

GREATER BONGKOT SOUTH AUTONOMOUS SYSTEM



Rev.2

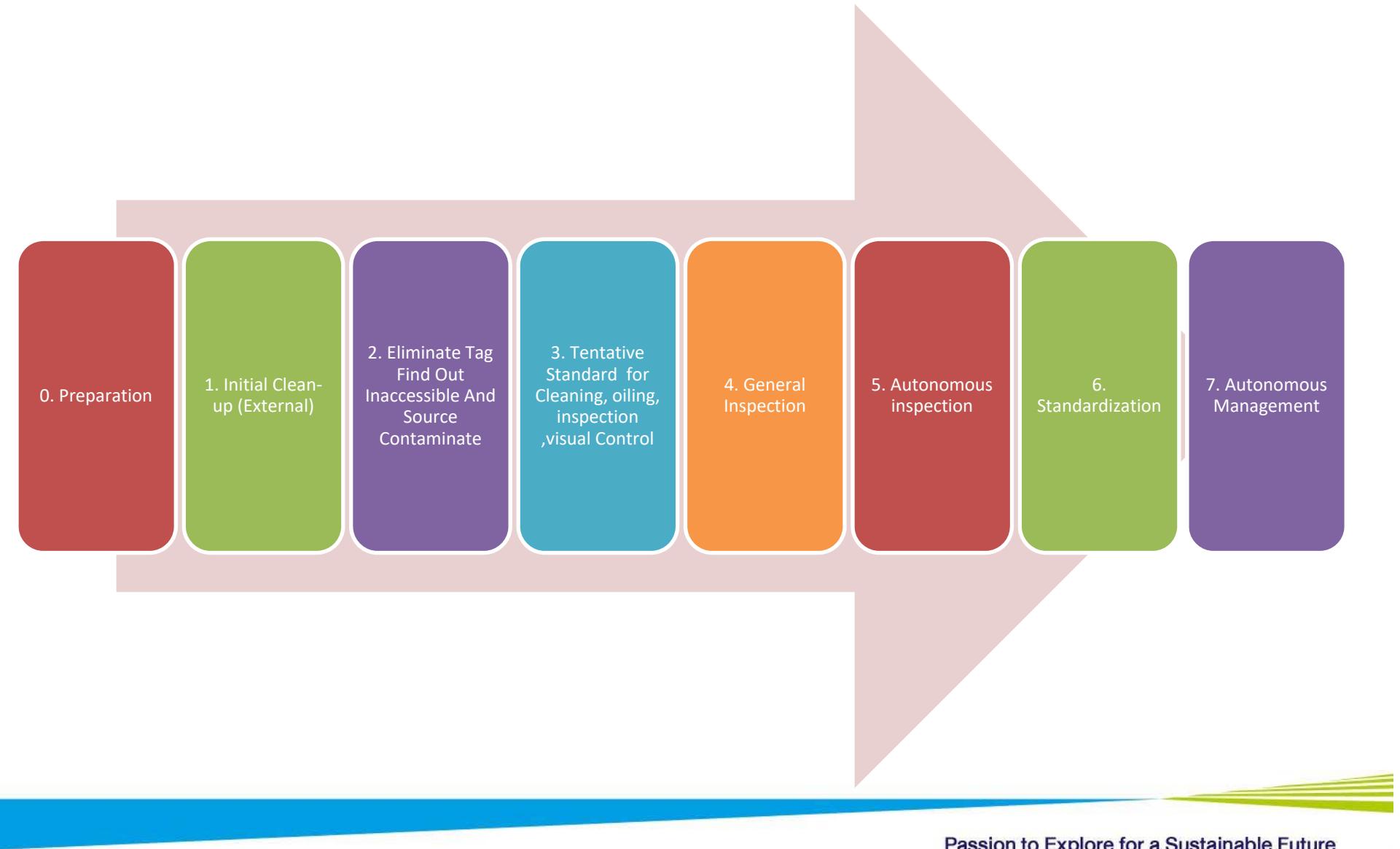
INTRODUCTION

- Autonomous maintenance is “independent” maintenance carried out by the operators of the machines rather than by dedicated maintenance technicians.
- This is core concept of TPM or Total productive maintenance, much like TQM (total quality management).





Methodology Steps of Autonomous Maintenance



Benefits



**TARGET
ZERO**

Breakdown

Accident

Off-spec



Greater Bongkot South Autonomous Initiation



PTT Exploration and Production Public Company Limited
A Company of PTT Group

Memorandum

FROM: PBS/F
TO: PBS/P, PBS/M
CC: PFO, PBS/FS, PBS/FL, PBS/FN, PBS/FI, OTFW/
Paison A (PMI/R)

REF: 341/M001/2015
DATE: 27th July 2015

SUBJECT: Autonomous Maintenance Task Force team

We commit to implement the Autonomous Maintenance System in order to increase the productivity of plant and improve the integrity of production through the machines, equipment, processes, and employees. A dedicated task force team is assigned to define the scope of GBS autonomous, generate the work plan and achievement of each phase, direct and ensure that autonomous is properly implemented and is continuously improved.

This task force team composes of the following members:

- Field Manager Task Force team adviser
- Production Superintendent Task Force team Leader
- Maintenance Superintendent Task Force team Technical support leader
- Production coordinator Task Force team member
- Production Shift supervisor Task Force team member
- Production Skilled operator Task Force team member
- E& I supervisor Task Force team member
- Mechanical supervisor Task Force team member

The Task Force team to conduct regular meetings and maintain proper reports of the progress.



Kittitat M
PBS/F

« To increase productivity of plant and improve integrity of production through machines, equipment, processes, and employees. » --PBS/F

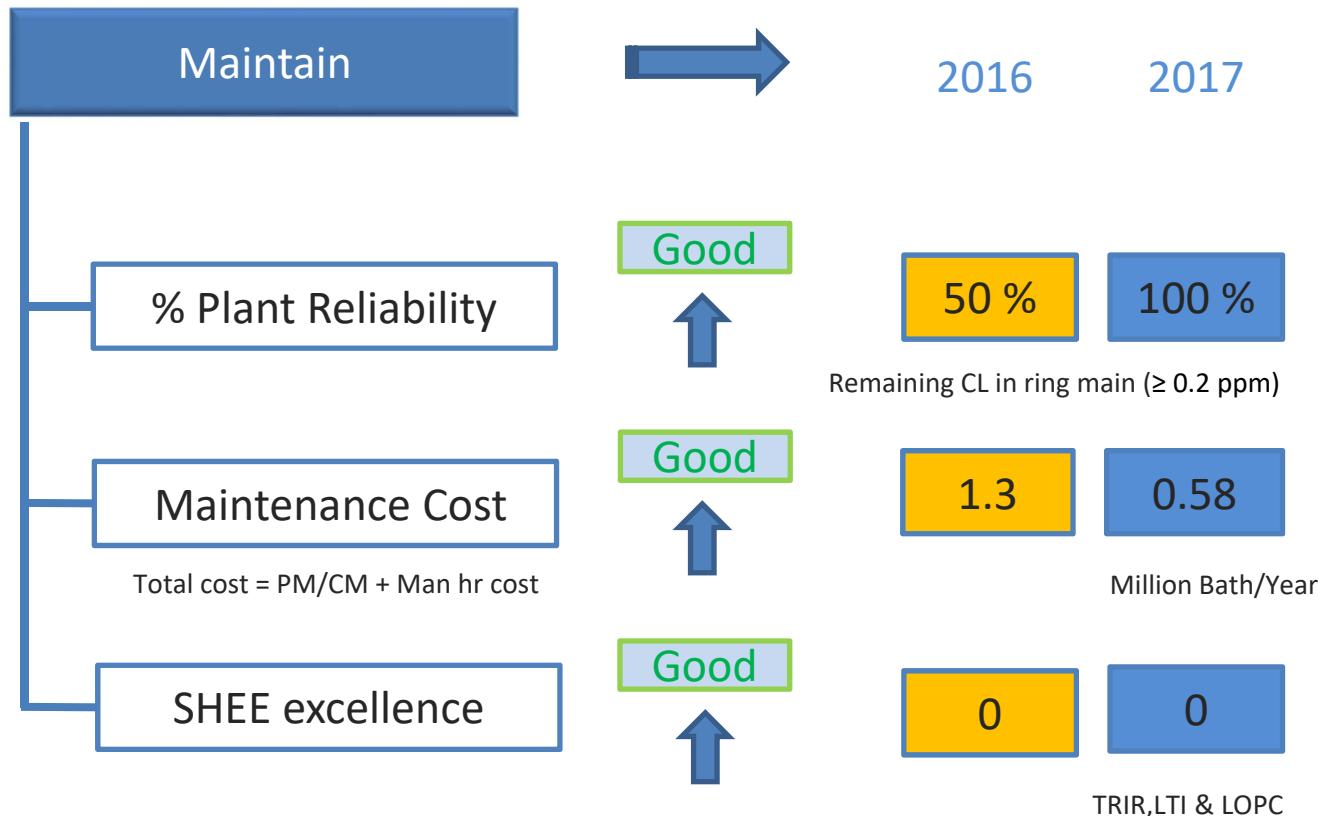
Targets to improve (KPI) AM manager model 2017

Hoshi Kanri

					number of LTIF does not exceed 0.6/MMhrs				
					Loss of primary containment rate does not exceed 0.17/MMhrs	O			
				●	2017 OPEX reduction by 10%	O	●	●	O
PBS/P Objectives					Targets to improve (KPI)				
PMI Objectives					Minimum concentration of Cl equivalent must be $\geq 0.2 \text{ ppm}$				
PBS Objectives					cost of maintenance of the unit reduced by 10% comparing to 2016				
zero accident (TRIR for medical treatment)					maintenance man-hour of the unit reduced by 10% comparing to 2016				
Zero unexpected shutdown					number of unit breakdown reduced by 10% comparing to 2016				
Complied with SPEND SMART campaign									

- Primary correlation
- Secondary correlation

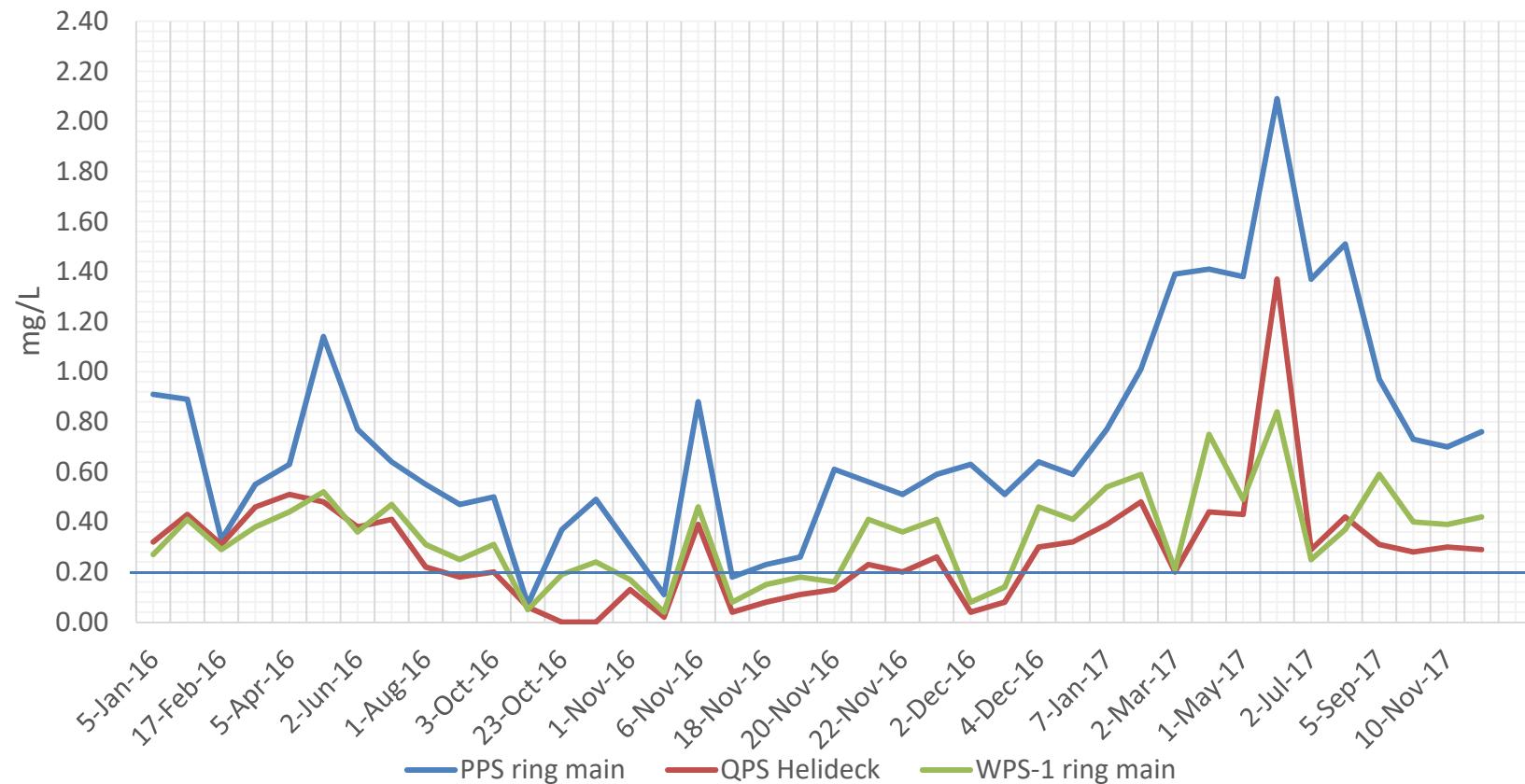
AM KPI 2017



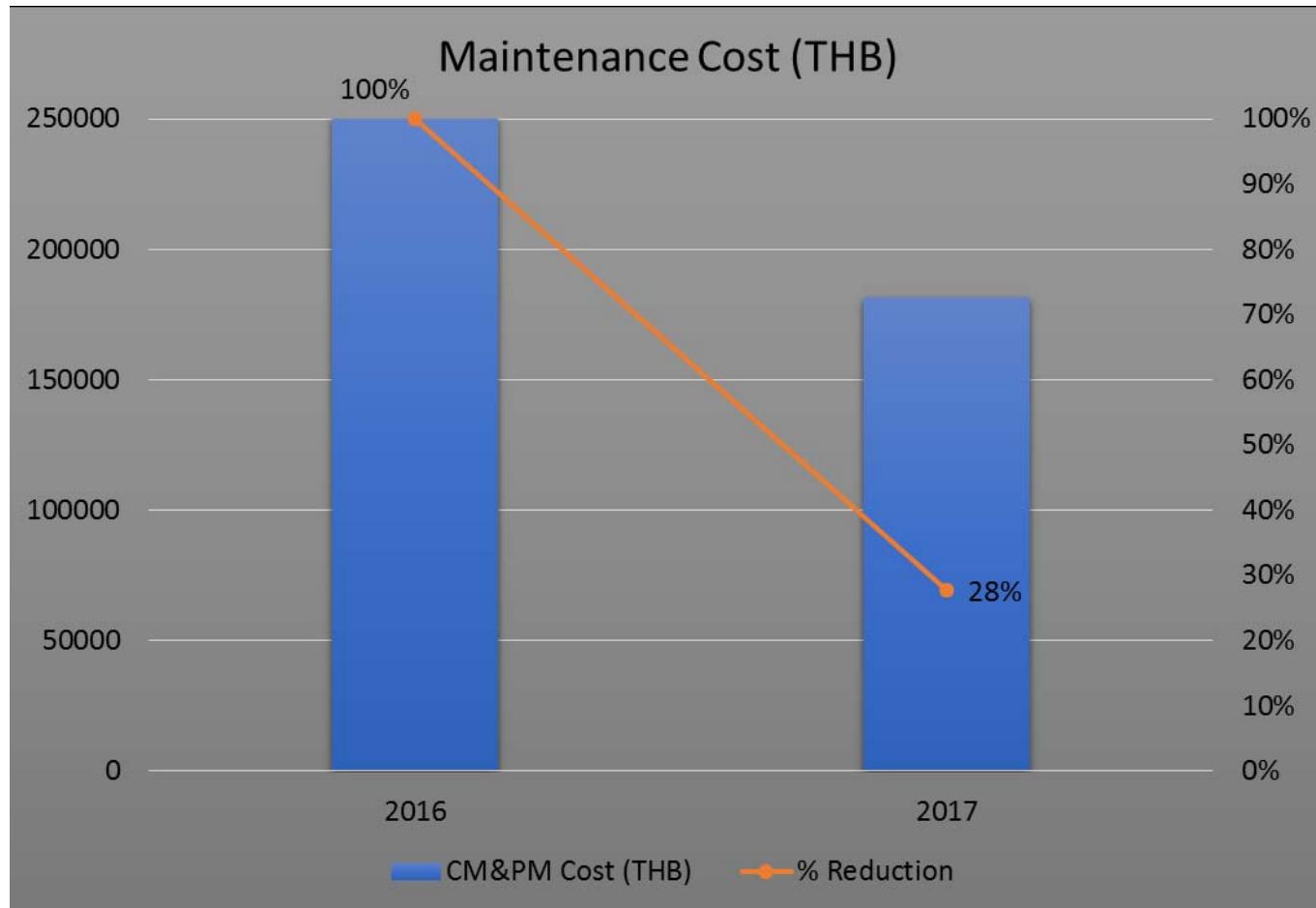
Target to improve (KPI) : Minimum concentration of Cl equivalent
must be ≥ 0.2 ppm



