



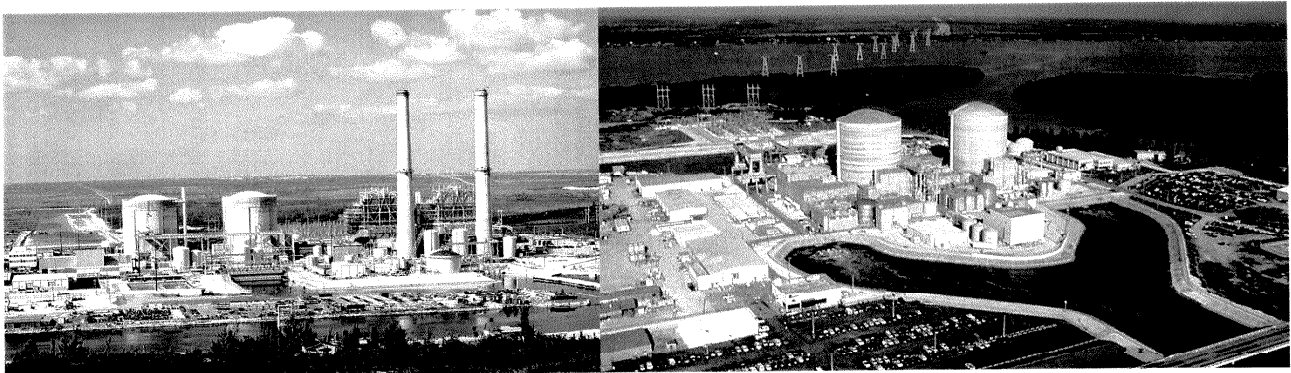
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Nuclear Engineering NRC / FPL Interface Meeting

March 15, 2002

Region II

Atlanta, Georgia





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Agenda

- **Opening Remarks** R. Kundalkar
- **Engineering Performance** B. Dunn / A. Zielonka
- **Self Assessment / Corrective Action**
 - Turkey Point/St. Lucie EDG Availability A. Zielonka
 - St. Lucie Shutdown Cooling System V. Rubano
 - Steam Generator Integrity Program R. Gil
- **Fuel Related Topics** J. Garcia
 - Boraflex
 - Fuel Reliability
- **Initiatives/Special Projects**
 - Spent Fuel Storage Planning C. Bible
 - License Renewal Project E. Abbott
 - Life Cycle Management D. Tomaszewski
- **Summary**



