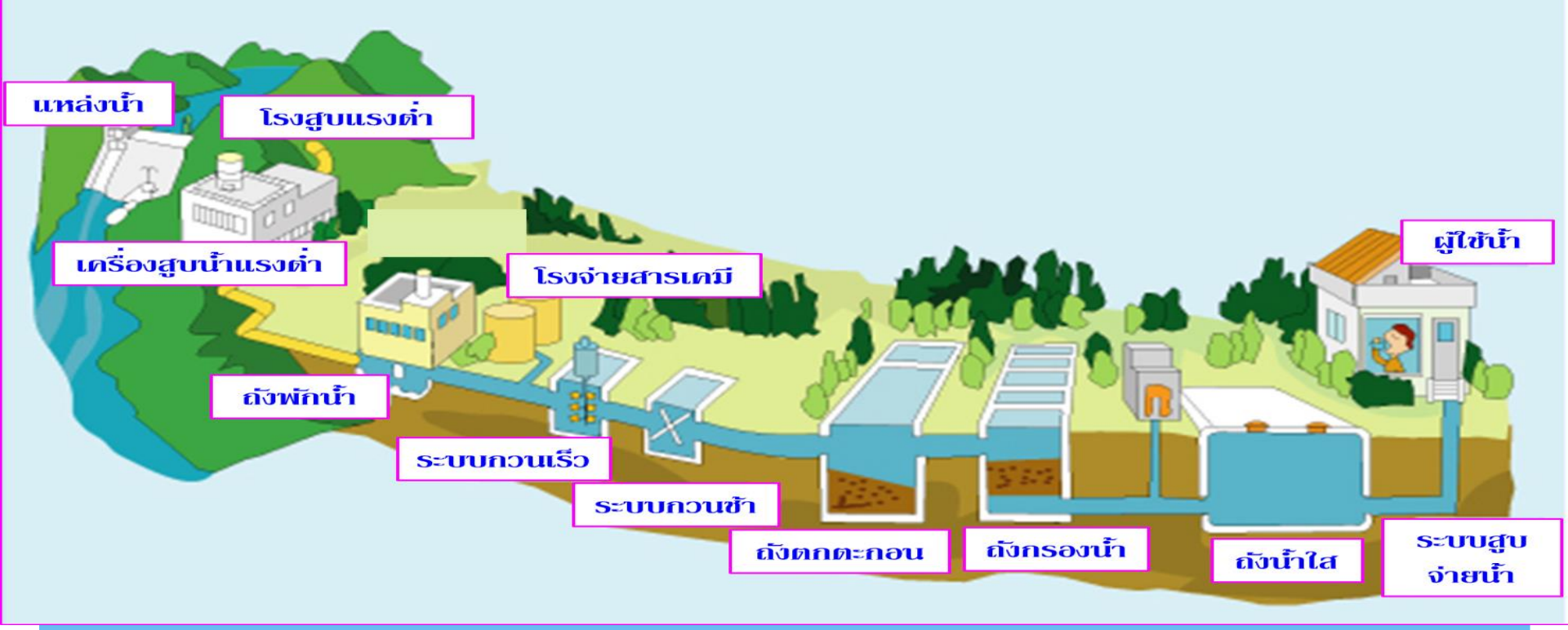
Water Quality Management through Water Safety Plan (WSP)



A Water safety plan is a plan to ensure the safety of *drinking water* through the use of a comprehensive *risk assessment* and *risk management* approach that encompasses all steps in *water supply* from *catchment* to *consumer*.

Context clues:

