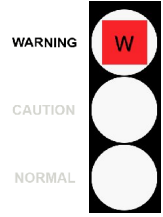


C Code : 100020  
 U Name :  
 T Address : Huamark, Bangkapi,  
 O Bangkok 10240  
 M Site :  
 E Location :  
 R Test code : T814

Unit ID : ST 23  
 Unit Type : Engine Turbine Steam  
 Unit Make : SIEMENS  
 Unit Model : SST 300-C  
 Oil type / Viscosity : SHELL TURBO T ISO 46  
 Oil System Capacity : 10000 Liters



**Notes (Finding, Evaluation, Interpretation, Suggestion and Recommendation)**

Dirt (silicon) is present and resulting in abrasive wear.  
 All oil conditions and oil tests appear in normal working range.  
 Particle count indicates that oil cleanliness level is in unacceptable range.  
 Varnish & Sludge Potential Index (VsPI) is in the Warning range and indicates the abnormal presence of sludge, varnish and other insoluble matter in the oil system.  
 Recommend check the oil filters for proper operation and suggest using an off-line filtration system to clean up the oil system.  
 Recommend resample in 500 hours from the time this sample was taken, to monitor.

Wasan C.

			Current Sample			Previous Sample			Baseline and Alarm Limit							
Condition History			Wear	Oil	Cont.	Wear	Oil	Cont.	Wear	Oil	Cont.	Alarm Limit				
<b>Lab ID</b> <b>Bottle ID</b> <b>Date Sampled</b> <b>Oil Hours (Kms)</b> <b>Unit Hours (Kms)</b> <b>Oil Change</b> <b>Oil Added (Liters)</b> <b>Filters Hours (Kms)</b>	Test Method	Result														
			244075	237021	230301											
			1016341	1016570	1016560											
			24-Jan-14	21-Nov-13	24-Sep-13											
			52975	51535	50095							Engine Turbine Steam				
			52975	51535	50095							Siemens Turbo T 46				
Wear Condition												Reference Oil (RO)	Fine wear		Coarse wear	
Wear Element	Method	Unit	Fine (small) Wear	Coarse (large) Wear	Fine (small) Wear	Coarse (large) Wear	Fine (small) Wear	Coarse (large) Wear	Fine (small) Wear	Coarse (large) Wear	Fine (small) Wear	Coarse (large) Wear	U-Caution	U-Warning	U-Caution	U-Warning
Iron	D-6595	PPM	0.2	2.9 C	0.0	2.6 C	0.0	1.9	0	0	>2	>3	>2	>4		
Chromium	D-6595	PPM	0.0	0.0	0.0	0.0	0.1	0.0	0	0	>1	>2	>1	>2		
Lead	D-6595	PPM	0.0	0.1	0.0	0.9	0.3	0.0	0	0	>1	>2	>3	>5		
Copper	D-6595	PPM	0.0	0.2	0.0	0.0	0.0	0.0	0	0	>1	>2	>1	>2		
Tin	D-6595	PPM	0.6	0.0	0.0	0.0	0.0	0.9	0	0	>2	>3	>2	>4		
Aluminum	D-6595	PPM	0.2	2.5 W	0.4	0.0	0.0	0.2	0	0	>1	>2	>1	>2		
Nickel	D-6595	PPM	0.1	0.0	0.0	0.0	0.1	0.6	0	0	>1	>2	>1	>2		
Silver	D-6595	PPM	0.0	0.0	0.0	0.0	0.0	0.0	0	0						
Molybdenum	D-6595	PPM	0.6	0.0	0.4	1.3	0.3	0.0	0	0						
Titanium	D-6595	PPM	0.0	0.0	0.0	0.9	0.0	1.5	0	0						
Oil Condition												RO	L-Warning	L-Caution	U-Caution	U-Warning
Viscosity @ 40 °C	D-445	cSt	46.0		46.8		46.2		46.4	<41.8	<44.1	>48.7	>51			
Viscosity @ 100 °C	D-445	cSt							7.5		>9.3	>11.3				
Oxidation	FTIR	Abs	8.7		8.6		8.2		7.0		>8.8	>12.3				
Nitration	FTIR	Abs	7.4		7.5		7.4		0.10		>0.19	>0.27				
TAN	D-974	mg KOH/g.	0.04		0.04		0.05									
TBN	D-4739	mg KOH/g.														
Contamination												RO	U-Caution		U-Warning	
Water	T-H2O Check™	% (Wt.)	0.023		0.013		0.021		0.014		>0.047	>0.08				
Additive Element												RO	U-Caution		U-Warning	
Boron	D-6595	PPM	0		0		0		0							
Magnesium	D-6595	PPM	0		1		0		0							
Calcium	D-6595	PPM	0		1		0		0							
Barium	D-6595	PPM	0		0		0		0							
Phosphorus	D-6595	PPM	0		60		0		2							
Zinc	D-6595	PPM	1	1	3	2	1	1	2							
Additional Test												RO	L-Caution	L-Warning	U-Caution	U-Warning
Flash Point	D-3828	°C														
Viscosity Index	D-2270															