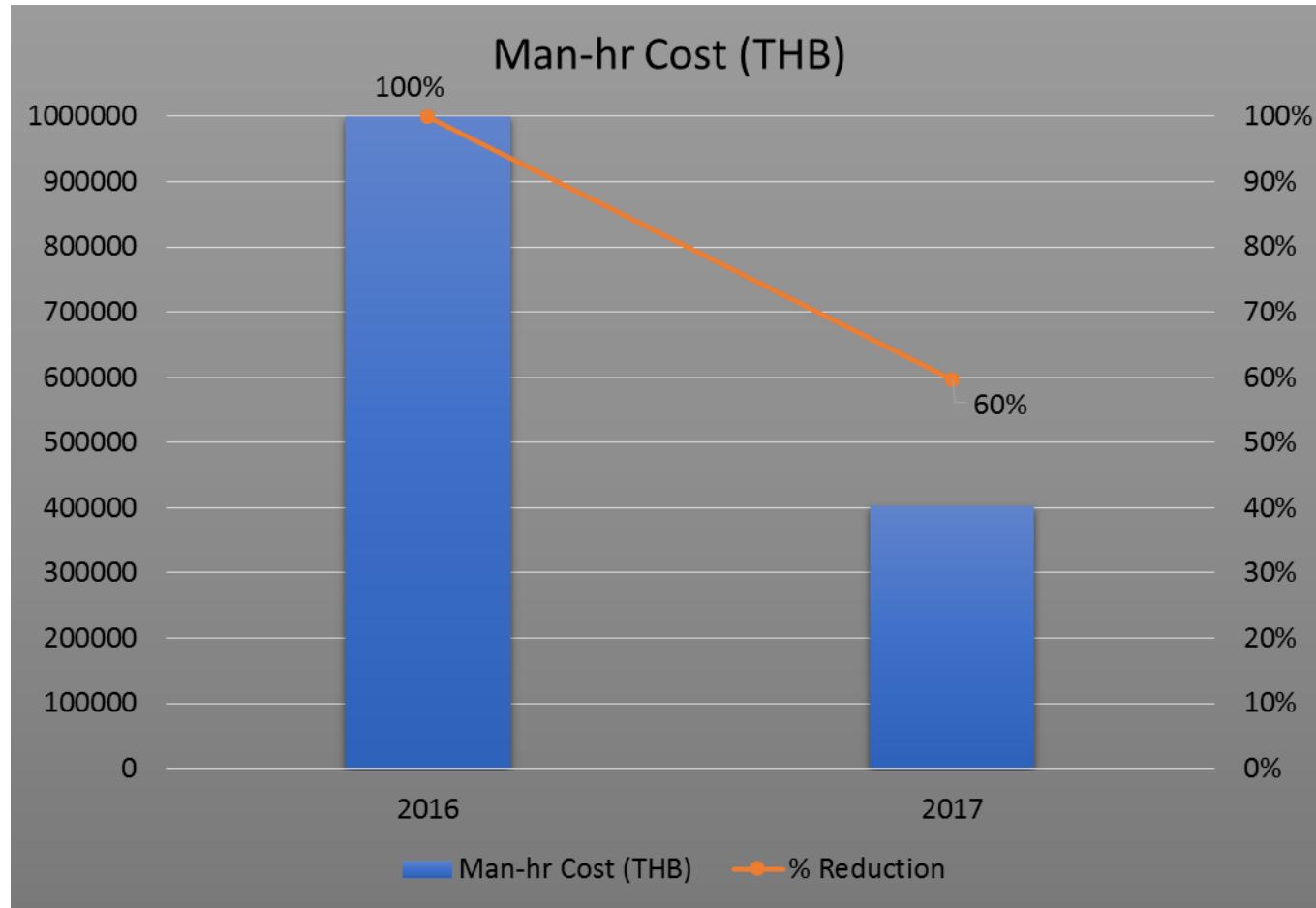
Chlorine content in water of Service ring main



Target to improve (KPI) 2017: Maintenance Cost summary comparing with 2016



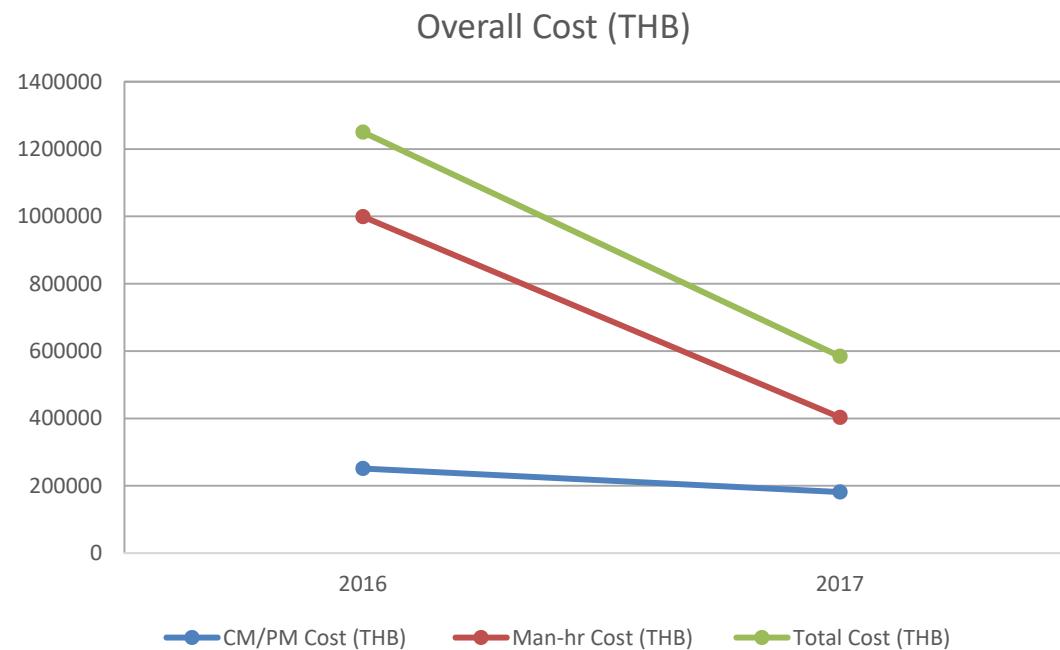
Target to improve (KPI) 2017 : Man-hour Cost summary comparing with 2016



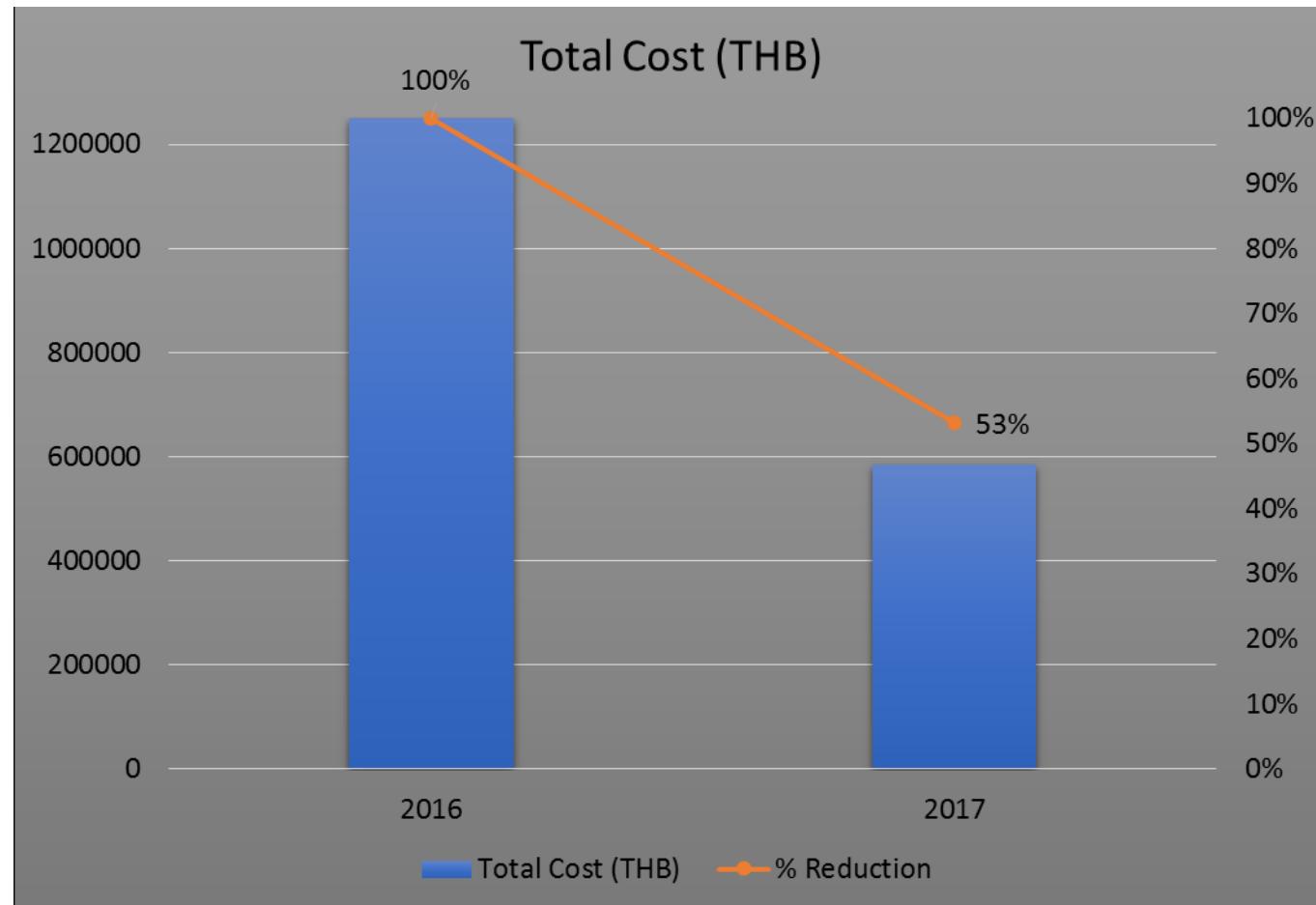
Target to improve (KPI) :Total cost of maintenance & maintenance man-hours of the unit reduced comparing to 2016



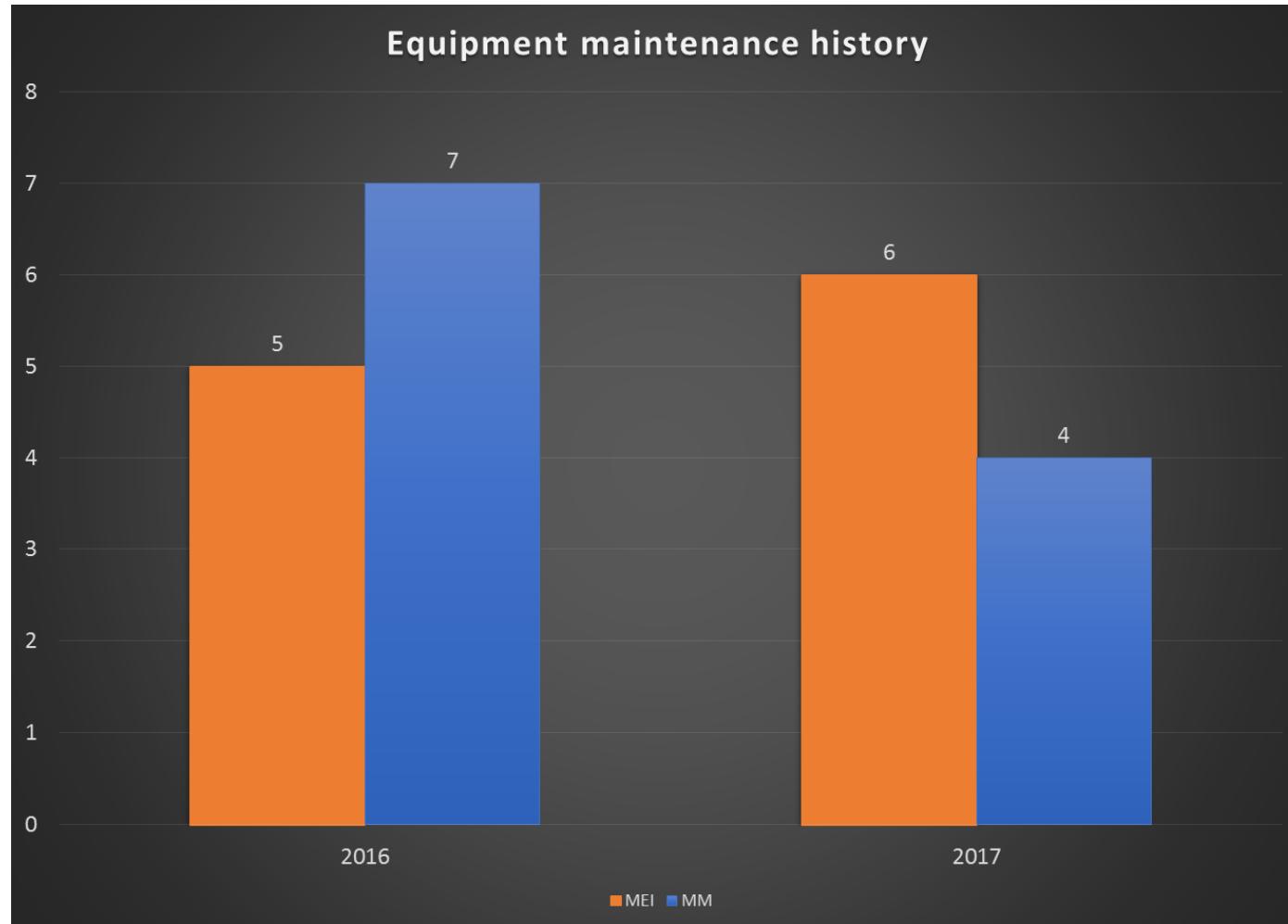
	2016	2017
CM/PM Cost (THB)	251,001	181,354
Man-hr Cost (THB)	998,976	402,996
Total Cost (THB)	1,249,977	584,350



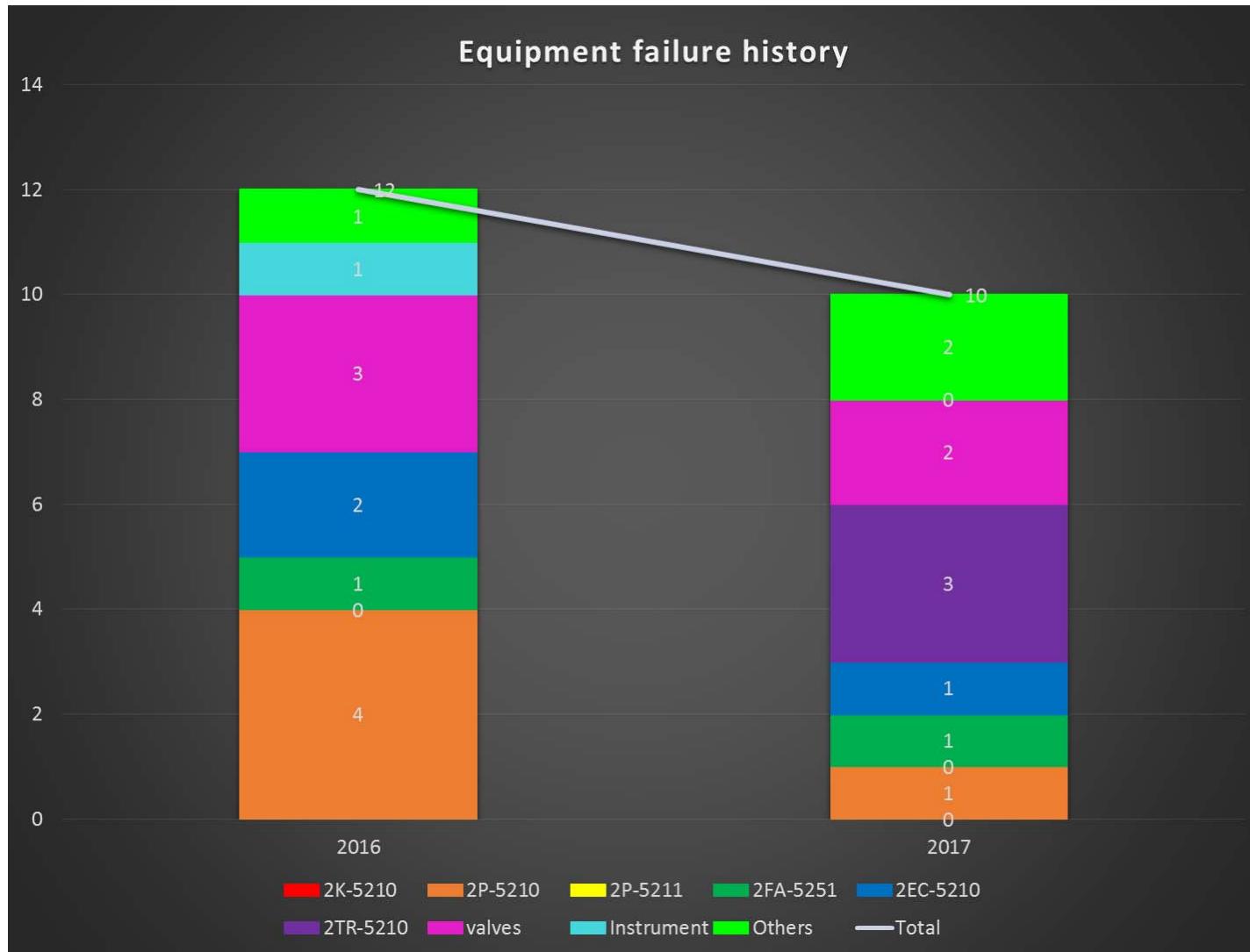
Target to improve (KPI) 2017 : Total Cost summary comparing with 2016



