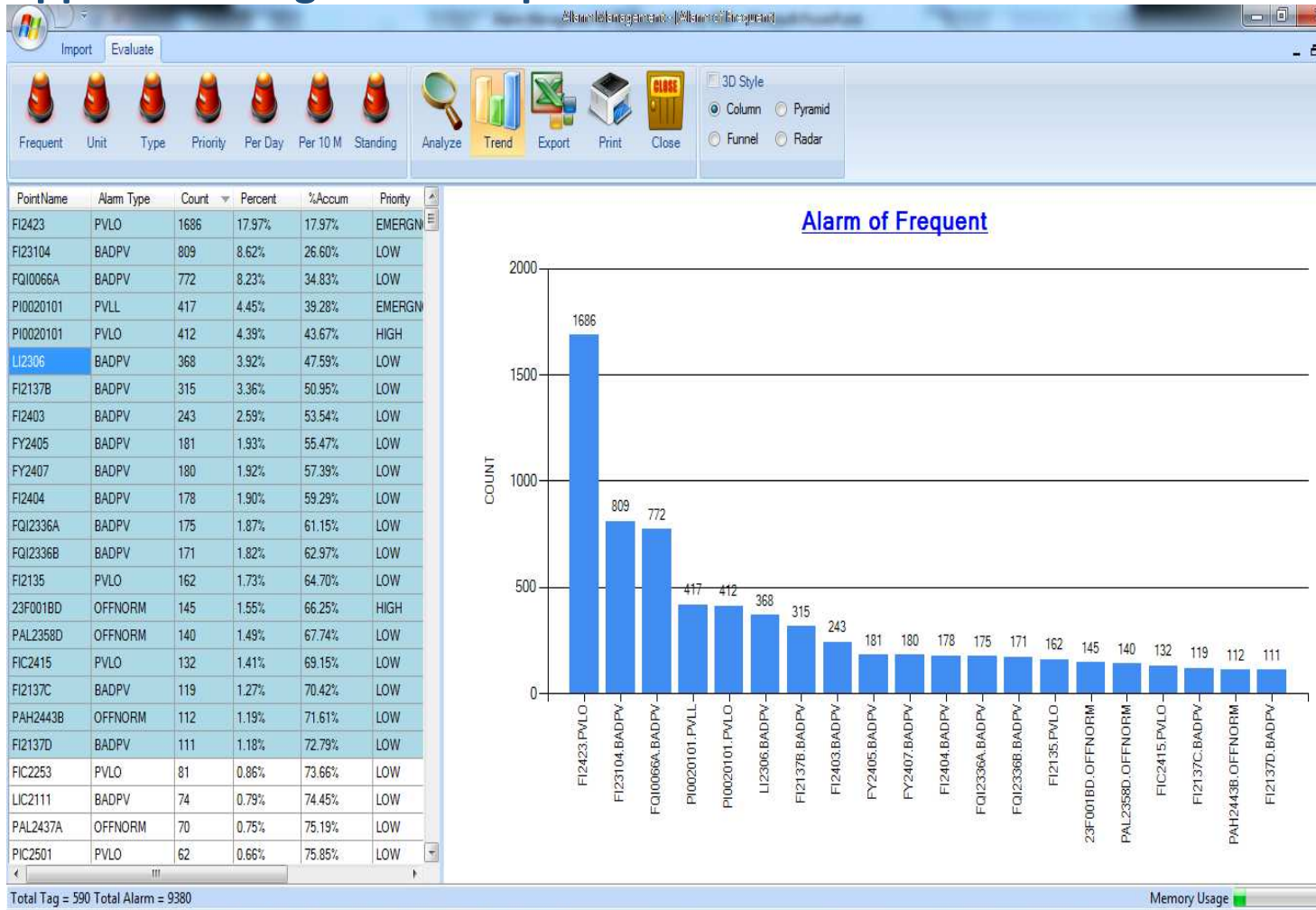
Daily data collection plant by plant (Manual)
(Start on 2014)

Alarm report by Excel



IRPC before alarm system installation (Continue)

Application to generate report



What application ability.

1. Most frequent alarm .
2. Alarm by unit
3. Alarm by type
4. Alarm by priority
5. Alarm count per day
6. Alarm average per 10 min
7. Standing alarm