Note: Alarm Limits are variable and dependent upon dataset size and to be used as general guideline.  
 No Sign or : NORMAL, or : CAUTION (first level warning limit), or : Warning (second level warning limit)  
 U-Caution : Upper CAUTION Level, L-Caution : Lower CAUTION Level, First Level Alarm Alert Limit in Upper Level and/or Lower Level  
 U-Warning : Upper WARNING Level, L-Warning : Lower WARNING required Level, Second Level Alarm Alert Limit in Upper Level and/or Lower Level  
 Baseline will be data of either "The new oil" or "Reference oil" or "Oil specification". TNO = The new oil, RO = Reference oil, OS = Oil Specification  
 Accuracy of interpretation and recommendation are based on representatives sample and information supplied. No warranty is expressed or implied for this report.

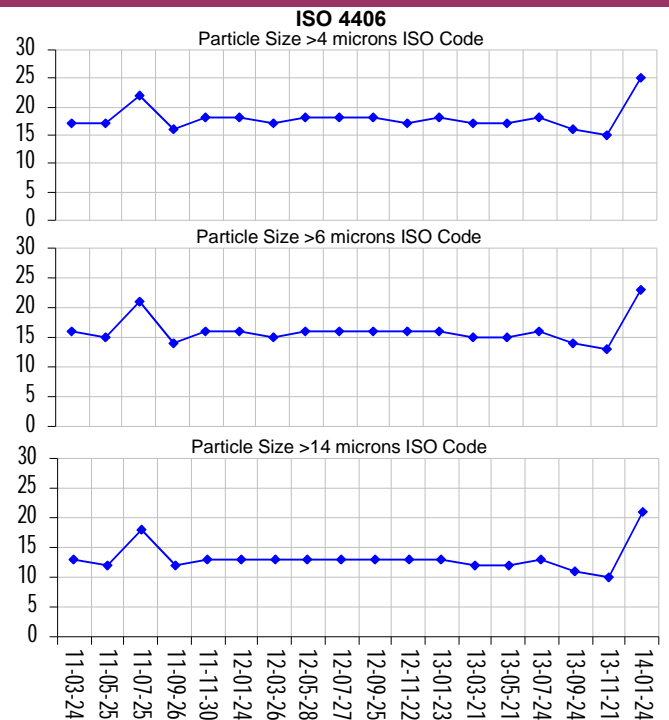
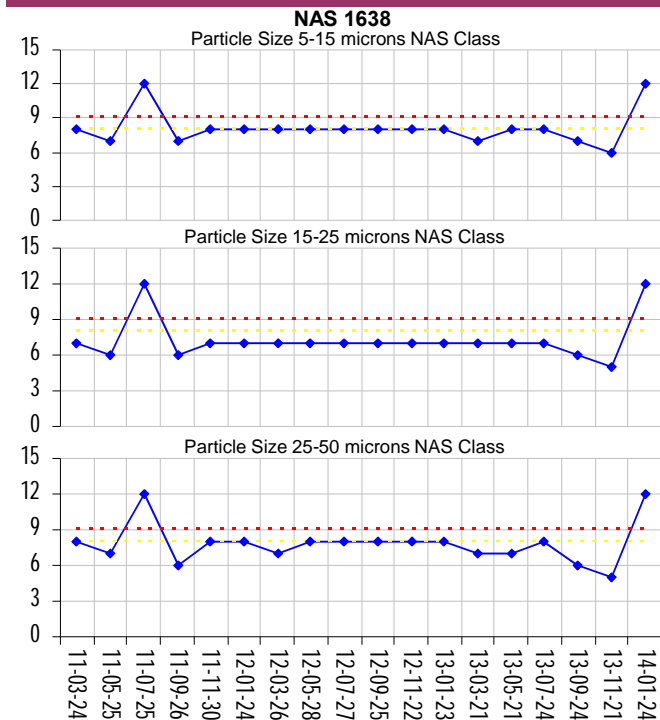
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 U Name :  
 S Address : Huamark, Bangkapi,  
 T Bangkok 10240  
 O Site :  
 M Location :  
 E Test code : T814

E Unit ID : **ST 23**  
 O Unit Type : Engine Turbine Steam  
 U Unit Make : SIEMENS  
 I Unit Model : SST 300-C  
 P Oil type / Viscosity : SHELL TURBO T ISO 46  
 M  
 E  
 N  
 T  
 L Oil System Capacity : 10000 Liters

**Notes (Finding, Evaluation, Interpretation, Suggestion and Recommendation)**

Particle count indicates that oil cleanliness level is in unacceptable range.