1. Drinking water
2. Risk assessment & Management
3. Water supply (Catchment to Consumer)

Vision of PWA

Customers are delighted with water quality and excellent services


CUSTOMER

Taste

Standard

CUSTOMER

Care

Pleasure

odor

Clean

Satisfy

complain

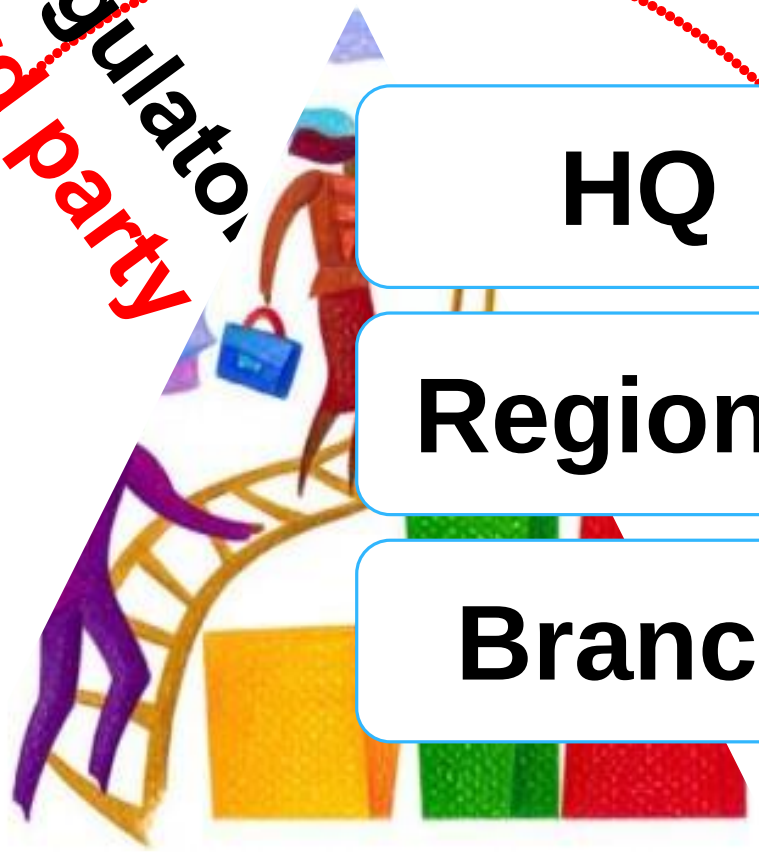
customer

Health

Bad color

service

Regulator,
3 rd party



HQ

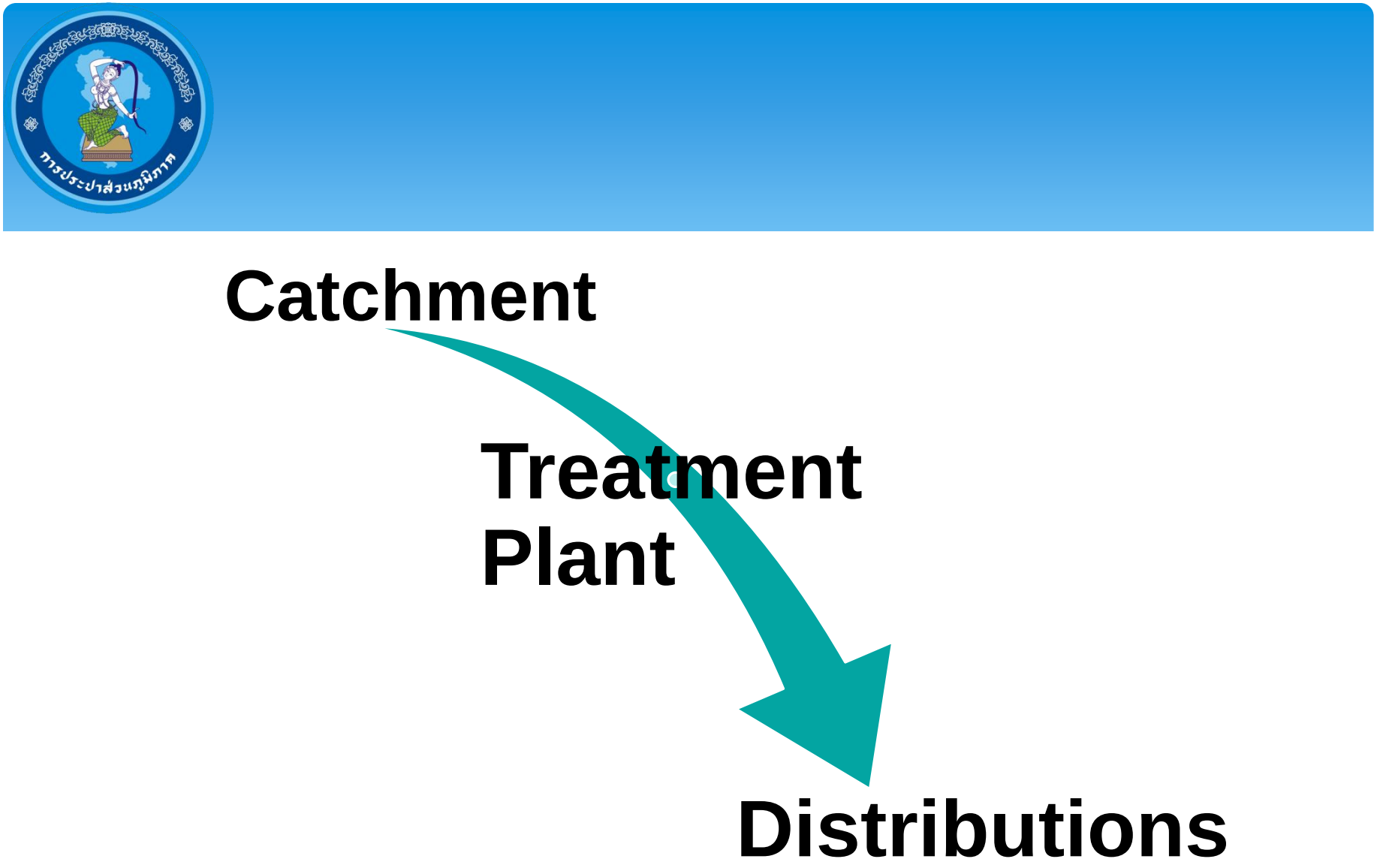
Regional

Branch

Yearly/Project/
Worst Cases

Monthly/
Problems

Daily/
Problems

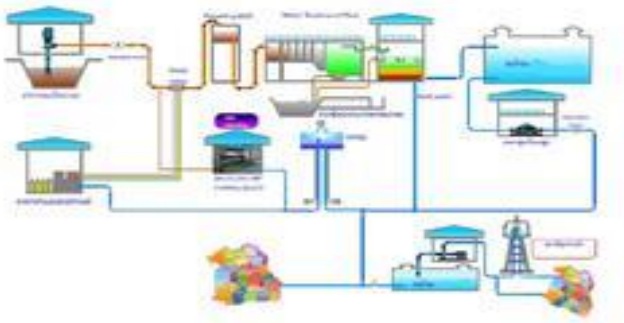

Catchment
Treatment Plant
Distributions

คู่มือกระบวนการหลัก ด้านกระบวนการผลิตน้ำประปา

เล่ม 1 ภาคปฏิบัติ

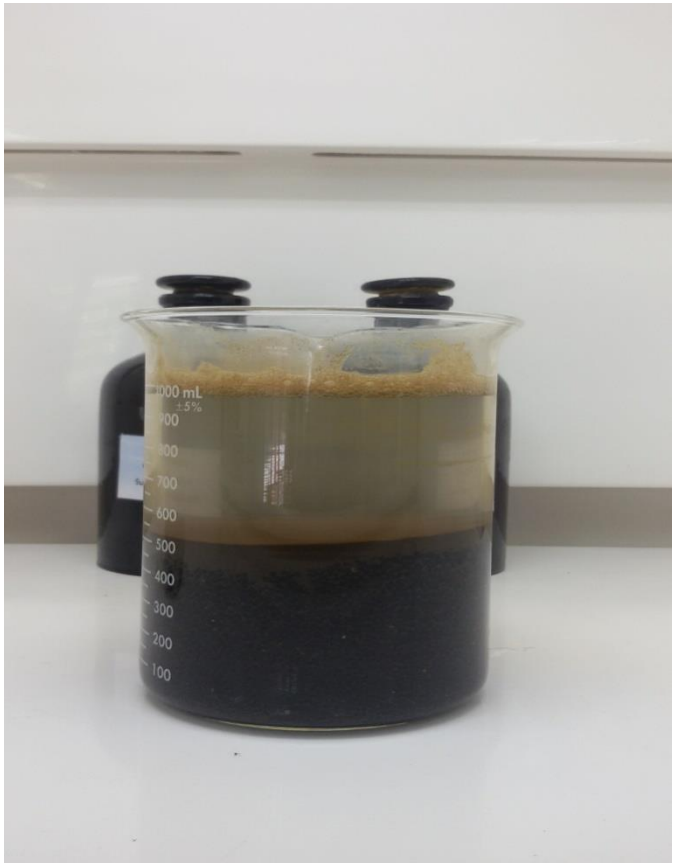
การประปาส่วนภูมิภาค

ฉบับปรับปรุง ครั้งที่ 1 พ.ศ. 2558

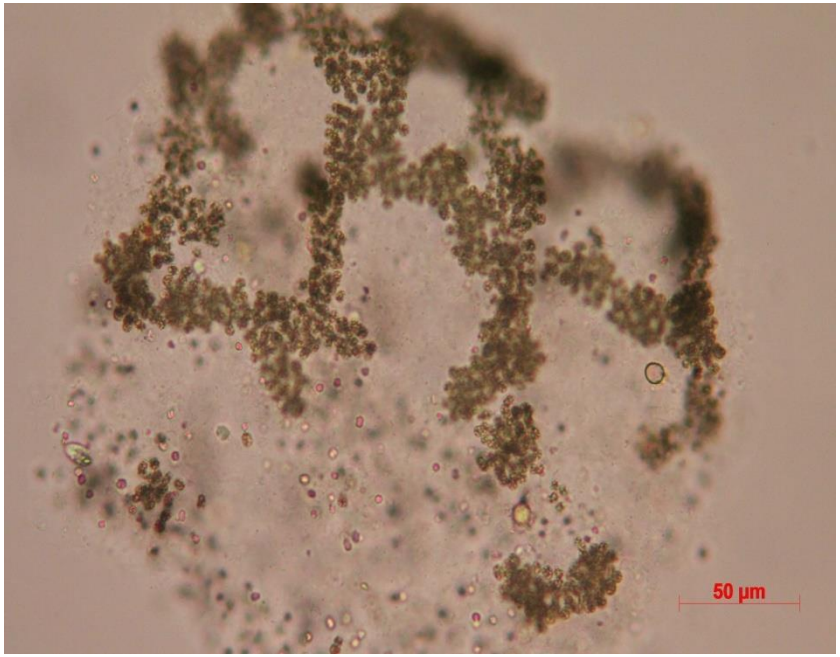


คณะทำงาน: คู่มือกระบวนการหลัก ด้านกระบวนการผลิตน้ำประปา

? Why do we management WQ with WSP.



? Why do we management WQ with WSP.