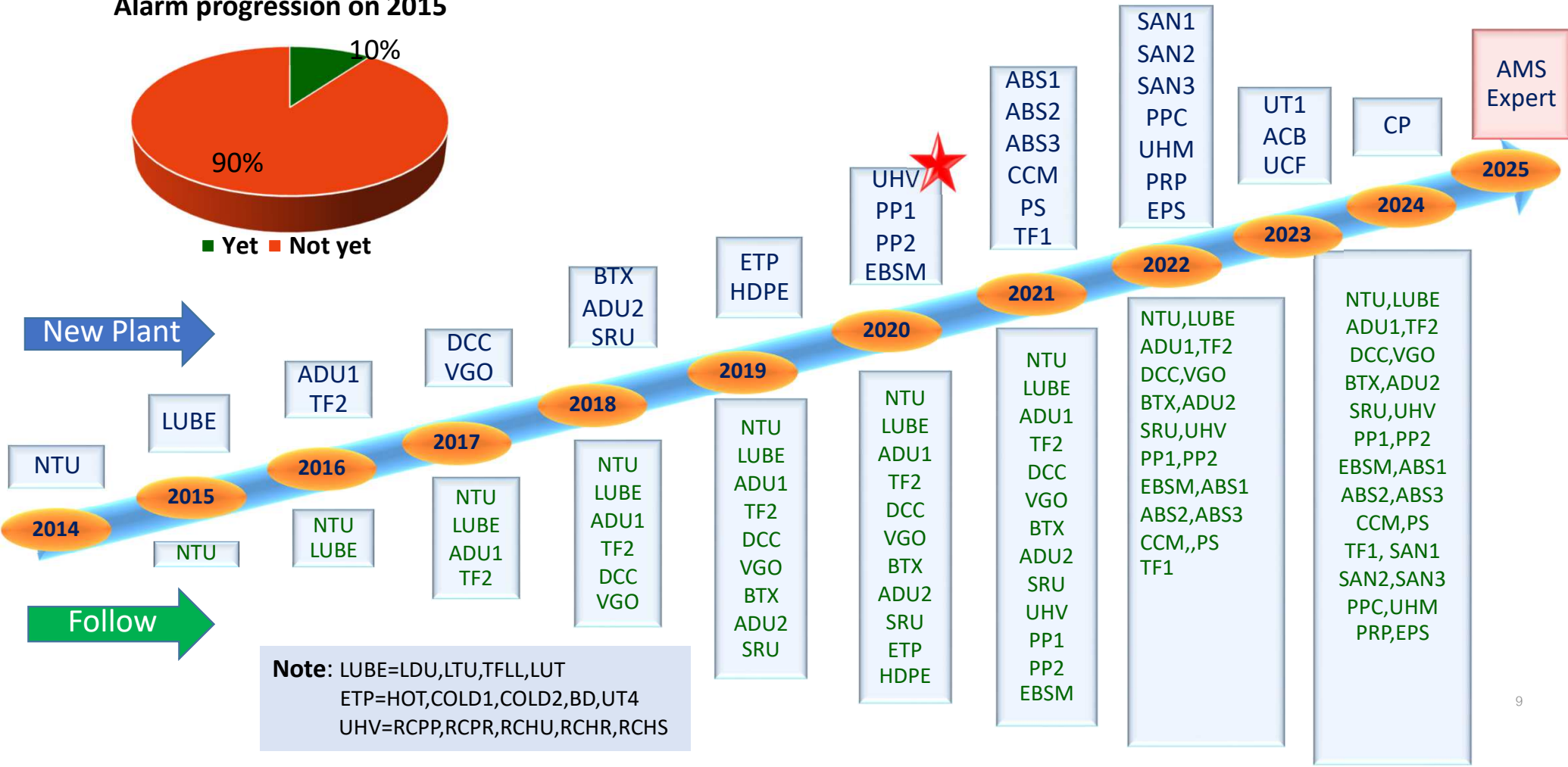
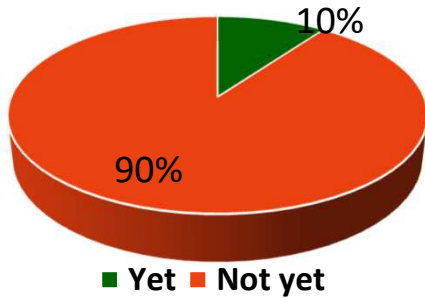
Limitation

1. Not standard tool
2. Not cover API Standard
3. Manual upload excel file for generate report.
4. Suitable for a few units

IRPC before alarm system installation (Continue)

