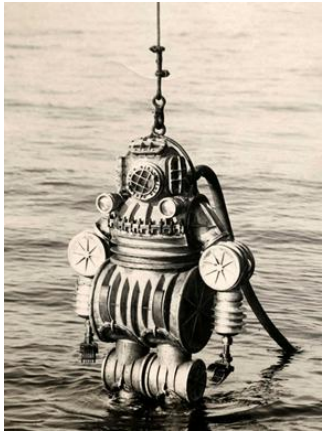
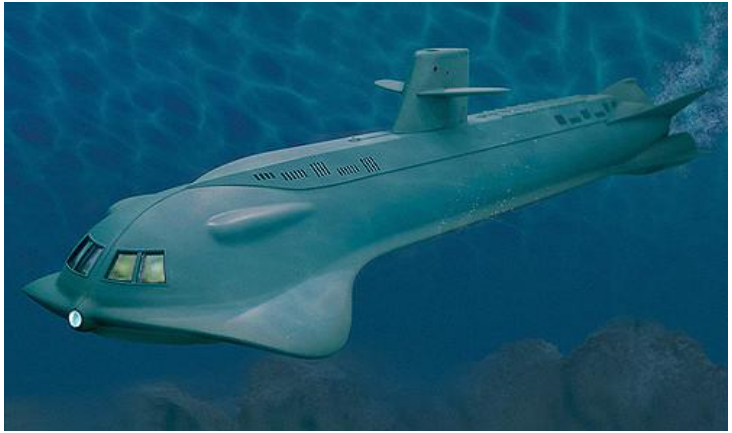


Deep Dive into Transformer Monitoring with PI



Vince Polsoni
Alectra Utilities

alectra
Discover the possibilities



Agenda

- Alectra
- Maintenance Methodology
- Intelligent Transformer Maintenance
- Innovation
- Leveraging Integrated/ Interfaced Systems
- PI AF, Notifications, Analysis, Reporting

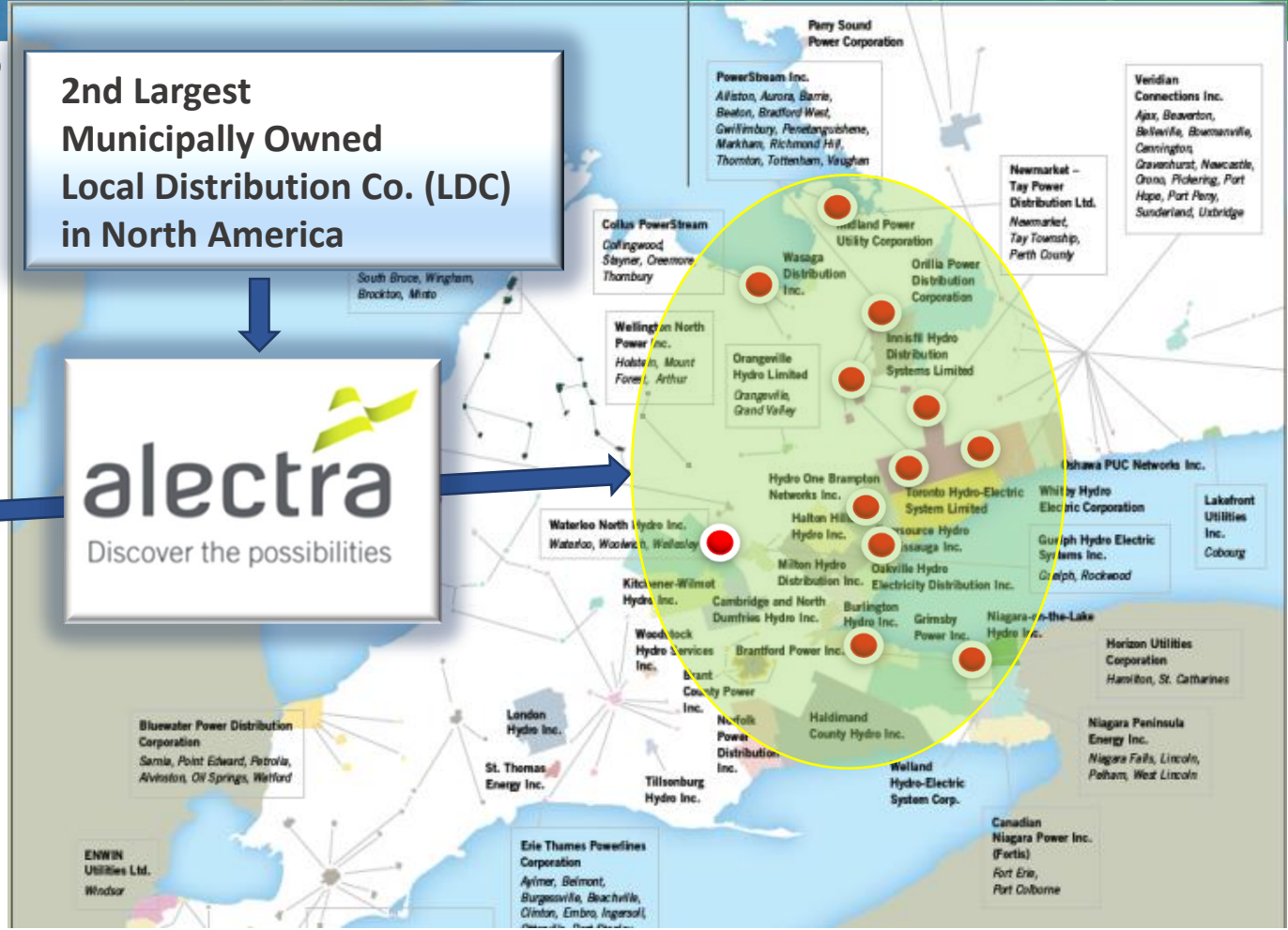
alectra
Discover the possibilities

Where is Alectra?

Ontario
1,068,587 km2

2nd Largest Municipally Owned Local Distribution Co. (LDC) in North America

alectra
Discover the possibilities



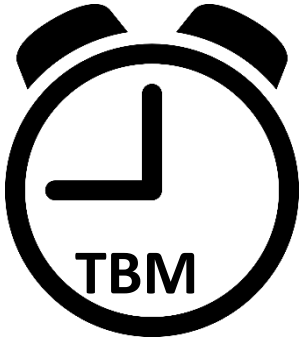
Alectra Service Territory

- Located just North and West of Toronto, Ontario, Canada
- 1800 km2
- 15 Communities
- 1 million Customers
- 3.1 million Population
- 4750 MW Peak Demand
- $3.6 Billion Total Assets

The Alectra Intelligent Maintenance Plan

RCM3 - ISO55000 Compliant
RCM3 - ISO31000 Compliant

The Plan



(Time Based Maintenance)

RCM3

(Reliability Centered Maintenance)

RCM3

(Condition Based Maintenance)

100% of work (PM) was time based

- Preventive, Predictive
- On Condition Task
- Failure Finding
- Scheduled Restoration
- Scheduled Discard
- No Scheduled Maintenance

'Right Work at the Right Time, Done the Right Way, The First time'

Intelligent Station Maintenance at Alectra

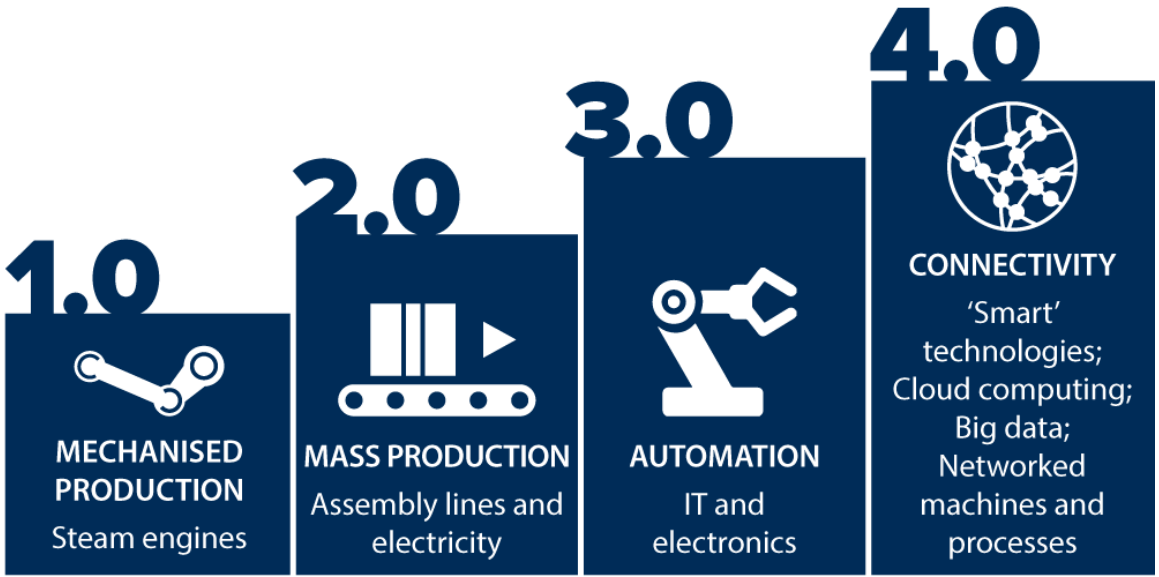
- Leverage integration of PI System and CMMS
- Risk Based - Condition Based Maintenance
- RCM3 methodology incorporated in CMMS
- Situational Awareness - Instant Information 24/7
  - PI Notifications (Real time)
  - Alerts from CMMS System
  - PI System Reports, Dashboards
- Automatic Triggered Maintenance Work Orders
- Analytics in multiple systems
- One source of data
- Keeping it Simple

The Alectra Intelligent Maintenance System
2 Key Components

1. CASCADE CMMS
   - Tracks assets, Maintenance history, Asset Condition and Costs
   - Analytics
   - Trigger maintenance tasks based on condition or events
   - Interfaces with PI System, test equipment and Oil lab data
   - Prioritize maintenance work – Criticality, Health and Risk

2. PI System
   - Data collector, Speed optimized
   - Real-time analysis and notifications
   - Easy reporting tools, easy interfacing, enabler of IIOT

Industrial Development – Industry 1.0 to 4.0



The stages of industrial development

What is RCM3

1st Generation
- Fix it when it breaks

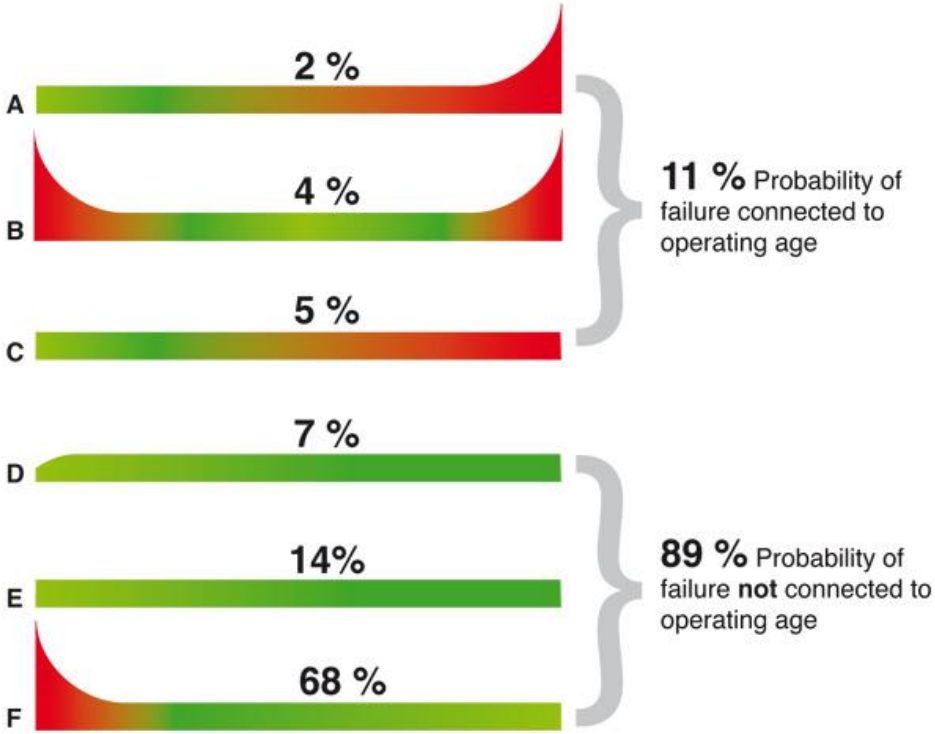
2nd Generation
- Higher availability
- Lower costs
- Longer asset life

3rd Generation
- Higher availability, reliability and throughput
- Greater cost-effectiveness
- Greater safety
- Better product quality
- No damage to the environment
- Longer asset life

4th Generation
- Managing physical and economic risks
- Standardization and adopting standards (i.e. ISO 55000)
- Globalization
- Stewardship and social responsibility
- Renewable strategies
- Defect elimination
- Innovation

1930 1940 1950 1960 1970 1980 1990 2000 2010 2020.....

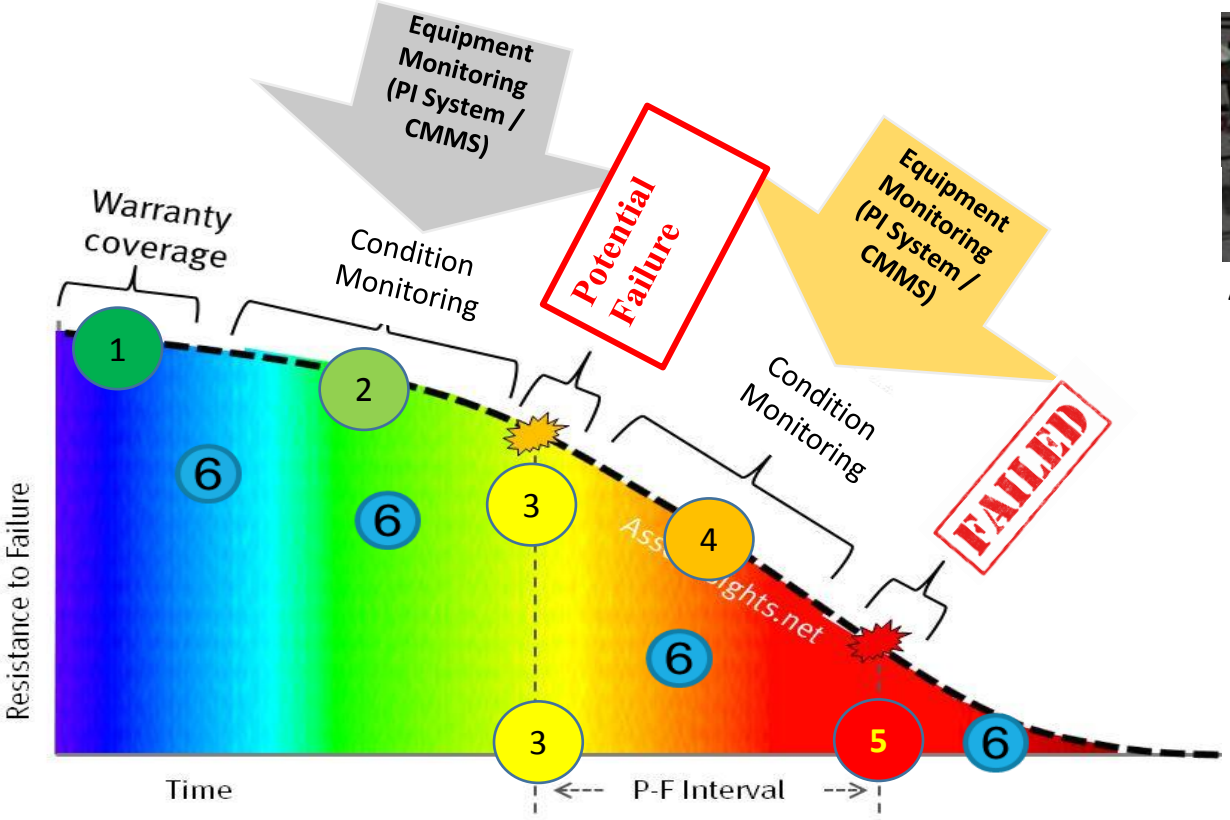
RCM3 - Understanding Failure Curves



Source: RCM II by John Moubray, Industrial Press Inc, 1992

- Premature random failures
- Often after Human Intervention

RCM3 – On Condition Task
Condition Scoring Using Potential Failure "PF" Curve

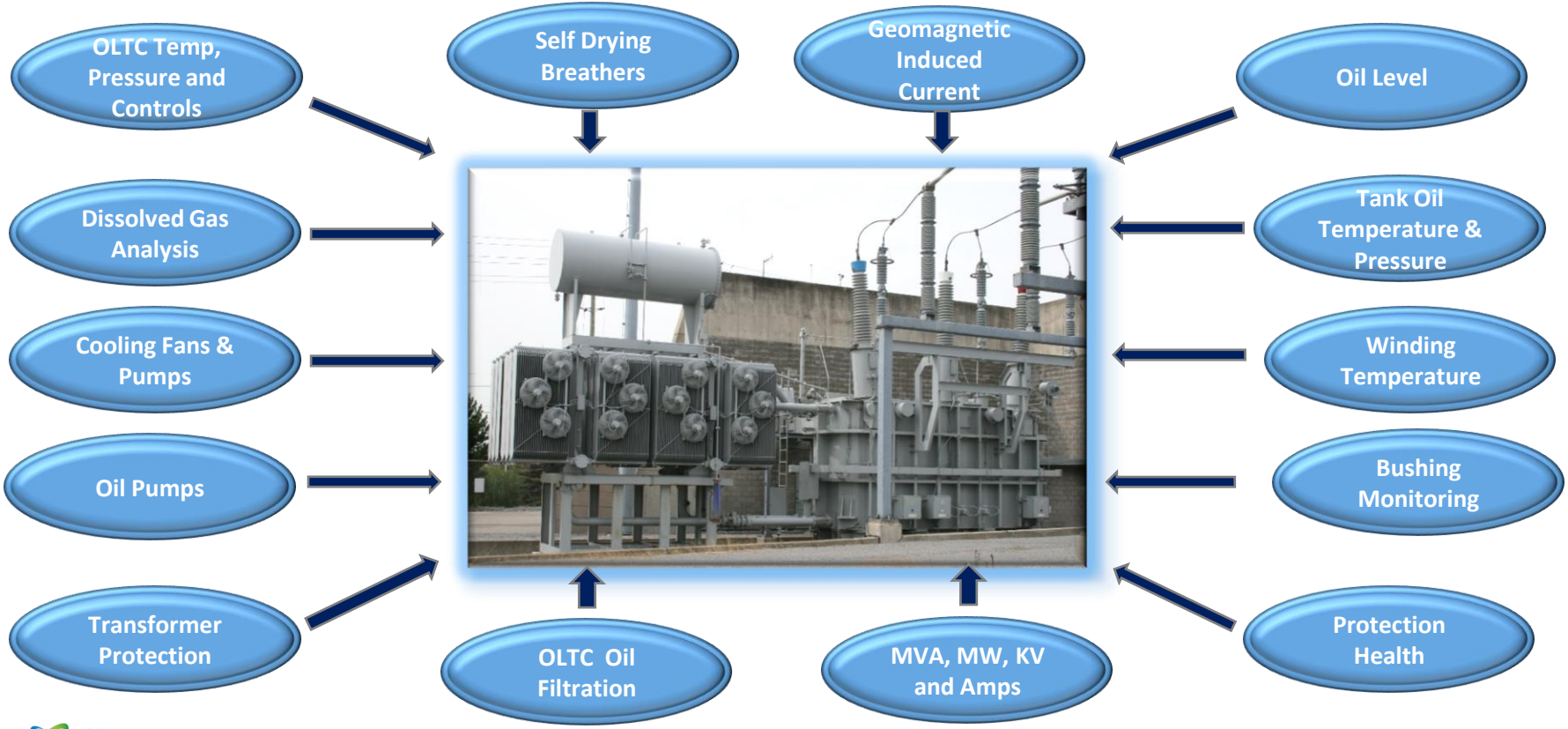


Alectra Condition Scoring Matrix

1	New
2	Used
3	Potential Failure
4	Failed – Schedule Repair
5	Failed – Emergency Repair
6	Failed – Repaired Onsite

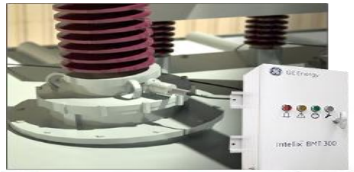
Embedded Sensors of a Power Transformer at Alectra

Over 100 sensors/monitoring points on a typical station power transformer



Sensors / Equipment Monitoring – Building block for successful Intelligent Maintenance (CBM)

Transformer Self Drying Breather



Bushing Monitoring Systems

Substation Thermal Camera

Tap Changer Oil Filtration

Sensors / Equipment Monitoring – Key building block for successful Intelligent Maintenance (CBM)

