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Prairie Island Unit 1
Steam Generator Replacement Project

NRC Region III Presentation
August 25, 2003

SGR Project Update
Meeting Agenda

Introductions	Joe Solymossy
Project Overview	Ken Albrecht
Project Oversight	Ken Albrecht
RSG Design and Fabrication	Richard Pearson
RSG Licensing	Richard Pearson
RSG Installation Plans	Scott Marty
SGRO Schedule	Scott Marty
Future NRC Meetings	Ken Albrecht

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SGR Project Update
Attendees

- Nuclear Management Company

  Joe Solymossy – Site Vice President
  Ken Albrecht – Project Manager
  Richard Pearson – Project Engineer, Design Engineering & Analysis
  Scott Marty – Project Engineer, Installation
  Gene Eckholt – Manager Regulatory Affairs

- The Steam Generating Team (SGT)

  Mike Hubbard – Project Manager
  Larry Davis – Engineering Manager
  Mark Ceraldi – Lead Engineer, Licensing

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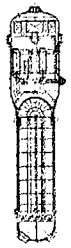
Project Overview

Ken Albrecht



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Project Overview

- Justification for Replacement
- Original Steam Generator Status
- Project Participants
- Project Milestone Schedule
- NMC Project Organization

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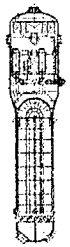
Justification for Replacement

Economic - No Safety Concerns



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Original Steam Generator Status

	#11 SG	#12 SG
Total Tubes Plugged	193	555
Sleeves Installed	0	1074
% Equivalent Plugged	5.70%	17.51% *
% Average Equivalent Plugged	11.61%	

*28 sleeves = 1 plug

Project Participants

Project Management

Nuclear Management Company (NMC)

- Project management and oversight personnel

RSG Design, Fabrication and Licensing

Framatome ANP

- Design and Fabrication – Framatome ANP SAS
- Licensing Support – Framatome ANP Inc.

Installation Contractor

The Steam Generating Team (SGT, Ltd.)

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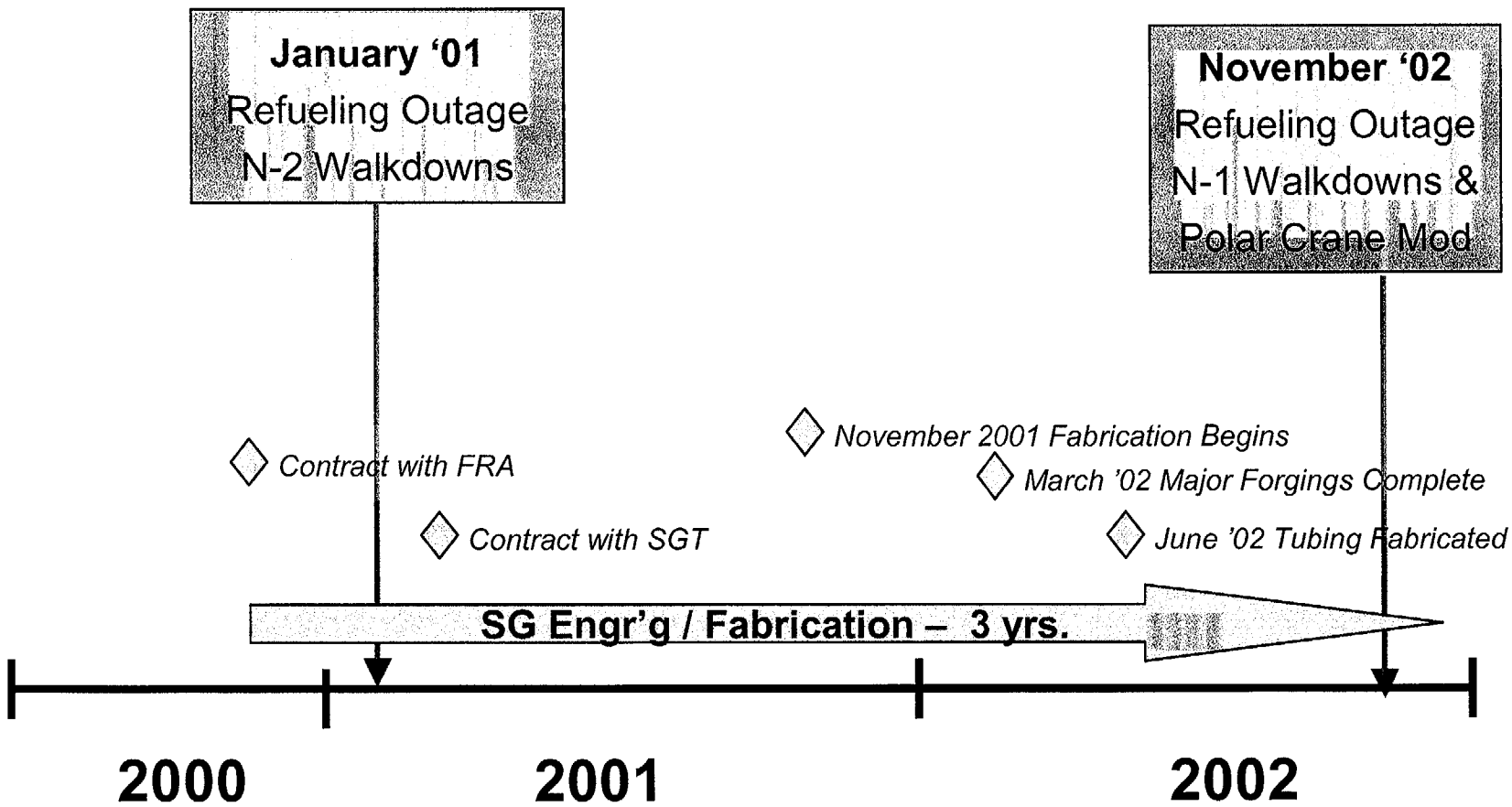
Project Milestone Schedule



