
3002009080

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Problem Statement

- In recent years United States NDE operational experience (OE) has included cases of poor planning, execution, or data review practices that resulted in issues with the reliability or efficiency of NDE.
- This has resulted in new guidelines being developed, governing the examination of dissimilar metal welds and, based on the strength of these offering, guidelines have been developed for planning and execution of all NDE in the plant.
- So, how should nuclear power utilities, not subject to the same codes and regulations as the United States, consider implementation of recent EPRI NDE reliability guidelines and reports issued in response to U.S. industry NDE operating experience (OE) and lessons learned?
Background

- **2012 North Anna DM Weld Examination Event**
  - PDI-qualified inspection was performed before pre-emptive mitigation
    - No indications reported in the pre-overlay exam
    - Subsequent machining revealed 5 deep, axial cracks
  - **Plant Response**
    - Performed Extent of Condition at the plant
    - Proceeded with weld overlay repair
    --Launched root cause evaluation
  - **U.S. Industry Response**
    - Incident was viewed by industry leadership as a “watershed” event
    - Industry executives called for the formation of an NDE Improvement Focus Group (NIFG) to review and improve upon all industry practices involved in the examination of DM welds

Total 5 cracks, all axial, all deep, **none detected**
1st Guideline Published by NIFG: Extent of Condition Process for DM welds

- Nondestructive Evaluation: NDE Improvement Focus Group Extent of Condition Actions in Response to North Anna Dissimilar Metal Weld Operating Experience (3002000041).
  - Published – Spring 2013
  - Provided a process for U.S. plants to categorize DM welds in terms of risk
    - The risk levels were determined by reviewing two key aspects
      - Whether the weld materials were considered susceptible to SCC (and had not been mitigated), and
      - Whether the weld had ever been examined by ASME Section XI, Appendix VIII qualified, encoded UT procedures, personnel, and equipment
    - For high risk welds, accelerated examination requirements were imposed
    - U.S. plants were required to use this process to categorize all their DM welds in the ISI program and report the results back to the NDE Action Plan Committee, along with examination plans for any high risk welds
2nd Guideline Published by NIFG: Revised Guideline for Conducting Examinations of DM Welds

- Nondestructive Evaluation: Guideline for Conducting Examinations of Dissimilar Metal Welds, Revision 1 (3002000091)
  - Published in 2013
  - This report contains guidance on the planning, preparation, and execution of DM weld UT examinations
  - Although originally published in 2009, this report was thoroughly reviewed and revised by the NIFG to include the lessons learned from the North Anna OE
  - In addition, the NEI 03-08 implementation level of Revision 1 of this guideline was increased from Good Practice to Needed
3rd Guideline Published by NIFG: Revised Guideline for Conducting Examinations of DM Welds

- Nondestructive Evaluation: Performance Demonstration Initiative (PDI) Guidance for Improved Reliability in Ultrasonic Examinations (3002000204)
  - Published in 2013
  - This report contains revised versions of two pre-existing Performance Demonstration Initiative (PDI) documents
    - Site-Specific Mockup Requirements for Dissimilar Metal Welds, Revision C, and
    - Guideline for Hands-On Practice (PDI-GL-001), Revision B
      - Each of which was reviewed and revised by the NIFG, based on the North Anna OE and in an effort to improve the overall examination reliability associated with these products
4th Guideline Published by NIFG: Revised Guideline for Conducting Examinations of DM Welds

- Nondestructive Evaluation: 2013 Team Scanning Assessment Conducted on Behalf of the NDE Integration Committee’s NDE Improvement Focus Group (3002002048)
  - Published in Fall of 2013
  - The NIFG developed a set of guidelines on the use of team scanning (Appendix B of Guideline for Conducting Ultrasonic Examinations of Dissimilar Metal Welds, Revision 1)
  - In an effort to test the reliability of team scanning, when employing these new guidelines, the NIFG conducted a blind testing experiment with three examiner teams using team scanning and following the new guidance
  - This report documents this experiment and the results and provides additional recommendations on the use of team scanning
Additional Guideline Published by EPRI: Industry Best Practices for Performing Reliable NDE

  - Published in 2016
  - Based on the reliability improvements for UT of DM welds, realized because of the NIFG products, industry executives requested that additional NDE guidance be developed to assist plant personnel with planning and executing all NDE with the same high standards of reliability
  - This report is formatted to allow quick reference to various aspects of the examination process, including:
    - Pre-Examination Preparation
    - Scheduling Examinations
    - NDE Staffing
    - NDE Staff Indocotrination
    - Examiner Preparation, Training, and Practice
    - Pre-Job Briefing
    - Use of Team Scanning
    - Oversight
    - Post-Job Debriefing
    - NDE Data Review
    - Examination / Outage Close-Out
  - In areas where more detail is warranted, the report provides references to other EPRI and industry documents containing additional information
Additional Related Documents

  - Product ID - 3002009080
- Detailed descriptions of each reliability-related guideline
- A chapter acknowledging and discussing the fact that SCC susceptible materials may be identified differently, outside of the U.S.
- A discussion on the U.S. Materials Initiative **NEI 03-08**
  - Why it exists and how it affects U.S. utilities
  - Insights for international utilities considering how to utilize its guidance in their own plants
- Detailed instructions on how to access the EPRI Technical Reports and Guidelines discussed in this report
Summary

- The U.S. nuclear industry has experienced some challenges with the consistency and reliability of NDE examinations, in recent years.
- They have made a concerted effort to resolve these issues through development of guidelines and reports, all containing implementation requirements through their country-wide materials initiative *NEI 03-08*.
- It has been recognized that international utilities are not confined by the same industry requirements and rules, but that plants with similar susceptibilities should consider how, and to what extent, to utilize these U.S. guidelines.
- This report is intended to assist utilities, outside the U.S., to understand the guidelines that have been produced and in what ways they should consider applying them.
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