Nuclear Engineering
NRC / FPL Interface Meeting

December 18, 2003

Region II

Atlanta, Georgia

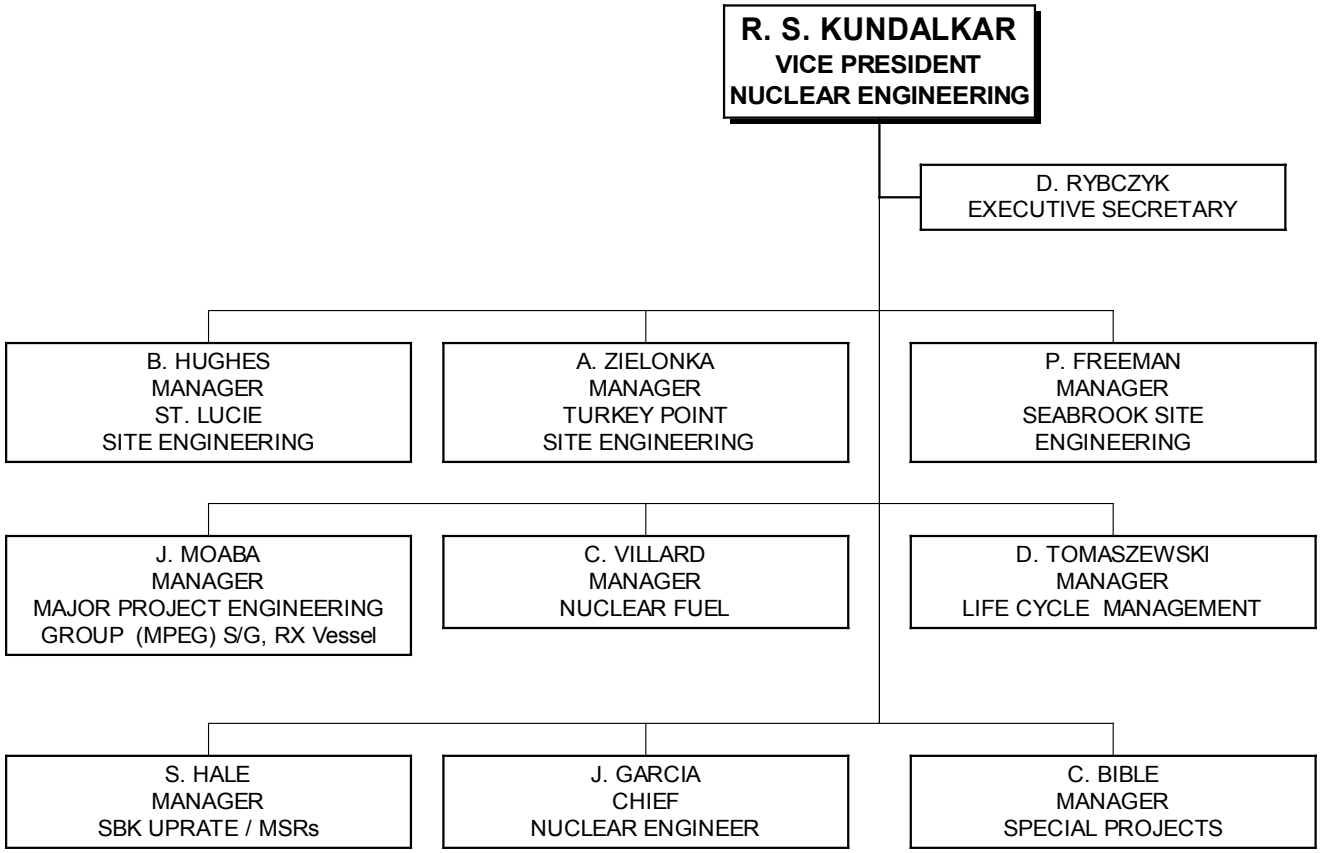
Agenda

Opening Remarks	R. Kundalkar
Principles & Expectations	C. Bible
Engineering Performance	B. Hughes /J. Cadogan
Corrective Action	J. Garcia
Equipment Reliability	J. Cadogan
Breaker Reliability Improvements	J. Granger
Life Cycle Management	D. Tomaszewski
Materials Management	R. Gil
Summary	

Nuclear Engineering

- Nuclear Division Focus Areas
  - Nuclear Safety
  - Equipment Reliability
  - Corrective Action
  - Performance Management
- License Renewal

Nuclear Engineering Organization



Principles & Expectations

C. Bible

Principles and Expectations

- Developed Principles and Expectations Document
- Trained all engineers on document
- Tool to be used during daily work activities
  - Communicated
  - Emphasized in training
  - Utilized on a daily basis

Principles and Expectations

- Key Attributes
  - Nuclear safety is highest priority
  - Intolerance for failures of critical equipment
  - Repeat failures constitute collective failure of the organization
  - Rigorous problem solving
  - Own problems until they are completed
  - Operationally focused
  - Tolerance for minor issues can mask safety problems
  - Demonstrate professionalism

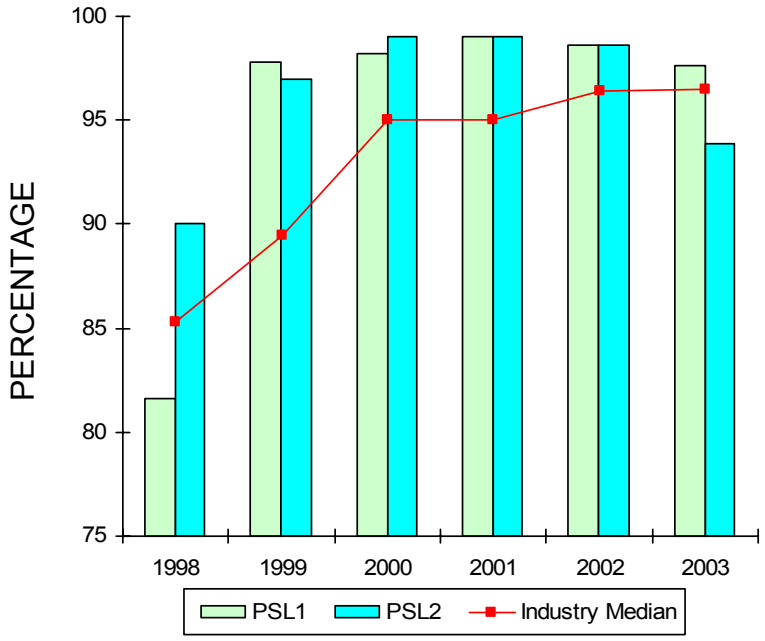
Engineering Performance

St. Lucie / Turkey Point
Engineering

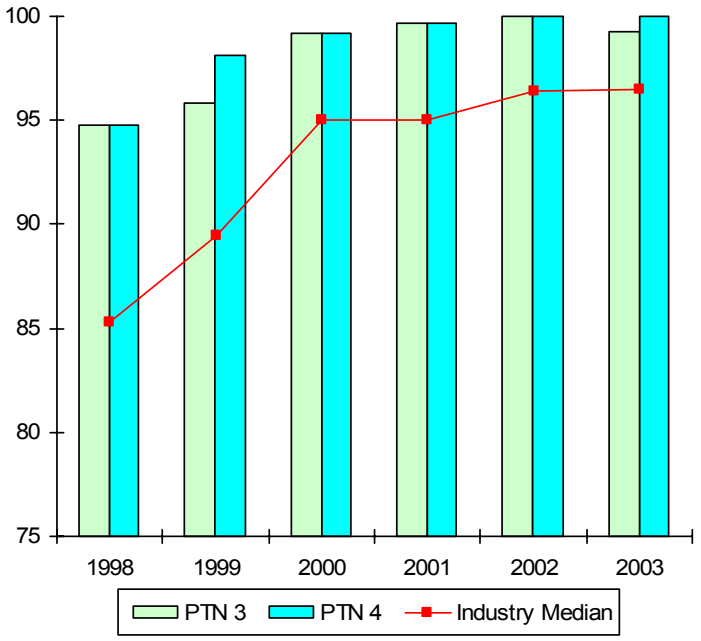
B. Hughes / J. Cadogan

WANO Weighted Overall Performance

St. Lucie



Turkey Point



Data Through 9/03

Engineering Department Indicators and Goals

Nuclear Safety Focus (Data Through 9/30/03)					
Indicators		Goals		St. Lucie Actuals	Turkey Point Actuals
		Green	Red		
A.	Unplanned Scrams Per 7000 Hours	≤1	>6	Unit 1 - 0.9 Unit 2 - 1.9	Unit 3 - .9 Unit 4 - 0
B.	Safety System Unavailibility - EAC (1)(2)(3)	<1.25%	>5%	Unit 1 - 1.9% Unit 2 - 0.3%	Unit 3 - .6% Unit 4 - .4%
C.	Safety System Unavailibility - HPSI (1)(2)	<0.75%	>5%	Unit 1 - 0.4% Unit 2 - 0.4%	Unit 3 - .2% Unit 4 -.5%
D.	Safety System Unavailibility -AFW (1)(2)	<1.0%	>6%	Unit 1 - 0.5% Unit 2 - 0.5%	Unit 3 - 0.3% Unit 4 - 0.5%
E.	Safety System Unavailibility - RHR (1)(2)	<0.75%	>5%	Unit 1 - 0.7% Unit 2 - 0.6%	Unit 3 - 0.5% Unit 4 - 0.4%
F.	NRC Violations due to Engineering	≤2	>6	2	1
G.	QA Findings	<2	>6	1	3
H.	Wano FRI	≤5 E-4	>2.0 E-2	Unit 1 - 4.12E-5 Unit 2 - 2.66E-5	Unit 3 - 1.60 E-5 Unit 4 -1.0 E-6
I.	OSHA Recordable Injuries	0	2	1	0
J.	ALARA	10% <Budget	>5% Over Budget	Outage 1%< Non-Outage 52%>	Outage 87%> Non-Outage 7%<
K.	Reactivity Events Due to Engineering	0 Major <4 Minor	≥5 Major > 8 Minor	0 Major 0 Minor	0 Major 0 Minor

(1) All green by NRC criteria

(2) FPL criteria more stringent

(3) Unit 3 EAC significant improvement

Engineering Department Indicators and Goals

Problem Identification and Correction (Data Through 9/30/03)					
Indicators		Goals		St. Lucie Actuals	Turkey Point Actuals (As of 9/30/03)
		Green	Red		
A.	Condition Reports (Late)	0 Late	≥5 Late	0	3 (1)(2)
B.	Condition Report Action Items (PMAI's)	0-75	>125 at YE	267	222
C.	Condition Report Action Items (Late)	0 Late	>11 Late	94 (1)	6 (1)(2)
D.	Self Assessments	1 in 6 mos	<2 per year	2	0
E.	System Walkdowns	90%-100% W/D Complete	<70% W/D Complete	90%	100%
F.	Drawing/VTM/TEDB Changes	0-2 Late	≥10 Late	0	7 (1)

(1) No safety significant items late.

(2) Zero overdue by year-end.

Engineering Department Indicators and Goals

Quality of Engineering (Data Through 9/30/03)					
Indicators		Goals		St. Lucie Actuals	Turkey Point Actuals
		Green	Red		
A.	Engineer Initial Training Not Started Within 12 Months of Hire	<1	>6	0	0
B.	Training Effectiveness	>90%	<70%	ETP - 100% STA - 100%	ETP - 100% STA - 100%
C.	Plant Modification Revisions due to ENG Error	0	≥5	6 (1)	4 (1)
D.	Procurement Engineering Backlog (>4 Weeks Old)	<2	>11	0	18 (2)

(1) Minor changes only, no package revisions.

(2) Increase due to outage items, presently zero.