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Nuclear Engineering

- Opening Remarks
 - Reactor Head Inspections
 - Strategic Planning



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Engineering Performance

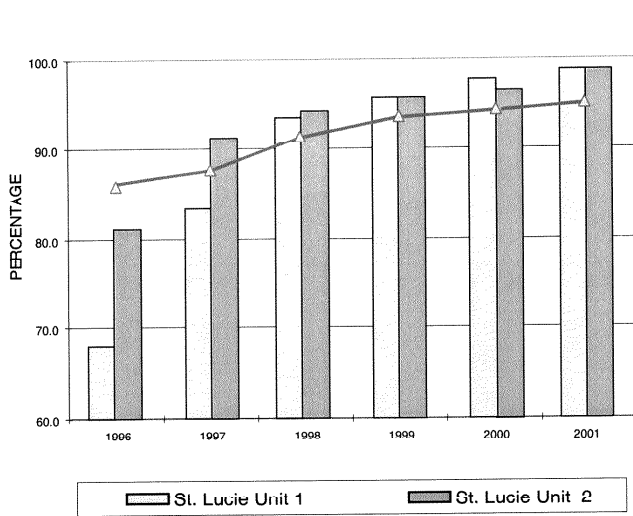
St. Lucie / Turkey Point Engineering

B. K. Dunn / A. T. Zielonka



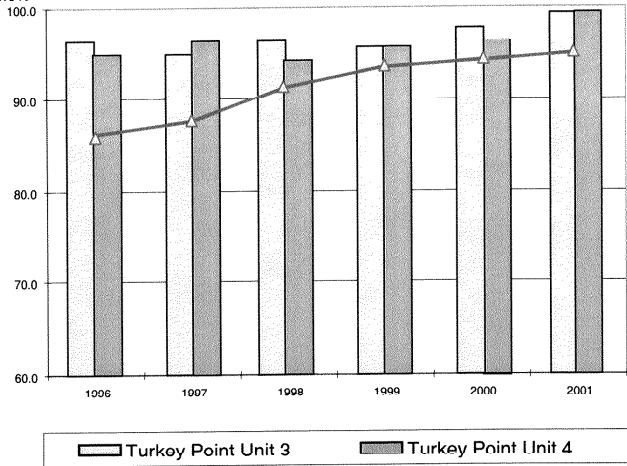
WANO Weighted Overall Performance

St. Lucie



Turkey Point

Top Decile-
98.8%



Industry Median



Engineering Department Indicators and Goals

Nuclear Safety Focus 2001 Results				
Indicators	Goals		St. Lucie Actuals	Turkey Point Actuals
	Green	Red		
A. Unplanned Scrams Per 7000 Hours	≤ 1	> 6	Unit 1 - 0.9	Unit 3 - 0.9
			Unit 2 - 0.9	Unit 4 - 0.8
B. Safety System Unavailability - EAC	$< 1.0\%$	$> 5\%$	Unit 1 - 1.8%	Unit 3 - 1.2%
			Unit 2 - 0.2%	Unit 4 - 0.4%
C. Safety System Unavailability - HPSI	$< 0.75\%$	$> 5\%$	Unit 1 - 0.4%	Unit 3 - 0.1%
			Unit 2 - 0.6%	Unit 4 - 0.8%
D. Safety System Unavailability - AFW	$< 1.0\%$	$> 6\%$	Unit 1 - 0.5%	Unit 3 - 0.5%
			Unit 2 - 0.4%	Unit 4 - 0.4%
E. Safety System Unavailability - RHR	$< 0.75\%$	$> 5\%$	Unit 1 - 0.8%	Unit 3 - 0.2%
			Unit 2 - 0.7%	Unit 4 - 0.3%
F. NRC NCVs due to Engineering	≤ 2	> 6	3	2
G. QA Findings	≤ 2	> 6	1	1
H. WANO Fuel Reliability Indicator	$\leq 5 \text{ E-}4$	$> 2.0 \text{ E-}2$	Unit 1 - 3.70 E-5	Unit 3 - 1.29 E-6
			Unit 2 - 6.87 E-5	Unit 4 - 1.60 E-5
I. OSHA Recordable Injuries	0	> 1	0	0
J. Reactivity Events due to Engineering	0	> 1	0	0
K. ALARA	10% < Budget	$> 5\%$ Over Budget	$> 4\%$ Over Budget	



Engineering Department Indicators and Goals

Problem Identification and Correction 2001 Results					
Indicators		Goals		St. Lucie Actuals	Turkey Point Actuals
		Green	Black		
A.	Condition Reports	0 Late	>5 Late	0 Late	0 Late
B.	Condition Report Action Items (PMAI's)	< 100 by YE <75 by YE	>150 by YE >125 by YE	145	113
C.	Condition Report Action Items (Late)	0 Late	≥11 Late	Black	2 Late
D.	Self Assessments	1 per Qtr	≤3/Yr Trend	4	4
E.	System Walkdowns	90%-100% W/D Complete	<70% W/D Complete	100%	100%
F.	Drawing / VTM / TEDB Changes	≤2 Late	≥11 Late	0 Late	3 Late



Engineering Department Indicators and Goals

Quality of Engineering 2001 Results					
Indicators		Goals		St. Lucie Actuals	Turkey Point Actuals
		Green	Yellow		
A.	Engineer Initial Training Not Started within 12 Months of Hire	≤1	≥6	1	0
B.	Training Effectiveness	>90%	<70%	96%	ETP -98% STA - 100%
C.	System Expert Qualifications	1 per System Engr	<1 per System Engr	1 Not Completed	1 per System Engr
D.	Backup Shift Technical Advisor Qualification	≥16	<8	Turkey Point Only	13
E.	Plant Modification Revisions due to Engineering Error	0	>4	3	0
F.	Significant Human Performance Issues	0/Qtr	>2/Qtr	0.75/Qtr	0.5/Qtr
G.	Procurement Engineering Backlog (>4 Weeks)	≤2	>11	0	0



Engineering

FPL Department Indicators and Goals

Cost Performance 2001 Results				
Indicators	Goals		St. Lucie Actuals	Turkey Point Actuals
	Green	Yellow		
A. Summer Capacity Factor	>99.8%	<98.0%	99.4%	
B. Thermal Performance Indicator	>99.9%	>99.0%	Unit 1 - 99.98%	Unit 3 - 99.72%
			Unit 2 - 99.94%	Unit 4 - 100%
C. Refueling Outage Duration	<25 Days	>35 Days	Unit 1 - 28 Days Unit 2 - 25 Days	Unit 3 - 28 Days
D. Unplanned Capability Loss Factor (3 Year Average)	≤1%	>2.5%	Unit 1 - 1.6%	Unit 3 - 1.1%
			Unit 2 - 2.1%	Unit 4 - 0.9%



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Self Assessment/Corrective Action

St. Lucie / Turkey Point EDG Availability

A. T. Zielonka



EDG Availability

- Turkey Point Performance Indicators have not met FPL's Expectations
- Numerous Corrective Actions taken to Address Specific Conditions
- Reliability Team Formed
- Results Being Applied to St. Lucie



EDG Availability

- **Upgrades/Corrective Actions Implemented**
 - Radiators
 - Replaced on Unit 3 / PM Established
 - Governor Boards
 - Replaced on All EDG's / New PM Based on Capacitor Life
 - Unit 3 Soakback Pumps
 - Existing Pumps to be Backup
 - New Pump Horizontally Mounted with Flex Hose Connection
 - Air Start Motor Failure
 - Defective Motor Replaced / PM Revised to Inspect Bendix Unit
 - Fuel Oil Piping
 - Re-routed Above Ground
 - Relay Performance - Non-Emergency Circuits
 - Revised Governor Circuit for Low Voltage Level
 - Investigation of Time Delay Relay Failure and Relay Corrosion