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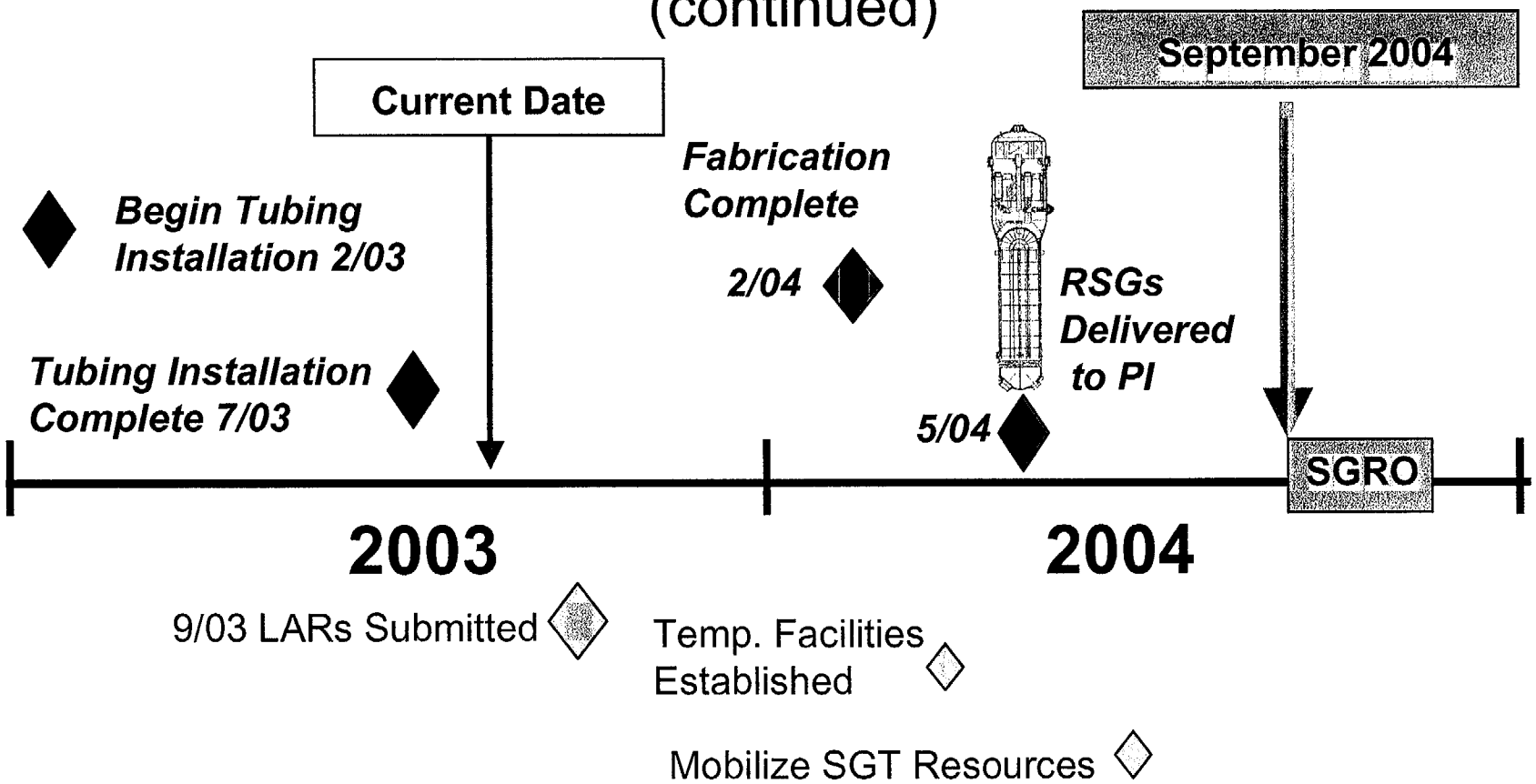
