Wireless Gauge Reader

User Training for Nuclear Plant Operators

Version 4 – July 2025

CYPRESS ENVIROSYSTEMS™

Installed at 32 nuclear plants in N. America

- Duke Energy (Fleetwide: Oconee, Robinson, Brunswick, Harris, Catawba, McGuire)
- Southern (Fleetwide: Farley, Hatch, Vogtle)
- Xcel Energy (Fleetwide: Prairie Island, Monticello)
- PSEG (Fleetwide: Salem, Hope Creek)*
- Bruce Power (Canada)
- Constellation Energy (Calvert, Braidwood, Clinton, JAF, Nine Mile Point, Limerick, Ginna, Peach Bottom)
- NextEra (Fleetwide: Turkey Point, St. Lucie, Point Beach, Seabrook)
- Vistra (Comanche Peak, Davis Besse, Beaver Valley)
- STP Nuclear (South Texas)
- Nebraska Public Power District (Cooper)
- Arizona Public Service (Palo Verde*)

* Pending Installation

Wireless Gauge Readers – Overview for Operators

- What problem are we solving?
- What is the solution: Wireless Gauge Readers
- Why are they installed?
- Where are they installed?
- How do I read the WGR's / gauge value?
- Where is the data collected and stored?
- How can I view the data?

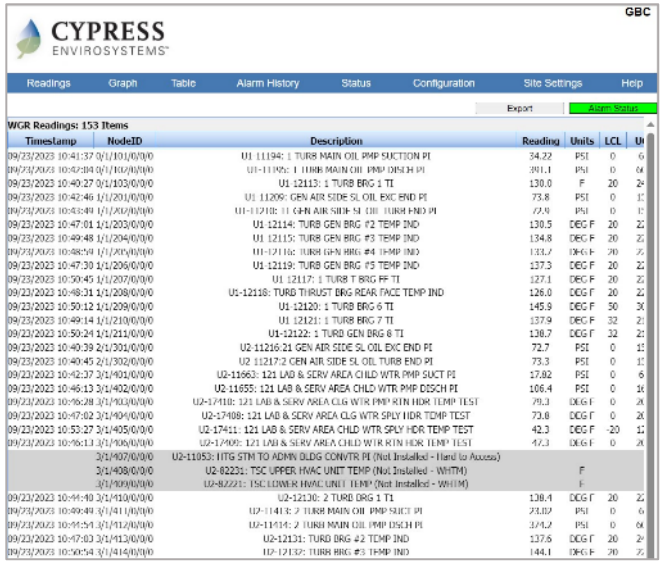
Most plant data is not even digitized

Solution: Non-Invasive Sensors – 5 Minute Install

Connection via
RESTful API or OPC

Historian

HMI



Wireless, battery operated, does not touch plant process:
10% the cost of traditional instrumentation, 5 minute install

Why are They Installed?

- WGR's collect data automatically - it reduces the labor required by operators for visual data collection.
- It collects data more frequently (typically once every 15 minutes).
- It allow trending of data for improved fault detection and analysis.

Where are they installed?

Outdoors, Radiologically Controlled Area, Seismic Structures, Safety Related Related

Where are WGR's Installed?

- WGR's can be installed on most types of manual dial gauges. Pressure, Flow, Level, Temperature etc.
- WGR's can be installed indoors or outdoors (IP56 and IP67 rated versions).
- WGR's may be installed in RCA – up 50 mRem/hr dosage rate tested.
- WGR's may NOT be used to read any Critical Digital Asset (CDA), and the data collected CANNOT be used to make operating decisions (must rely on direct human observation).

Optional Flip Door Mounting for Maximum Visibility

Minimal disruption to existing operator rounds

How to Read WGR/Gauge Value

- The WGR has an LCD front display – it shows the last reading sampled (i.e. for a 15 minute sample rate, the displayed value may be up to 15 minutes old).

- To force an immediate sample reading, press the middle button on the WGR, and the display will update to the latest value.

- To read the underlying gauge needle, twist the WGR counter-clockwise 20 degrees (quick disconnect) and remove from the mounting adapter.

- Caution: the WGR mounting adapter uses double sticky tape – when twisting the WGR, use two hands to avoid peeling off the tape – one hand to hold onto the mounting adapter base, and the other to rotate the WGR.

- Once the WGR is removed from the adapter, you will be able to see the needle through the hole in the mounting adapter.

Proper Removal of WGR from Mounting Adapter

Detachment:

- Use two hands
- One hand secures base adapter
- Other hand rotates and removes WGR sensor

Re-attachment:

- Use two hands – reverse procedure above

IMPROPER Removal of WGR from Mounting Adapter

- Mounting Adapter rotated together with underlying gauge lens
- WGR reading becomes incorrect

To correct:

- Manually rotate mounting adapter and gauge lens back to correct position
- Press middle button to get sample
- Compare LCD display reading with needle
- Readjust till LCD display matches needle
- Tighten bezel or use RTV to secure gauge lens to prevent inadvertent rotation

Temporary Rapid Sampling Modes

- The WGR is typically pre-programmed to a 15 minute sample rate.
- However, there may be a need for a faster sample rate at certain times e.g. need to record transients during troubleshooting
- The WGR has two temporary modes for faster sampling:

FAST Mode
- Press right button -> FAST
- Press Middle button -> Select FAST
- Start 5 second sample rate
- After approximately five minutes, revert back to original sample rate to conserve battery life

MEDIUM Mode
- Press right button twice -> MED
- Press Middle button -> Select MED
- Start 30 second sample rate
- After approximately eight hours, revert back to original sample rate to conserve battery life

Vibrating Needles

- The WGR takes a picture with a “shutter speed” of about 1/5 of a second.

- If the needle is vibrating fast, then it will appear as a blur in the picture, and the WGR will take the middle of the blur as the needle position (much like a person would do).

- If the needle is vibrating slowly, then the picture will “freeze” the needle in place when the picture is taken. Over time, as a trend, the needle will move between the upper and lower oscillation limits (you will see approximately a sine wave in the trend).