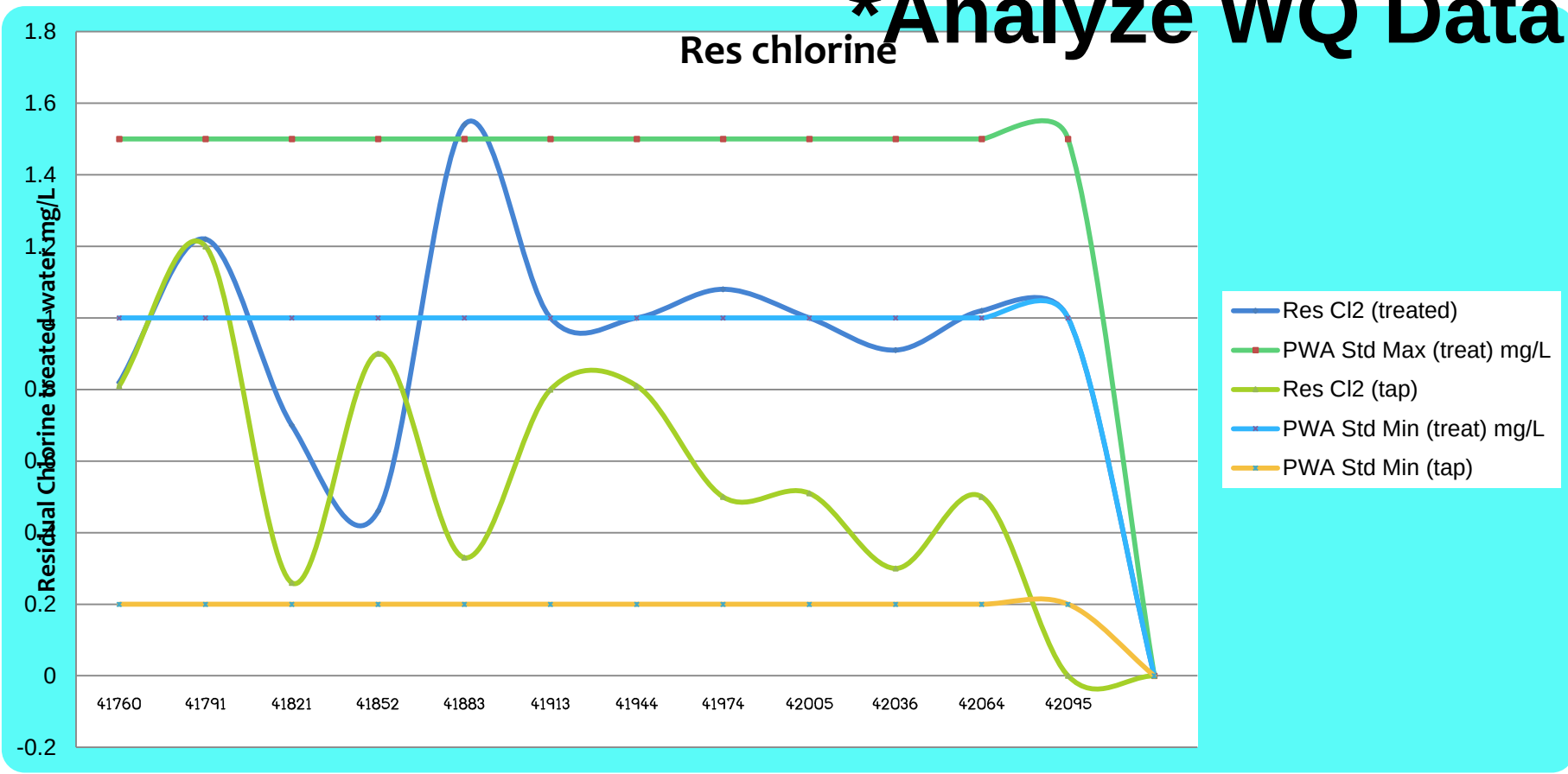
? Why do we management WQ with WSP.

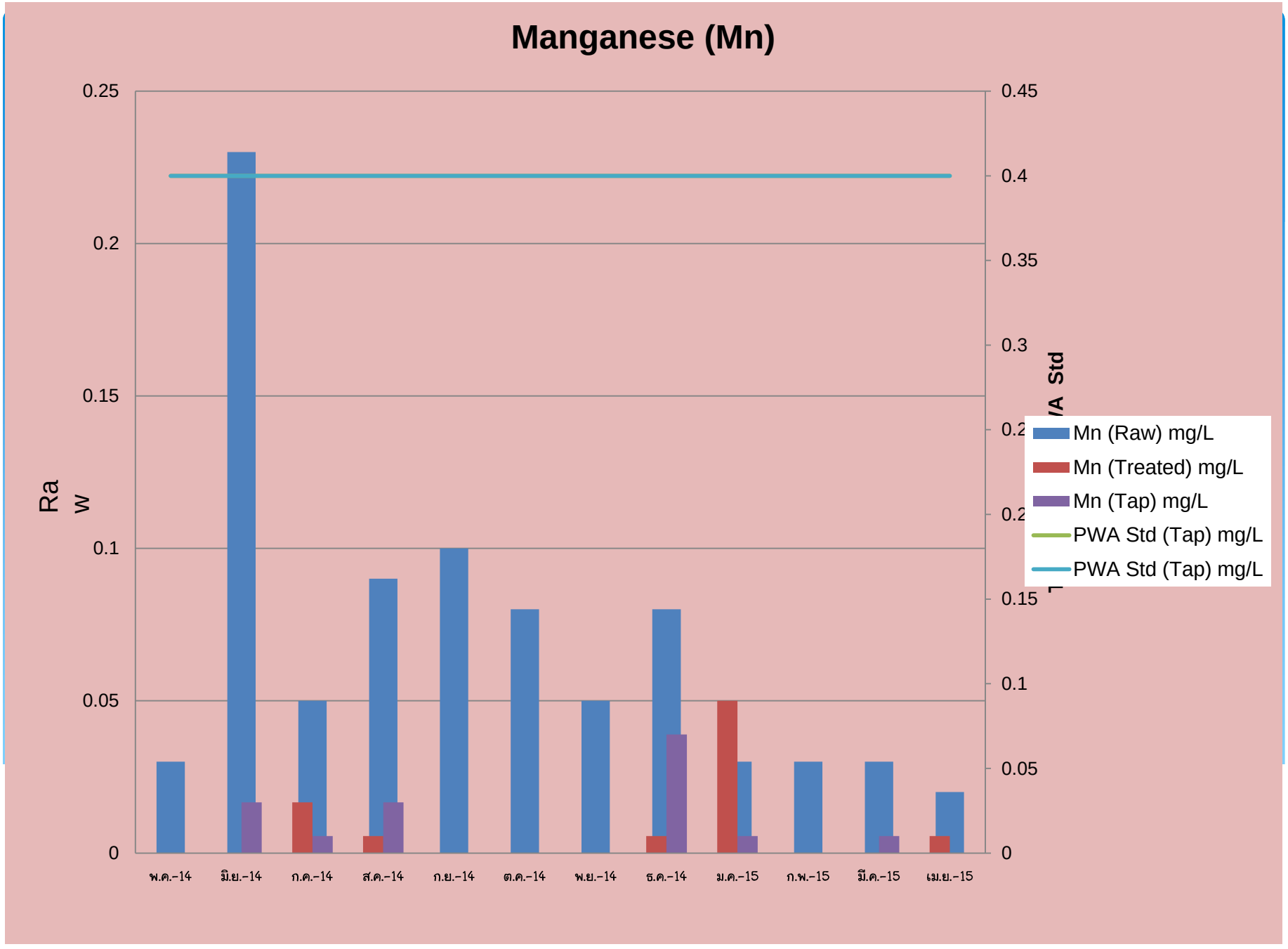
? Why do we management WQ with WSP.

