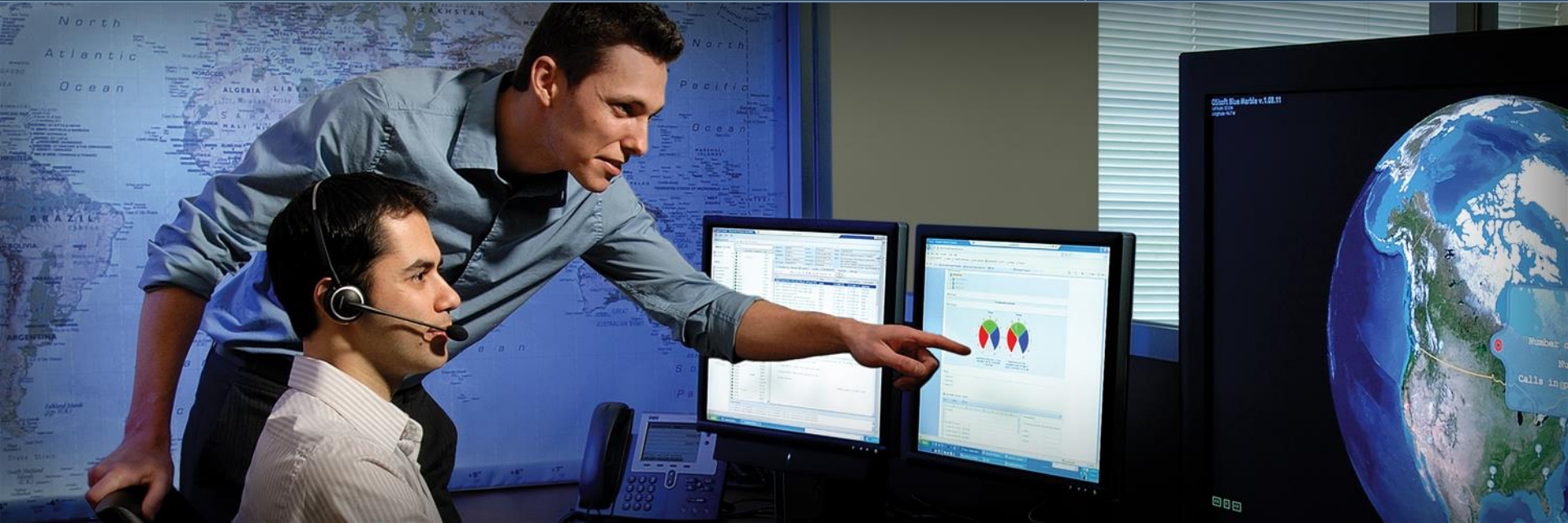




## Regional Seminar Series Houston



# Value of Partnerships and Collaboration for World Class Performance Monitoring

Brianne LaBry  
Chevron Global Power

October 28, 2009

Empowering Business in Real Time.

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- Power Support Center Overview
- PSC Performance Monitoring Solution
- PSC Workflow Process
- Case Studies
- VRP Initiatives
- Value of EA and Collaboration
- Q&A



## Monitoring & Diagnostics Center

- Power Solutions Network
- Business planning support
- Operations philosophy and tools
- Maintenance philosophy and tools
- Engineering and technical solutions
- Performance monitoring/trip analysis
- Training/OC development
- Equipment modifications and upgrades