Engineering Department Indicators and Goals

Summer Capacity Factor	**>99.8%**	**<98%**	**91.14%**	**99.85%**
Thermal Performance Indicator	**>99.70%**	**<99.5%**	**Unit 1 - 99.99% Unit 2 - 99.99%**	**Unit 3 - 99.8% Unit 4 - 99.9%**
Refueling Outage Duration	**<30 Days**	**>35 Days**	**Unit 2 49.2**	**Unit 3 28**
Forced Loss Rate 18 Month Running Average	**0% - 1%**	**>2.0%**	**Unit 1 - 0.05% Unit 2 - 2.49%**	**Unit 3 - 1.4% Unit 4 - 0.5%**

Corrective Action

J. Garcia

Corrective Action

- Current Situation
- Performance Improvement Initiatives
  - Programmatic
  - Organization
  - Strategic Initiatives
- Examples
- Conclusions

Current Situation

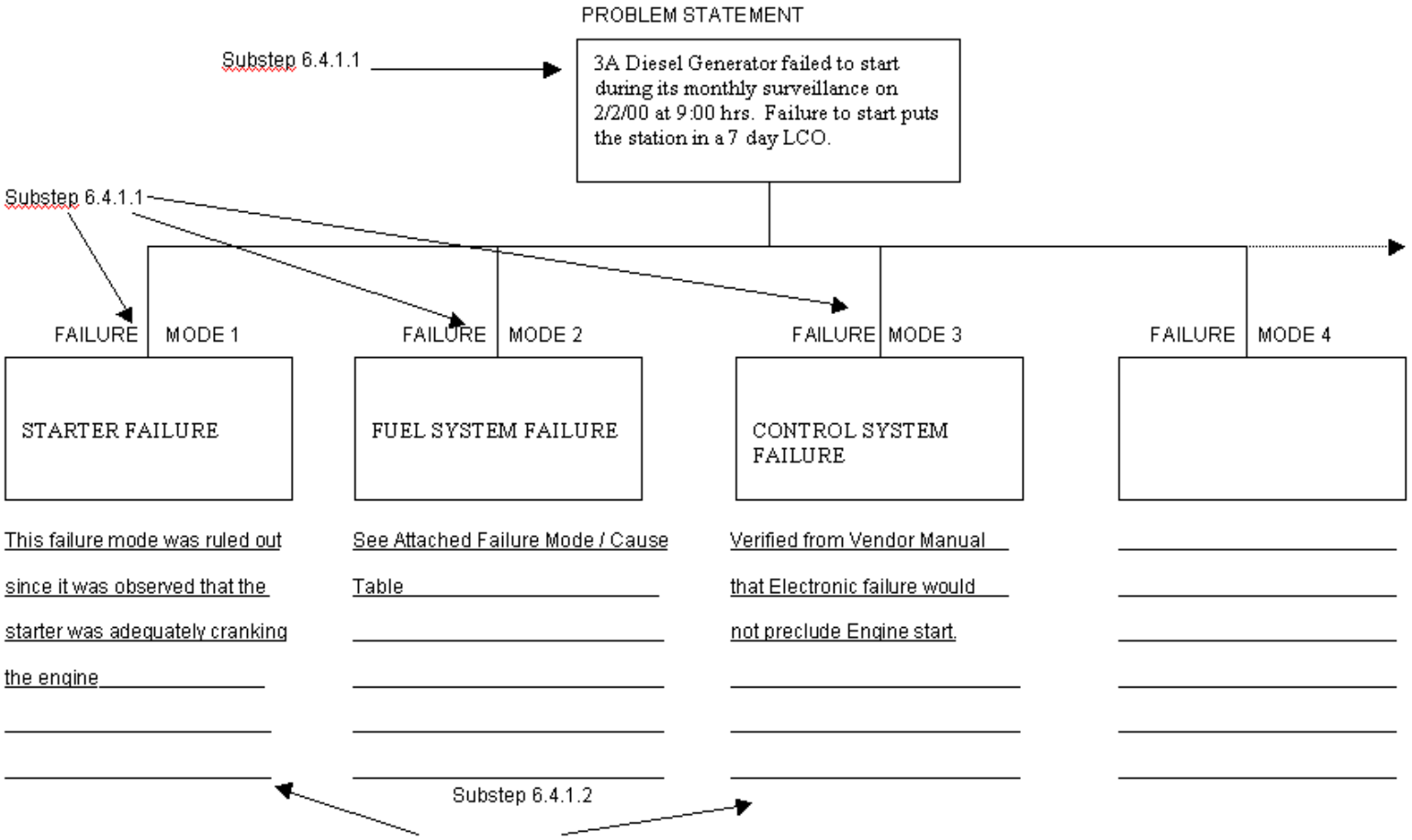
- Equipment Failure Corrective Action
  - Troubleshooting process problems
  - Narrowly focused corrective actions
  - Limited extent of condition reviews
- Problem Identification and Resolution Improvements In Progress

Performance Improvement Initiatives

- Programmatic Improvements
  - Enhanced troubleshooting procedure
    - Clear problem statement
    - Identification of failure modes
    - Validation of causes
    - Incorporation of results into the corrective action process

Performance Improvement Initiatives

ATTACHMENT 3
(Page 1 of 3)
TROUBLESHOOTING FAILURE MODE/CAUSE TABLE EXAMPLE



Performance Improvement Initiatives

ATTACHMENT 3
(Page 2 of 3)
TROUBLESHOOTING FAILURE MODE/CAUSE TABLE EXAMPLE
(Failure Mode / Cause Table)

TROUBLESHOOTING FAILURE MODE / CAUSE TABLE EXAMPLE

Failure Mode No. 2 Description Fuel System Failure

Cause(s)	Validation/Action Steps	Results		Owner Status
		Expected	Actual	
1. Fuel Filter Plugged	Run fuel pump and check pressure drop across filter. Remove filter element and check for cleanliness	0 – 5 psig No visual signs of dirt or debris	_____ _____ _____ _____ _____ _____ _____ _____	OPS OPEN MMM OPEN
2. Fuel Pump Broke	Check discharge pressure while cranking engine. Disassemble pump and inspect	20 – 30 psig No visual degradation	_____ _____ _____ _____ _____ _____ _____ _____	SYS. ENG. OPEN **MMM** OPEN
3. Plugged Supply Line	Disconnect line before fuel pump and verify fuel flow	Fuel Flow at 1.0 gpm	_____ _____ _____ _____ _____ _____ _____ _____	MM OPEN
4. Lack of Fuel in Tank	This cause was ruled out since a visual check of level in the tank confirmed that adequate fuel level exists.	N/A	_____ _____ _____ _____ _____ _____ _____ _____	

Performance Improvement Initiatives

- Programmatic Improvements (cont.)
  - Significant change to corrective action procedure
    - Additional guidance for repeat events
      - Review past identified occurrences
      - Determine why previous corrective actions were not effective
      - Determine if the previous evaluations were too narrowly focused

Performance Improvement Initiatives

- Programmatic Improvements (cont.)
  - Expanded guidance for generic implications and extent of condition
    - Develop a comprehensive list of components or systems that could have the same identified condition
    - Determine other common characteristics (e.g., personnel, procedure, material, vendor, age, location, environment, etc.)
    - Identify extent of condition

Performance Improvement Initiatives

- Programmatic Improvements (cont.)
  - Expanded guidance for human performance errors
    - Development of specific error description
    - Identification of precursors
    - Identification of causes
      - Individual
      - Team
      - Organizational

Performance Improvement Initiatives

- Organizational Initiatives
  - Established Performance Improvement Departments
  - Created division performance improvement coordinator position
    - Coordinate industry benchmarking
    - Standardize fleet approach
  - Hiring engineers and adjusting staffing levels
    - Improve focus on equipment reliability
    - More proactive approach for equipment health

Performance Improvement Initiatives

- Strategic Initiatives
  - Equipment Reliability
  - Breaker Reliability
  - Life Cycle Management

Instrument Air

- Design
  - Four Compressors installed; 2 Electric Driven, 2 Diesel Driven
  - One Compressor required for plant load
- Operational Issues
  - Fuel system failures
  - Water intrusion
  - High temperature trips
  - Electrical failure
  - Cold weather failures

Instrument Air

- Applied revised troubleshooting procedure
  - Formed multi-discipline team
  - Obtained vendor input
  - Performed historical review of failures
- Extensive corrective actions implemented
  - Increased engine idle speed
  - Modified logic scheme
  - Improved preventive maintenance activities
  - Incorporated industry operating experience and vendor input
  - Improved post modification and maintenance testing
  - Monitoring modifications planned

Auxiliary Feedwater

- Design
  - Two trains
  - 3 turbine driven pumps
    - 1 pump required per train
    - Additional pump aligned to either train
  - Common to both Units
- Pump failure due to loss of oil pressure
  - Pumps realigned to maintain two train operability
- Applied revised troubleshooting procedure
  - Formed multi-discipline team
  - Obtained vendor input
  - Performed historical review of failures

Auxiliary Feedwater

- Root Cause
  - Foot valve did not maintain the main oil pump line full
  - Excessive clearances in main oil pump
- Corrective Action
  - Replaced foot valve
  - Reworked the main oil pump
  - Installed loop seal in oil line
  - Improved post modification and maintenance testing
  - Applying corrective actions to other pumps

15% Feedwater Bypass Valve Stem Separation

- Background
  - During start up, after refueling, Unit 2 tripped on low steam generator levels
  - 2 A 15% Bypass Valve was open with no flow
  - Event response team formed
- Root Cause
  - Sheared valve stem caused by high cycle fatigue due to worn piston rings
  - Valve PM program implementation
- Corrective Actions
  - Inspected remaining 15% Bypass Valve stem/plug assemblies
  - Significant extent of condition review performed
  - Increase PM overhaul frequency to 36 months
  - Initiated review of valve PM program

Conclusions

- Equipment Performance Improvements
  - Programmatic
  - Organizational
  - Strategic initiatives
- Starting to See Positive Benefits
  - Turkey Point 4KV breaker / cubicle interface
  - External corrosion

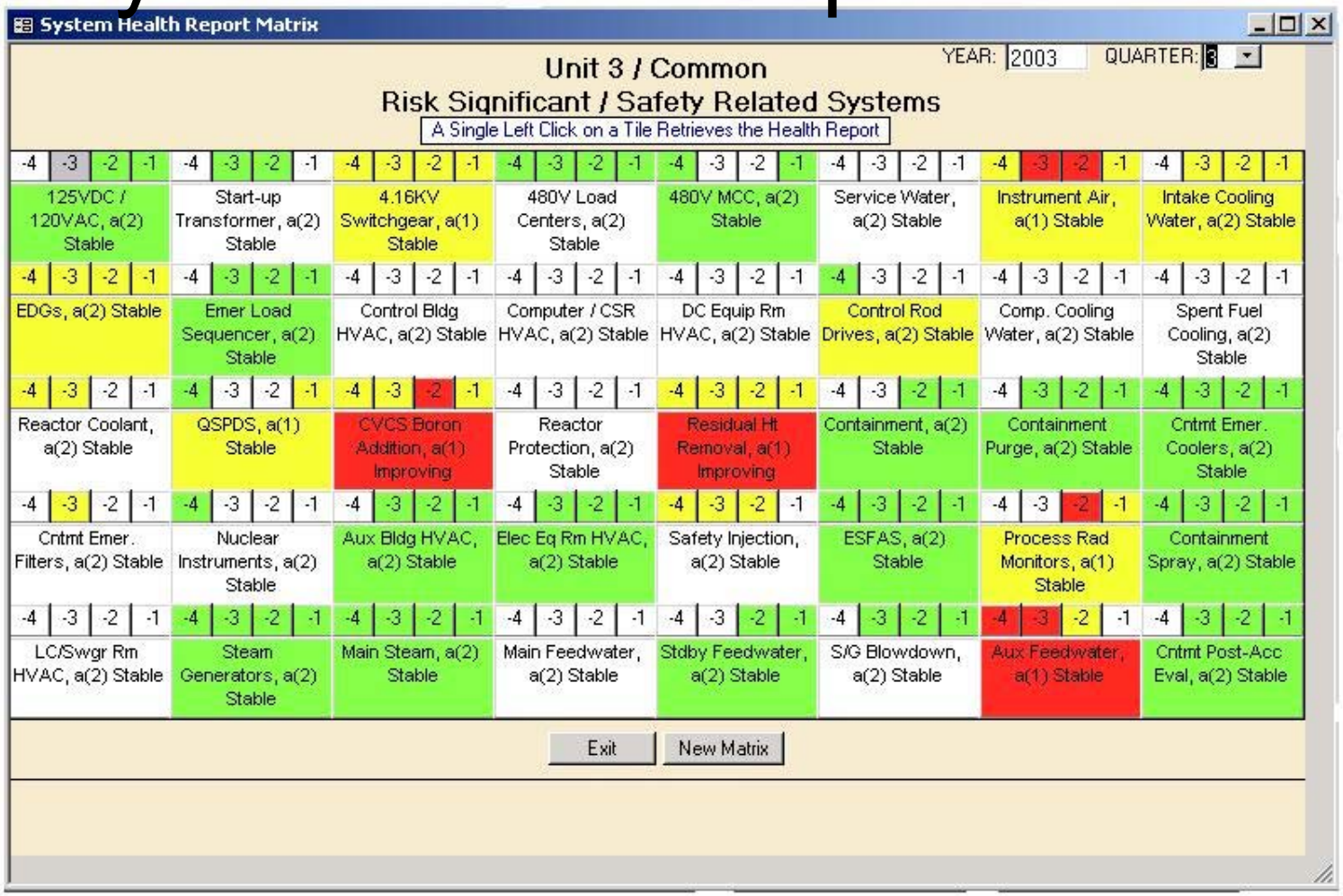
Equipment Reliability

J. Cadogan

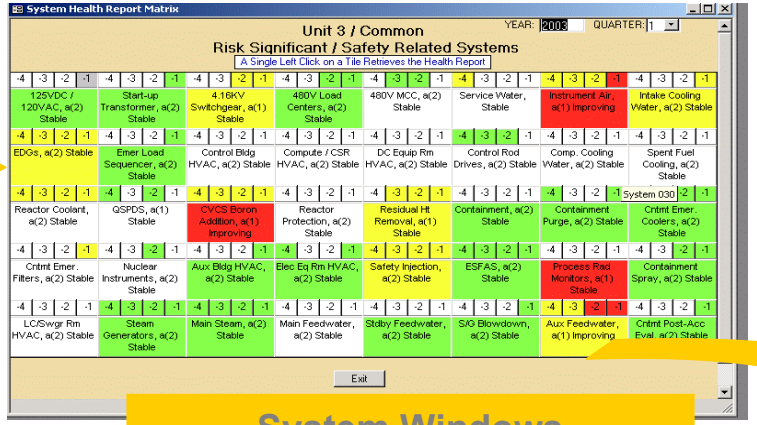
Maintenance Rule and Equipment Reliability

- Division level process changes to include
  - Maintenance Rule process supports Equipment Reliability
  - Integration of System Health Reporting and the Maintenance Rule to drive equipment health
  - Significant element of Fleet Equipment Reliability Improvement Plan