Lab ID	Current Sample		Previous Sample				Particle Count				
	244075		237021		230301		NAS 1638 ISO 4406				
Bottle ID	1016341		1016570		1016560		BASELINE				
Date Sampled	24-Jan-14		21-Nov-13		24-Sep-13		Alarm Limit				
Oil Hours (Kms)	52975		51535		50095		Engine Turbine Steam Siemens				
Unit Hours (Kms)	52975		51535		50095		Turbo T 46				
Oil Change											
Oil Added (Liters)											
Filters Hours (Kms)											
<b>Contamination</b>											
Particle Count NAS 1638 System Standard											
Particle Size Range	No. of Particles / 100ml.	Class	No. of Particles / 100ml.	Class	No. of Particles / 100ml.	Class	Class	No. of Particles / 100ml.	Class	No. of Particles / 100ml.	Class
Particle Size 5-15 microns	8,978,500	12 W	9,000	6	16,400	7		>32000	8	>64000	9
Particle Size 15-25 microns	816,700	12 W	800	5	1,500	6		>5700	8	>11400	9
Particle Size 25-50 microns	232,800	12 W	200	5	400	6		>1012	8	>2025	9
Particle Size 50-100 microns	23,500	12	<100	5	<100	5					
Particle Size >100 microns	1500	12	<100	2	<100	3					
Particle Count ISO 4406:1999 System Standard											
Particle Size Range	No. of Particles / ml.	Class	No. of Particles / ml.	Class	No. of Particles / ml.	Class	Class	No. of Particles / ml.	Class	No. of Particles / ml.	Class
Particle Size > 4 microns	269,345	25	269	15	491	16					
Particle Size > 6 microns	75,398	23	75	13	137	14					
Particle Size > 14 microns	10,584	21	10	10	19	11					
ISO 4406 Class Rating	25 / 23 / 21		15 / 13 / 10		16 / 14 / 11						



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 M Address : Huamark, Bangkapi,  
 E Bangkok 10240  
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 Location :  
 Test code : T814

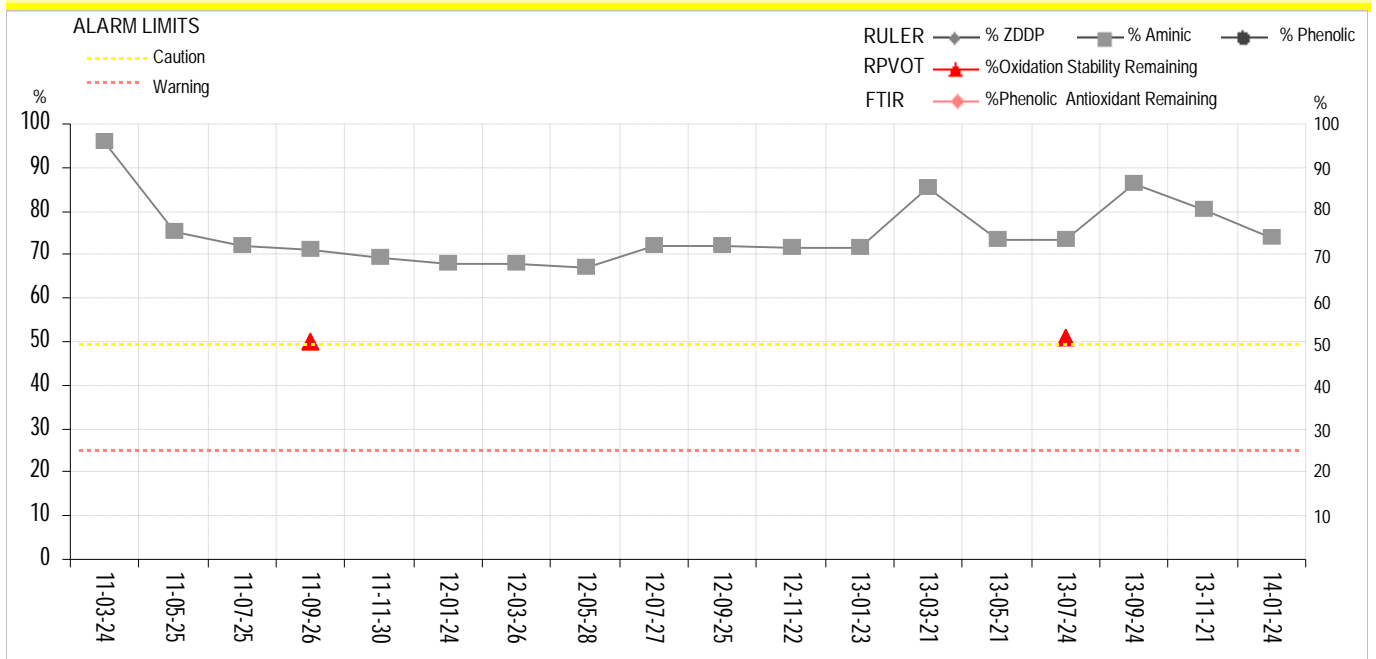
Unit ID : **ST 23**  
 Unit Type : Engine Turbine Steam  
 Unit Make : SIEMENS  
 Unit Model : SST 300-C  
 Oil type / Viscosity : SHELL TURBO T ISO 46  
 Oil System Capacity : 10000 Liters