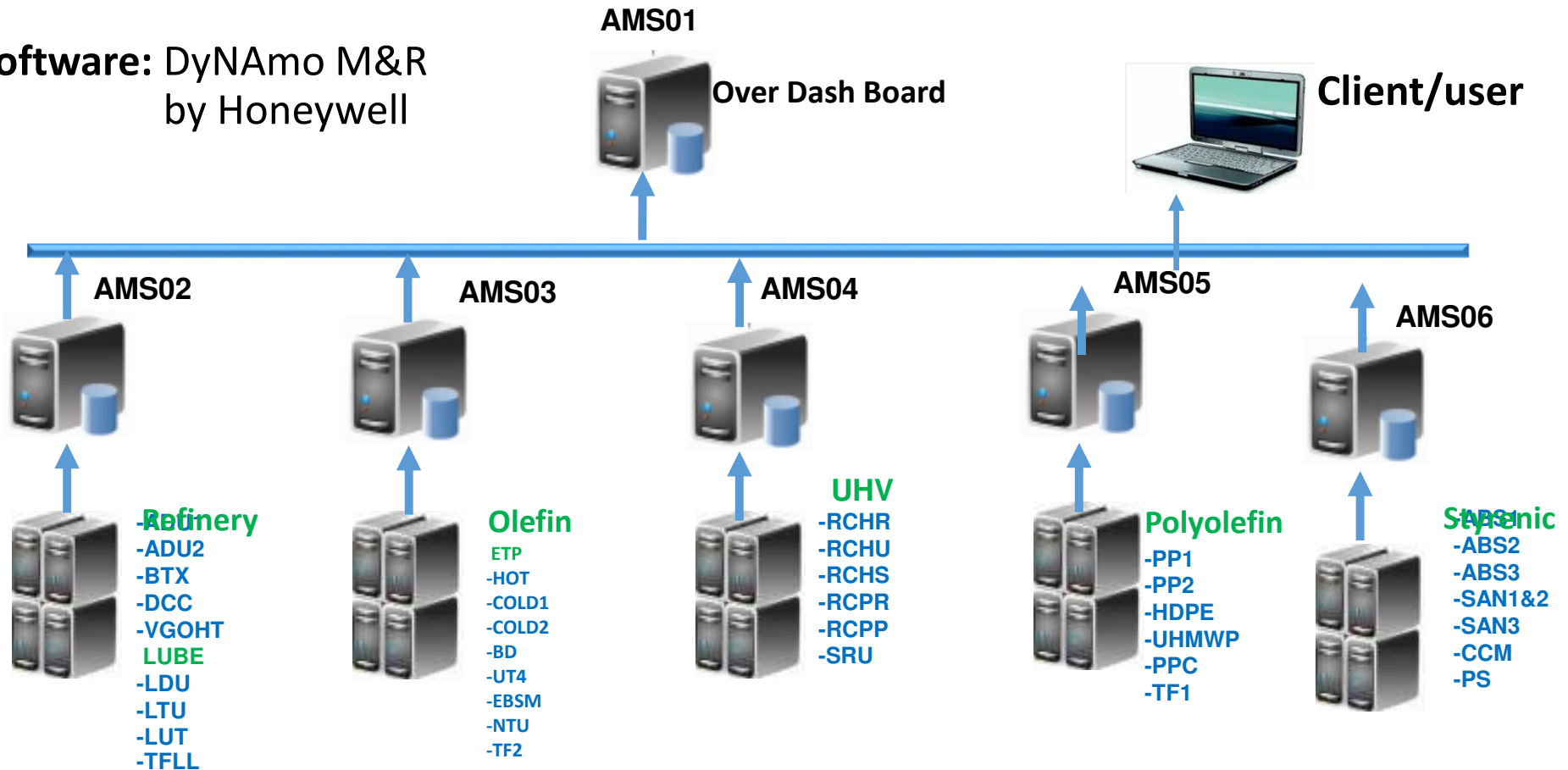
IRPC alarm management roadmap for 2025

Alarm progression on 2015



3.IRPC alarm management system architecture

Software: DyNAmo M&R
by Honeywell

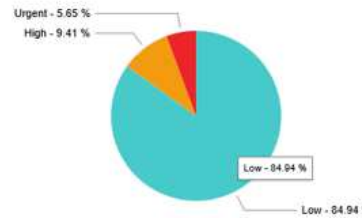
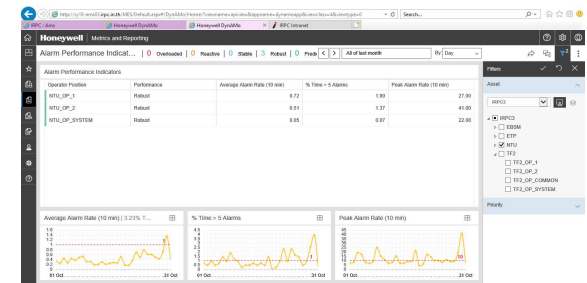
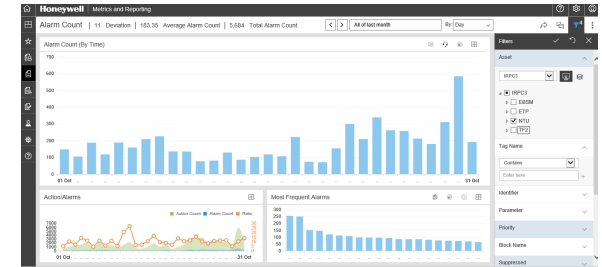


3. IRPC alarm management system architecture (continue)



Alarm performance index monitoring

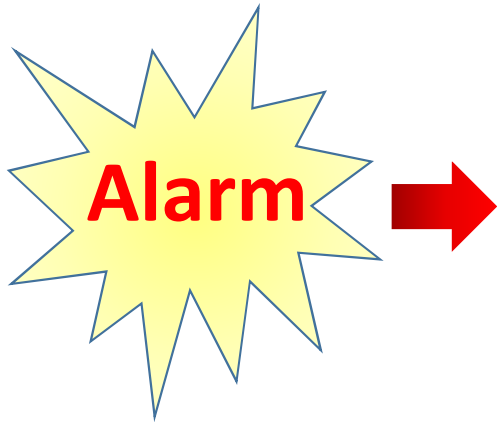
1. Alarm count : By Time, daily, weekly, monthly
: Top 20 Most frequent alarm
2. Bad actors : Fleeting alarm
: Chattering alarm
3. Alarm Performance index (API)
: Alarm average/10 min/Operator
: Max alarm /10 Min/Operator
: % Time outside of Target (5 Alarm/10 Min)
4. Priority alarm distribution
: Low/High/Urgent
: Low/Medium/High
5. Shelving and Suppression
: Tag Alarm Shelving Start –End
: Tag Disable alarm
: Tag Alarm OFF (AOF)
6. Standing & Stale alarm
: Tag alarm not return to normal but no action ≤ 24 hr
: Tag alarm not return to normal but no action > 24 hr



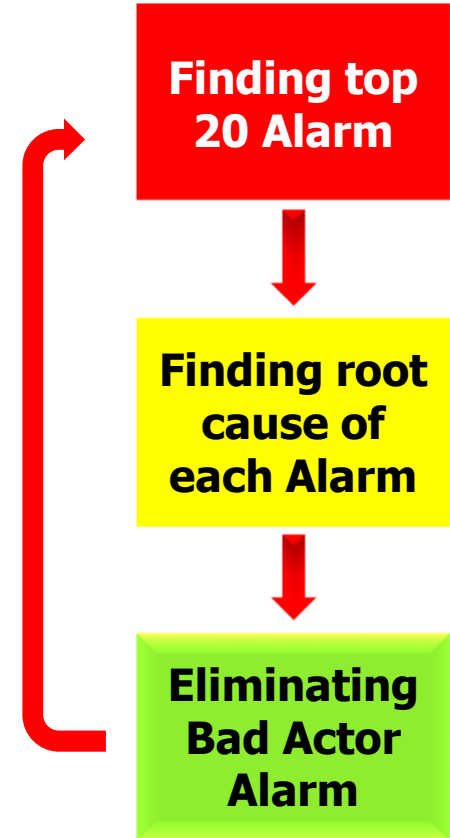
NTU Top 20 Bad actor on Nov 2019							
No.	Tag	Identifier	Count	Percentage	Priority	Description	Asset
1	FI110407	PVLOW	448	5.18	High	11D001 OUTLET	U11
2	TI100531	PVHIGH	298	3.48	High	10C002 OVHD	U10
3	FI1010635	PVHIGH	260	3.01	Low	INST. AIR HEADER TOTAL	U10
4	PDIC100556	BAD PV	204	2.38	Low	10D005 LOW LOAD	U10
5	FI130117	PVLOW	190	2.20	Low	13D005 INLET	U13
6	TIC100535	PVHIGH	185	2.14	High	10E010 TUBE OUTLET	U10
7	AIC120704	PVHIGH	160	1.73	Low	O2 12B002	U12
8	PDIC130562	PVLOW	143	1.68	High	P11362.PIC1221 CAL.	U13
9	FAL130118	OFFNRM	136	1.57	High	13P001 OUTLET	U13
10	LI110508	PVLOW	124	1.43	Low	11C002 TOP	U11
11	FI132101	BAD PV	116	1.34	Low	H2 EXPORT	U13
12	TI100423	PVLOW	115	1.33	Low	10C001 TRAY TEMP.	U10
13	PDIC100556	PVHIGH	104	1.20	Low	10D005 LOW LOAD	U10
14	XL11P007A	OFFNRM	102	1.19	Low	11P007A RUN/STOP	U11
15	PIC110431	PVHIGH	91	1.05	High	11C001 TOP	U11
16	FFOIC121127	PVHIGH	91	1.05	High	12D008 F.G FEED	U12
17	FI110512	PVLOW	88	1.02	Low	11C002 DEMI WATER	U11
18	AIC100602	PVHIGH	85	0.99	High	O2 10B002	U10
19	LI110508	BAD PV	85	0.99	Low	11C002 TOP	U11
20	\Experadmin	CHANGE	79	0.91	Urgent		SYSTEM