EDG Availability

- **Broader Corrective Actions**
 - Established Reliability Team
 - Outside Consultant Participation
 - Review PM's
 - Thermography Testing of Relays
 - Vibration/Oil Analysis Program Enhancements
 - Diagnostic Testing to Evaluate PM Scope
 - Evaluate Other Utilities Maintenance Programs
 - Review Part Obsolescence/Availability
 - Results of Turkey Point Experience Applied to St. Lucie
 - St. Lucie Unit 1 Radiator Replacement
 - Electronic Governor Replacement



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Self Assessment/Corrective Action

St. Lucie Shutdown Cooling System

V. F. Rubano



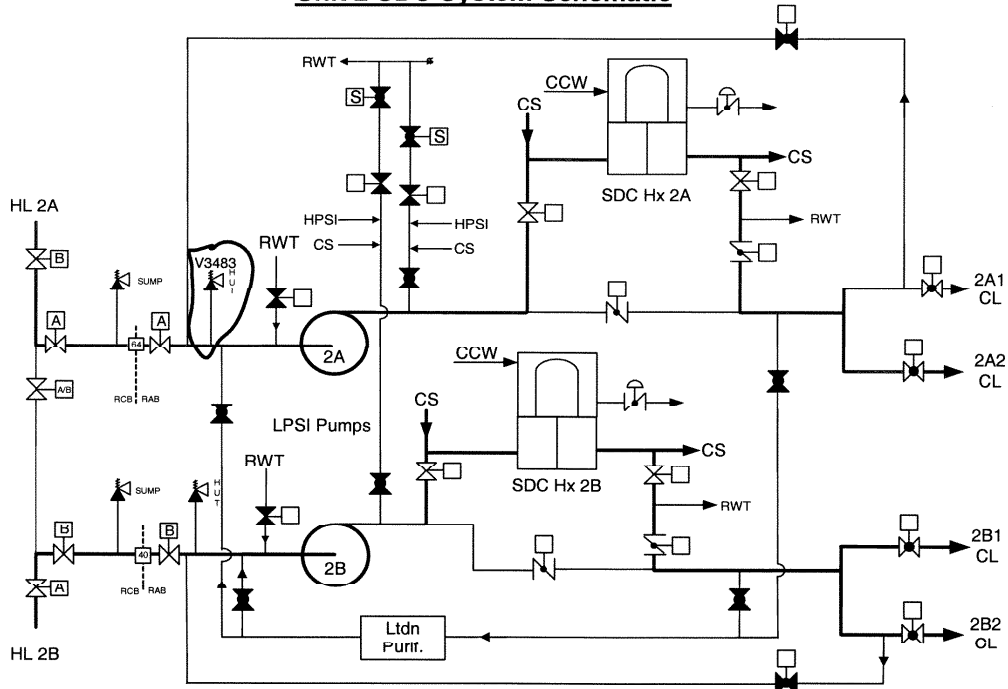
St. Lucie Shutdown Cooling System

- Multiple Events
 - RCS Inventory Loss from SDC Suction Relief Valve
 - Low Safety Significance
 - Isolable from Control Room
 - Did Not Affect Low Pressure Safety Injection Function
- Causes
 - Gas Voids in A SDC Suction Line
 - Low Design Margin for Relief Valve Lift Setpoint
 - Reactor Coolant System Hydraulics



St. Lucie Shutdown Cooling System

Unit 2 SDC System Schematic





St. Lucie Shutdown Cooling System

- Corrective Actions
 - Independent Team Formed
 - Detailed Transient Pressure Analysis Performed
 - Suction Lines Surveyed for Slope/Ultrasonic Examination of Piping Performed
 - Additional Vent Valves Installed (Unit 1)
 - Design Pressure / Lift Setpoint Increased (Unit 1 A SDC)



St. Lucie Shutdown Cooling System

- Corrective Actions (continued)
 - Procedures Revised to Pressurize SDC Prior to Service
 - Unit 1 Pressurize Through CVCS
 - Unit 2 Manually Open Isolation Valve
 - Reset Blowdown Rings
 - Reviewed Blowdown Settings of Other Relief Valves
 - Instituted SDC Flushing at End of Outage



St. Lucie Shutdown Cooling System

- Long Term Plan
 - Enhance System Venting
 - Evaluate Long Term Improvement Options
 - Implement Alternate Pressurization From Control Room
 - Increase System Design Pressure (Unit 1 B SDC)
 - Senior Management Team Formed to Ensure Issues are Resolved
 - Chaired by Site Vice President



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Steam Generator Integrity Program