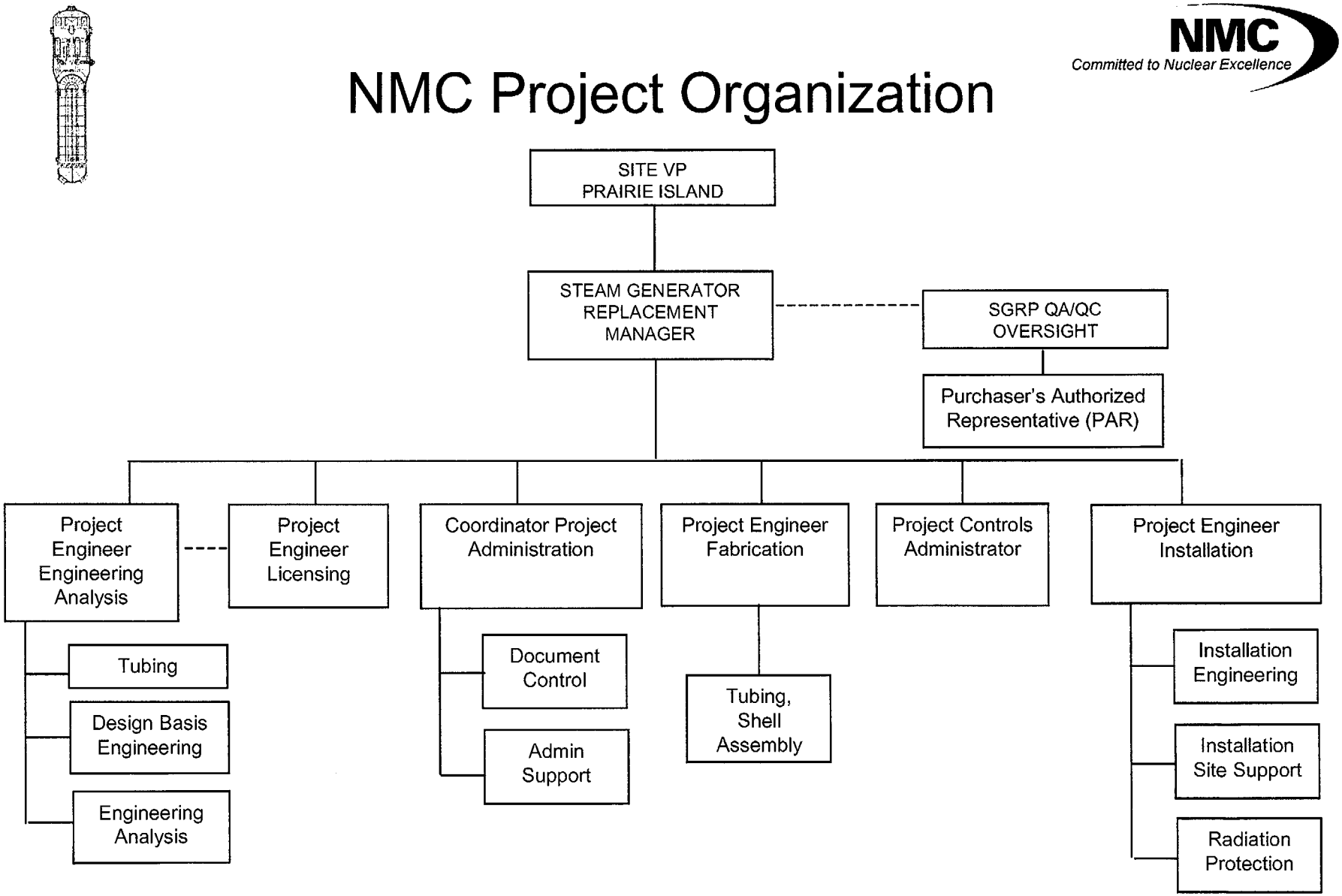
Project Milestone Schedule
(continued)