4. Alarm elimination

Typically Bad Actor Alarm Type

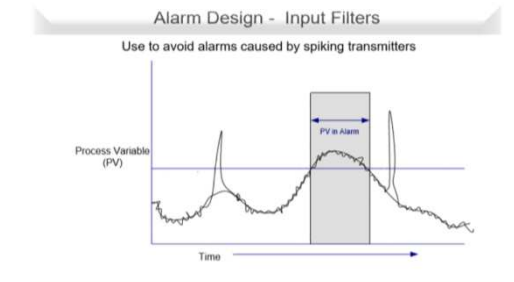
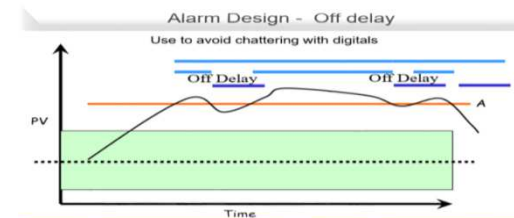
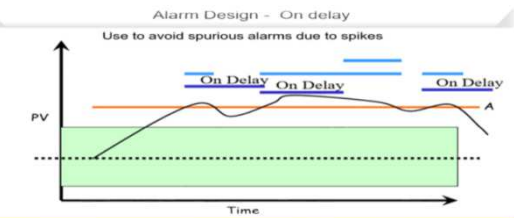
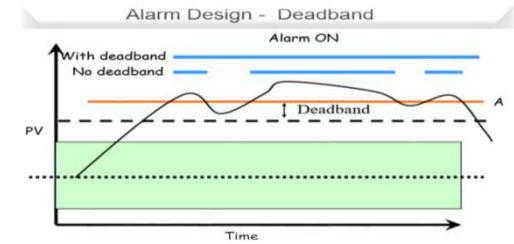


Bad Actor type	Description
xxxx.PVH	Alarm High
xxxx.PVHH	Alarm High-High
xxxx.PVLO	Alarm Low
xxxx.PVLL	Alarm Low-Low
xxxx.BadPV	Bad value
xxxx.IOP	Bad value
xxxx.OPHI	%Valve output High
xxxx.OPLO	%Valve output LOW
xxxx.MHI	%Valve output High
xxxx.MLO	%Valve output LOW
xxxx.ALM	Alarm
xxxx.ANS	Answer back



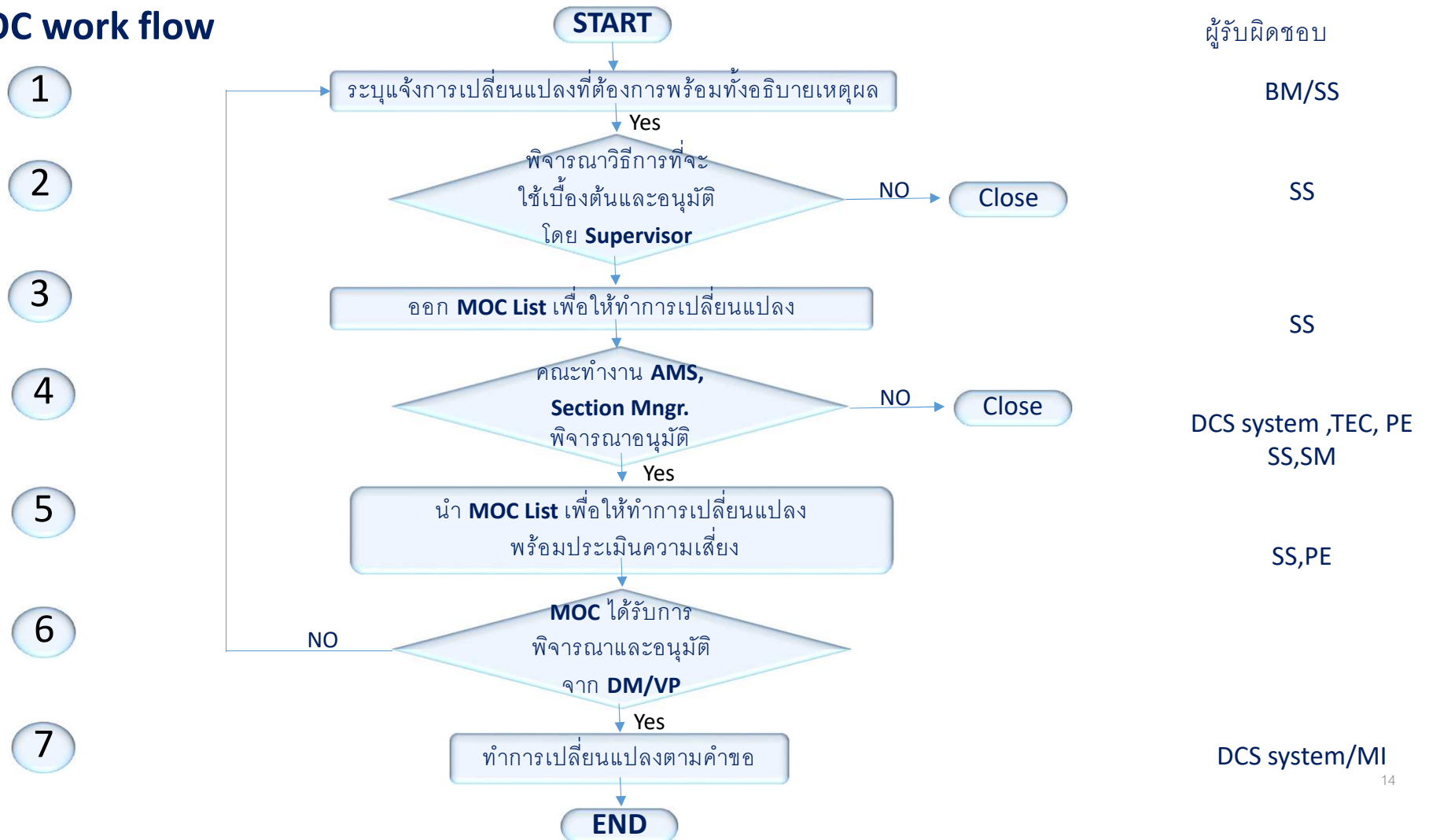
How to Eliminate Bad actor alarm

- 1 Alarm limit adjust refer: ROW/SOW/IOW
- 2 Instrument or system improvement : Error or failure
- 3 Alarm Dead Band or Alarm Hysteresis
- 4 Add Time Filter/ On-Delay/Off-Delay
- 5 Remove alarm : Change priority to journal or logging
- 6 Shelving /Suppression: Disable , AOF
- 7 Block flow logic modification or Controller PID tuning