7 Gas Dissolved Gas Analysis Monitoring Unit

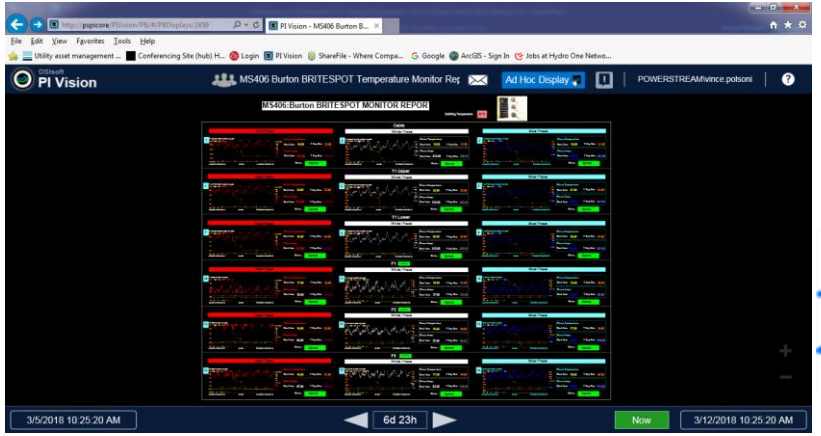
Temperature & Pressure

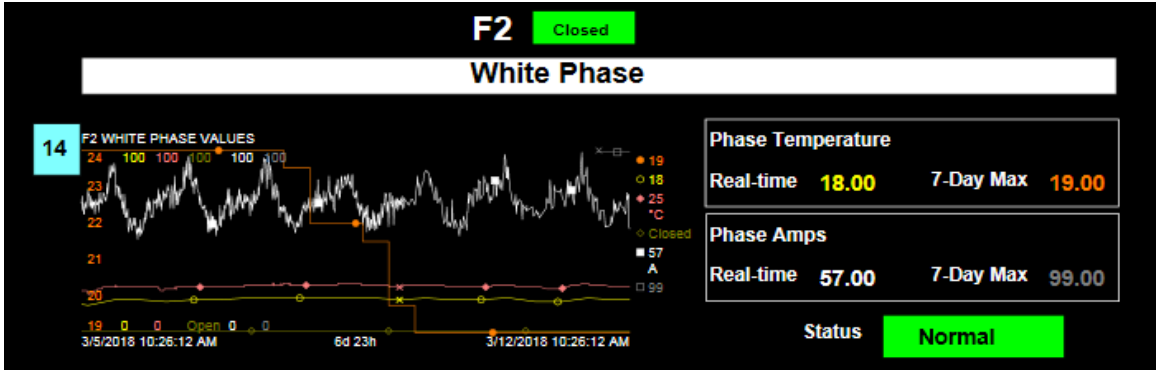
Protection Relay

Transformer Monitoring Relay

Hydrogen Gas Monitor

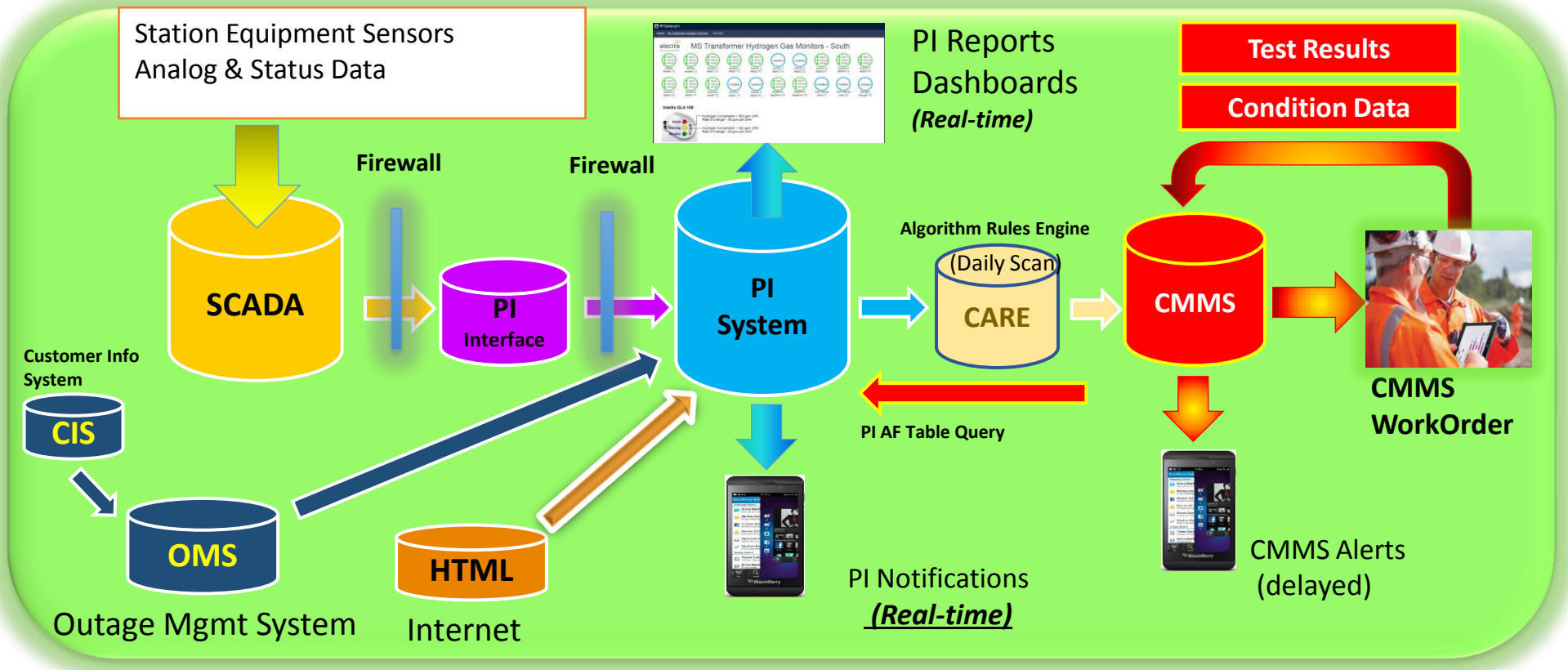
Fibre Optic - Temperature Sensor Monitoring





Monitors temperature of terminations, locations where InfraRed scanning is not safe or possible.

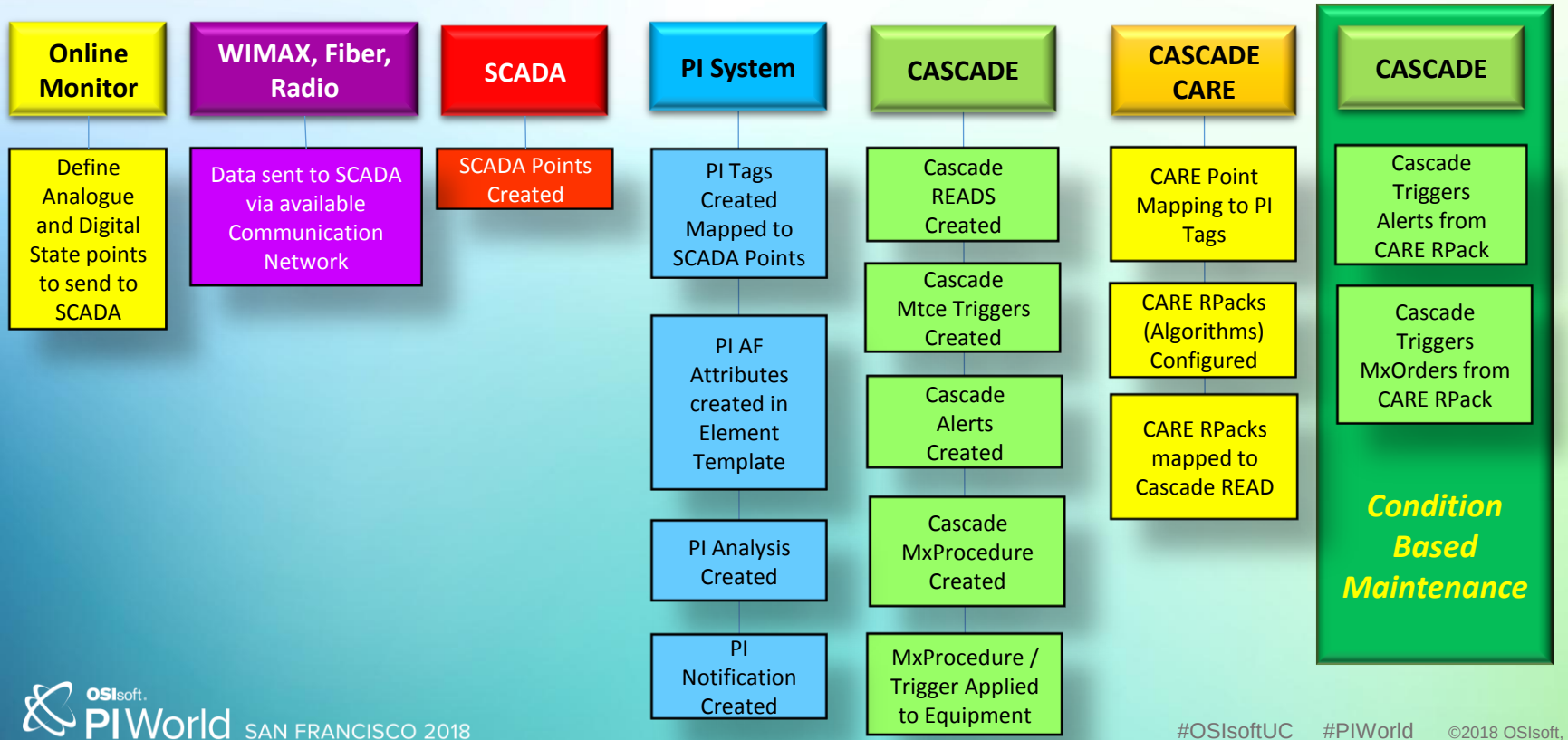
Alectra Intelligent Maintenance System Setup



Sensor Data used to Trigger Transformer Maintenance Tasks

- **Transformer:**
  - Dissolved Gas and Moisture (Oil Condition)
  - Loading, Oil Temperature, Oil Level, Transformer Tank Pressure
  - Transformer Cooling Status and Cooling Failure
  - Tap Positions (monthly max and min and if passed through neutral)
  - Tap Changer Oil temperature vs main Tank Oil Temperature
  - Bushing Monitoring Power Factor & Capacitance
  - Geomagnetically Induced Currents (GIC)

How Alectra configures Intelligent Transformer CBM using PI System and CMMS



Communication Infrastructure

- Fibre – redundant systems throughout utility territory
  - Leased and owned
- WiMax (Remote stations) to Hubs (Stations) then Fibre to servers throughout utility
- Radio System to Hubs (Stations)

Transformer Monitoring

- Utilize a SEL 2414 Relay
- Inputs:
  - Hydrogen Monitor
    - High, High High, Monitor status (Form C Contact)
  - Winding and Oil temperatures from gauges
  - Oil level
  - Pressure Relief Status, Rapid Pressure (Oil movement – Protection Trip)
  - RTD – building temperature (3 wire 100ohm range)
  - Fan controls, amps
    - Know running current. If within operating window ‘Normal” if outside operating range “Cooling Failure Alarm”
    - Once a week for a 15 min interval fans are exercised automatically.

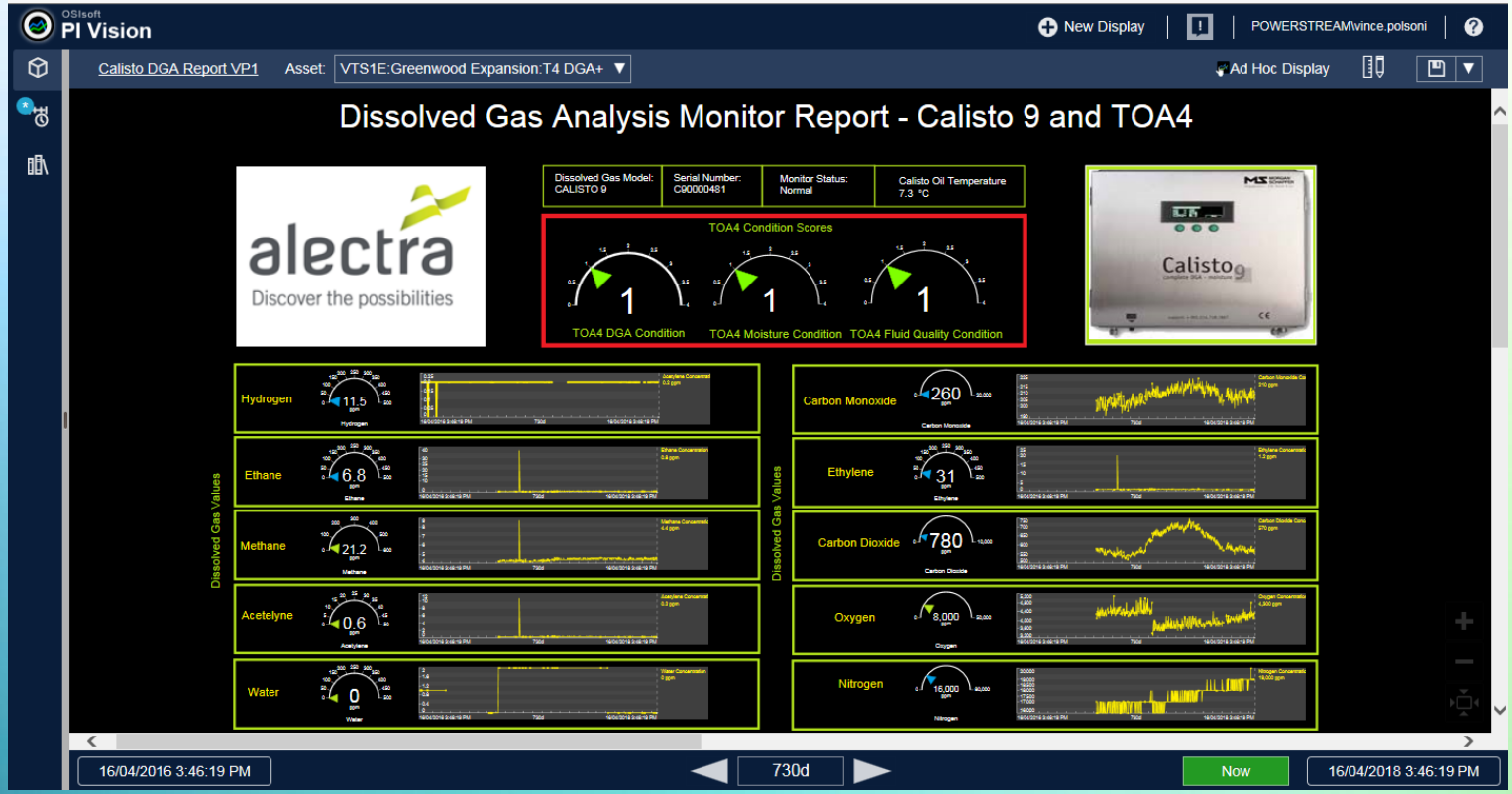
Example: 7 Gas Transformer Oil Monitor

Product: Morgan Schaffer Calisto 9

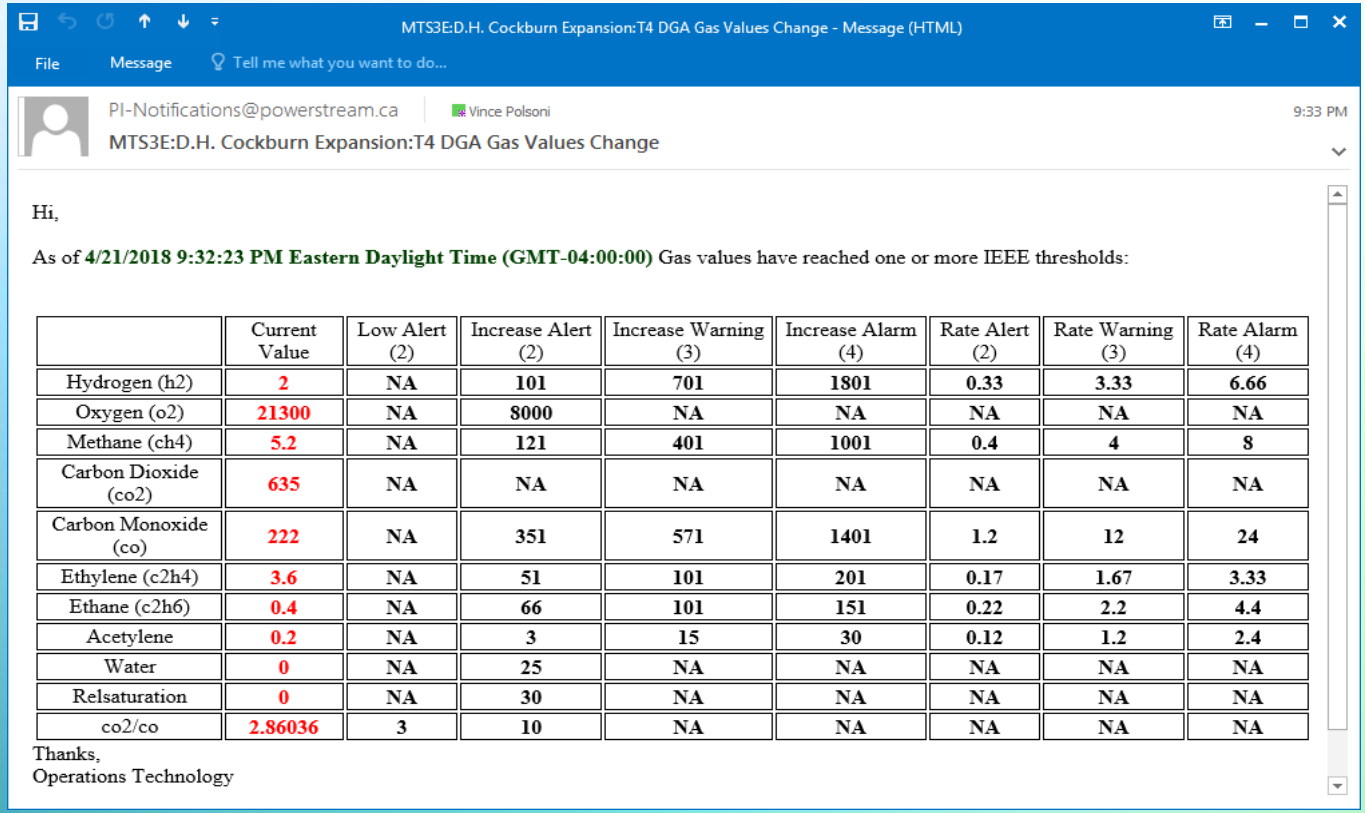
- Analyses 7 gasses plus water content
- Monitored Consumables: Carrier gas, Calibration gas
  - PI Report and Notifications on consumables (weeks remaining and pressure)
- Gas data interfaced to TOA4
  - Script run at 3pm daily to upload gas values and have oil analyzed
- Synchronized with CMMS twice a day
- PI Notifications if gasses exceed IEEE standard thresholds
- CMMS triggers alerts and auto generates work order if DGA or Moisture condition codes show oil is in poor condition
- Data stored in PI as tags and stored in AF structure

Integrated Expert Systems – Intelligent Transformer Oil Monitoring

Transformer Dissolved Gas Analysis Monitor Report



PI Notification-Transformer DGA Levels Exceeding Thresholds



MTS3E:D.H. Cockburn Expansion:T4 DGA Gas Values Change - Message (HTML)

File Message Tell me what you want to do...

PI-Notifications@powerstream.ca Vince Polsoni 9:33 PM

MTS3E:D.H. Cockburn Expansion:T4 DGA Gas Values Change

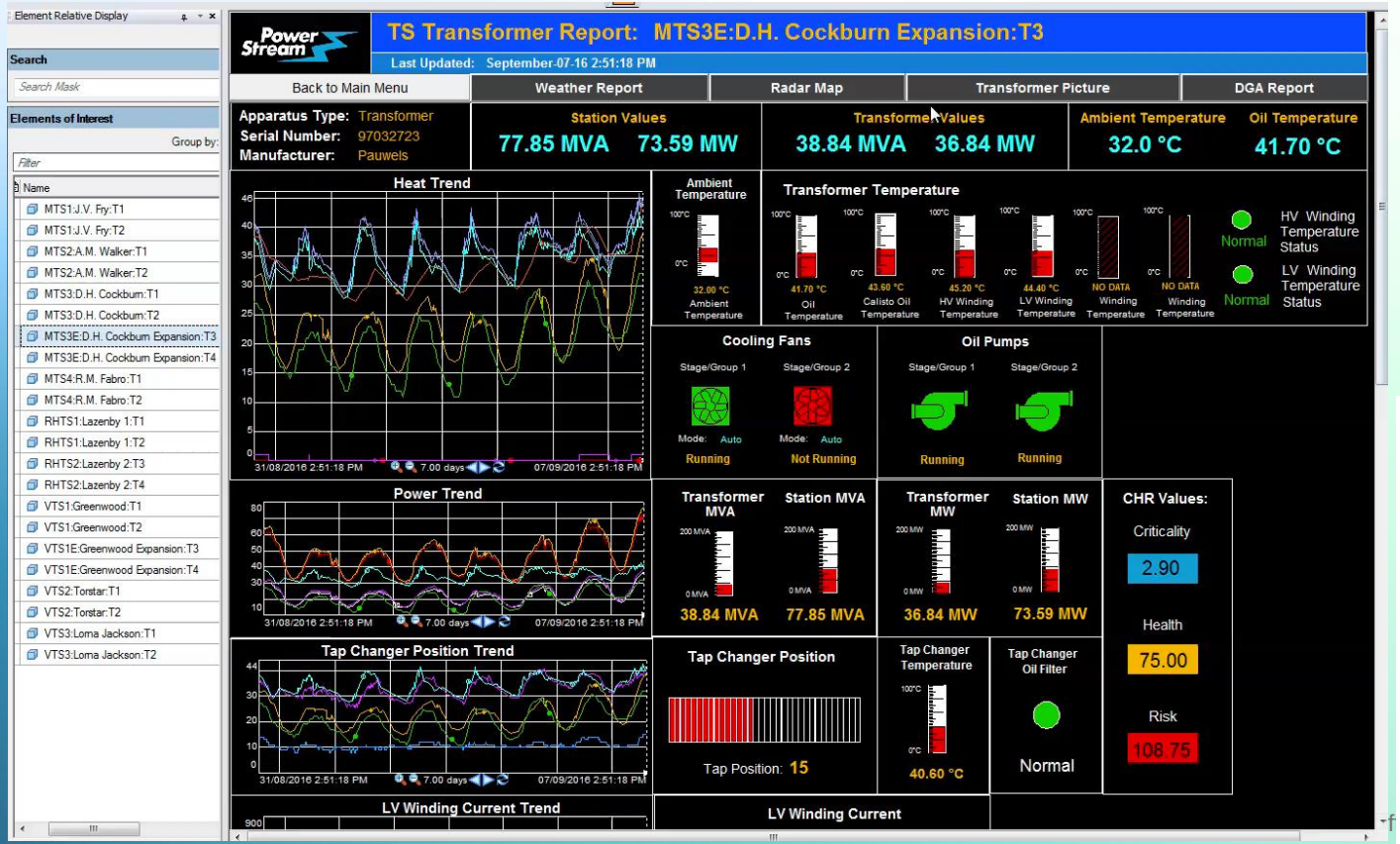
Hi,

As of **4/21/2018 9:32:23 PM Eastern Daylight Time (GMT-04:00:00)** Gas values have reached one or more IEEE thresholds:

