

# PUBLIC MEETING WITH INDUSTRY TO DISCUSS 2/11/03 ORDER ESTABLISHING INTERIM INSPECTION REQUIREMENTS FOR REACTOR PRESSURE VESSEL HEADS AT PRESSURIZED WATER REACTORS

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## Presenters

Brian Sheron, Associate Director  
Allen Hiser, Senior Materials Engineer  
Steven Bloom, Project Manager



February 24, 2003  
1:00 pm til 5:00 pm

Doubletree Hotel  
Rockville, Maryland



# Meeting Purpose and Agenda

**Purpose:** Discuss with industry, the Orders issued on February 11, 2003 concerning reactor pressure vessel head inspection requirements

**Category 2 Meeting:** Meeting with industry representative to discuss an issue which affects more than one licensee

**Agenda:**

NRC Opening Remarks  
NRC Presentations

BREAK

NEI Questions and Comments  
Industry Questions and Comments  
Public Questions and Comments

**NOTE:** Questions will be solicited from the meeting room first, then the phone lines.



# WHY ISSUE AN ORDER?



# Background

- Davis Besse Root Cause was qualitative and speculative:
  - Could not conclusively identify sequence of events, associated phenomena, and time scale.
  - As such, conditions under which corrosion will or won't occur are not known with certainty.
- Staff approach in Bulletin 2002-02 was to gain reasonable assurance that conditions that could potentially lead to corrosion and/or circumferential cracking do not exist (i.e., reasonable assurance that through-wall cracks would not occur).
- Staff identified an inspection regime in Bulletin 2002-02 that it believed would provide this assurance.



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# Background

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- Most Licensee responses to Bulletin 2002-02 committed to one-time inspections in accordance with Bulletin 2002-02 guidance and then were either non-committal or committed to industry program.
- Industry was requested, in May 2001, to develop inspection plan which staff could endorse.
- Discovery of corrosion by Davis Besse in March 2002 prompted industry to consider corrosion potential in any inspection plan.



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# Background

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- Industry submitted inspection plan (MRP-75) in August 2002.
  - Staff has provided comments, but NEI requested (i.e., verbally) the report be withdrawn from review based on Fall '02 inspection results.
- Currently unclear when successor to MRP-75 will be submitted, and if the staff can find it acceptable.
- Licensees who performed inspections in Fall '02 in accordance with Bulletin 2002-02 guidance are likely to begin planning their next outages soon, if not already.



# WHY ISSUE AN ORDER?

- Given:
  - Lack of current regulations that adequately address the circumferential cracking and corrosion issues.
  - Uncertainty in acceptability of licensee's inspection plans beyond those currently committed to.
  - Uncertainty in when a staff-approved industry inspection program will be available.
- Staff concluded that an Order was needed to assure adequate protection related to primary system integrity.



# Orders Are Interim Requirements

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- Order is generally consistent with inspection guidance originally provided in Bulletin 2002-02.
- Order is considered an interim measure.
  - If industry submittal and staff approval of MRP-75 occurs in timely manner, staff can amend order to include approved MRP-75 method.
  - ASME working on revised inspection guidance. Presuming it is consistent with a staff approved version of industry inspection plan, staff would endorse revised code requirements and incorporate into regulations via 10 CFR 50.55a rule change with expediated implementation of inspection requirements.
  - If staff and industry cannot reach agreement on acceptable inspection program in reasonable amount of time, staff will consider incorporating augmented inspection requirements into 10 CFR 50.55a via rulemaking.





# Impact of Order on Plant's License

- Order is considered part of a plant's license.
- If a licensee wants to take exception to the inspection requirements in the Order, licensee should submit a request for relaxation.
- Staff is available to answer question about the Order.



# Need for Inspection Requirements

- Strengthen inspection requirements for RPV heads at PWR facilities thus ensuring reasonable assurance of adequate protection of the public's health and safety. Current ASME inspection requirements:
  - Inspections on insulated surface of reactor pressure vessel head every outage (i.e., VT-2) do not provide reasonable assurance.
  - May not detect small leaks that can lead to wastage/corrosion.
  - May not detect small leaks from cracks in the VHP nozzle or J-groove weld.
  - Do not detect leaks until after they have occurred.
  - Do not provide an extremely low probability of abnormal leakage (GDC-14).
- Provides a clear regulatory framework pending the incorporation of revised inspection requirements into 10 CFR 50.55a