System Health Reports

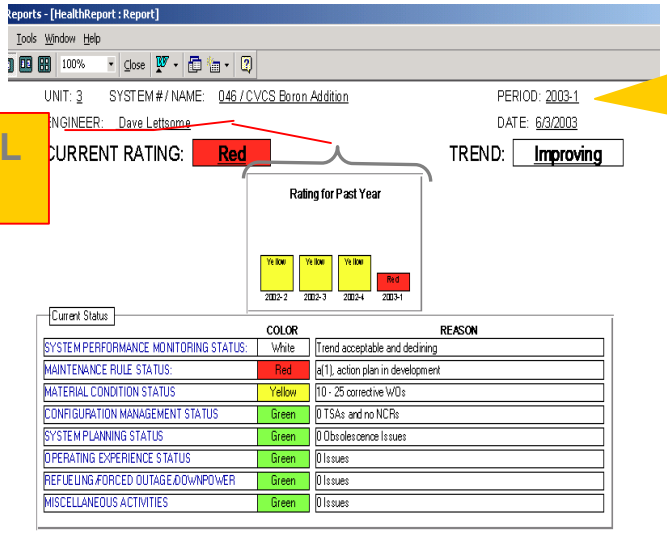


System Health Report Icon



System Windows (Point & click)

LINKS TO HISTORICAL HEALTH REPORTS



System Health Reports - [HealthReport : Report]

File Edit View Tools Window Help

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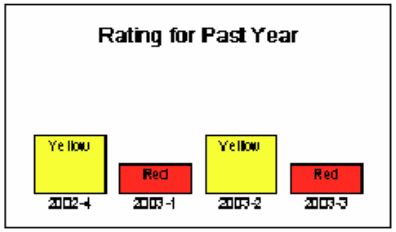
TURKEY POINT NUCLEAR PLANT

SYSTEM CHECKLIST / HEALTH REPORT

UNIT: 3 SYSTEM # / NAME: 046 / CVCS Boron Addition PERIOD: 2003-3

ENGINEER: Mike Caselli DATE: 11/24/2003

CURRENT RATING: **Red** TREND: **Improving**



Current Status

	COLOR	REASON
SYSTEM PERFORMANCE MONITORING STATUS:	White	Trends acceptable and declining
MAINTENANCE RULE STATUS:	Yellow	a(1), action plan working
MATERIAL CONDITION STATUS	Yellow	10 - 25 corrective WOs
CONFIGURATION MANAGEMENT STATUS	Green	0 TSAs and no NCRs
SYSTEM PLANNING STATUS	Green	0 Obsolescence Issues
OPERATING EXPERIENCE STATUS	Yellow	1 Nuc Safety or compliance issue
REFUELING / FORCED OUTAGE / DOWNPOWER	Green	0 Issues requiring a FO / RO or down power
MISCELLANEOUS ACTIVITIES	Green	0 Significant System Issues

Page: 1

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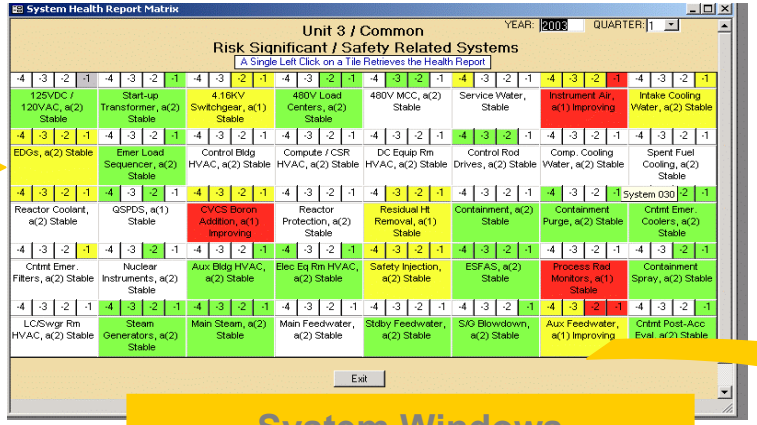
System Health Report Icon



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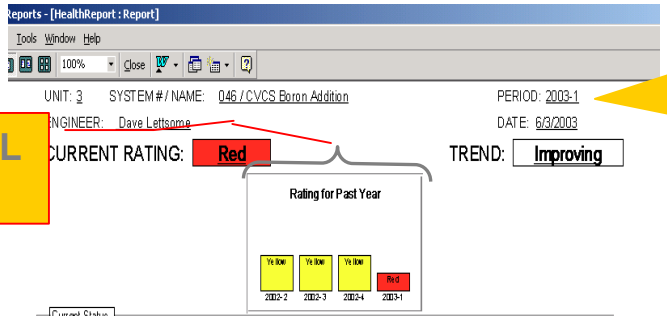


System Engineer

Plant Health Committee

- Oversight
- Leadership
- Prioritization

Maintenance Rule (a)(1) Action Plan Timeline

Common, Unit 3 and Unit 4

Structure, System or Component (SSC)	Date Placed in (a)(1)	Reason	Open Action Plan Summary	SSC Owner	Return to (a)(2)	Milestones and Planned Return to (a)(2) Status										
						2003	2004									
						4th Qtr	Jan	Feb	Mar	Apr	May	Jun	3rd Qtr	4th Qtr	After 12/31/04	Performance Comment
Common																
AFW	10/03	R	WOs 33014567, 33016752, and PMCR 03-434075 remain. MRule (a)(1) actions plan in development and will be established under CR 03-2174.	Chambers	5/04	12/15/2003	1/30/2004				5/30/2004					
Unit 3																
Unit 3 CVCS	12/03	R	WOs 33015862 initially scheduled for 12/02 moved to 03/11/04. (a)(2) restoration requires 3 consecutive surveillances in which emergency boration flow is established.	Lettsome	1/05				3/11/2004						After 2005	The March date for corrective action implementation is due to parts availability.
RAD-6426	8/03	R	Corrective Actions complete. In monitoring.	Richardson	1/04		1/30/2004									
Unit 3 3CD Instrument Air Compressor	11/00	R / U	Corrective Actions complete. In monitoring phase.	Peschke	4/04					4/30/2004						
Unit 3 4KV Breakers	11/02	R	Corrective Actions complete, in monitoring phase.	Jenkins	1/04							6/30/2004				
Unit 3 QSPDS - 3A train	1/03	R	Immediate Corrective Actions complete. System replacement needed for long-term reliability.	Richardson	After System Replacement										ONE YEAR	Note 2
Unit 3 R-15	2/03	R	WOs 33011999, 33012034 and 33012000 scheduled to inspect and overhaul impacted SSCs.	Richardson	10/07									10/04 R3-21 Outage	1/30/2007	Note 3
Unit 3 RHR Room Sumps	9/02	R	(a)(1) action plan in development. U3 RHR sump pumps/level switches have been replaced.	Ballon	TBD	**Conditionally approved on 10/03, goals and monitoring dates have yet to be approved by PNSC. Root Cause complete, awaiting PNSC. Due: 12/19/03.**										Note 1
Unit 4																
Unit 4 ARPI Connectors	3/03	R	Immediate Corrective Actions complete. Connector replacement needed for long-term reliability.	Robinson	After Connector Replacement									10/04 R3-21 Outage	1/30/2007	
Unit 4 CVCS	3/03	R	Corrective Actions complete. In monitoring phase.	Lettsome	1/04		1/30/2004									
Unit 4 4KV Breakers	11/02	R	Corrective Actions complete. In monitoring phase.	Jenkins	1/04							6/30/2004				
Unit 4 QSPDS - 4A train	1/03	U	Immediate Corrective Actions complete. System replacement needed for long-term reliability.	Richardson	After System Replacement										TWO YEARS	Note 2
Unit 4 QSPDS - 4B train	1/03	R	Immediate Corrective Actions complete. System replacement needed for long-term reliability.	Richardson	After System Replacement										TWO YEARS	Note 2
Unit 4 4CD Instrument Air Compressor	11/00	R	WO's 33014105, 33014104, 33012890, 33009167, 33014226, 33000297, 33012896	Peschke	4/04	12/15/2003				4/30/2004						
Unit 4 EDG	5/03	R	Corrective Actions complete. In monitoring phase.	Scheffing	12/03	12/30/2003										
Unit 4 4C Emergency Containment Filter	1/03	U	Corrective Actions complete, in monitoring phase.	Melchor	7/04								7/30/2004			
Unit 4 RHR Room Sumps	9/02	R	4 Pumps / assemblies currently being replaced, (a)(1) action plan in development.	Ballon	TBD	**Conditionally approved on 10/03, goals and monitoring dates have yet to be approved by PNSC. Root Cause complete, awaiting PNSC. Due: 12/19/03.**										Note 1

Reason Status:	
Reliability	R
Unavailability	U
Condition Monitoring	C
Plant Level Monitoring	P

LEGEND: Color indicates milestone type. A date in block indicates scheduled in Action Plan.

Soft Issue	Field Work	Monitoring Phase	Return to (a)(2)
Grey	Orange	Light Green	Blue

Performance Comment Legend:	
Behind schedule or otherwise challenged. Not having an Action Plan approved within 30 days of going (a)(1) is at least "Yellow".	Yellow
Overdue or action plan adjustment required	Red

Definition of the Performance Indicator

The status of System (a)(1) Action Plans are shown on this indicator. Important activities and associated milestone dates are shown including the expected date for return to (a)(2) status. If more than one milestone occurs in a given time increment, the more significant millstone is shown. Soft Issues are those items other than actual field activities, such as procedure revisions, Design Change development, Work Order preparation, etc.

Performance Measurement / Goal

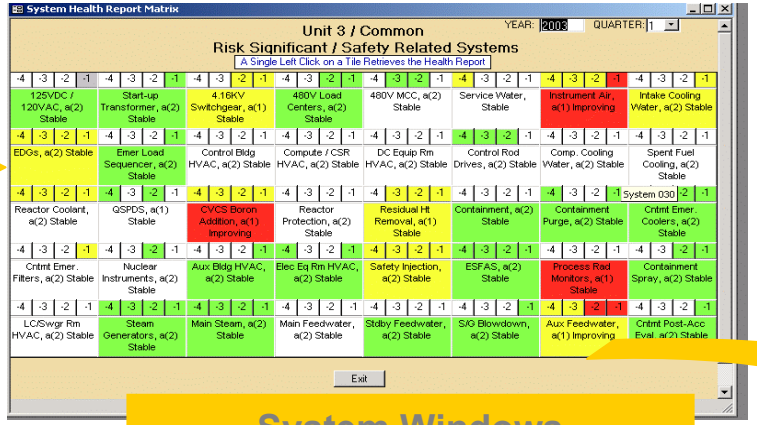
The goal is to complete planned activities supporting return of the (a)(1) structure, system, or component to (a)(2) status as scheduled. Activities that are at behind schedule or "at risk" will be flagged by applying the appropriate color in the "Performance Comment" column.

Analysis / Summary

Note 1. Details of Action Plan not identified.
Note 2. It should be noted that QSPDS will remain in (a)(1) until system replacement. This is scheduled for 2005 and 2006.
Note 3. Candidate for increased monitoring frequency.

Data Collected By: Jim Johns **Last Update:** 12/15/2003

System Health Report Icon



System Windows

(Point & click)

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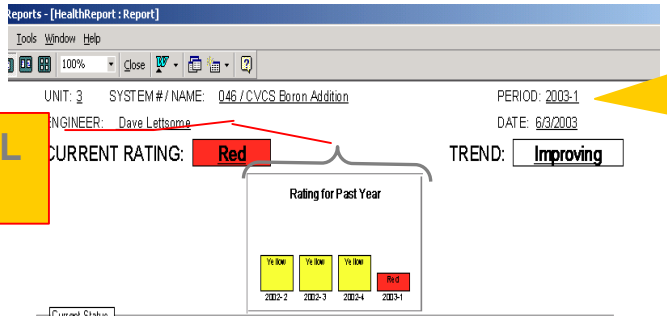


System Engineer

Plant Health Committee

- Oversight
- Leadership
- Prioritization

Work Management

(Scheduling and Action)

FPL

EQUIPMENT RELIABILITY IMPROVEMENTS / SIGNIFICANT PLANNED MAINTENANCE

Monday, December 15

Activity	Dept	Scheduled Start Date	Completion Date	System	Sys Health	Comments
3P16B 3B Primary Water makeup pump PMTs	MM EL/OP	12/15/03	12/15/03	020 Y A(2)	A G(1)	WTYP (1) PMT run @ 07:00
3A EDG Air Compressor Monthly/Quarterly PMs	MM	12/15/03	12/16/03	022 W A(2)		Clearance hang @ 04:00 Clr Rel/Test run: @10:00 on 12/16
Alarm Point 26 – Replace UV/IR detectors	EM	12/15/03	12/17/03	091		WTYP (7) PMAI for CR 02-1815
Circ Lube Water Piping Replacement – MSP-03-047	MM	12/15/03	12/19/03	010 W A(2)	C G(1)	Prep work – Install 12/19
U4 H2 Panel – Instr On-Line 18MO Calibration - Carryover	IC	12/09/03	12/18/03	090		DDD 12/14/03 WTYP (7)
E-16D Inverter/Battery Rm HVAC Bi-monthly PM	EL	12/15/03	12/16/03	025 W A(2)		DDD 12/29/03
3P26A/B RHR room B sump work Continuing work	MS	12/01/03	12/17/03	050 R A(1)	B W	WTYP (3)
U3/4 Safeguards Relay Rack Train B (STP0607 & STP1079)	OP	12/15/03	12/15/03	063 G A(2)		Start 11:00
U3/4 CTMT Isolation Rack QR51 (STP0609 & STP1081)	OP	12/15/03	12/15/03	063 G A(2)		Start 15:00
3A CTMT Spray Pump Semi-Annual PM	MM	12/15/03	12/15/03	068 G A(2)		Clearance hang @ 15:00 Clearance release @ 23:00 133.8 Hrs Remaining
P235D Diesel Service Water Pump Controller/Battery PMs	EL	12/15/03	12/15/03	012 W A(2)		Clearance hang @ 16:00 Clearance release @ 22:00 96.1 Hrs Remaining