NMC Project Organization



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Project Oversight

Ken Albrecht

Project Oversight

- Purchaser's Authorized Representative (PAR) Inspections
- Audits and Surveillances
- Self Assessments

PAR Inspections

- Sandvik - Tubing
  - Hold 28
  - Witness 21
  - Record 18

- Framatome ANP SAS - RSG Fabrication
  - Scheduled (Hold/Witness) 516
  - Unscheduled (Walk-up) 279

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Audits and Surveillances

- Surveillance/Audit of Framatome Paris and/or Chalon,
  - April 2000 (Lead)
  - June 2000 (Lead)
  - December 2001 (Lead)
  - June 2002 (NUPIC)
  - June 2003 (Lead)

- Framatome's Audit of Subvendors
  - Japan Steel Works, July 2001 (Team Member/Observer)
  - Sandvik, August 2001 (Team Member/Observer)
  - Fomas, October 2001 (Team Member/Observer)

Audits and Surveillances
(continued)

- Surveillance/Audit of Framatome ANP Inc.
  - January 2001 (NUPIC)
  - February 2003 (NUPIC)

- Surveillance/Audit of SGT
  - April 2001 (Lead)
  - March 2003 (Lead)
  - March 2003 (Team Member/Observer)

Results of Audits and/or Surveillances

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- Creation of process for entering PAR identified items into Framatome's corrective action process
- Restriction on SGT for performing commercial grade dedications

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Self Assessment

- April 2002 – SGR Project
- July 2002 – ASME Code Compliance
- Oct 2003 – INPO Readiness Review

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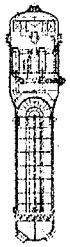
Replacement Steam Generator (RSG) 56/19 Design and Fabrication

Richard Pearson

Design and Fabrication

- RSG Design Requirements
- RSG Design Features
- Fabrication Status
- Tubing Examinations
- Framatome ANP SAS
  Non-Conformances Requiring Owner Approval



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RSG Design Requirements

- Two pieces
- Compatible – no major modifications
- Maximize heat transfer surface area
- Guaranteed steam pressure of 750 psia
- Tube integrity
- ASME Codes