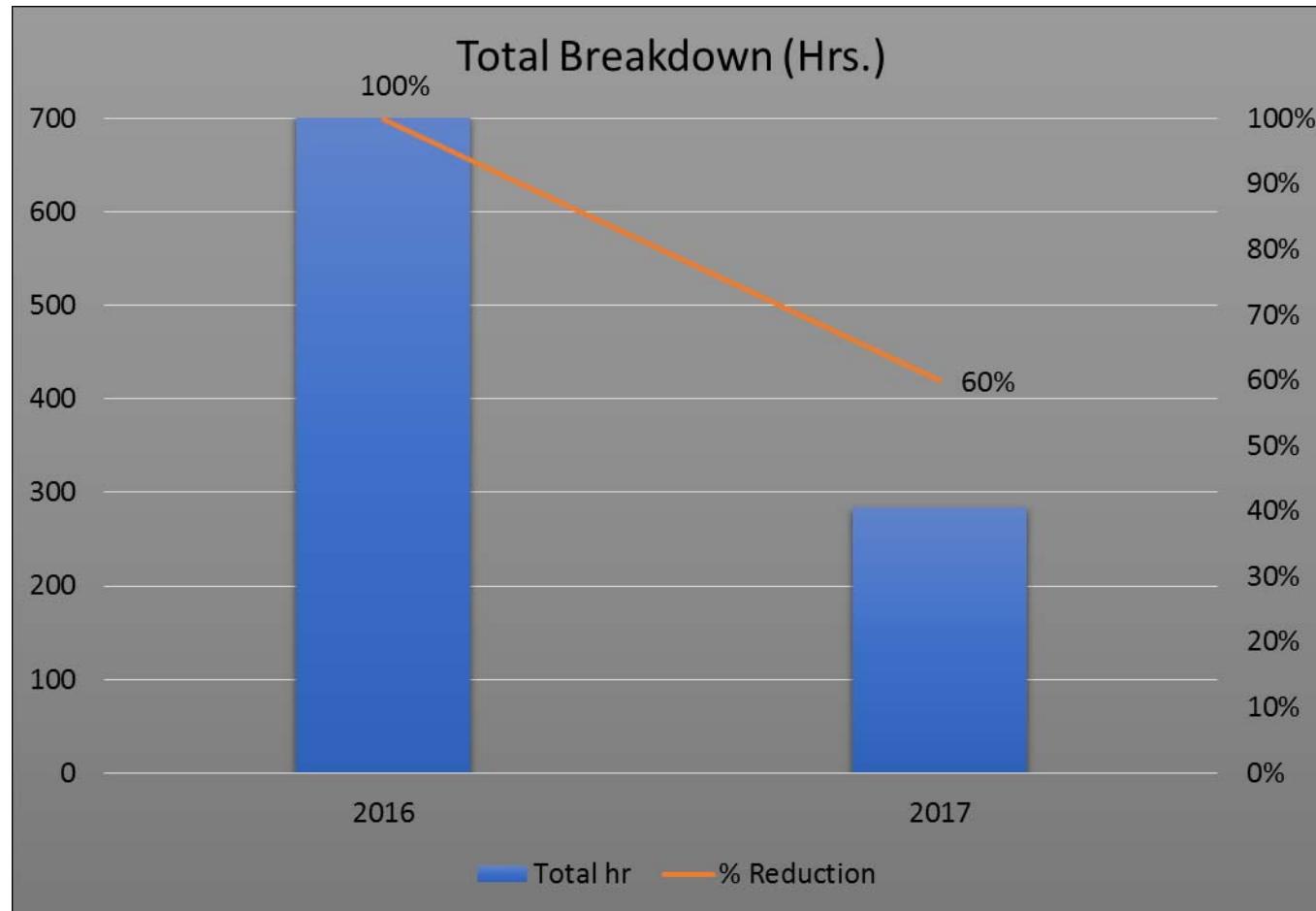
Target to improve (KPI) : number of unit breakdown reduced comparing to 2016



Target to improve (KPI) : number of unit breakdown reduced comparing to 2016



Target to improve (KPI) 2017 : number of unit breakdown reduced comparing to 2016





Methodology, Planning and Execution

Passion to Explore for a Sustainable Future



Step 0 : Preparation Step

Step 0 : Activities

Kick Of Meeting

Set-up organization chart and team member

Planning

Select unit implemented autonomous maintenance

Gather information for selected unit

Kick Off Meeting

- Kick off meeting was done on Oct'2015



GBS AM PROJECT ORGANIZATION



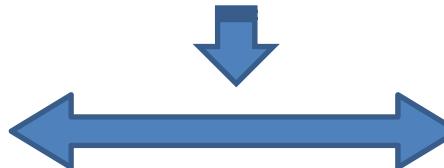
AM PROJECT MANAGERS



AM PROJECT SPONSORS



TECHNICAL CONSULTANTS



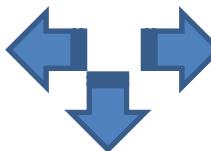
AM PROJECT LEADERS



AM PROJECT LEADERS



Support



Support



AM SMALL GROUP LEADERS

Group 1



Group 2



Group 3

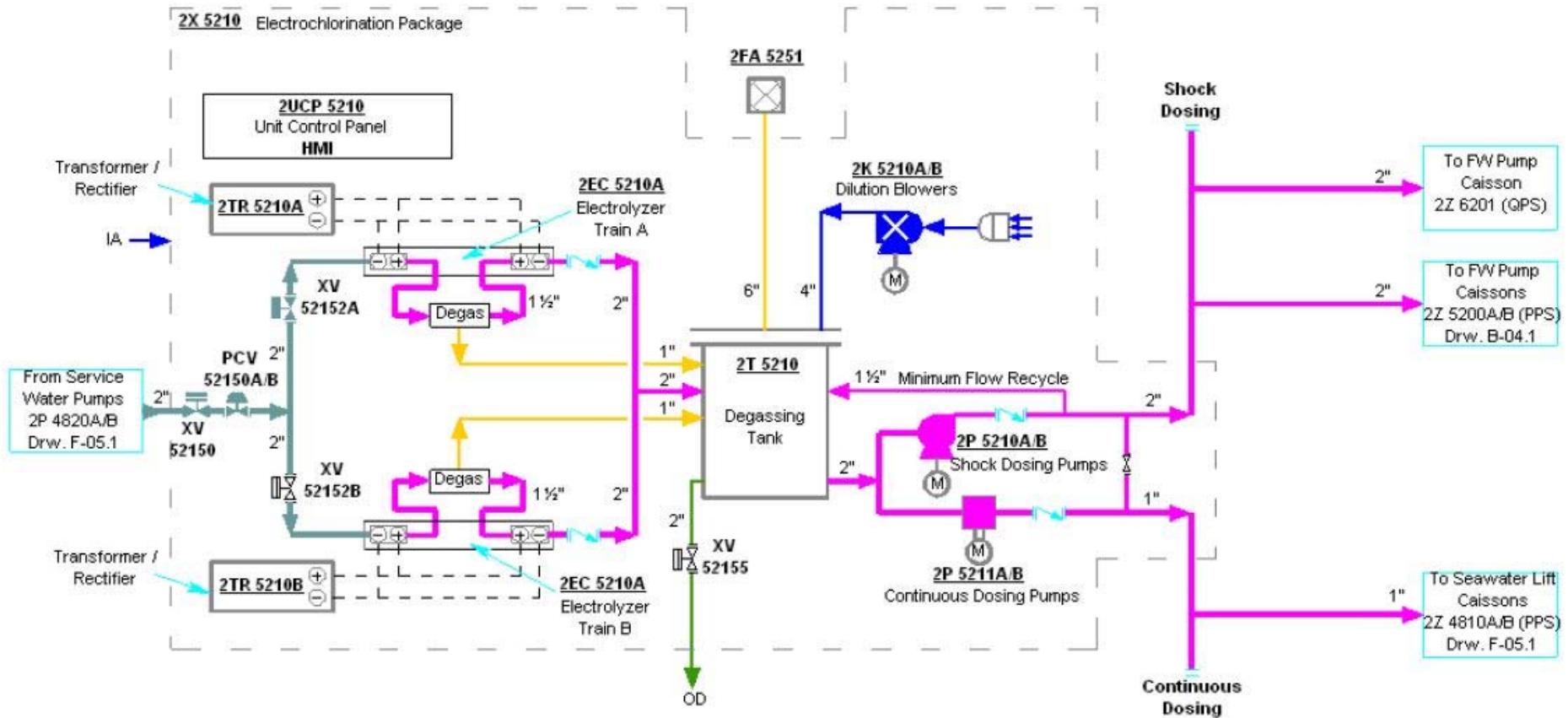


Selecting Unit Implemented Autonomous Maintenance

- 2X-5210 Electro chlorination was selected to be implemented autonomous maintenance.
- This unit function is to generate hypochlorite from seawater. The hypochlorite is used for marine growth and bio fouling prevention in piping. Otherwise, line will be blocked.
- Hypochlorite is supplied to important unit such as fire water ring main, service water pump and fire water pump. Therefore, continuous injection of hypochlorite is very critical for plant.

Gathering Information

2X-5210 - PFD



Note: Remaining concentration of Cl in ring main equivalent must be ≥ 0.2 ppm

Gathering Information

2X-5210 – Equipment List

Document Number: NG-018-P2-HHI-000001

Equipment list

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**SEVERN
TRENT
DE NORA**

PO No. 1Q83
Equipment Tag No. 2X 5210

EQUIPMENT LIST

JOB NO.: D017640
PROJECT: BONGKOT Field Development Proj. - Phase 4A
EQUIP. NAME: ELECTROCHLORINATION PACKAGE
HHI NO.: THAI-4A-PPS-M083-10-00-0004
STDN No.: D017640-LST-EQP

NOTE: REFER TO THE EQUIPMENT DATA SHEETS FOR DETAIL INFORMATION.

Service	Tag No.	Dimensions (mm)			Material (1)		Painting System (2)		Weights (kg)			P&ID Reference	Packag Type	Design Conditions			Datasheet Reference	GA Reference	Part of / Loose Item	Notes	Rev.		
		L	W / Dia	H	Internal	External	Internal	External	DRY	Operating	Test			Design P (barg)	Design T (°C)	Operating T (°C)	Design Capacity						
Seawater Electrochlorination Package	2X 5210	7,315	2,540	3,338	-	-	-	-	20,912	23,640	23,640	THAI-4A-PPS-M083-11-09-0001	P3	10	65 (3)	37	5.68m³/h, 6.4 kgh	THAI-4A-PPS-M083-12-09-0001	T1 AI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	2X 5210		
Electrolyser A	2EC-5210A	1,461	470	1,464	Titanium	Titanium	-	-	567	586	586	THAI-4A-PPS-M083-11-09-0001	-	9	35 (4)	27-29	5.68m³/h, 6.4 kgh	THAI-4A-PPS-M083-12-09-0001	T1 AI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	2X 5210		
Electrolyser B	2EC-5210B	1,461	470	1,464	Titanium	Titanium	-	-	567	586	586	THAI-4A-PPS-M083-11-09-0001	-	9	35 (4)	27-29	6.25 kg/hr	THAI-4A-PPS-M083-12-09-0001	T1 AI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	2X 5210		
Transformer/Rectifier A	2TR-5210A	1,840	1,480	1,740	Carbon Steel	Carbon Steel	(2)	(2)	4,200	4,200	4,200	THAI-4A-PPS-M083-11-09-0001	-	-	40	37	400ADC@9 VDC	THAI-4A-PPS-M083-12-09-0006	T1 AI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	2X 5210		
Transformer/Rectifier B	2TR-5210B	1,840	1,480	1,740	Carbon Steel	Carbon Steel	(2)	(2)	4,200	4,200	4,200	THAI-4A-PPS-M083-11-09-0001	-	-	40	37	400ADC@9 VDC	THAI-4A-PPS-M083-12-09-0006	T1 AI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	2X 5210		
Hydrogen Dilution Air Blower	2K-5210A	527	467	712	SS316L	SS316L	(2)	(2)	61	61	61	THAI-4A-PPS-M083-11-09-0001	-	-	300mmWC	65 (3)	37	300mmWC	THAI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	T1 AI-4A-PPS-M083-12-09-0002	2X 5210	
Hydrogen Dilution Air Blower	2K-5210B	527	467	712	SS316L	SS316L	(2)	(2)	61	61	61	THAI-4A-PPS-M083-11-09-0001	-	-	300mmWC	65 (3)	37	250Nm³/h	THAI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	T1 AI-4A-PPS-M083-12-09-0002	2X 5210	
Hydrogen Dilution Air Blower Motor A	2KM-5210A	340	215	255	Cast Iron	Cast Iron	(2)	(2)	28	28	28	THAI-4A-PPS-M083-11-09-0001	-	-	65 (3)	37	0.75kW	THAI-4A-PPS-M083-12-09-0004	T1 AI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	2X 5210		
Hydrogen Dilution Air Blower Motor B	2KM-5210B	340	215	255	Cast Iron	Cast Iron	(2)	(2)	28	28	28	THAI-4A-PPS-M083-11-09-0001	-	-	65 (3)	37	0.75kW	THAI-4A-PPS-M083-12-09-0004	T1 AI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	2X 5210		
Hypochlorite Storage Drum (Degas Tank)	2T-5210	-	1,219	2,591	GRP	GRP	(2)	(2)	300	2,860	2,860	THAI-4A-PPS-M083-11-09-0001	-	-	ATM/Water Full	65 (3)	60	3m³	THAI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	T1 AI-4A-PPS-M083-12-09-0002	2X 5210	6
Continuous Dosing Pump A	2P-5211A	670	430	780	Titanium	Titanium	-	-	130	135	135	THAI-4A-PPS-M083-11-09-0001	-	-	5 barg	65 (3)	27-29	0.16m³/h	THAI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	T1 AI-4A-PPS-M083-12-09-0002	2X 5210	6
Continuous Dosing Pump B	2P-5211B	670	430	780	Titanium	Titanium	-	-	130	135	135	THAI-4A-PPS-M083-11-09-0001	-	-	5 barg	65 (3)	27-29	0.16m³/h	THAI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	T1 AI-4A-PPS-M083-12-09-0002	2X 5210	6
Continuous Dosing Pump Motor A	2PM-5211A	360	215	255	Cast Iron	Cast Iron	(2)	(2)	28	28	28	THAI-4A-PPS-M083-11-09-0001	-	-	65 (3)	37	0.55kW	THAI-4A-PPS-M083-12-09-0004	T1 AI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	2X 5210		
Continuous Dosing Pump Motor B	2PM-5211B	360	215	255	Cast Iron	Cast Iron	(2)	(2)	28	28	28	THAI-4A-PPS-M083-11-09-0001	-	-	65 (3)	37	0.55kW	THAI-4A-PPS-M083-12-09-0004	T1 AI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	2X 5210		
Shock Dosing Pump A	2P-5210A	261	248	417	Titanium	Titanium	-	-	28	30	30	THAI-4A-PPS-M083-11-09-0001	-	-	10 barg	65 (3)	27-29	5.52m³/h	THAI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	T1 AI-4A-PPS-M083-12-09-0002	2X 5210	6
Shock Dosing Pump B	2P-5210B	261	248	417	Titanium	Titanium	-	-	28	30	30	THAI-4A-PPS-M083-11-09-0001	-	-	10 barg	65 (3)	27-29	5.52m³/h	THAI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	T1 AI-4A-PPS-M083-12-09-0002	2X 5210	6
Shock Dosing Pump Motor A	2PM-5210A	430	180	260	Cast Iron	Cast Iron	(2)	(2)	44	44	44	THAI-4A-PPS-M083-11-09-0001	-	-	65 (3)	37	2.2kW	THAI-4A-PPS-M083-12-09-0004	T1 AI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	2X 5210		
Shock Dosing Pump Motor B	2PM-5210B	430	180	260	Cast Iron	Cast Iron	(2)	(2)	44	44	44	THAI-4A-PPS-M083-11-09-0001	-	-	65 (3)	37	2.2kW	THAI-4A-PPS-M083-12-09-0004	T1 AI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	2X 5210		
Local Control Panel	2UCP-5210	800	400	1,400	316SSL	316SSL	(2)	(2)	450	450	450	THAI-4A-PPS-M083-11-09-0001	-	-	65 (3)	40	-	THAI-4A-PPS-M083-12-09-0002	T1 AI-4A-PPS-M083-12-09-0001	T1 AI-4A-PPS-M083-12-09-0002	2X 5210	THAI-4A-PPS-M083-16-09-0002	

(1) Refer to the Equipment Data Sheets for Material of Construction details, THAI-4A-PPS-M083-12-08-0002 (STDN No. D017640-DS-EQP).

(2) Refer to the Paint List Specification for Paint System details, THAI-4A-PPS-M083-12-08-0002 (STDN No. D017640-LST-PNT).

(3) Mechanical Design Temperature

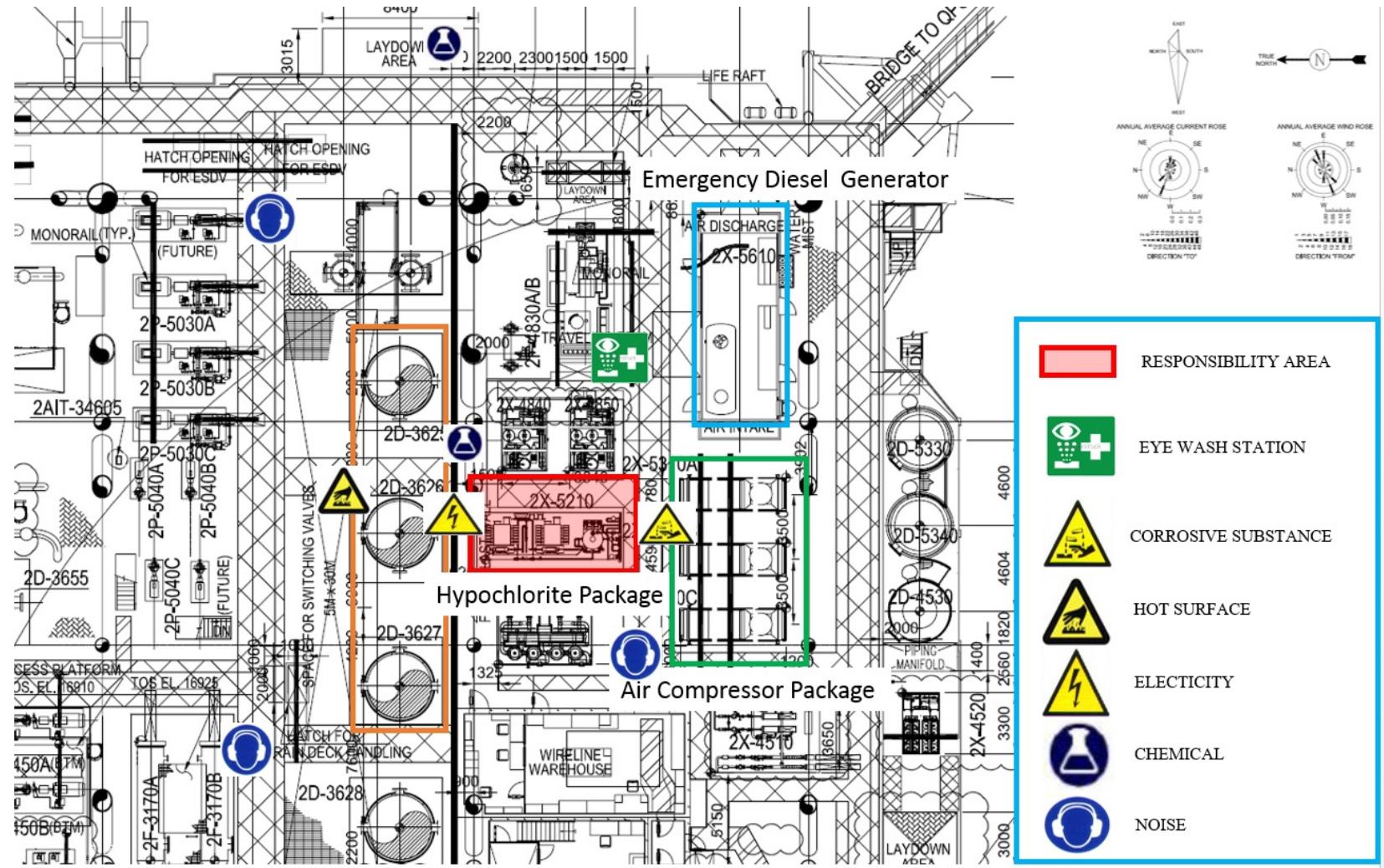
(4) Design for cell process temperature for hypochlorite production.