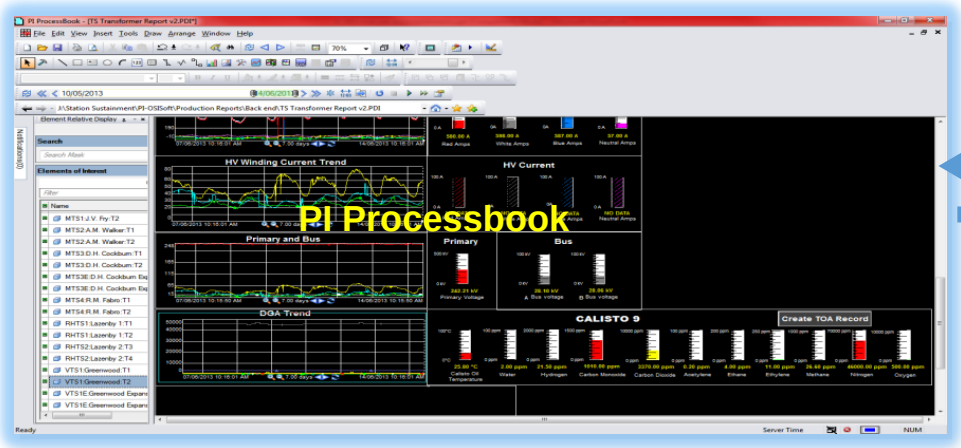
	Current Value	Low Alert (2)	Increase Alert (2)	Increase Warning (3)	Increase Alarm (4)	Rate Alert (2)	Rate Warning (3)	Rate Alarm (4)
Hydrogen (h2)	2	NA	101	701	1801	0.33	3.33	6.66
Oxygen (o2)	21300	NA	8000	NA	NA	NA	NA	NA
Methane (ch4)	5.2	NA	121	401	1001	0.4	4	8
Carbon Dioxide (co2)	635	NA	NA	NA	NA	NA	NA	NA
Carbon Monoxide (co)	222	NA	351	571	1401	1.2	12	24
Ethylene (c2h4)	3.6	NA	51	101	201	0.17	1.67	3.33
Ethane (c2h6)	0.4	NA	66	101	151	0.22	2.2	4.4
Acetylene	0.2	NA	3	15	30	0.12	1.2	2.4
Water	0	NA	25	NA	NA	NA	NA	NA
Relsaturation	0	NA	30	NA	NA	NA	NA	NA
co2/co	2.86036	3	10	NA	NA	NA	NA	NA

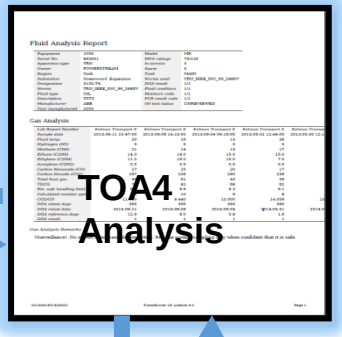
Thanks,
Operations Technology

Real-Time Transformer Oil Analysis



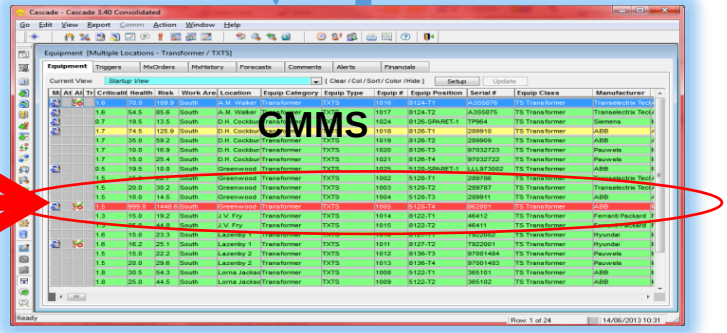
Intelligent Maintenance Example
Dissolved Gas Analysis in Transformer





Daily Synch
or On Demand

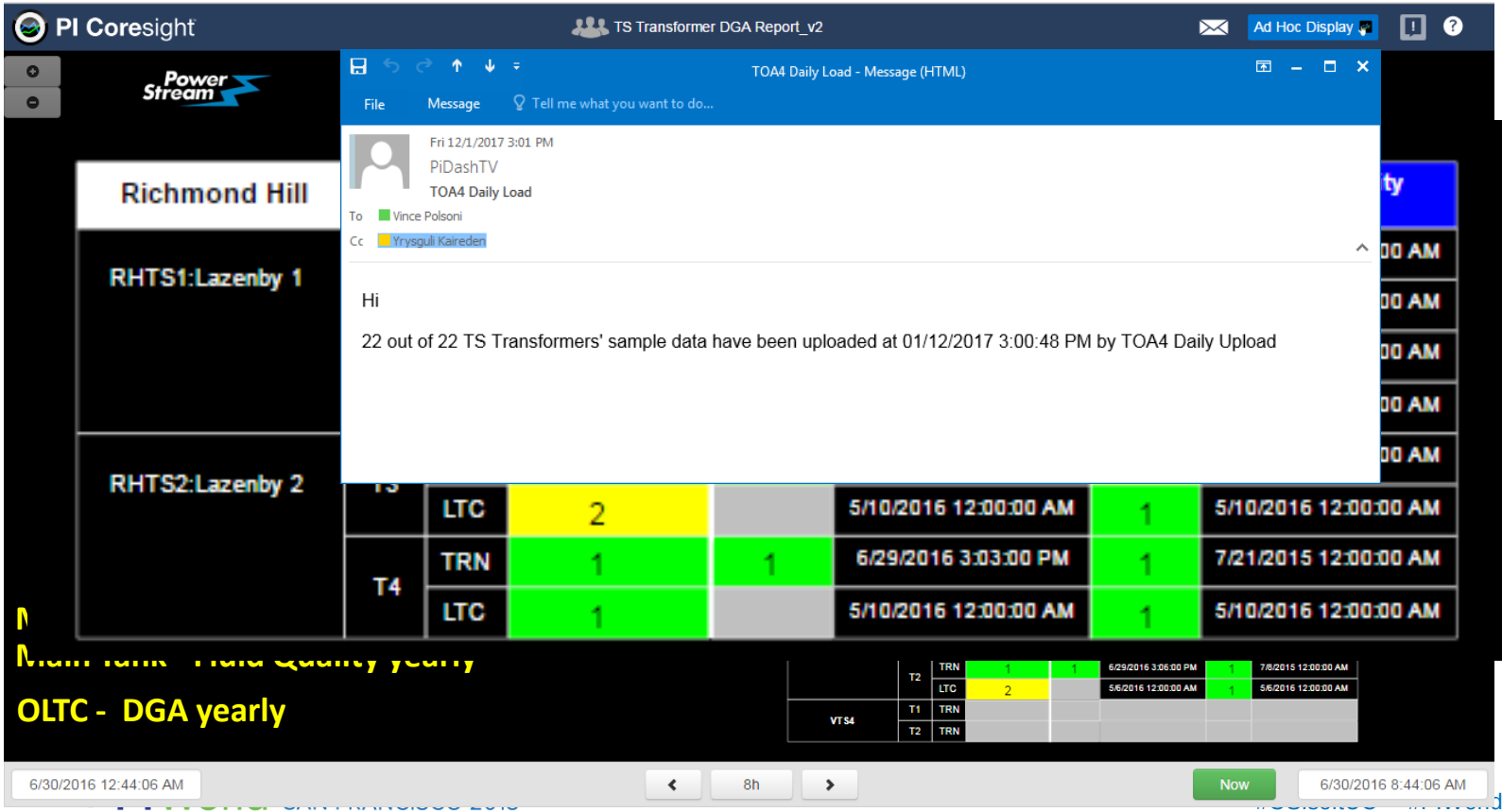
Daily synch



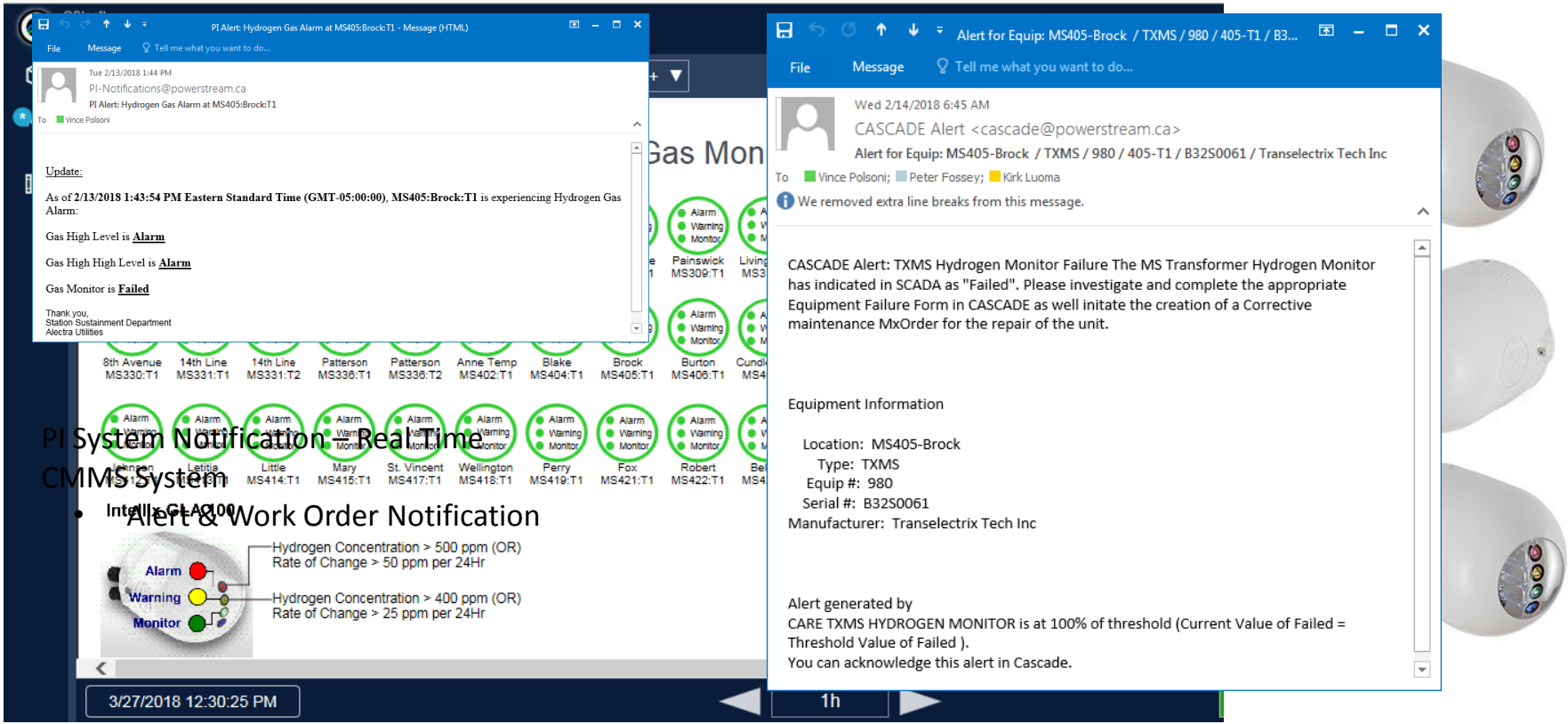
Transformer Problem Identified

- **(Health and Risk Increase)**
- **PI Notification, CMMS Alert**
- **Auto Generated CM Work Order**

TS Transformer Oil Condition Report



Transformer Hydrogen Gas Alarm Report



- PI System Notification: Real Time
- CMMS System
  - Alert & Work Order Notification

Detailed Transformer Report

Example: Transformer Bushing Monitor

Product: Doble IDD/Doble Prime

- Each unit can monitor up to 12 bushings
- Connected to SCADA via DNP3
- Local connection and web page reporting
- Raw data from IDD into PI System
- Leverage PI Reporting and PI Notifications

Bushing Monitor

Integrated Expert Systems – Bushing Monitoring
Transforming our World

Bushing Monitoring – 1 set Secondary Windings

Bushing Monitor

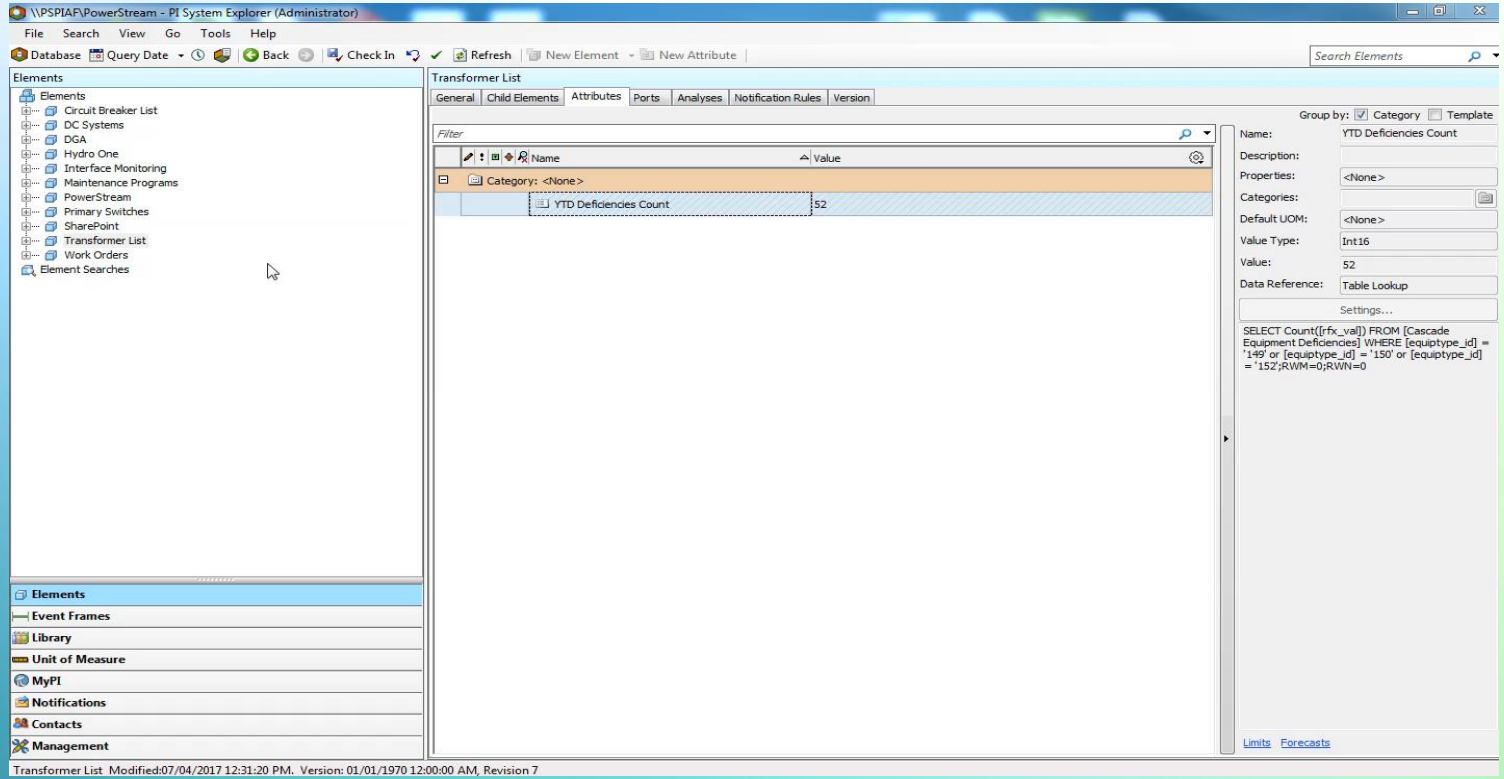
Bushing Monitoring – 2 sets Secondary Windings

Bushing Monitor

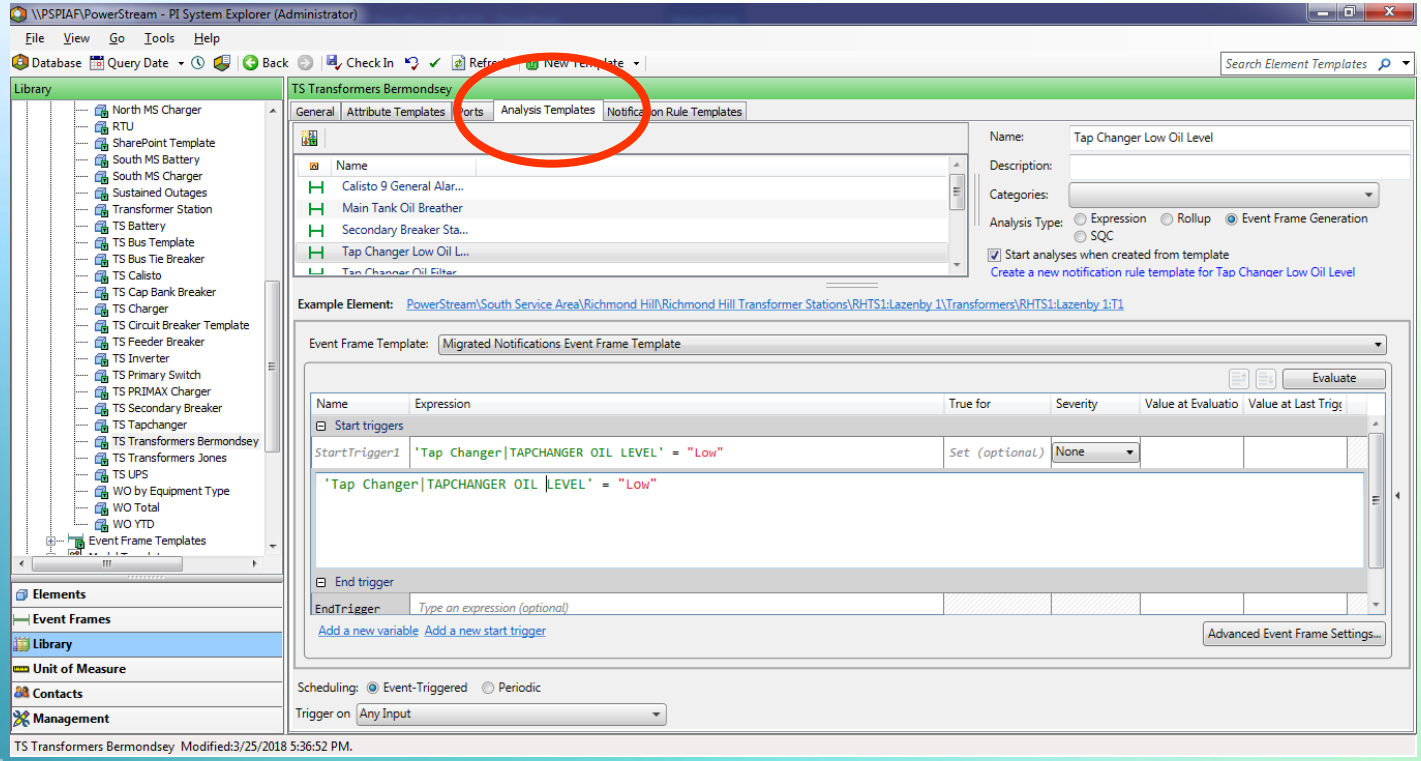
PI AF – Transformer Management

- PI AF Templates
- PI AF Transformer Attributes
- PI Analysis
- PI Notifications
  - Configuration – Analysis
  - Configuration - Notification
  - Email
- PI Table
  - Data extracted from CMMS and OMS systems

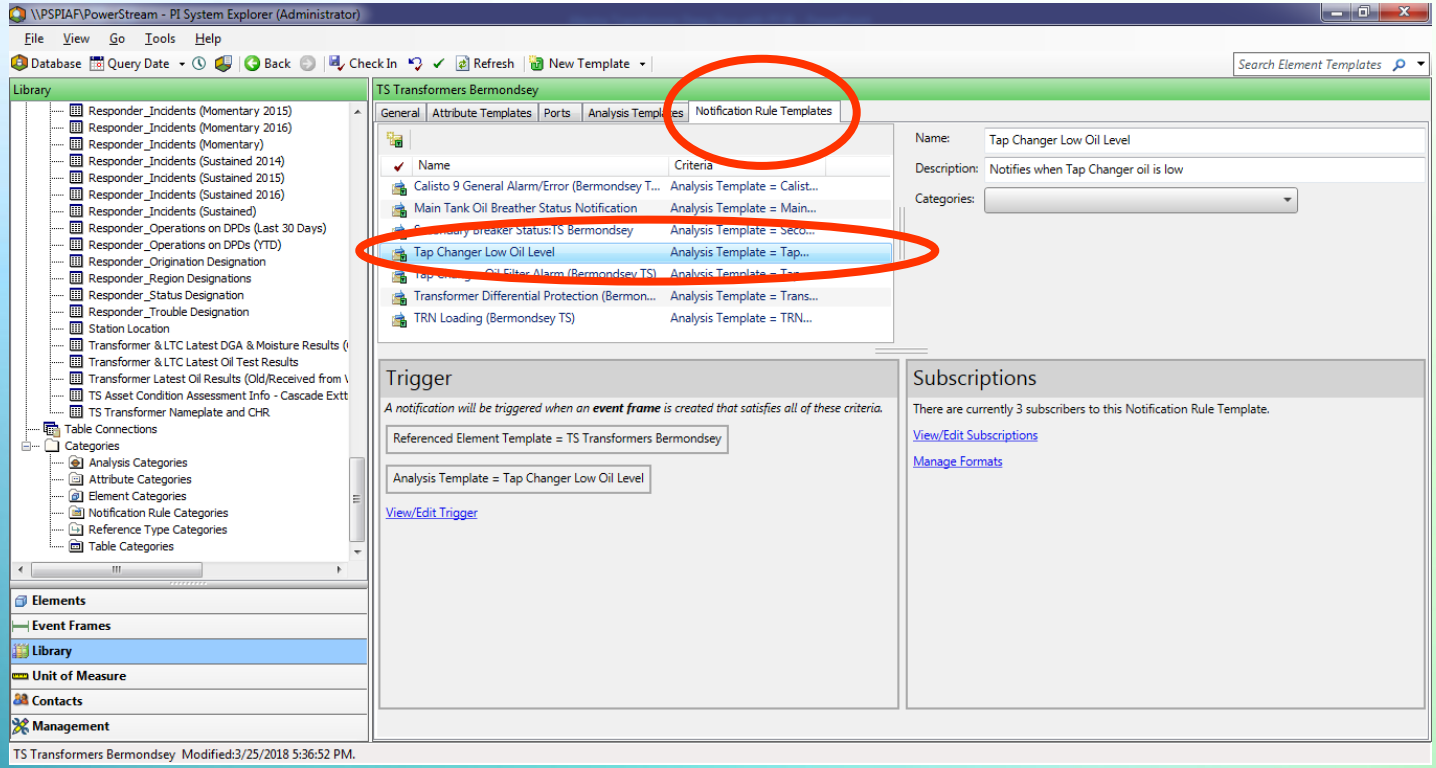
PI Asset Framework – Transformer Attributes