**Notes (Finding, Evaluation, Interpretation, Suggestion and Recommendation)**

The Anti-Oxidant Additive Tests that have been performed indicate that the AO additive strength is still within ASTM D4378 guidelines.

Wasan C.

		Current Sample		Previous Sample		RULER™ RPVOT (RBOT) FTIR		
<b>Lab ID</b>		244075	237021	230301		Based on and referred to ASTM D-4378-0 Alarm Limit based on ASTM D-4378-08		
<b>Bottle ID</b>		1016341	1016570	1016560				
<b>Date Sampled</b>		24-Jan-14	21-Nov-13	24-Sep-13				
<b>Oil Hours (Kms)</b>		52975	51535	50095				
<b>Unit Hours (Kms)</b>		52975	51535	50095				
<b>Oil Added (Liters)</b>								
<b>Oilchange</b>								
<b>Filters Hours (Kms)</b>								
<b>Oil Condition</b>								
<b>RULER™(Remaining Useful Life Evaluation Routine)</b>								
% ZDDP Antioxidant Remaining		%	n/p	n/p	n/p	Reference Oil	Caution	Warning
%Aminic Antioxidant Remaining	D-6971-04	%	73.9	80.3	86.1	100	<50	<25
%Phenolic Antioxidant Remaining	D-6810-02	%	n/p	n/p	n/p			
RULER Test Solution		Color	Green	Green	Green			
<b>FTIR (Fourier Transform Infrared)</b>								
%Phenolic Antioxidant Remaining	D-2668	%	n/p	n/p	n/p		Caution	Warning
<b>RPVOT (Rotating Pressure Vessel Oxidation Test) or previously known as RBOT</b>								
Oxidation Stability		Minutes				1100	<550	<275
%Oxidation Stability Remaining	D-2272	%				100	<50	<25








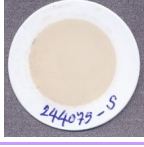
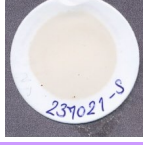

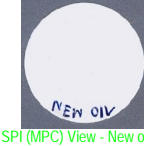
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 U Name :  
 S Address :  
 T Huamark, Bangkapi,  
 O Bangkok 10240  
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 R Location :  
 Test code : T814