R. D. Gil



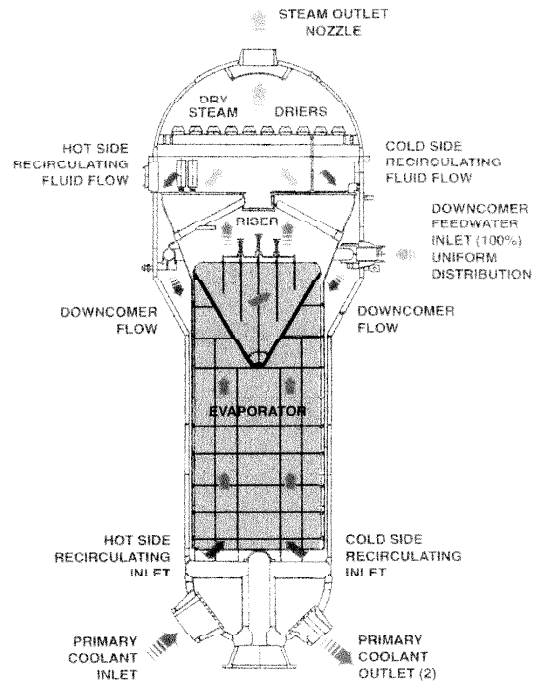
Steam Generator Integrity Program

- Turkey Point Units 3 & 4
 - No Active Corrosion/Low Number of Plugs
 - Unit 3 Inspection Completed in October 2001
 - Increased Wear at Support Plates (11 Tubes)
 - Bobbin Program Expanded to 100% of Tubes
 - Unit 4 Inspection Completed in October 2000
 - Total of 10 Tubes Plugged
- St. Lucie Unit 1
 - Replacement Steam Generators



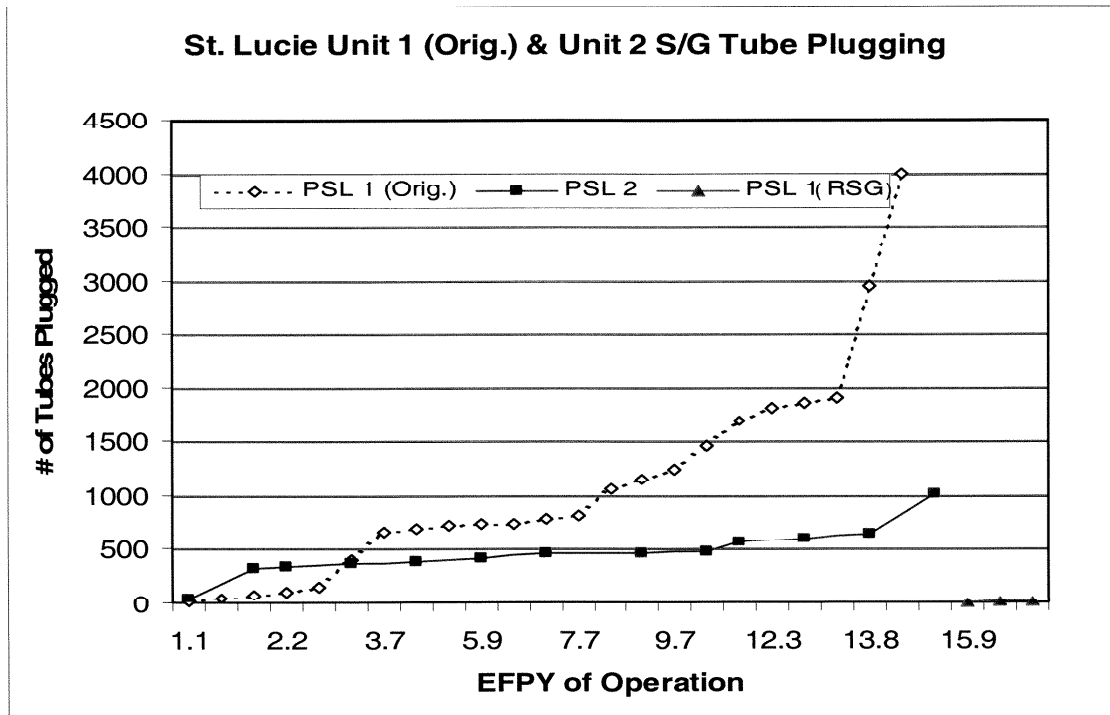
Steam Generator Integrity Program

- St. Lucie Unit 2
 - Inspection Completed Fall 2001
 - 361 Tubes Plugged
 - Increased Cracking at Eggcrates (257 Tubes)
 - First Time Identification of Cracks in Dents (6 Tubes)
 - Dent Inspection Expanded





Steam Generator Integrity Program





Steam Generator Integrity Program

- Program Initiatives
 - St. Lucie Unit 2 Operational Assessment Being Developed - Will be Presented to NRR
 - Independent Assessment of St. Lucie Chemistry and Degradation Assessment Program Underway
 - Program/Procedures Meet NEI 97-06
 - Assessments Performed by INPO/Industry Peers
 - NEI SGTF Member (Generic PLA Efforts)
 - Effective SG Management Team



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Fuel Related Topics

J. Garcia



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Boraflex

- Surveillance Performed in 2000 for Turkey Point Unit 3 and St. Lucie Unit 1
- Criticality Evaluation Using Measured Results Confirmed that Plants Remain Within the Design Bases
- Determined Dose Threshold Above Which No Boraflex Credit Is Taken