Maintenance Rule and Equipment Reliability

- Developing organizational roles and responsibilities training to support process
- Investigating Maintenance Rule software improvements to provide better integration
- Maintenance Rule Program Quarterly Health Report and Indicators
- Detailed a(1) action plans
  - Reviewed by Expert Panel
  - Approved by Plant Health Committee

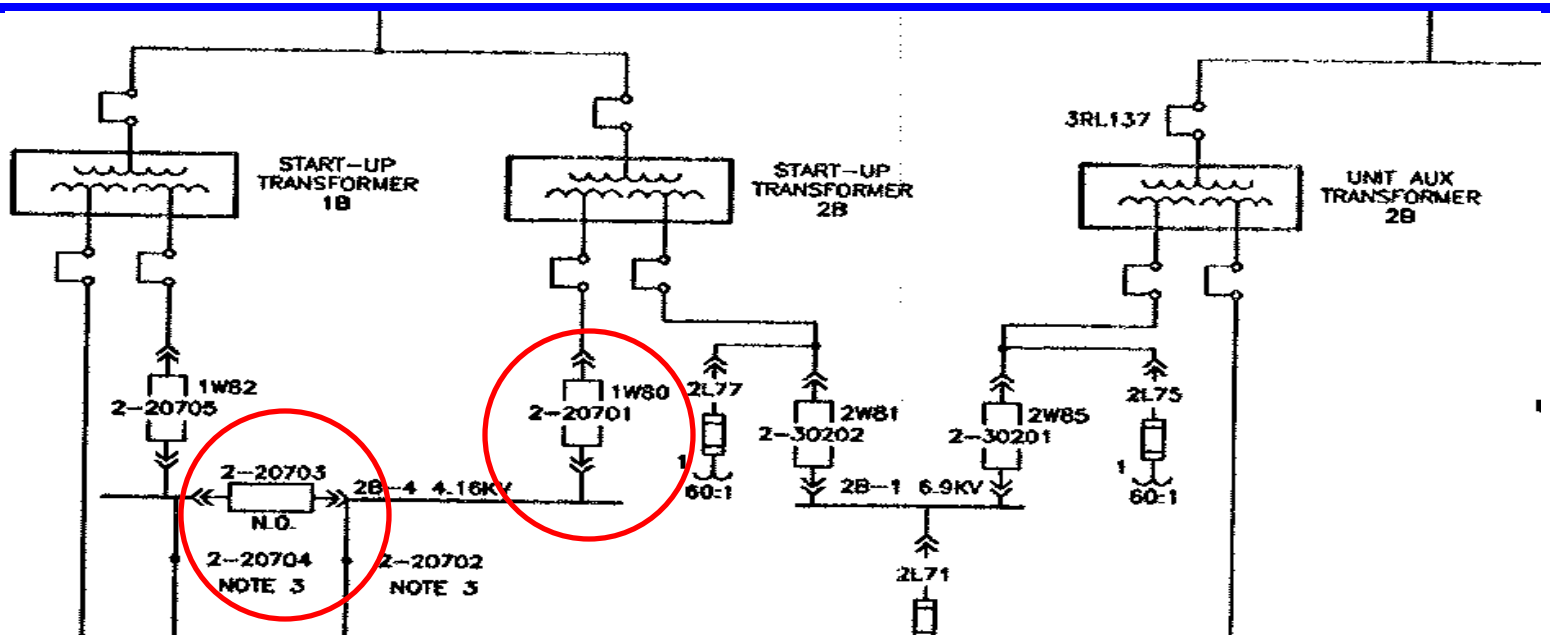
Breaker Reliability Improvements

J. Granger

Breaker Reliability Improvements

- Fleet wide evaluation performed to identify improvement action plan
- Reasons for breaker reliability improvement
  - 14 functional failures in past 3 years
  - Some repeat failures
  - 4.16 KV systems in Maintenance Rule a(1) status
  - Notice of Enforcement Discretion at St. Lucie

Breaker Reliability Improvements



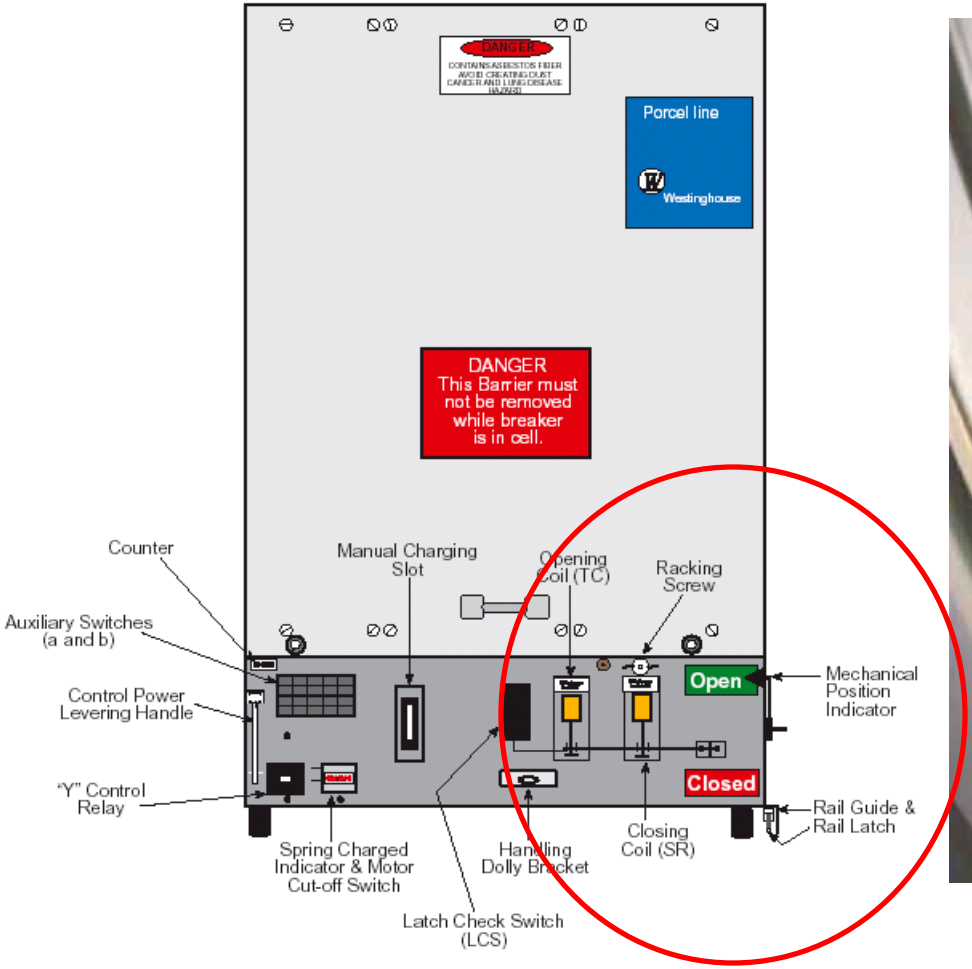
- On 11/22/03, St. Lucie Unit 2 required alternate line-up to the 1B startup transformer. Breaker in location 2-20701 relocated to 2-20703, failed to close on first two attempts.
- On 11/25/03, breaker relocated back to 2-20701 and failed to close.
- Outdoor Non-Safety switchgear (2A-4 and 2B-4) “flexible” floor can cause breaker to trip-free after rack-in due to spurious operation of floor tripper mechanism. Troubleshooting confirmed this as root cause.

Breaker Reliability Improvements

St. Lucie 2B-4 Non-Safety Switchgear

Breaker Reliability Improvements

St. Lucie Westinghouse DHP breaker



St. Lucie 4.16 KV switchgear floor tripper

Breaker Reliability Improvements

- St. Lucie DHP breakers interface with switchgear cubicle
  - DHP floor trippers only installed at St. Lucie.
  - Flexible floor primary concern with outdoor non-safety switchgear
  - No failures of safety related breakers due to floor tripper
  - Outdoor switchgear breakers perform no safety function and do not operate in any design basis event

Breaker Reliability Improvements

- St. Lucie DHP breakers interface with switchgear cubicle (cont.)
  - Floor trippers can cause failure to close after breaker is removed and then racked-in
  - Breakers do not trip once successfully closed
  - Switchgear floor stiffening being evaluated
    - Potential 72 hour LCO for bus outage

Breaker Reliability Improvements

- **Turkey Point 4.16 KV breaker failures due to switchgear interface**
  - 4B SI pump failed to close in March 2000 due to Positive Interlock Roller (PIR) adjustment problem on GE Magne-Blast Circuit Breaker
  - Incorrect PIR adjustment caused 3A CCW pump breaker failure to close in August 2002
  - Accelerated breaker overhauls increased breaker swaps
    - Increased potential for interface problems due to unique breaker “fit-up” requirements
  - Detailed corrective actions completed to prevent re-occurrence:
    - Inspections and required adjustments made on switchgear cubicle interface points
    - Operations and Maintenance procedures revised to address critical checks and tolerances
    - New procedure with detailed checks and testing for breaker “swaps”
    - Training completed for Electrical Maintenance and Engineering personnel.
  - Further enhancements to standardize switchgear cubicles being performed during bus outages (2 of 4 buses complete)
  - Four breaker overhauls remaining in 2004
    - Future breaker swaps minimized

Breaker Reliability Improvements

GE Magne-Blast 4.16 KV Breakers PIR design

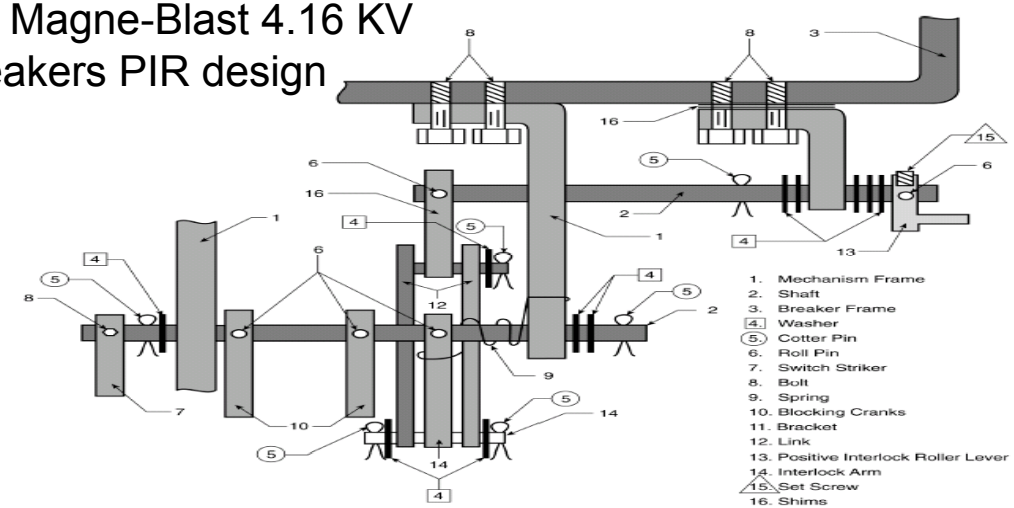


Figure 6-12
Positive Interlock Assembly

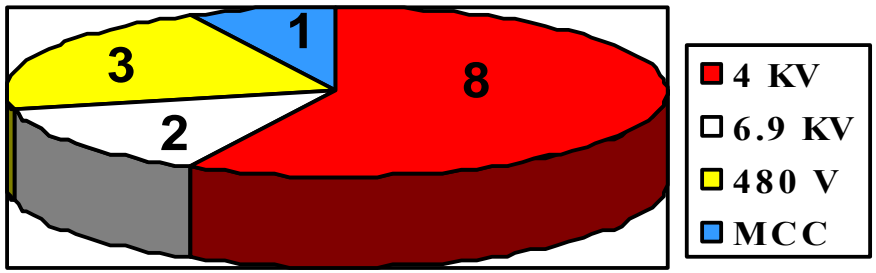
PIR must be centered in notch of cam plate with 1/16” clearance

52/IS switch striker clearance must be less than 1/32” to ensure actuated (racked-in)