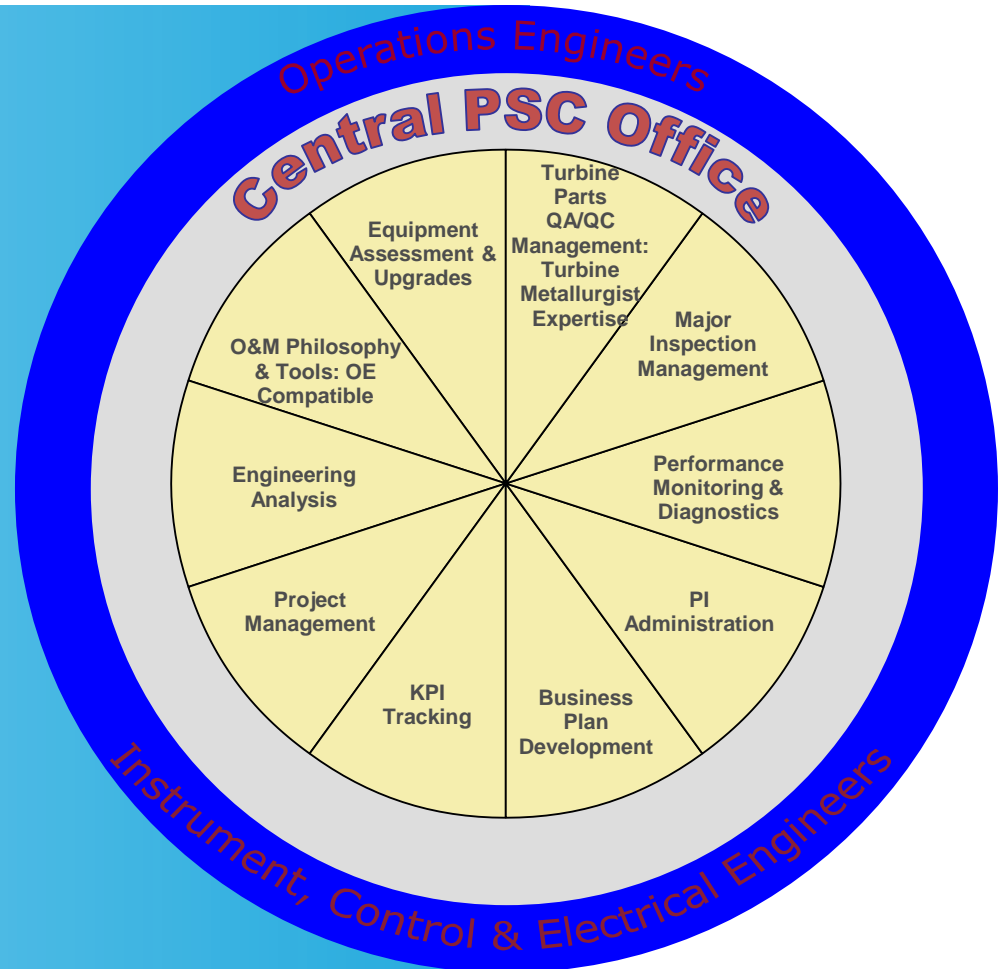


# Power Support Center Organization



Refineries

Oil & Gas Operations



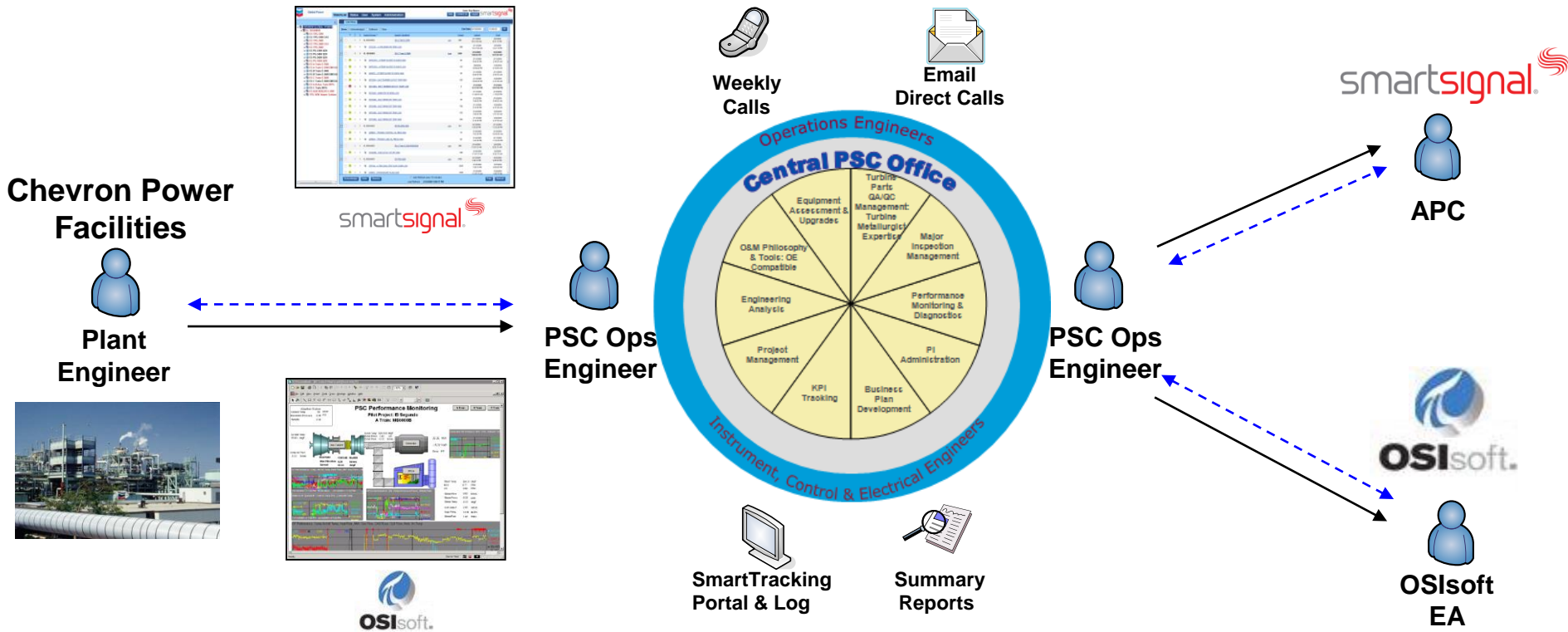
## OSIsoft Enterprise Agreement for data infrastructure

- PI ProcessBook
- PI Datalink
- PI ACE
- PI MDB
- PI RT Webparts via SharePoint
- AF2.0 (future)
- Notifications (future)
- NOC and CoE

## SmartSignal for predictive analytics

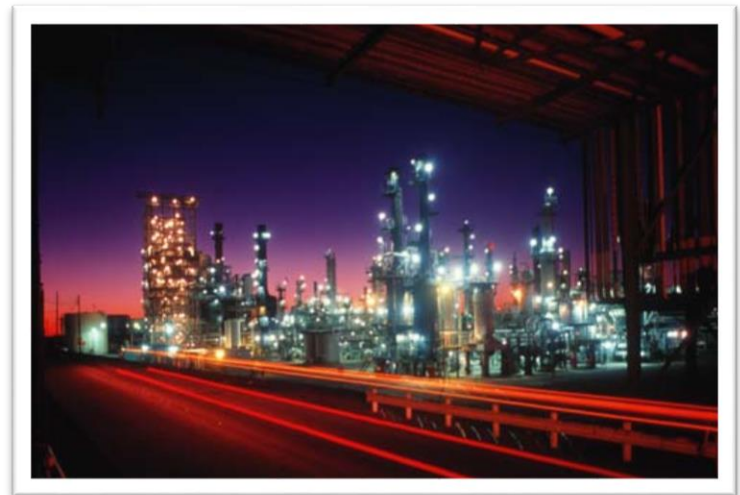
- SmartSignal EPI\*Center
- SmartSignal Watchlist
- SmartSignal participates in the weekly PSC/ES teleconference.
- Initially hosted and monitored by APC, recently transitioned to CVX

# PSC Performance Monitoring Workflow



Located on the Pacific coast in El Segundo, CA just south of LAX.

- 3 - Cogeneration Trains (GE Frame 6Bs, dual pressure HRSGs), + 170,000 hrs.
- 1 - Steam Turbine Generator
- 1 - Auxiliary Boiler



# Case Study: High Steam Drum Conductivity



## B priority: ES B train E-3400 Conductivity HIGH

Sebastian Lama Gimbutas [slamagimbutas@smartsignal.com]

You forwarded this message on 11/12/2008 12:10 PM.

Sent: Wed 11/12/2008 10:11 AM

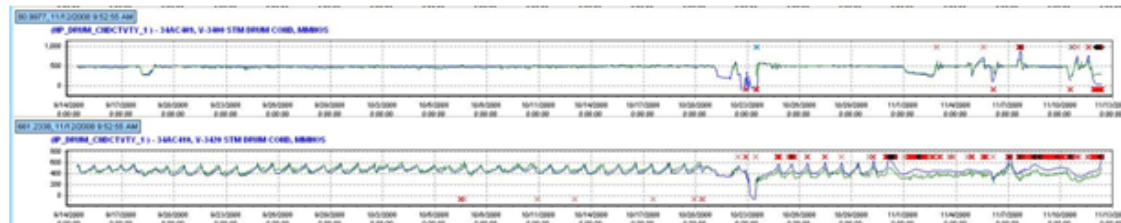
To: Blanco, Roy V

Cc: Konieczka, Matthew D; Yoss, Kenneth A; Chuck Cotton; Brian McCarthy

Roy,

Starting on 10/24 we've seen slight changes in the conductivity readings, but nothing significant until 11/7 when HP DRUM CONDUCTIVITY (4AC409, V-3400 STM DRUM COND) spiked up to ~855 MMHOS. It seems like some corrective action was taken because this sensor is now reading ~30 MMHOS. However IP DRUM CONDUCTIVITY (34AC410, V-3420 ST DRUM COND) continues to increase, and today reached 661 MMHOS and seems like it is still going up. See the screenshots below

Please let me know what you think, thank you for your time.



Sebastian Lama Gimbutas  
Analyst, Availability & Performance Center  
SmartSignal Corporation

901.Warrenville.Road - Suite.300  
Lisle, Illinois 60532  
Phone: +1\_630\_829\_4000  
Fax: +1\_630\_829\_4001  
Direct: +1\_630\_829\_3209



# Case Study: High Steam Drum Conductivity



---

**From:** Blanco, Roy V  
**Sent:** Wednesday, November 12, 2008 10:17 AM  
**To:** Wenschlag, Michael D (mwten)  
**Cc:** Konieczka, Matthew D; Yoss, Kenneth A  
**Subject:** FW: B priority: ES B train E-3400 Conductivity HIGH

Mike,

FYI... Please see SmartSignal's message below. The team is currently out of the office and has not had the chance to analyze this data. Just wanted to put it on your radar.

