From: "Sanchez, Edward" <esanch1@entergy.com>
To: "Perry Buckberg" <PHB1@nrc.gov>
Date: 8/27/2007 10:48:03 AM
Subject: Copy of Pilgrim ACRS slides

Perry,

Attached is a copy of the slides Entergy (Pilgrim) will present at the ACRS meeting on Sept. 6.

Ed Sanchez
Pilgrim Licensing

Hearing Identifier: PilgrimRenewalNonPublic
Email Number: 22

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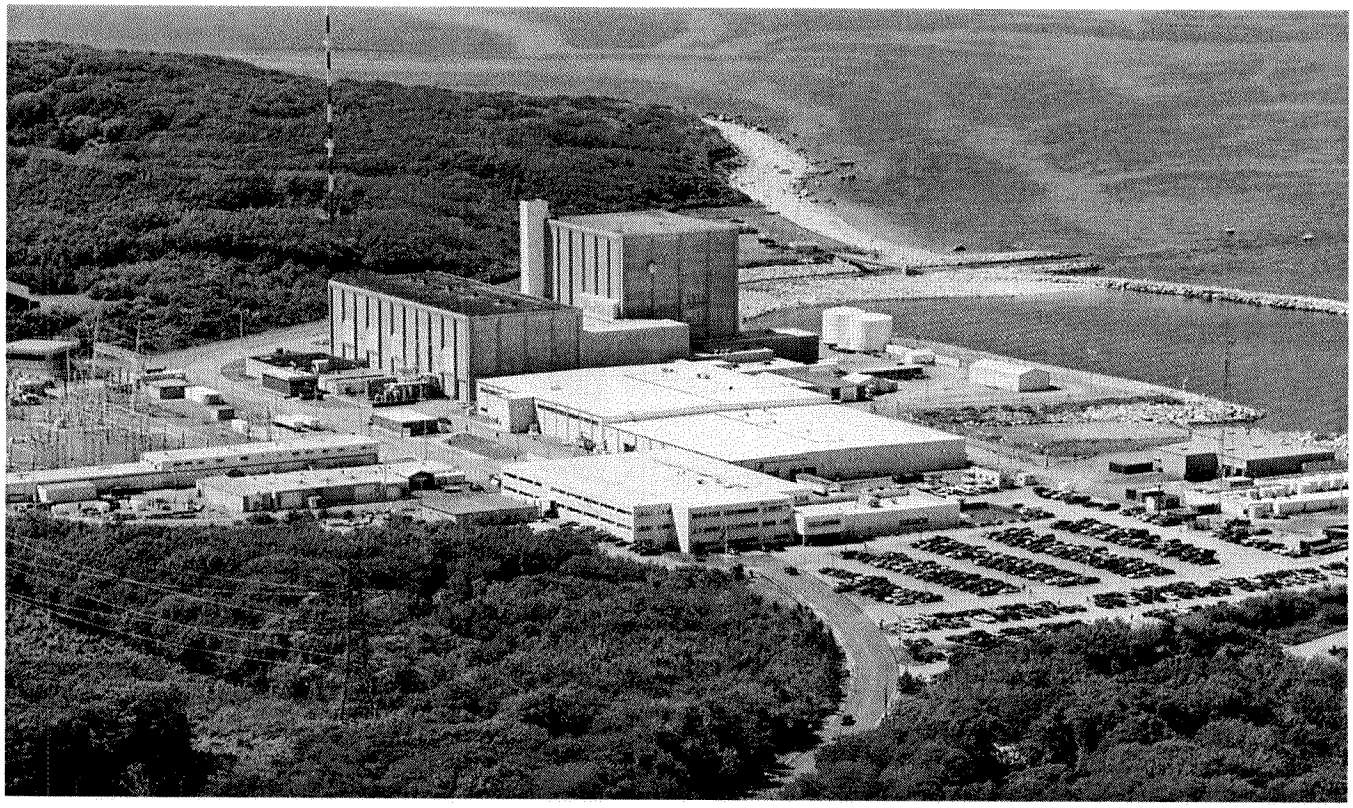
Pilgrim Nuclear Power Station

License Renewal ACRS
September 6, 2007



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Pilgrim Personnel in Attendance

Kevin Bronson	Site Vice President
Steve Bethay	Director of Nuclear Safety Assurance
Brian Sullivan	Director of Engineering
Bryan Ford	Senior Manager NS&L
Alan Cox	Entergy LR Project Manager
Fred Mogolesko	Pilgrim LR Project Manager

Other support personnel

Agenda

- Description and Current Status
- Licensing History and Highlights
- License Renewal Project
- Draft SER (March 2007)
  - 4 Open Items
- Final SER (June 2007)
  - Open Items resolved
- Summary

Pilgrim Description

- Located in Plymouth, Massachusetts on Cape Cod Bay
- ~ 40 miles south of Boston
- Sited on 1600 Acres
- BWR-3
- Mark I Containment
- General Electric (NSSS), Bechtel (AE and Constructor)
- 2028 MWt Thermal Power; ~ 690 MWe
- Open Cycle Condenser Cooling
- Owned and Operated by Entergy
- Staff: ~ 650

Current Plant Status

- Completed RFO-16 May 9, 2007
- Operating at 100% power
- NRC PIs & Inspection Findings All Column 1
- Next Refueling Outage April/May 2009

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Licensing History and Highlights