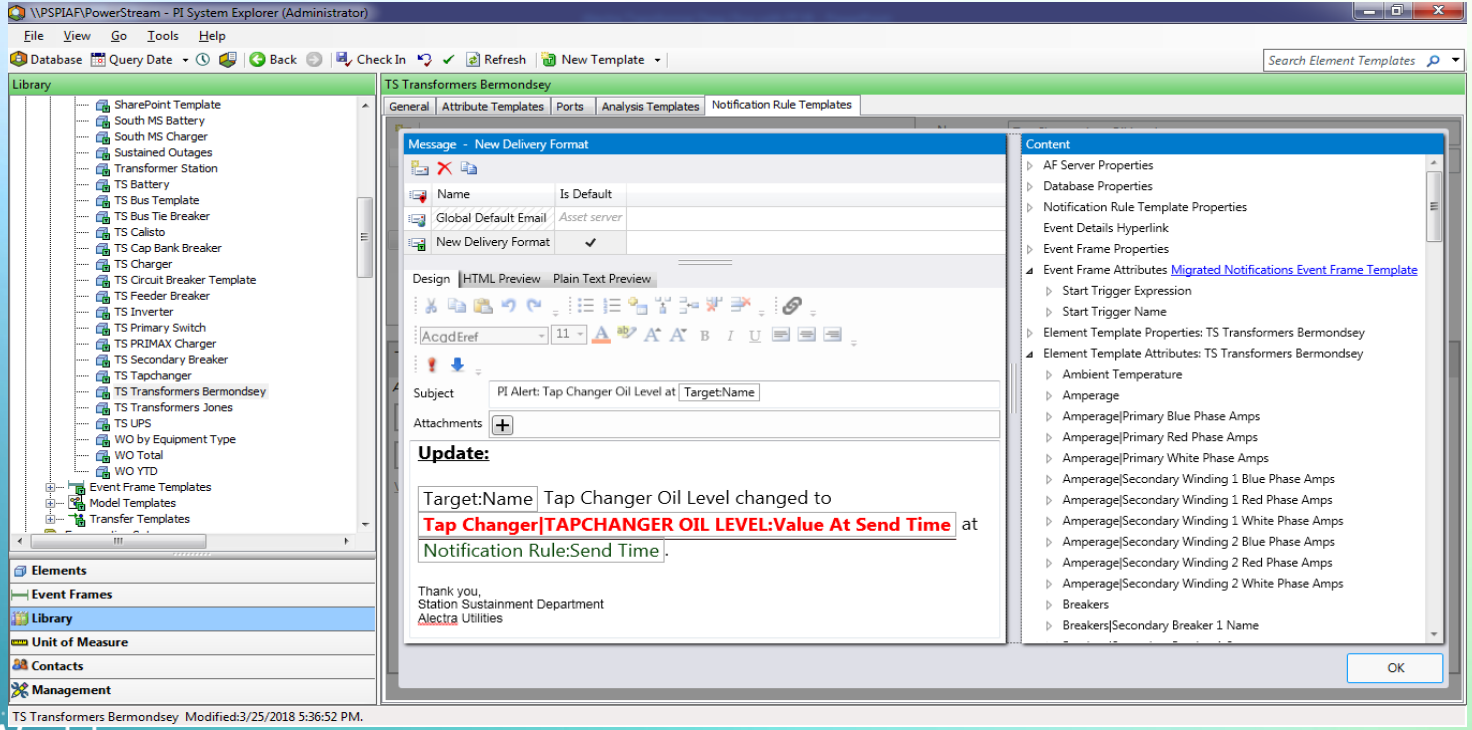
Analysis Template – Tap Changer Oil Level



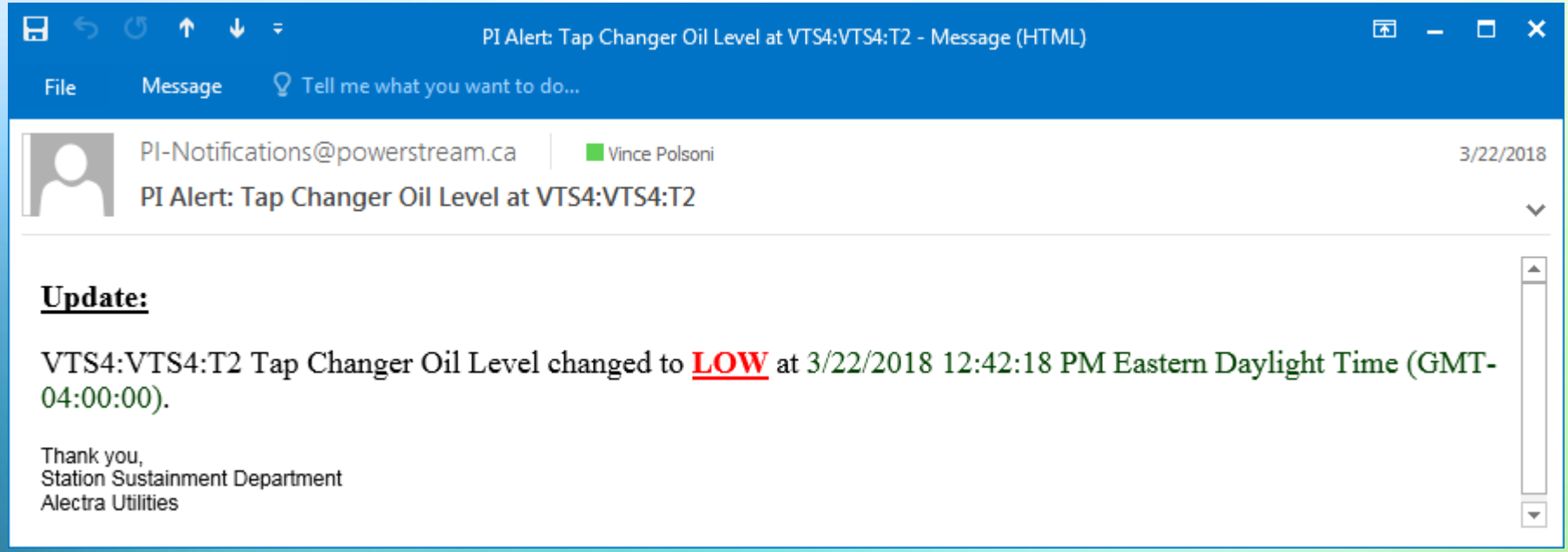
Notification Rule – Tap Changer Oil Level



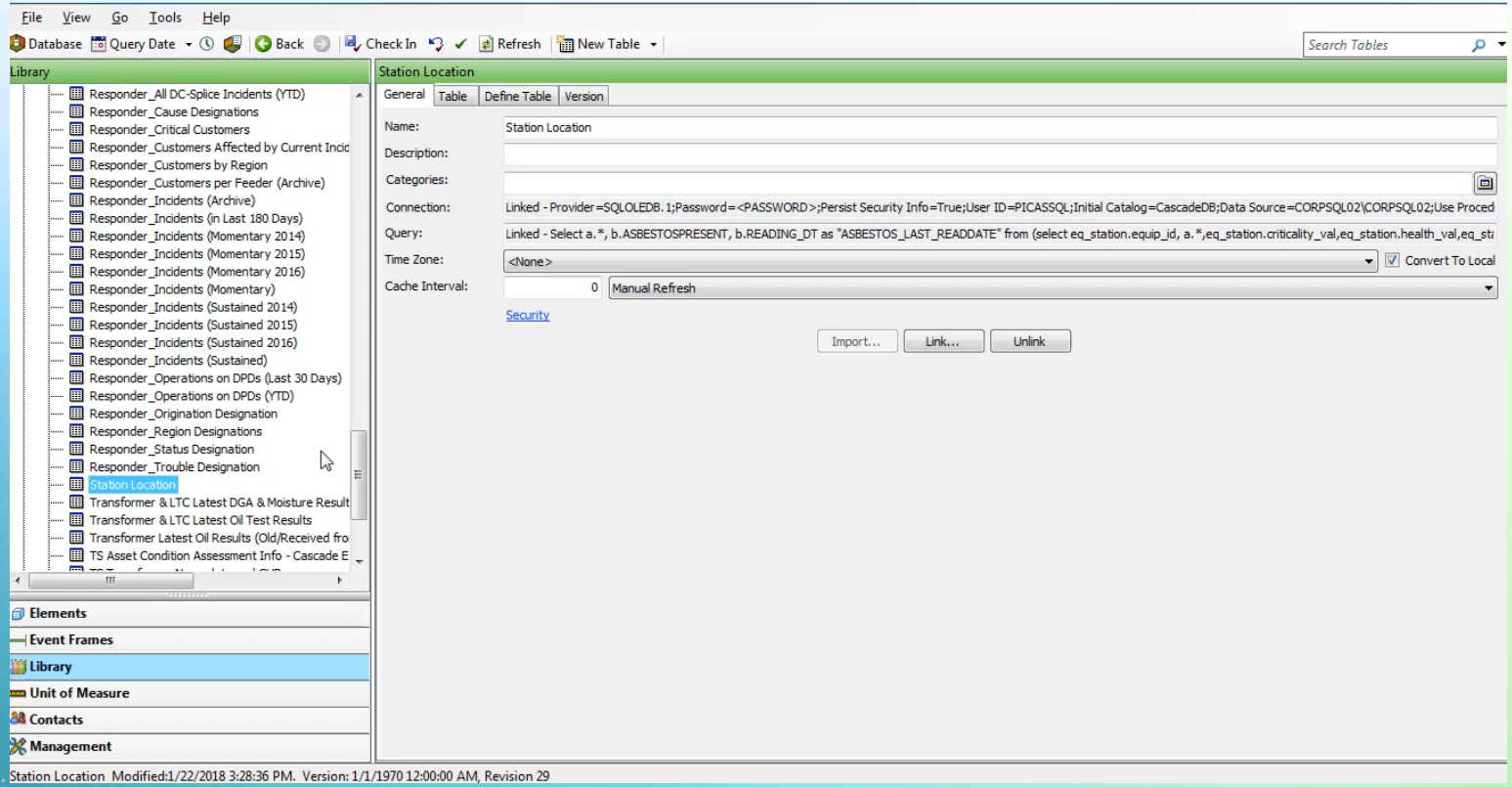
PI Notification Email Message Template Tap Changer Low Oil



PI Notification – Low Tap Changer Oil



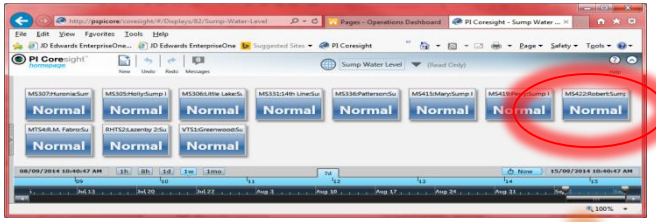
Video Example Table – Transformer and Tap Changer Oil Test Results from CMMS



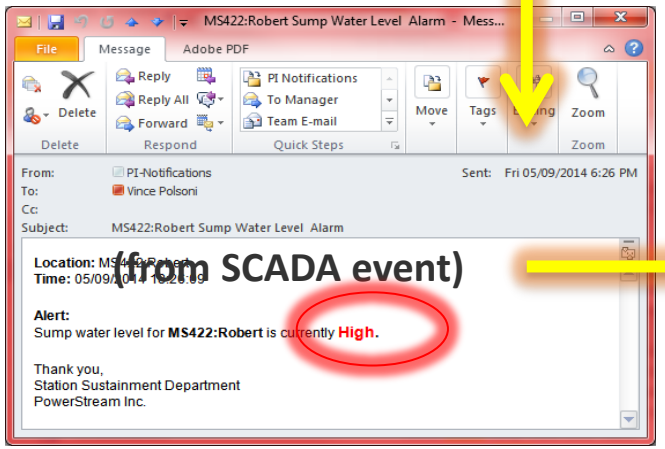
SCADA – PI System – CMMS working as One

PI Report **(High Water Alarm)**

PI Report **(High Water Alarm Cleared)**

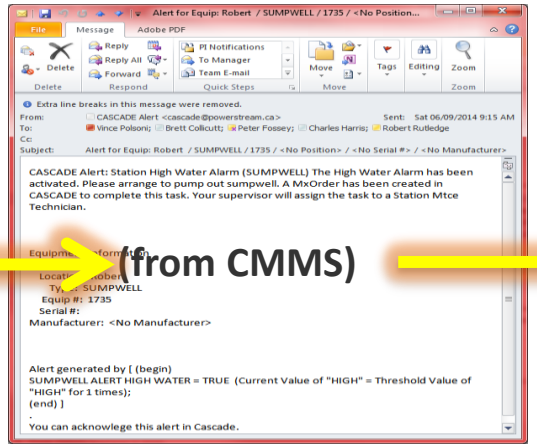


PI Notification



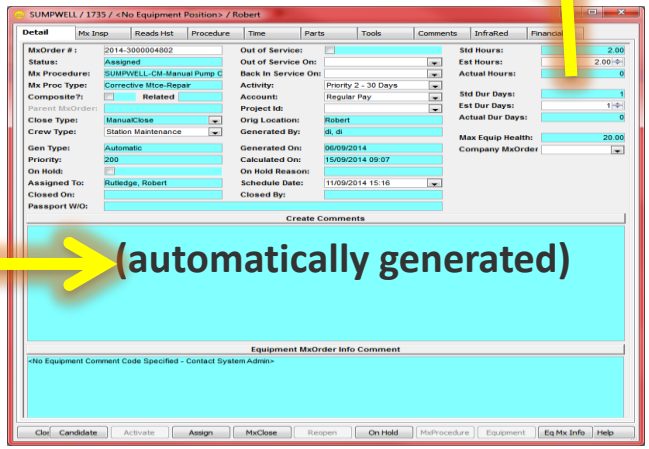
(from SCADA event)

CMMS Work Order Alert



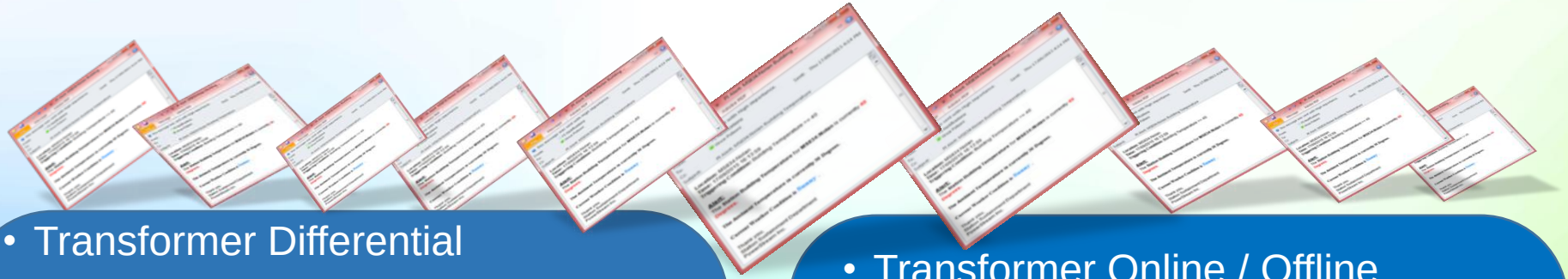
(from CMMS)

CMMS Work Order



(automatically generated)

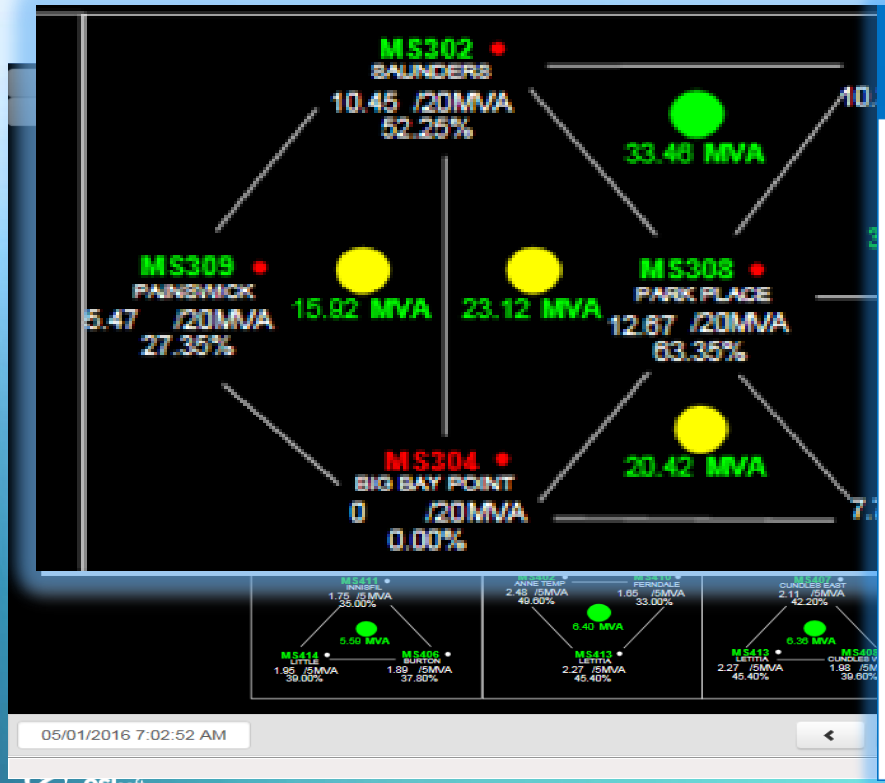
PI Notifications – Transformer Conditions



- Transformer Differential
- Transformer Main Tank Breather
- Tap Changer Low Oil
- Tap Changer Oil Filtration Alarm
- Dissolved Gas IEEE Threshold Exceeded
- Dissolved Gas, Moisture and Fluid Quality Condition Code >2
- Calisto 9 Oil Monitor General Alarm

- Transformer Online / Offline
  - Primary Switch Operation
  - Secondary Txmr Breaker Operation
- Transformer Oil Temp/Cooling
- Transformer Bushing Alarm
- Oil Containment Alarm
- Hydrogen Alarm
- Transformer High Winding Temp

SubStation Interconnection – Load Transfer Report



MS309:Painswick:T1 High MVA Ratio - Message (...

File Message Tell me what you want to do...

PI-Notifications@powerstream.ca Vince Polsoni Sat 4:00 PM

MS309:Painswick:T1 High MVA Ratio

Hi,

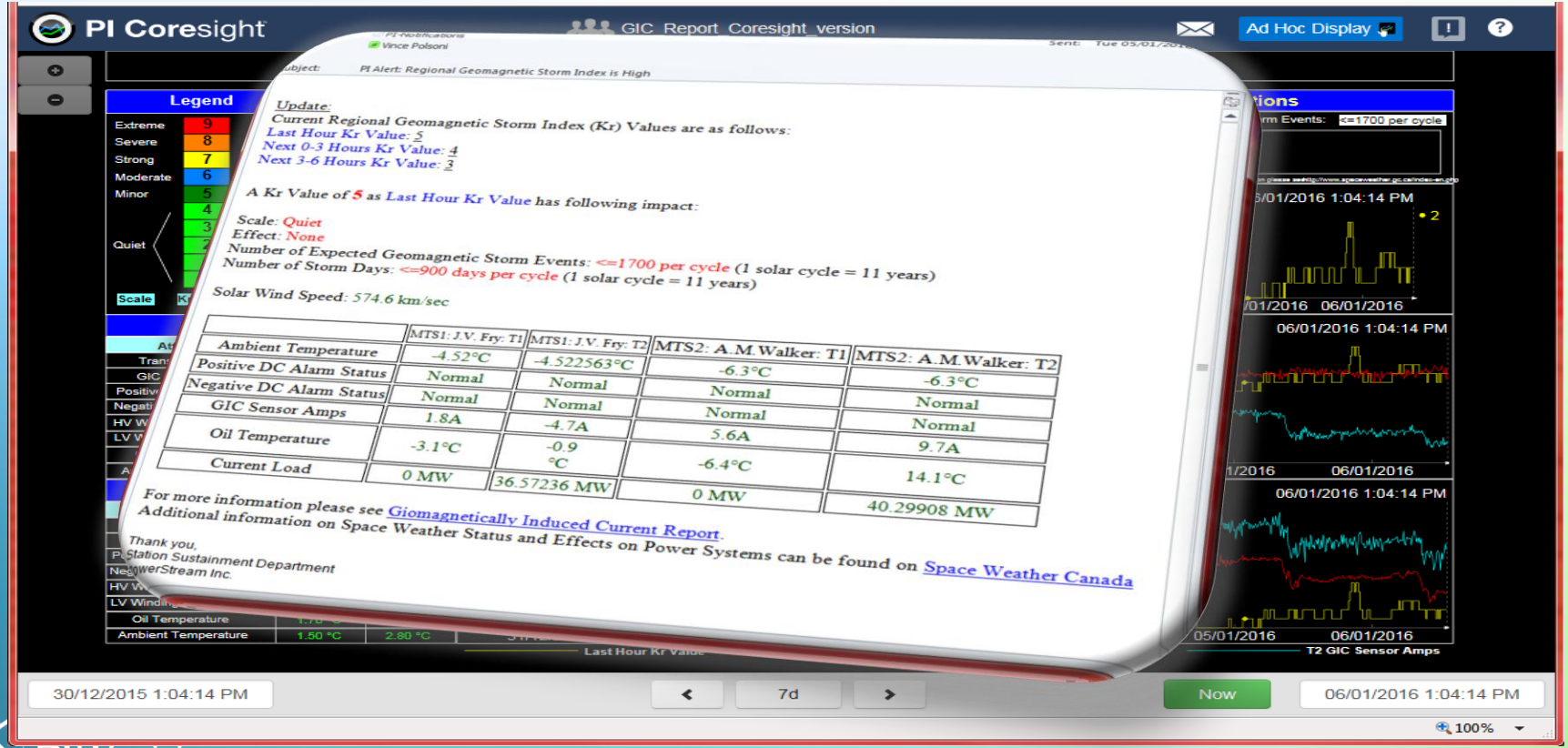
MS309:Painswick:T1 Transformer is experiencing a high MVA ratio of **81%**.