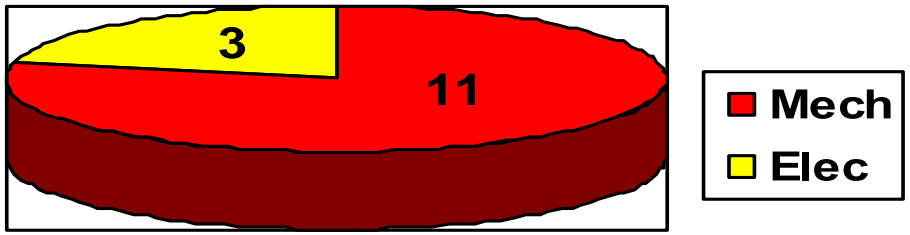
Breaker Reliability Improvements

Functional Failures in Past 3 Years

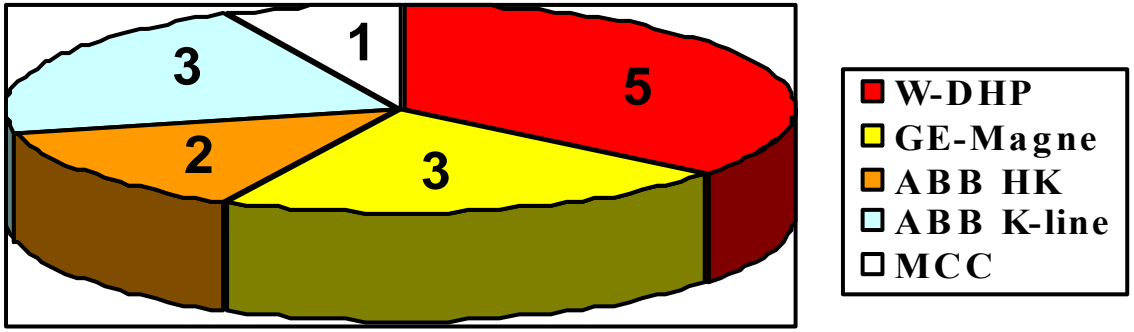
Failures by Voltage Class



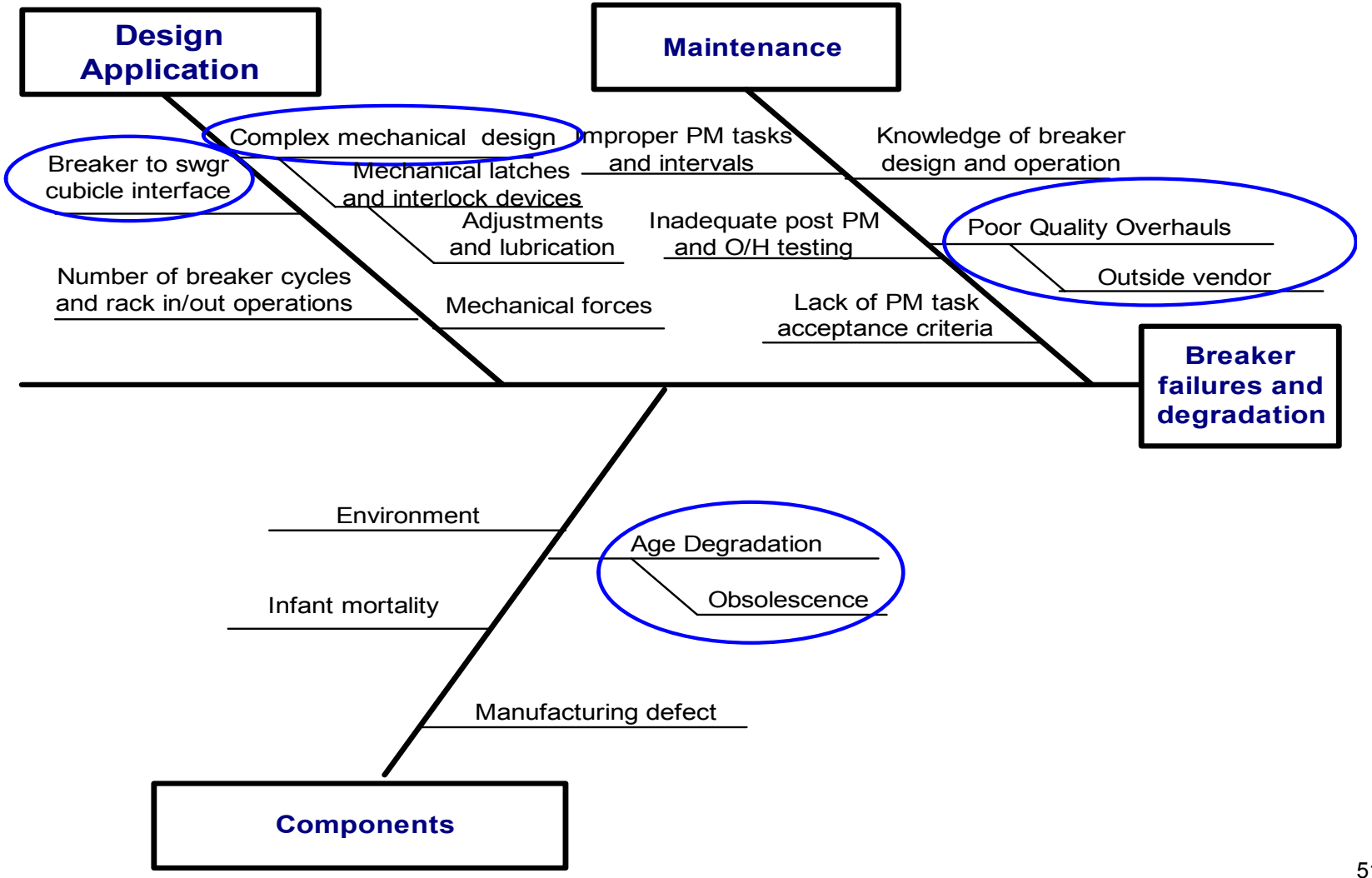
Failures by Mechanism



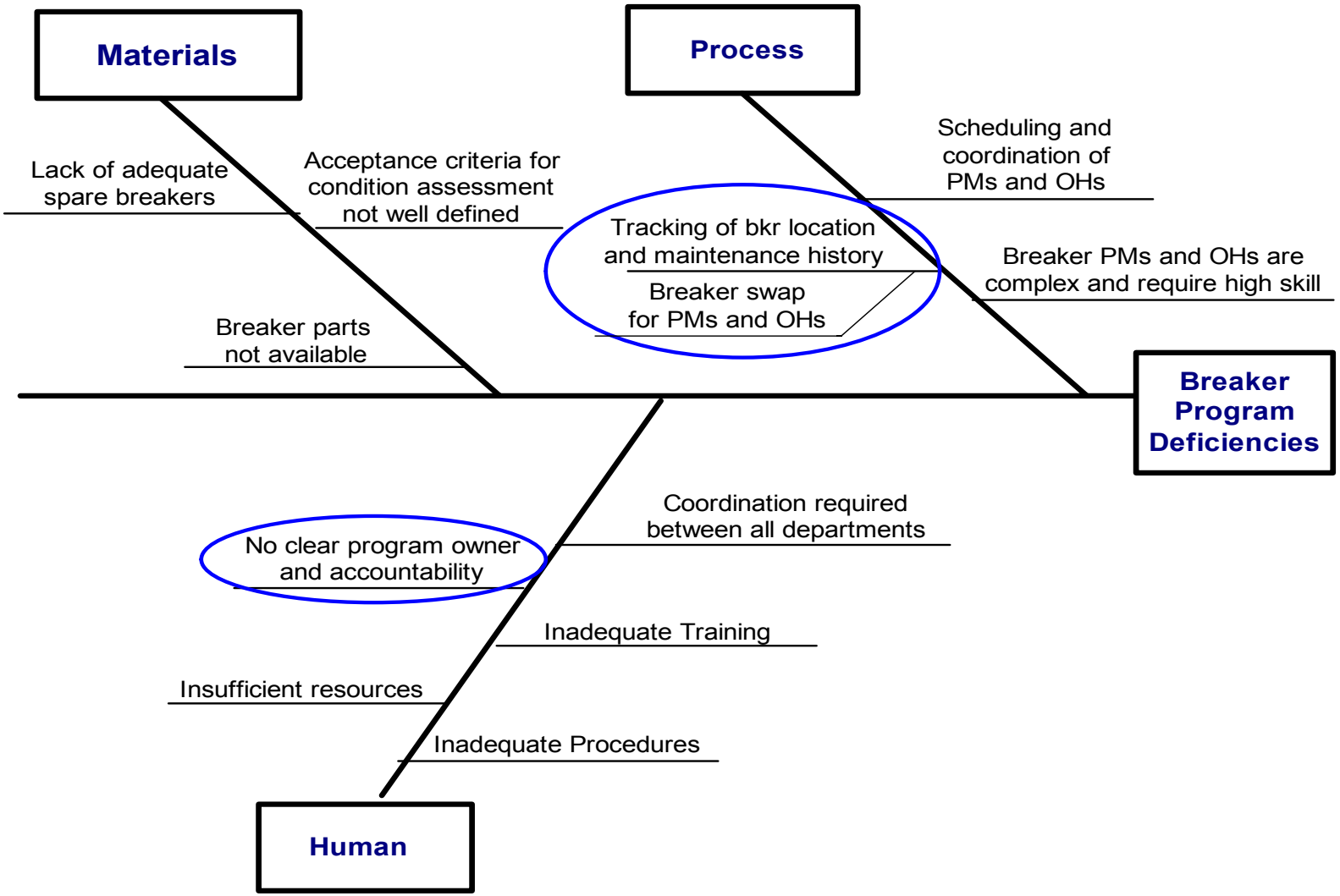
Failures by Manufacturer



Breaker Reliability Improvements



Breaker Reliability Improvements



Breaker Reliability Improvement Plan

FPL

Counter-measures: Breaker to Switchgear Interface

Site	Counter-Measure	Basis - Effect	Strategy	Fleet Actions	Site Actions
St. Lucie	Identify and correct interface deficiencies Verify procedures address critical interface requirements Reduce frequency of breaker rack-in/out	Root cause of functional failures at Turkey Point and St. Lucie Reduce potential for misalignment during breaker install	Switchgear cubicle inspection and maintenance Standardize switchgear cubicles Evaluate increasing PM and overhaul intervals	Evaluate basis for PM and overhaul intervals Validate corrective actions implemented for CR 01-2681	Verify procedures address critical interface requirements Validate adequacy of switchgear inspections, scope and interval Verify interface design for DHP replacement breakers
Turkey Point				Evaluate basis for PM and overhaul intervals Validate corrective actions implemented for CR 02-1544	Verify procedures address critical interface requirements (complete for GE breakers) Perform switchgear inspections and maintenance during next outage (3B and 4A complete)
Sea-brook	Note: No problem currently observed at Seabrook				Verify procedures address critical interface requirements Validate adequacy of switchgear inspections, scope and interval

Breaker Reliability Improvements

- Action Plan Summary
  - Reliability
    - Planning St.Lucie 4 KV and 6.9 KV breaker replacement starting in April 2004
      - Stiffening outdoor switchgear floor
    - Complete Turkey Point breaker replacement on C-bus in 2004
    - Replace Turkey Point 4 KV GE Magne-Blast breakers prior to next overhaul cycle
    - Identify and correct switchgear cubicle interface deficiencies
    - Increase monitoring, inspection, testing of overhauled breakers
    - Evaluate using Seabrook to perform fleet overhauls of ABB breakers

Breaker Reliability Improvements

- Action Plan Summary (cont.)
  - Program
    - Assign breaker program owner and team
    - Consistent program documentation and procedures
    - Controlled process for tracking breaker status and history

Breaker Reliability Improvements

- St. Lucie DHP Breaker Replacement Improvements
  - Simple operating mechanism with less failure modes
  - Less maintenance required at longer intervals
    - 4 hours duration, 6 year intervals
  - Reduced maintenance minimizes breaker “swapping”
  - Weight of new breakers significantly less
    - Reduces switchgear interface problems
  - Less mechanical forces required to operate breaker
    - Reduced vibration

Breaker Reliability Improvements

SF6 Replacement Breaker

DHP Breaker

Life Cycle Management

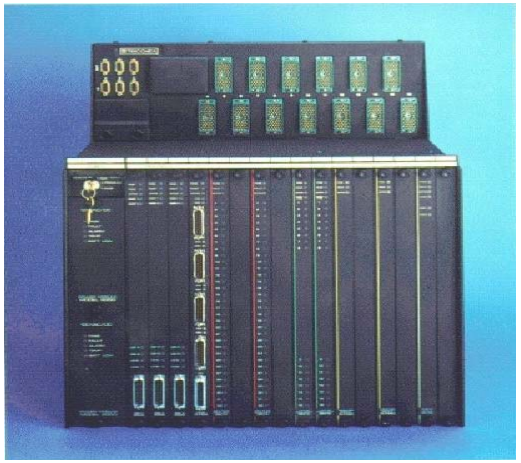
D. Tomaszewski

Life Cycle Management

- Program to Effectively Cope with Aging Systems and Components in FPL Nuclear Plants
- Near Term Focus is Instrumentation and Control Systems
- Replacements of Selected I&C Systems are in process
- Improved Data Gathering Capability and Human Factors