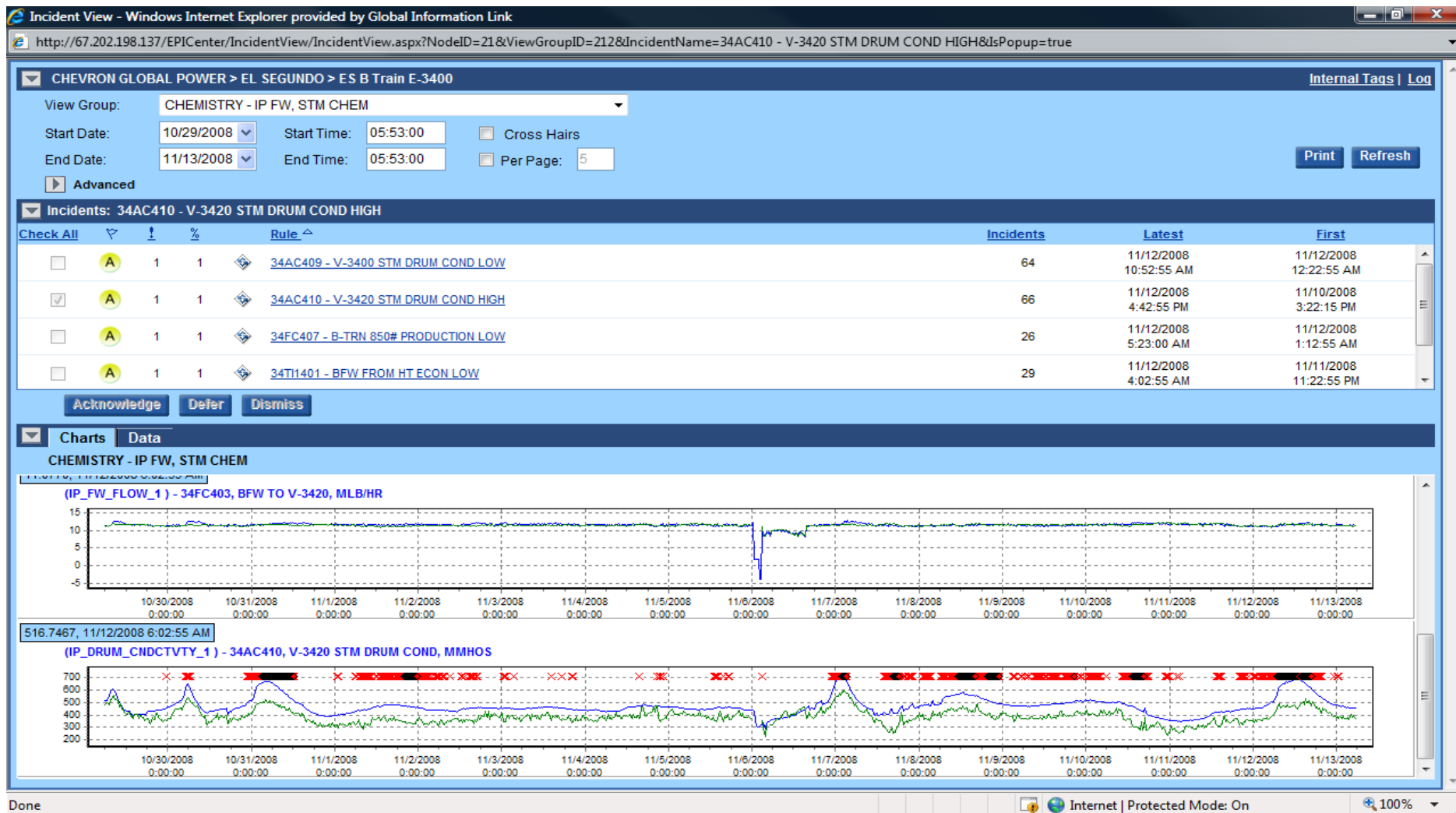
Please let me know if this is normal behavior (spikes in conductivity) or not. It looks like operations normally takes corrective action shy of 700 mmhos, you are currently at around 680 mmhos.

At what conductivity reading do you feel is "abnormally high" and action needs to be taken?