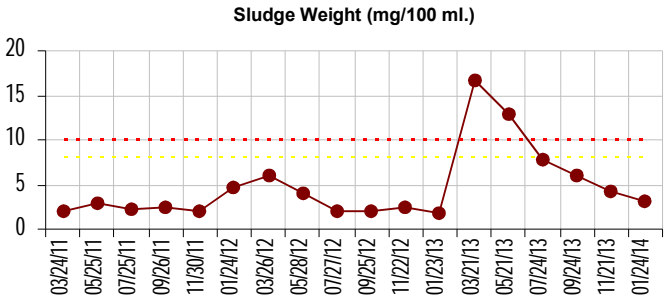
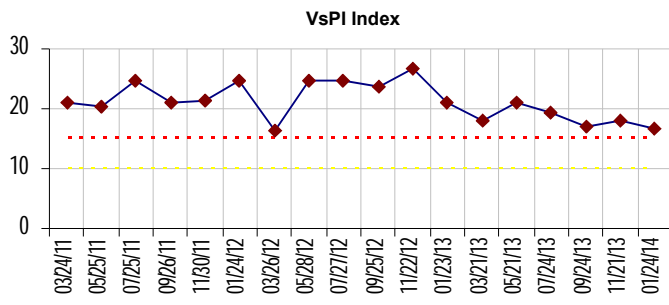
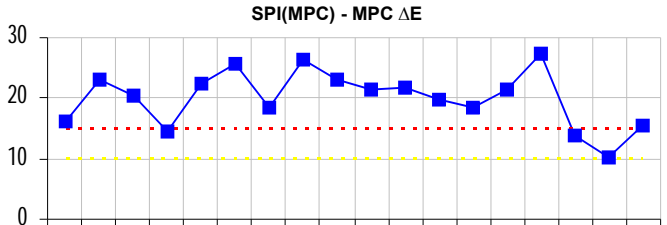
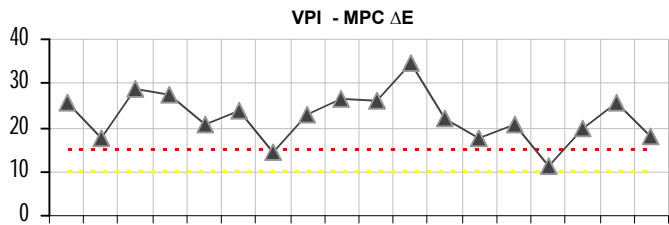
E Unit ID : **ST 23**  
 O Unit Type : Engine Turbine Steam  
 U Unit Make : SIEMENS  
 I Unit Model : SST 300-C  
 P  
 M Oil type /  
 E Viscosity : SHELL TURBO T ISO 46  
 N  
 T Oil System Capacity : 10000 Liters

**Notes (Finding, Evaluation, Interpretation, Suggestion and Recommendation)**

Varnish & Sludge Potential Index (VsPI) is in the Warning range and indicates the abnormal presence of sludge, varnish and other insoluble matter in the oil system.

Wasan C.

	Current Sample		Previous Sample		<b>ASTM D7843 M</b> <b>VsPI™</b> Varnish & Sludge Potential Index  <b>New Oil and Alarm Limit Name</b> New Oil Limit Name Engine Turbine Steam Siemens Turbo T 46
<b>Lab ID</b> <b>Bottle ID</b> <b>Date Sampled</b> <b>Oil Hours (Kms)</b> <b>Unit Hours (Kms)</b> <b>Oil Change</b> <b>Oil Added (Liters)</b> <b>Filters Hours (Kms)</b>	244075	237021	230301	230301	
	1016341	1016570	1016560	1016560	
	24-Jan-14	21-Nov-13	24-Sep-13	24-Sep-13	
	52975	51535	50095	50095	
	52975	51535	50095	50095	
<b>Contamination</b>					
<b>Varnish and Sludge Potential Index™ (VsPI™)</b>					
VPI (Varnish Potential Index) : Soluble Varnish Type Contamination in Oil					
VPI™ Varnish Potential Index Soluble Varnish Contaminant					
VPI Rating	18.1	25.8	20.0	1	>10 >15
SPI (Sludge Potential Index) : Conform to ASTM D7843 - MPC (Membrane Patch Colorimetry) : Insoluble Varnish Type Contamination in Oil					
SPI™ Sludge Potential Index (MPC Membrane Patch Colorimetry) Insoluble Varnish Contaminant					
SPI(MPC) Rating	15.4	10.2	13.7	1	>10 >15
<b>VsPI™</b>	16.8 <b>W</b>	18.0 <b>W</b>	16.9 <b>W</b>	1	>10 >15
Sludge Weight	3.2 mg/100 ml	4.2 mg/100 ml	5.9 mg/100 ml	2	>8 >10



C Code : **100020**  
U Name :  
S  
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O  
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E  
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Address :  
Huamark, Bangkapi,  
Bangkok 10240  
Site :  
Location :  
Test code : T814

E Unit ID : **ST 23**  
O  
U  
I  
P Unit Type : Engine Turbine Steam  
M Unit Make : SIEMENS  
E Unit Model : SST 300-C  
N  
T  
O Oil type/  
I Viscosity : SHELL TURBO T ISO 46  
L  
Oil System Capacity : 10000 Liters

Lab ID : 244075 Date sampled : 24-Jan-14 Hours on Oil : 52975 Hours on Unit : 52975 Bottle ID : 1016341