# Inspection Requirements

- Inspection requirements reflects additional information obtained during Fall '02 outages and consideration of this additional information.
- Evaluate susceptibility to primary water stress corrosion cracking, i.e., effective degradation years (EDY)
  - High -  $EDY \geq 12$  or previous cracking identified
  - Moderate -  $8 \leq EDY < 12$
  - Low -  $EDY < 8$



# Inspection Requirements

Continued

- 100% Bare metal visual (BMV) - beneath RPV head insulation
  - High: every RFO
  - Moderate: every other RFO
  - Low: every third RFO or every 5 years, whichever occurs first
  - \* In some cases insulation will have to be removed.
- 100% Ultrasonic of VHP nozzle base material and assessment of leakage into interference fit zone
  - \* From 2 inches above the J-groove weld to the bottom of the nozzle.

**OR**

- Eddy current or dye penetrant examination of all wetted surfaces (nozzle and J-weld)
  - High: every RFO
  - Moderate: every other RFO
  - Low: every fourth RFO or every 7 years, whichever occurs first



# Inspection Requirements

Continued

- Moderates must conduct BMV and non-visual examinations during alternate RFOs.
- Lows complete first BMV within two RFO and first non-visual examination within five years
  - Orders also apply to new RPV heads, either Alloy 600 (e.g., Davis-Besse) or Alloy 690 (e.g., North Anna 2 and many others)
- Explicit requirements and criteria to inspect repaired nozzles/welds
- Flaw evaluation per NRC guidance (i.e., Strosnider letter - Fall ' 01)



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# Inspection Requirements

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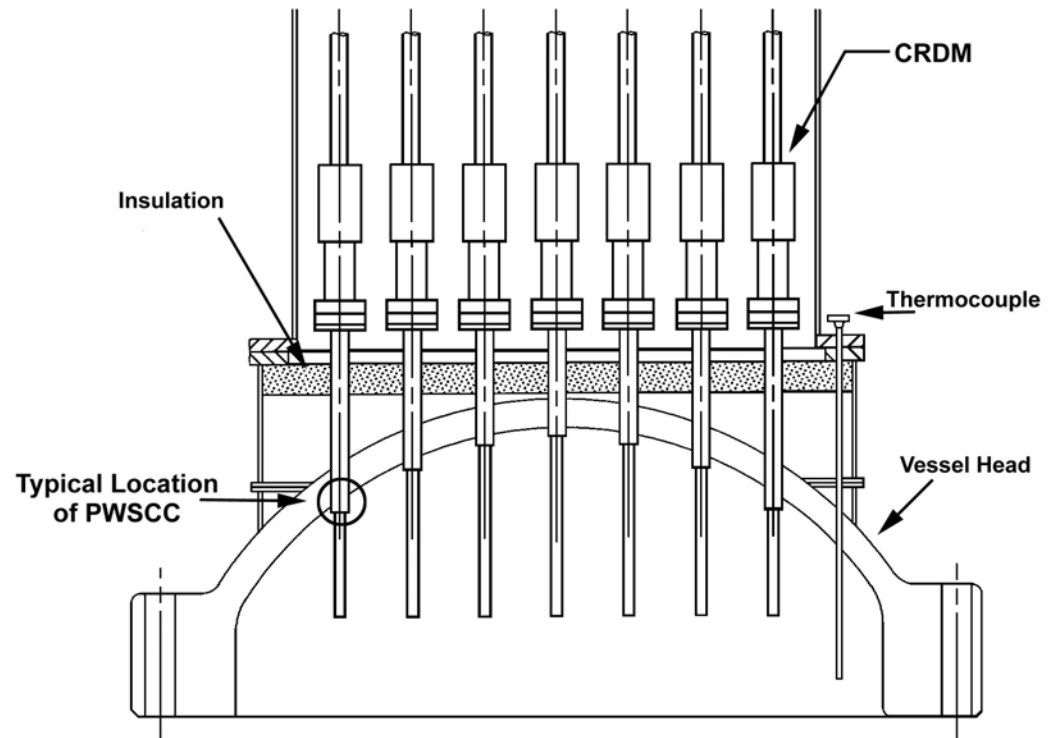
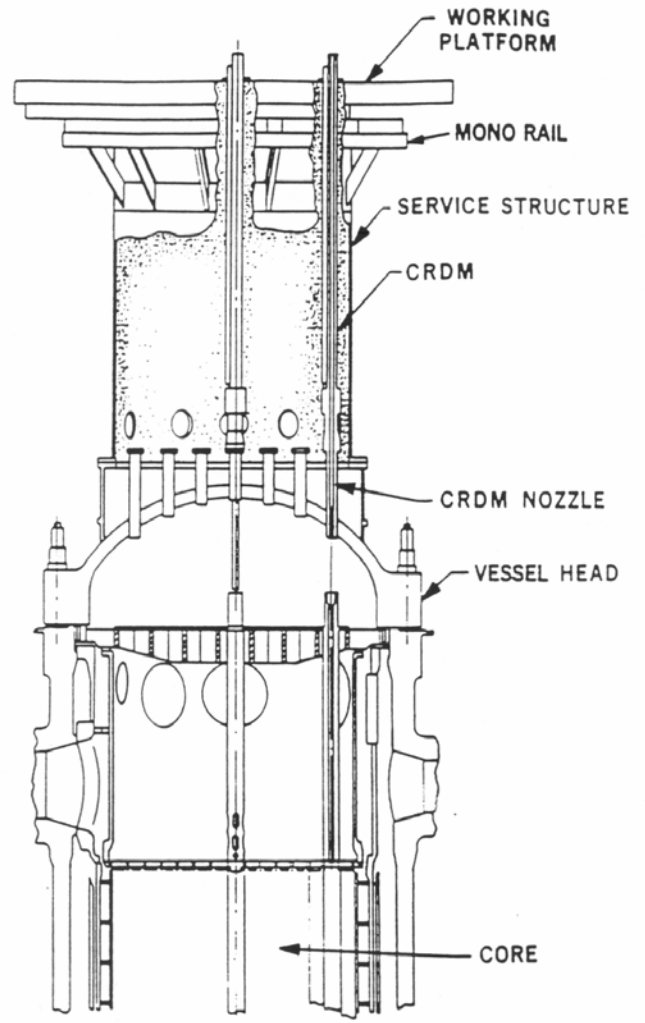
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- Boric Acid Leak Inspection - All PWRs
  - Each RFO
  - Visual inspection for potential boric acid leaks in pressure retaining components above RPV head
  - If leaks onto head or insulation, then inspect affected RPV head surface and penetrations