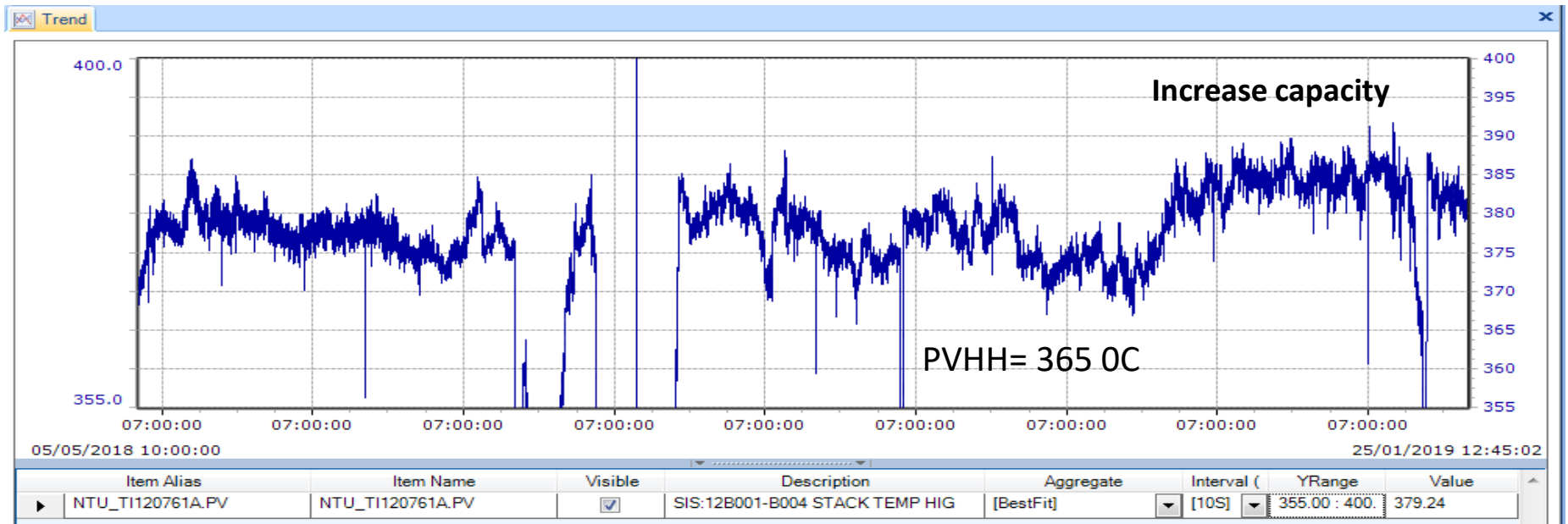
Alarm elimination(continue)

MOC work flow



Example 1: Alarm due to Alarm limit setting improper.

MOC-12-2018027	TI.120761A	TEMP STACK 12B001-4	PVHH=365 ,PVH=360 OC	PVHH=390, PVHI=387 OC	Change alarm setting for safety operation	Sakda(TEC)	Wiyawit (NTU)
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Before

PVHI= 360 OC

PVHH = 365 OC

Standing alarm PVHI , and Alarm PVHH

Adjust Alarm Setting to

PVHI = 387 OC

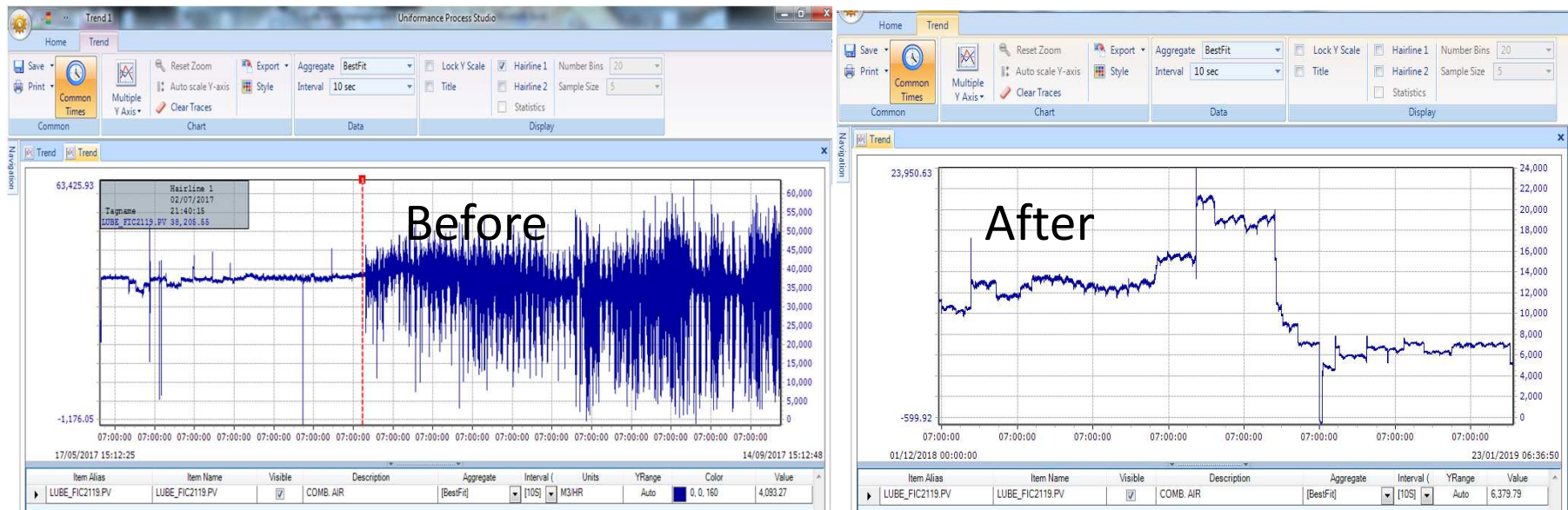
PVHH =390 OC

Refer IOW and material design by Process engineer

(Reduce alarm PVHI,& PVHH)

