Working Group on Codes and Standards
International workshop on In-Service Inspection

11-14 April 2022
Working Group on Codes and Standards

Workshop on In-Service Inspection

Welcome

Day 4 – Thursday 14 April 2022
To contact us, please use the chat function.

To ask a question, please use the Q&A section.
Opening remarks

Dr David RUDLAND
Senior Technical Advisor for Nuclear Power Plant Materials
US Nuclear Regulatory Commission
## Agenda of Day 4

<table>
<thead>
<tr>
<th>Time*</th>
<th>Topic</th>
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<tr>
<td>11:00AM – 11:15AM</td>
<td>Opening remarks</td>
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</tbody>
</table>
| 11:15AM – 12:00PM Session 3 | Presentations:  
- Dr David RUDLAND (US NRC): Can ISI be eliminated with risk-in-formed decision making?  
- Ms Margaret AUDRAIN (SU NRC): Perspective on RIM for advanced reactor |
| 12:10PM – 12:40(30min) | Panel discussion and questions from the audience |
| 12:40PM – 12:50PM(10min) | Break |
| 12:50PM – 14:05PM Session 4 | Presentations:  
- Mr Andrew HOLT (ONR, United Kingdom): Design for inspectability – UK approach  
- Mr Tom ROBERTS (ASME): BWR RPV circ weld inspection elimination |
| 14:05-14:50PM | Final session: Harmonisation discussion  
- Dr Sangmin LEE (KINS, Korea),  
- Dr Seiji ASADA (SDO CB Chair)  
- Pr Nawal PRINJA (Cordel)  
- Dr David RUDLAND (US NRC) |
| 14:50PM – 15:00PM | Conclusion of the workshop |

*Paris time
Session 3
Extending ISI intervals - approvals and basis
Dr David RUDLAND
US Nuclear Regulatory Commission
Can ISI be Eliminated with Risk-Informed Decision Making

David L. Rudland
U.S. Nuclear Regulatory Commission

International ISI Workshop
April 11-14, 2022
Virtual Workshop

The views expressed herein are those of the authors and do not represent an official position of the U.S. NRC
ASME BPV Section XI

• First published in 1970

• A component, as designed and constructed, is acceptable but a “preservice” baseline examination is required. Subsequent “inservice” examinations are compared to this “pre-service” exam

• Similar components in similar conditions should act the same – Sampling programs were developed

• NDE methods were developed to look for service induced degradation
Sampling

- Originally all vessel welds were inspected at 5% for circ welds and 10% for longitudinal welds – NRC requested 100% of vessel welds – ASME agreed in hopes automation would allow this without burden – Didn’t happen!

- Pipe welds - Class 1 – 25%, Class 2 – 7.5% - due to lesser safety significance

- 10-year interval was chosen based on historical failure rate from non-nuclear steam and petrochemical systems – Not a strong basis

- Degradation is not solely random – sampling programs may not always be effective at revealing degradation
Risk-informed Modifications to Inspection

- Degradation occurs where the conditions necessary for a particular mechanism exist – typical ISI programs are not focused.

- Locations that have a higher failure potential with a significant consequence of that failure (i.e., risk) can be targeted for inspection.

- NRC uses a risk-informed decision-making methodology to determine impact.

- But we only know what we learned from operational history.
Using Risk Arguments for Inspections

What if we are wrong?

Additional degradation
Unknown behavior
Data from Nuclear Energy Agency (NEA) has operated an event database project, Component Operational Experience, Degradation and Aging Program (CODAP)

Operational History

The potential for new mechanisms must be considered

Due to IGSCC

1.5 mechanisms/year

6 mechanisms/year

1.5 mechanisms/year

1.5 mechanisms/year
Risk Arguments for ISI

• Probabilistic fracture mechanics and other advanced analytical techniques model the state-of-the-art with the current-day knowledge

• Modelling the unknown is always a major question and limitation of these analyses

• Monitoring provides the necessary feedback
Examples

• Risk-informed ISI for Piping
  ▪ Uses evaluation of pipe failure consequence, and risk impacts of inspection changes to develop programs
  ▪ Any reduction in inspection is continually monitored through the performance monitoring program
  ▪ Updates to the RI-ISI program are performed at least on a 10-year interval and includes any industry OE
  ▪ Appropriate modifications of the ISI plan developed if new or unexpected degradation mechanisms occur
  ▪ Experienced-based and leverage the highly reliable performance and relatively low risk of nuclear power plant piping
Examples

• Class 1 BWR Vessel welds
  ▪ BWRVIP-05 provided the basis for the elimination of circumferential weld inspections in BWR pressure vessels – used probabilistic fracture mechanics (PFM)
  ▪ NRC staff did independent analyses and used principles of risk-informed decision making
  ▪ Demonstrated the failure frequency of the circumferential welds without ISI was well below the acceptance criteria defined in NUREG-1806 (pressurized thermal shock)
  ▪ Axial welds and approximately 3% of circumferential welds are still inspected
    ❖ Allows performance monitoring of the circumferential welds to verify that the analyses used in the failure predictions remains accurate
Examples

• 10 CFR 50.69, Risk-informed categorization and treatment of structures, systems and components for nuclear power reactors
  ▪ Reduces unnecessary regulatory burden for system, structures and components (SSCs) of low safety significance by removing these SSCs from the scope of special treatment requirements
  ▪ Blends risk insights, new technical information, and operational experience
  ▪ For ISI, safety-related SSCs that perform low safety significant functions (RISC-3), and nonsafety-related SSCs that perform low safety significant functions (RISC-4) can voluntarily comply with ISI rules
  ▪ RISC-3 category still need to undergo periodic inspections to verify that they can still perform as expected
Summary