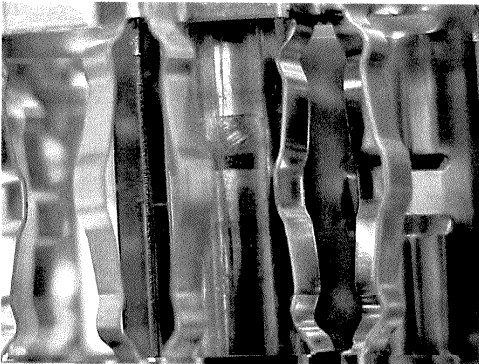
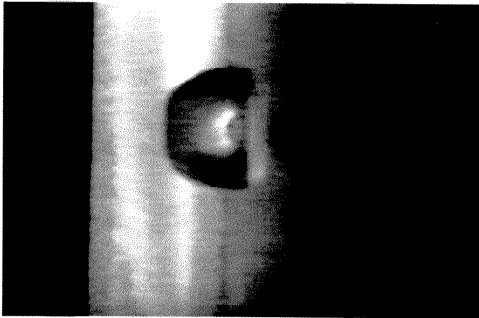
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Boraflex

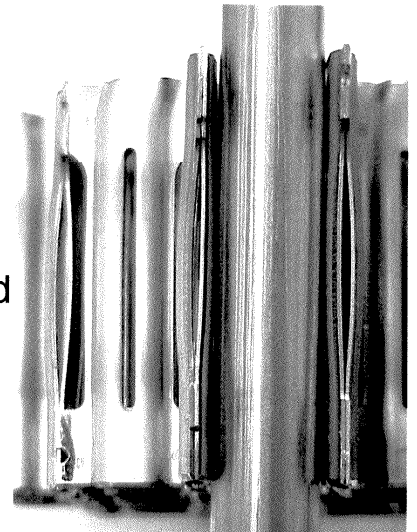
- Established Administrative Restrictions for Those Cells that Exceed Dose Threshold
- Completed Dose Analysis for Unit 4
- Dose Threshold Implemented on Unit 4
- Evaluating Timely Alternatives to Eliminate Reliance on Boraflex



Fuel Reliability St. Lucie Unit 1



- Failed Rods in Low Power Third Cycle Assemblies at Core Periphery
- Grid-to-Rod Fretting, Caused by Grid Design Weakness
- Corrective Action
 - Use New Design High Thermal Performance (HTP) Spacer Grid in St. Lucie Unit 1 Reload Fuel
 - Full Core Transition to New Design by Spring 2004



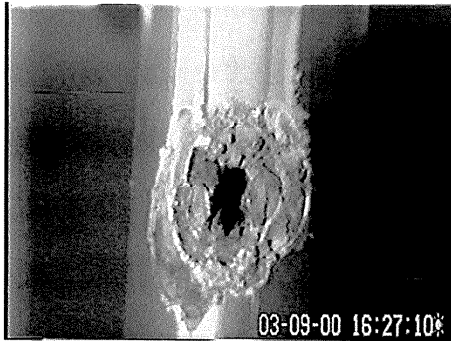


Fuel Reliability St. Lucie Unit 2

- One High Burnup Failed Rod in a Peripheral Fuel Assembly
- Likely Cause to be Grid-to-Rod Fretting
- Corrective Actions
 - Limit Fuel Assembly Placement on Periphery for Two Cycles
 - Assess the Need for Further Burnup Restrictions
 - Continue to Evaluate Industry Experience in Grid-to-Rod Fretting
 - Evaluate Implementation of an Improved Grid



Fuel Reliability Turkey Point Unit 3 & 4



- Unit 3
 - Isolated First Cycle Rod Failure
 - Primary Hydriding
 - Manufacturing Defect



- Unit 4
 - One Rod Failure in Third Cycle
 - Older Design with Zircaloy-4 Cladding
 - Crud Assisted Localized Corrosion



Fuel Reliability Turkey Point Unit 3 & 4

- Corrective Actions
 - Significantly Enhanced Manufacturing Oversight
 - ZIRLO Cores by Fall 2001 / Spring 2002 (Except for 8 Zircaloy-4 Assemblies)
 - Higher pH Li-B Chemistry Program
 - Guidelines to Limit Locations of Zircaloy-4 Assemblies in Future Reloads



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Initiatives/Special Projects