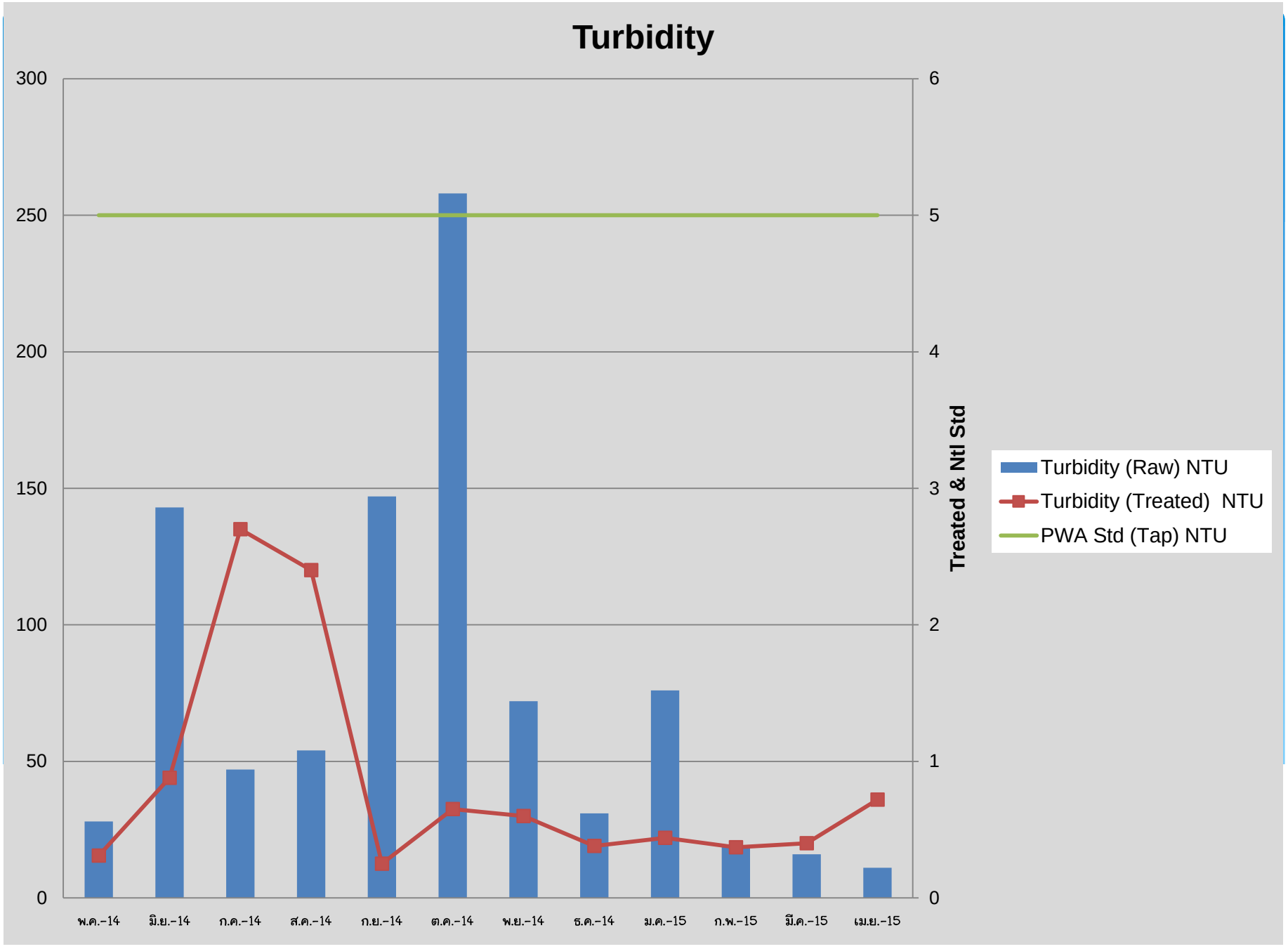
The Step of Practices

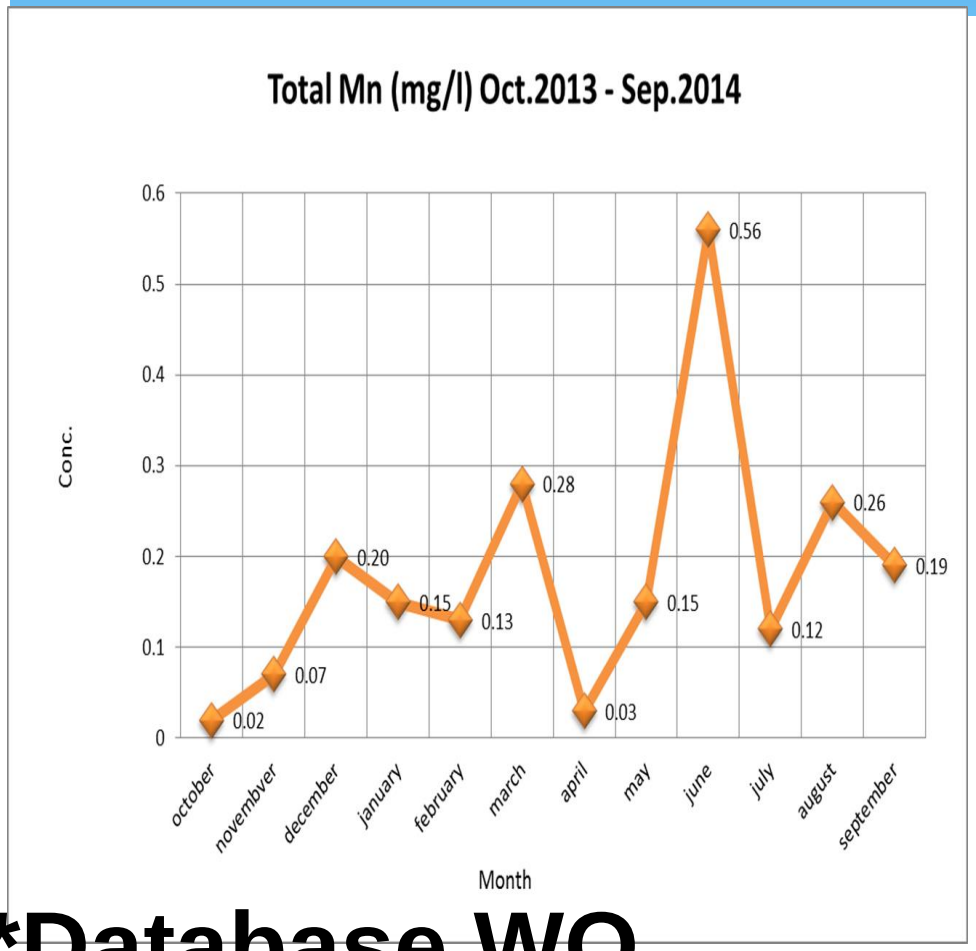
1.Precess Evaluation

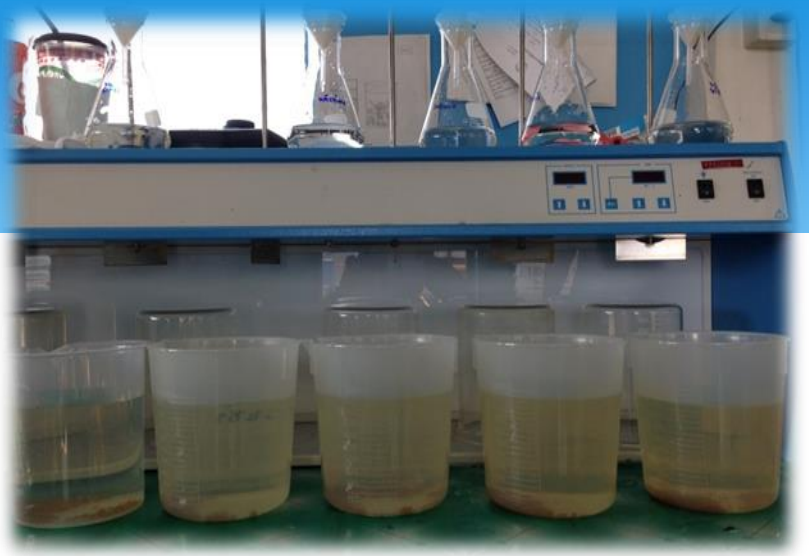
*Analyze WQ Data

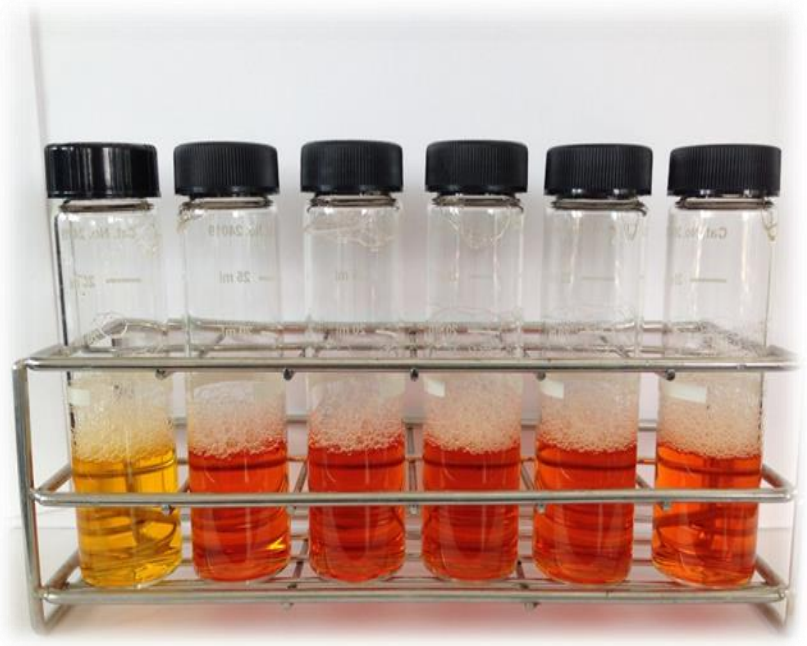



Manganese (Mn)
0.25
0.2
0.15
0.1
0.05
0
0.45
0.4
0.35
0.3
0.2
0.15
0.1
0.05
0
พ.ค.-14
มิ.ย.-14
ก.ค.-14
ส.ค.-14
ก.ย.-14
ต.ค.-14
พ.ย.-14
ธ.ค.-14
ม.ค.-15
ก.พ.-15
มี.ค.-15
เม.ย.-15
Mn (Raw) mg/L
Mn (Treated) mg/L
Mn (Tap) mg/L
PWA Std (Tap) mg/L
PWA Std (Tap) mg/L


Turbidity
300
250
200
150
100
50
0
6
5
4
3
2
1
0
Treated & Ntl Std
พ.ค.-14
มิ.ย.-14
ก.ค.-14
ส.ค.-14
ก.ย.-14
ต.ค.-14
พ.ย.-14
ธ.ค.-14
ม.ค.-15
ก.พ.-15
มี.ค.-15
เม.ย.-15
Turbidity (Raw) NTU
Turbidity (Treated) NTU
PWA Std (Tap) NTU


Total Mn (mg/l) Oct.2013 - Sep.2014
Conc.
0.6
0.5
0.4
0.3
0.2