**ส่วนที่ 1 : หน้าหลัก**

[Section 1 : Main Page](#)

พบฝุ่นละออง (ซิลิกอน) ส่งผลให้เกิดการสึกหรอแบบขูดขีด (abrasive wear)  
คุณสมบัติของน้ำมันและผลทดสอบน้ำมันทั้งหมด พบว่าอยู่ในช่วงปกติ  
ผลการตรวจนับอนุภาคสิ่งสกปรกชี้ว่าระดับความสะอาดของน้ำมันยอมรับไม่ได้แล้ว  
ค่าดัชนีการเกิด Varnish อยู่ในระดับอันตราย แสดงว่าเกิดตะกอน คราบยางเหนียว และสารแขวนลอยที่ไม่ละลายในน้ำมันในระบบ  
แนะนำให้ตรวจสอบการทำงานของกรองน้ำมัน เพื่อตรวจสอบหาการทำงานที่ผิดปกติ และแนะนำให้ระบบกรองภายนอกร่วมด้วย เพื่อจัดการให้ระบบน้ำมันสะอาด  
ขึ้น  
แนะนำให้เก็บตัวอย่างซ้ำอีกครั้งภายใน 500 ชั่วโมง หลังจากเก็บตัวอย่างครั้งนี้ เพื่อเฝ้าติดตาม

**ส่วนที่ 2 : หน้าของ Particle Count**

[Section 2 : Particle Count](#)

ผลการตรวจนับอนุภาคสิ่งสกปรกชี้ว่าระดับความสะอาดของน้ำมันยอมรับไม่ได้แล้ว

**ส่วนที่ 3 : หน้าของ Ferrographic Analysis**

[Section 3 : Ferrographic Analysis](#)

**ส่วนที่ 4 : หน้าของ Varnish and Sludge Potential**

[Section 4 : Varnish and Sludge Potential](#)

ค่าดัชนีการเกิด Varnish อยู่ในระดับอันตราย แสดงว่าเกิดตะกอน คราบยางเหนียว และสารแขวนลอยที่ไม่ละลายในน้ำมันในระบบ