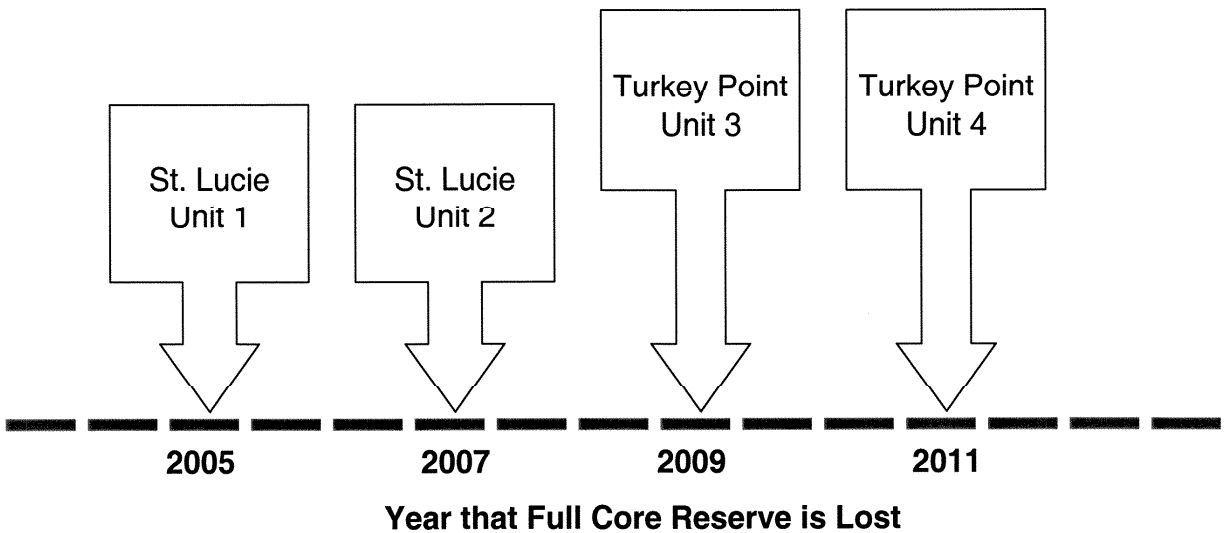
Spent Fuel Storage Planning

C. R. Bible



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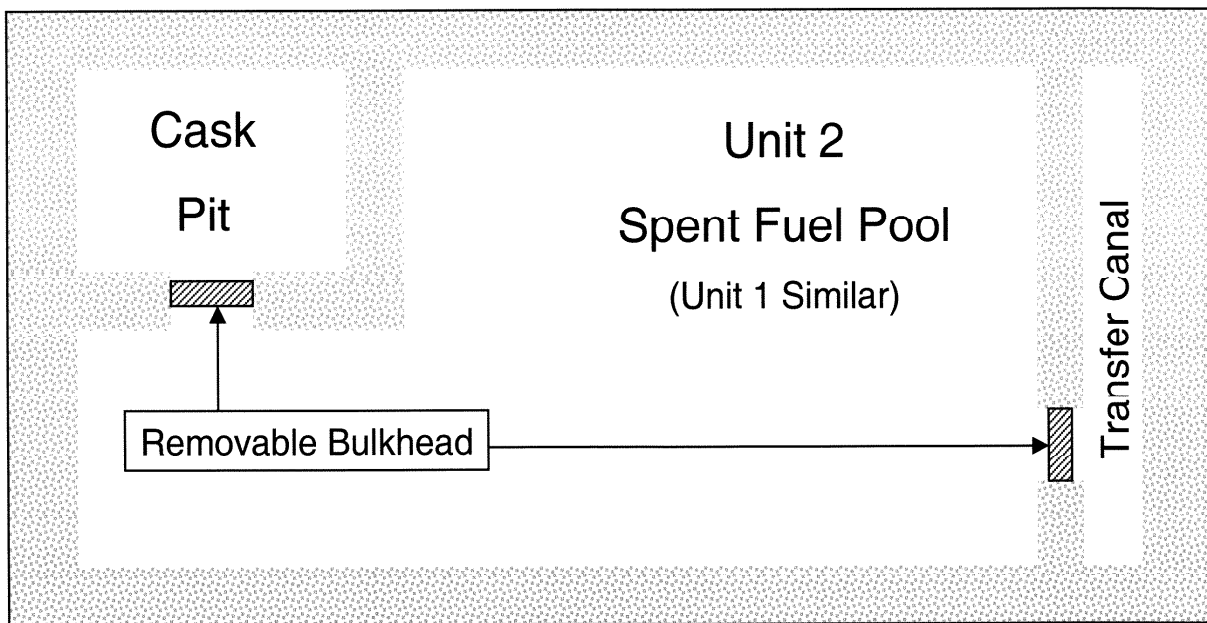
Spent Fuel Storage Planning





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Spent Fuel Storage Planning





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Spent Fuel Storage Planning

- St. Lucie Cask Pit Rack Installation
 - Increases the Spent Fuel Pool Storage Capacity by Three Cycles
 - Maintains Full Core Off-Load Capability
 - Cask Pit Area will be Capable of Being Restored to Allow Use of Cask
 - Cask Pit Rack can be Removed When Fuel is in the Reactor Vessel
 - In the Unlikely Scenario Where Fuel cannot be Placed in the Reactor Vessel, then Additional Racks can be Installed in the Transfer Canal



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Spent Fuel Storage Planning

Unit 1 Fuel Handling Crane





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Spent Fuel Storage Planning

- Cask Crane
 - Not Single Failure Proof
 - Meets NUREG-0612 by Limiting Load Movement (Safe Load Path)
 - Upgrade to Single Failure Proof for Future Flexibility
 - Contract Awarded to Vendor
 - Submit License Amendment in Mid-2002
 - Install in Fall 2003