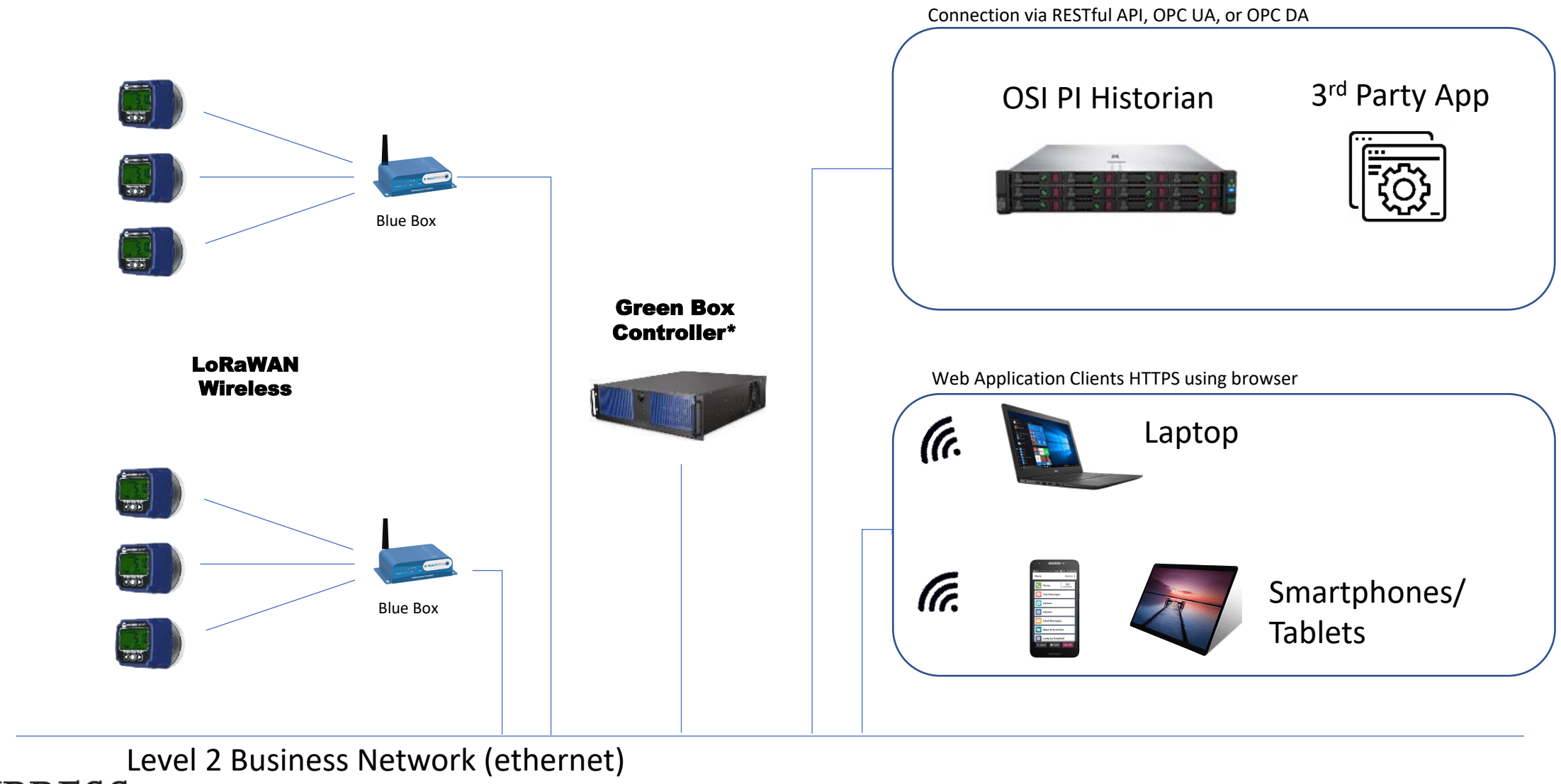
Error Conditions

- Displayed value doesn't match needle
  - Press middle button to get new sample. See if it matches then.
  - If still not match, then this is a calibration problem – Cypress to recalibrate.
  - Check to see if the lens is loose/rotates – need to glue in place.

- Display shows "----" but no value
  - The Wireless Gauge Reader is unable to read the needle
  - Cypress may need to recalibrate
  - Check if glass is loose (rotated)
  - Check if reader is not mounted properly to quick disconnect

- Low Battery
  - Batteries last 3 years at 15 min sample rate – indicator on front LCD display
  - Battery level also shown on GBC display and transmitted to historian
  - Email/Text notification of low battery (depends on IT network)

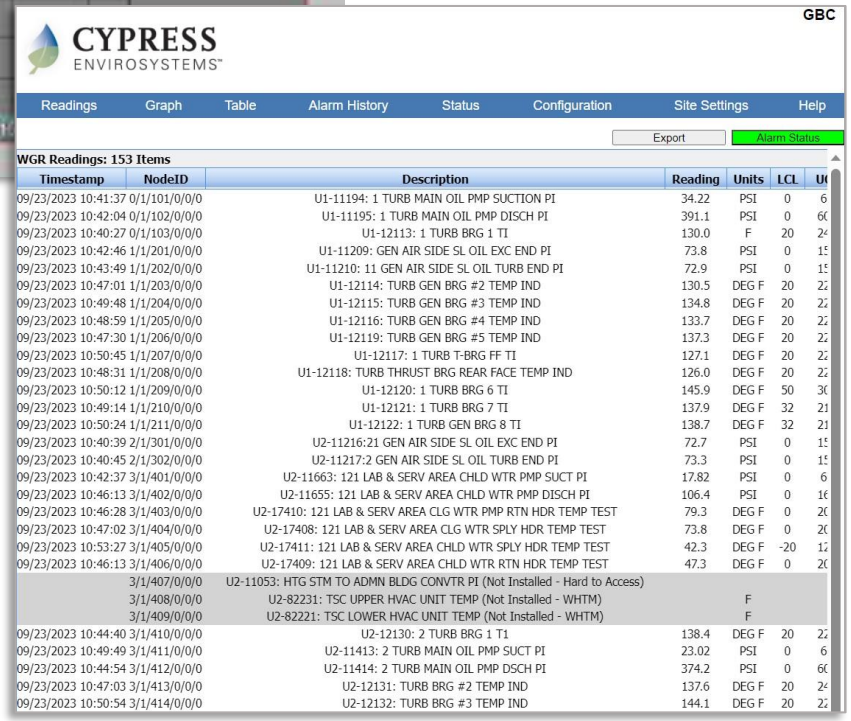
Where is the data collected?



How Can the Data be Viewed?

- Once the WGR data is stored on the Plant Historian (e.g. OSI PI), users may retrieve historical data and create trend plots using PI Process Book / PI Vision etc.
- Authorized users may also use the Web Application on the Green Box Controller to view historical data without using PI.
- The Green Box Controller stores up to one month of data.