# Inspection Requirements

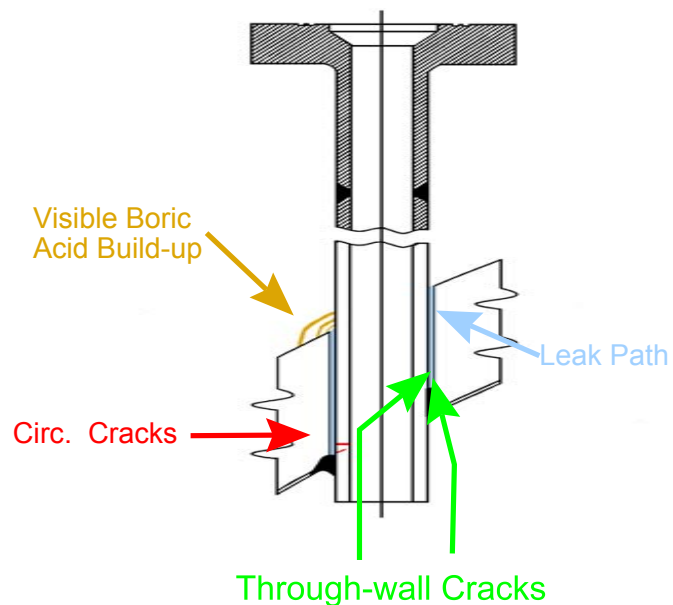
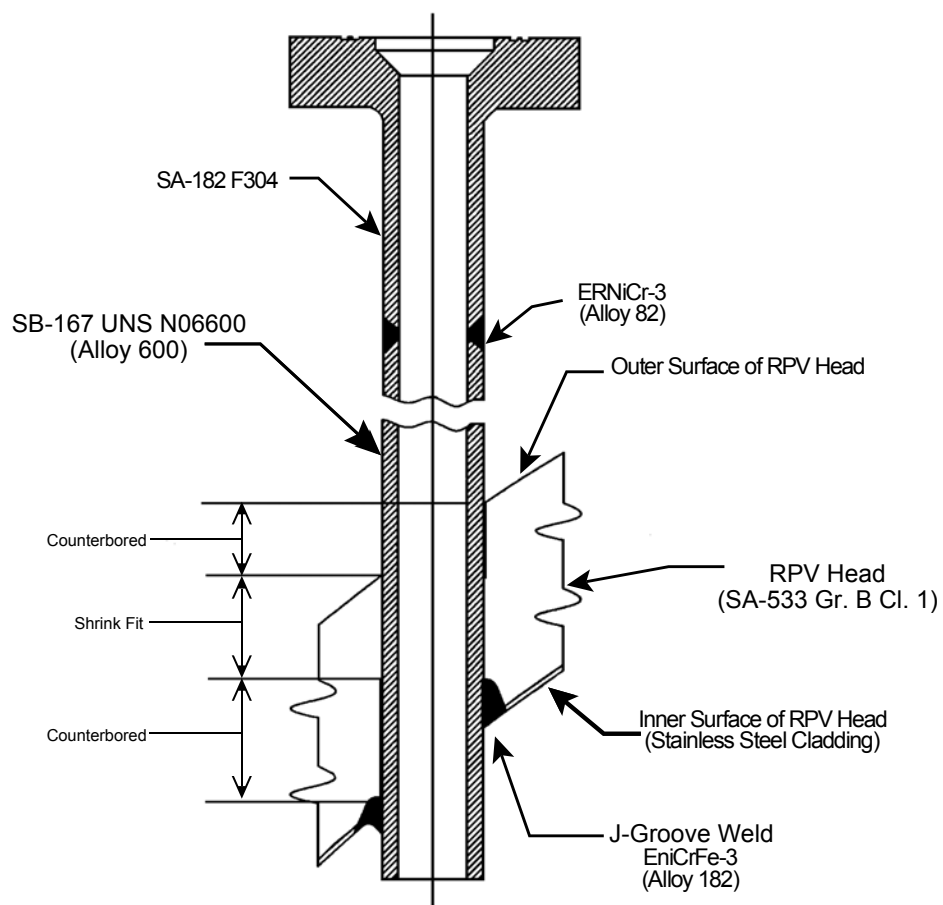
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# Inspection Requirements