(5) Refer to the Mechanical Equipment Data Sheets, THAI-4A-PPS-M083-12-08-0002, and the Sub Vendor List, THAI-4A-PPS-M083-10-00-0003, for Supplier, Model number, and other details not listed here.

REV.	DESCRIPTION	DATE	BY
0	INTERNAL DISCIPLINE CHECK	18-May-09	BPF
1	ISSUED FOR COMMENT	28-Jul-09	BPF
2	ISSUED FOR APPROVAL	25-Sep-09	BPF
3	APPROVED FOR CONSTRUCTION	20-Nov-09	BPF
4	APPROVED FOR CONSTRUCTION	26-Feb-10	BPF
5	APPROVED FOR CONSTRUCTION	2-Jun-10	BPF
6	APPROVED FOR CONSTRUCTION	19-Jul-10	BPF

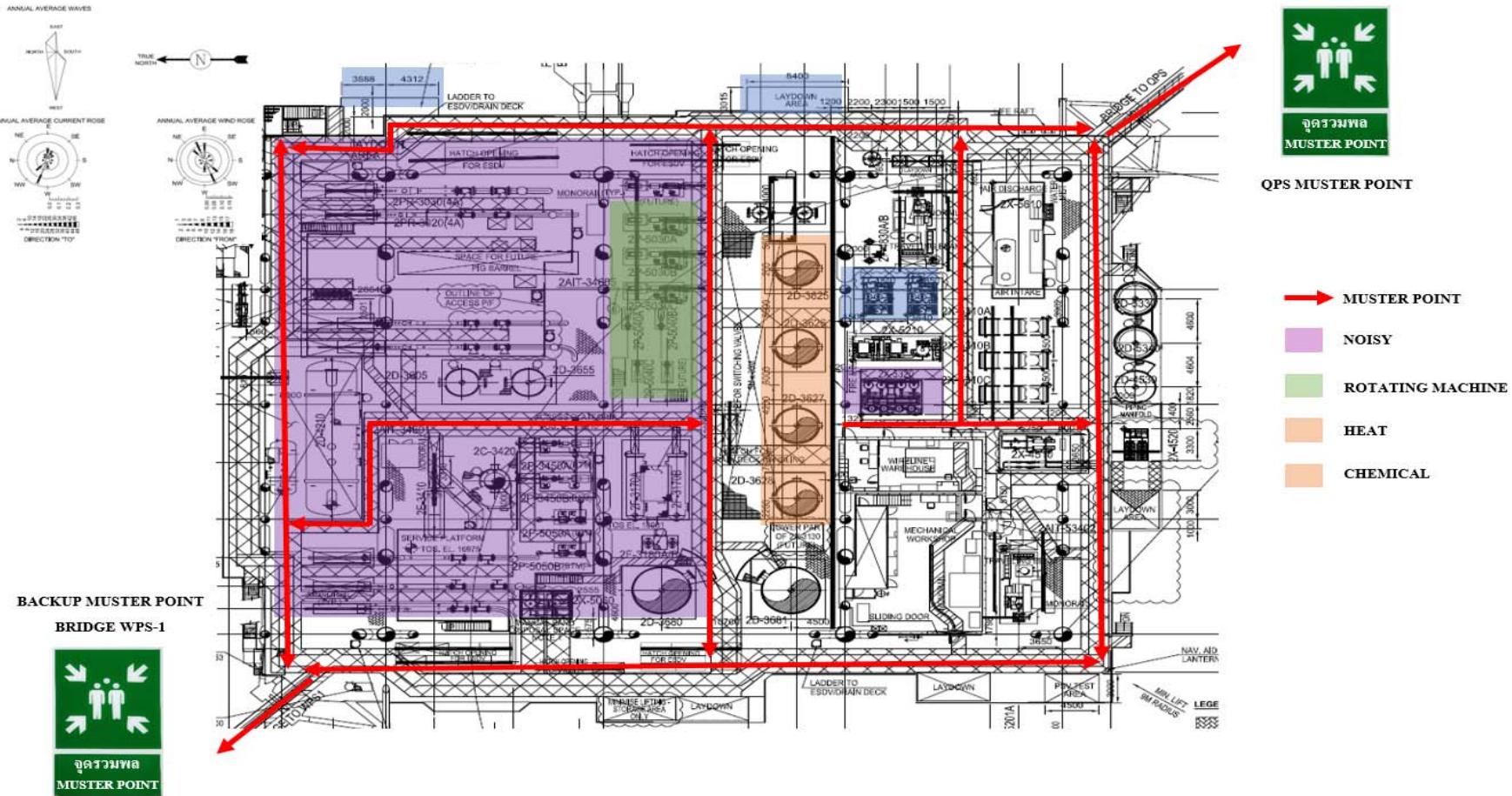
Gathering Information

2X-5210 – Safety Layout



Gathering Information

2X-5210 – Safety Layout





Planning Schedule

		Master Plan														Revision	Date
		Autonomous Maintenance Pillar															
		Bongkot South															
		2018														Respons.	Remark
		Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC			
Description	Year	Week	WK 1	WK 2	WK 3	WK 4	WK 1	WK 2	WK 3	WK 4	WK 1	WK 2	WK 3	WK 4	WK 1	WK 2	WK 3
	Actual	Plan															
	Actual	Actual															
Task force team kick off meeting.	Plan																SMG Leader
Small group training	Plan																SMG Leader
Continue Implement AM step of manager model	Plan																SMG Leader
Implement AM step(New unit)	Plan																SMG Leader
Self Audit	Plan																SMG Leader
Management Audit	Plan																SMG Leader
Other	Plan																SMG Leader
Actual	Actual																

Gathering Information

Risk Assessment - KYT

- KYT**
 - Kiken = Danger Identification
 - Yoshi = Prediction
 - Training = Training

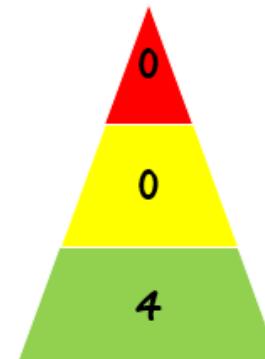
GB5-AM-01-R00

KYT Sheet								
การคาดการณ์อันตรายที่จะเกิดขึ้นในการปฏิบัติงาน								
Unit No. : BX-5210	Unit Name : Electrical	Department : Production	Project: Bongkot South					
Date	27/10/2015							
รายชื่อผู้เข้าร่วม KYT								
1	Sayarn C.	5	Apichai O.					
2	Sadthit J.	6	Krid S.					
3	Sutin B.	7	Chumri K.					
4	kasem S.	8	Singthong J.					
IR : อันตรายที่อาจเกิดขึ้น (แนะนำการอ่อนตัวที่ซ่อนเร้น ขอบนี้เป็นเพียง IR)								
IR : เป็นอันตรายจาก IR และเริ่มต้นเมื่อเราต้องถูกภัยอันตรายให้เพียงครั้ง ไม่ใช่ผู้ผลิตภัยอันตราย แต่เรียกว่าตัวของภัยอันตรายที่สูงถึง 2.3.4								
ข้อที่	IR : ด้านหัวอันตราย	ข้อที่	2R : เลือก(เรียง)อันตรายที่สำคัญที่สุด					
1	Electrical	1	Electrical					
2	Work at high	2	Chemical					
3	Obstruck object	3	Pin point.					
4	pin point	4	noise					
5	noise	5	lighting insufficient.					
6	chemical	6	Work at high					
7	lighting in sufficient	7	obstruck object.					
3R : จัดตั้งการรักษา IR ทั้งหมดขึ้น ตาม 2 และกำหนดมาตรการเพื่อการกันภัยอย่างทันท่วงที (หากเป็นไปได้จะระบุไว้ด้วย)								
3R : เน้นมาตรการรักษา IR ว่ามาตรการใดจะบันทึกโดยเอกสารเป็นที่ดีที่สุด								
ข้อที่เลือก	3R : เลือกมาตรการป้องกันและแก้ไข							
ข้อ 1	1	Power Isolation						
	2	Stop package.						
	3	Push emergency SN						
	4							
	5							
ข้อ 2	1	Used correctly PPE						
	2	Empty source chemical						
	3							
	4							
	5							
4R : เลือกมาตรการควบคุมป้องกัน								
Electrical Isolation tag out / Tag out								
Used correctly and properly PPE aware critical source								
ลงนามยืนยันการดำเนินการตามที่ได้เขียนไว้ใน KYT Sheet ทราบและเข้าใจว่าได้ดำเนินการตามที่ได้เขียนไว้แล้ว ตกลงและรับทราบ ทราบและเข้าใจว่าได้ดำเนินการตามที่ได้เขียนไว้แล้ว ดำเนินการตามที่ได้เขียนไว้แล้ว ดำเนินการตามที่ได้เขียนไว้แล้ว หาก PPE "OK"								

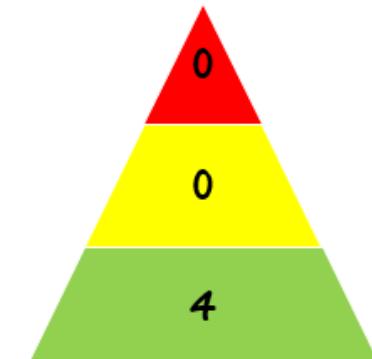
Zero Accident

SAFETY STATISTICS REPORT

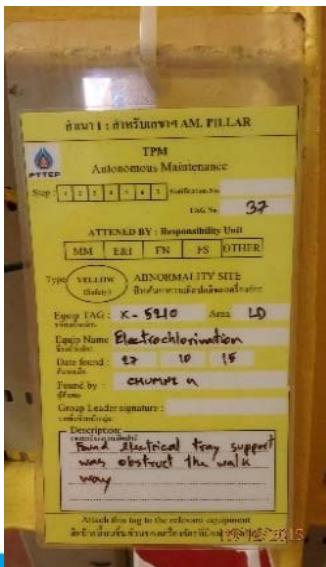
Accident
Near Miss
Substandard



2016



2017

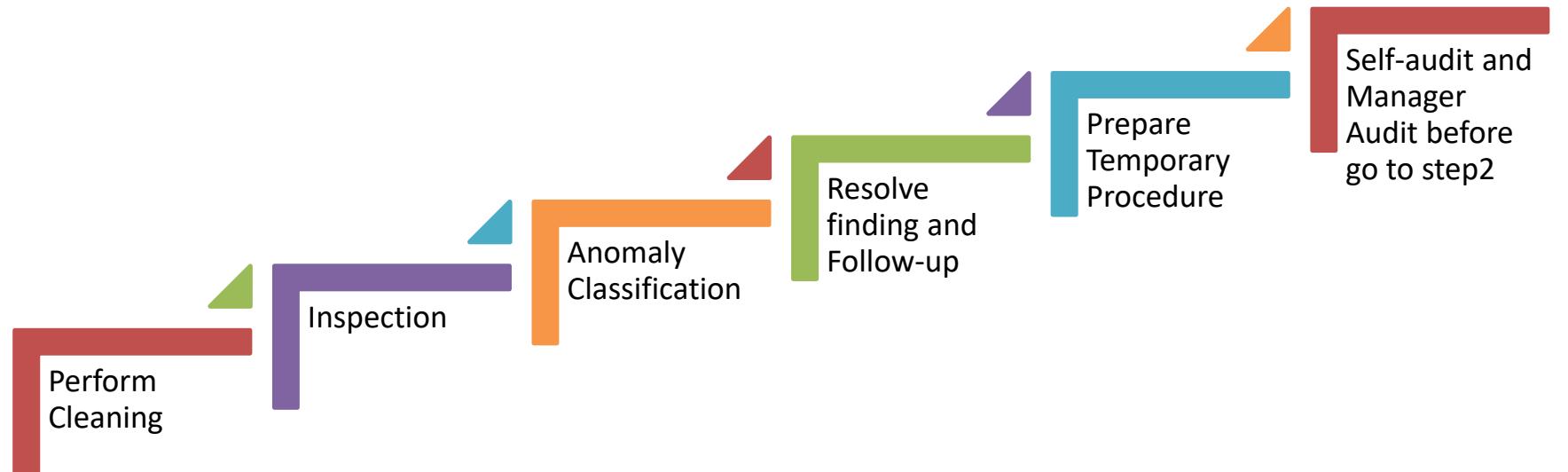




Step 1: Initial Clean-up

Step 1 : Activities

Start Step 1: NOV'2015 and onward



Before Cleaning



Activities STEP 1



After Cleaning



Inspection and Anomaly Recording

- Cumulative finding is 37 tags as Feb'2016.
- Example of finding
 - 2X-5210, Found cable tray damaged
 - 2LG-52157 cannot reading.
 - 2LG-52157 plug at drain line missing.
 - 2HV-52154B's body is rusty.
 - Many equipment is dirty and rusty.
 - etc.

Tag No.	Date	Name / Equipment Tag	Description	Unit Name		
				Tag Type		
				W	Y	R
1	27-Oct-15	2X-5210	Found cable tray was damage.			X
2	27-Oct-15	2LG-52157	can't reading.			X
3	27-Oct-15	2LG-52157	found plug at drain line valve was missing.			X
4	27-Oct-15	tag number	Found was rusty.	X		
5	27-Oct-15	2PI-52158B	Found was rusty.	X		
6	27-Oct-15	2X-5210	Drain line hight,Chemical may be spill.			X
7	27-Oct-15	2EC-5210B	To be re-painting electrolyzer cabinet.			X
8	27-Oct-15	2HV-52154B	Body valve was rusty.			X
9	27-Oct-15	2XV-52152B	body valve was rusty.			X
10	27-Oct-15	HV U/S of 2PIT-52150	Body valve was rusty.			X
11	27-Oct-15	2PSV-52151	body valve was rusty.			X
12	27-Oct-15	2PCV-52150B	body valve was rusty.			X
13	27-Oct-15	2PCV-52150A	body valve was rusty.			X
14	27-Oct-15	2HV-52153A	Body valve was rusty.			X
15	27-Oct-15	2HV-52152	Body valve was rusty.			X
16	27-Oct-15	2EC-5210A	To be re-painting electrolyzer cabinet.			X
17	27-Oct-15	2TR-5210A,B	To identify unit tag.			X

Anomaly Classification Methodology

- “Tag System” and 7 major losses are utilized as classification tools.
- Tag system will help to classify anomaly as below and it will be installed onsite to indicate anomaly.
 - To self repair by operator (W)
 - To repair by maintenance team (R)
 - To indicate the safety concerns (Y)

ลักษณะ 1 : ลักษณะของ TPM PILLAR

TPM
Autonomous Maintenance

Step [] [] [] [] [] [] Notification No. TAG No.

ATTENDED BY : Responsibility Unit

MM	E&I	FN	FS	OTHER
----	-----	----	----	-------

Type: **WHITE TAG** (Open) บันทึกความไม่ปกติที่สามารถ自行ซ่อมได้

Emp TAO : _____ Area : _____

Equip Name : _____
Date found : _____ / _____ / _____
Found by : _____
Group Leader signature : _____
Description : _____

Attach this tag to the relevant equipment
ติดป้ายนี้บนชิ้นงานของเครื่องจักรที่เกิดข้อผิดพลาด

ลักษณะ 2 : ลักษณะของ TPM PILLAR

TPM
Autonomous Maintenance

Step [] [] [] [] [] [] Notification No. TAG No.

ATTENDED BY : Responsibility Unit

MM	E&I	FN	FS	OTHER
----	-----	----	----	-------

Type: **RED TAG** (Warning) บันทึกความไม่ปกติที่ต้องการให้ผู้ดูแลตรวจสอบ

Emp TAO : _____ Area : _____

Equip Name : _____
Date found : _____ / _____ / _____
Found by : _____
Group Leader signature : _____
Description : _____

Attach this tag to the relevant equipment
ติดป้ายนี้บนชิ้นงานของเครื่องจักรที่มีความเสี่ยงสูง

ลักษณะ 3 : ลักษณะของ TPM PILLAR

TPM
Autonomous Maintenance

Step [] [] [] [] [] [] Notification No. TAG No.