PI Process Book Display



Timestamp	NodeID	Description	Reading	Units	LCL	UC
09/23/2023 10:41:37	0/1/101/0/0/0	U1-11194: 1 TURB MAIN OIL PMP SUCTION PI	34.22	PSI	0	6
09/23/2023 10:42:04	0/1/102/0/0/0	U1-11195: 1 TURB MAIN OIL PMP DISCH PI	391.1	PSI	0	6(
09/23/2023 10:40:27	0/1/103/0/0/0	U1-12113: 1 TURB BRG 1 TI	130.0	F	20	2(
09/23/2023 10:42:46	1/1/201/0/0/0	U1-11209: GEN AIR SIDE SL OIL EXC END PI	73.8	PSI	0	1!
09/23/2023 10:43:49	1/1/202/0/0/0	U1-11210: 11 GEN AIR SIDE SL OIL TURB END PI	72.9	PSI	0	1!
09/23/2023 10:47:01	1/1/203/0/0/0	U1-12114: TURB GEN BRG #2 TEMP IND	130.5	DEG F	20	2(
09/23/2023 10:49:48	1/1/204/0/0/0	U1-12115: TURB GEN BRG #3 TEMP IND	134.8	DEG F	20	2(
09/23/2023 10:48:59	1/1/205/0/0/0	U1-12116: TURB GEN BRG #4 TEMP IND	133.7	DEG F	20	2(
09/23/2023 10:47:30	1/1/206/0/0/0	U1-12119: TURB GEN BRG #5 TEMP IND	137.3	DEG F	20	2(
09/23/2023 10:50:45	1/1/207/0/0/0	U1-12117: 1 TURB T-BRG FF TI	127.1	DEG F	20	2(
09/23/2023 10:48:31	1/1/208/0/0/0	U1-12118: TURB THRUST BRG REAR FACE TEMP IND	126.0	DEG F	20	2(
09/23/2023 10:50:12	1/1/209/0/0/0	U1-12120: 1 TURB BRG 6 TI	145.9	DEG F	50	3(
09/23/2023 10:49:14	1/1/210/0/0/0	U1-12121: 1 TURB BRG 7 TI	137.9	DEG F	32	2!
09/23/2023 10:50:24	1/1/211/0/0/0	U1-12122: 1 TURB GEN BRG 8 TI	138.7	DEG F	32	2!
09/23/2023 10:40:39	2/1/301/0/0/0	U2-11216:21 GEN AIR SIDE SL OIL EXC END PI	72.7	PSI	0	1!
09/23/2023 10:40:45	2/1/302/0/0/0	U2-11217:2 GEN AIR SIDE SL OIL TURB END PI	73.3	PSI	0	1!
09/23/2023 10:42:37	3/1/401/0/0/0	U2-11663: 121 LAB & SERV AREA CHLD WTR PMP SUCT PI	17.82	PSI	0	6
09/23/2023 10:46:13	3/1/402/0/0/0	U2-11655: 121 LAB & SERV AREA CHLD WTR PMP DISCH PI	106.4	PSI	0	1(
09/23/2023 10:46:28	3/1/403/0/0/0	U2-17410: 121 LAB & SERV AREA CLG WTR PMP RTN HDR TEMP TEST	79.3	DEG F	0	2(
09/23/2023 10:47:02	3/1/404/0/0/0	U2-17408: 121 LAB & SERV AREA CLG WTR SPLY HDR TEMP TEST	73.8	DEG F	0	2(
09/23/2023 10:53:27	3/1/405/0/0/0	U2-17411: 121 LAB & SERV AREA CHLD WTR SPLY HDR TEMP TEST	42.3	DEG F	-20	1(
09/23/2023 10:46:13	3/1/406/0/0/0	U2-17409: 121 LAB & SERV AREA CHLD WTR RTN HDR TEMP TEST	47.3	DEG F	0	2(
	3/1/407/0/0/0	U2-11053: HTG STM TO ADMN BLDG CONVTR PI (Not Installed - Hard to Access)				
	3/1/408/0/0/0	U2-82231: TSC UPPER HVAC UNIT TEMP (Not Installed - WHTM)		F		
	3/1/409/0/0/0	U2-82221: TSC LOWER HVAC UNIT TEMP (Not Installed - WHTM)		F		
09/23/2023 10:44:40	3/1/410/0/0/0	U2-12130: 2 TURB BRG 1 T1	138.4	DEG F	20	2(
09/23/2023 10:49:49	3/1/411/0/0/0	U2-11413: 2 TURB MAIN OIL PMP SUCT PI	23.02	PSI	0	6
09/23/2023 10:44:54	3/1/412/0/0/0	U2-11414: 2 TURB MAIN OIL PMP DSCH PI	374.2	PSI	0	6(
09/23/2023 10:47:03	3/1/413/0/0/0	U2-12131: TURB BRG #2 TEMP IND	137.6	DEG F	20	2(
09/23/2023 10:50:54	3/1/414/0/0/0	U2-12132: TURB BRG #3 TEMP IND	144.1	DEG F	20	2(

Cypress GBC Display

Additional Non-Invasive Sensors

Family of Non-Invasive Monitoring Solutions

Cycle Isolation Valve Monitor

Wireless Temperature and Humidity Monitor

Wireless Rad Monitor

Webcam Digitization
(machine vision)

Vibration Sensors

Wireless Transducer Reader
(thermocouples, 4-20mA, 0-5V, dry contacts, RS-232 etc.)

Wireless, Battery Operated, Non-Invasive, Install in Minutes
10% Cost of Traditional Approaches

CYPRESS ENVIROSYSTEMS™

Case Studies for Nuclear Power Plants

Use Case Library - Update

jotform | Tables

Use Case Library - Non-Invasive Nuclear Plant Digitization

Last updated at 18 Apr 2023 8:08 AM

Share | Help

Case Library - Non-Invasive Nuclear Plant Digitization | WGR Case Studies - Reports | + Add Tab

ch | Filter | Columns | Form | Do

Title of Use Case	Utility	Plant	T...	Depart...	Plant Location	Plant System or Sub-System	What improvements/benefits come from the data?
Enable condition Based Maintenance for condensate polisher filters	Constellation	Clinton	BWR	Maintenance	Turbine Building	Condensate Polishing System	Operator Efficiency; ALARA reducing dosage exposure; Maintenance
Fault detection for Air Operated Valves for Feedwater Heaters	Constellation	Calvert Cliffs	PWR	Engineering	Turbine Building	Feedwater Tanks Air Operated Valves	Operator Efficiency; Fault Detection; Maintenance Effort/Consumable
Fault Detection for Stator Cooling Water Control Valves	Southern Company	Hatch	BWR	Operations	Turbine Building	Generator Stator	Operator Efficiency; Fault Detection; Maintenance Effort/Consumable
Improve efficiency of Operator rounds	Duke Energy	Oconee	PWR	Operations	Multiple		Operator Efficiency; ALARA reducing dosage exposure
Fault Detection for Reactor Recirculation Pump Seals	Duke Energy	Brunswick	BWR	Engineering	Reactor Building	Reactor cooling	Fault Detection
DRAFT - Enhance operator efficiency for thermal performance monitoring	PSEG	Hope Creek	BWR	Operations	Turbine Building	Feedwater Heaters	Operator Efficiency; Fault Detection
Fault Detection for Transformers	Constellation	Calvert Cliffs	PWR	Engineering	Other	Transformers	Operator Efficiency; Fault Detection
Ensure personnel safety - Temperature and Humidity Monitoring View	Constellation	Calvert Cliffs	PWR	Operations	Turbine Building	Work and storage environment	Operator Efficiency; Safety (e.g. Heat Stress, Confined Space etc.)
Improve groundwater management monitoring	Duke Energy	Brunswick	BWR	Chemistry	Other	Sump Pumps	Operator Efficiency; Fault Detection; Compliance (e.g. Environmental
Implement Condition Based Maintenance of Condensate Polisher Demin	Energy Harbor	Davis Besse	PWR	Chemistry	Turbine Building	Condensate Polishing System	Operator Efficiency; Maintenance Effort/Consumables
Enhance Operator Efficiency for Monitoring Intake Screen	Constellation	Nine Mile Pt	BWR	Operations	Intake	Intake screens	Operator Efficiency
Improve personnel safety for negative pressure compliance monitoring	Constellation	Nine Mile Pt	BWR	Other	Multiple	Negative pressure locations	Operator Efficiency; Safety (e.g. Heat Stress, Confined Space etc.)
DRAFT - Condition based monitoring of lube oil filters	Constellation	Nine Mile Pt	BWR	Engineering	Turbine Building	Lubricating oil system	Fault Detection
Fault Detection - Cycle Isolation Valve Temperature Monitoring	Duke Energy	Harris	PWR	Engineering	Turbine Building	Cycle isolation valves	Thermal Performance; Improves efficiency of the Thermal Performance
Feedwater Heater Temperature Monitoring	Duke Energy	Robinson	PWR	Engineering	Turbine Building	Heater Drain	Troubleshooting/Emergent Issues
DRAFT - Fault detection for condensate vacuum pumps and valves	PSEG	Salem	PWR	Engineering	Turbine Building	Condensate pumps and valves	Operator Efficiency; Fault Detection; Maintenance Effort/Consumable
DRAFT - Fault detection & troubleshooting for containment moisture rem...	Bruce Power	Bruce A	CANDU	Engineering	Other	Dryer system for containment moist...	Operator Efficiency; Fault Detection; Maintenance Effort/Consumable
DRAFT - Safety Surveillance Monitoring remote monitoring	Luminant	Comanche Peak	PWR	Operations	Multiple	Safety related systems	Operator Efficiency; Fault Detection
Operator Efficiency - Automating Webcam Monitoring	Southern Company	Vogtle	PWR	Operations	Turbine Building		Operator Efficiency; Fault Detection; Maintenance Effort/Consumable

Crash Cart for Emergent Issues

Southern Hatch

Need:

- Plant needs data quickly to troubleshoot, diagnose and correct emergent issues.