Current Load is **4.58MVA**
Current Applied Rate is **20MVA**

	Base Rate	Stage 1	Stage 2
Status	**NA**	**Off**	**Off**
Rating	**20MVA**	**26.6 MVA**	**33.3 MVA**

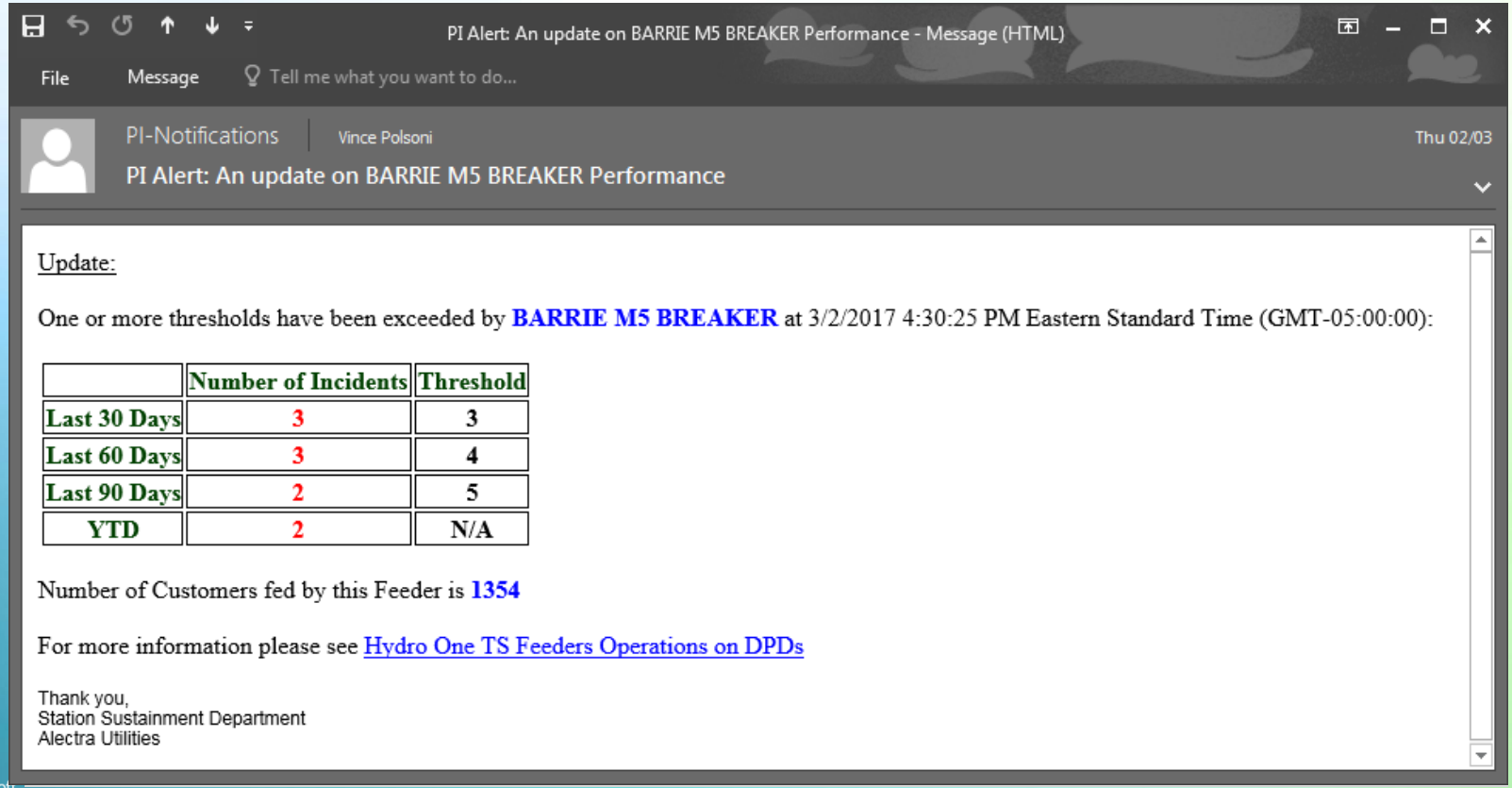
Thanks,
Operations Technology

Geomagnetic Induced Current Report



	MTS1: J.V. Fry: T1	MTS1: J.V. Fry: T2	MTS2: A.M.Walker: T1	MTS2: A.M.Walker: T2
Ambient Temperature	-4.52°C	-4.522563°C	-6.3°C	-6.3°C
Positive DC Alarm Status	Normal	Normal	Normal	Normal
Negative DC Alarm Status	Normal	Normal	Normal	Normal
GIC Sensor Amps	1.8A	-4.7A	5.6A	9.7A
Oil Temperature	-3.1°C	-0.9 °C	-6.4°C	14.1°C
Current Load	0 MW	36.57236 MW	0 MW	40.29908 MW

Feeder Availability Report - Risk



PI Alert: An update on BARRIE M5 BREAKER Performance - Message (HTML)

File Message Tell me what you want to do...

PI-Notifications | Vince Polsoni Thu 02/03

PI Alert: An update on BARRIE M5 BREAKER Performance

Update:

One or more thresholds have been exceeded by **BARRIE M5 BREAKER** at 3/2/2017 4:30:25 PM Eastern Standard Time (GMT-05:00:00):

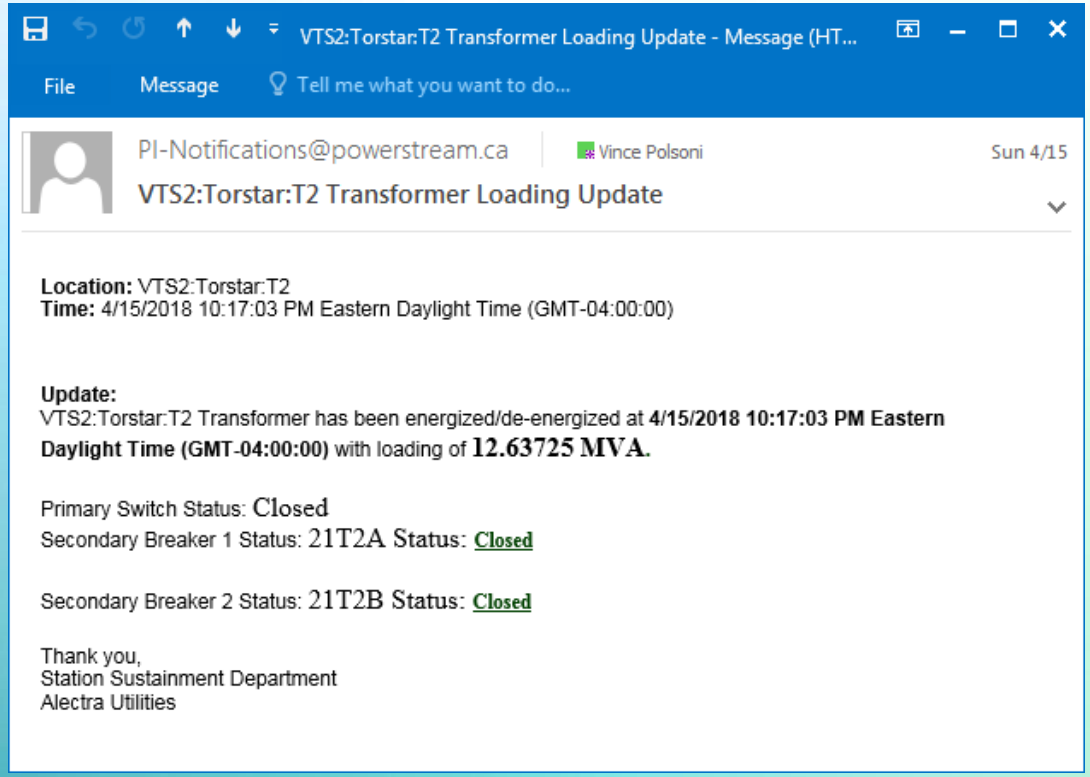
	Number of Incidents	Threshold
Last 30 Days	3	3
Last 60 Days	3	4
Last 90 Days	2	5
YTD	2	N/A

Number of Customers fed by this Feeder is **1354**

For more information please see Hydro One TS Feeders Operations on DPDs

Thank you,
Station Sustainment Department
Alectra Utilities

PI Notification – Transformer De-Energized / Energized



VTS2:Torstar:T2 Transformer Loading Update - Message (HT...

File Message Tell me what you want to do...

PI-Notifications@powerstream.ca Vince Polsoni Sun 4/15

VTS2:Torstar:T2 Transformer Loading Update

Location: VTS2:Torstar:T2
Time: 4/15/2018 10:17:03 PM Eastern Daylight Time (GMT-04:00:00)

Update:
VTS2:Torstar:T2 Transformer has been energized/de-energized at **4/15/2018 10:17:03 PM Eastern Daylight Time (GMT-04:00:00)** with loading of **12.63725 MVA.**

Primary Switch Status: Closed
Secondary Breaker 1 Status: 21T2A Status: **Closed**

Secondary Breaker 2 Status: 21T2B Status: **Closed**

Thank you,
Station Sustainment Department
Alectra Utilities

PI Notification – Transformer Cooling System On / Off

PI Alert: Fan Status Change at VTS1:Greenwood:T2 - Message...

File Message Tell me what you want to do...

PI-Notifications@powerstream.ca Vince Polsoni 4/5/2018

PI Alert: Fan Status Change at VTS1:Greenwood:T2

Update:

Cooling Fans Status changed to **On** at 4/5/2018 5:16:34 PM Eastern Daylight Time (GMT-04:00:00).

DGA Oil Temperature is **28.9 °C**
Main Tank Oil Temperature is **30.8999996185303 °C**
Secondary Winding X Temperature is **46.1 °C**
Secondary Winding Y Temperature is **43.6 °C**
Ambient Temperature is **1**

Transformer Load is **89.8299 MVA**

Thank you,
Station Sustainment Department
Alectra Utilities

PI Notification - Transformer Cooling Failure

From: PI-Notifications@powerstream.ca [mailto:PI-Notifications@powerstream.ca]
Sent: April-20-18 5:01 PM
To:
Subject: MS309:Painswick:T1 Cooling Failure Status Change

Hi,

Cooling Failure Status changed to **Failed** at **4/20/2018 5:00:48 PM Eastern Daylight Time (GMT-04:00:00)**

Additional information:
Fan current is **0A**
Oil Level is **Normal**
Oil Temperature is **27°C**
Winding Temperature is **25°C**
Transformer Load is **4.44MVA**

Thanks,
Operations Technology

PI Notification – Tap Changer Oil Filtration Alarm

PI Alert: Tap Changer Oil Filter Alarm at MTS3:D.H. Cockburn:T2...

File Message Tell me what you want to do...

PI-Notifications@powerstream.ca | Vince Polsoni | Mon 4/16

PI Alert: Tap Changer Oil Filter Alarm at MTS3:D.H. Cockburn:T2

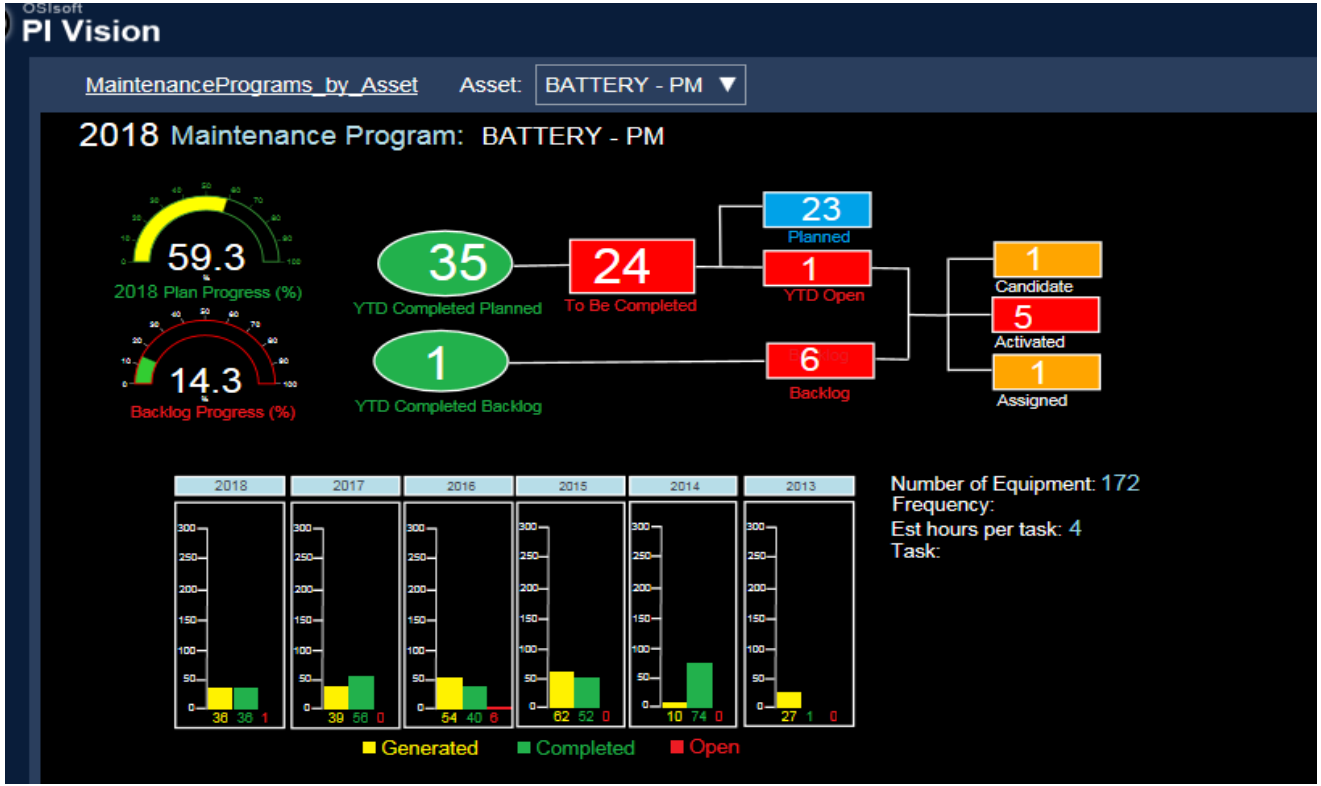
Update:

MTS3:D.H. Cockburn:T2 Tap Changer Oil Filter status changed to **Alarm** at 4/16/2018 1:09:22 AM Eastern Daylight Time (GMT-04:00:00).

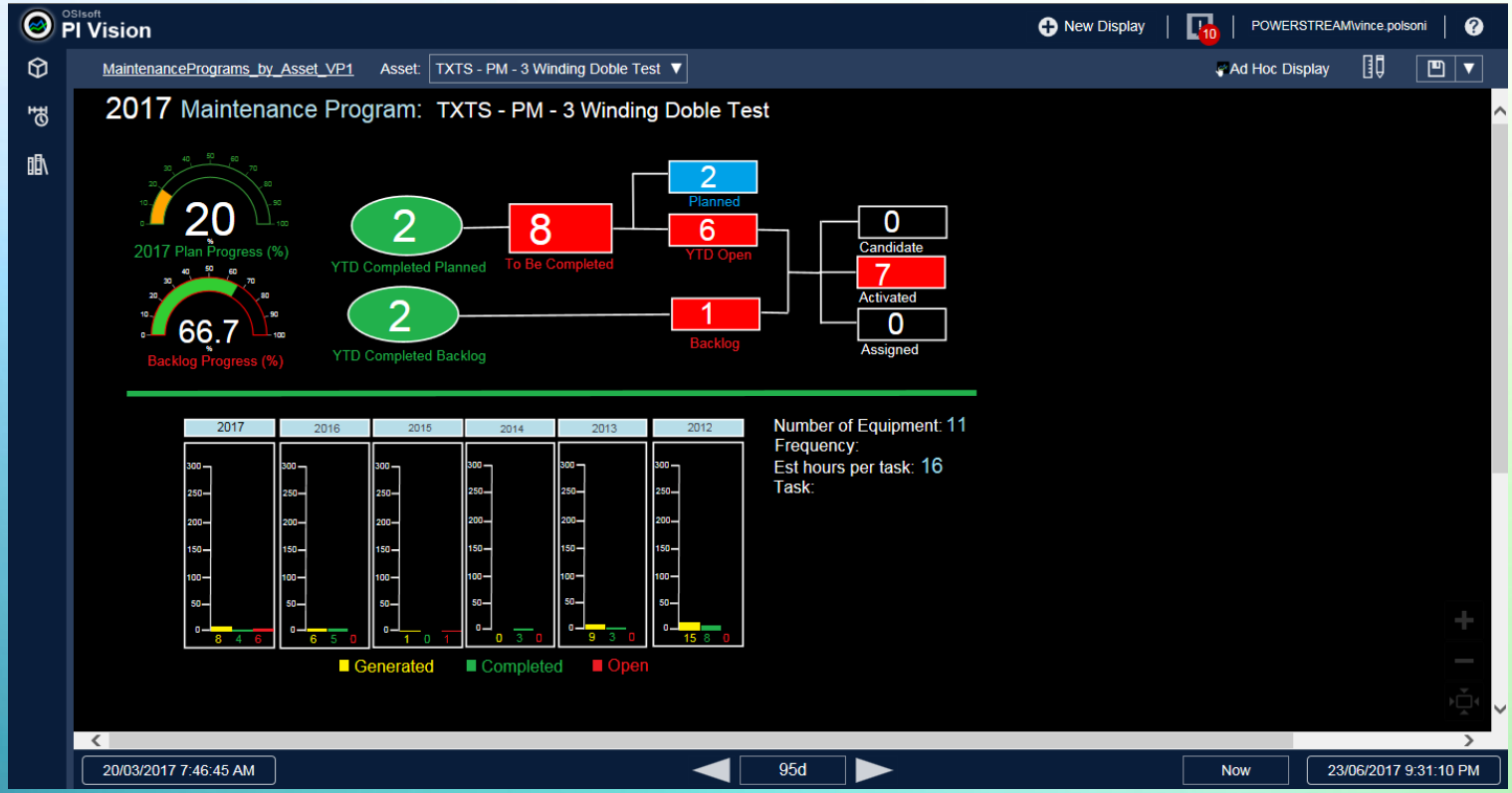
Thank you,
Station Sustainment Department
Alectra Utilities

Maintenance Performance Reports

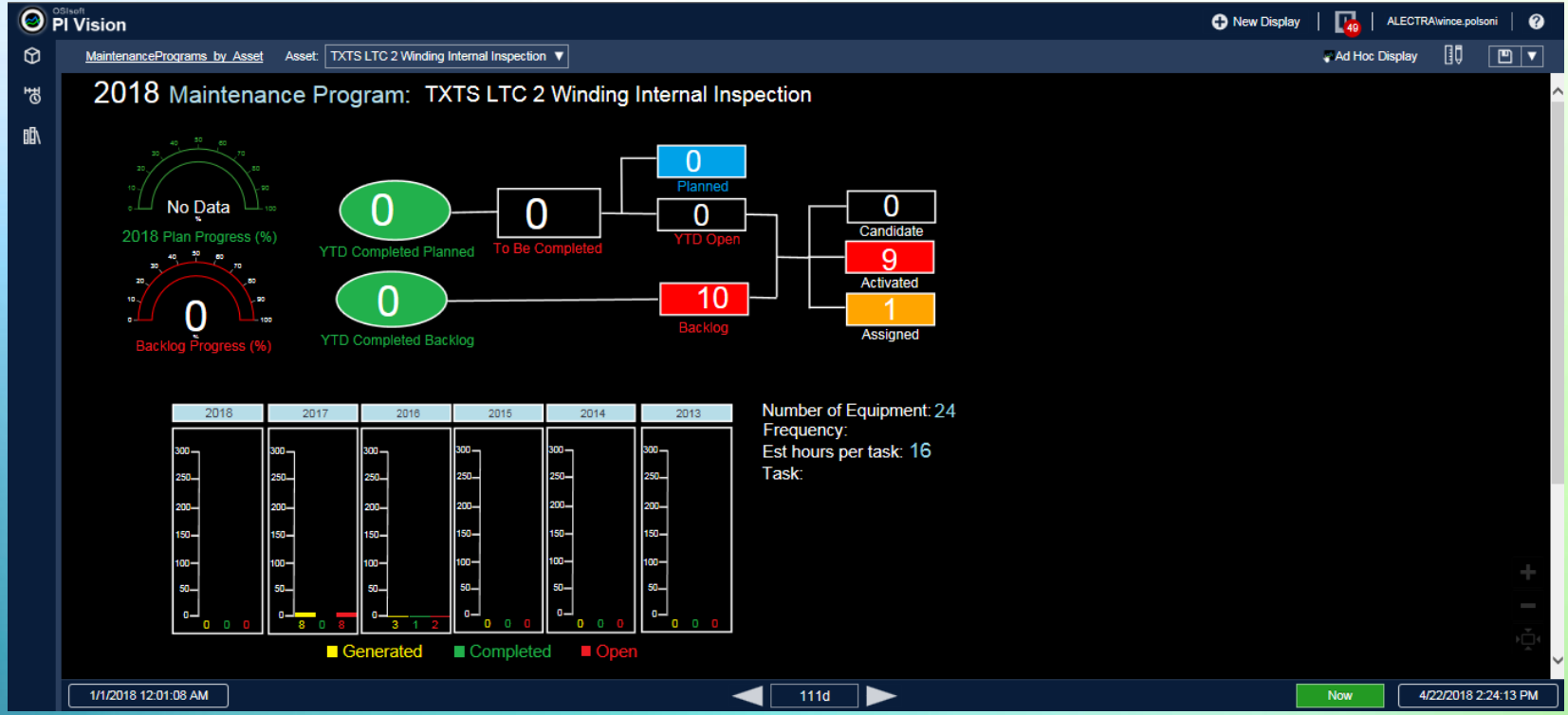
Maintenance Program and Backlog Performance
(by Mtce Task)