0.1
0
0.02
0.07
0.20
0.15
0.13
0.28
0.03
0.15
0.56
0.12
0.26
0.19
october
novembver
december
january
february
march
april
may
june
july
august
september
Month





*Database WQ

Raw Water Quality

@Surface @ Middle1.9 m. @Bottom 3.8 m.

Tutbidity

152.0
152.3
156.5

ORP

1175.6
1170.2
1138.5

DO

15.38
13.40
12.51

COD

129
132
133

Fe

10.65
10.80
10.86

Tot.Mn

10.872
10.880
10.940

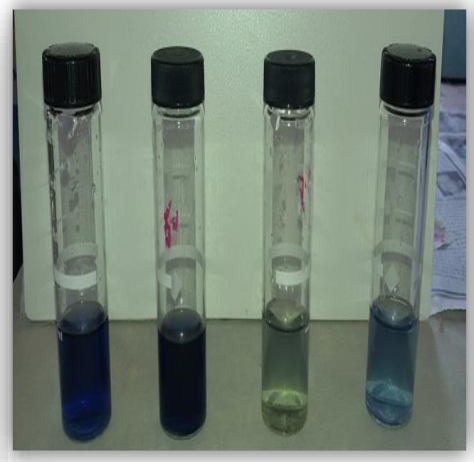
NH_4^+

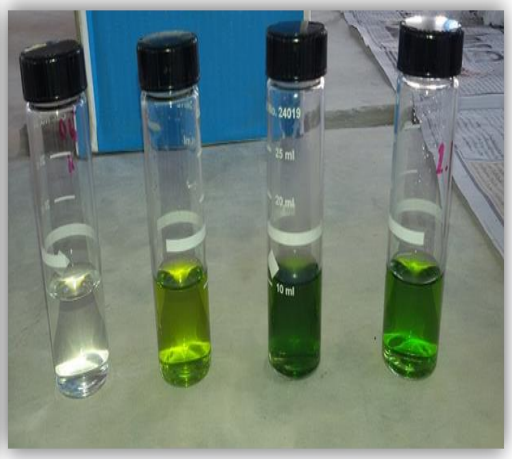
10.19
10.20
10.23

PO_4^{2-}

10.09
10.10
10.10


10 µm
สาหร่ายสีเขียว
Order Chlorellales
10 µm
สาหร่ายสีเขียวแกมน้ำเงิน
Order Chroococcales
สาหร่ายสีเขียวแกมน้ำเงิน
Order Nostocales
10 µm
5 µm
5 µm
สาหร่ายสีเขียว
Order
Chlorellales
สาหร่ายไดอะตอม
Order Biddulpphiales
5 µm
สาหร่ายไดอะตอม
Order Bacillales