ASME Codes

- ASME Section III Class 1 Nuclear Pressure Vessel
  - N-stamped in field

- ASME Code Edition and Addenda

– NCA	Current
– Section III	95, 96 Addenda
– Section XI	1989

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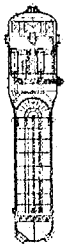
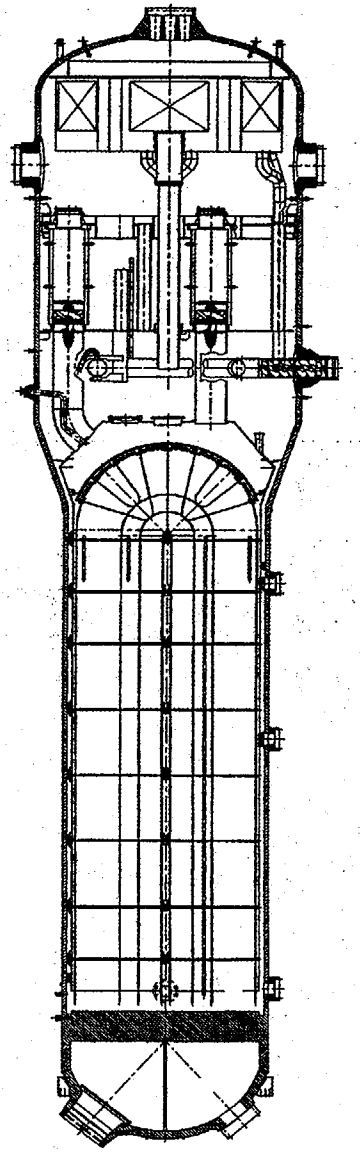
ASME Request for Interpretation Field Girth Weld

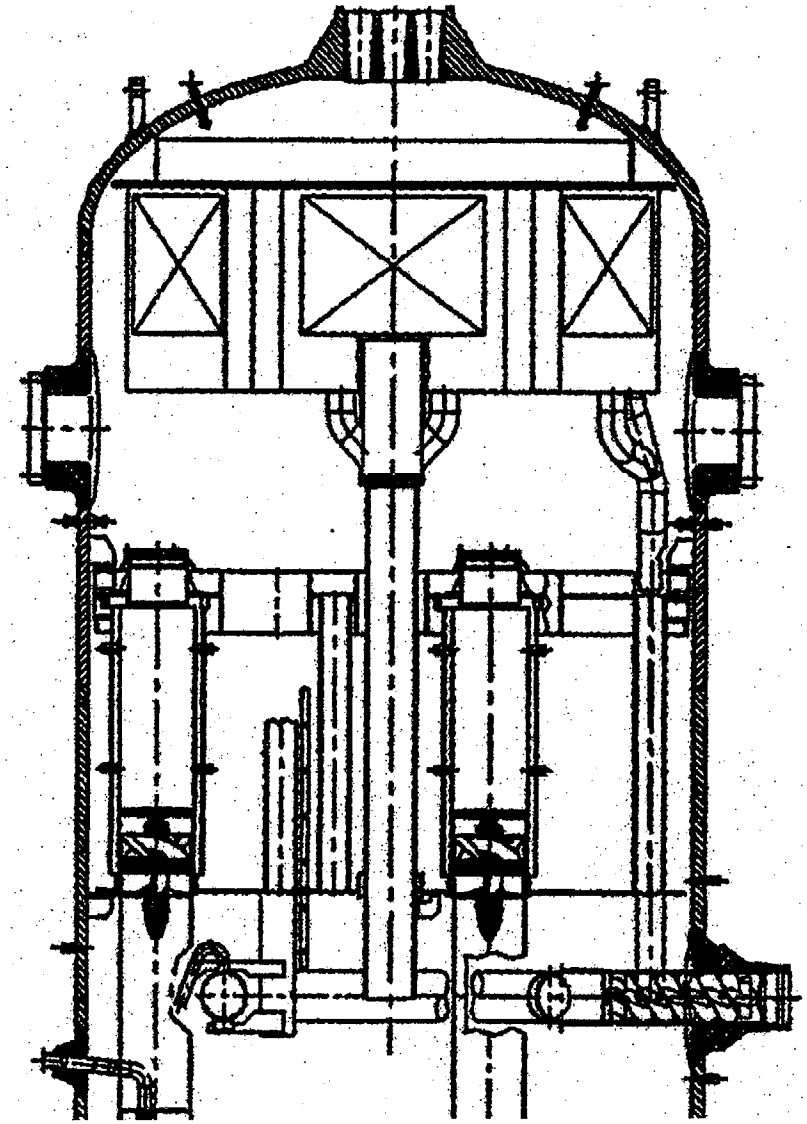
- ASME NI02-026 received May 27, 2003
  - Correct Stamp for Girth Weld – NPT
  - Supplier Subcontract Requirements for Field Girth Weld
- SGT - ASME NPT Certificate