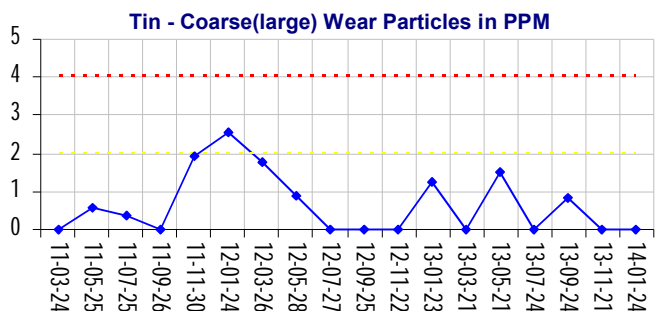
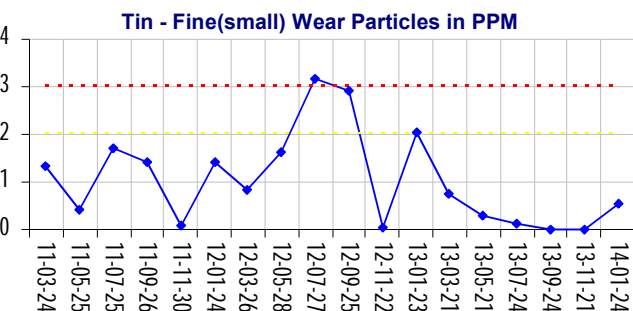
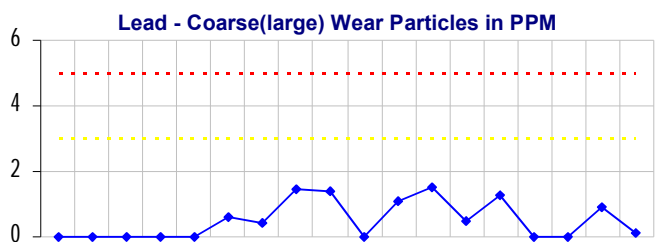
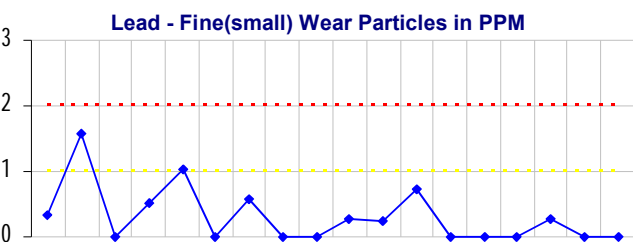
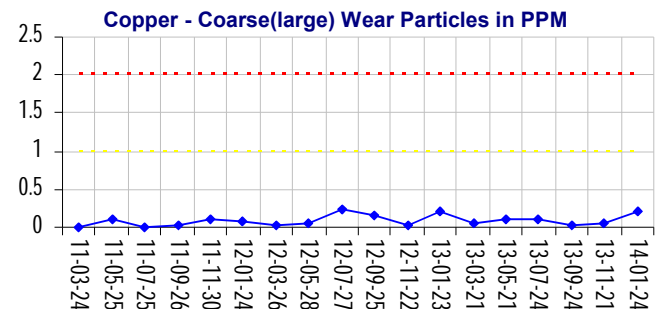
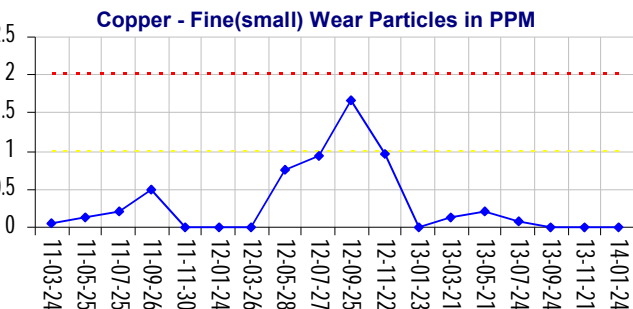
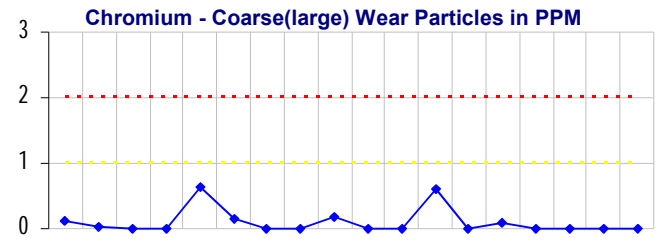
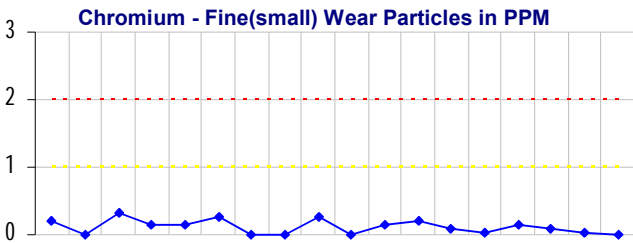
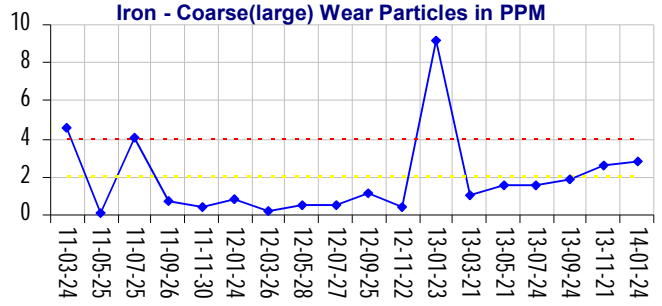
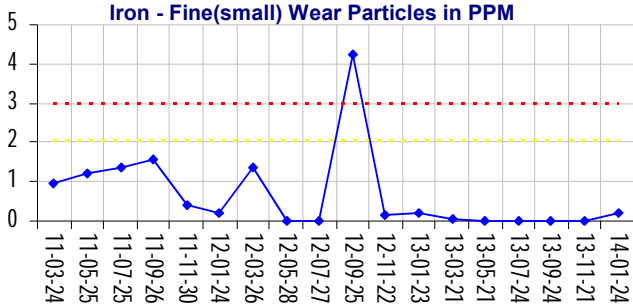
**ส่วนที่ 5 : หน้าของ Gravimetric Analysis**

[Section 5 : Gravimetric Analysis](#)

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 U Name :  
 S Address : Huamark, Bangkapi,  
 T Bangkok 10240  
 O Site :  
 I Location :  
 R Test code : T814