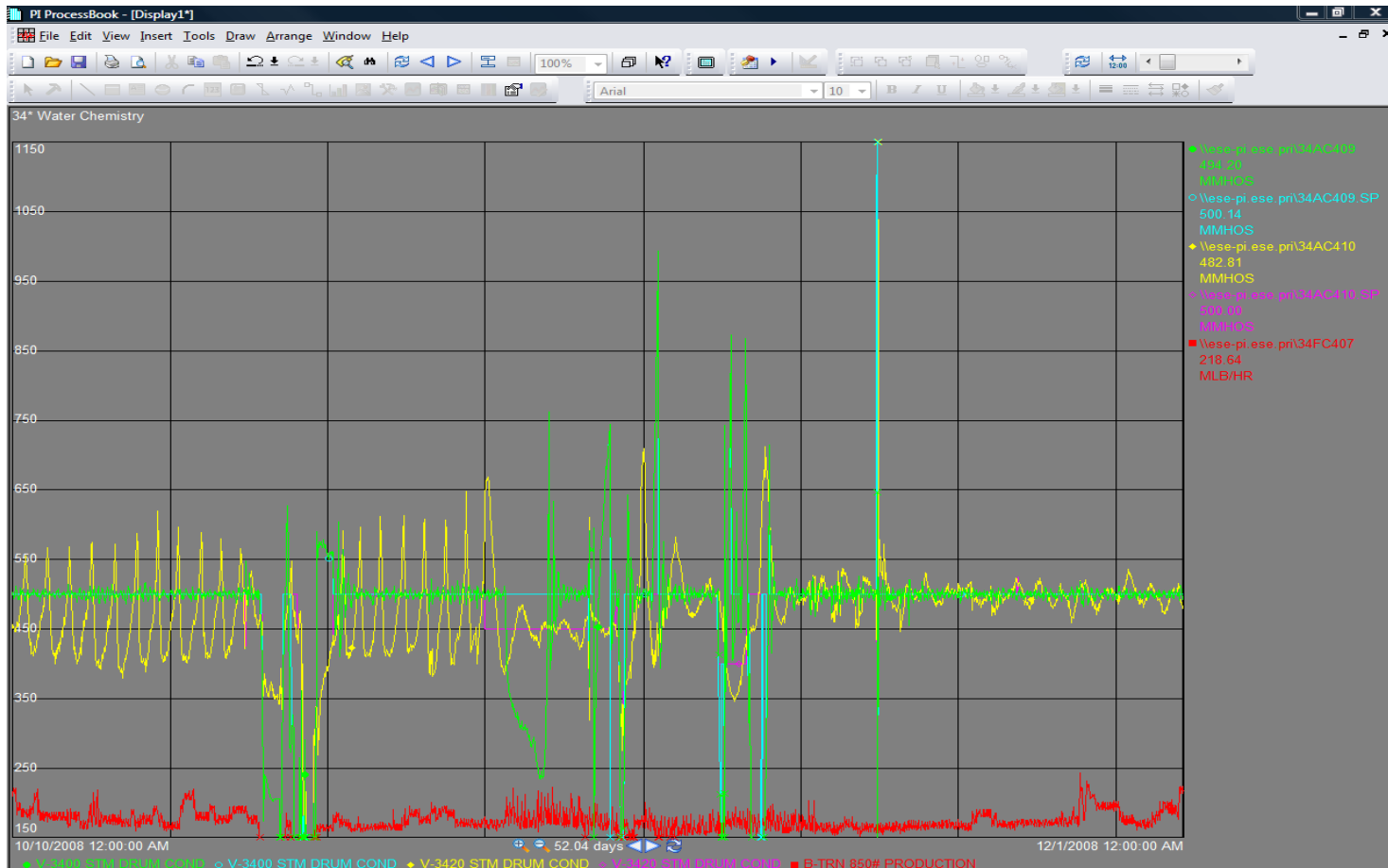
Thanks,

Roy

# Case Study: High Steam Drum Conductivity



# Case Study: High Steam Drum Conductivity



# Case Study: High Steam Drum Conductivity



## El Segundo PSC Pilot Weekly Project Update: 08 November 13

### 1. Attendees:

Mike W., Matt K., Chuck Cotton(Smart Signal), Ken Yoss

### 2. Weekly Summary:

Equipment Integrity Review Log									
#	Report Date	Date Occurred	Train	Responsible Party	Trend	Tag	Tag Descriptor	Exception: Completed: COMPL Emergent Item:	Action Taken:
76	11/13/2008	10/24/2008	B Trn	RB	SS	34AC410	V-3400 STM DRUM COND	Monitor: Starting on 10/24 we've seen slight changes in the conductivity readings, but nothing significant until 11/7 when HP DRUM CONDUCTIVITY (44AC409, V-3400 STM DRUM COND) spiked up to ~855 MHOS. It seems like some corrective action was taken because this sensor is now reading ~30 MHOS. However IP DRUM CONDUCTIVITY (34AC410, V-3420 ST DRUM COND) continues to increase, and today reached 661 MHOS and seems like it is still going up. Update: Mike W: The system was taken out of service two time for downstream valve work on the blowdown system. Will discuss with console operator. Update: Operations has returned the system to normal behavior.	Mike W. notified of exception via email.

- o #76: The smart signal catch led successful action to site personnel as this point would not have alarmed and notified operations. This allowed operations to control this situation and bring the Conductivity back to normal levels. Good Catch for SmartSignal.

- o B Trn Trip 11-5-08: lost communication with seismic probes, which caused a controlled shutdown on B-Train. The shutdown functionality should have been disabled when we installed Mark VI, per MOC that was done at that time. Update:

**Catch of the month: Mike W. saves B Train trip:** B-Train had the same situation happen with the RST processors not seeing a signal from BB5 and getting a Transducer fault alarm on Friday night at 23:53:27 that happened on Wednesday night when the unit shutdown. The difference is the shutdown signal L39VD2\_ALM has been forced to a good value. Previously GE eliminated the trip logic on high vibration for the seismic probes, but not loss of signal. During the next water wash Mike W. will change logic so the unit does not trip on loss of signal.



# Case Study: High Steam Drum Conductivity



9.0	11/26/2008 8:55:27	Michelle Walton
Site/Unit		
Asset	ES B Train E-3400	
Category	Other - see comments	
Category Description/Detail	IP DRUM CONDUCTIVITY HIGH	
Assigned To	rblanco	
Priority	MEDIUM	
Action	Other - see comments	
Comment	Starting on 10/24 we've seen slight changes in the conductivity readings, but nothing significant until 11/7 when HP DRUM CONDUCTIVITY (4AC409, V-3400 STM DRUM COND) spiked up to ~855 MMHOS. It seems like some corrective action was taken because this sensor is now reading ~30 MMHOS. However IP DRUM CONDUCTIVITY (34AC410, V-3420 ST DRUM COND) continues to increase, and today reached 661 MMHOS and seems like it is still going up. See the screenshot attached	

---

10.0	12/3/2008 1:31:35	rblanco
Site/Unit		
Asset	ES B Train E-3400	
Category	Other - see comments	
Category Description/Detail	IP DRUM CONDUCTIVITY HIGH	
Assigned To	Chuck Cotton	
Priority	MEDIUM	
Action	Other - see comments	
Comment	The blowdown on this system has issues. It is usually placed into manual. This was a legitimate catch for SmartSignal. Thanks!	

## Value delivered:

- Long term reliability
- Confirmation of equipment issues

11/7/2008: PSC received phone call from SmartSignal APC informing of a NH3/air ratio High Rule posting on the SmartSignal WatchList.