• Construction Permit	August 26, 1968
• Operating License	June 8, 1972
• Full Power License	September 15, 1972
• Commercial Operation	December 9, 1972
• License Transfer to Entergy	July 13, 1999
• Appendix K Power Uprate (1.5%)	May 8, 2003
• LR Application Submitted	January 25, 2006
• Operating License Expires	June 8, 2012

Licensing History and Highlights
(continued)

Significant design improvements

- 1977- Replaced Core Spray safe-ends and piping inside primary containment with IGSCC-resistant material
- 1978 -1982 Mark I containment modifications
- 1984 - Replaced recirculation piping to address IGSCC concerns
- 1986 -1989 Safety enhancement modifications (SSW-RHR cross-tie, Direct Torus Vent to Main Stack, Station Blackout Diesel Generator)

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Licensing History and Highlights
(continued)

Significant design improvements

- 1991 - Hydrogen water chemistry
- 1995 - Replaced ECCS suction strainers
- 2007 - Implementation of Noble Metals

- Spent fuel pool capacity adequate through end of current operating license
- Dry cask storage project to be initiated in 2008

License Renewal Project

- LRA prepared by experienced, multi-discipline Entergy team (corporate and on-site)
- Extensive training program provided to Engineering, Licensing, and QA
- Pilgrim and VY LRAs first applications submitted following issuance of Rev. 1, SRP and GALL
- Incorporated lessons learned from previous applications
- Peer review conducted (10 Utilities), all observations addressed
- LRA internal reviews (OSRC, SRC, QA)

License Renewal Project
(continued)

- Commitments in the LRA refined as needed during audit/inspection process (40 aging management programs)
- Commitments captured in the Pilgrim commitment tracking system
- Programs owned by site Engineering
  - 14 programs in place w/o enhancements
  - 16 programs require enhancement
  - 10 new programs

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Safety Evaluation Report (SER)

- **Draft SER - 4 Open Items** (March 2007)
  - OI 2.3.3.6 Security Diesel Generator
  - OI 3.0.3.2.10 Fire Barrier Penetration Seals
  - OI 3.0.3.3.2 Containment Inservice Inspection
  - OI 4.2 Reactor Vessel Neutron Fluence
- **Final SER** (June 2007)
  - All open items resolved

Security Diesel Generator

OI 2.3.3.6

- Region 1 Confirmatory Item to determine if security diesel components are within the scope of license renewal
- Requested support provided

Fire Barrier Penetration Seals

OI 3.0.3.2.10

- Concern on aging management of inaccessible seals
- All penetration seals are included in the inspection program

Containment Inservice Inspection
OI 3.0.3.3.2

- Potential for corrosion in the inaccessible area of the steel containment shell, base mat and sand pocket region

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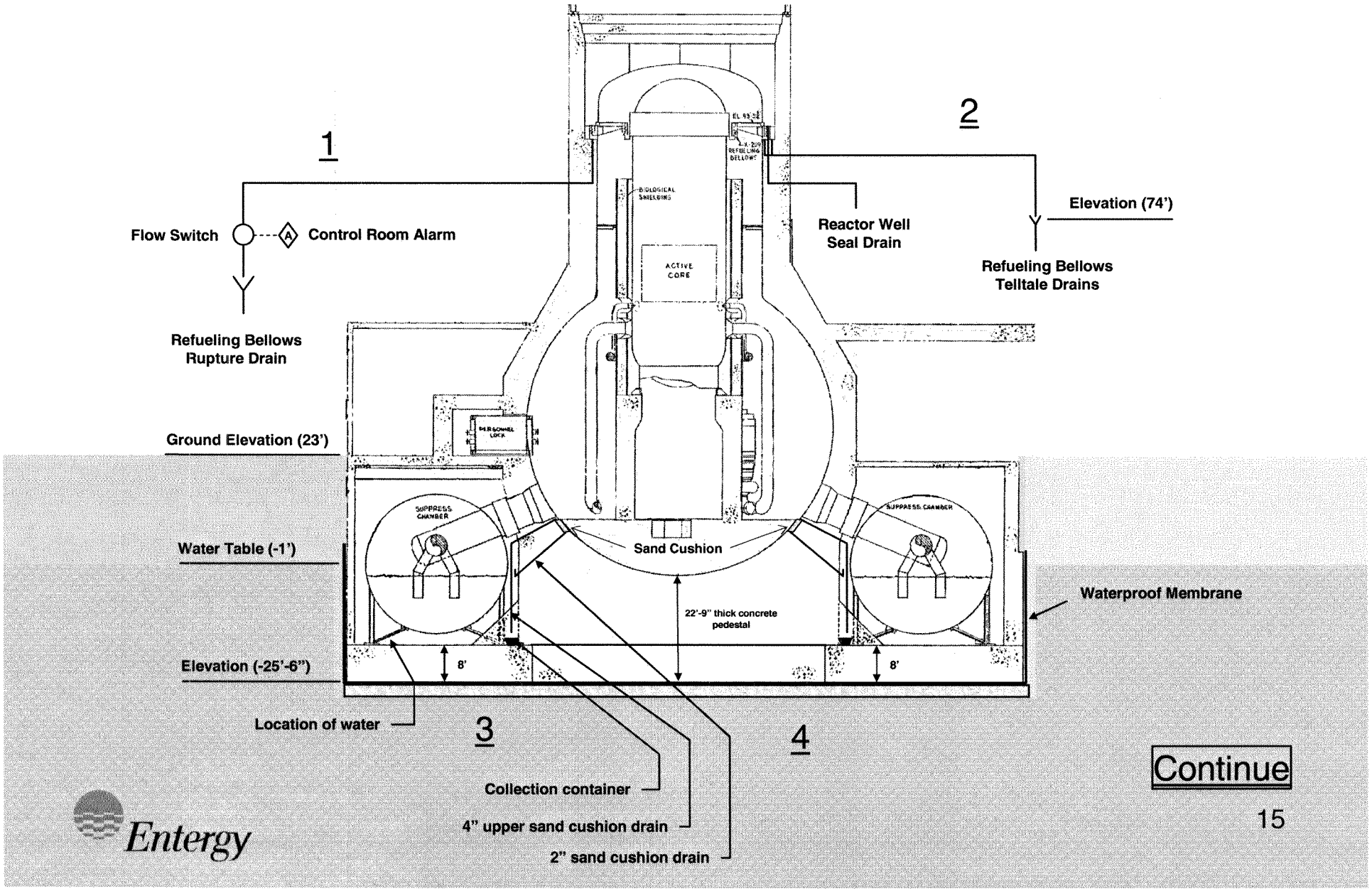
Containment Inservice Inspection
OI 3.0.3.3.2