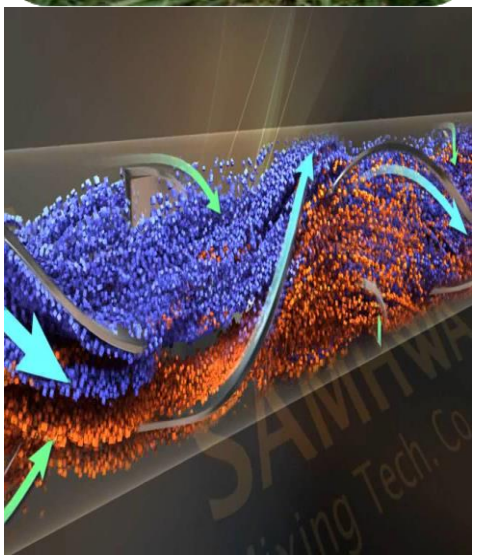




*Database WQ

**Performance of the Treatment Plant

Rapid Mixing

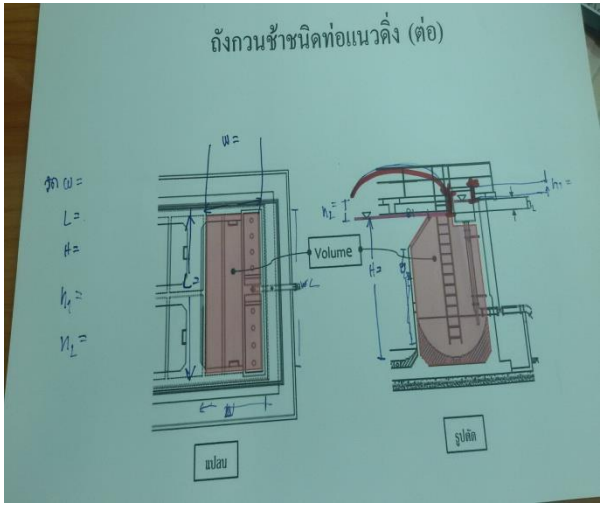


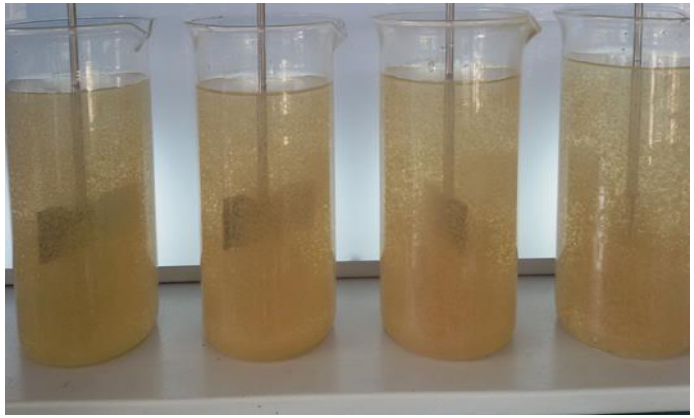
Checking Floc

Control

Pressure Drop
0.6 – 0.9 bar

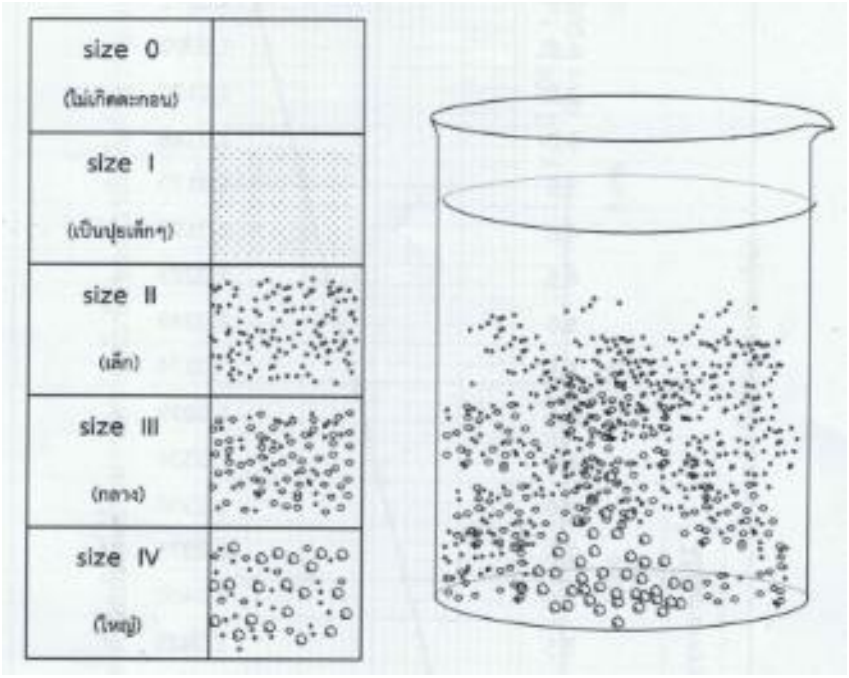
Slow Mixing

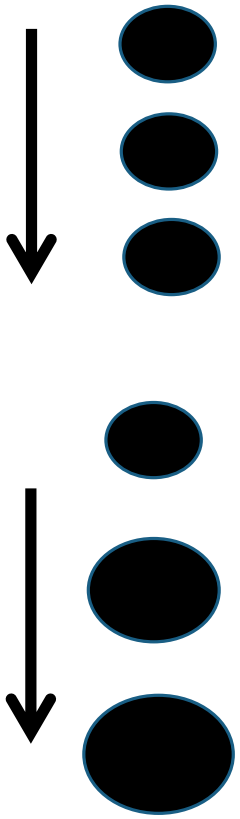


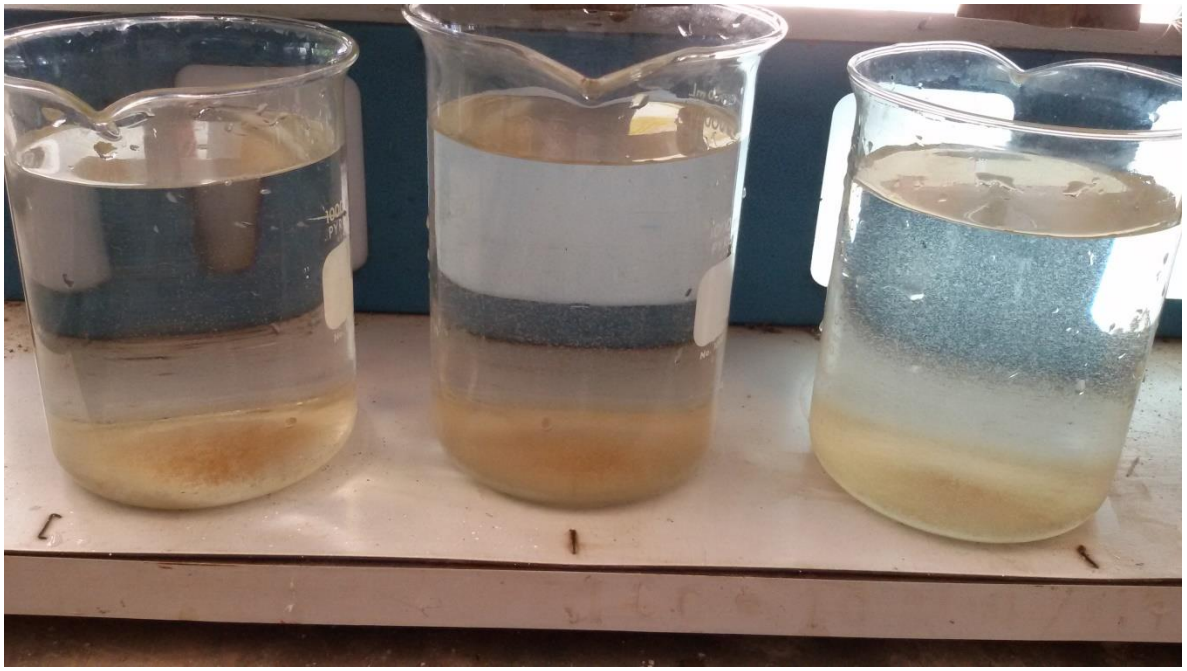


Checking

1.Floc Size



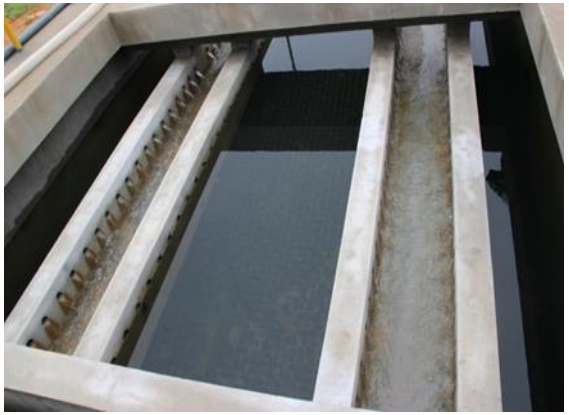




Control

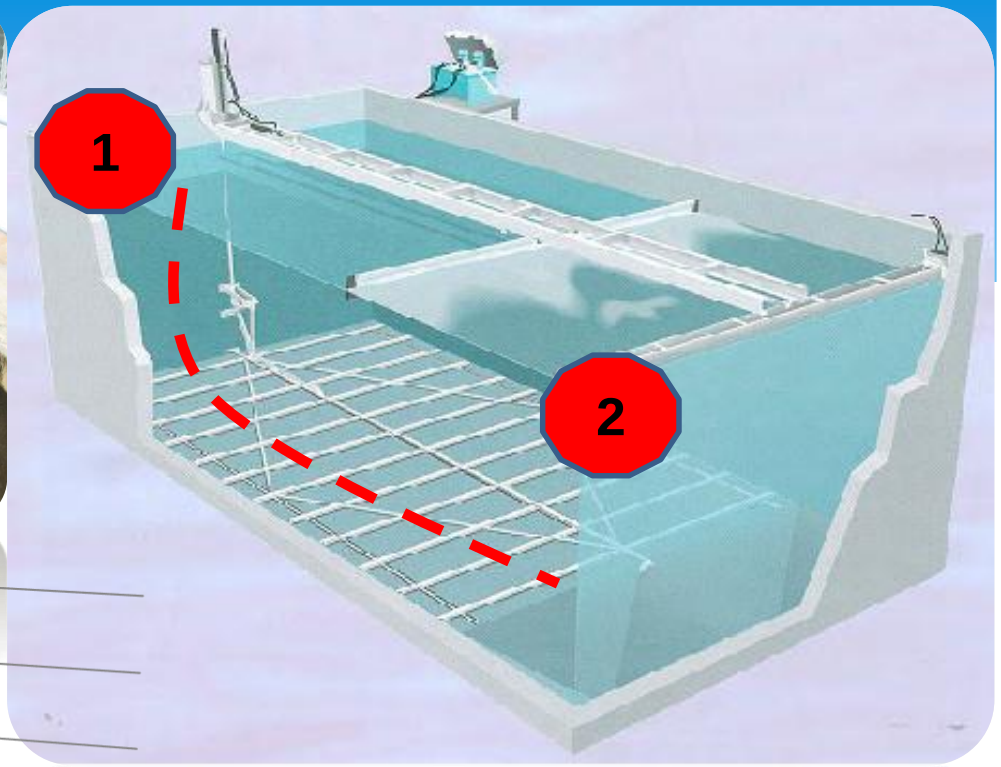
Floc Weight
Settling Rate
1m/hr or
10 cm/6 min