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Spent Fuel Storage Planning

- Boraflex Effect on Fuel Storage
 - Goal is to Maintain Existing Spent Fuel Storage Capacity
 - Analyzing Number of Options
 - Fuel Management
 - Region I Cask Pit Racks
 - Poison Inserts
 - Etc.
 - Submit License Amendments for St. Lucie in 2002 and Turkey Point in 2003



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Initiatives/Special Projects

License Renewal Project

E. A. Abbott



License Renewal

- Turkey Point Application Status
 - Submitted 9/11/00
 - Major Milestones of Review Met
 - › Scoping and Screening Inspection Completed
 - › Aging Management Inspection - Completed
 - › Four Open Items/Two Confirmatory Items
 - › Regional Administrators Letter Issued Ahead of Schedule
 - License Decision due July 17, 2002



License Renewal

- **St. Lucie Application Schedule**
 - Submitted on November 30, 2001
 - Inspection Timeframes
 - Environmental Scoping Meeting - April 3, 2002
 - Scoping/Screening - October 2002
 - Aging Management Review - January 2003
 - Closeout - June 2003 (if required)
 - Actions to Facilitate Inspections



License Renewal

- St. Lucie Community Outreach
 - Performed Research of Community Impressions
 - Neighbors Think Positively of St. Lucie
 - License Renewal Recognized as Positive
 - Some Community Issues Identified
 - Emphasis Areas
 - › Safe, Reliable, Clean, Low Cost Electricity Now and in the Future
 - › Highly Trained Team Attentive to Equipment Maintenance
 - › Community Citizenship
 - › Quality Workforce
 - › Waste Management
 - › Emergency Preparedness



License Renewal

- St. Lucie Community Outreach Interface with Federal, State and Local Officials
- Community Outreach Team
 - Presentations/Dialog through Community Organizations
 - Presentation, Brochure, Question and Answer Materials
 - Feedback is Neutral to Supportive



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Life Cycle Management

D. J. Tomaszewski



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Life Cycle Management

- Nuclear Division Strategic Team
 - Define Systems, Structures, and Components (SSCs) that Require LCM Action
 - Consolidate Division Approach
 - Ensure Reliable Equipment Operation
 - Benchmark Industry Efforts
 - Action Plans and Schedules Through 2008



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Life Cycle Management

- SSC Selection
 - Will Utilize Best Practices of Several Industry Organizations such as **INPO / EPRI / NEI**
 - Includes I&C/Electrical/Civil/Mechanical Items



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Life Cycle Management

- I&C Area Case Study Instrumentation Area
 - Difficult to Obtain Parts and Support
 - Maintenance Intensive
 - High Amount of Expertise to Maintain



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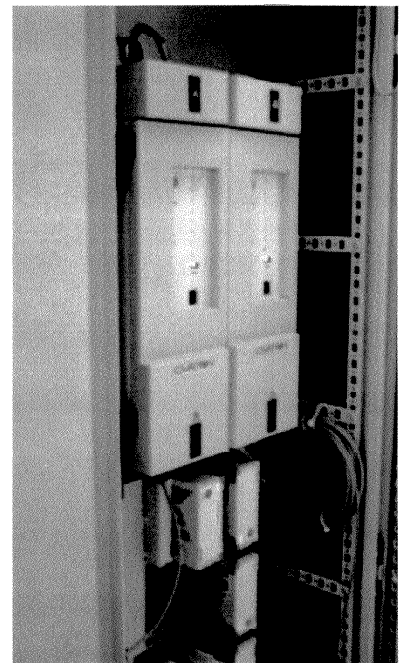
Life Cycle Management

- Integrated Distributed Control System (DCS) Approach
 - Use Off The Shelf DCS Equipment
 - Reduce number of components/vendors
 - Implement in Phases
 - Prioritized by Obsolete Equipment Matrix
 - Use Proven Installations
 - Off Ramps if Equipment Not Mature
 - Evaluating Options to Upgrade to New Technology



Life Cycle Management

- Maximizing Benefit
 - Standardize Platform
 - Plug-in Upgrades/Repairs
 - Design for Obsolescence
 - Widest Customer Base
 - Open Architecture