Drywell Shell Condition and Monitoring

- Defense in depth design minimizes potential for undetected water intrusion
- Diverse methods of prevention and identification of potential water leakage into air gap
- No refueling bellows leakage
- No water intrusion into drywell air gap
- No drywell shell degradation
- Confirmatory inspections planned and performed

Containment Inservice Inspection

Drywell Shell Condition and Monitoring



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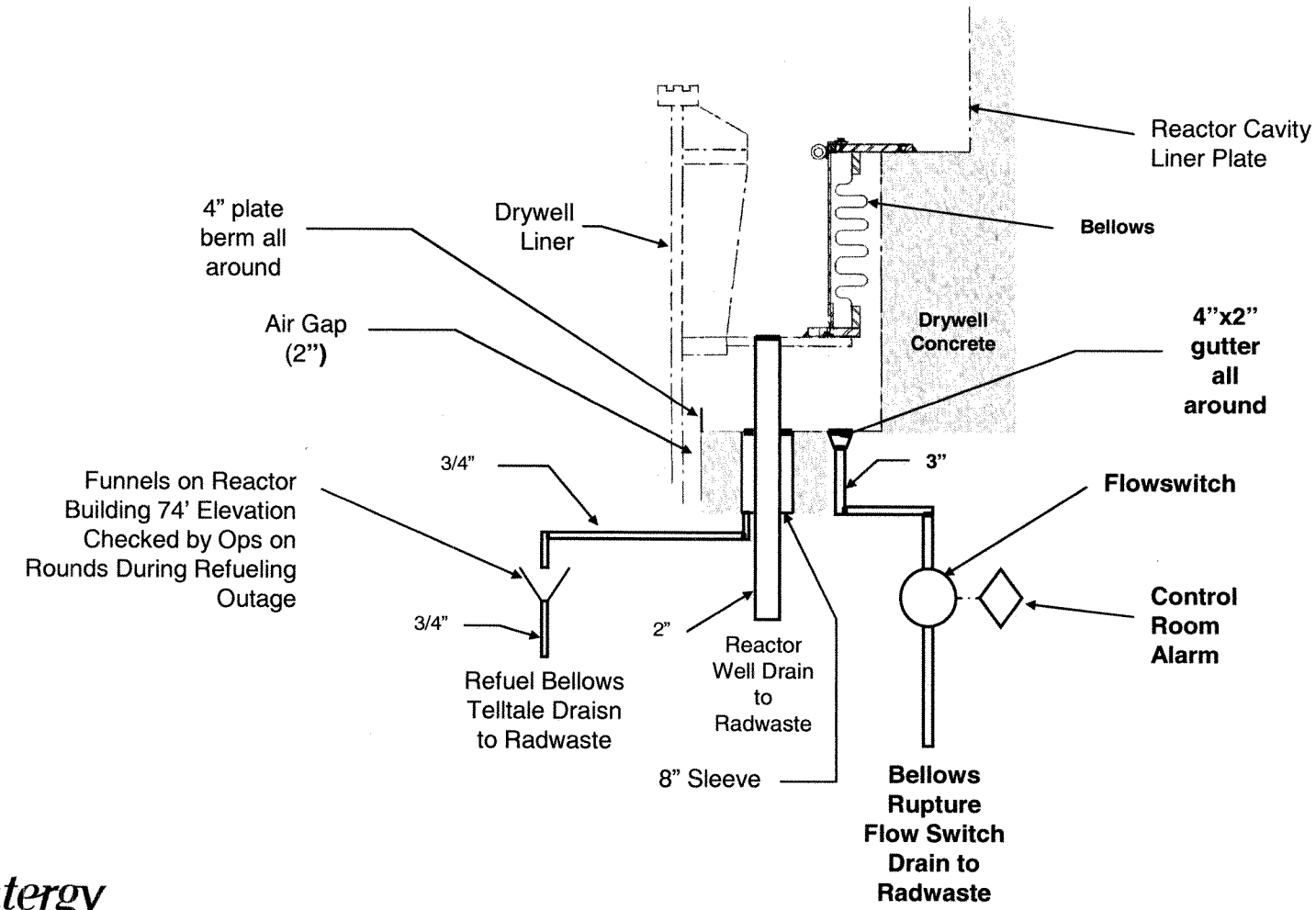
Containment Inservice Inspection
Drywell Shell Condition and Monitoring