Concept:

- Use Crash Cart with non-invasive sensors to collect data
- Pre-approved, ready to install in 30 minutes.

Benefit:

- Avoid lengthy engineering reviews and approvals to add sensors
- Minimize operator man-hours
- Reduce plant downtime

Feedwater Heater Level - Webcam Digitization

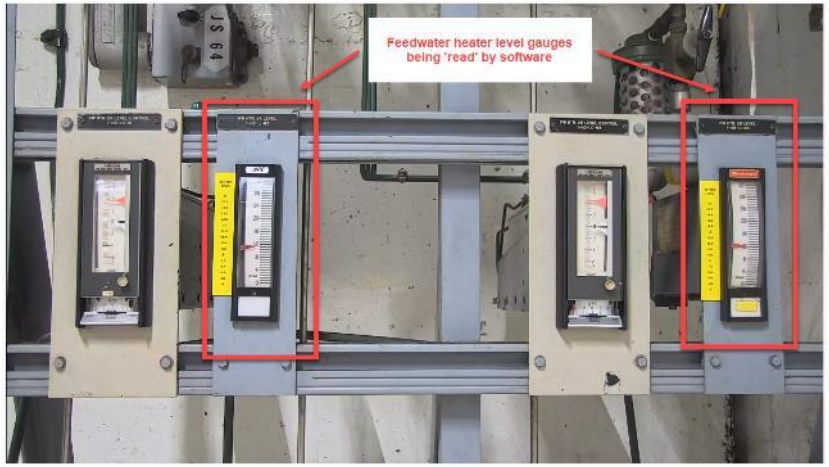
Duke Brunswick

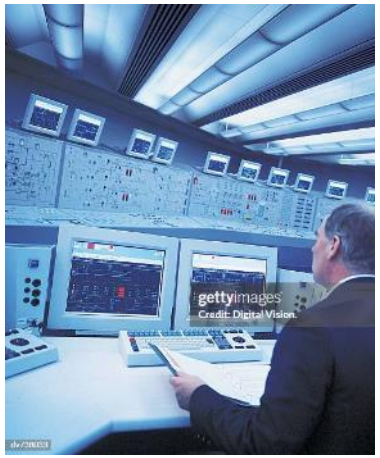
Need:

- Automate data collection from feedwater heater including heater level.
- Prior issue resulted in heater taken offline for repairs.
- Must rely on vertical gauge local indicator.

Solution:

- Install Panasonic IP camera, use GBC machine vision capability to digitize image.
- Data can be stored in PI Historian.
- Operator can look at digitized trend data on PI Vision instead of just watching webcam video.





Data collected and displayed via PI Historian

Operator Rounds Dashboard

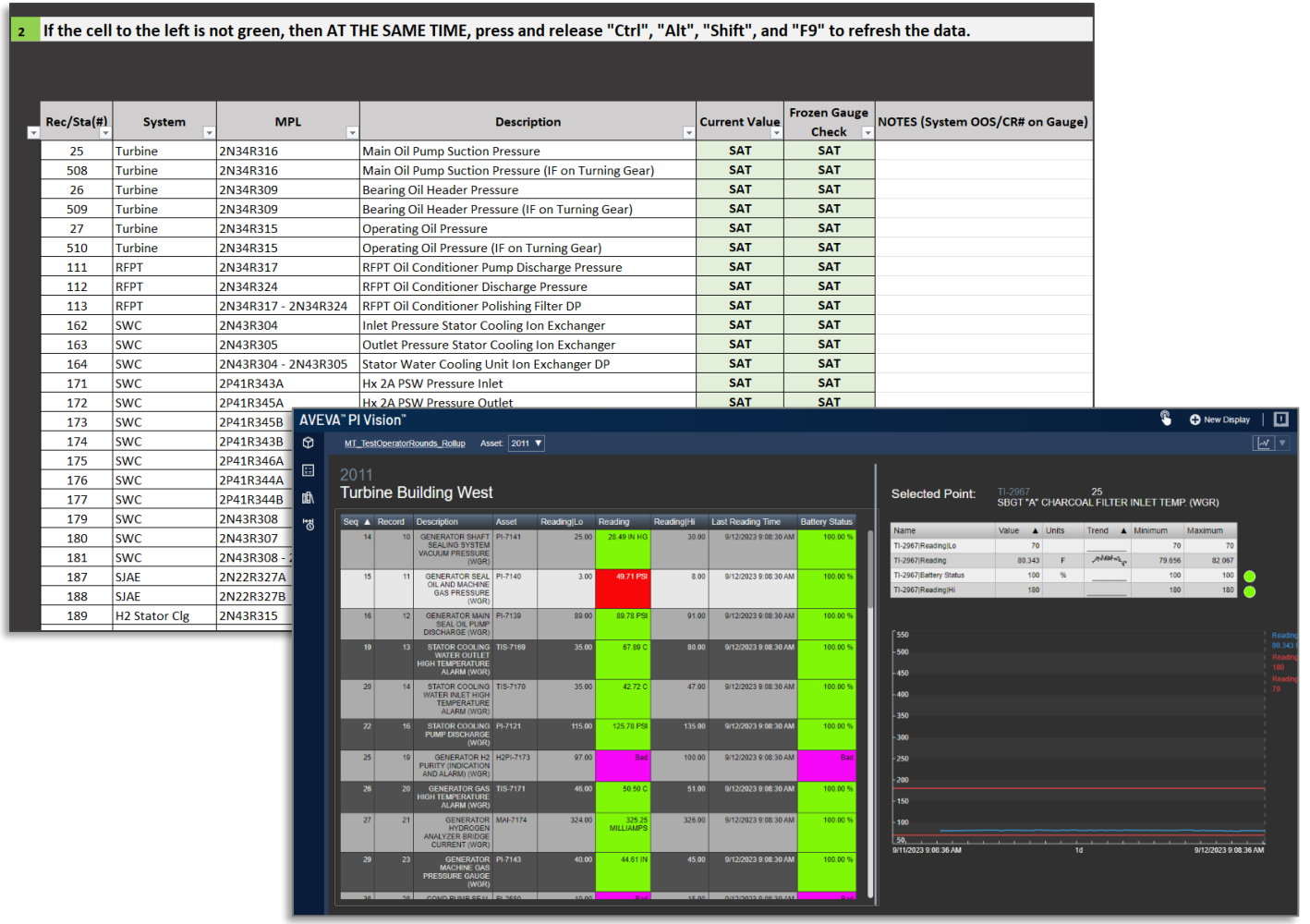
Southern Hatch
Duke Oconee

Concept:

- Collect rounds data throughout day using WGRs
- Operators can review trends and identify abnormalities at start of shift
- Plan and prioritize work more efficiently

Benefit:

- Reduce operator time by 2 hours per shift
- Faster response to excursions / emergent issues