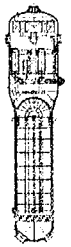


RSG
Design Features



Upper Assembly Design Features





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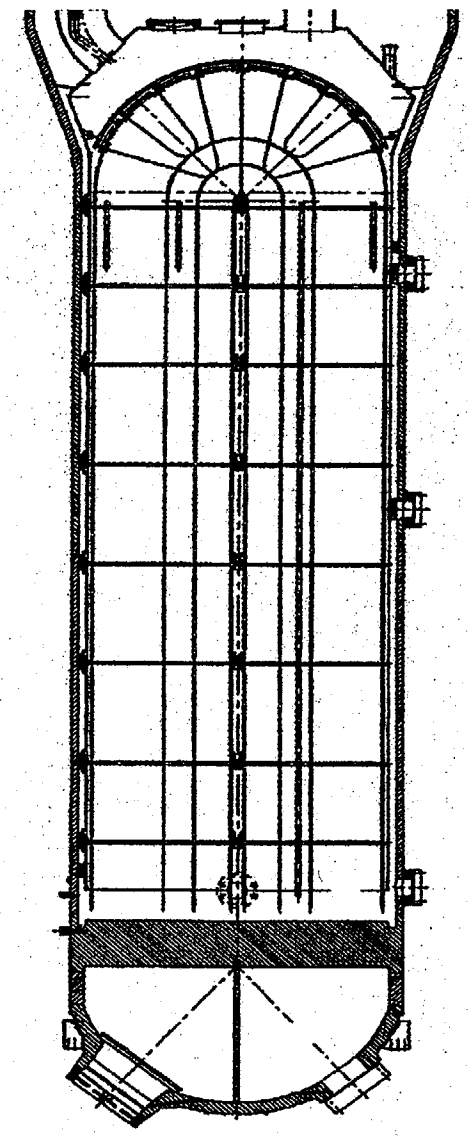
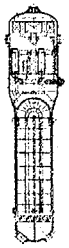
RSG Design Features

- Steam outlet nozzle flow restrictor integral to RSG elliptical head
- Improved Moisture Separation
- All stainless steel feedwater ring assembly
  - Welded inlet thermal sleeve
  - Integral anti-stratification device
  - J-tube outlet nozzles

Lower Assembly Design Features





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RSG Design Features
(continued)

- Loose parts trapping system
- Blowdown channel
- Alloy 690 thermally treated tubing material
- SS quatrefoil tube support plates
- SS anti-vibration bar system with nominal 9 bars

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OSG/RSG Comparison

Parameter	OSG	RSG
Thermal Output (MWt)	825	825
Thot/Tcold/Tave (nom.) (deg F)	590/530/560	590/530/560
Number of Tubes	3388	4868
Tubing OD/WT (in.)	0.875/0.050	0.75/0.043
Heat Transfer Area (sq. ft.)	51,500	61,281
Performance Coefficient UA (10E6 Btu/hr-F)	67.52	81.93
RCS Flow per SG - Best Estimate (10E6 lbm/hr)	38.39	38.51
RCS Pressure (psia)	2250	2250
Steam Flow (10E6 lbm/hr)	3.54	3.57
Full Load Steam Outlet Pressure (design normal operating) (psia)	750	806.8
Max. Moisture Carryover (%)	0.25	0.1
Operating Weight (lbf)	801,073	802,080
Primary Volume (cu ft)	1089	1127
Secondary Liquid Mass (lbm) Hot Zero Power 100% Power	 157,123 107,420	 159,100 107,100

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Fabrication Status

Component	RSG PI-291	RSG PI-292
Tubesheet	Complete.	Complete.
Lower Assembly & Tube Bundle Wrapper	Hydraulic expansion of tubes is completed. ECT profilometry completed.	Hydraulic expansion is completed. Tube washing in progress.
Primary Head	The Channel head divider plate installation is completed.	Nozzle dam ring installation is completed. Channel head divider plate installation is in progress.
Shell / Elliptical Head	Steam separator supports are completed.	Instrument tap welding is completed and drilling and tapping is in progress.