ATTENDED BY : Responsibility Unit

MM	E&I	FN	FS	OTHER
----	-----	----	----	-------

Type: **YELLOW TAG** (Safety) บันทึกความไม่ปกติที่ต้องการให้ผู้ดูแลตรวจสอบ

Emp TAO : _____ Area : _____

Equip Name : _____
Date found : _____ / _____ / _____
Found by : _____
Group Leader signature : _____
Description : _____

Attach this tag to the relevant equipment
ติดป้ายนี้บนชิ้นงานของเครื่องจักรที่มีความเสี่ยงสูง

Abnormally Classification Methodology

Self fixed

Issue Notification

Safety

สำเนา 1 : สำหรับเดาๆ AM. PILLAR								
TPM Autonomous Maintenance								
Step :	1	2	3	4	5	6	7	Notification No.
TAG No.								
ATTENDED BY : Responsibility Unit								
MM	E&I	FN	FS	OTHER				
Type WHITE TAG (Operator)	ABNORMALITY SITE ป้ายที่น้ำขาวที่ติดปักขึ้นเครื่องจักร							
Equip TAG : รหัสเครื่องจักร	Area							
Equip Name : ชื่อเครื่องจักร								
Date found : / /								
Found by : ผู้ค้นพบ								
Group Leader signature : รายชื่อหัวหน้ากลุ่ม:								
Description: รายการอิฐความชำรุด								
Attach this tag to the relevant equipment ติดป้ายนี้บนชิ้นส่วนของเครื่องจักรที่มีอาการติดปักดิ								

สำเนา 1 : สำหรับเดาๆ AM. PILLAR								
TPM Autonomous Maintenance								
Step :	1	2	3	4	5	6	7	Notification No.
TAG No.								
ATTENDED BY : Responsibility Unit								
MM	E&I	FN	FS	OTHER				
Type RED TAG (Maintenance)	ABNORMALITY SITE ป้ายที่น้ำขาวที่ติดปักขึ้นเครื่องจักร							
Equip TAG : รหัสเครื่องจักร	Area							
Equip Name : ชื่อเครื่องจักร								
Date found : / /								
Found by : ผู้ค้นพบ								
Group Leader signature : รายชื่อหัวหน้ากลุ่ม:								
Description: รายการอิฐความชำรุด								
Attach this tag to the relevant equipment ติดป้ายนี้บนชิ้นส่วนของเครื่องจักรที่มีอาการติดปักดิ								

สำเนา 1 : สำหรับเดาๆ AM. PILLAR								
TPM Autonomous Maintenance								
Step :	1	2	3	4	5	6	7	Notification No.
TAG No.								
ATTENDED BY : Responsibility Unit								
MM	E&I	FN	FS	OTHER				
Type YELLOW TAG (Safety)	ABNORMALITY SITE ป้ายที่น้ำขาวที่ติดปักขึ้นเครื่องจักร							
Equip TAG : รหัสเครื่องจักร	Area							
Equip Name : ชื่อเครื่องจักร								
Date found : / /								
Found by : ผู้ค้นพบ								
Group Leader signature : รายชื่อหัวหน้ากลุ่ม:								
Description: รายการอิฐความชำรุด								
Attach this tag to the relevant equipment ติดป้ายนี้บนชิ้นส่วนของเครื่องจักรที่มีอาการติดปักดิ								

Anomaly Classification Methodology

- 7 abnormalities
 - Minor Flaws
 - Unfulfilled basic
 - Inaccessible place
 - Contamination Sources
 - Quality defect source
 - Unnecessary & Non-urgent item
 - Unsafe places

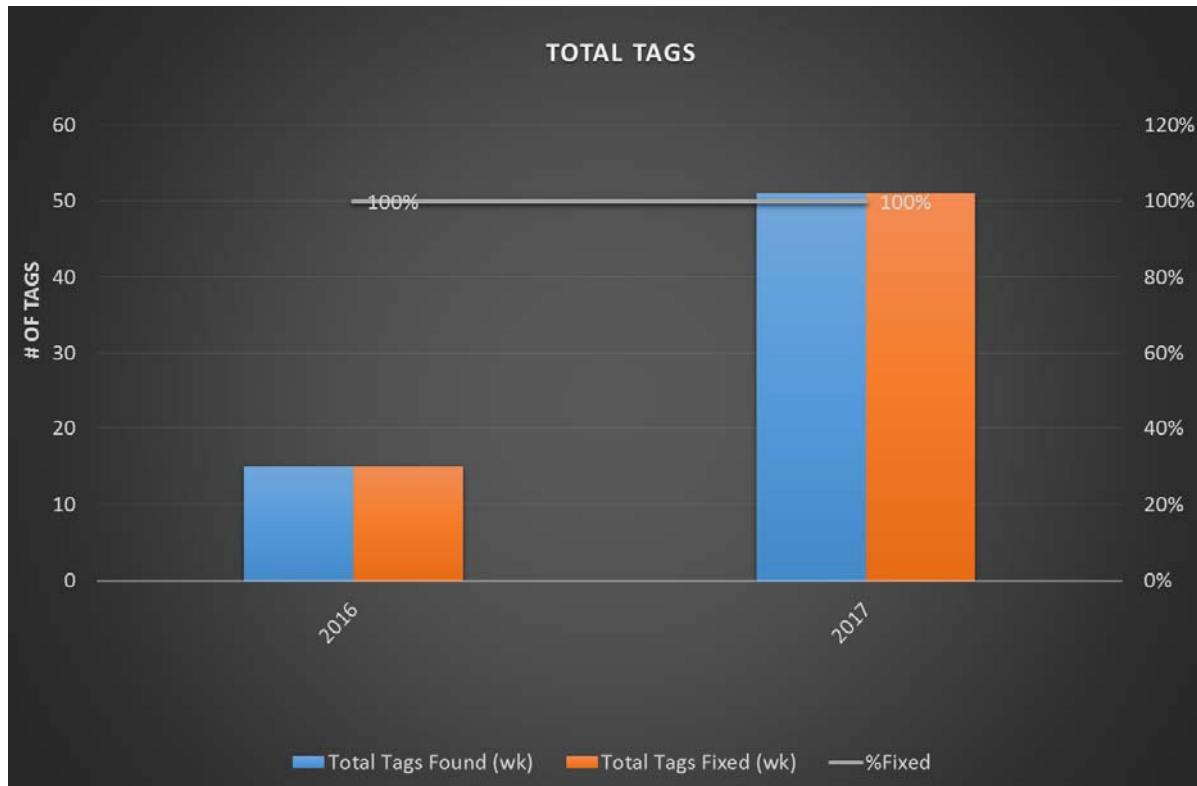
Resolve finding and Follow-up

- The findings are recorded, classified, and follow-up in excel sheet. For example,

Unit No :2X-5210				Unit Name :Electrochlorination				Department : Production				Project : Bongkot South														
Tag No.	Date	Name / Equipment Tag	Description	Tag Type		Type of Problem						Relationship to 7 Major Loss						Notification No.	Solve Result	Completed Date	Responsible person					
				W	Y	R	Bolt & Nut	Electrical	Lubricant	Hydraulic	Pneumatic	Leak/Spill	Safety / Environment	Other	Minor Flaws	Unfulfilled Basic Condition	Inaccessible places	Contaminate Sources	Quality Defect Source	Unnecessary and Non-Urgent	Unsafe Places					
43	15-Aug-16	2PI-52158B	Water leak at vent plug.	X								X											Completed	21/08/2016	Nittawat S	
44	15-Aug-16	2X-5210	Drip pan Dirty	X										X	X									Completed	09/03/2017	PBS/P
45	15-Aug-16	2X-5210	Drip pan Dirty	X										X	X									Completed	09/03/2017	PBS/P
46	15-Aug-16	2P-5211A/B	Dirty inside cover guard motor.	X										X	X									Completed	09/03/2017	PBS/P
47	15-Aug-16	2P-5210A/B	Dirty inside cover guard motor.	X										X	X									Completed	09/03/2017	PBS/P
48	15-Aug-16	2K-5210A/B	Dirty inside cover guard motor.	X										X	X									Completed	09/03/2017	PBS/P
49	15-Aug-16	2K-5210A/B	Dirty inside Flapper blower	X										X	X									Completed	09/03/2017	PBS/P
50	15-Aug-16	2T-5210	Dirty at upper tank.	X										X	X									Completed	09/03/2017	PBS/P
51	15-Aug-16	2TR-5210A	Dirty at upper transformer.	X										X	X									Completed	09/03/2017	PBS/P
52	15-Aug-16	2TR-5210A	Dirty plastic indicator show level oil	X										X	X									Completed	09/03/2017	PBS/P
53	15-Aug-16	2TR-5210	Dirty at under transformer.	X										X	X									Completed	09/03/2017	PBS/P
54	9-Mar-17	2P-5210A	Found temporary tag No on pump	X										X	X									Completed	14/03/2017	PBS/P
55	9-Mar-17	2P-5210B	Found temporary tag No on pump	X										X	X									Completed	14/03/2017	PBS/P
56	9-Mar-17	2TR-5210A	AC input box no label on/off	X										X	X									Completed	14/03/2017	PBS/P
57	9-Mar-17	2TR-5210B	AC input box no label on/off	X										X	X									Completed	14/03/2017	PBS/P
58	9-Mar-17	2K-5210A	5 way of 2FIT-52160A was rusty	X										X	X									Completed	14/03/2017	PBS/P
59	9-Mar-17	2K-5210B	5 way of 2FIT-52160A was rusty	X										X	X									Completed	14/03/2017	PBS/P
60	9-Mar-17	2P-5210A	Support pump was rusty	X										X	X									Completed	14/03/2017	PBS/P
61	9-Mar-17	2P-5210B	Support pump was rusty	X										X	X									Completed	14/03/2017	PBS/P
62	9-Mar-17	2P-5210B	Stud Bolt of valve line to services water pump	X			X							X										Completed	14/03/2017	PBS/P
63	9-Mar-17	2P-5211A	Support was rusty		X									X	X									Work request		PBS/FN
64	9-Mar-17	2TR-5210B	Cover guard of 2TR-5210B was rusty		X									X	X									Work request		PBS/FN

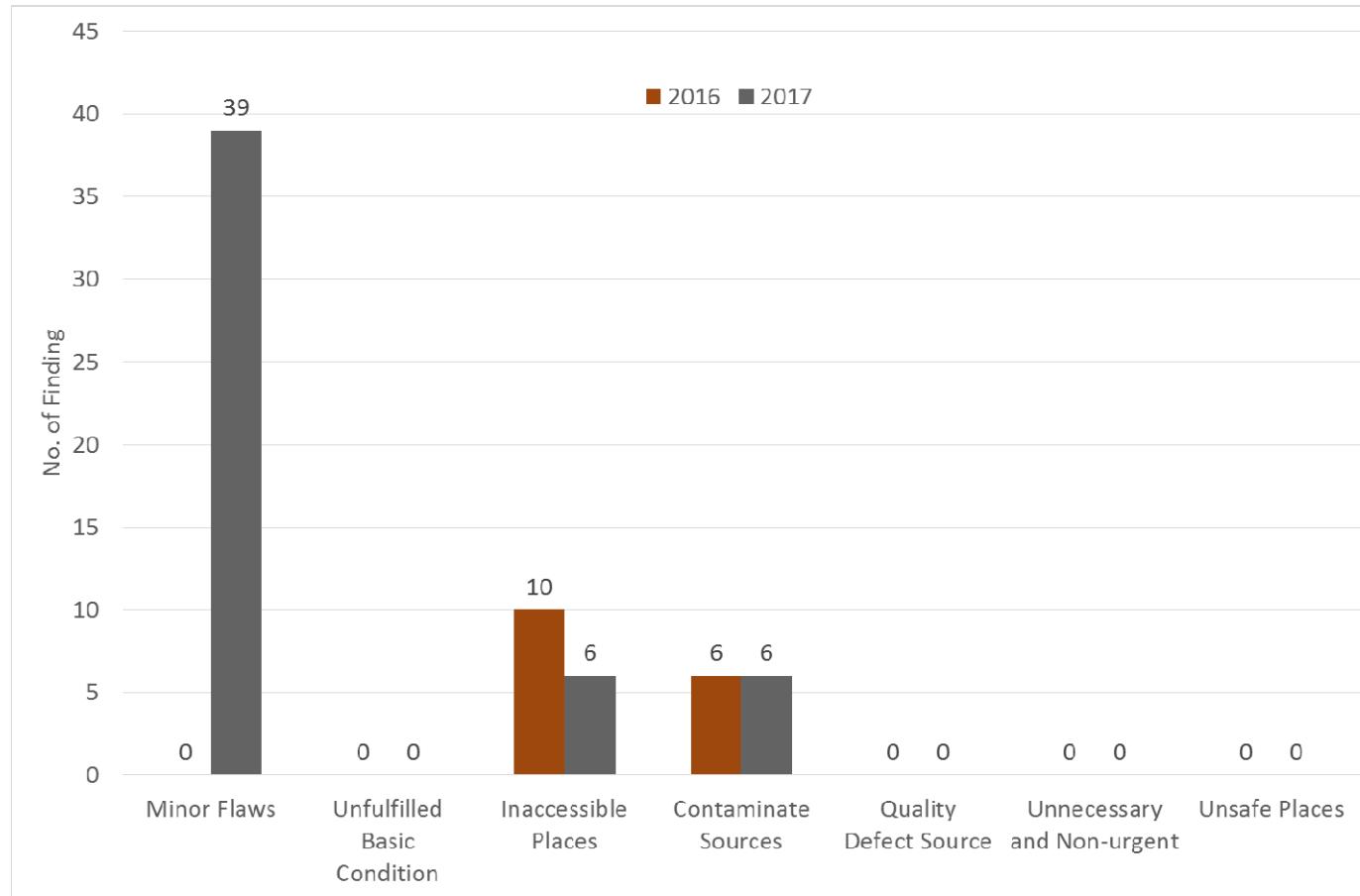
Step 1: Resolve finding and Follow-up

- Finding status classified by tag-type are shown below. All of them are closed.



Step 1: Resolve finding and Follow-up

- Anomaly classified by 7 major losses are shown below



Example of finding and rectification

- Example of Finding and actions for resolved

Finding	Rectified Actions
	
Cannot Reading	Clean float

Example of finding and rectification

- Example of Finding and actions for resolved

Finding	Rectified Actions
 A photograph showing a valve body that is heavily rusted and yellowish in color, indicating significant corrosion.	 A photograph of the same valve body after rectification, showing it has been cleaned, painted, and appears much more polished and yellowish-gold in color.

Rusty Valve Body

Remove scale and repair painting

Example of finding and rectification

- Example of Finding and actions for resolved

Finding	Rectified Actions
	
Painting damaged	Repair painting

Example of finding and rectification

- Example of Finding and actions for resolved

Finding	Rectified Actions
	
Drain line was plug.	Flushing by HP-Hose

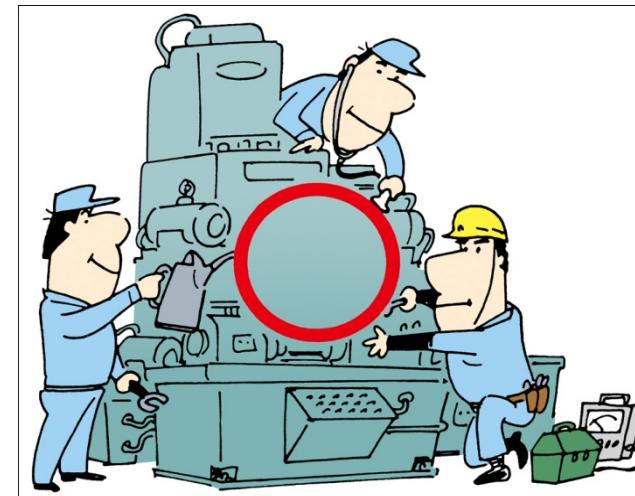
Example of finding and rectification

- Example of Finding and actions for resolved

Finding	Rectified Actions
	
Obstruct walk way	Painting caution sign

Prepare Temporary Procedure

- Temporary procedure is document identified target, methodology, and tools required of each activities.
- It helps to prepare tools, standardize methodology and target.
- The following temporary procedure are developed.
 - Cleaning Procedure
 - Oiling Procedure
 - Tightening Procedure



Cleaning Procedure

Cleaning Procedure								
 PTTEP	Unit Name : Electrochlorination		Unit No : 2X-5210	Department : Production	Project : Bongkot South		Date:16/07/2017	
	Illustration :	ចំណាំង (No.)	ឱ្យនត់គាន (Part)	មាត្រិកាង (Standard)	វិធីការ (Method)	ឧបករណ៍ (Tool)	ផ្សេងៗគិតខែប (Person-in-charge)	វេលាយភេទ (Time Period)
	1	Dilution Blower	Free of dust	Free of dust	Cleaning by utility water for dust removal.	Rags ,Scrub sponge	<i>Nopachai N.</i>	<i>15 Min.</i>
		(2K-5210A)			Use Oiler-1 solution with rags/spong for cleaning.			
			Free of oil stain	Free of oil stain	Cleaning by utility water for dust removal.	Rags ,Scrub sponge		
					Use Oiler-1 solution with rags/spong for cleaning.			
			Free of rust	Free of rust	Apply WD-40 on rusty area and use sandpaper or brush for rust removal.	Sand paper		
						Brush and WD 40		
	2	Dilution Blower	Free of dust	Free of dust	Cleaning by utility water for dust removal.	Rags ,Scrub sponge	<i>Nopachai N.</i>	<i>15 Min.</i>
		(2K-5210B)			Use Oiler-1 solution with rags/spong for cleaning.			
			Free of oil stain	Free of oil stain	Cleaning by utility water for dust removal.	Rags ,Scrub sponge		
					Use Oiler-1 solution with rags/spong for cleaning.			
			Free of rust	Free of rust	Apply WD-40 on rusty area and use sandpaper or brush for rust removal.	Sand paper		
						Brush and WD 40		
Cleaning Point (Illustration or Photo)								
   								



Oiling Procedure

Oiling Procedure								
	Unit No : 2X-5210 Unit Name : Electrochlorination.			Department : Production	Project : Bongkotsouth.			Date: 26/11/2015
Illustration :	លេខការងារ (No.)	ឯកសារណ៍ (Part)	មាត្រាថ្មី (Standard)	វិធីការ (Method)	Type of Lubricant	ឧបករណ៍ (Tool)	ផ្សេងៗនៃការងារ (Person-in-charge)	ពេលវេលា (Time Period)
	1	Transformer rectifiers (2TR-5210A)	Lube oil level not low than red mark of sight glass	Open plug on the top of transformer Connect ground cable between container and transformer Top up lube oil to transformer by container or pump about 50% of sight glass	Oil	Container / pump		
	2	Transformer rectifiers (2TR-5210B)	Lube oil level not low than red mark of sight glass	Open plug on the top of transformer Connect ground cable between container and transformer Top up lube oil to transformer by container or pump about 50% of sight glass	Oil			
Cleaning Point (Illustration or Photo)								
								



Tightening Procedure



Tightening Procedure

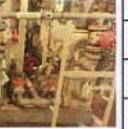
Created : 3 / 1 / 2016 ,

Unit Name Electrochlorination.