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# Technical Basis of “Permanent” Requirements

- Work needed for technical basis of “permanent” requirements:
  - Corrosion Wastage Rates
  - Crack Growth Rates
  - Susceptibility Benchmarks
  - Inspection Baseline and Data
  - Consider Alloy 690 cracking behavior



# Impact of Order on Other Regulatory Actions

- **Bulletin 2001-01**
  - Order Supersedes Post Outage Reporting Requirements
  - Bulletin Has Been Closed
  
- **Bulletin 2002-01**
  - Order Supersedes Post Outage Reporting Requirements
  - Boric Acid Corrosion Control Aspect Unaffected
  
- **Bulletin 2002-02**
  - Order Supersedes Post Outage Reporting Requirements
  - Bulletin Will Be Closed
  
- **Temporary Instruction 2515/150, Rev 01**
  - Scope of Inspections Will Not Change
  - Completion Schedule and Expiration May Be Changed



# Impact of Order on Upper Head Inspection Commitments

- In response to Bulletins 2001-01, 2002-01, & 2002-02 licensees committed to various inspections of the reactor pressure vessel head.
- The requirements in the Order takes precedence over past commitments.
  - Except for plants that received a written response to their Bulletin 2002-02 submittal stating that planned inspections for next outage provides reasonable assurance.



# Expected Licensees' Responses

- **20-Day Response - Mandatory**
  - Submit an answer to the NRC as to whether or not the order will be followed
  - May request a hearing
  - May request time extension to prepare answer
  
- **20-Day Response - Optional**
  - Notify Commission if unable to comply with requirements
  - Notify Commission if compliance is unnecessary
  
- **60-Day Post-Outage Response**
  - After inspections required by Order
  - Describe inspection results
  - ✦ **Content similar to that requested in Bulletin 2002-02.**
  
- **Request for Relaxation**
  - Approval of NRR Director, except for specific nozzles or set of nozzles, per the order
  - For specific nozzles or set of nozzles following the procedures for relief requests (LIC-102)



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# Contacts

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Technical: Allen Hiser  
301-415-1034  
alh1@nrc.gov

Licensing: Steven Bloom  
301-415-1313  
sdb1@nrc.gov

URLs:

<http://www.nrc.gov/reactors/operating/ops-experience/alloy600.html>

<http://www.nrc.gov/reactors/operating/ops-experience/vessel-head-degradation.html>