Example 2: Alarm PVLO due to instrument error

Top 20 Alarm on Aug 2017 meeting on 14 Sep -2017												
No.	PointName	Alarm Type	Count	Percent	Priority	Description	PVLL	PVL	PVH	PVHH	Cause of Alarm	14-Sep-2017
2	FIC2119	PVLOW	685	3.4%	Low	21B001 AIR FLOW CONTROL		5000.0			impulse line to transmitter was plugging	notification to flushing impulse line , because of change new transmitter already but flow still error



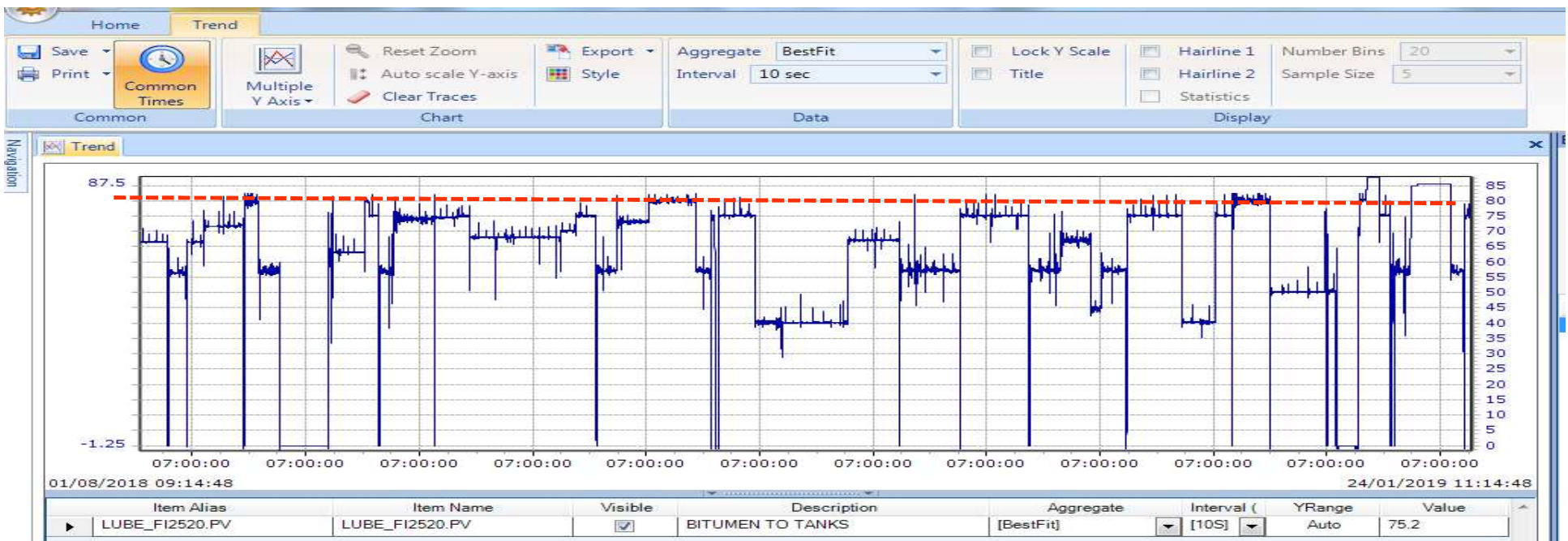
Root cause analysis at flow error

- Flow cleaning and calibration
- Change flow transmitter
- Clean impulse line , after cleaning flow back to normal operation no alarm

Alarm elimination(continue)

Example 3: BadPV due to operate at high limit of flow range.

8	FI2520	BAD PV	346	1.72%	Low	BITUMEN TO TANKS	flow badPV(High) due to high capacity > 80 T/hr (flow EUHI range high =80 T/Hr)	consider to expan flow rage 0-80 to 0-100 T/hr
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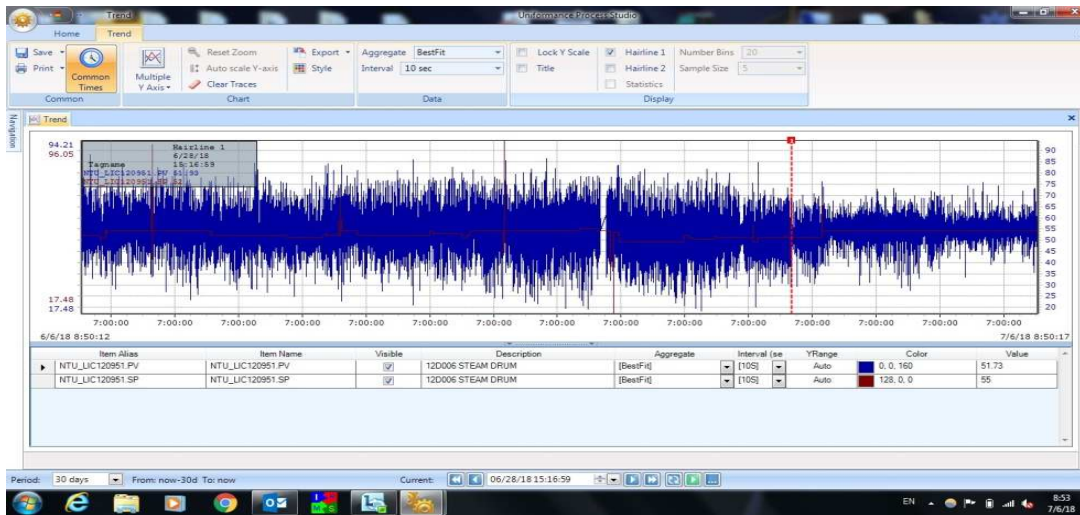