3" instrumented drain line alarms in control room



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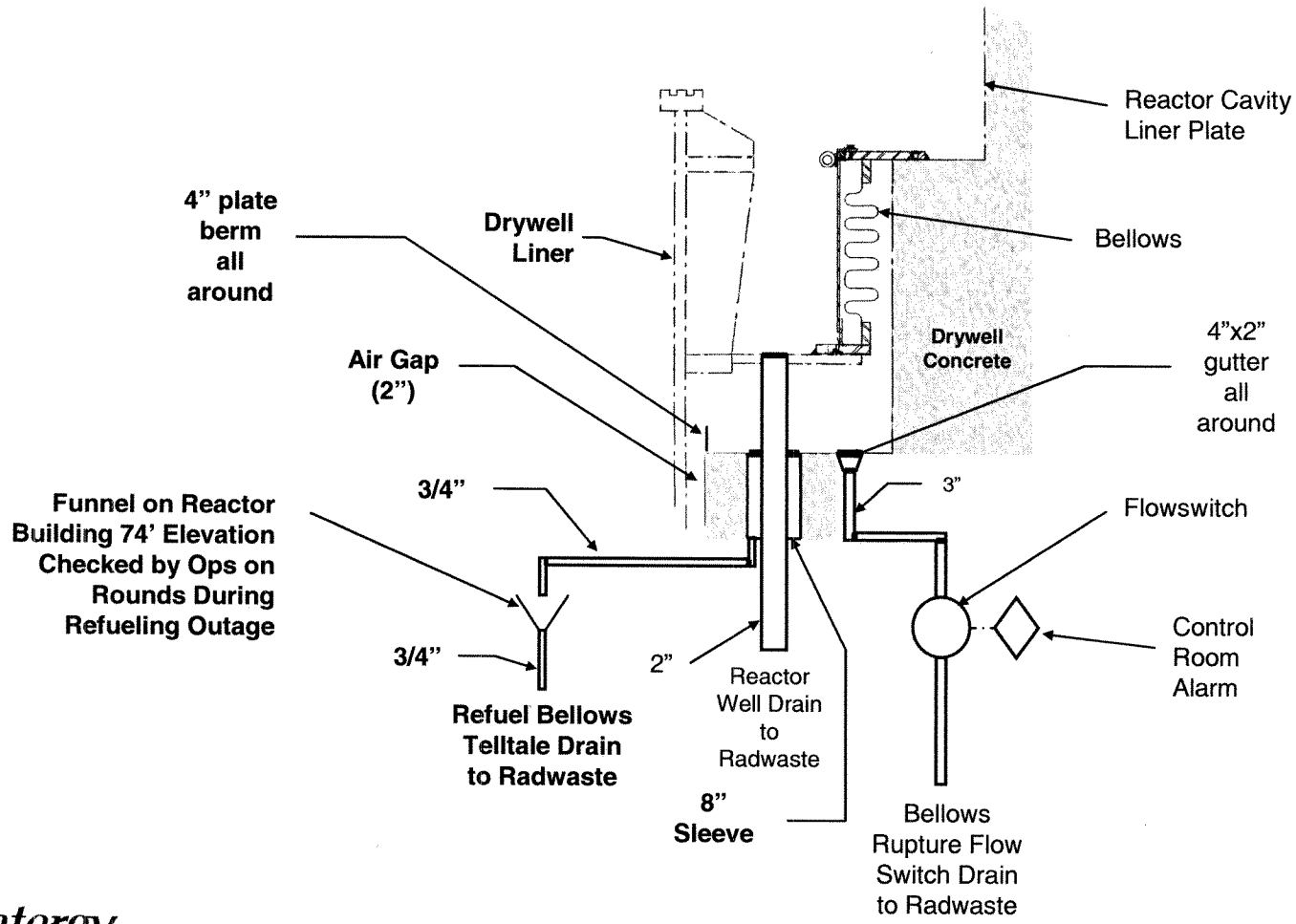
Containment Inservice Inspection
Drywell Shell Condition and Monitoring