Life Cycle Management

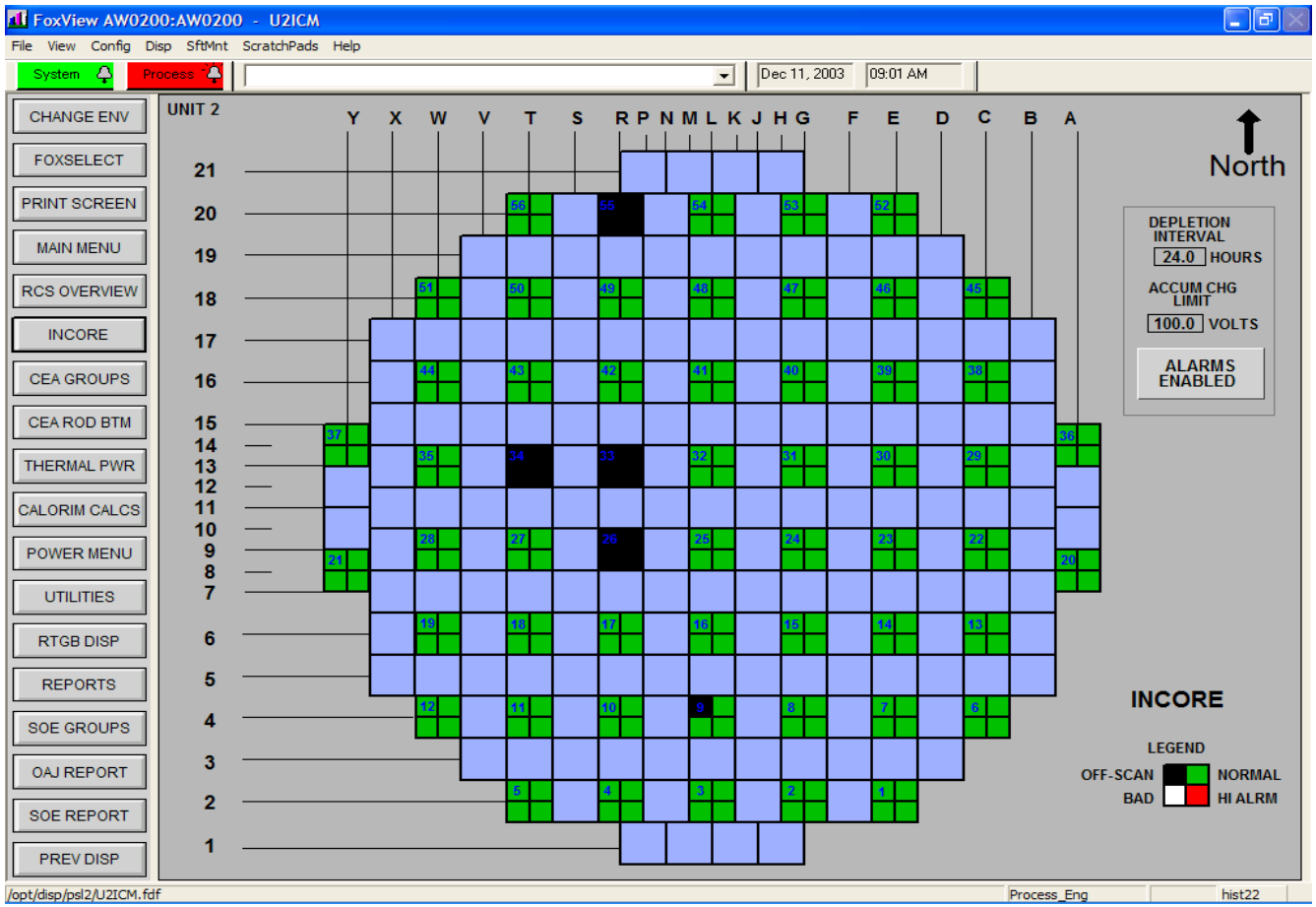
- Standard Platform Approach to System Replacements
  - Distributed Control System, Foxboro I/A
  - Safety Related Platform, Triconex
- Design Includes Redundancy and Diversity



Life Cycle Management

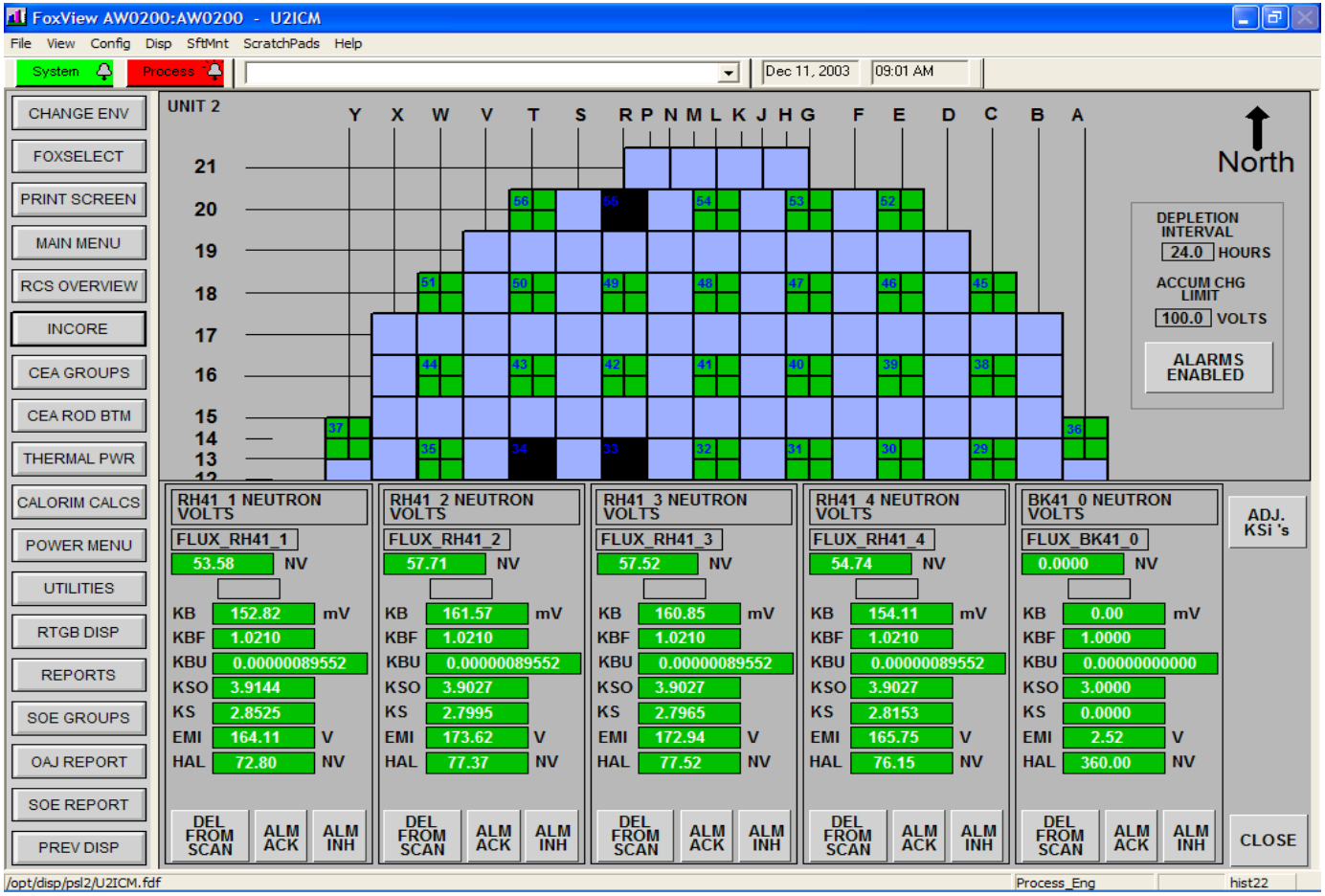
- St. Lucie Digital Data Processing System Replacement
  - Unit 2, In-service since May 2003
  - Unit 1, Installation to be completed March 2004
- Three Functions plus Sequence of Events

Life Cycle Management



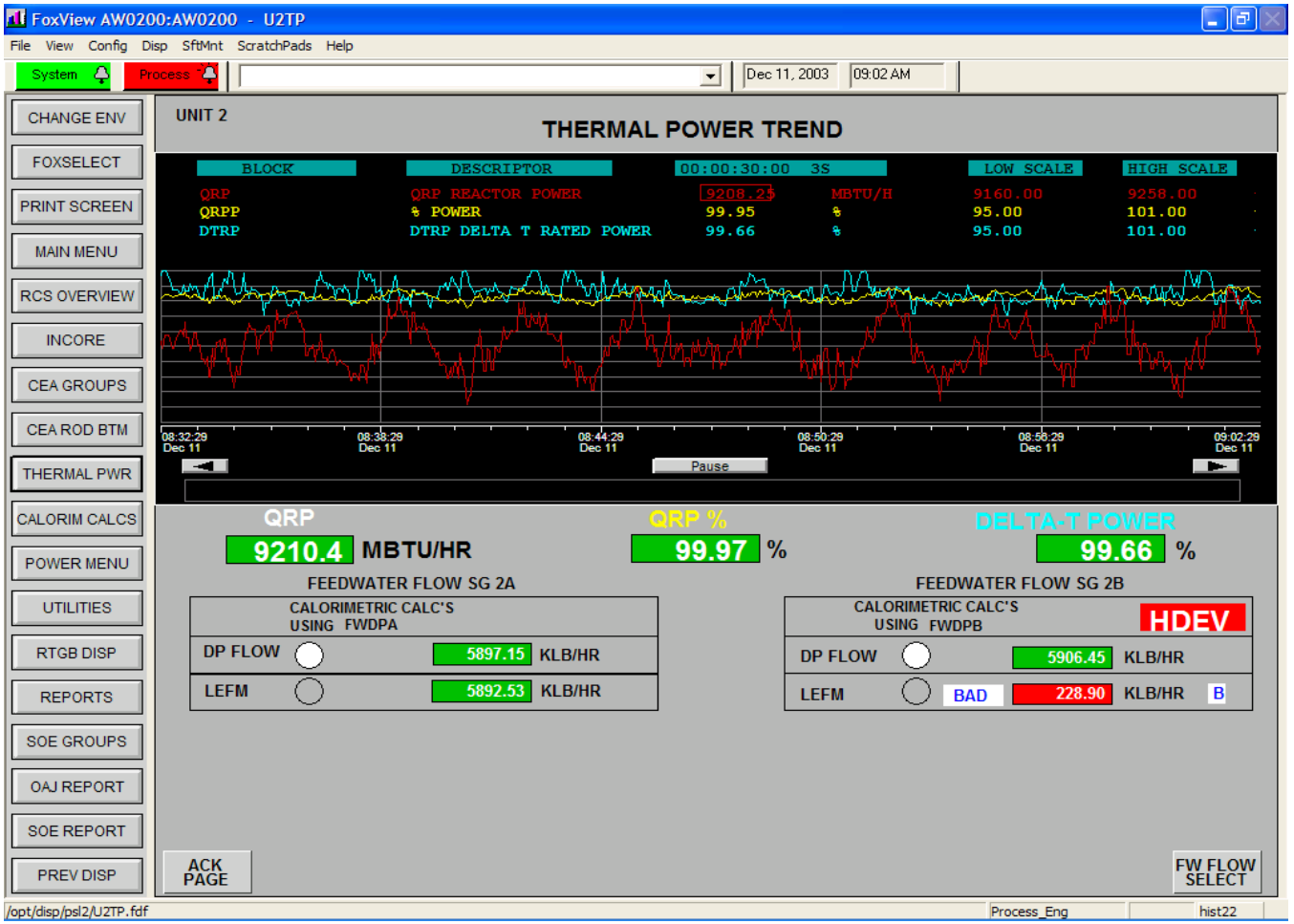
- Incore Detectors/Linear Heat Rate Monitoring

Life Cycle Management



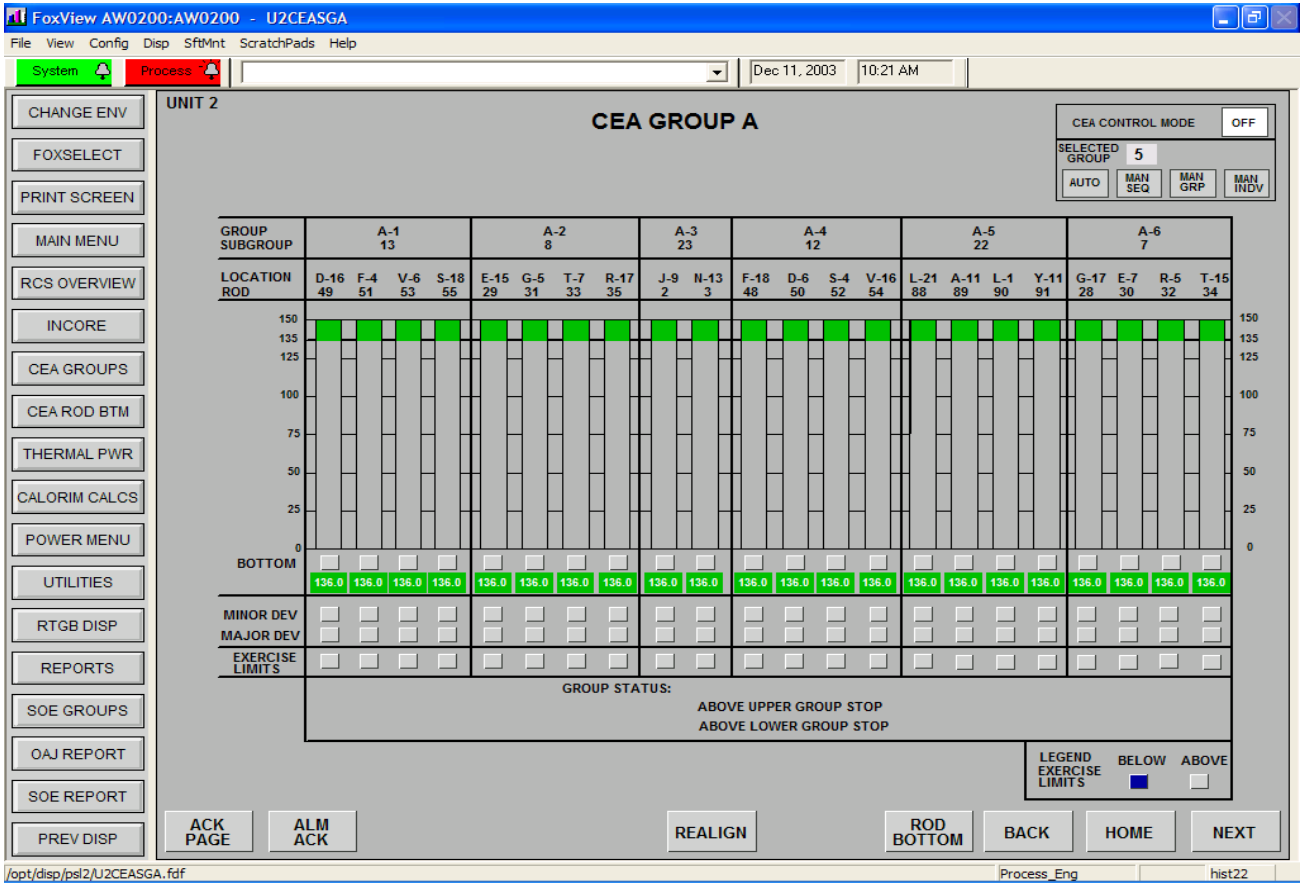
- Incore Detectors/Linear Heat Rate Monitoring