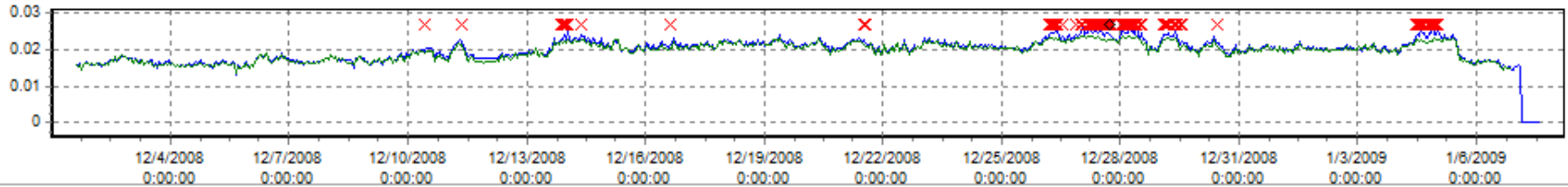


# Case Study: NH3 Over Injection



0.0167, 12/5/2008 10:46:25 AM

(NH3/AIR\_RATIO) - 36FFI610, V3610 NH3/AIR MOLE RATIO, RATIO



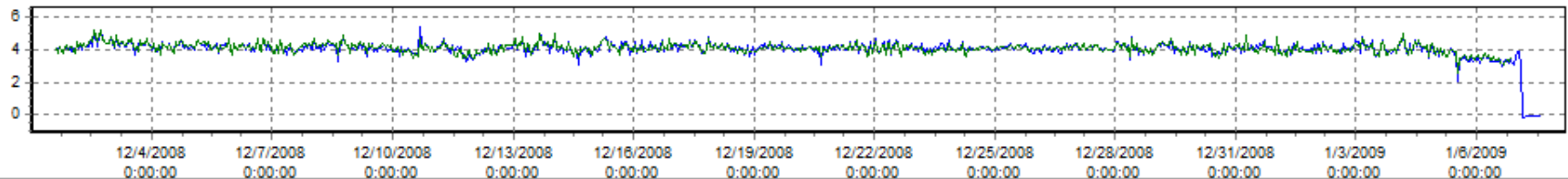
8.7177, 12/5/2008 10:46:25 AM

(NH3\_FLOW\_RATE) - 36FC610, AQ NH3 TO V3610, GPH

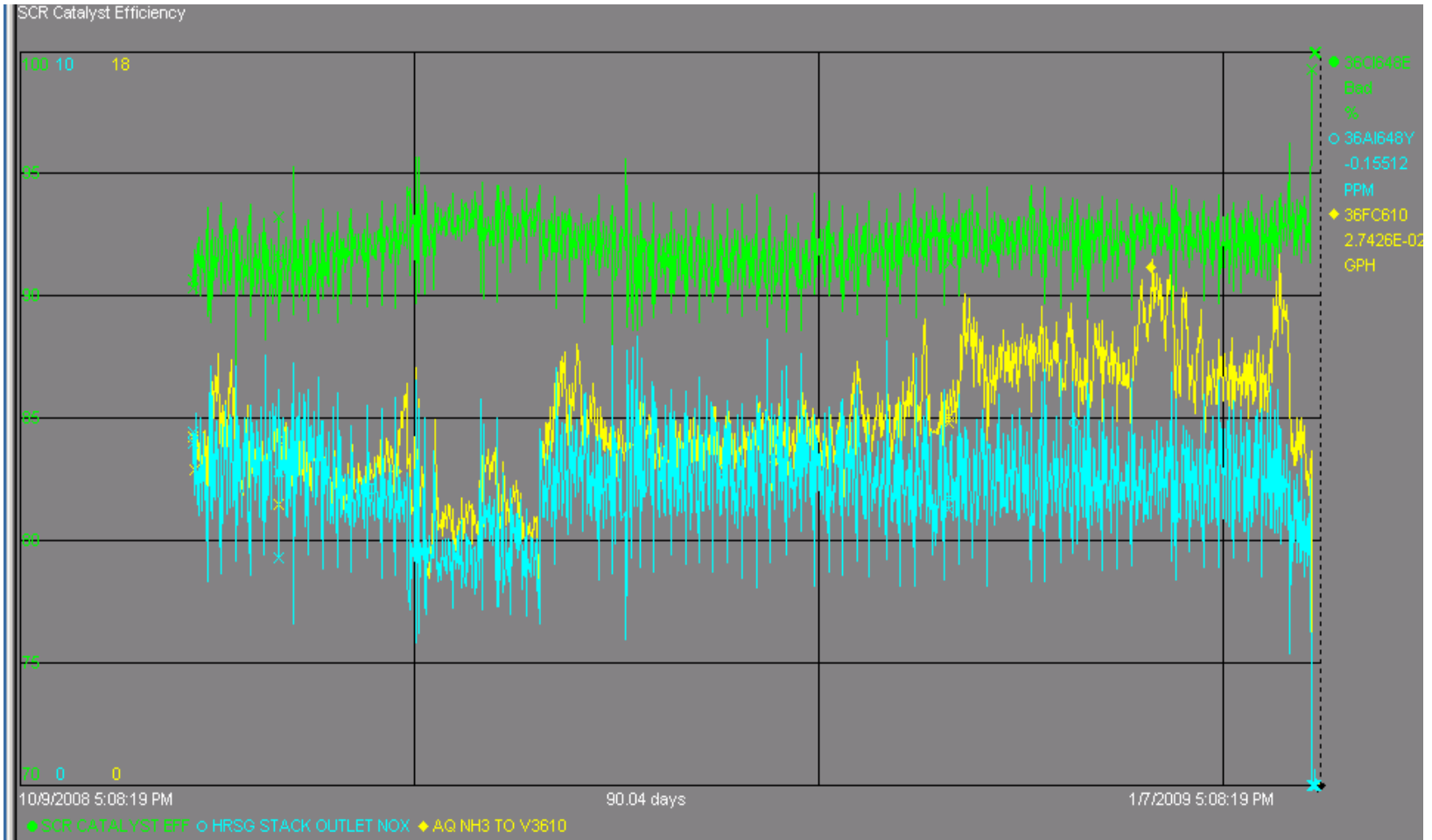


3.9749, 12/5/2008 1:46:25 PM

(STACK\_NOX) - 36AI648Y, HRSG STACK OUTLET NOX, PPM



# Case Study: NH3 Over Injection





# Case Study: NH3 Over Injection



## El Segundo PSC Pilot Weekly Project Update: 09 January 22<sup>nd</sup> (minutes)

### 1. Attendees:

- Mike Wenschlag (Site Cogen Specialist)
- Chuck Cotton (SmartSignal)
- Brian McCarthy (SmartSignal)
- Roy Blanco (PSC)
- Ken Yoss (PSC)

Equipment Integrity Review Log									
#	Report Date	Date Occurred	Train	Response Part	Trend	Tag	Tag Descriptor	Exception: Update: Closed / Open Emergent Item:	Action Taken:
84		12/6/2008	46	RB	SS	46V810	TP-3200 THRST A P2	Monitor: 11-17-08 46V1810 - TP-3200 THRST A P2 This sensor began exhibiting what appears to be erratic behavior on 11-13-08, jumping up and down between ~1 and ~8 mls, while 46V1809 - TP3200 THRST B P2 tag has been fairly steady between 7 and 8 mls. Can this sensor be checked? Update: 1/21/09 - Mike Popp to investigate. Open	PSC Ops Engineer reviewed with Machinery Analyst on site.
88	1/7/2009	1/7/2009	C	RB	SS	36FC610	AQ NH3 to V3610	Monitor: NH3 injection appears to be increasing without a correlation in catalyst efficiency. Update:	Will notify site during weekly meeting.
89	1/22/2009	1/20/2009	BOP	RB	SS	46T1220 46T1221	MP-3320 MOTOR JRN6 ICUTBRD MP-3320 MOTOR JRN6 INBRD	Monitor: Motor JRN6 bearing temperatures about 10 degrees higher than expected. The fin fan cooling circuit has been having difficulty meeting capacity. All other ARIAux bearing temperatures were alerting high but have returned to normal behavior except MP3320 Temps.	Email notification sent to the Machinery Analyst (Mike Popp). Continue to Monitor.
90	1/22/2009	1/21/2009	C	RB	SS	36HR016 6	TURB WHLSPC TEMP 2ND STG	Monitor: Wheel-space temperature running about 23 degF higher than expected. Continue to monitor.	
91	1/22/2009	1/16/2009	BOP	RB	SS	46V0248	P_3240 P1 THRUST VIB	Monitor: Thrust vibrations (P1 & P2) moving from ~6 MILS to ~1 MILS with corresponding drop in thrust bearing temperature. Continue to monitor.	
92	1/22/2009	1/19/2009	A & B	RB	FSR Position and Flow	33PQ414	ATN INTERVLV PRESS,NG	Monitor: Social line pressure fluctuations causing cogen fuel pressure to fluctuate including a 7 psi fluctuation in intervalve pressure. Interval pressure went as low as 257 psi. What is low interval pressure alarm point?	Will notify site during weekly meeting.
93	1/22/2009	1/19/2009	A/B/Aux BFWPs	RB	SS		Bearing Temps	Monitor: ARIAux BFWP bearing temperatures range from 200 to 275 deg F compared to C Tm BFWPs bearing temperatures ranging between 50 and 200 deg F. Are these accurate measurements? What are upper alarm limits for BFWP bearing temperatures?	Will notify site during weekly meeting.