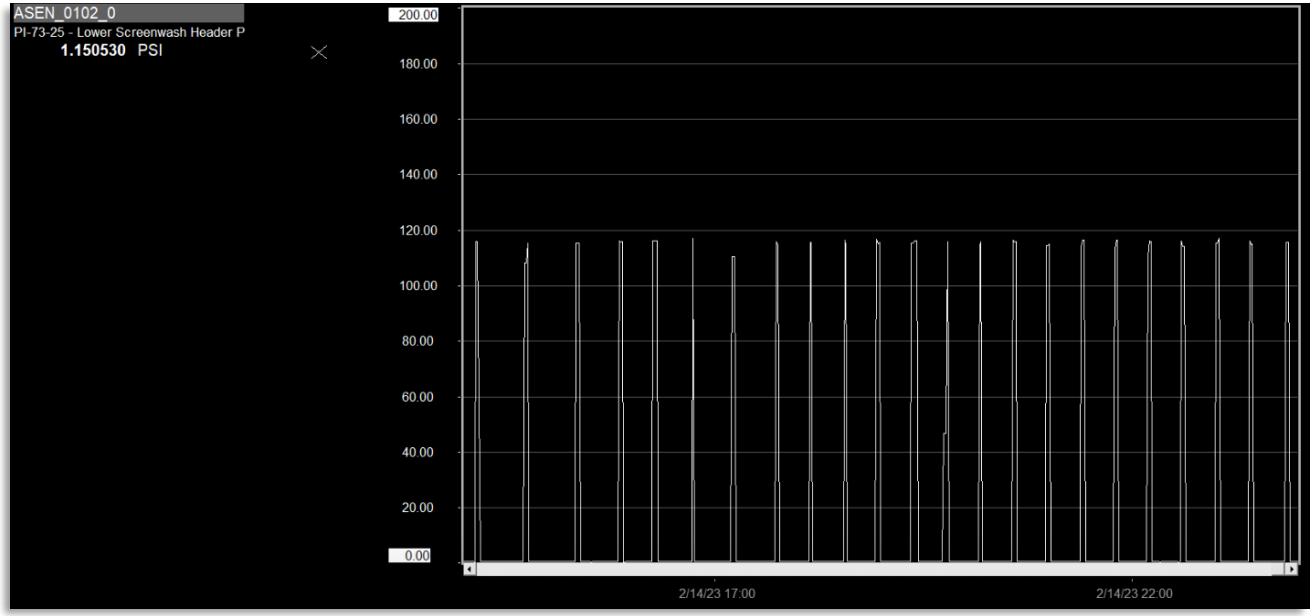


2 If the cell to the left is not green, then AT THE SAME TIME, press and release "Ctrl", "Alt", "Shift", and "F9" to refresh the data.

Rec/Sta(#)	System	MPL	Description	Current Value	Frozen Gauge Check	NOTES (System OOS/CR# on Gauge)
25	Turbine	2N34R316	Main Oil Pump Suction Pressure	SAT	SAT	
508	Turbine	2N34R316	Main Oil Pump Suction Pressure (IF on Turning Gear)	SAT	SAT	
26	Turbine	2N34R309	Bearing Oil Header Pressure	SAT	SAT	
509	Turbine	2N34R309	Bearing Oil Header Pressure (IF on Turning Gear)	SAT	SAT	
27	Turbine	2N34R315	Operating Oil Pressure	SAT	SAT	
510	Turbine	2N34R315	Operating Oil Pressure (IF on Turning Gear)	SAT	SAT	
111	RFPT	2N34R317	RFPT Oil Conditioner Pump Discharge Pressure	SAT	SAT	
112	RFPT	2N34R324	RFPT Oil Conditioner Discharge Pressure	SAT	SAT	
113	RFPT	2N34R317 - 2N34R324	RFPT Oil Conditioner Polishing Filter DP	SAT	SAT	
162	SWC	2N43R304	Inlet Pressure Stator Cooling Ion Exchanger	SAT	SAT	
163	SWC	2N43R305	Outlet Pressure Stator Cooling Ion Exchanger	SAT	SAT	
164	SWC	2N43R304 - 2N43R305	Stator Water Cooling Unit Ion Exchanger DP	SAT	SAT	
171	SWC	2P41R343A	Hx 2A PSW Pressure Inlet	SAT	SAT	
172	SWC	2P41R345A	Hx 2A PSW Pressure Outlet	SAT	SAT	
173	SWC	2P41R345B				
174	SWC	2P41R343B				
175	SWC	2P41R346A				
176	SWC	2P41R344A				
177	SWC	2P41R344B				
179	SWC	2N43R308				
180	SWC	2N43R307				
181	SWC	2N43R308 -				
187	SJAE	2N22R327A				
188	SJAE	2N22R327B				
189	H2 Stator Clg	2N43R315				

Constellation Nine Mile Point:
Reduce Operator wait time, Improve Fault Detection

- **Intake Screen Wash System Monitoring**
  - Operators must monitor intake screen wash system for proper operation to clear debris.
  - Screen wash system operates for 3 minutes every hour – operator must wait up to one hour to confirm.
  - Gauge Readers automatically monitors delta pressure across screenwash system.
  - Saves 30 minutes per operator shift, two shifts per day.



Duke Brunswick: Environmental Compliance

- As part of a Groundwater Protection Plan, Cypress installed wireless gauge readers on sump pump hour meters to track electrical manhole sump pump run-time.
- No current method to monitor sump levels automatically.
- If tritium is detected the sump pump runtime data may be useful to determine where it came from.
- Catch two types of faults:
  - Pumps not running when they should (sump level too high)
  - Pumps running too much (must be a leak)

Condition Based Monitoring – FRF Filters

Bruce Power

Need:

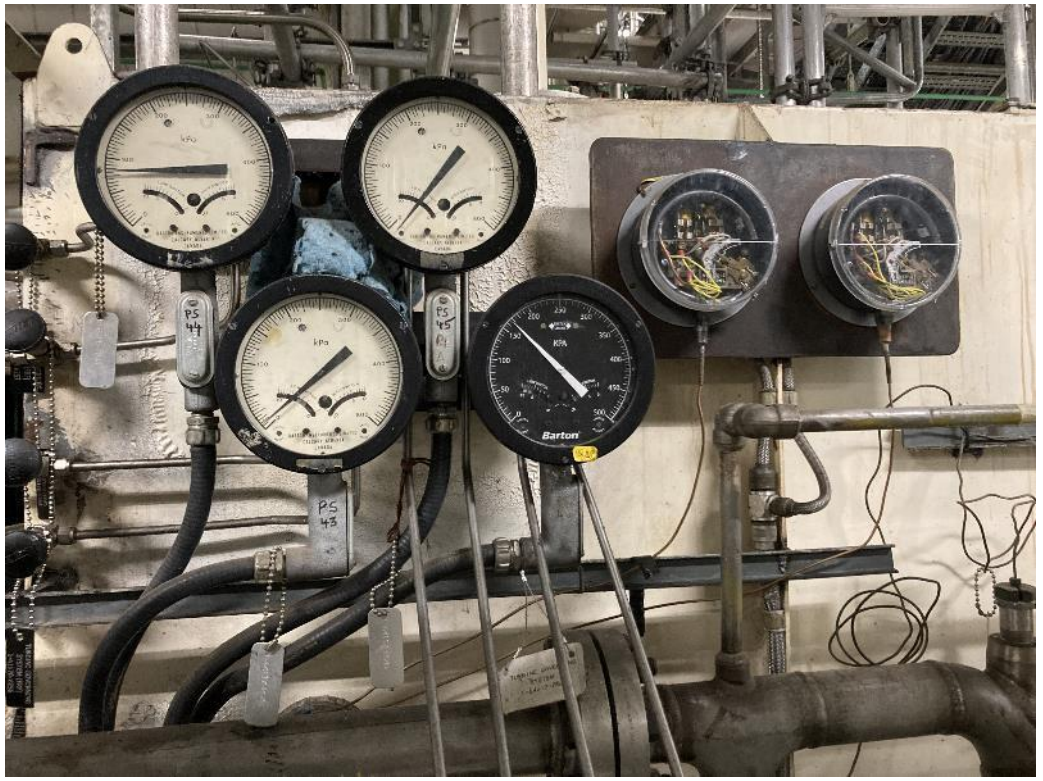
- Apply Condition Based Monitoring to FRF filters. Replace consumables only when data shows it is necessary.
- Note: FRF Filters remove impurities which can cause damage or malfunction to the hydraulic system.