Four ¾" drain lines which exit to 74' checked during operator tours



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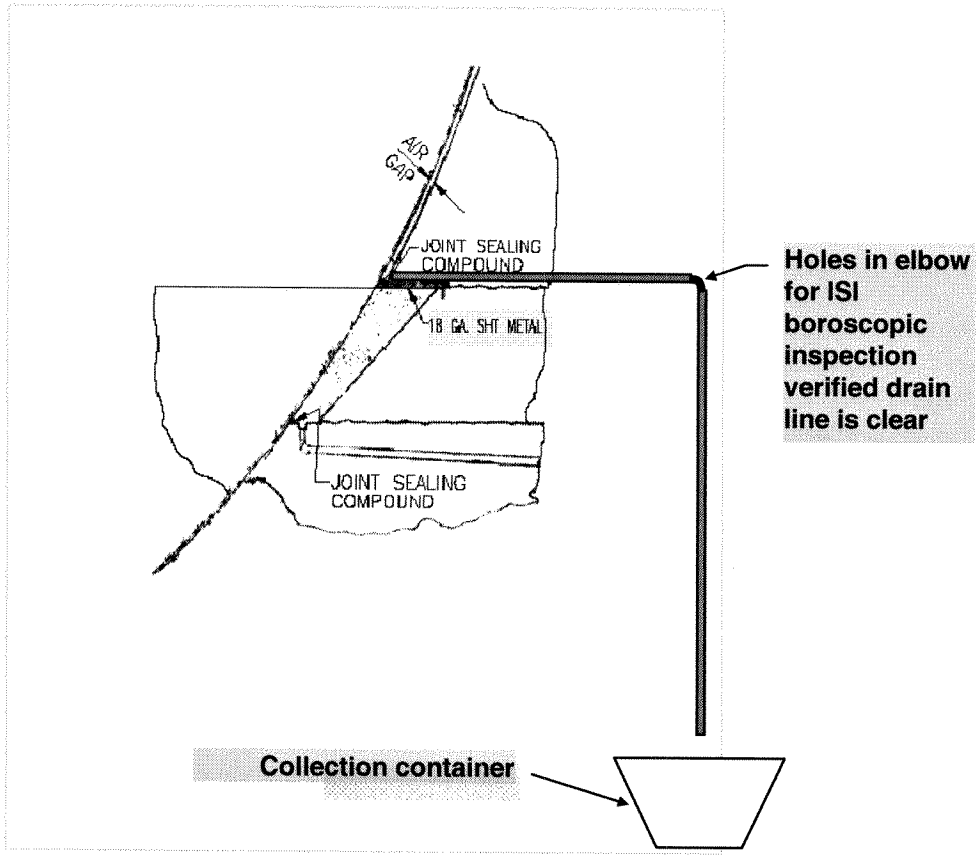
Containment Inservice Inspection

Drywell Shell Condition and Monitoring

Four 4" upper sand cushion drains drain into collection devices and are monitored at beginning and end of each RFO



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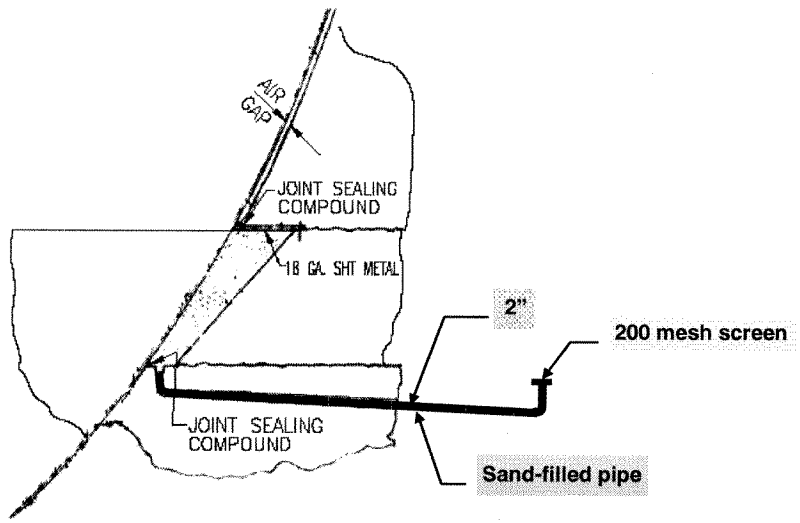
Containment Inservice Inspection
Drywell Shell Condition and Monitoring

Four sand cushion drains provide further detection capabilities



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Containment Inservice Inspection

Drywell Shell Condition and Monitoring

Past Inspections

- Limited confirmatory examinations
  - UT at twelve locations at 9'-2" elevation
  - UT at four locations at 9'-1" elevation
    - Concrete chipped out to a depth of 1"
  - UT at six locations at 72' and 83' elevations
- Verified upper sand cushion drains unobstructed and dry
- All inspections identified no corrosion

Containment Inservice Inspection
Drywell Shell Condition and Monitoring

Future Examinations

- UT at 12 locations at 9'-2" elevation
  - Prior to Period of Extended Operation
  - Once within first 10 years
- UT at 4 locations at 9'-1" elevation
  - Prior to Period of Extended Operation
  - Once within first 10 years
- UT at 72' elevation adjacent to SFP
  - Conducted every 40 months by IWE

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Containment Inservice Inspection