\*Screenshots can be found in the appendix section.

### Updates:

- o #84 – Mike Popp will investigate during upcoming scheduled maintenance to turbine drive leak off heat exchanger.
- o #89 – SmartSignal Catch! Communication with console operations is going into calibration and coming out as a bad point causing the system to go into manual mode, at a low NOx ppm setpoint causing excess NH3 injection, without notification or alarm to the console operator. Operator procedures have been modified to verify operational mode and raise setpoint to 4 ppm.
- o #91 – Roy to create PI trend and forward to Mike Popp.
- o #92 – Site believes exception is not a significant reliability risk. The SRV valve has to open up 100% to go into alarm. Lately, the NG

## Value delivered:

- Decrease in NH3 release to atmosphere
- \$ decrease in NH3 purchases
- Operational procedures/training modified



# Case Study: NOC Notifications



Hello,

On node HOU150NTAH3V337 for PItToPI, there seems to be a connection problem with the source PI server.

21-Jul-09 17:05:00 PItToPI- 1> Unable to connect to source PI server ESE-PI.ESE.PRI.

If you need assistance please contact OSI TechSupport so that we can help you in troubleshooting this issue.

Thanks,

Zainab Jariwala  
OSIsoft NOC Support  
[NOCsupport@osieanoc.com](mailto:NOCsupport@osieanoc.com)  
+1 510-877-9430

-----  
OSIsoft Call 264197

Summary: 2502932 - HOU150NTAH3V337 "Network communication error to source PI server"

# Case Study: NOC Notifications



Hello,

We are contacting you regarding the issue of not receiving e-mails from the following site:

Server Installation ID: 2502932  
Enterprise: Chevron Corporation  
Organization: Chevron USA  
Site: Global Power Generation - Houston  
Server Name: hou150ntah3d418

Is the machine hou150ntah3d418 running? If yes, could you please check if PI Enterprise System Monitor is running? Are you able to connect from the PI server to your SMTP server?

We are eager to work with you to help resolve this issue and were hoping to start a WebEx session with you (see <https://osisoft.webex.com>) in order to fix the problem.

You can reply to this email or call us at +1-510-877-9430 as soon as you are available.

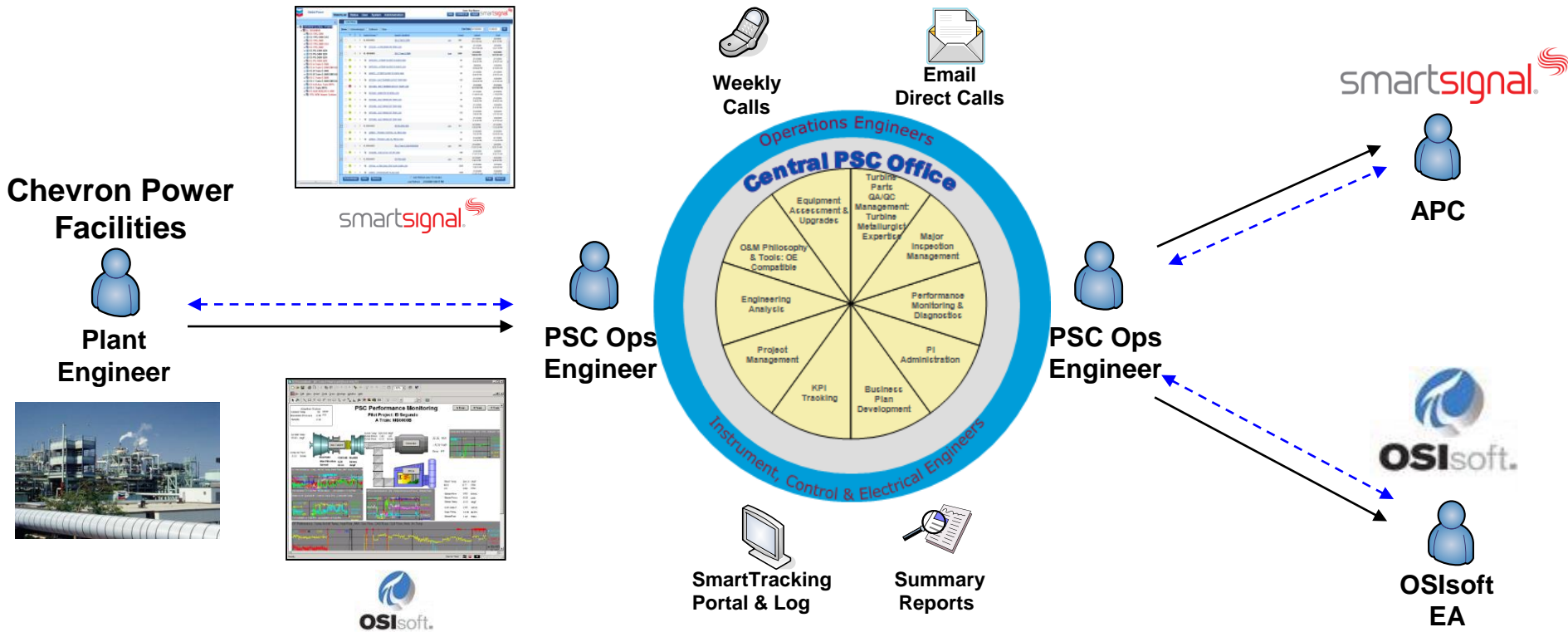
Note: If you address the issue on your own, it is important to inform us once you have corrected it so that we can remove the suspension of this alert.

Please reply at your earliest convenience.