Solution:

- Use WGR's to monitor and trend delta pressure across FRF filters.
- Replace filters at designated delta P.

Benefit:

- Save filter consumables.
- Avoid system damage or downtime due to undetected filter rupture or clog.



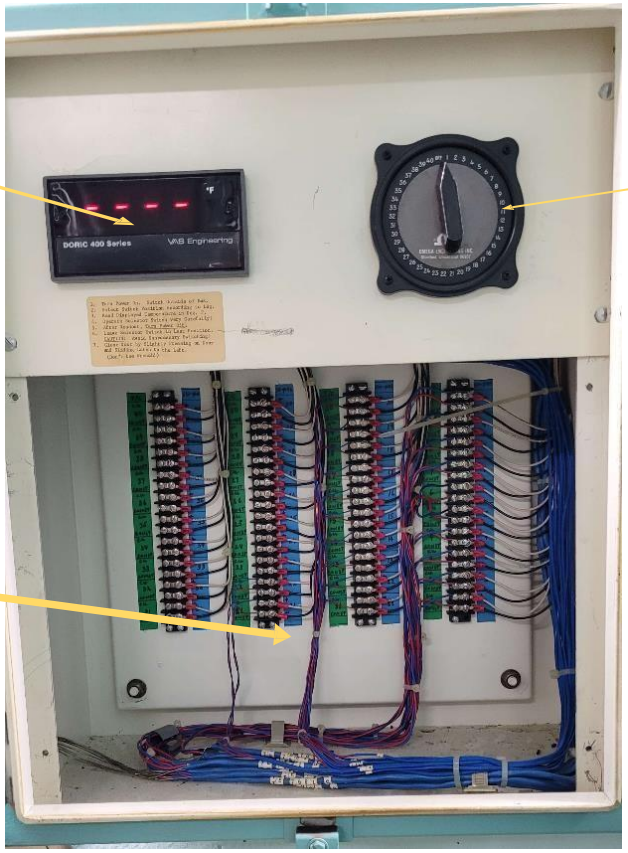
PSEG Hope Creek and Xcel Monticello: Automating Thermal Performance Monitoring

Xcel Monticello

Temperature Display

Thermocouple Selector dial

Thermo-couple connections (>100)



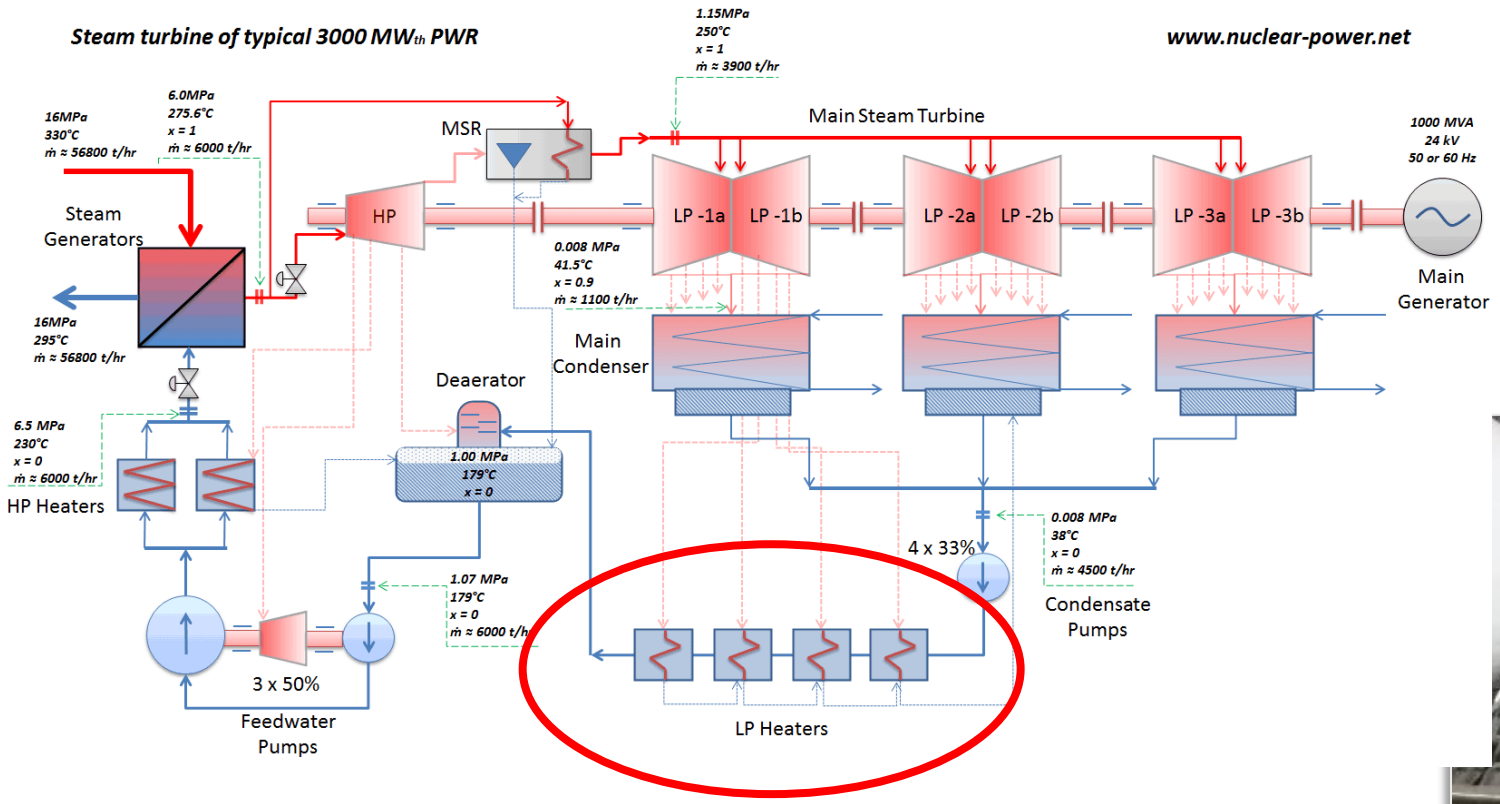
Thermocouple Selector Panel for Manual Readings

PSEG Hope Creek

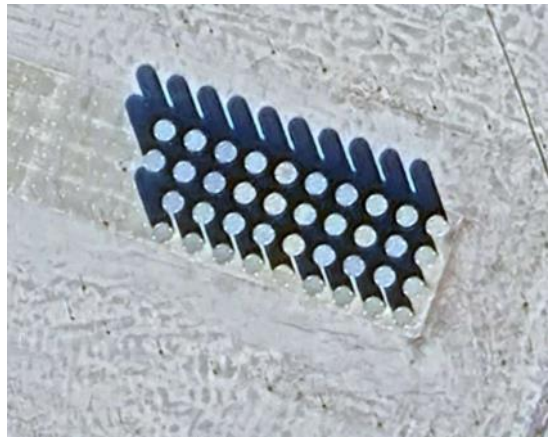
Thermocouple Connectors for Manual Readings