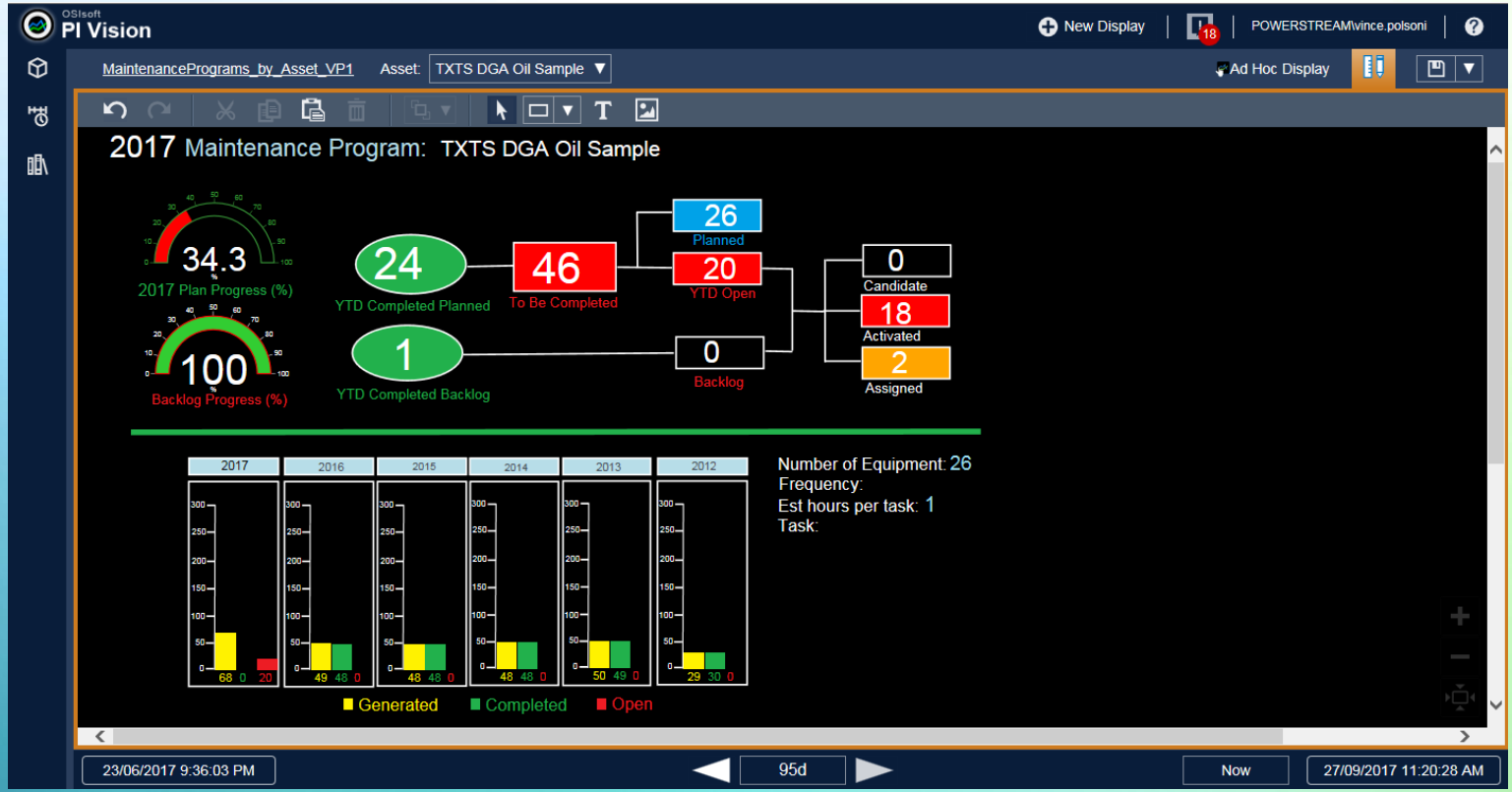
Current Year Transformer 3 Winding Doble Test Maintenance Program Completion Report



Current Year Transformer Tap Changer Maintenance Completion Report



Transformer - Annual Oil Samples



Station Maintenance Program Performance
(by Equipment Type)

Open WO Status

WO to be Co

Estimated Eff

Forecasted

Ope

Backlog

t Completed

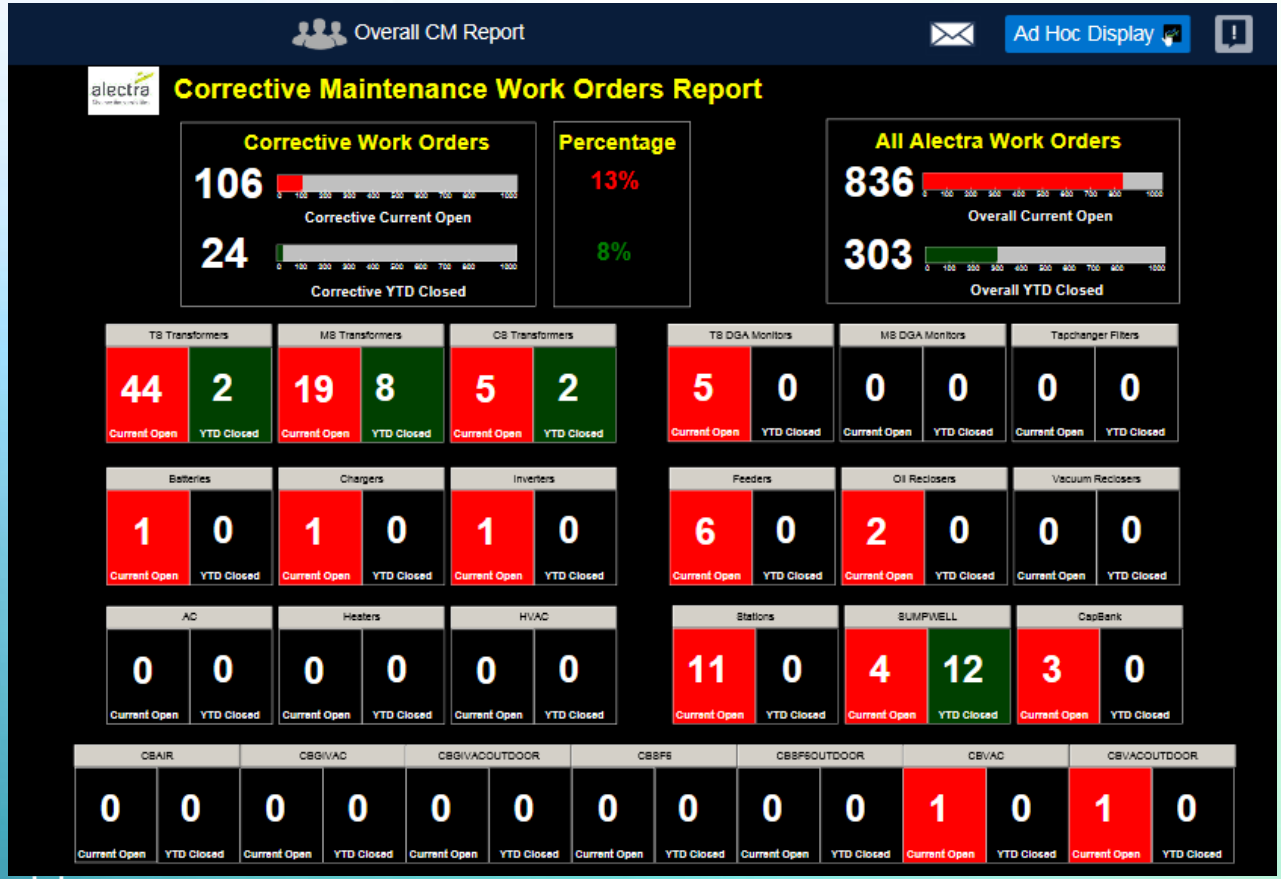
al

erated

ed

Historical Open

Corrective Maintenance Performance



Visualizing Real-Time Asset Health – CMMS and PI System

Risk

Function of Criticality and Risk

Health

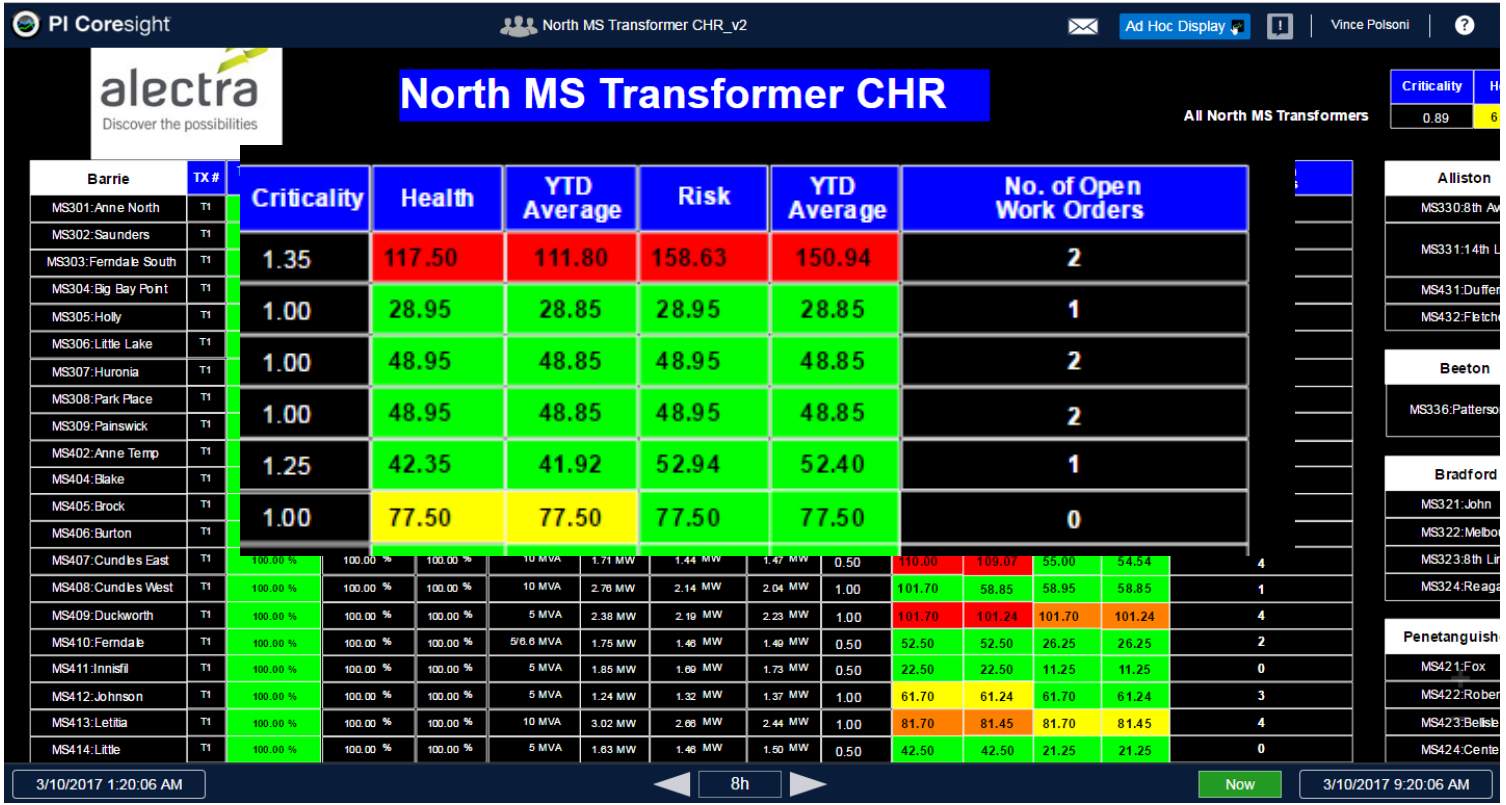
CMMS
- Maintenance Program Performance

CMMS and PI / SCADA Data
- Equipment Condition (DGA, Moisture, Fluid Quality, Insulation, Capacitance, Bushings, etc.)
- Failures, Equipment Status
- Number of Customers per Feeder/ Transformer / Station
- Number of Open Work Orders
- Age

Criticality

- No of Transformers at Station (1, 2 or more)
- Transfer Capability
- Oil Containment
- Key Customers
- Proximity of Station to Water
- Total No of Customers per Station

Transformer - Criticality, Health and Risk

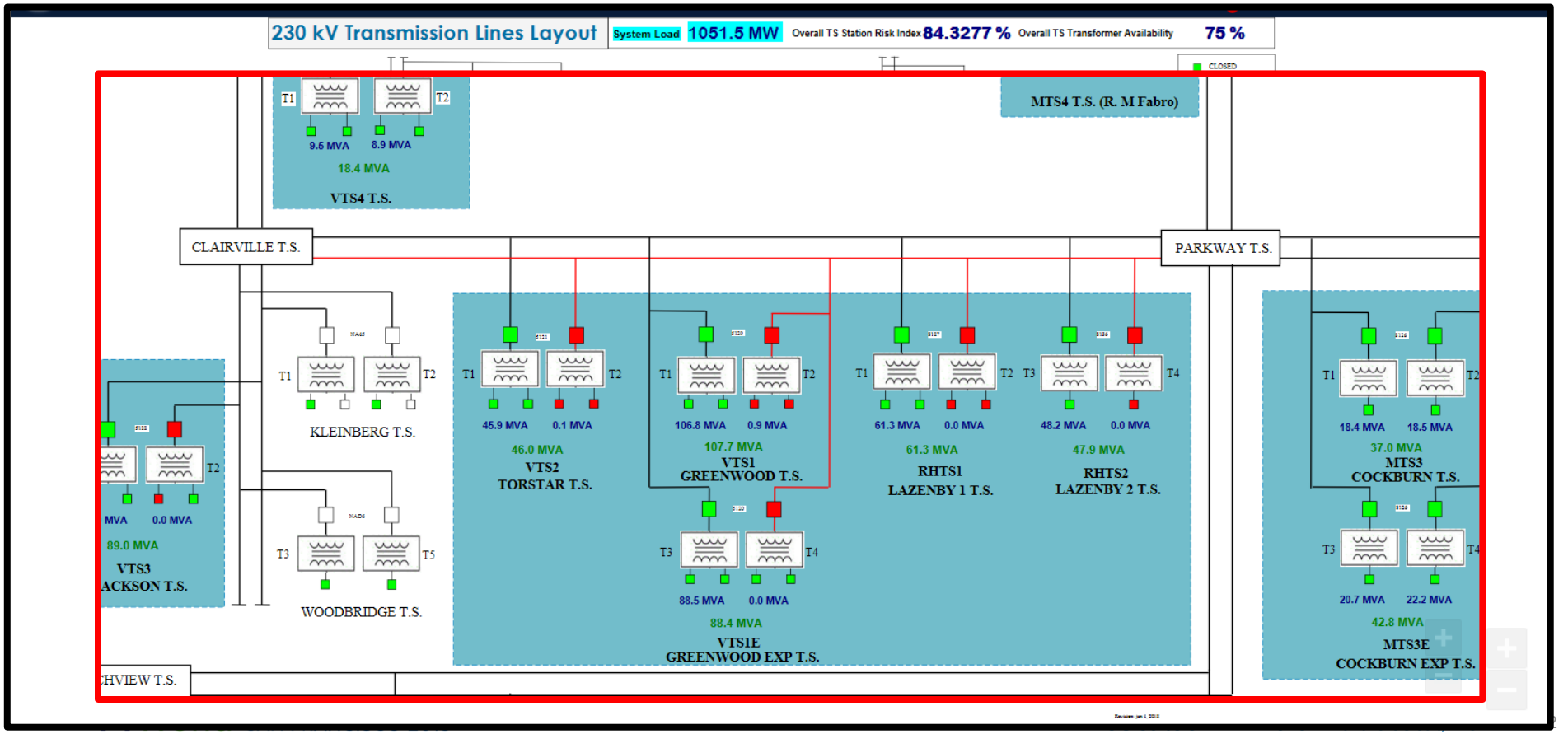


Various Operations / Equipment Reports - Alectra

- Transformer Availability
- Transformer Oil Temperature
- Transformer DGA
- Transformer Hydrogen
- Transformer Hydrogen and Moisture
- Transformer Health & Risk
- Transformer Cooling
- Geomagnetic Induced Current
- Transformer Loading

- Transformer Mtce Completion
- Transformer Mtce Forecast
- Transformer Oil Containment
- Transformer Monitoring Equipment
- Transformer Pressure Relief Vent & Gas Accumulation
- Transmission System Supply

230kV Transmission Supply Status Report

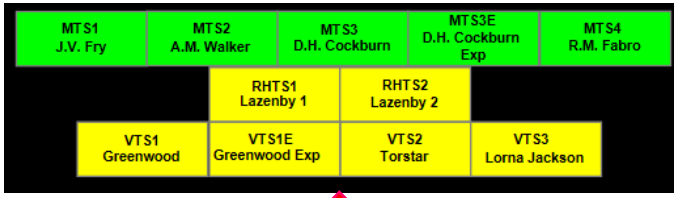


Station Performance Metrics (Example)

Overall TS Station Performance	
Overall TS Station Risk Index	79.61 %
Overall TS Transformer Availability	72.7273 %
Overall TS Bus Availability	100 %
Feeder TS Breakers "Closed"	92.36 %

MTS3:D.H. Cockburn	
Station Status	On
Station Risk Index	100
Transformer Availability	100
Bus Availability	100
Bus E Availability	LIVE
Bus E Voltage	28.65
Bus Z Availability	LIVE
Bus Z Voltage	28.67
Feeder Breakers Closed (%)	100

RHTS2:Lazenby 2	
Station Status	On
Station Risk Index	65.625
Transformer Availability	50
Bus Availability	100
Bus C Availability	LIVE
Bus C Voltage	28.32
Bus D Availability	LIVE
Bus D Voltage	28.28
Feeder Breakers Closed (%)	87.5