Life Cycle Management



- Calorimetric Power Determination

Life Cycle Management



- Control Element Assembly Pulse Count Position Indication

Life Cycle Management

- Planned Projects Scheduled Through 2005
  - Qualified Safety Parameter Display Systems
  - Emergency Response Data Acquisition and Display Systems
  - Feedwater and Low Power Feedwater Control Systems
  - Turkey Point Auxiliary Feedwater Controls
  - Turkey Point Steam Dump Controls

Life Cycle Management

- St. Lucie Project Plans

	PROJECT	2003	2004	2005	2006
PSL1	Digital Data Processing System				
	Feedwater Controls				
	Qualified Safety Parameter Display System				
	Emergency Response Data Acquisition and Display				
	Turbine Controls				
	Condensate and Cooling Water Control and Instr.				
	Turbine Building/ Heater Drains				
	Reactor Protection System				
PSL 2	Digital Data Processing System				
	Feedwater Controls				
	Qualified Safety Parameter Display System				
	Emergency Response Data Acquisition and Display				
	Turbine Controls				
	Condensate and Cooling Water Control and Instr.				
	Turbine Building/ Heater Drains				
	Reactor Protection System				

Life Cycle Management

- Turkey Point Project Plans

	PROJECT	2003	2004	2005	2006
PTN 3	ERDADS				
	Qualified Safety Parameter Display System				
	Auxiliary Feedwater Controls				
	Feedwater Controls and Steam Dump to Atm.				
	Steam Dump to Condensor				
	Reactor Protection System				
	Reactor Coolant, Chemical and Volume Control				
	Pneumatics/Turbine Building				
PTN 4	ERDADS				
	Qualified Safety Parameter Display System				
	Auxiliary Feedwater Controls				
	Feedwater Controls and Steam Dump to Atm.				
	Steam Dump to Condensor				

Life Cycle Management

- Additional Planned LCM Projects

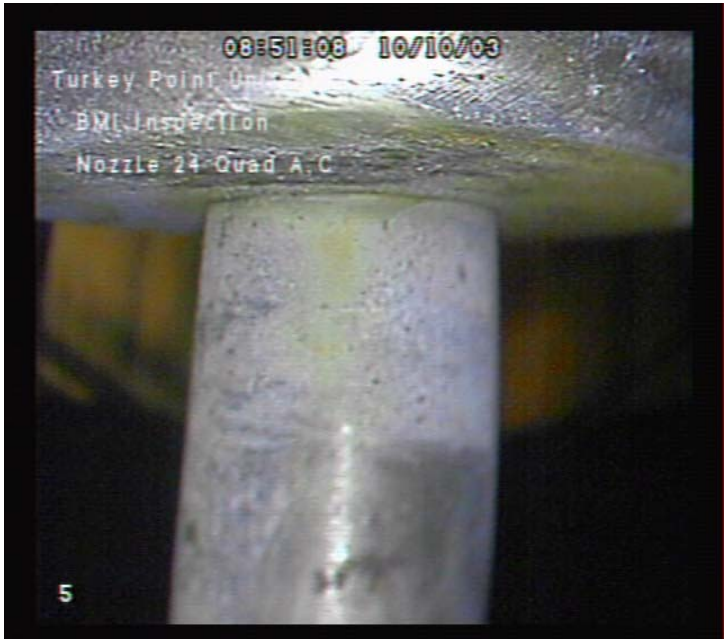
	PROJECT
PSL1	Motor Generator Set Controls
	Instrument Inverter Replacement
	Auxiliary Feedwater Governor
PSL 2	Acoustic Feedwater Flow Measurement Upgrade
	Motor Generator Set Controls

Materials Management

R. Gil

Materials Management

- Alloy 600 and other materials issues continue to be a focus area
- Bottom Mounted Instrumentation (Turkey Point)
  - Bare metal visual completed at Turkey Point Unit 4
  - No leaks or boric acid accumulation identified
  - Timing for UT inspections being evaluated



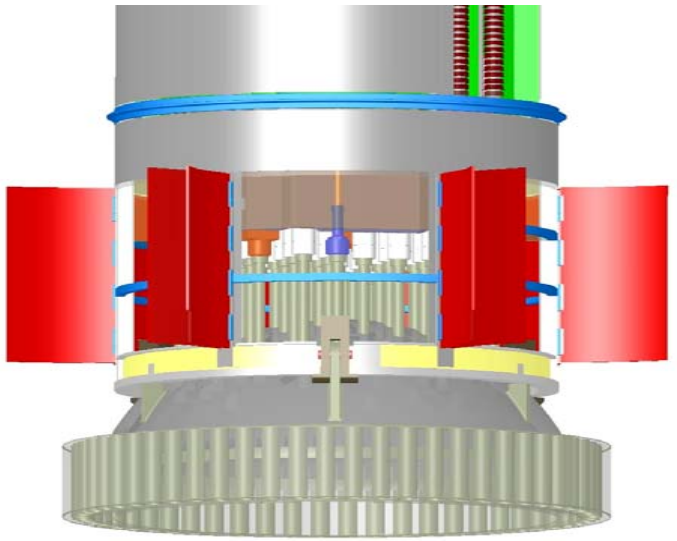
Turkey Point Unit 4
BMI Visual

Materials Management

- Small Bore Instrument Nozzles (St. Lucie)
  - Hot leg and pressurizer bare metal visuals performed each outage
  - Replacing on prioritized basis
  - Unit 2 hot leg and pressurizer nozzles already replaced
- Pressurizer Heater Sleeves (St. Lucie)
  - Unit 1 mitigated with nickel plating
  - Visual inspections per industry recommendations
  - Long term resolution being evaluated

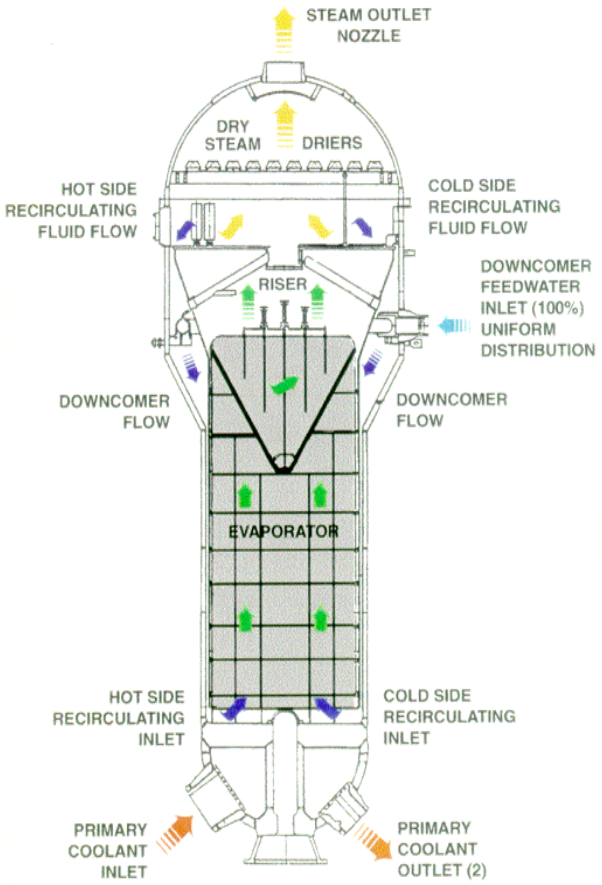
Materials Management

- Butt Welds (St. Lucie)
  - Augmenting ISI with bare metal visuals
  - Mitigation options being evaluated
- Reactor Head Penetrations
  - All four heads volumetrically inspected
  - No leaks or wastage identified
  - St. Lucie Unit 2 repaired two cracked penetrations
  - Plans in place to replace all four heads



Materials Management

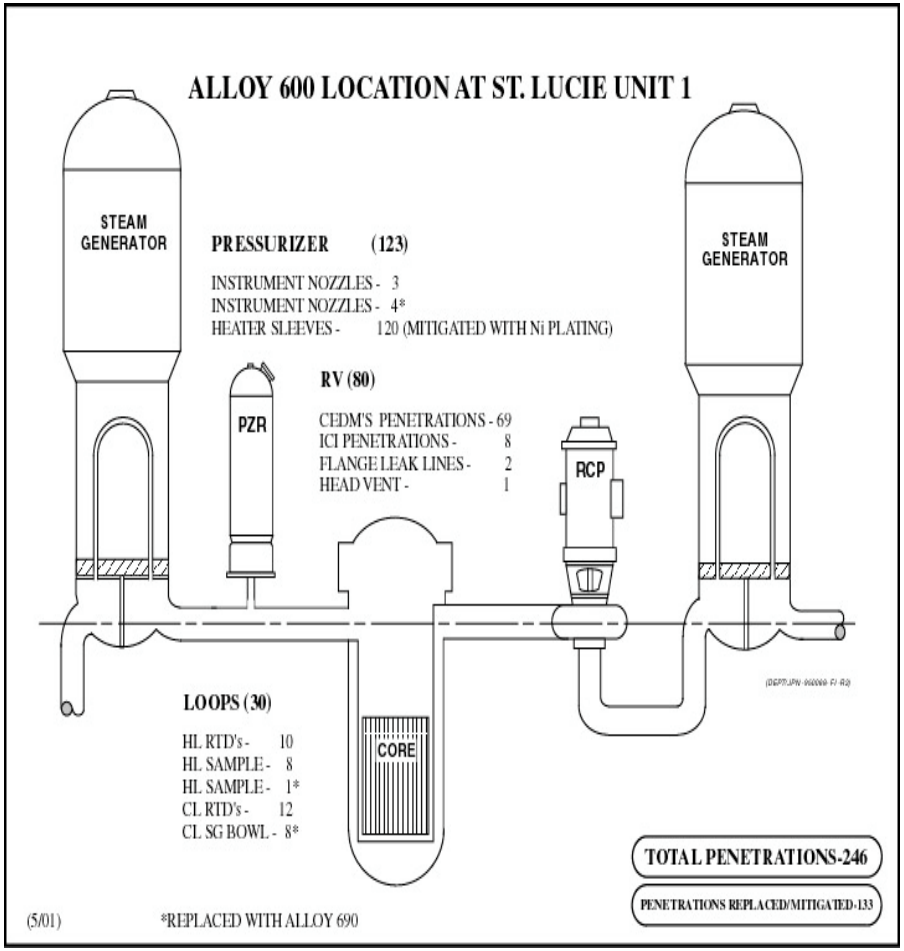
- Steam Generators (St. Lucie Unit 2)
  - 361 Tubes Plugged in ’01
  - 530 Tubes Plugged in ‘03
  - Increased Cracking at Eggcrates (257/482)
  - No Ding Indications in ‘03
  - Replacement Planned in 2007 Based on Projections



Boric Acid Corrosion Control

- Nuclear Policy and station procedures in place
- Significant effort applied to identification and resolution of boric acid conditions
  - Focused walkdowns
  - Emphasis on cleaning and repairs
  - Significant effort during recent outages
- Successful INPO assessment at St. Lucie
  - Strength in cross-functional effort
  - Minor enhancements recommended

Conclusions



- Alloy 600 issues need - proactive inspections and mitigation / repair actions
- FPL is very active In industry groups addressing these issues
- All Alloy 600 locations at FPL plants have been identified and plans are in place, or actively being developed, to provide long-term resolution

FPUFPLE Nuclear Engineering Principles and Expectations

April 25, 2003

FPL

To: Distribution
From: Rajiv S. Kundalkar

Date: April 25, 2003
Department: ENG/JB

Subject: ***Engineering Principles and Expectations***

Attached is a document entitled FPL/FPLE Nuclear Engineering P[illegible]. This document is a tool that identifies principles and expectations that all of us in Engineering must follow. Meeting these will ensure safe and continually improving performance that leads to world class operation of the Turkey Point, St. Lucie and Seabrook plants. This handbook is built on the foundation of shared values: trust, professionalism and accountability. As always, we will never compromise nuclear or personnel safety for short term production goals and will ensure that a safety conscious work environment (SCWE) clearly exists at all times.