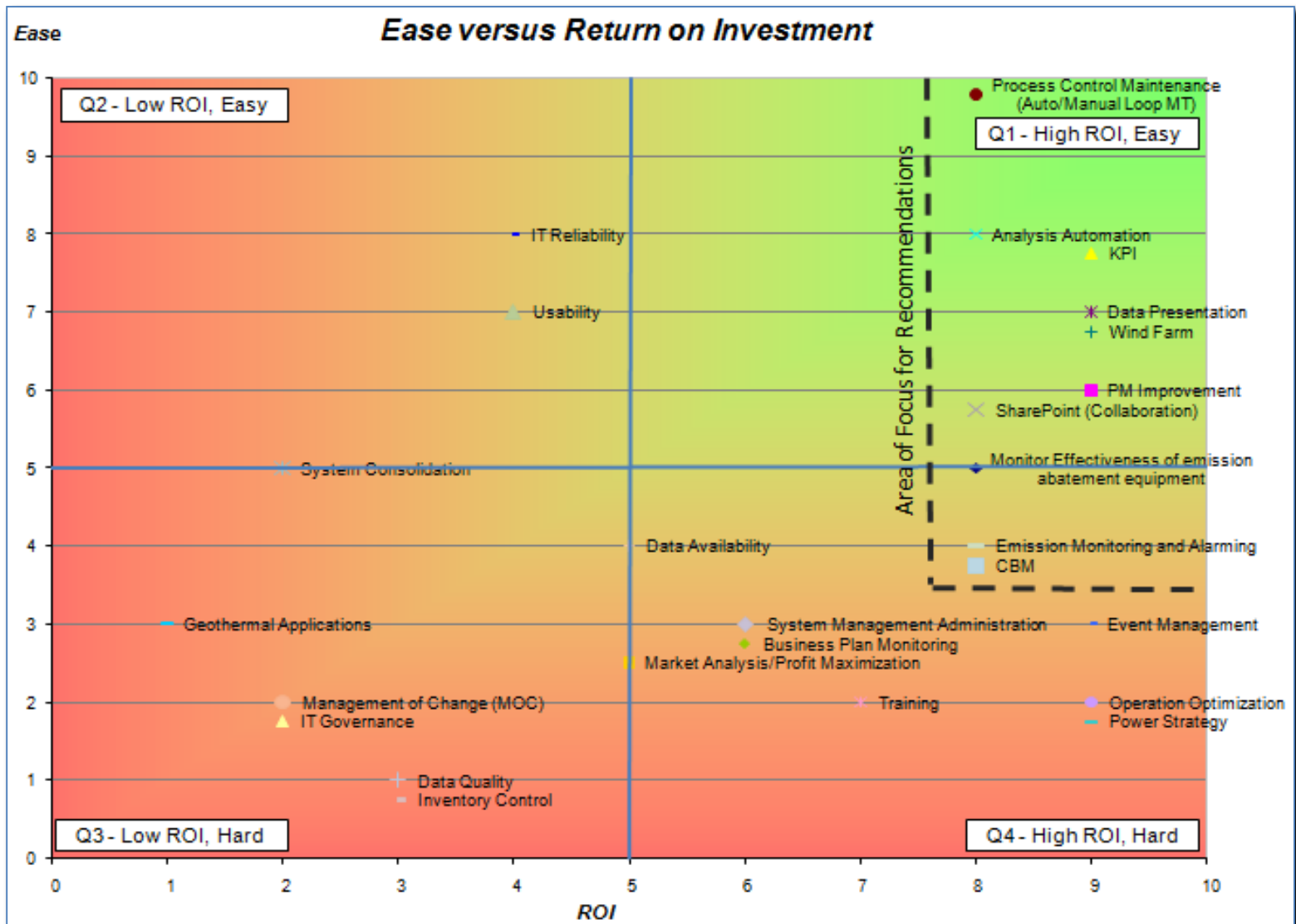
Kind Regards,



# PSC Performance Monitoring Workflow



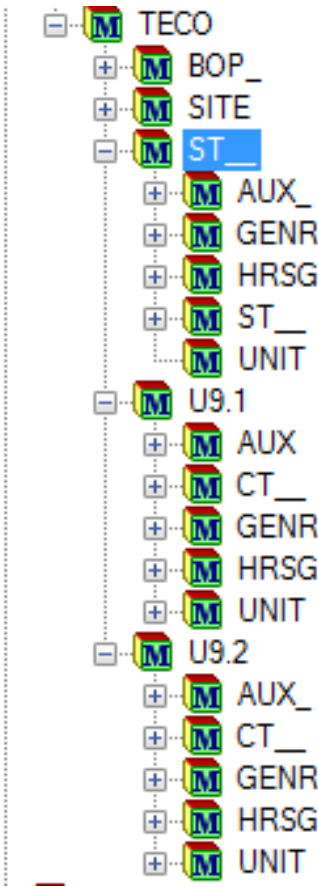
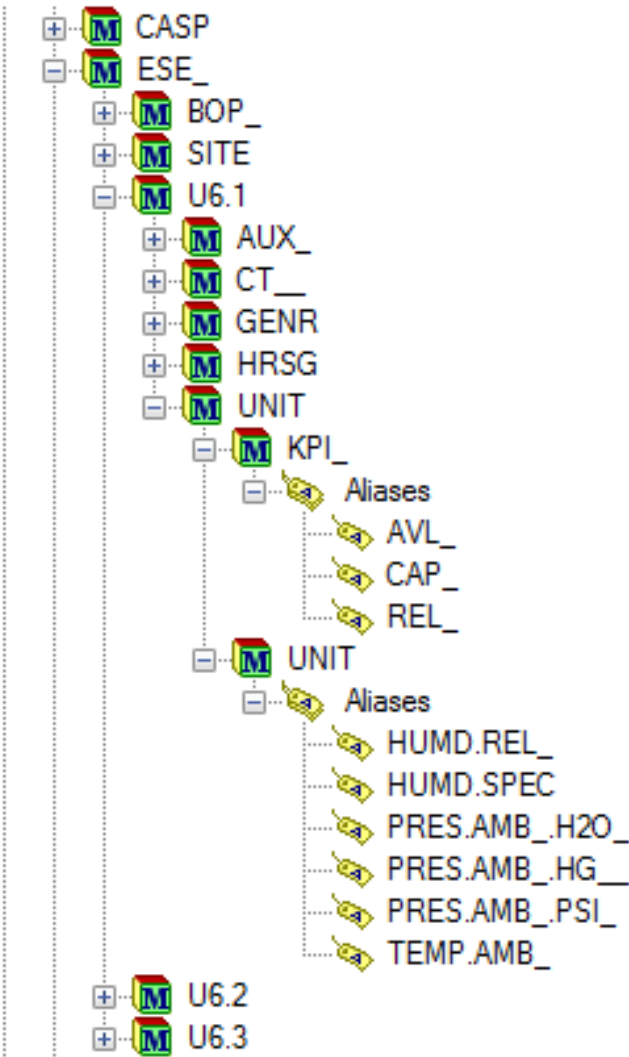
- **PI (1 year)**
  - **Confirmed** - 3 trip avoidances
  - **Potential** - 6 trip avoidances
  - **Equipment Abnormalities** - Over 70 abnormalities monitored - - - > *long term reliability*
  - **System Abnormalities**
- **SmartSignal (3 months)**
  - **Equipment Abnormalities** - 14 identified that either returned to normal or communications to plant lead to corrective actions. - - - > *long term reliability*
  - **Instrumentation Issues** - Over 35 identified resulting in a potential increase of plant reliability. - - - > *long term reliability*
  - **Efficiency** - 2 efficiency catches resulting in the scheduling of a water wash and NH3 injection reduction.
- **Culture Change**
  - PSC has noticed plant personnel are more cognizant of equipment abnormalities that are not yet urgent.
  - Operational procedures have been modified to prevent less than optimal operational conditions.