OI 3.0.3.3.2

Water on Torus Room Floor

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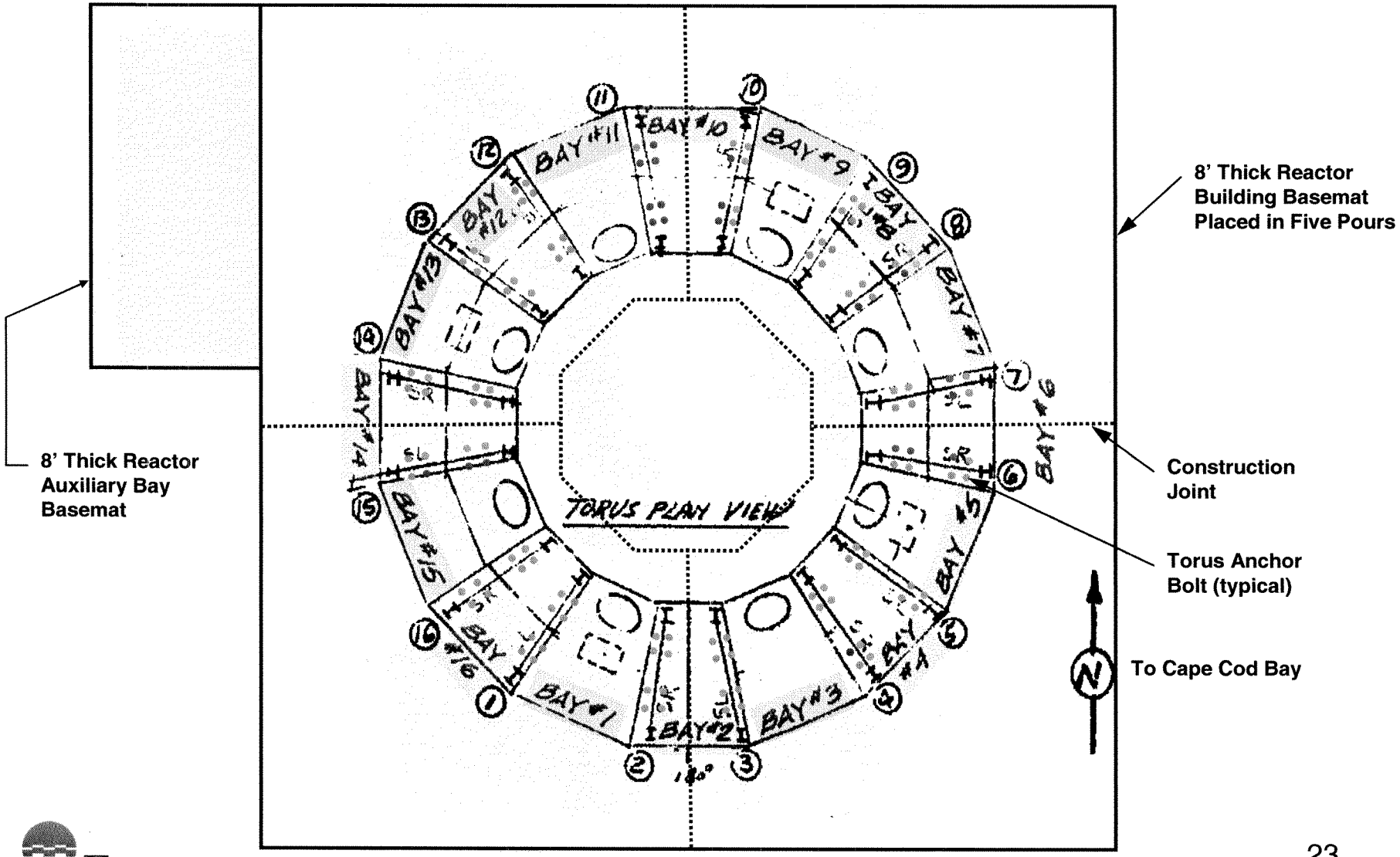
Containment Inservice Inspection

Torus Room Floor



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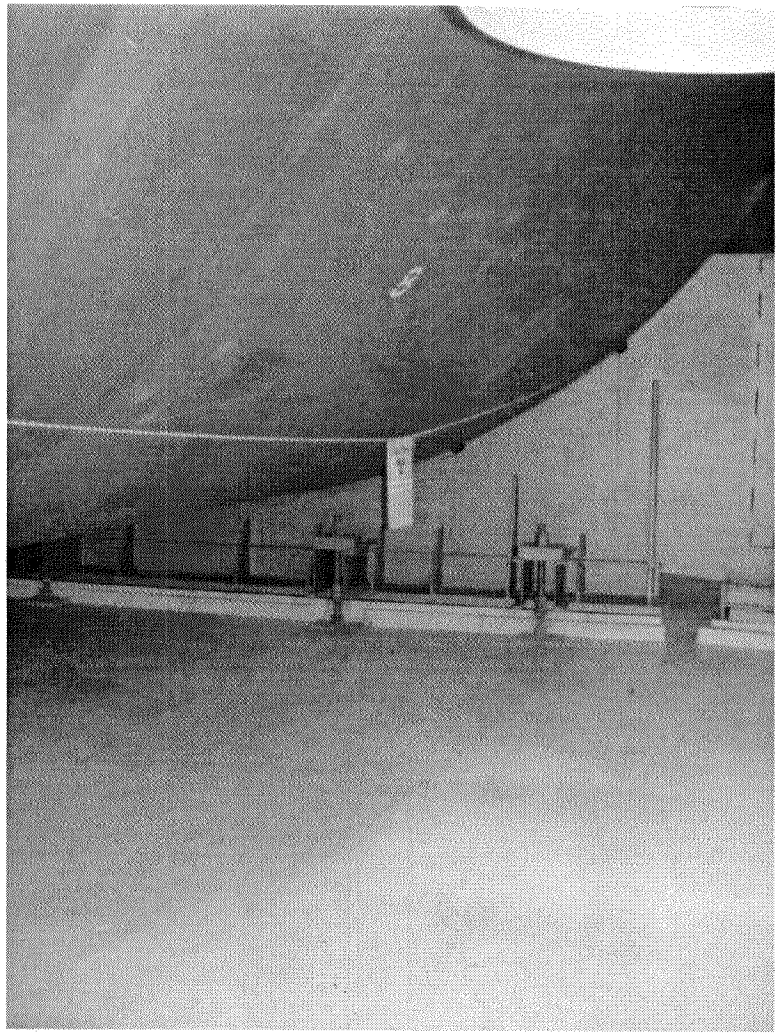
Containment Inservice Inspection