Tubing Examinations

- Fabrication testing done at Sandvik tubing mill
  - Standard ASME Section III
  - Inservice inspectability
  - AMSE Section XI prior to shipment
    - Multi-frequency ET testing of U-bend tubes (MIZ-30 Bobbin Coil)
    - MRPC of rows 1 through 9 U-bends

Tubing Examinations
(continued)

- Preservice in Chalon, France
  - 100% Bobbin, full length
  - MRPC
    - Expansion transition, ±3 inches, hot and cold leg
    - Selected U-bends

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Framatome ANP SAS
Non-Conformances Requiring Owner Approval

Description	Included in the SFAR *
Tube sheet GV/PI 292 - Deep Drilling	Yes
Tube sheet GV/PI 291- Deep Drilling	Yes
PI 292 PIE hand hole thread OOS	Yes
CVP GV/PI 292 (low er shell / tube sheet) Arc strike on low er shell	No
Sandvik: Incorrect reporting on optical disk for ECT on tubes bundle column 49	No
Orientation of 3 nozzles holes on the upper part - GV/PI 292	No
PI 292 PIE over machining of MIMS	No

*SFAR – Stress and Fatigue Analysis Report

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RSG
Licensing

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Licensing

- 50.59
- Technical Specification Changes

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Licensed Under 50.59

- No increase in occurrence of accidents/malfunctions
- No more than a "minimal" increase in dose consequences
- No new accidents or malfunctions

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Licensed Under 50.59
(continued)

- Meets all Design Basis Limits for Fission Product Barriers
- Methods are NRC approved
- Conclusion – does not require NRC approval

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Technical Specification Changes

- ILRT
- Tube Surveillance

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RSG
Installation Plans

Scott Marty

Installation Plans

- Installation Contractor
- Delivery of RSGs
- Steam Generator Removal/Replacement
- ALARA

Installation Plans
(continued)

- Design Change Packages
- OSG Disposal
- Construction/Installation Testing
- Operational Testing and Monitoring

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Installation Contractor

SGT, Ltd.

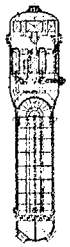
Washington Group International, Inc. / Framatome ANP

Completed

- Point Beach Units 1 & 2
- DC Cook Unit 2
- St. Lucie Unit 1
- Indian Point 2
- Calvert Cliffs Unit 1
- Calvert Cliffs Unit 2

Future

- Oconee Units 1, 2 & 3
- Callaway
- ANO



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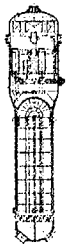
Delivery of RSGs

- RSGs arrive by barge, May 2004.
- Moved via Self Propelled Modular Transporter (SPMT)



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Steam Generator Removal/Replacement

- Two piece removal
- Two piece installation with field weld at transition cone upper girth joint
- Existing equipment hatch, no containment modifications
- Existing 230t capacity polar crane.
- Engineered Lifts, with maximum < 250t

Steam Generator Removal/Replacement (continued)

- Girth weld closure joint using manual welding process
- Contingency for minimum concrete removal for girth weld
- One cut per RCS nozzle
- Automatic narrow groove weld process for primary nozzles

Steam Generator Removal/Replacement (continued)

- Anticipate automatic welding for MS & FW nozzles
- Additional wide range water level taps
- Blowdown piping

ALARA

- RCS pipe end decon
- Control secondary water level for shielding
- Shielding
  - Locations identified
  - Incorporated with scaffolding designs

Design Change Packages
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- RSG component
- New mirror insulation
- Nozzle dams
- RSG new connections
- Misc. to facilitate installation

Design Change Packages
SGT

- RCS piping and SG supports
- RSG and secondary piping
- Remove/replace interferences
- Misc. to facilitate installation

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OSG Disposal

- No long term onsite storage
- Transport lower assemblies by rail to Envirocare (UTAH)
- Transport upper assemblies by truck to Duratek (Tennessee)

Construction/Installation Testing

- Secondary side hydrostatic test to 1357 psig (125% of design pressure)
  - Post hydrostatic NDE
  - Required for vessel ASME "N" stamping

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Construction/Installation Testing (continued)

- ASME Section XI testing
  - Preservice examinations of welds and supports
  - System pressure tests
- Support gap monitoring during heatup

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Operational Testing and Monitoring

- Moisture carryover testing
- Thermal and hydraulic performance

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Steam Generator Replacement Outage (SGRO) Schedule

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Schedule

- Pre-Outage activities
- Outage Activities

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Pre-Outage Activities

- Design Change Packages approvals
- RCS, MS, and FW nozzle weld preps.
- RSG girth weld profile