Handheld Thermocouple Reader

Feedwater Heater Level Fault Detection



Drone Integration: Dry Cask Inspection



Skydio Drone
- May be piloted
- Or autonomous

Skydio Dock
- “Garage” protection
- Recharging
- Data download

Dry Well Temp / Humidity Monitoring

Time check 11:05am ET

Southern Nuclear

Southern Hatch

Need:

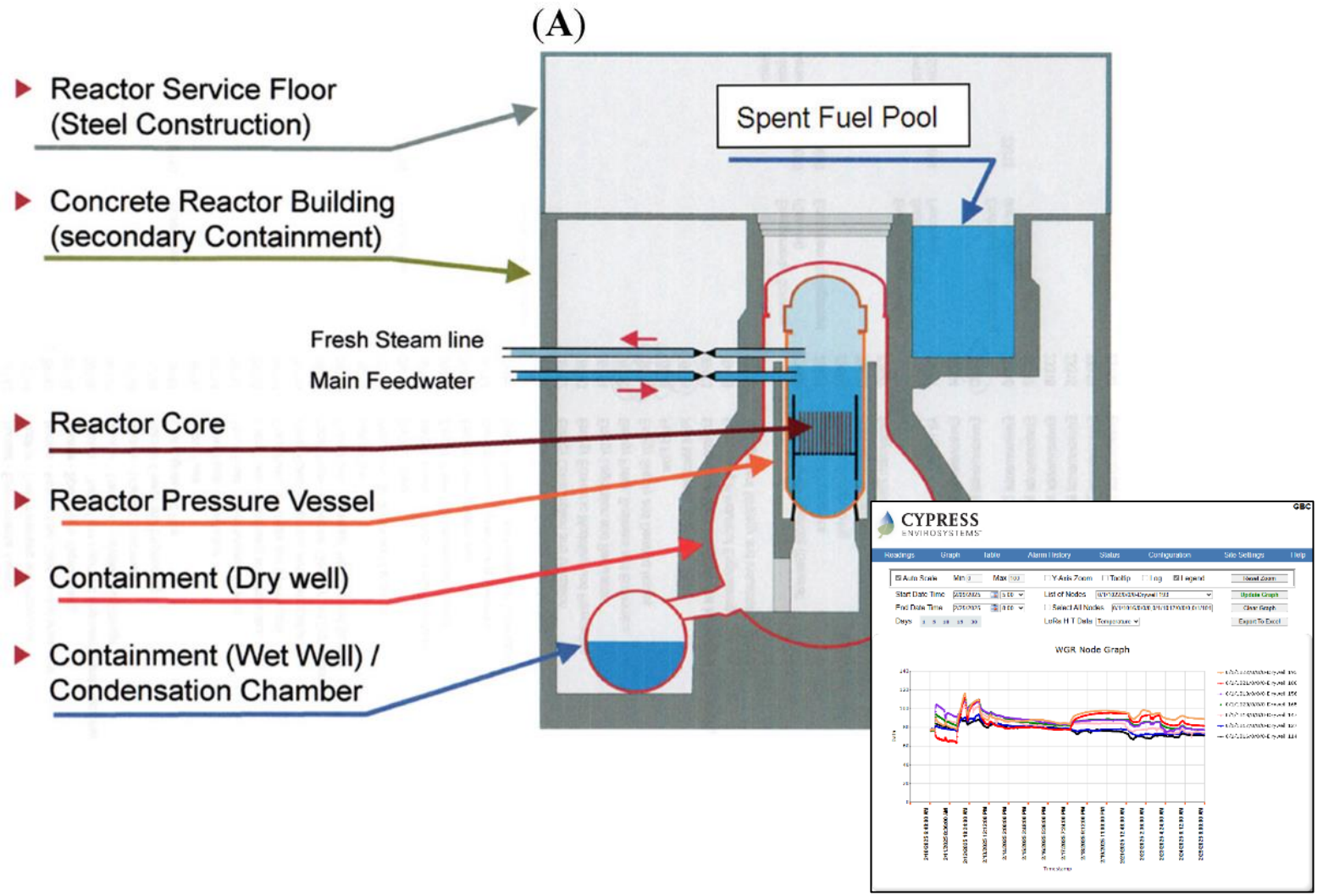
- During outage: Monitor temperature and humidity for worker safety.
- Minimize time and dosage exposure for RP Tech to gather data each shift.

Solution:

- Use magnetic mount temporary non-invasive Wireless Temperature and Humidity Monitors.

Benefit:

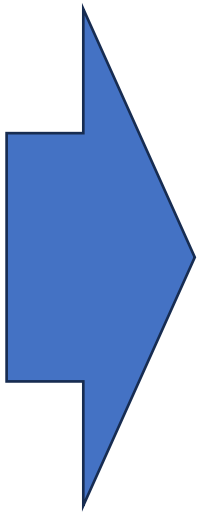
- Save 1.5 Man-hours/day, 45 Man-hours outage total
- Reduce 8 mrem/day, 240 mrem outage total radiation exposure
- Reduced Industrial Safety exposure



CYPRESS ENVIROSYSTEMS™

Wireless Remote Radiation Monitor

Commercially Available
Radiation Meter



External
Battery Pack

Add-on
Wireless Digit Reader

- Real-time wireless mobile radiation dose rate monitor
- Battery operated: does not require power nor communications wires
- No need to install additional wireless network (uses Blue Box Gateway and GBC)
- Data via OPC or RESTful API available to PI Historian, 360 Plant Walkthru Software etc.

Valve Cycle Isolation Monitoring

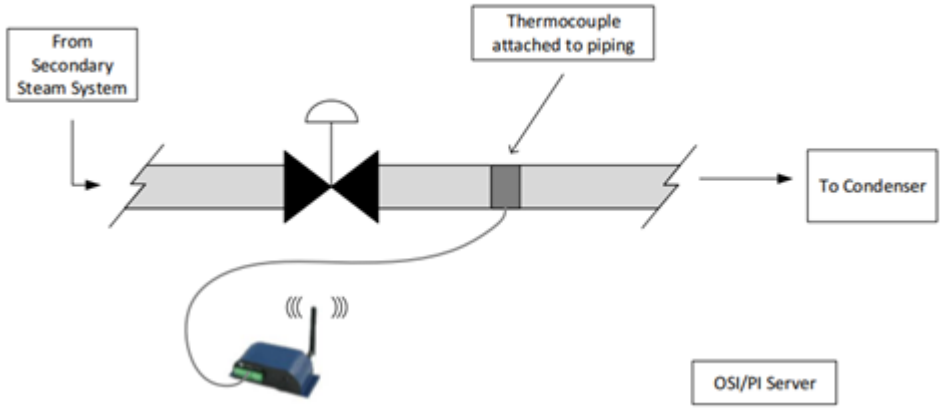
Need:

- Detect valve cycle isolation faults.
- Minimize cost and process disruption.