Expansion flow rage 0-80 to 0-100 T/hr , alarm count BadPV= 346 alarm /month

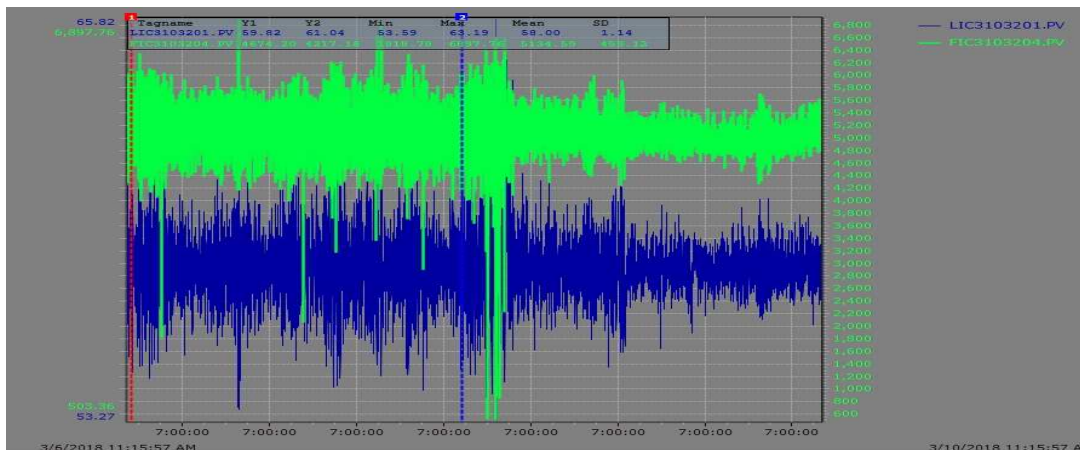
Now no alarm

Alarm elimination(continue)

Example 4: PID tuning controller



Controller PID Tuning to keep smoothly operation at LIC120951.PV

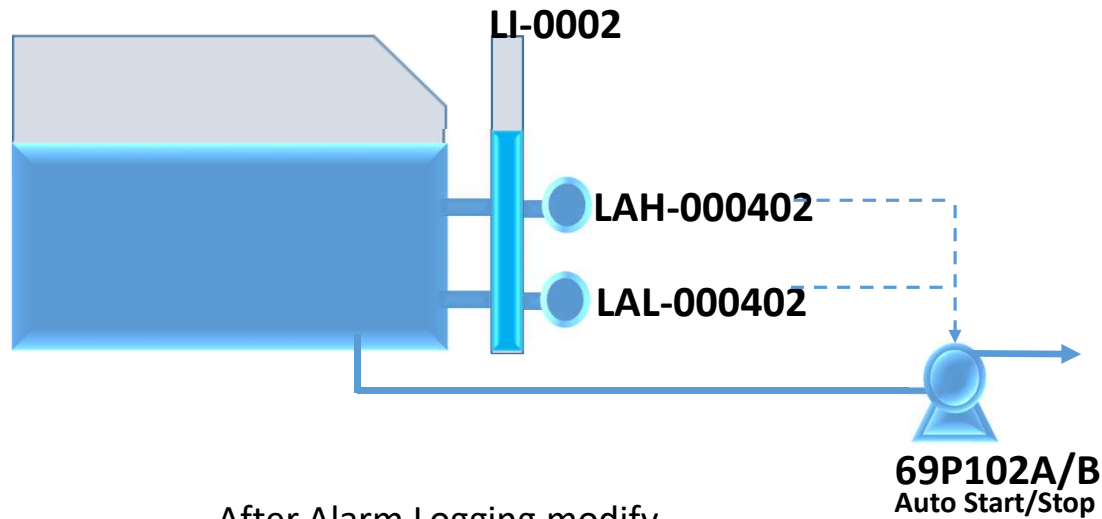


Controller PID Tuning for

- FIC3103204.PV (Slave loop) alarm PVLO
- LIC3103201.OP (Master loop)

decrease deviation at controller to decrease alarm PVLO

Example 5. CPI System alarm improvement



Existing (Level High)

LI-0002 alarm = **PVHI**
LAH-000402 alarm= **OFFNORM**
69P012A/B (Auto Mode) alarm **Start**

Existing (Level LOW)

LI-0002 alarm = **PVLO**
LAL-000402 alarm= **OFFNORM**
69P012A/B (Auto Mode) alarm **Stop**
Note: (1 Cycle= 6 alarm)