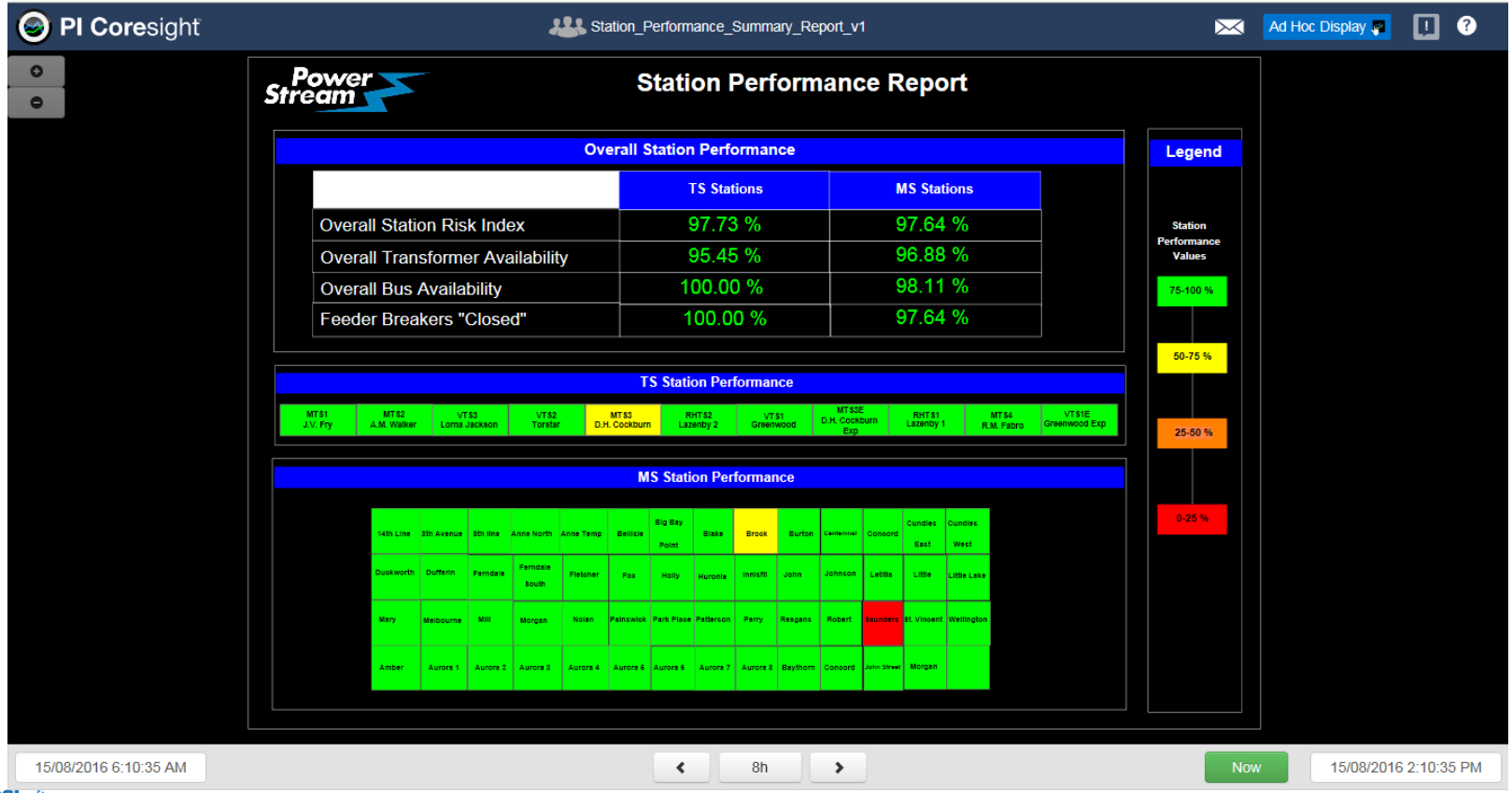


Multi States

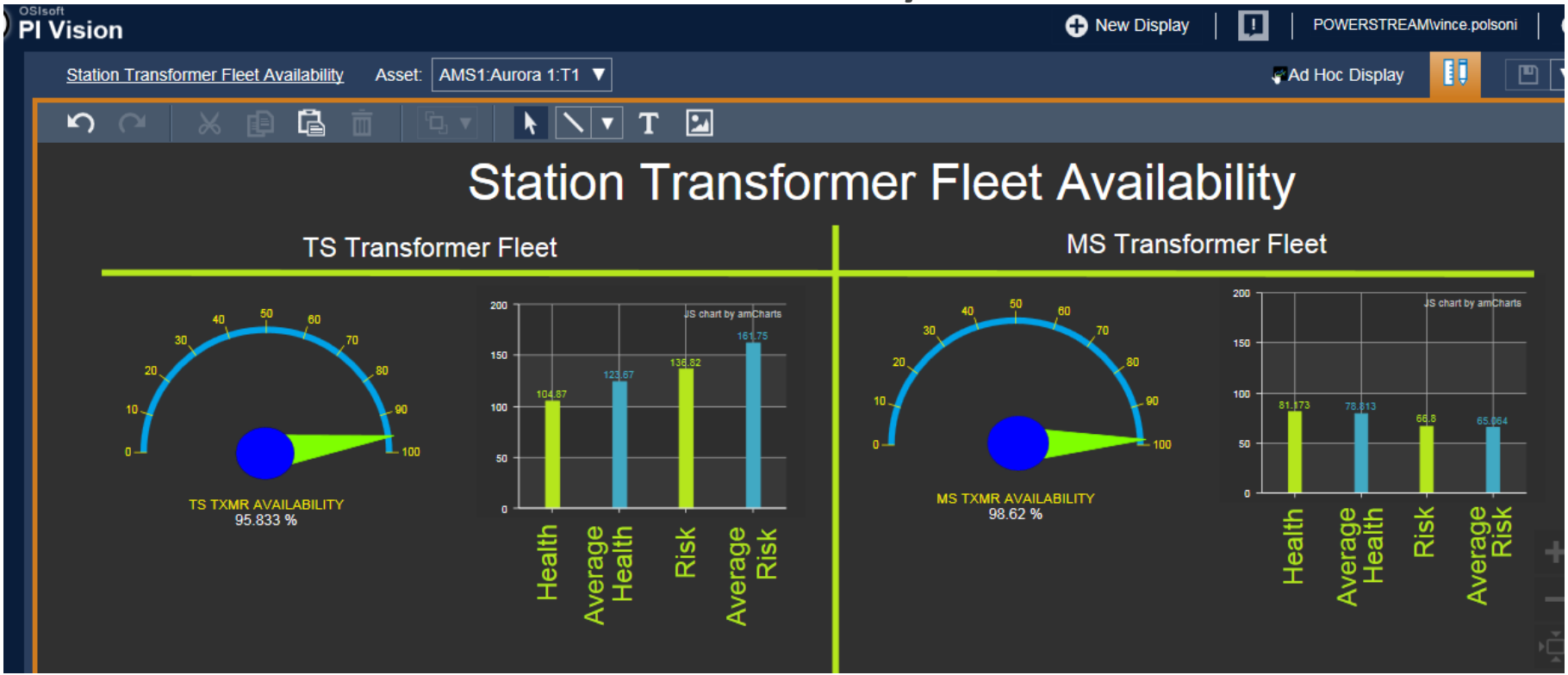
Performance Indicators
(Performance Equations)

Analytics
(Performance Equations)

Station Availability (Risk) Report



Transformer Fleet Availability



Station Transformer Oil Temperature/Cooling Report

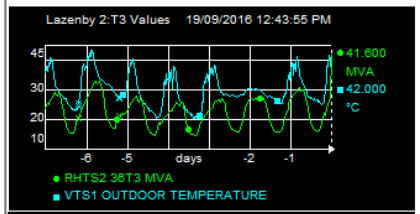
alectra utilities

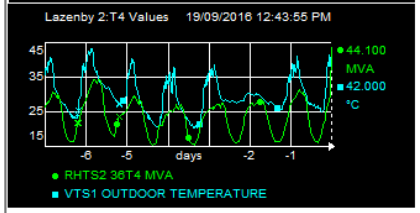
Station TS Transformer Oil Temperature Report

Back to Main Menu | Date & Time: 19/09/2016 12:43:55 PM

Lazenby 2

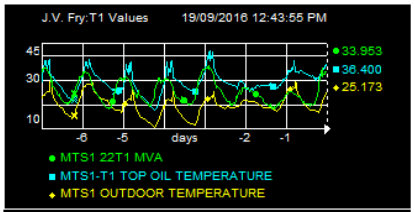
	T3	T4
Power	41.60 MVA	44.10 MVA
Oil Temp Status	Normal	Normal
Ambient Temp	25.17 °C	25.17 °C
Fans 1/2	On / On	On / On

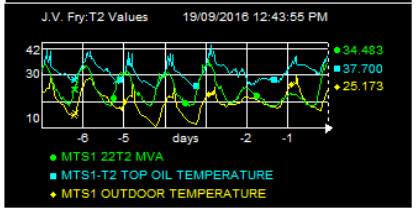




J.V. Fry

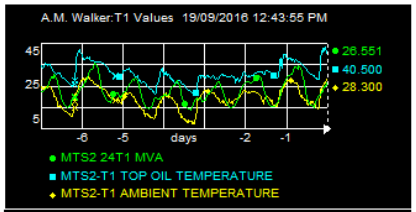
	T1	T2
Power	33.95 MVA	34.48 MVA
Oil Temp	36.40 °C	37.70 °C
TC Oil Temp	30.00 °C	30.10 °C
Ambient Temp	25.17 °C	25.17 °C
Fans Group 1/2	On / Off	On / Off

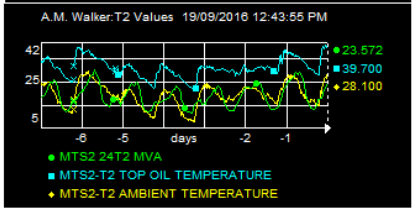




A.M. Walker

	T1	T2
Power	26.55 MVA	23.57 MVA
Oil Temp	40.50 °C	39.70 °C
TC Oil Temp	25.50 °C	25.40 °C
Ambient Temp	28.30 °C	28.10 °C
Fans Stage 1/2	On / Off	On / Off

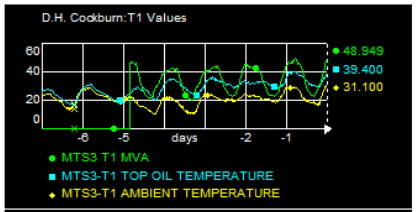


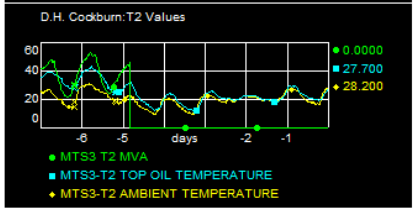


On
Off

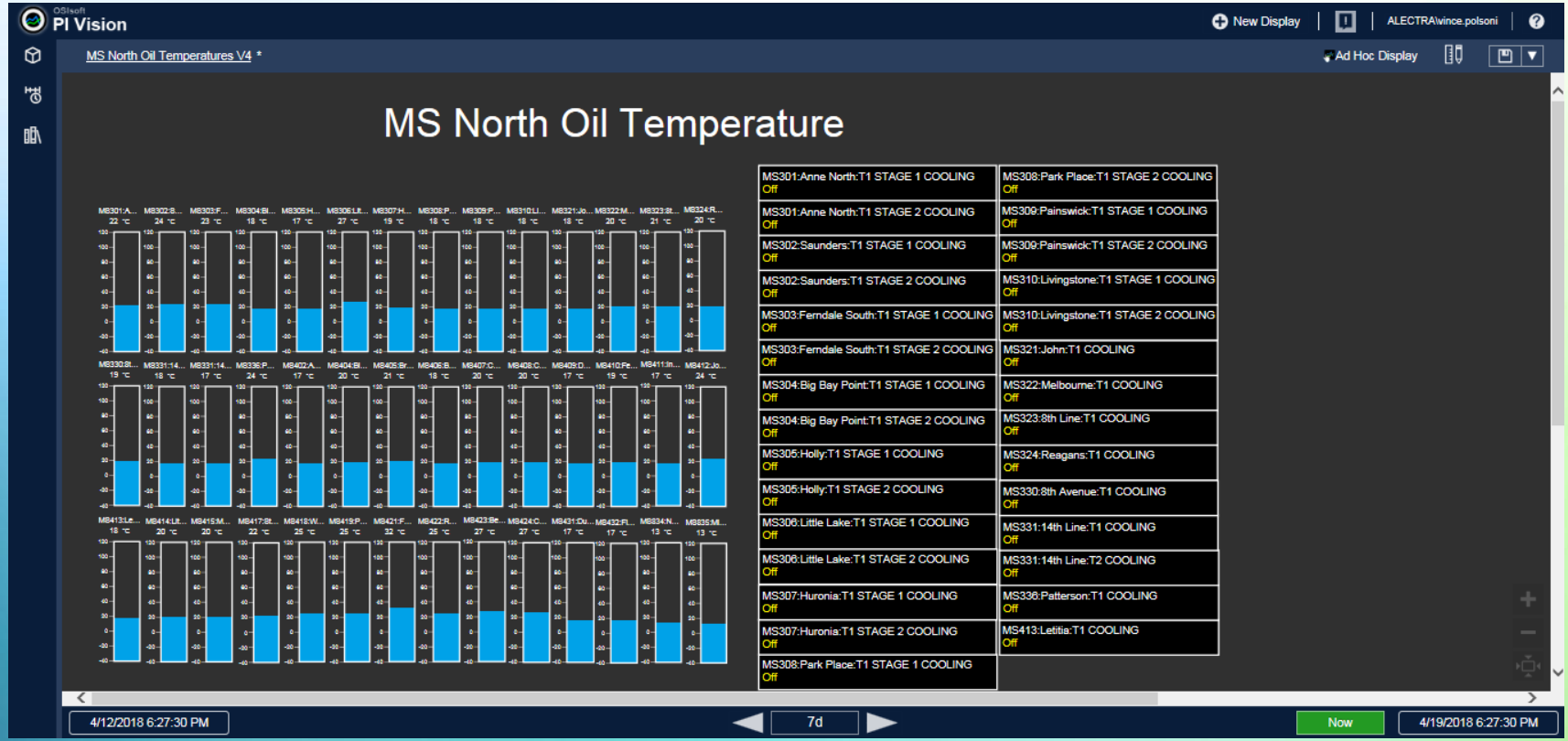
D.H. Cockburn

	T1	T2
Power	48.95 MVA	0.00 MVA
Oil Temp	39.40 °C	27.70 °C
TC Oil Temp	27.60 °C	25.70 °C
Ambient Temp	31.10 °C	28.20 °C
Fans Group 1-4	1 2 3 4	1 2 3 4

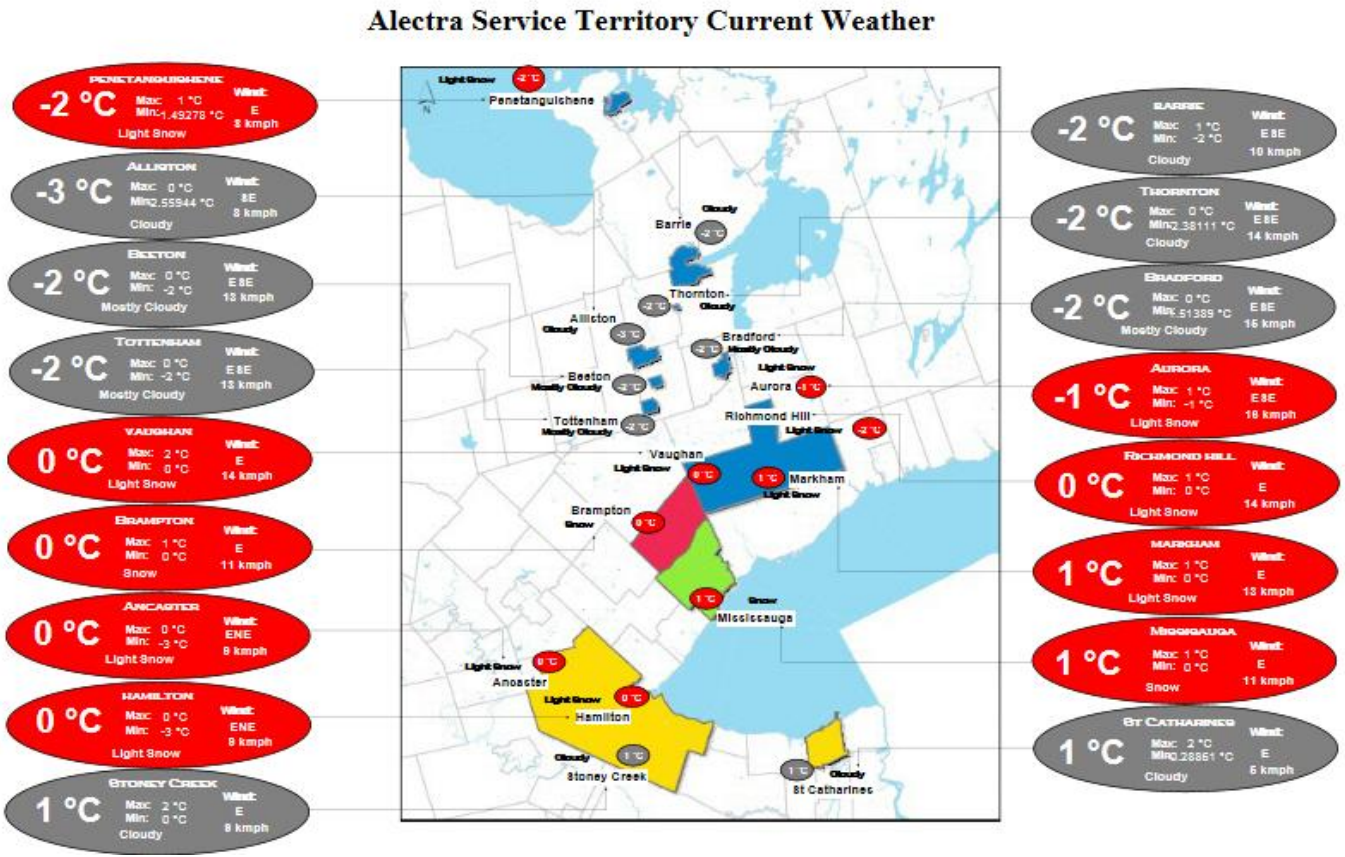




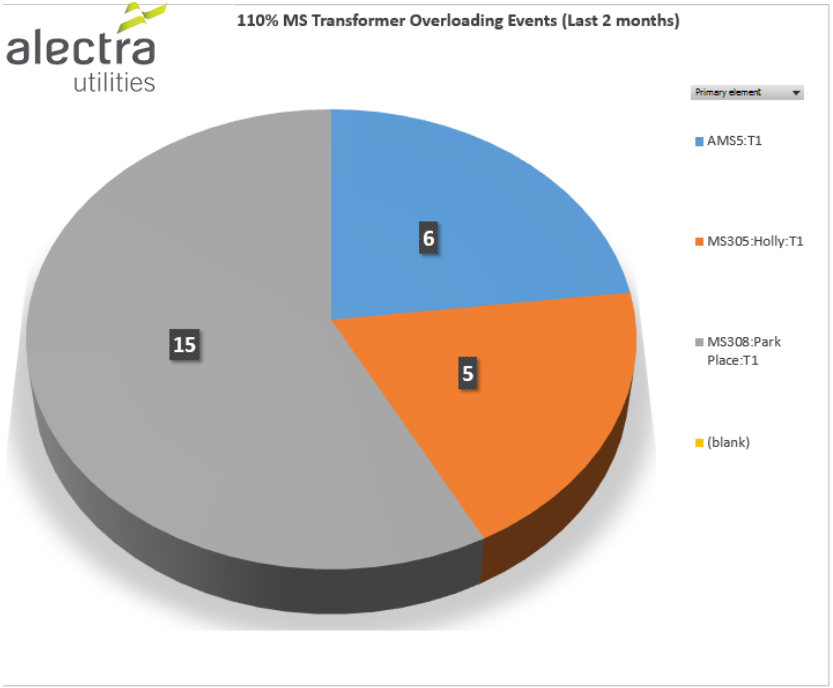
Transformer Oil Temperature Report

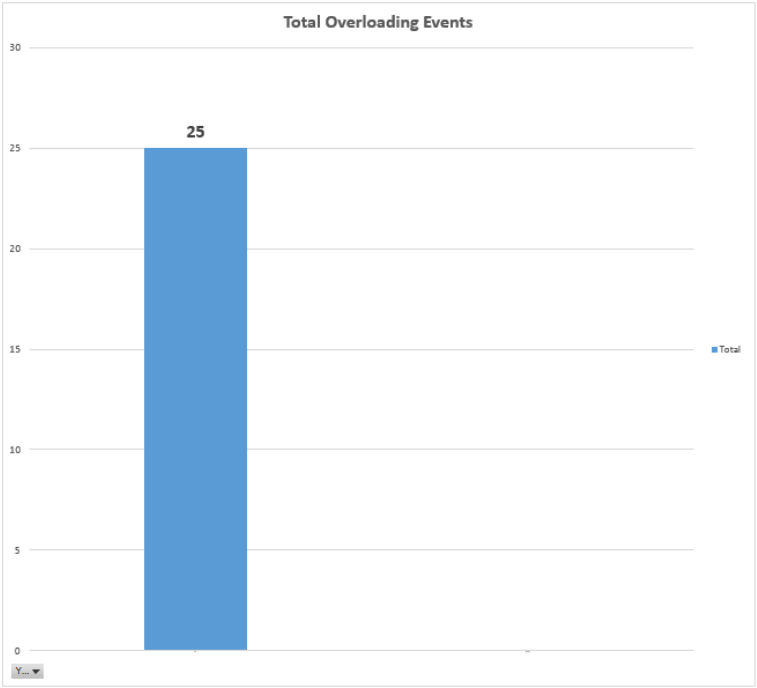


Alectra Service Territory Weather Report

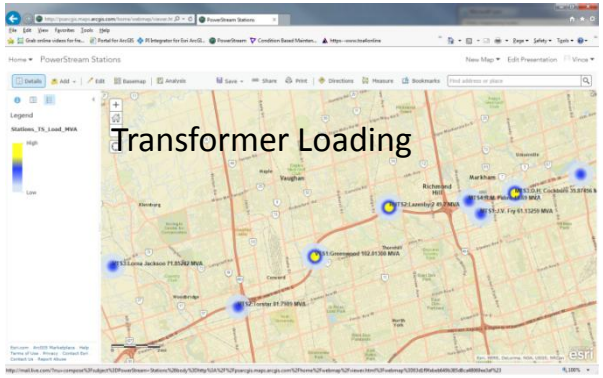


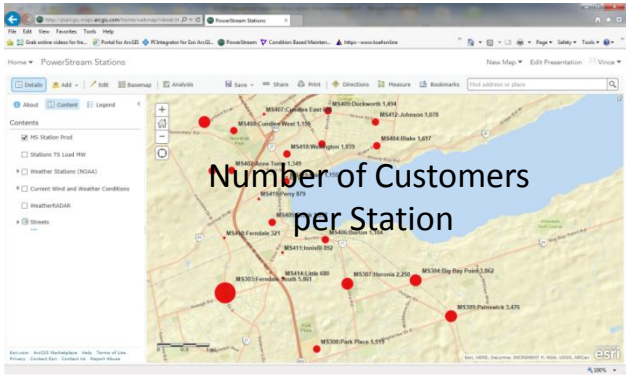
Event Frame Report - Substation Transformer 110% Overloading Events