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Pre-Outage Activities
(continued)

- Welder qualification
- Girth weld mock-up
- Hatch Transfer System (HTS) outside containment

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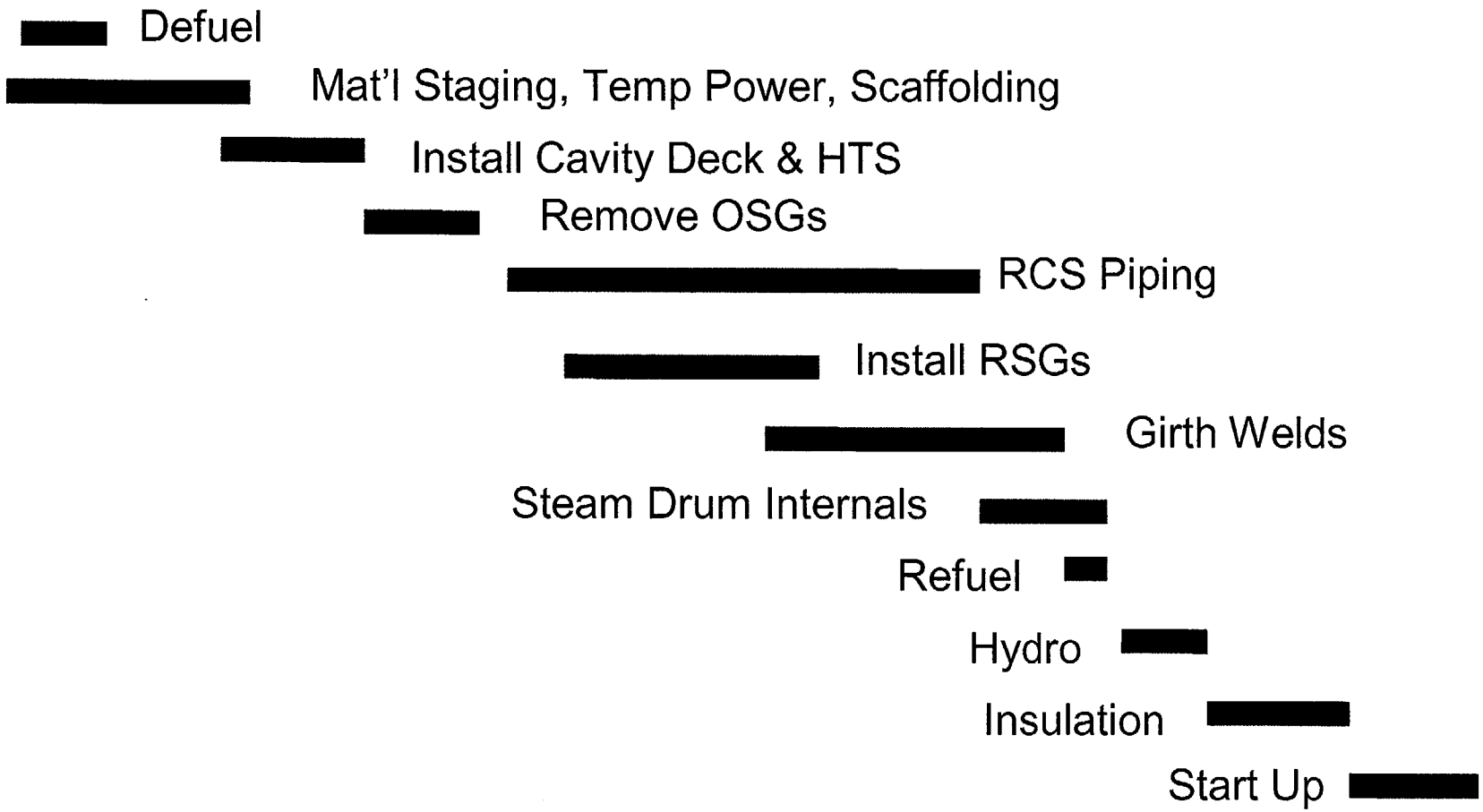
Outage Activities



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Future NRC Meetings

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Future NRC Meetings

- Fall 2003 — NRR - Licensing & Fabrication Update
- Spring 2004 — NRR - Pre-Installation Update
- Others as needed