Setting high standards and following them is critical. We must all be self-critical and share a passion for excellence.

This document will be printed out in handbook format and a copy will be provided to each of you. It will be maintained as a Juno Beach document, JB ENG-003. In addition, we will be scheduling meetings to review this document.

Please distribute to all Engineering employees at the Turkey Point, St. Lucie and Seabrook plants.

If there are any questions, please feel free to call me.

Distribution:

Carl Bible
Brian Dunn
Paul Freeman
Rudy Gil
Al Gould
Ching Guey
Steve Hale
Subhash Khurana
Mike Moran
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Claude Villard
Andy Zielonka
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Bob Acosta
Bill Jefferson
Terry Jones
Jeff Tucker
Mark Warner

TAME OF CONTENTS

Introduction

The purpose of Nuclear Engineering at FPUFPLE is to ensure safe and reliable equipment performance and i o Control and mahtain the configurations of each nuclear facility in accordance with the design and licensing requirements. To achieve a high ievei of performance in these areas, an environment that promotes excellence and professionalism is required. To esiabiish this atmosphere, we must all share and embrace a number of fundamental principles for engineering work.

Characteristics of excellence in *engineering* include:

- Nuclear safely is never compromised
- Personnel safety is never compromised
- A [illegible] conscious work environment (SCWE) clearly exists
- High equipment reliability
- Intol[illegible]
- operationally focused
- Maintenance of plant configuration
- Continued performance improvement
- Organizational effectiveness
- Timely identification and resolution of technical equipment problems and engineering issues
- Seek out and share lessons learned
- Maintenance of engineering programs
- Accountable, engaged and motivated workforce

The purpose of *this document* is to establish the fundamental principles and expectations for technical and engineering work at FPL /FPLE These standards do not replace any existing pr[illegible] requirements rather they constitute a [illegible] and behaviors ex[illegible] from [illegible] in E[illegible] Th[illegible] are to be communicated, emphasized in training and practiced on a [illegible] with E[illegible] ing and with i[illegible] ing org[illegible] They [illegible] the f[illegible] context and atmosphere for our work.

I. Safety

Nuclear safety is our highest priority, and is our most fundamental mission. Engineering must be the "technical conscience" of the station. Engineering must ensure mat:

- The plant is maintained end operated within the design and licensing bases at all times. Design margins must be understood, controlled and properly maintained
- We do not tolerate failures of equipment that am critical or important to plant safety and reliability. We provide in-depth failure analyses and implement actions sufficient to prevent any repeat failures.
- Equipment problems are promptly evaluated and resolved. Recurrent equipment problems are not tolerated. We understand and support Operations priorities.
- We do not live with suspected or known p[illegible] diti with the plant, but aggressively pursue solutions.
- We are engaged with industry peers through benchmarking and Operating Experience.
- We pursue safety issues by taking them to any level of management and across any organizational boundaries to ensure that actions required to ensure safe operation are taken.
- We consider higher costs, longer outages or reduced electrical output that might result from needed actions; however, operating the plant safely is our most fundamental principle.
- We avoid "tunnel vision" -- differing views are welcome and critical thinking is expected.
- We take an aggressive proactive approach to the id[illegible] reporting and resolution of concerns related to nuclear safety [illegible] This approach will be taken without fear of reprisal, [illegible] or intimidati[illegible]

There are [illegible] when [illegible] comes to safety. Your supervisor, manager, and V.P are there to [illegible] in removing impediments.

II. Knowledge and Maintenance of the Design and Licensing Basis

Engineering is the repository of, and custodian for, the plant design basis. This is one of our most fundamental principles. Engineering must:

- Understand the design basis of the plant and its equipment.
- Understand, control and properly maintain design and safety margins.
- Communicate that understanding to others, such as Operations and Maintenance.
- Maintain and preserve the design basis documentation.
- Be continually alert for situations where the plant could be operated, maintained or modified inconsistent with design basis. including equipment specifications and component limitations.

With license renewal, we expect our plants to operate for many years. We must maintain our design basis documentation current such that future engineers are not hampered by incomplete or poor quality information. We are the trustees for the future engineers. To properly discharge this trust, we must ensure the calculations, drawing, design basis documents, vendor manuals and other key information are accurate, up-to-date, useable, and easily accessible.

Only Engineering can fulfill this obligation. There will always be forces and pressures at work that can distract us from this obligation. That is why we must consider maintenance of the design basis as a most fundamental principle.

III. Intolerance for Failures of Critical Equipment

Our operators expect and deserve to have a plant at the highest level of material condition and reliability. We cannot tolerate failures of equipment that are critical to safe and reliable station operation. We must dedicate ourselves to anticipating and eliminating suc challenges. Fail s of critical equipment will not be tolerated. Repea failures constitute a collective failure of the Engineering organizatior and ar unacceptable. In the event there are failures of critica ipl int, Engi i g t st re th t li xti i e sufficiently robust to preclude repeat failures. g r d organizational behaviors are to be focused on the p e iti of c equipment failures. This attitude must b i is illed in the thinking and attitudes of Engineering and constitute our "mind set" as we approach c r jobs. Our equipment reliability program will only be successful if it i b d on th is i inci le

In lit or t riti g e must have a low tolerance for gr d tic of r nc i- ipr : f sy it Degradation of any system establishes a poor working atmosphere

System performance monitoring must be relentless in order to identify and correct equipmen ues be c they aff ct plant erat

Tolerance for minor leaks, work arounds, degraded support equipment and backlogs can mask more serious safety problems and compromise our sense of ownership and pride.

We must not tolerate large backlogs. This bogs us down in yesterday's problems and prevents us from working on today's and tomorrow's challenges.

We must conduct our work with the sense of urgency that the situation merits. We will not allow low value work to distract us from resolution of problems with critical equipment.

N. Corrective Actions

A major day-to-day task of Engineering is to resolve problems. The corrective action program is the vehicle for the identification and assessment of problems. This program is also used for assigning, tracking and evaluating the effectiveness of corrective actions. It is

essential that all Engineering personnel understand that engineers own problems until they are completed. It is not acceptable to relinquish ownership of *corrective* actions. Corrective actions are to be timely, thorough and provide resolution of the identified causes. Identified causes Shall provide sufficient insights into organizational *shortfalls* so that we can root out and correct these issues whioh are usually deep-seated and fundamental. A robust corrective action and self-assessment program is *essential* to *continual* improvement

V. *Rigorous Approach* to Problem Solving

Our approach to problem solving will be *rigorous* and *formal*. The following attributes must be adhered to:

- Clear assignments for solving the problem.
- Thorough fact finding and data **gathering.** Personally inspect the situation.
- *Consultation* with all parties with background or past experience in the issue. A multi-disciplined team may be needed.
- Consultation with industry operating experience, viewing it broadly to determine Station impact.
- Intolerance for *repeat* **problems.**
- Draw conclusions based **on** facts and evidence.
- Review results with management and supervision.

There is **always** pressure to short **cut** a disciplined approach to problem solving; particularly during outages or other **time** sensitive situations. It is one of our principles that time sensitive situations are when **it's** most important to apply rigorous problem **solving.**

VI. Rigorous **Application of** Engineering **Procedures** and ***Methods***

In addition to those engineering *principles* derived from our formal education, there are several others that are fundamental to our work.

- *Technical* work **is** always done formally in writing. **All** problem solving or issue evaluation becomes part of the station's history and must be *available for future* consideration.
- All technical decisions impacting piant safety and reliability will **be** verified and approved at the appropriate levels. The more urgent, or risk *significant* the situation, the greater the **need** to ensure thorough reviews and approvals.
- In making technical evaluations, the limitations and uncertainties of the data or information must **be** considered **and** clearly documented.
- Assumptions made in performing *technical evaluations* shall be made explicit so they can **be** independently assessed.
- Assumptions made **in** performing a technicai evaluation shall be verified by *direct inspection* or test to the extent practical.
- When evaluating equipment conditions, a personal inspection shall always be performed.
- *All communications* of technical information must be clear and formally transmitted. Informal transmittal of technical **information** has been the cause of considerable misfortune in the nuclear industry over the **years.**

VH. Strict **Compliance** with **Technical Programs and Procedures**

Our *technical* programs and procedures are the repository of w r accumulated technical knowledge and of the engineering methods and procedures that history has shown to be *most* effective. Like all Engineering program documents, our programs contain features that experience has demonstrated to **be** necessary. These features are **not** always obvious and the reasons for them often become **obscure** with time. Experience has shown, however, that we proceed at our peril whenever we do not comply with **established** *engineering* and plant programs **and** processes. Accordingly. **all** Engineering Programs will be rigorously followed. As we gain experience, we must **also** update **and** improve **our** program documents so that future engineers can **avoid** w r mistakes.

VIII. Ownership for Engineering Programs

Program ownership consists d having a single point accountability for the success of a program. Although there may be a number of individuals involved with program implementation. there can be only one owner. The following is expecled of program owners:

1. Fully understands the technical and regulatory basis for the program. Keeps up with industry and regulatory developments so that FPL employs industry best practices.
2. Ensures mat program-implementing documents are clear, up-to-date, and compliant with reguiatary requirements and industry best practices.
3. Ensures that interfaces with other *programs* and procedures *are* clear and functional.
4. Ensures that Roles and Responsibilities are properly defined and are baing effectively implemented in the field.
5. Ensures that suitable training and qualification programs are available for implementing individuals.
6. Uses outside peers and INPO assistance.
7. Maintains awareness of industry Operating Experience. and uses OE lo improve program effectiveness.
8. Ensures that corrective actions are properly evaluated, implemented, and closed. Places major emphasis on the effectiveness d the corrective action.
9. Ensures management is periodically apprised of problems with the program and its implementation. It is recognized that some issues affecting program implementation are beyond the control of the program owner; however. visible and persistent highlighting of implementation problems is expected.

IX. Results Orientation

The above principles will help us to produce high quality technical work and ensure correct solutions to problems. They will not, however, produce resuits. All engineers must be dedicated to producing results and to baing effective. Being technically correct is not enough.

Too often we can be tempted to take a limited view 01 our engineering jobs. For example:

- We don't just produce designs; we resolve problems and improve plant performance.
- We don't just report problems on CRs; we ensure problems are corrected permanently.
- We don't simply execute our Engineering Programs; we improve the plant through their implementation.
- We don't use organizational obstacles as excuses; we overcome them.
- We don't just do system walkdowns; we manage the health of our systems and ensure problems are found and corrected before they adversely affect the plant.

It is essential that each engineer grasp the significance of this principle and *embrace* it fully.

X. Demonstrate Professionalism

Professionalism is a positive attribute focused on doing the best job possible.

- We are professionals who take full responsibility for the quality and productivity of our work. and have the same expectations of all members of the team.
- We demonstrate personal leadership, responsibility, and accountability.
- Wa balance the value of teamwork and synergy with ownership and personal responsibility.
- We positively confront team members who are not performing.
- We relate proactively and positively within the plant organization and with external organizations.

- We are committed to improving quality. reducing costs, and seeking ways to continuously improve.
- We are self-critical, admit and learn from our mistakes, and are open to coaching lor self-impmvement.
- We build trust in others. and are trustworthy.
- We have high personal integrity and ethics.
- we continually improve our own technical competence and interpersonal skills
- We learn from the experience of others, and stay current with the industry; we accept critical input from outsiders.
- We take time to proudly celebrate our successes and the successes of others.
- We understand that our signature on engineering documents represents adherence to these principles.
- We will abide by the FPL Nuclear Division Code of Ethics.

XI. Skilled. Knowledgeable Workforce

- Training is used as *a strategic tool* to provide highly skilled and knowledgeable personnel.
- We are expected to be fully trained and certified lo perform our assigned tasks.
- We will maintain our qualifications which document our [illegible] knowledge.
- We bear responsibility for our own education. This includes keeping up with engineering and plant procedures/process changes.
- We will apply the systematic approach to training.
- As a learning organization, we apply human performance tools such as self-checking, questioning attitude (QV&V), peer checking, and three-way communication as a means of [illegible]

FPL
Nuclear Division
Code of Ethics

As members of FPL's nuclear organization, committed to *excellence* and *professionalism* in *the conduct of our activities,* we do hereby endorse the following professional code:

- We will at all times, regard the safety of the public and our fellow employees as our own personal and moral responsibility.
- We will efficiently and effectively utilize our resources to promote cost effective electrical power generation.
- We will conduct our nuclear activities in a manner which demonstrates commitment and integrity, and which establishes and maintains a professional environment conducive to excellence in performance.
- We will ensure that key personnel. managers, and officers, responsible lor supporting nuclear plant operation. possess the necessary knowledge and experience to understand nuclear plant activities, events and problems.
- We will avoid complacency and establish an environment of continuous improvement. We will [illegible] constructive critici
- We will commit ourselves to ensuring that [illegible] items and components are reliable and properly [illegible] We will protect the environment. We commit to an aggressive and timely [illegible] pursuing the objective of identifying and correcting root causes to improve performance.
- We will adopt and maintain policies and practices that [illegible] an attitude of trust, encourage [illegible] and foster [illegible] all groups that operate in and support the [illegible]

FPL/FPLE Engineering
Principles and Expectations

April 25, 2003

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