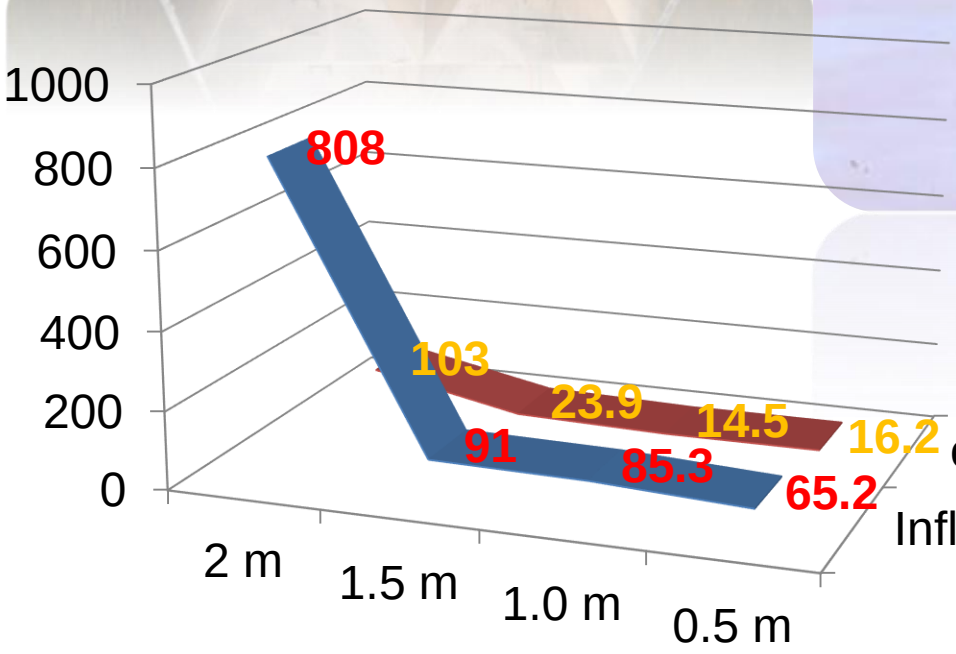
Sedimentation/Clarifier



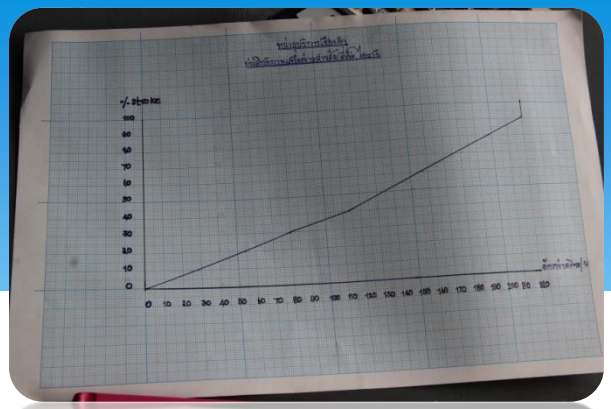
Control

Effluent Turbidity
< 10 NTU


1
2


1000
800
600
400
200
0
808
103
23.9
14.5
16.2
91
85.3
65.2
2 m
1.5 m
1.0 m
0.5 m
effluent TURB.
Influent TURB.