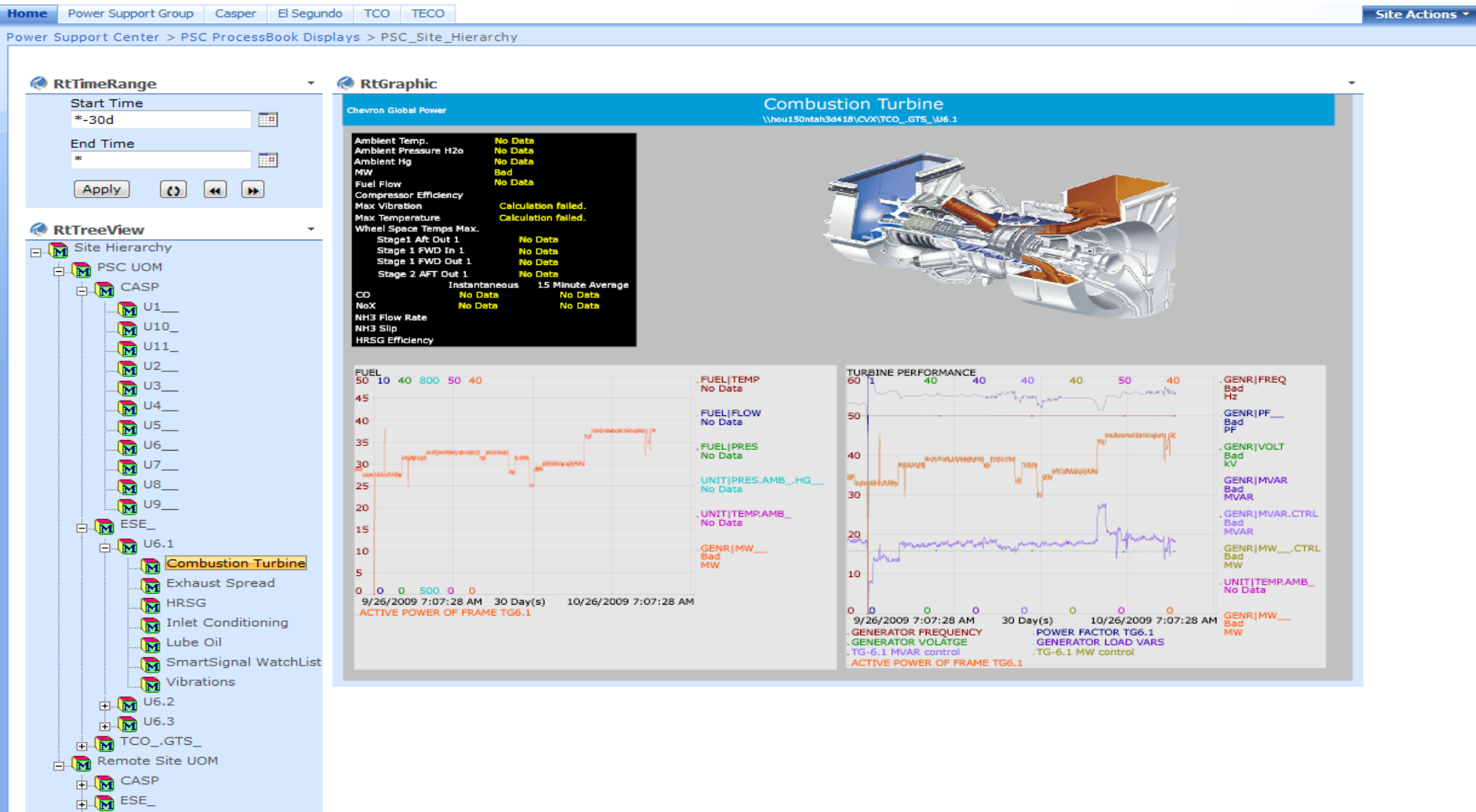
- Business KPI's
- Wind Farm KPI's
- Data Presentation Model
- Meta-Data Management
- SharePoint Collaboration



- Value of Cogeneration
- Fuel Gas Costs
- Fuel Consumption
- Steam Production
- LPO Avoidance
- Reliability
- Availability
- MW Produced
- Total Capacity
- Efficiency
- Unplanned Outage Hours



# Visualization



**RtTimeRange**

Start Time  
\*-30d

End Time  
\*

Apply

**RtTreeView**

Site Hierarchy

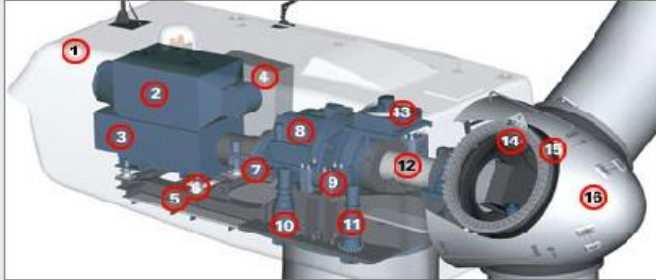
- PSC UOM
  - CASP
    - U1\_
    - U10\_
    - U11\_
    - U2\_
    - U3\_
    - U4\_
    - U5\_
    - U6\_
    - U7\_
    - U8\_
    - U9\_
  - ESE\_
    - U6.1
      - Combustion Turbine
      - Exhaust Spread
      - HRSG
      - Inlet Conditioning
      - Lube Oil
      - SmartSignal WatchList
      - Vibrations

**RtGraphic**

Chevron Global Power

## Wind Turbine

Wtu0100rsh3d418CV00CASP\_L2\_



- Nacelle
- Heat Exchanger
- Generator
- Control Panel
- Main Frame
- Impact Noise Insulation
- Hydraulic Parking Brake
- Gearbox
- Impact Noise Insulation
- Yaw Drive
- Yaw Drive
- Rotor Shaft
- Oil Cooler
- Pitch Drive
- Rotor Hub
- Nose Cone

Wind Deviation (1 sec)	0	Bearing A Temp.	0	Control Box Temp.	0
Wind Deviation (10 sec)	0	Bearing B Temp.	0	Control Box Axis 1 Temp.	0
Rotor Speed	0	Air Temp.	0	Control Box Axis 2 Temp.	0
Torque		Generator Cooling Air Temp.	0	Control Box Axis 3 Temp.	0
Blade 1	Set Value	Gearbox Bearing Temp.	0	BatteryBox Axis 1 Temp.	0
Blade 2	0	Drive Train Acceleration	0	BatteryBox Axis 2 Temp.	0
Blade 3	0	Hydraulic Pressure	0	BatteryBox Axis 3 Temp.	0
Trip Speed Rotation	0	Hub Temp	0	Voltage A_N	0
Generator 1 Temp.	0	Gearbox Temp.	0	Voltage B_N	0
Generator 2 Temp.	0	Current Phase A	0	Voltage C_N	0
		Current Phase B	0	Line Frequency	0
		Current Phase C	0	Placeholder	0
				Placeholder	0

- Unlimited PI tags and software licenses
- Established centralized network architecture at PSC
- Assist with PI integration at each unique site
- Provide 24/7 monitoring and notifications of PI system health and performance
- Assist with VRP Initiatives
- Provide SME input for technical issues
- Provide technical support and evangelism for PSC sites

- OSIsoft
  - Additional knowledge and resources
- SmartSignal
  - Enhanced tool set for performance monitoring
- PKO Services
  - Experienced integrator developing visualization solutions







# Thank you

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