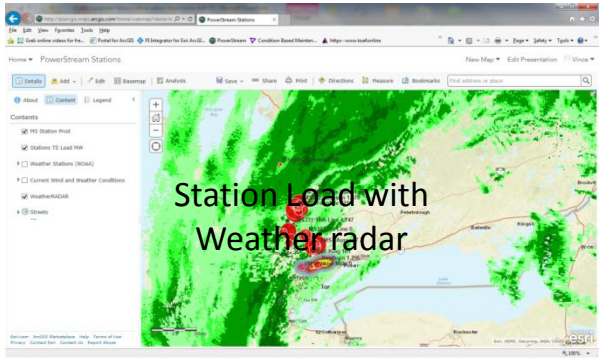


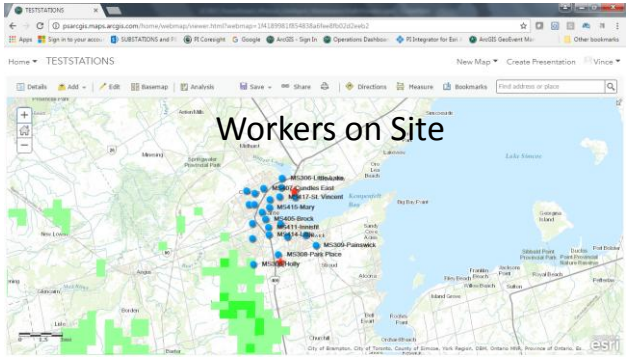


PI-ESRI Reports







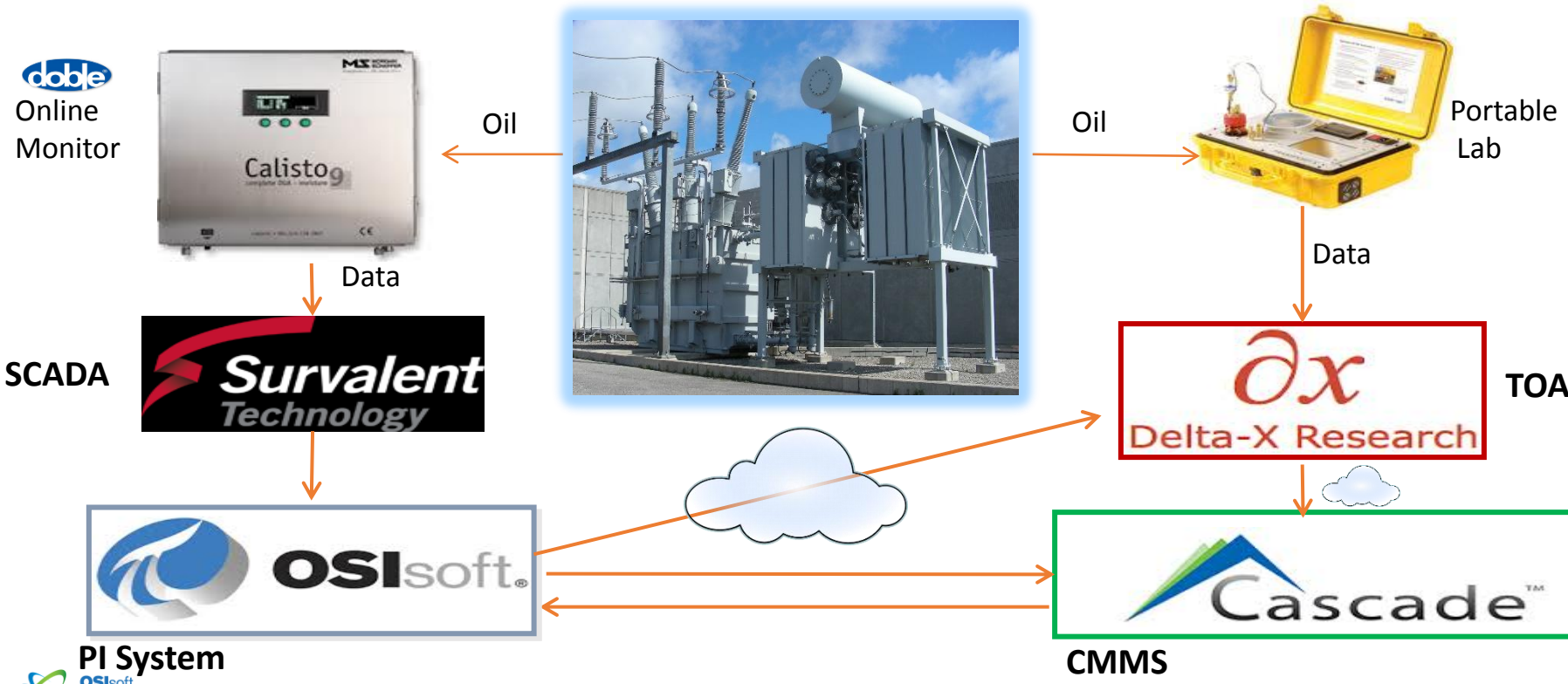


- PI Integrator for ESRI ArcGIS
- ArcGIS Online
- Users of ESRI reports:
  - System Planning
  - Engineering
  - Operations
- Other reports:
  - **Outages with Weather Radar and Wind**
  - **Transformer Health**
  - **Transformer Loading**
  - **Transformer Oil Temperature**

Notable Transformer Saves – Alectra Intelligent Maintenance

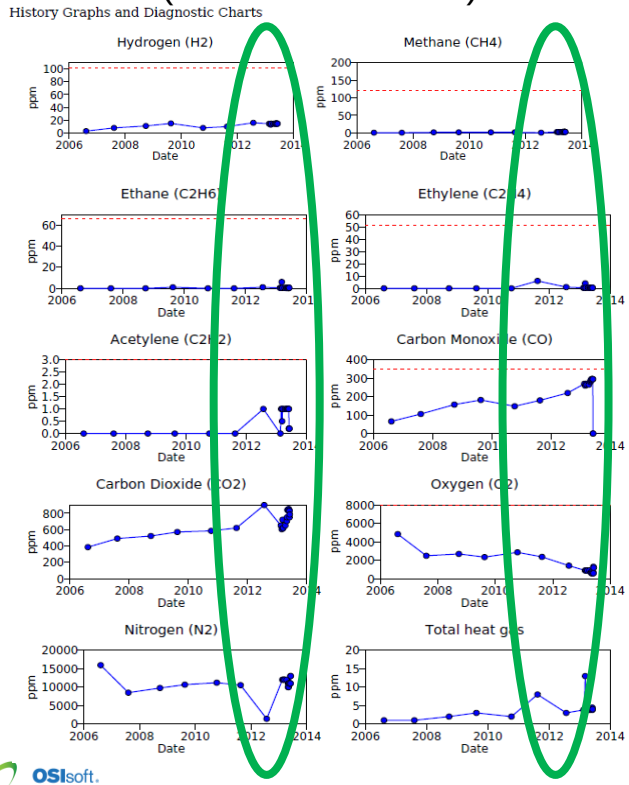
Save - 230kV-27.6kV 75/125 MVA

Integrated Expert Systems – Alectra Intelligent Transformer Maintenance

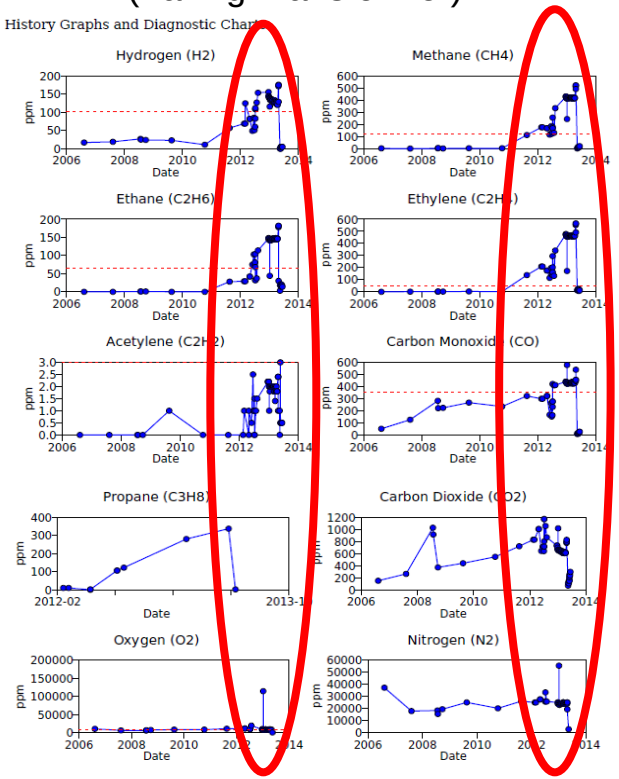


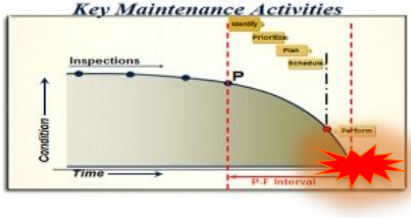
Comparison of Sister Units - DGA Trends

(Good Transformer)



(Failing Transformer)

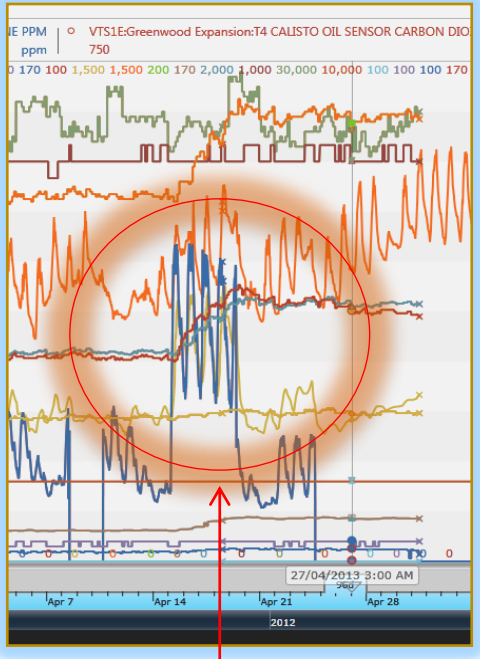




Increased Gassing - 2 Significant Events

Event 1

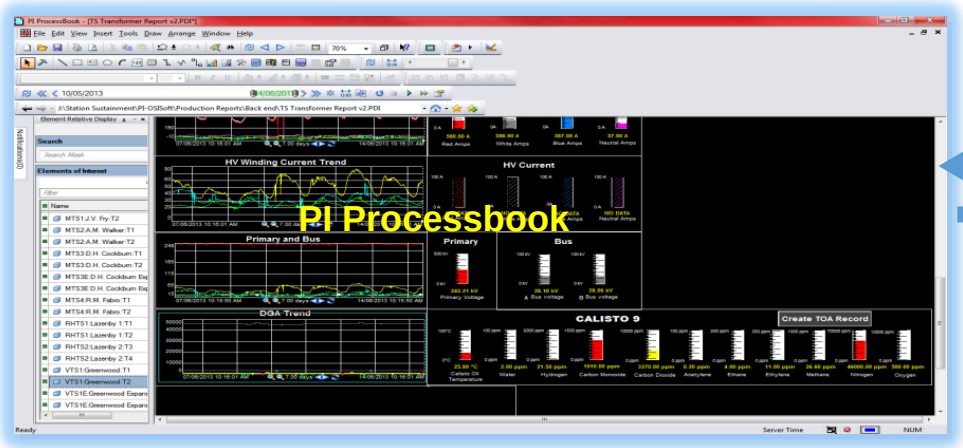
Event 2

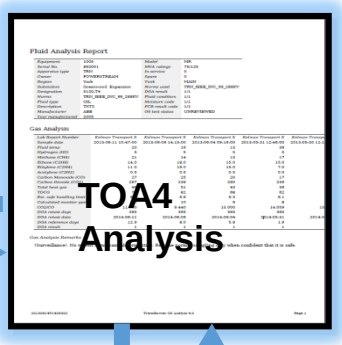


Oct 20, 2012
Gas levels increased as load increased

April 19, 2013
Gas levels increased as load increased

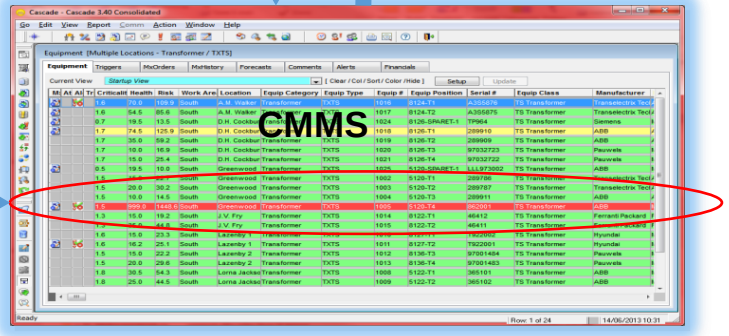
Intelligent Maintenance
CMMS-PI System-TOA4 - Dissolved Gas Analysis in Transformer





Daily Synch
or On Demand

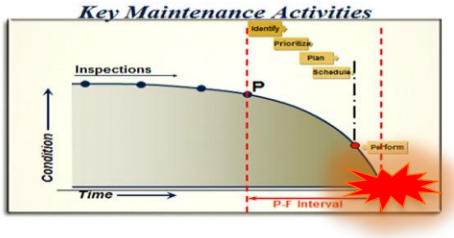
Daily synch



Transformer Problem Identified
(Health and Risk Increase)
PI Notification, CMMS Alert and
Auto Generated CM Work Order
(Alert Generated if TOA4 DGA code is >2)

Findings and Cost Avoidance

- It was found that one of the "T" connectors was not crimped during manufacturing to the copper lead.
- Transformer was just over 5 years old.
- Problem was identified just after warranty period ended.



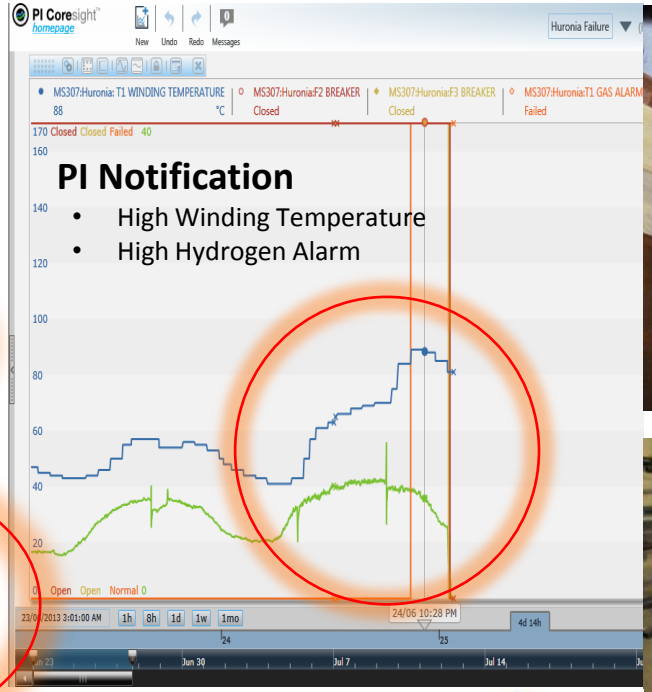
Cost Avoidance:

- **Onsite Repair: $100,000 (Potential Failure)**
- **Over $3 million if unit failed catastrophically or with serious internal damage to windings or core.**

Photo 7 – Discolored Lead Paper Insulation

Photo 8 – Burned and Carbonized Lead Insulation

Save - 10MVA 44kV-13.8 kV Transformer



Installed a Hydrogen Gas Monitoring Unit and connected to SCADA (PI and CMMS)

Cost Avoidance: $500,000 averted

- **Repair Cost: $130,000**
- **No customer outages**
- **Transformer taken out of service before failure, repaired and replaced with spare**

Increased Visibility – Transformer Maintenance Programs

Dramatic Increase in Visibility and Awareness of Asset Condition and Program Performance

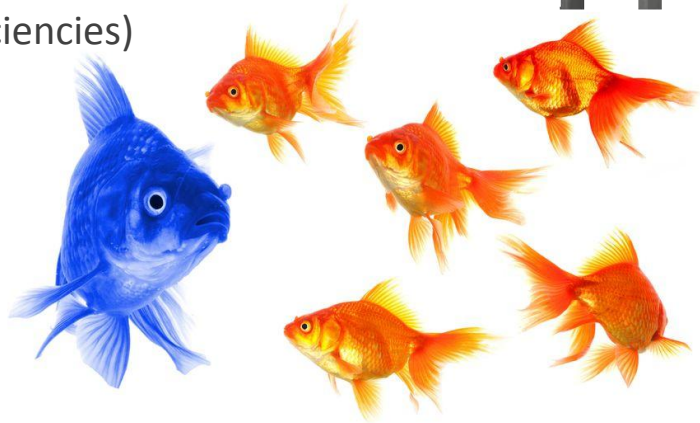
Equipment Reliability (Availability/Uptime)

Decrease Emergency Maintenance Tasks

Increase Corrective Maintenance Tasks (no missed deficiencies)

Decrease in Preventive / Predictive Maintenance Tasks

Detective Maintenance (Failure Finding from RCM3)



HUGE SAVINGS - Intelligent Maintenance

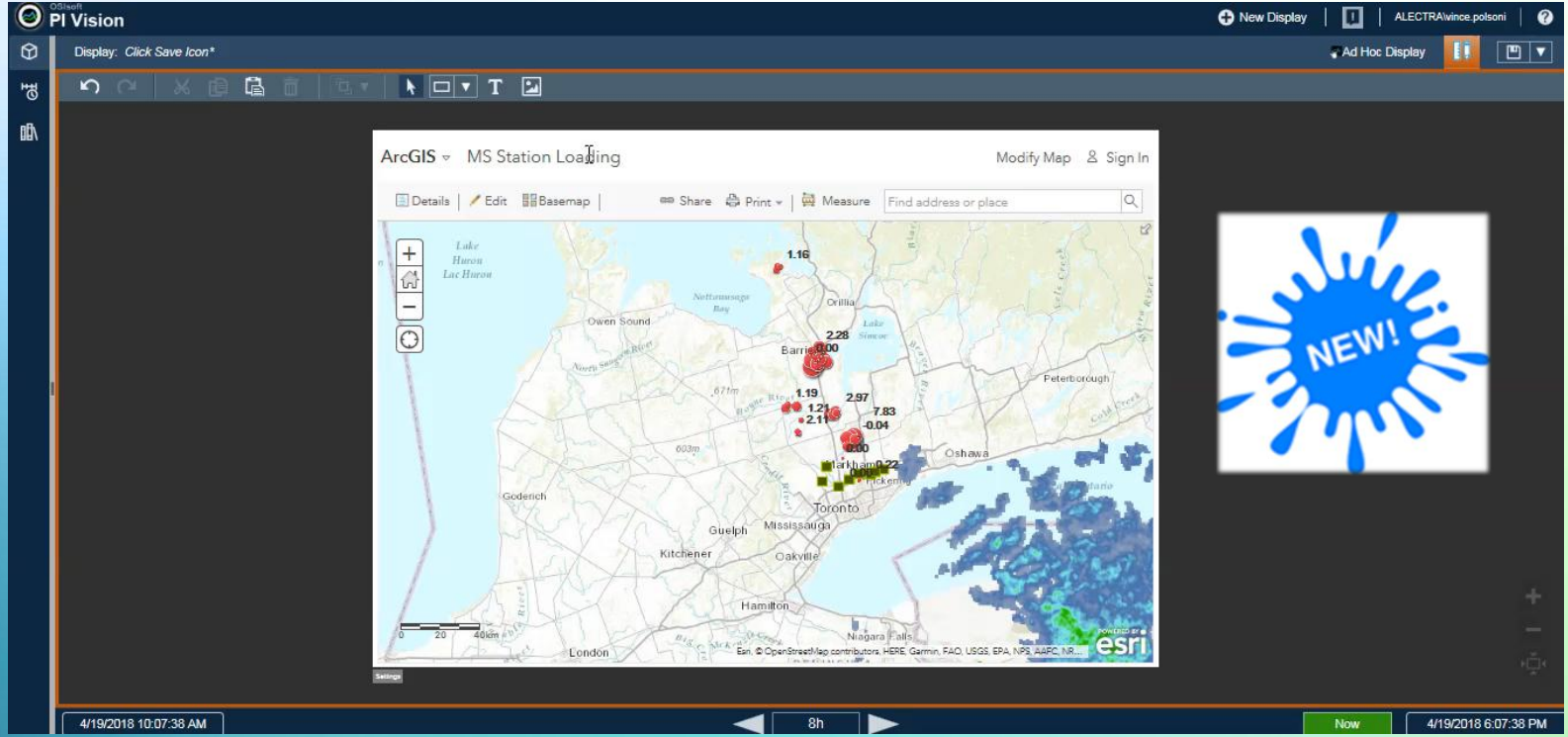
- Failure Avoidance Costs – RCM3 –> CBM
  - 2 Notable Catastrophic Transformer Failure Avoidances
    - $3.5 Million Avoided Costs
- Many Reliability Improvements through CBM Identified Potential Failures
  - No missed failures no matter how small
- Safer Working Environment / Safer for Public
- Improved Risk Management
- Better Asset Condition Assessment (Health and Risk)

Benefits of Leveraging PI System for Transformer Management

- Makes it **Easy** to turn Real-time Data into Information
  - Stores Key Information for Asset Management Decision Making
- **Enabler** for Risk Based Condition Based Maintenance
- Maintenance **Optimizer**
- **Innovation** stimulant
- PI System is **Easy** to learn
- Keeping it **Simple** is better

New – Live Video Streaming PI Report

New - ESRI Report in PI Vision Report



Questions

Please wait for the **microphone** before asking your questions

State your **name & company**

Please remember to…

Complete the Online Survey for this session

Leveraging the PI System Station Transformer Intelligent Maintenance

alectra
Discover the possibilities

COMPANY AND GOAL

Alectra Utilities Inc. is a progressive distribution utility company that focuses on Innovation and Technology to achieve operational efficiencies that contribute to maintenance optimization and reduction of equipment failures

CHALLENGE

Implement an Intelligent Transformer Maintenance System that improves worker safety, increases asset availability, improves reliability, lowers Operational costs, and provides Operations information to those who do not have access.

- Adopt a new approach to transformer maintenance which lowers maintenance costs while extending life of asset and improving worker safety.

SOLUTION

Used the PI System as a means of enabling Prioritized Risk based Condition Based Maintenance on station transformer fleet. Interface key systems to allow operational data to aid in Optimizing transformer maintenance.

- Configured Intelligent Maintenance system with RCM3 as core maintenance utilizing CMMS and PI Systems to operationalize the system.
- Integrated to CMMS system to enable True Condition Based Maintenance
- Developed PI Notifications to notify on equipment conditions.

RESULTS

Transformer fleet fully monitored. Deficiencies are automatically detected early and prioritized. Cost avoidance is achieved as a benefit. Life Cycle extension is realized.

- Cost Avoidance achieved with every deficiency find.
- Improved System Reliability
- Improved Response Time to Equipment Abnormalities
- Increased Equipment Availability due to early detection of problems.
- Savings in Operating Costs

Contact Information

Vince Polsoni

vince.polsoni@alectrautilities.com

Manager Station Sustainment

Alectra Utilities Inc.

alectra

Discover the possibilities

Merci

谢谢

Danke

Спасибо

Gracias

Thank You

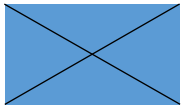
감사합니다

ありがとう

Grazie

Obrigado

Optional: Click to add a takeaway you wish the audience to leave with.



CHALLENGE

SOLUTION

RESULTS