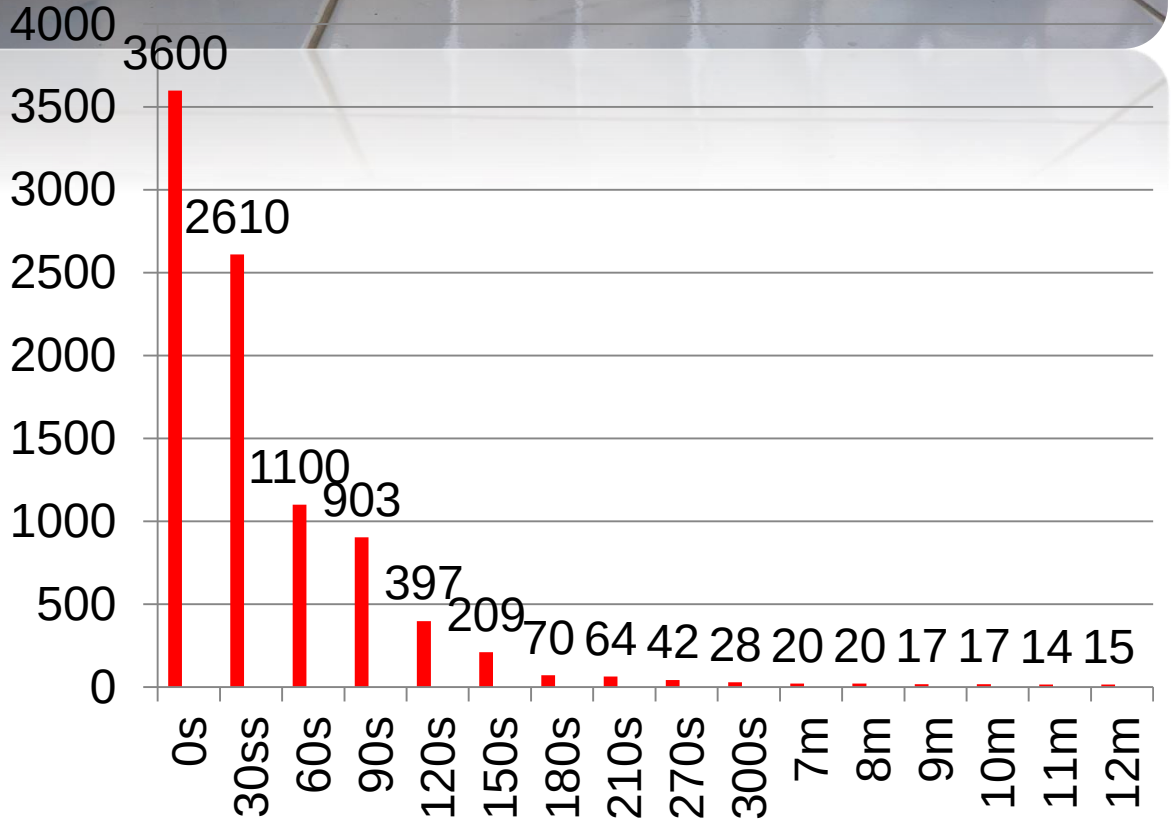
Chemical Feeding



Mud ball

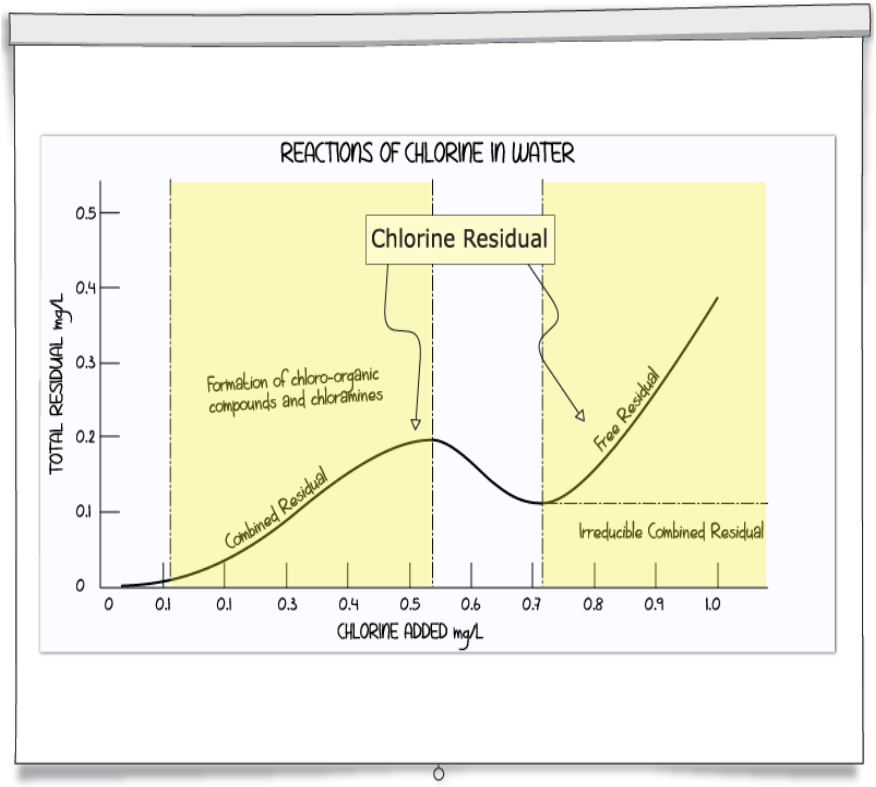
Filtration → Filtration Rate

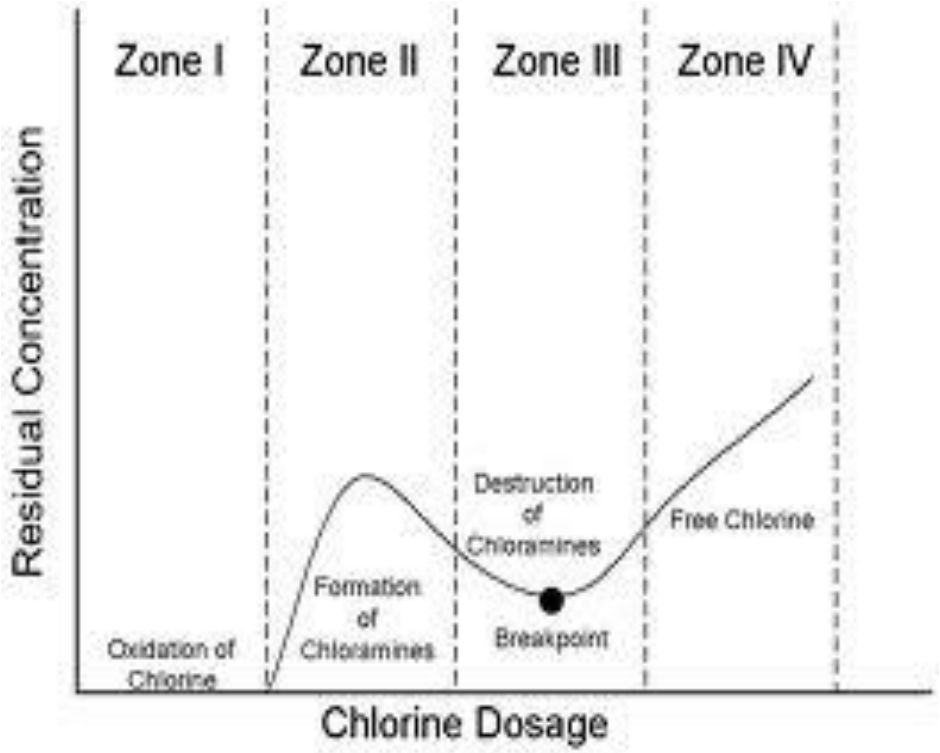
Sludge Retaining Profile



Particle size& Mud ball

Chlorination





Problems: Mn in Raw Water

Type:

1.Soluble $Mn2^{+}$

2.Particle Mn3+ Mn4+

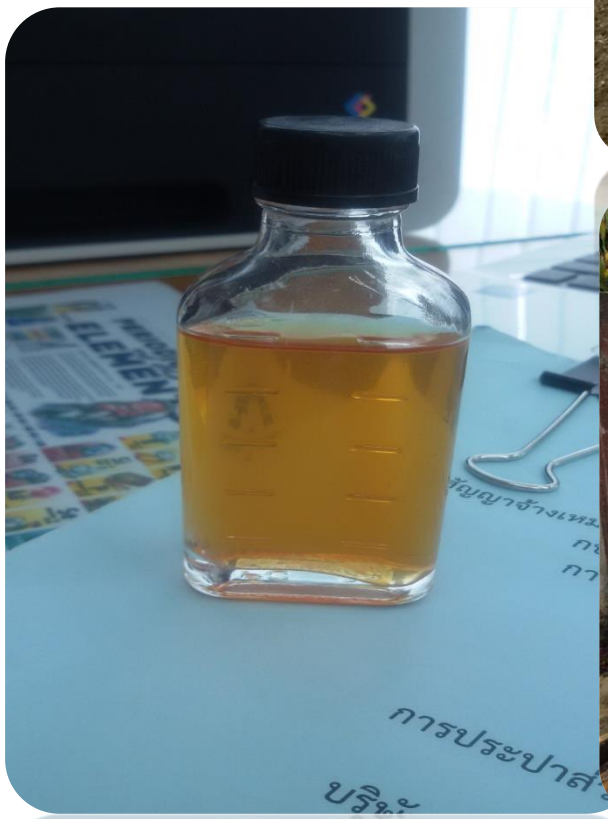
3.Compound Mn(HCO3),Mn(SiO3)

Mn > 0.1 mg/l = strain on sanitary ware, Bad smell, Bad color

Mn > 0.2 mg/l = coat inner pipeline leads to tear down

Stock Tank/ Contact tank

Distribution



Improvements:

1.The Continuously of Water Quality

1.Water Tank Cleansing (Twice a Year)

2.Process (How to, Clean, apparatus, manpower, sub contractor etc.)

3.Cleaniness, Tasks, contract, etc.

4.Other Method

Improvements:

2.Corrective Control of Water Quality

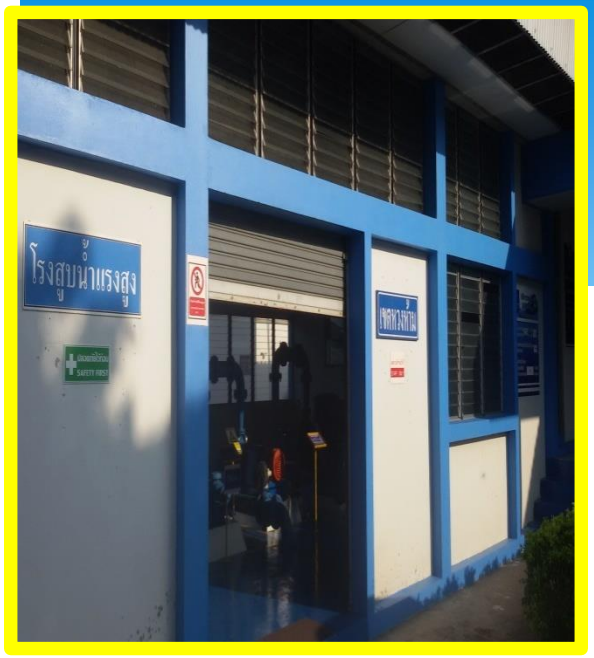
Improvements:

3.Preceess Development

- Teamwork
- Good Practice
- Corporate Image
- Communication
- Etc.

Improvements:

4.Compliance with Standards


โรงสูบน้ำแรงสูง

Thank You