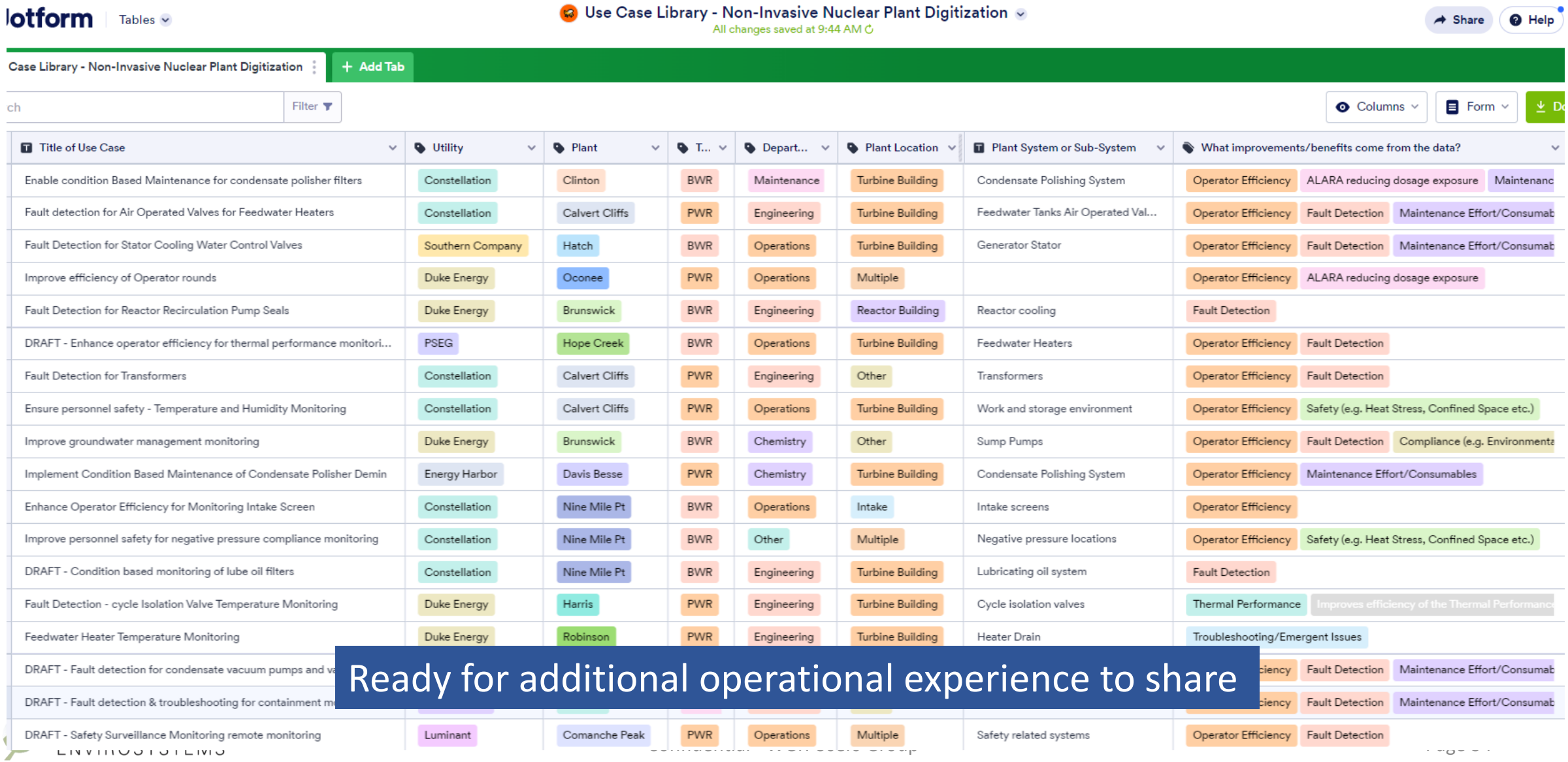
Benefit:

- Stop leaks, save MW's (est. up to 2MW per malfunctioning valve).
- Save operator time to monitor valves

Detect Leaking Valves



Nuclear Industry Use Case Library



Title of Use Case	Utility	Plant	T...	Depart...	Plant Location	Plant System or Sub-System	What improvements/benefits come from the data?
Enable condition Based Maintenance for condensate polisher filters	Constellation	Clinton	BWR	Maintenance	Turbine Building	Condensate Polishing System	Operator Efficiency; ALARA reducing dosage exposure; Maintenanc
Fault detection for Air Operated Valves for Feedwater Heaters	Constellation	Calvert Cliffs	PWR	Engineering	Turbine Building	Feedwater Tanks Air Operated Val...	Operator Efficiency; Fault Detection; Maintenance Effort/Consumab
Fault Detection for Stator Cooling Water Control Valves	Southern Company	Hatch	BWR	Operations	Turbine Building	Generator Stator	Operator Efficiency; Fault Detection; Maintenance Effort/Consumab
Improve efficiency of Operator rounds	Duke Energy	Oconee	PWR	Operations	Multiple		Operator Efficiency; ALARA reducing dosage exposure
Fault Detection for Reactor Recirculation Pump Seals	Duke Energy	Brunswick	BWR	Engineering	Reactor Building	Reactor cooling	Fault Detection
DRAFT - Enhance operator efficiency for thermal performance monitori...	PSEG	Hope Creek	BWR	Operations	Turbine Building	Feedwater Heaters	Operator Efficiency; Fault Detection
Fault Detection for Transformers	Constellation	Calvert Cliffs	PWR	Engineering	Other	Transformers	Operator Efficiency; Fault Detection
Ensure personnel safety - Temperature and Humidity Monitoring	Constellation	Calvert Cliffs	PWR	Operations	Turbine Building	Work and storage environment	Operator Efficiency; Safety (e.g. Heat Stress, Confined Space etc.)
Improve groundwater management monitoring	Duke Energy	Brunswick	BWR	Chemistry	Other	Sump Pumps	Operator Efficiency; Fault Detection; Compliance (e.g. Environmenta
Implement Condition Based Maintenance of Condensate Polisher Demin	Energy Harbor	Davis Besse	PWR	Chemistry	Turbine Building	Condensate Polishing System	Operator Efficiency; Maintenance Effort/Consumables
Enhance Operator Efficiency for Monitoring Intake Screen	Constellation	Nine Mile Pt	BWR	Operations	Intake	Intake screens	Operator Efficiency
Improve personnel safety for negative pressure compliance monitoring	Constellation	Nine Mile Pt	BWR	Other	Multiple	Negative pressure locations	Operator Efficiency; Safety (e.g. Heat Stress, Confined Space etc.)
DRAFT - Condition based monitoring of lube oil filters	Constellation	Nine Mile Pt	BWR	Engineering	Turbine Building	Lubricating oil system	Fault Detection
Fault Detection - cycle Isolation Valve Temperature Monitoring	Duke Energy	Harris	PWR	Engineering	Turbine Building	Cycle isolation valves	Thermal Performance; Improves efficiency of the Thermal Performanc
Feedwater Heater Temperature Monitoring	Duke Energy	Robinson	PWR	Engineering	Turbine Building	Heater Drain	Troubleshooting/Emergent Issues
DRAFT - Fault detection for condensate vacuum pumps and va...							...iency; Fault Detection; Maintenance Effort/Consumab
DRAFT - Fault detection & troubleshooting for containment m...							...iency; Fault Detection; Maintenance Effort/Consumab
DRAFT - Safety Surveillance Monitoring remote monitoring	Luminant	Comanche Peak	PWR	Operations	Multiple	Safety related systems	Operator Efficiency; Fault Detection

Ready for additional operational experience to share

International Atomic Energy Agency Innovation Award 2024

"The ISOP Innovation Awards aim to highlight and recognize innovative use cases within the nuclear power industry. This programme showcases practical applications of cutting-edge technologies and solutions that have been successfully implemented in operating nuclear power plants."

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Paper will also be presented at 2025 ANS Annual Conference, Chicago

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Thank You

Q&A?