Department : PBS/P.

Project : Bongkot south .

Equipment Tag/Name : 2X-5210

Illustration :	ตำแหน่ง (No.)	ชิ้นส่วน (Part)	มาตรฐาน (Standard)	วิธีการ (Method)	การแก้ไข (Solve Problem)	ผู้รับผิดชอบ (Person-in-charge)	ระยะเวลา (Time Period)
	1	Shock dosing pump	Mark at nuts of body pump.	Mark with permanent pen.			
		(2P-5210 A&B)					
	2	Continue dosing pump	Mark at nuts of flange suction and discharge of pump.	Mark with permanent pen.		70 N.m torque	10 min
		(2P-5211 A&B)					
	3	Dilution blower	Mark at nuts of base pump.	Mark with permanent pen.			
		(2K-5210 A&B)					
Tightening Point (Illustration or Photo)	(1)	(2)	(3)	(4)	(5)		
							



Auditing

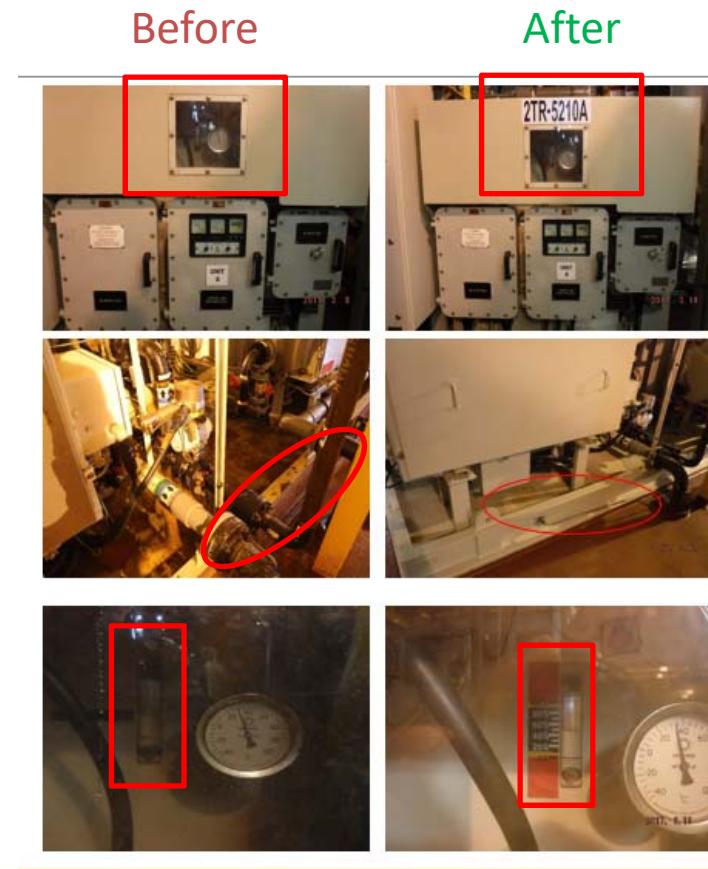
- There are 2 audits which each acceptable criteria are shown below..
 - Self audit
 - \geq 90 points before manager audit (Actual : 90 Points)
 - Manager audit
 - \geq 80 points before continue to step 2 (Actual : 93.32 Points)



Autonomous Maintenance Diagnostic Sheet	
	
Step 1: Initial Cleaning (คุณภาพของผลิตภัณฑ์ที่ดีที่สุด)	<input checked="" type="checkbox"/> ผ่าน muster <input type="checkbox"/> ไม่ผ่าน muster วันที่ muster: 26/02/2010 ผู้ muster: ช่างแม่ค้า
Step 2: Daily Cleaning (คุณภาพของผลิตภัณฑ์ที่ดีที่สุด)	<input checked="" type="checkbox"/> ผ่าน muster <input type="checkbox"/> ไม่ผ่าน muster วันที่ muster: 27/02/2010 ผู้ muster: ช่างแม่ค้า
Step 3: Weekly Cleaning (คุณภาพของผลิตภัณฑ์ที่ดีที่สุด)	<input checked="" type="checkbox"/> ผ่าน muster <input type="checkbox"/> ไม่ผ่าน muster วันที่ muster: 28/02/2010 ผู้ muster: ช่างแม่ค้า
Step 4: Monthly Cleaning (คุณภาพของผลิตภัณฑ์ที่ดีที่สุด)	<input checked="" type="checkbox"/> ผ่าน muster <input type="checkbox"/> ไม่ผ่าน muster วันที่ muster: 29/02/2010 ผู้ muster: ช่างแม่ค้า
Step 5: Annual Cleaning (คุณภาพของผลิตภัณฑ์ที่ดีที่สุด)	<input checked="" type="checkbox"/> ผ่าน muster <input type="checkbox"/> ไม่ผ่าน muster วันที่ muster: 29/02/2010 ผู้ muster: ช่างแม่ค้า
Overall Result:	<input checked="" type="checkbox"/> ผ่าน muster <input type="checkbox"/> ไม่ผ่าน muster
Comments:	ผลลัพธ์ที่ได้มาดูแลดีมาก ไม่มีปัญหาใดๆ
Signature:	_____ ช่างแม่ค้า
Notes:	Wiping off all dirt, dust, oil, and debris from the entire system.
Next Step:	Identify areas of potential dust and debris accumulation to prevent re-contamination.

Auditing Finding and Rectification

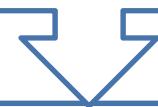
- Comment from management and rectified action



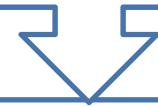
Step 2: Eliminate Tag Find Out Inaccessible And Source Contaminate

Step 2 : Activities

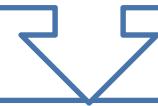
Identify inaccessible point and source of contaminant



Apply Why Why Analysis



Resolved finding or provide mitigation



Auditing before continue to step 3

Identify inaccessible point and contaminate source

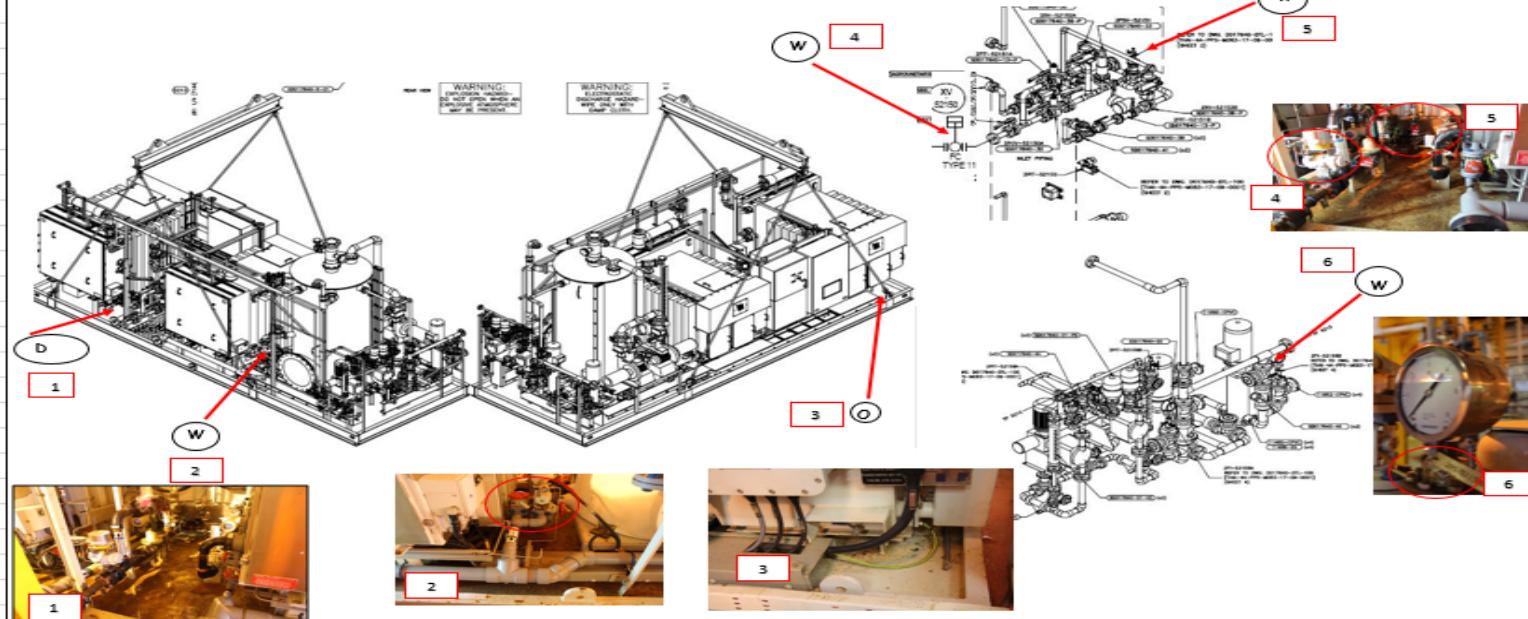
- Start step 2 since Mar'2016
- The inaccessible point and contaminate source are identified based on tag obtained when cleaning, oiling and tightening.
- There are 2 figures shown summary of location.
 - Location of contaminate source
 - Location of inaccessible during cleaning, oiling and tightening

Map of Contaminate source

Map of Generating Sources

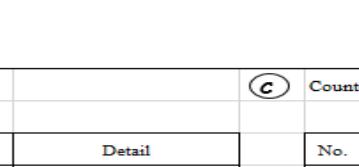
Unit No : 2X-5210 Unit Name : Electrochlorination Department : Production Project : Bongkot South

Illustration (ภาพจำลองสถานที่จริง) Machine Name : Electrochlorination No. : 2X-5210



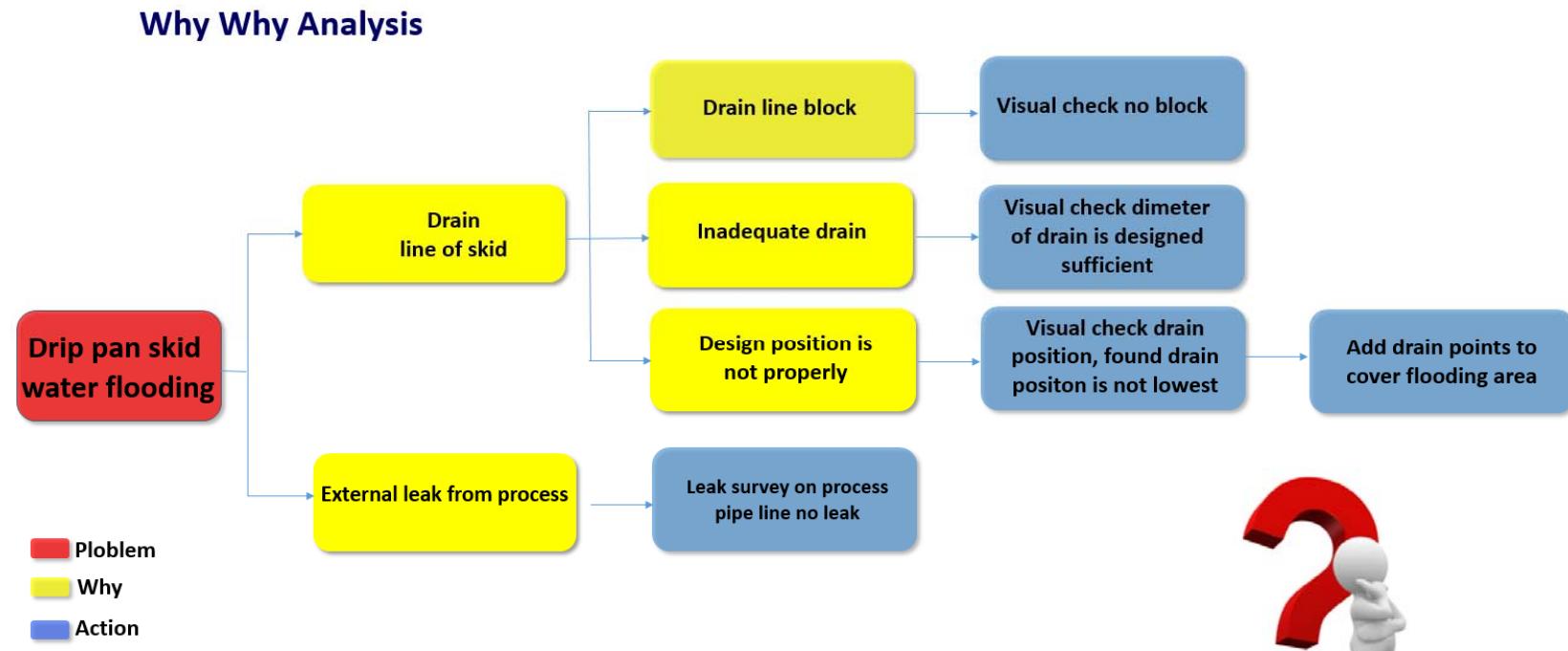
(B)	Drip / venting	(O)	Oil Leakage / รั่วตัวน้ำมัน	(C)	Countermeasures Completed / ดำเนินการแก้ไขแล้ว			
(A)	Air Leakage / รั่วตัวอากาศ	(W)	Water Leakage / รั่วตัวน้ำ					
No.	Part	Detail	No.	Part	Detail	No.	Part	Detail
1	Drip pan skid	Water flooding.	5			15		
2	HV-52158	Water leak at stem valve.	9			16		
3	2TR-5210A/B	Oil leak at oil filter.	10			17		
4	XV-52150	Water leak at stem valve.	11			18		
5	2PIT-52150	Water leak at union tubing	12			19		
6	PI-52158B	Water leak at vent plug.	13			20		
7			14			21		

Map of Inaccessible point

Map of Difficult-to-Access Cleaning, Inspection and Oiling Location								
Unit No : 2X-5210	Unit Name : Electrochlorination	Department : Production	Project : Bongkot South					
Illustration (ภาพเบื้องต้นของจุดที่ยากจะเข้าถึง)	Machine Name : Electrochlorination	No. :	2X-5210					
								
								
								
(cl) Cleaning / ทำความสะอาด	(I) Inspection / การตรวจสอบ	(C) Countermeasures Completed / ดำเนินการแก้ไขแล้ว						
(o) Oiling / การหล่อลื่น								
No.	Part	Detail	No.	Part	Detail	No.	Part	Detail
1	Drip pan	Dirty	8	2TR-5210	Dirty plastic indicator show level oil transformer	15		
2	2P-5211A/B	Dirty inside cover guard motor.	9	2TR-5210	Dirty at under transformer.	16		
3	2P-5210A/B	Dirty inside cover guard motor.	10			17		
4	2K-5210A/B	Dirty inside cover guard motor.	11			18		
5	2K-5210A/B	Dirty at indicator flapper blower.	12			19		
6	2T-5210	Dirty at upper tank	13			20		
7	2TR-5210	Dirty at upper transformer.	14			21		

Why Why Analysis

- Why Why analysis helps to find root causes of the problem as per example below.



Improvement after analysis

Before



After



Activities Improvement after analysis



Update no. of finding in step 2

- Cumulative finding is 53 tags as Feb'2017.
- Example of additional finding
 - 2X-5210, drip pan skid water flooding
 - 2HV-52155, water leak at stem valve
 - 2K-5210B, Oil leak at body of inlet filter fan.
 - 2PIT-52150 Water leak at union
 - Dirty equipment.
 - etc.

Name / Equipment Tag	Description	Tag Type		
		W	Y	R
2X-5210	Drip pan skid Water flooding.	X		
2HV-52155	Water leak at stem valve.		X	
2K-5210B	Oil leak at body of inlet filter fan.	X		
2XV-52150	Water leak at stem valve.			X
2PIT-52150	Water leak at union tubing	X		
2PI-52158B	Water leak at vent plug.	X		
2X-5210	Drip pan Dirty	X		
2X-5210	Drip pan Dirty	X		
2P-5210A/B	Dirty inside cover guard motor.	X		
2P-5210A/B	Dirty inside cover guard motor.	X		
2K-5210A/B	Dirty inside cover guard motor.	X		
2K-5210A/B	Dirty inside Flapper blower	X		
2T-5210	Dirty at upper tank.	X		
2TR-5210A	Dirty at upper transformer.	X		
2TR-5210A	Dirty plastic indicator show level oil transformer.	X		
2TR-5210	Dirty at under transformer.	X		

Example of finding and rectification

- Example of Finding and actions for resolved

Finding	Rectified Actions
	

2X-5210, drip pan skid water flooding

Modify to install drain line

Example of finding and rectification

- Example of Finding and actions for resolved

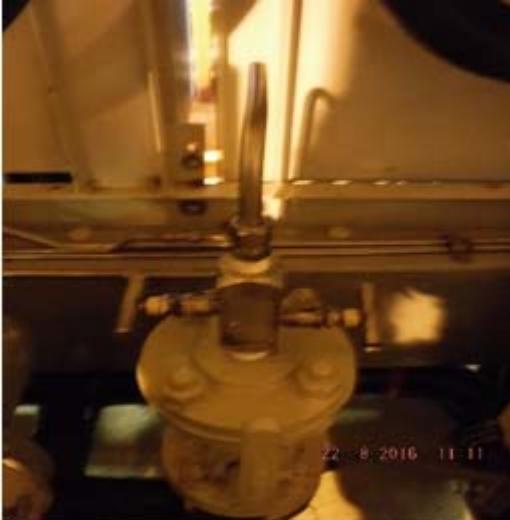
Finding	Rectified Actions
 A photograph showing a close-up view of a piping system. A white valve is mounted on a horizontal pipe. A vertical pipe is connected to the side of the valve. A black flexible hose is attached to the top of the valve. There is a visible leak point at the stem of the valve.	 A photograph showing the same piping system after repair. The white valve is now leak-free. The black flexible hose remains attached to the top of the valve. The date "2017-11-14" is visible in the bottom right corner of the image.