Torus Room Floor

Bay 8



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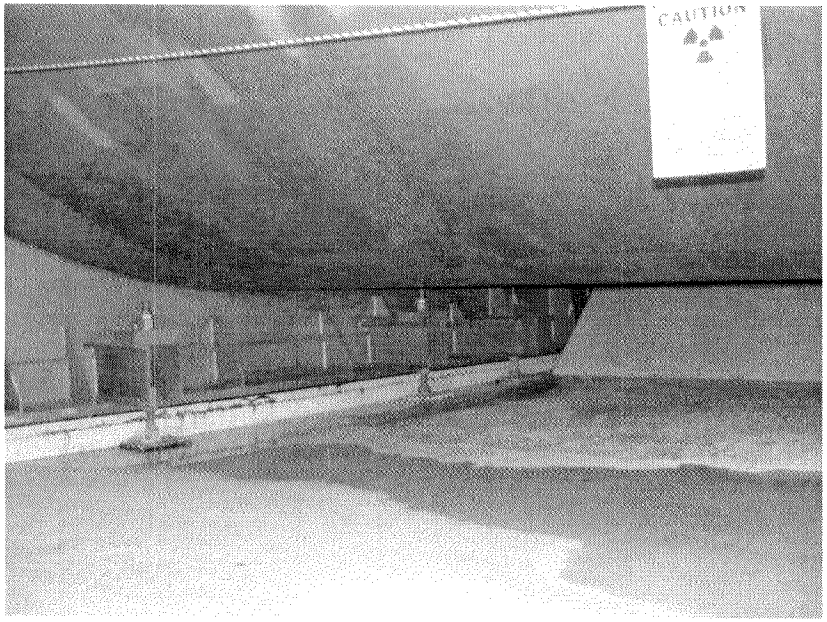
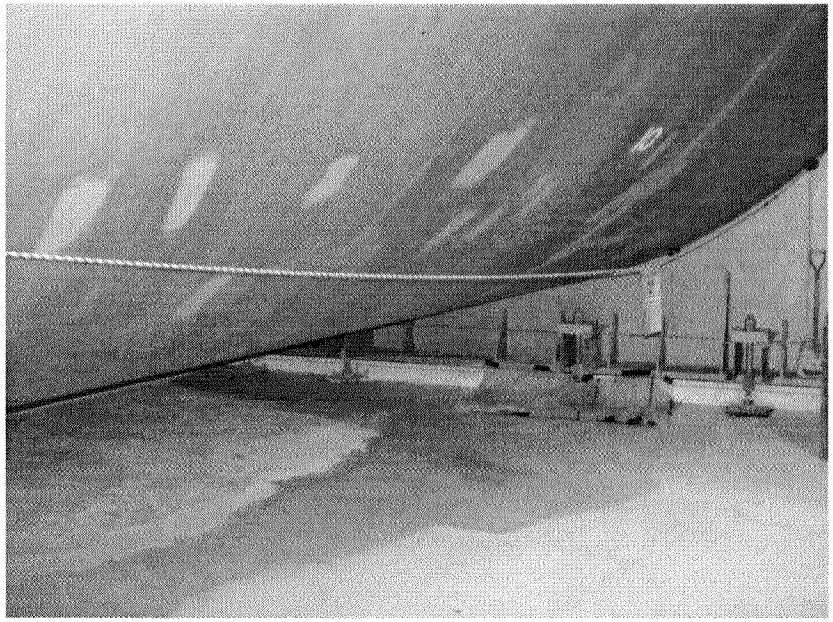
Containment Inservice Inspection
Torus Room Floor

Bay 10





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Containment Inservice Inspection

Water on Torus Room Floor

Aspects Evaluated

- Source of water
- Integrity of anchor bolts
- Structural adequacy of the reactor building
- Inspection and monitoring of water, concrete, and Torus hold down anchor bolts

Independent Assessment by Dr. Franz Ulm - MIT

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Containment Inservice Inspection

Water on Torus Room Floor

Source of water

- The source is ground water seepage under hydraulic pressure
- Path is through vertical joints and zones most likely weakened by tensions generated during setting and hydration following the construction (normal occurrence)
- Low seepage rate is counteracted by evaporation
- Non-aggressive, benign water chemistry

Containment Inservice Inspection

Water on Torus Room Floor

Integrity of anchor bolts

- Implemented commitment to inspect grout and bolts for degradation/corrosion

  Two cases evaluated:

  Bay 8: Typically dry (1 bolt inspected)

  Bay 10: Typically wet (4 bolts inspected)

- Inspection included lifting of jacking plate
- Results:

  No degradation of bolt or grout

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Containment Inservice Inspection

Water on Torus Room Floor

Structural adequacy of the reactor building

- Past sampling of water on floor demonstrated non-aggressive water chemistry
- No structural distress evident
- Groundwater is non-aggressive to base-mat
- Concrete Water Chemistry
  - Minimum degradation threshold limits for concrete established:
    - Acidic solutions with pH < 5.5
    - Chloride solutions > 500 ppm
    - Sulfate solutions > 1500 ppm
- Water re-analyzed to demonstrate non-aggressiveness

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Containment Inservice Inspection

Water on Torus Room Floor

Future Commitments

- Determine additional actions based on inspection of bolts and water analysis, prior to the period of extended operation
- Monitor chemistry of groundwater, every five years
- Monitor chemistry of water on floor
  - Prior to the period of extended operation, and
  - Once every five years during the period of extended operation
- Inspect Structure in accordance with Structures Monitoring Program, every five years

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Containment Inservice Inspection

Water on Torus Room Floor

Independent Assessment

- Evaluate functional capability of torus base-mat.
  - Professor Franz Ulm of MIT's Department of Civil Engineering
- Groundwater migration is highly localized
- Does not compromise the overall structural performance of the torus base mat.
- Does not affect the bulk integrity of the concrete slab or the overall compressive and bending load bearing capacity of the reactor foundation.
- Non-aggressiveness of ground water verified
- The localized calcium leaching does not affect the overall structural performance of the slab.