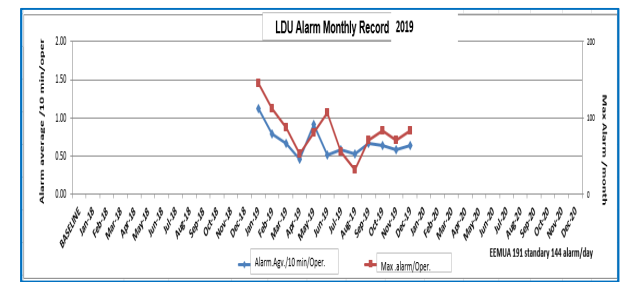
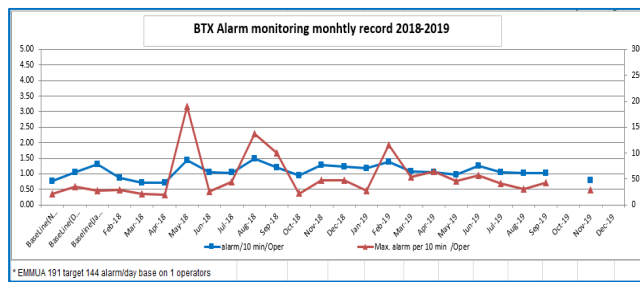
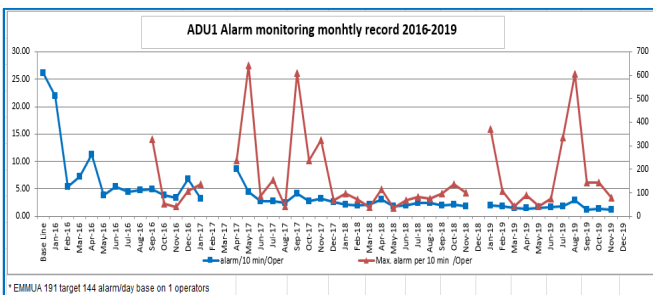
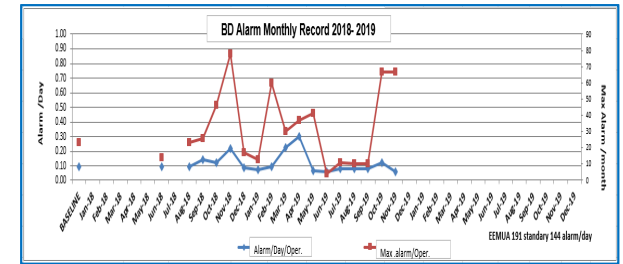
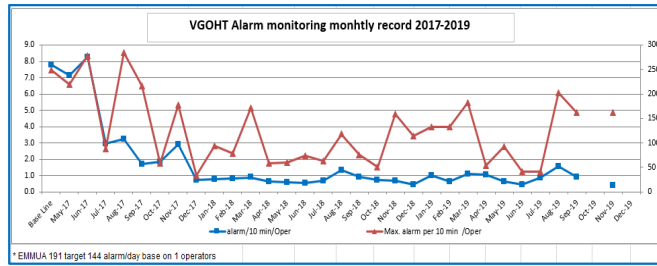
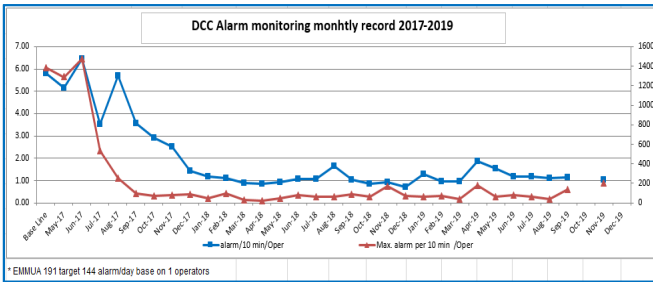
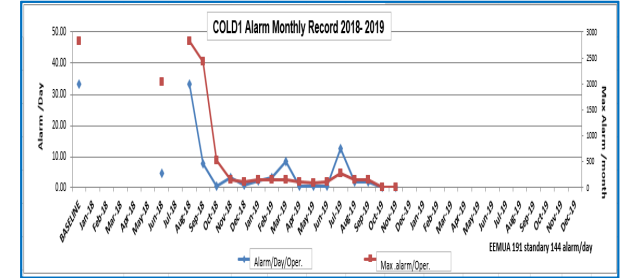
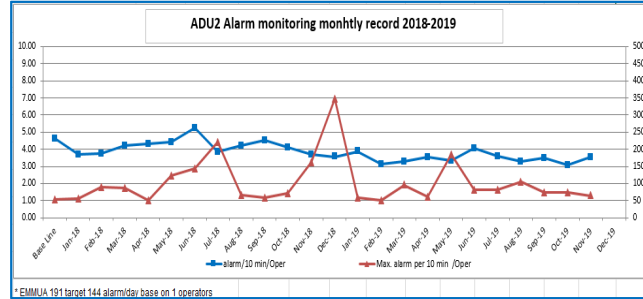
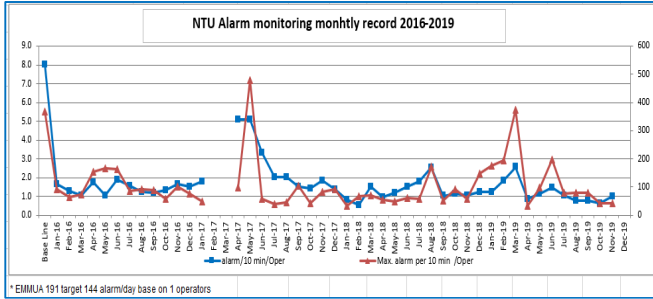
After Alarm Logging modify

1. LAH signal to Start pump 69P102A/B but not notification alarm to DCS
2. LAL signal to Stop pump 69P102A/B but not notification alarm to DCS
3. Pump 69P102A/B setting AUTO Start/ Stop and not notification alarm to DCS if action correct
4. Setting alarm High at LI-0002.PVH = 85% (Pump start at 80% (LAH action)
5. Setting alarm LOW at LI-0002.PVLO=15% (Pump Stop at 20% (LAL action)

IRPC alarm performance on Jan 2020(continue)



Alarm count monthly record



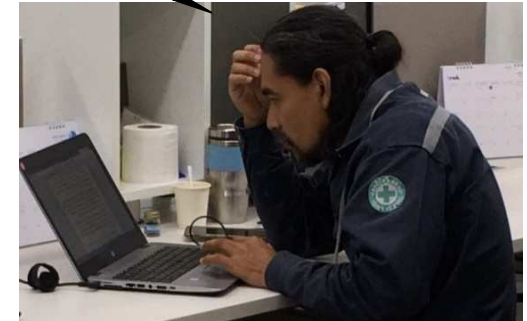
AMS System

1. Program limitation
2. Hardware limitation

How can
I fix this?

People

- 1.Team knowledge
- 2.Team participation ,plant participation
- 3.MOC approval process with more of plants
- 4.Manager conformation with alarm management



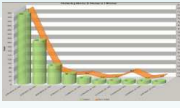
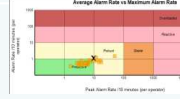


Way Forward

1. Apply AMS program (Limitation) by IRPC for report and monitoring.
2. Apply AMS for Operating Window real time monitoring
3. Alarm database and alarm enforcement system



8. Alarm Benefits

No	Direct	No	Indirect
1	 <p>Safety operation</p>	1	Safety awareness
2	 <p>Reliability</p>	2	Process investigate and problem solving
3	<p>Reduce Alarm load</p>	3	Competency and Knowledge Transfer
4	 <p>Alarm Quality</p>	4	Support OPW/IOW
		5	Unplan Shut down reducing

Alarm management is not just to reduce the number of alarms, but to manage the use of alarm effectively. By.K Wichai (VP RE)

THANK YOU