HV-52155 water leak at stem valve

Repaired to eliminate leak point

Example of finding and rectification

- Example of Finding and actions for resolved

Finding	Rectified Actions
	
Water leaked at union tubing	Tightening union to stop leak

Example of finding and rectification

- Example of Finding and actions for resolved

Finding	Rectified Actions
	
5 way of 2FIT-52160A was rusty	Cleaning

Example of finding and rectification

- Example of Finding and actions for resolved

Finding	Rectified Actions
	
Support pump (2P-5210A) was rusty	Cleaning

Example of finding and rectification

- Example of Finding and actions for resolved

Finding	Rectified Actions
	
Structure above HMI was rusty	Cleaning and Repair painting

Example of finding and rectification

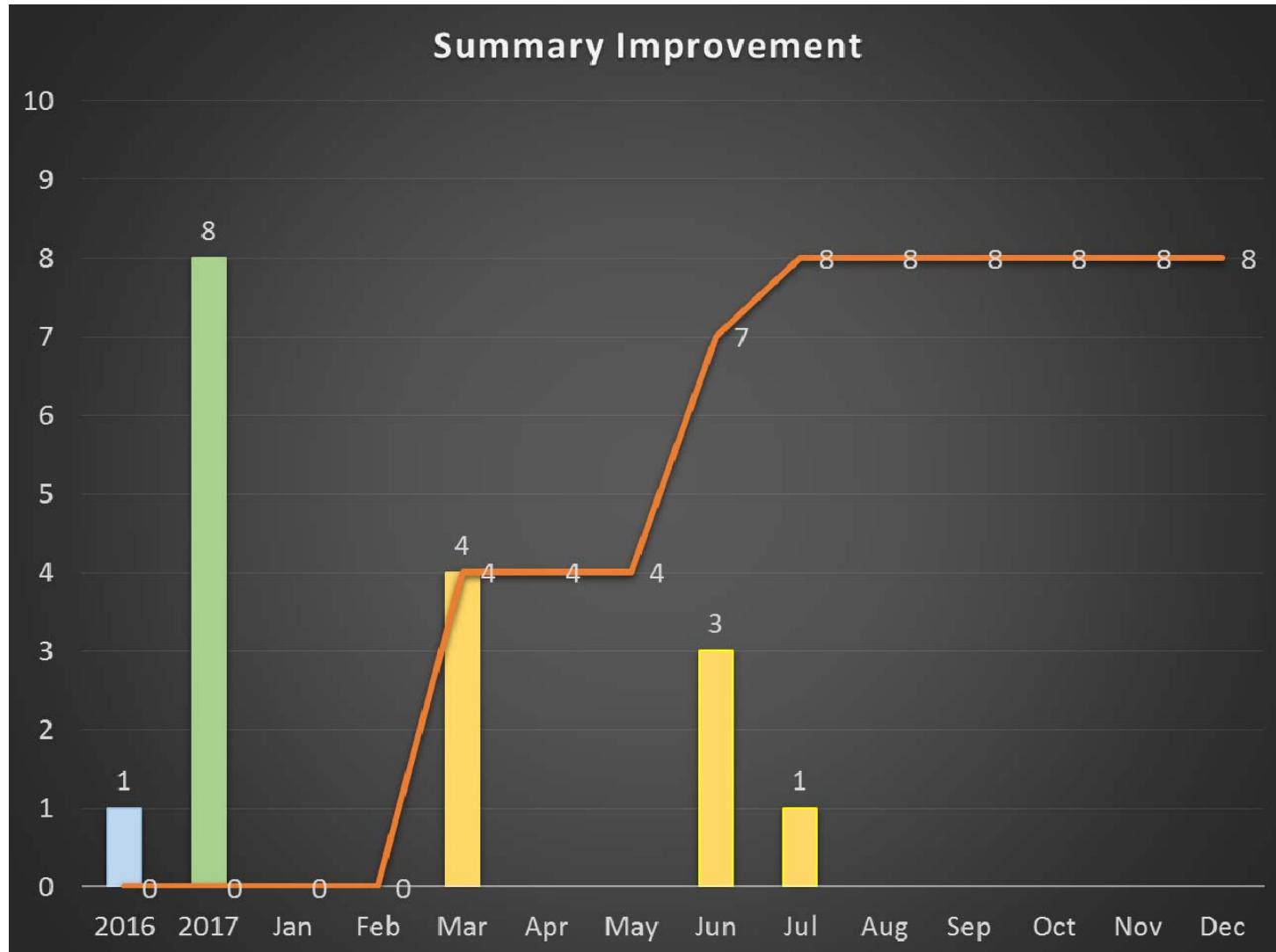
- Example of Finding and actions for resolved

Finding	Rectified Actions
 A photograph showing a close-up of a dark-colored pipe fitting, specifically a flange, which appears significantly rusted and dirty. It is mounted on a vertical pipe against a bright, possibly metallic background.	 A photograph showing the same pipe fitting after rectification. The surface is now clean and dark, indicating the removal of the extension spool. The background shows a clear blue sky with some white clouds.

Found dirty at line 2FA-5251 cause had liquids blow out from flame arrester

Remove extension spool (CS) to prevent rusty

Step 2: Resolve finding and Follow-up



Auditing

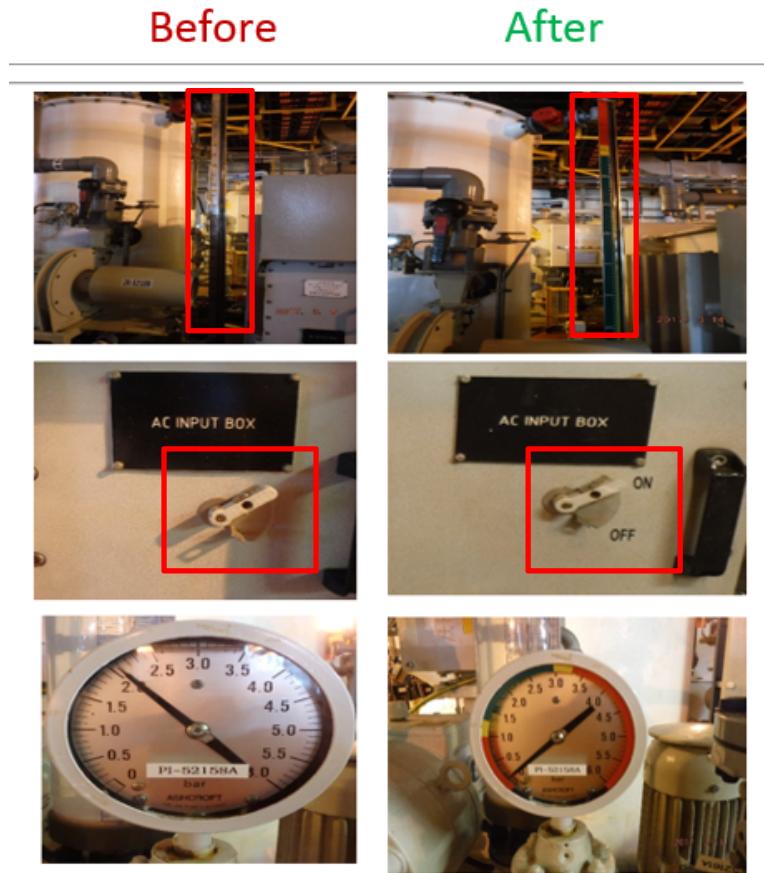
- There are 2 audits and audit criteria.
 - Self audit
 - > 90 points before manager audit (Actual : 93 Points)
 - Manager audit
 - > 80 points before continue to step 2 (Actual : 95 Points)



ใบรายงานการตรวจสอบว่าใช้ห้องด้วยตนเอง					
Autonomous Maintenance Diagnosis Sheet					
Step 2 Countermeasure for Generating Sources and difficult-to-Access Location		คะแนน (point) <input checked="" type="checkbox"/> ผ่าน (Pass) <input type="checkbox"/> ไม่ผ่าน (Fail)			
ขั้นที่ 2 ตรวจสอบที่มาของสาเหตุที่ไม่ได้ความสูงมาก		คะแนน 2 ถึง 5 คะแนน			
และด้านหนึ่งที่ห้องด้านบนในระบบปั๊มน้ำร้อน		ผู้ทดสอบ / ผู้บริหารตรวจสอบ 2 ถึง 5 คะแนน			
Unit No : <u>AX - 5910</u>		ห้องแม่			
Unit Name : <u>Electrical Inhibition Unit</u>		สถานที่ที่ผู้บริหารตรวจสอบ			
วัน - เวลา ครั้งที่ (Diagnosis Date) <u>11 Aug 2016</u>		<u>Sangkat D.</u> (Signature) <u>Damchit)</u>			
หัวข้อ	ประเมิน	ประเด็นในการตรวจสอบ		weight	points
Diagnosis	Step AM	Diagnosis Points		total	
อุปกรณ์หลัก Main Equipment	Step 1 Metal Generating	ไม่มีลักษณะ คุณลักษณะ หรืออัน เหตุผลใดๆ แสดงว่าไม่		5.0%	1 2 (6) 5
	กุญแจพื้นที่ไม่เป็นที่นิยม มีการเปลี่ยนแปลงบ่อยครั้ง		2.5%	1 2 (3) 2.5	
	กุญแจที่ใช้ชุดเดียวกันกับอุปกรณ์อื่นๆ เช่น กุญแจ ล็อก ห้อง ประตู และฯลฯ		10%	1 2 (6) 5	
	ไม่มีการติด ห้องแม่ Bolts & Nut		2.5%	1 2 (6) 2.5	
	รวม		15%		15
อุปกรณ์เสริม Auxiliary Element	Step 1 Metal Generating	ห้องแม่ไม่มีลักษณะ คุณลักษณะ หรืออัน เหตุผลใดๆ แสดงว่าไม่		15%	1 (2) 3 1.5
	กุญแจพื้นที่ไม่เป็นที่นิยม มีการเปลี่ยนแปลงบ่อยครั้ง		2.5%	1 2 (3) 2.5	
	กุญแจที่ใช้ชุดเดียวกันกับอุปกรณ์อื่นๆ เช่น กุญแจ ล็อก ห้อง ประตู และฯลฯ		10%	1 2 (3) 3	
	ไม่มีการติด ห้องแม่ Bolts & Nut		2.0%	1 2 (6) 2	
	รวม		15%		10
หัวข้อ	Step 1 Metal Generating	ห้องแม่ไม่มีลักษณะ คุณลักษณะ หรืออัน เหตุผลใดๆ แสดงว่าไม่		15%	1 (2) 3 1.5
	กุญแจพื้นที่ไม่เป็นที่นิยม มีการเปลี่ยนแปลงบ่อยครั้ง		2.5%	1 2 (3) 2.5	
	กุญแจที่ใช้ชุดเดียวกันกับอุปกรณ์อื่นๆ เช่น กุญแจ ล็อก ห้อง ประตู และฯลฯ		10%	1 2 (3) 3	
	ไม่มีการติด ห้องแม่ Bolts & Nut		2.0%	1 2 (6) 2	
	รวม		15%		5
อุปกรณ์เชื่อม	Step 1 Metal Generating	ไม่มีลักษณะที่เก็บความร่างกาย เป็น (ส่วน)		1.5%	1 2 (3) 1.5
	กุญแจที่ใช้ชุดเดียวกันกับอุปกรณ์อื่นๆ เช่น กุญแจ ล็อก ห้อง ประตู และฯลฯ		2.0%	1 2 (3) 2	
	ผู้ใช้ (ตน, ภาระงานหนัก, ภาระภัยหนัก) มีความชำนาญ (เฉพาะ)		5%	1 2 (6) 1.5	
	รวม		15%		5
	อุปกรณ์เชื่อม	Step 1 Metal Generating	เครื่องมือ (Tools) บางตัว และอุปกรณ์ (Spare part) ที่ถูกใช้มากที่สุด		2.5%
พบตัวที่ร้าว ไม่สามารถซ่อมได้		2.5%	1 2 (6) 2.5		
ป้ายบอก Nameplate, Label อยู่ในสภาพดี ไม่มีการหัก ชำรุด 丢失 หรือเสียหาย		5%	1 2 (6) 5		
รวม		15%		5	

Audit finding and rectification

- Comment from management and rectified action



Activities Improvement





Step 3: Tentative Standard for Cleaning, Oiling, Inspection, Visual Control

Tentative Standard

- Step 3 is started since Mar'17
- To develop of cleaning, oiling, inspection and visual control standard. The inspection tools will be developed to easily inspection in order to reduce activities time.
- The inspection technique will be addressed with criteria.



Tentative Standard

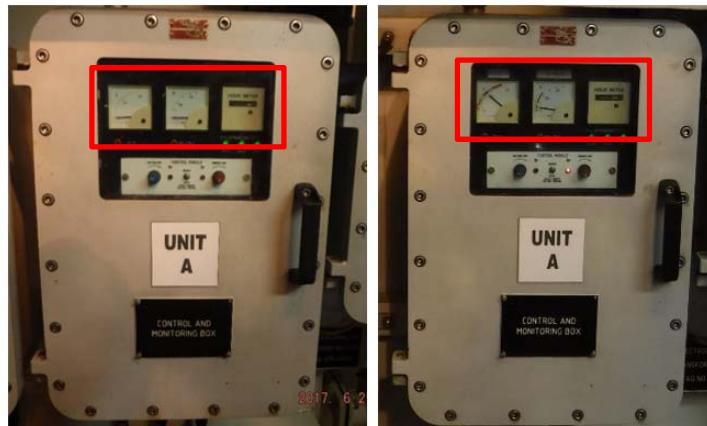
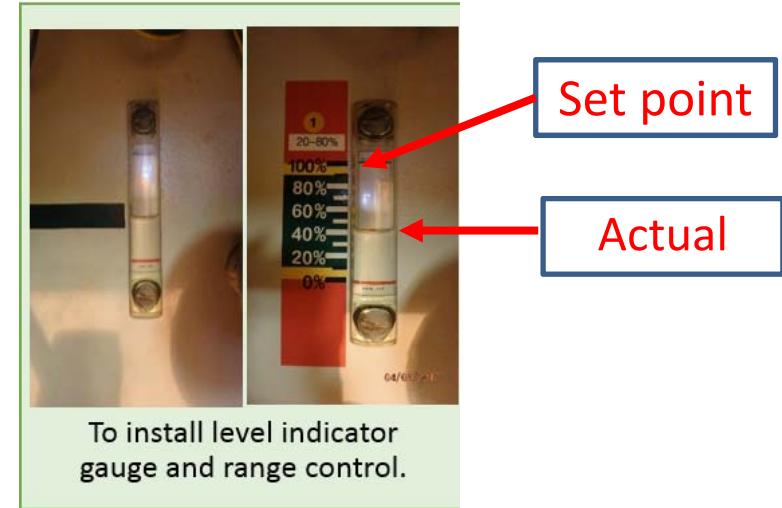
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Tentative Standard

Tentative cleaning / Inspection / Oiling / Relighting Standards																																																																																				
Illustration of Unit : 2X-5210		Equipment : 2TR-5210A, 2TR-5210B		Approve by : -Phitthaya kaenmuang		Create by : CHATTRAWUT H.																																																																														
Date : 16/07/2017	Department : PBS/P	Group : Bengkai South	Section : PBS/P	(Prod Supv)																																																																																
																																																																																				
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- <Y:\Selective Access\02 Production\14. Autonomous maintenance\Index\2X-5210 Electrochlorination Manager Model\Step 3>

Example of additional Improvement



Example of additional Improvement

Before	After
	 <p>Actual</p> <p>Set point</p> <p>Temp Gauge</p>
Require tag operation at temp gauge of 2TR-5210B.	Installed tag

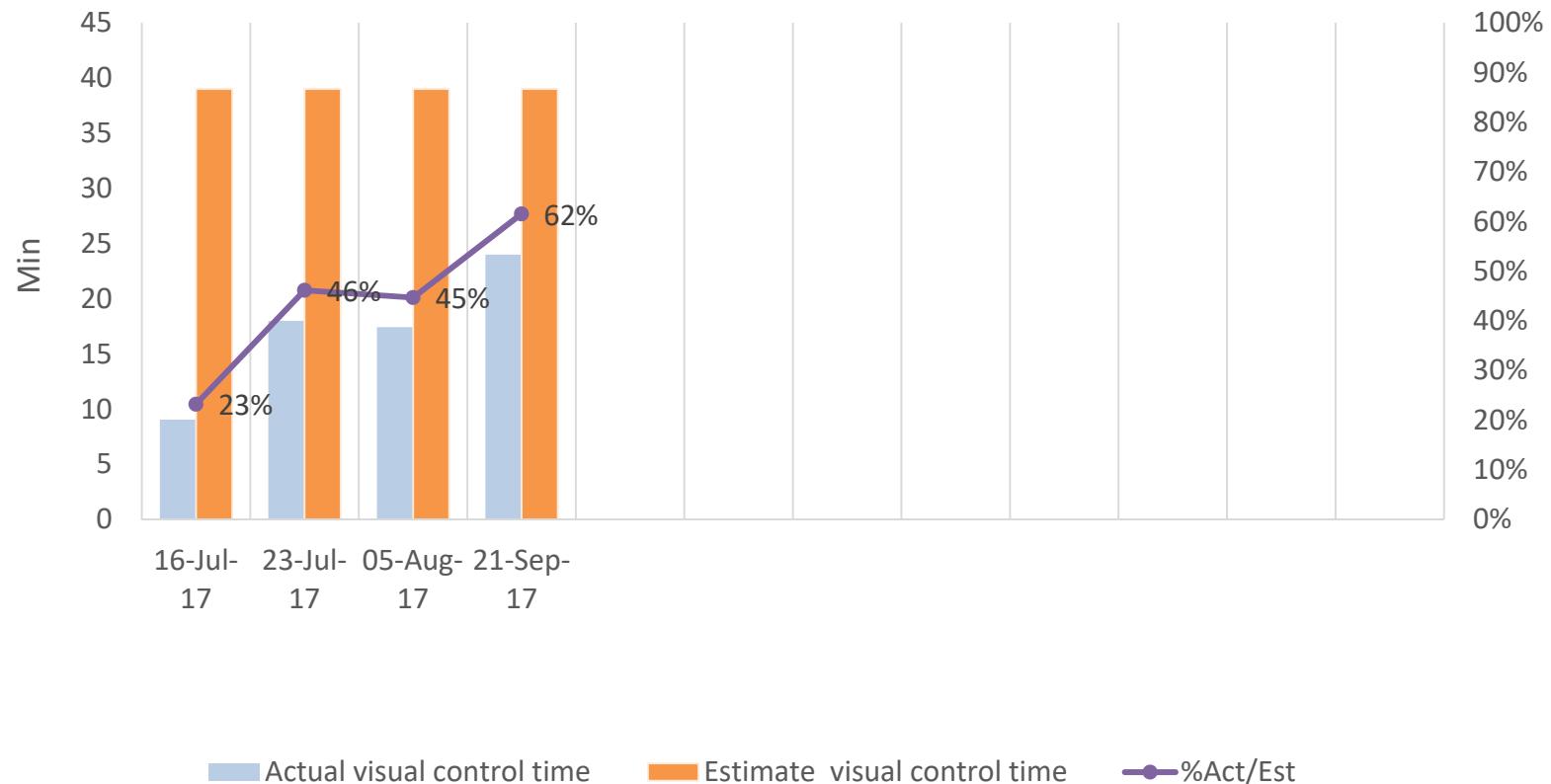
Update no. of finding in step 3

- Cumulative finding is 102 tags as Oct'2017.
- Example of additional finding
 - 2P-5210A, AC input box no label on/off
 - 2TR-5210A, 5 way of 2FIT-52160A was rusty
 - All motor, Motor running identification tools
 - 2FA-5251, Dirty at line of flame arrestor
 - 2LIT-52154, Found liquid seeping
 - Etc.