Reactor Vessel Neutron Fluence

OI 4.2

- Lack of benchmarking data to support plant specific fluence calculations for use in TLAAs

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Reactor Vessel Neutron Fluence

- Current P-T curves valid through 2011 RFO.
- Commitment to submit RG 1.190 calculations by June 2010
- Current Status:
  - Evaluated TLAAs to determine limiting fluence (RG 1.99)
    - Adjusted Reference Temperature
    - Upper Shelf Energy
    - RPV internals (top guide and shroud tie-down)
    - RPV welds
    - RPV nozzles near beltline
  - Axial Weld Failure Probability is limiting at 5×10^{-6} per Reactor Year
  - Limiting fluence value will not be challenged at 54 EFPY

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Reactor Vessel Neutron Fluence

License Condition:

On or before June 8, 2010, the applicant will submit to the NRC correctly benchmarked RV neutron fluence calculations, consistent with RG 1.190, that will confirm that the neutron fluence for the lower intermediate shell axial welds, at the inner surface of the RV, will not reach the limiting value of 3.37×10^{18} n/cm^2 (E > 1.0 MeV) by the end of the period of extended operation (54EFPY)

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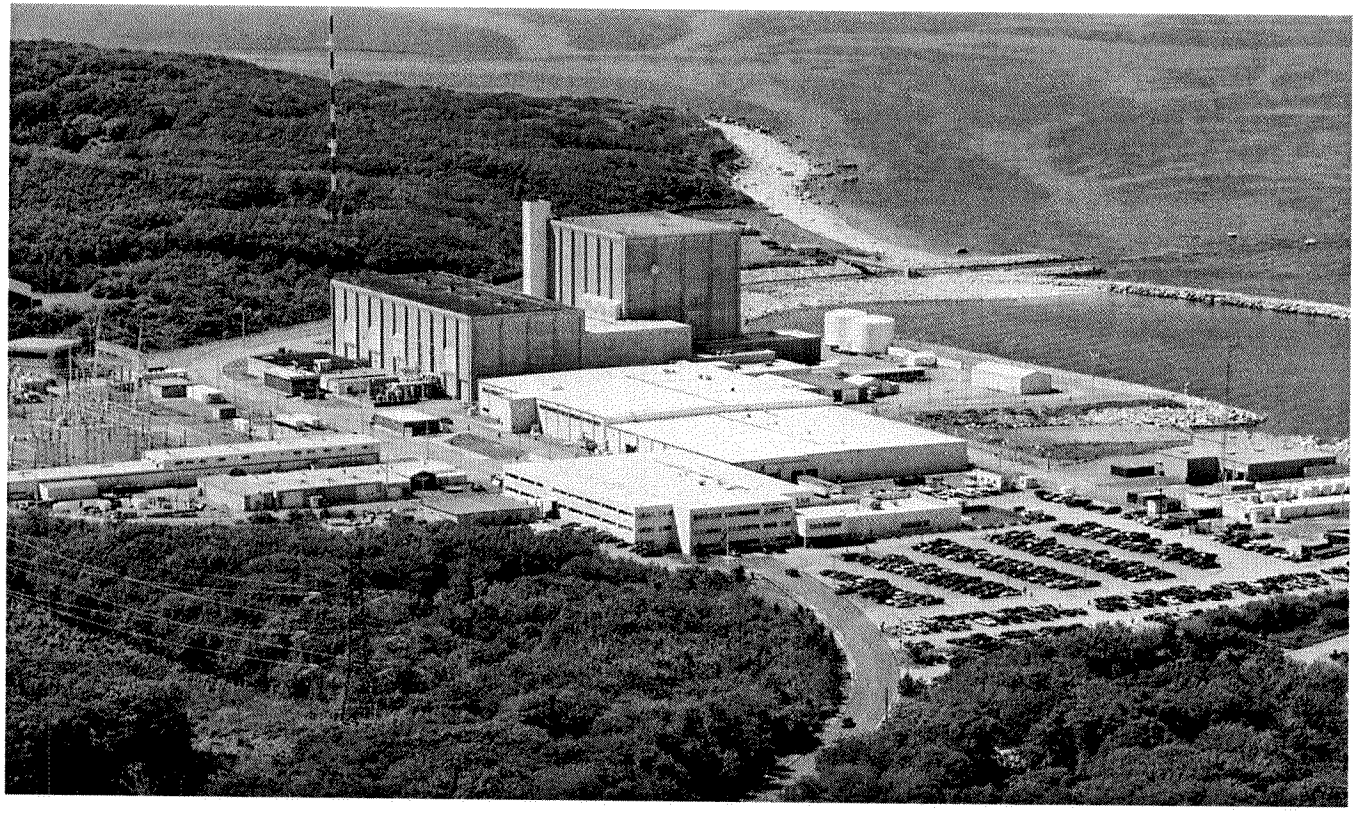
Summary

Pilgrim Station Team

- Understands plant aging issues
- Recognizes the relationship between successful implementation of LR commitments and enhanced reliability of plant SSCs
- Tracking the LR commitments and initiated implementation
- Has integrated the implementation of LR commitments into the organizational culture as an ongoing responsibility through the period of extended operation

Pilgrim Nuclear Power Station

Questions?



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