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Life Cycle Management



SOER printer
Terminal

DDPS Operator
Console

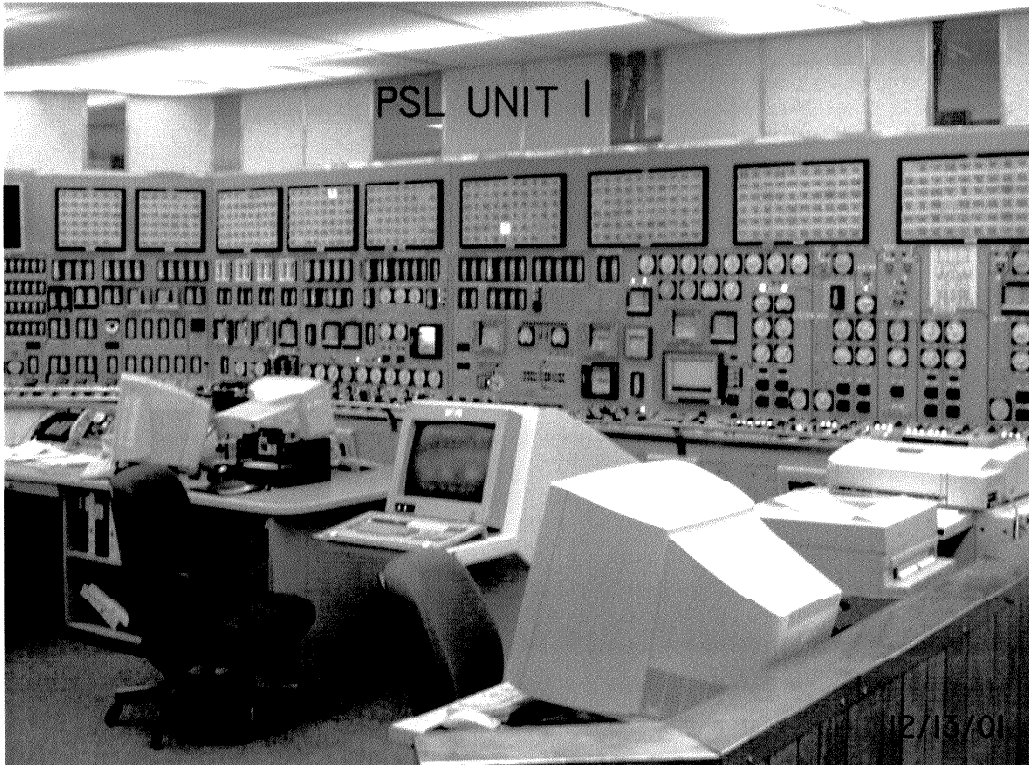


DDPS System Console
& Terminal



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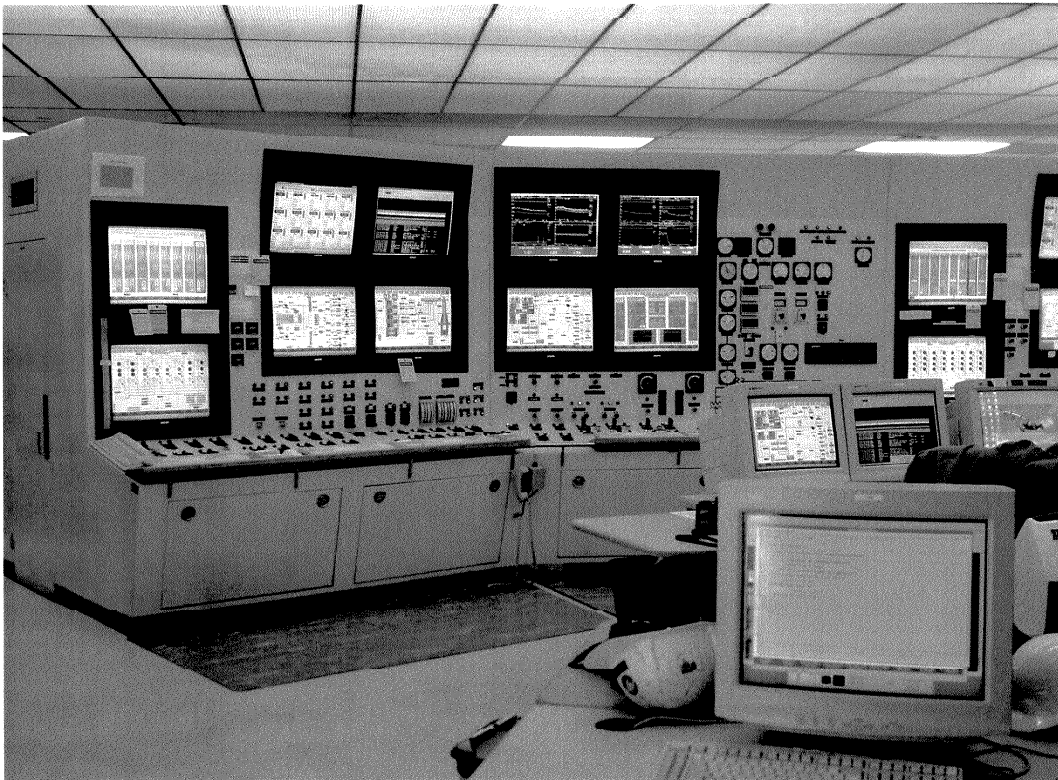
Life Cycle Management





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Life Cycle Management





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Life Cycle Management

- **Conclusions**
 - Maintaining Obsolete Equipment and Individual System Upgrades may not be Best Approach
 - Take Advantage of Technological Advantages Where it Makes Sense
 - License Renewal Provides Opportunity for Additional Plant Investment
 - Integrated Approach Allows Prioritization and Levelized Effort