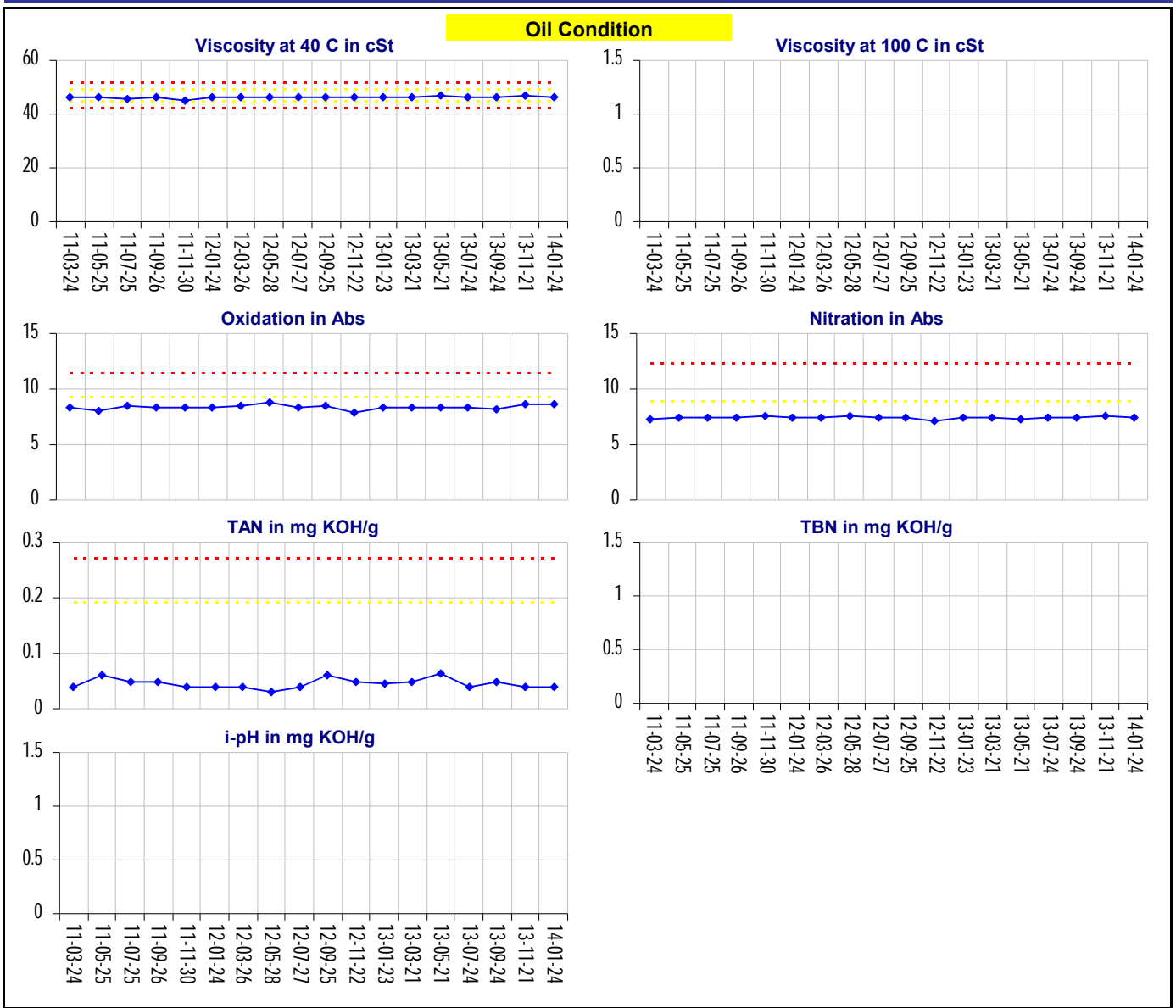
E Unit ID : **ST 23**  
 O Unit Type : Engine Turbine Steam  
 I Unit Make : SIEMENS  
 P Unit Model : SST 300-C  
 M  
 E  
 N  
 T  
 o Oil type /  
 I Viscosity : SHELL TURBO T ISO 46  
 L  
 Oil System Capacity : 10000 Liters

**Wear Condition**



C Code : 100020  
 U Name :  
 S Address : Huamark, Bangkapi,  
 T Bangkok 10240  
 O Site :  
 M Location :  
 E Test code : T814

Unit ID : **ST 23**  
 Unit Type : Engine Turbine Steam  
 Unit Make : SIEMENS  
 Unit Model : SST 300-C  
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 Oil System Capacity : 10000 Liters



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Unit ID : **ST 23**  
 Unit Type : Engine Turbine Steam  
 Unit Make : SIEMENS  
 Unit Model : SST 300-C  
 Oil type / Viscosity : SHELL TURBO T ISO 46  
 Oil System Capacity : 10000 Liters