Name / Equipment Tag	Description	Tag Type		
		W	Y	R
2P-5210A	Found temporary tag No on pump	X		
2P-5210B	Found temporary tag No on pump	X		
2TR-5210A	AC input box no label on/off	X		
2TR-5210B	AC input box no label on/off	X		
2K-5210A	5 way of 2FIT-52160A was rusty	X		
2K-5210B	5 way of 2FIT-52160A was rusty	X		
2P-5210A	Suport pump was rusty	X		
2P-5210B	Suport pump was rusty	X		
2P-5210B	Stud Bolt of valve line to services water pump was	X		
2P-5211A	Support was rusty	X		
2TR-5210B	Cover guard of 2TR-5210B was rusty	X		
2X-5210	Structure rusty	X		
2x-5210	Request painting detail name of unit.No only tag number.			X

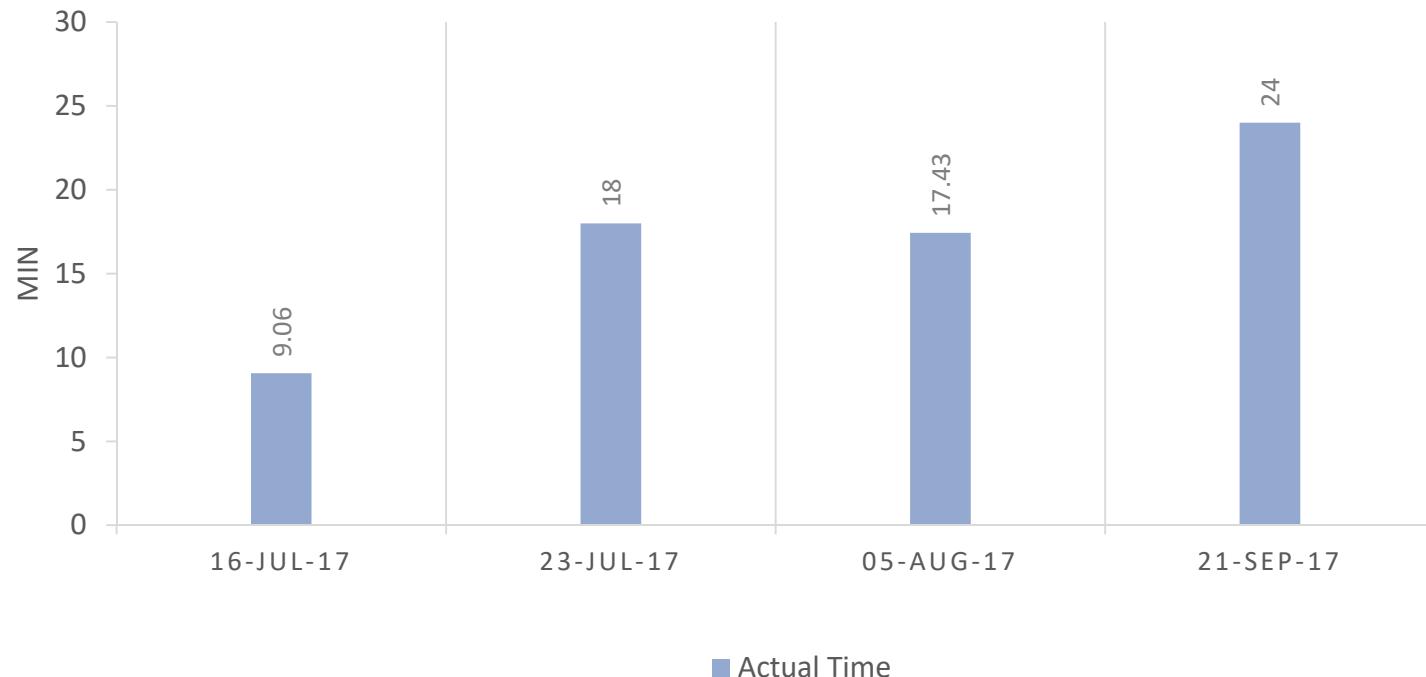
Step 3: Resolve finding and Follow-up

Summary inspection visual control



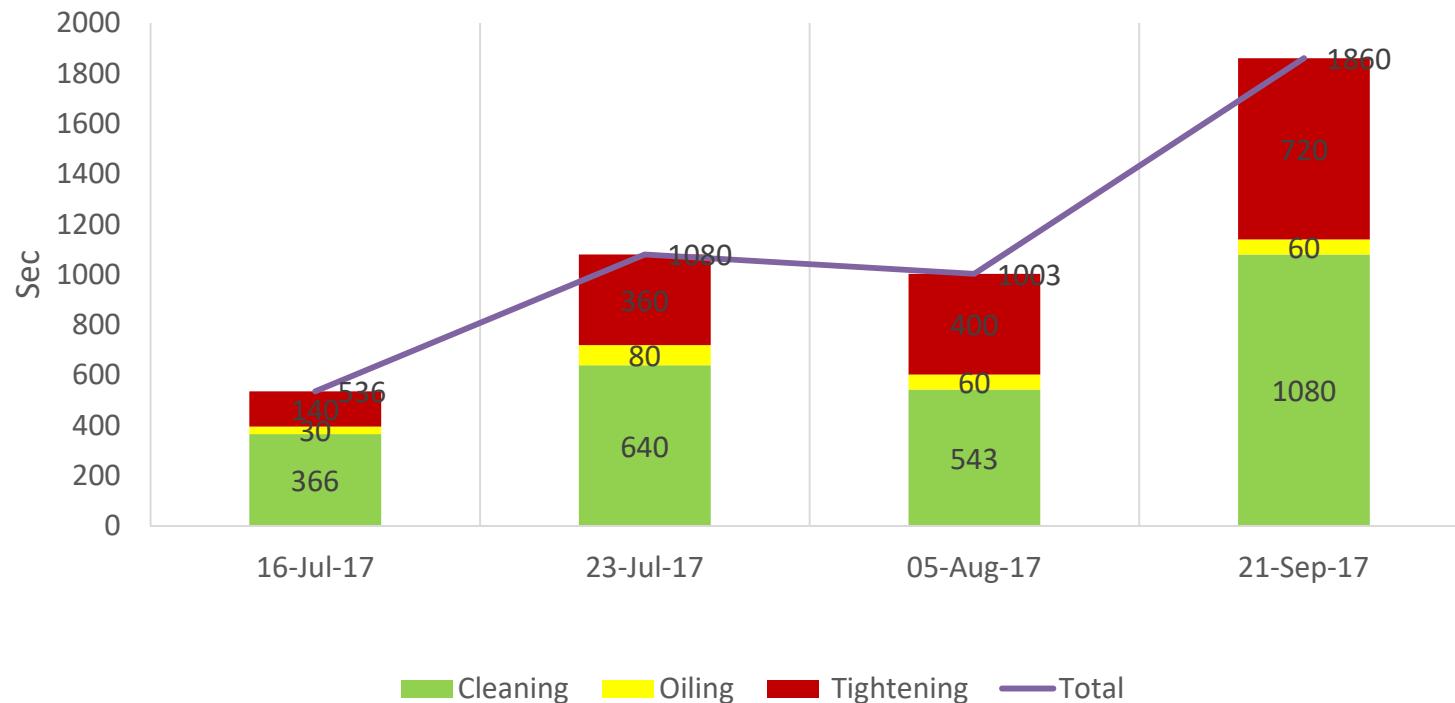
Step 3: Resolve finding and Follow-up

INSPECTION VISUAL CONTROL



Step 3: Resolve finding and Follow-up

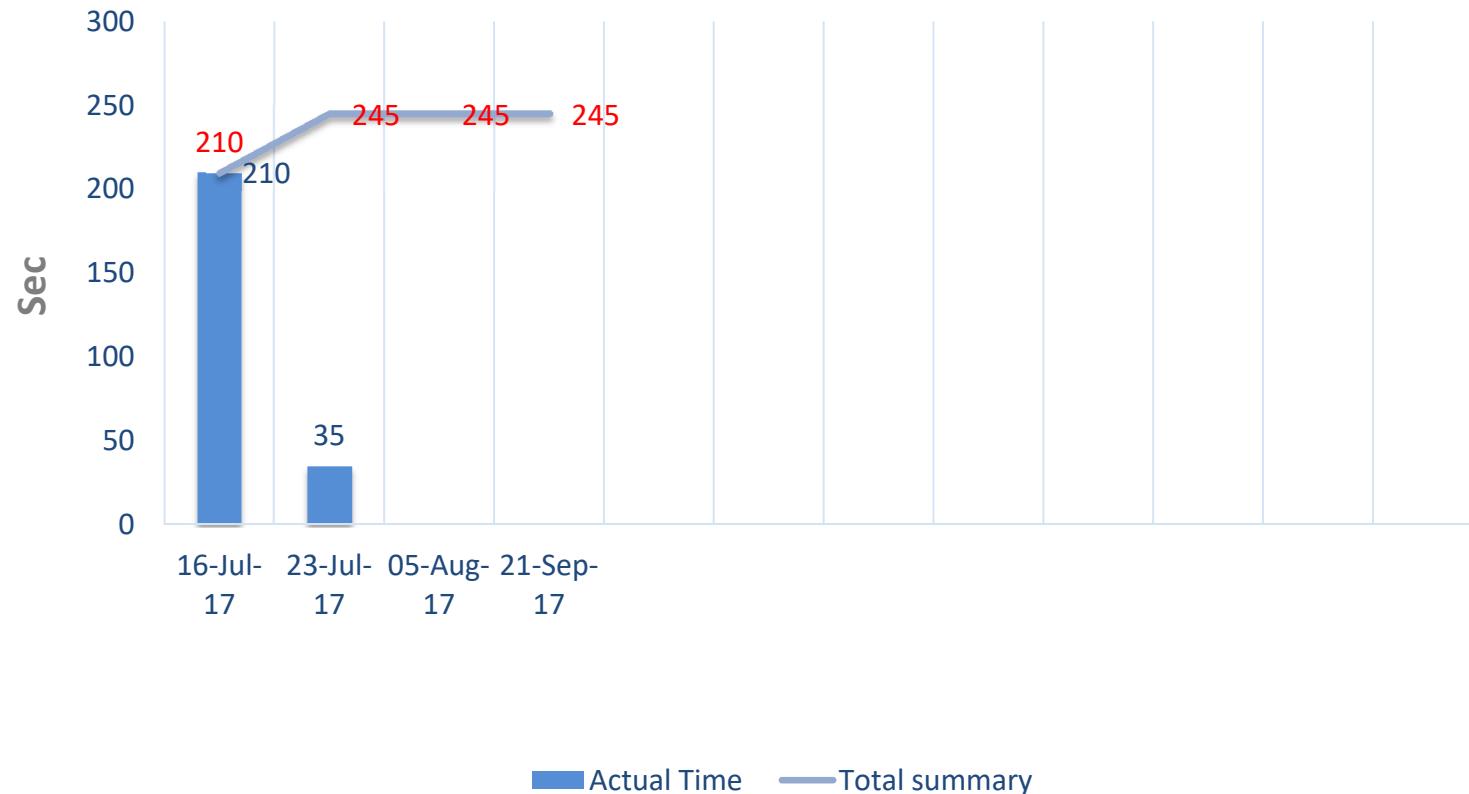
cleaning/oiling/tightening Inspection Time



Step 3: Resolve finding and Follow-up



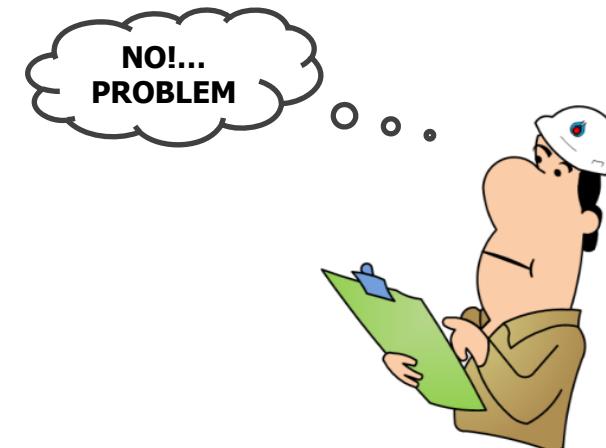
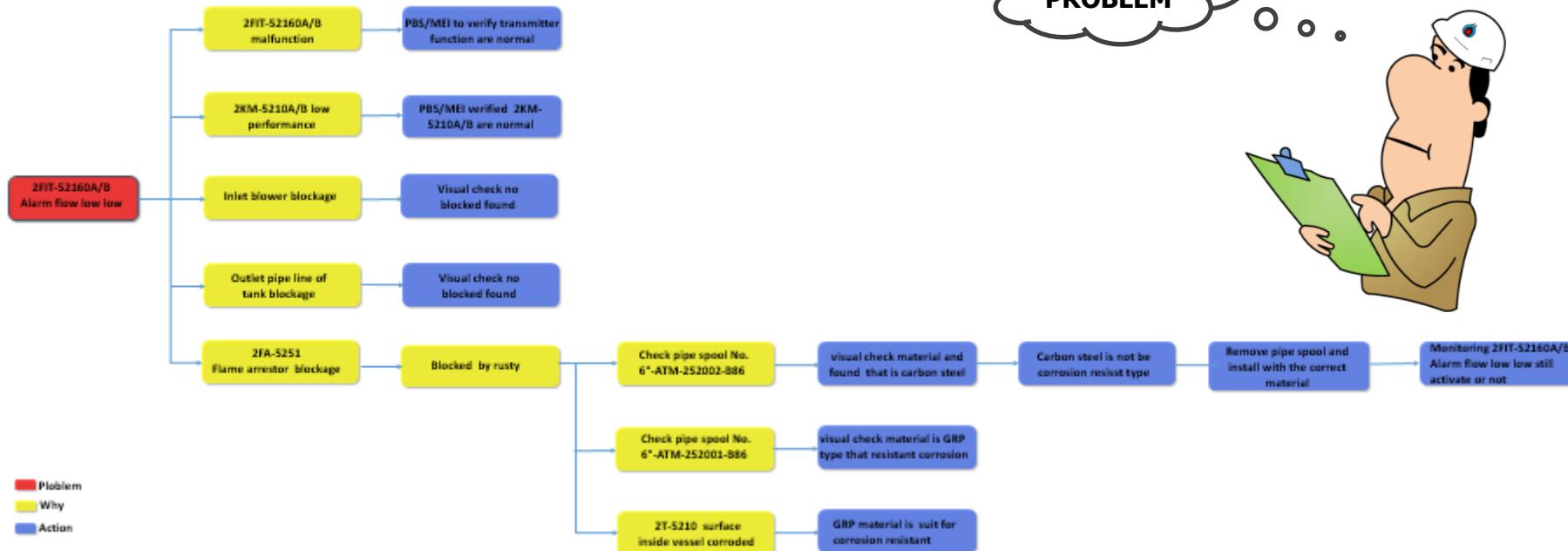
Activity Visual control



Why Why Analysis

- Why Why analysis helps to find root causes of the problem as per example below.

Why Why Analysis



Auditing

- There are 2 audits and audit criteria.
- Self Audit -> Done with 91 points (> 90 point, criteria)
- Management Audit -> Done with 95 points (> 80 point, criteria)



AM target of Year 2018

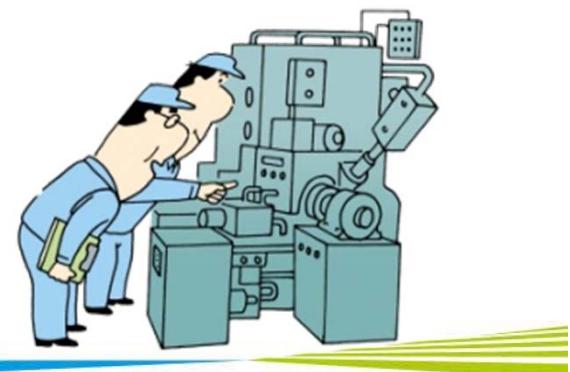
- Maintain STEP-3 implement for 2X-5210 Electro chlorination (Manager model).
- Assignment for AM small group activities. Area assignment is following.

Group A 2P-5201A, 2P-5030A, 2P-5040A, 2P-3450A ,2P-5031A

Group B 2P-5201B, 2P-5030B, 2P-5040B, 2P-3450B ,2P-5031B

Group C 2P-6201, 2P-5030C, 2P-5040C, 2P-5050 A/B

- AM target of year 2018 is STEP-2 achievement within October 2018.





Q&A

Passion to Explore for a Sustainable Future