• ISI has been a safety tool for detecting changes in passive components due to material degradation since the 1970s

• The operational experience in the U.S. indicates that new degradation continues to present on a periodic basis, and the current analytical assumptions may not account for these future changes

• For safety related and/or safety significant passive components, performance monitoring is needed even if the change in risk is considered acceptable when ISI is eliminated

• Performance monitoring can verify risk analysis assumptions, identify possible unknown or unexpected emergent degradation, and verify continued safety of the plant
MULTI-SECTOR WORKSHOP ON INNOVATIVE REGULATION:
Challenges and benefits of harmonizing the licensing process for emerging technologies

Ms Margaret AUDRAIN
US Nuclear Regulatory Commission
Perspectives on ISI for advanced reactors

Meg Audrain
Office of Nuclear Reactor Regulations
April 14, 2022
International ISI Workshop

The views expressed in this presentation are not necessarily those of the U.S. Nuclear Regulatory Commission.
Agenda

• Differences in light water reactors (LWR)s and Non-LWR

• How this impacts in-service inspection (ISI)

• Reliability integrity management (RIM)

• Conclusions
Safety Philosophy

• Non-LWR
  – Low pressure coolant systems
    • leaks not as critical and stresses on vessels and piping components are lower
  – Keep core temperature below fuel design limits
    • Use of different fuels may make leak tight integrity of reactor coolant system less significant
  – Passive heat removal
  – Functional containments may be acceptable

• LWR
  – Keep the reactor coolant pressure boundary intact
  – Pre-determined barriers
  – Emergency core cooling systems

• Both
  – Component support and core geometry are still important for safe shutdown in both LWRs and non-LWRs
Non-LWRs Overview

- Temperatures – operating up to 900 °C (1650°F)
- Materials – high temperature steels, graphite, ceramic composites
- Coolants – liquid metals, molten salts, helium
- Operating Modes – safe shutdown too hot for traditional NDE
- Fuels – metallic fuel, TRISO fuel, molten fuel
- Refueling – on-line or off-line
- Simpler designs (more passive vs active systems)
Non-LWR Materials Degradation

• Creep/creep-fatigue will be of concern.
  – When operating in a creep regime, not a question of if, but when.
  Need to consider:
    • How long can the ISI program be used before replacements are needed?
    • Does an inspection after 20 years mean the component is good for another 20 years?

• Graphite in an irradiated environment will have a limited life.
  – What types of cracks and in what areas are acceptable?

• When do flaws develop? What is the crack initiation period? Could take a long time to develop and then crack growth is fast.
  Uncertainties in:
    – Crack initiation
    – Flaw growth rates
    – Residual stresses
Risk Informed Performance-Based Aspects

• In considering a Risk-informed Performance-Based approach, the NRC is looking for these aspects that are in RG 1.174 and RG 1.178:
  – Consistent with the defense-in-depth philosophy
    • Failure of a single barrier should not jeopardize public health and safety
  – Maintain sufficient safety margins
    • Ensure designs remain conservative throughout life of SSCs
    • Uncertainty is considered
  – Any increase in plant risk should be small
    • Non-LWRs are advertised as lower risk than LWRs
    • Typically, risk is dominated by active components. e.g. valves, motors, actuation systems, electrical power systems
    • Risk from passive components should not result in any significant increase in plant risk.
  – Changes are to be monitored using performance measurement strategies
    • A living program that addresses issues as they arise and gets better with age
Assessing Safety Significance

• Probabilistic Risk Assessment (PRA)
  – Licensing Modernization Process techniques

• Additional Processes
  – Deterministic consequence analysis
  – Probabilistic Fracture Mechanics (PFM): A tool that can be used for:
    • flaw evaluation
    • establishing examination technique and frequency
    • leak before break analysis (might not be as safety significant in low pressure reactors)
    • analyses alone is not sufficient for RI-decision making
What does this mean for ISI?

• ISI Scope
  – Generally smaller than LWRs
    • Fewer safety related systems
    • Many designs rely on natural convection for cooling
  – Inspect to achieve reliable performance
    • Much more integrated with PRA
    • More dependence on probabilistic fracture mechanics
    • Performance monitoring will be needed

• Risk
  – Lower pressure may change the failure paradigm
  – Trending towards risk-informed and performance-based
  – Fewer inspections of low significant components

• Materials & Coolants
  – New materials with different environments
  – Environments may change due to coolant contaminants

• Operating Schemes
  – Refueling frequencies
  – Online vs. offline refueling

• Fuels
ISI Will be Different

• When to inspect
  – On-line monitoring or inspection
  – Will core offloads and coolant draining be needed?
  – Is the 10-year interval relevant?

• What should be inspected
  – Welds may not be the only concern
    • Creep damage can affect base material (may need to inspect more than welds in HT rx)

• How to inspect
  – Are volumetric exams always needed?
  – What exams are practical?
  – Many other activities may be used vice traditional NDE
    • Chemistry monitoring (don’t get cracking in the first place)
    • Leak monitoring
    • Strain monitoring
    • Component replacements (eliminates need for inspections)

• How do sensors need to change?
  – Need to be able to handle harsh environments but maintain sensitivity
Consequences

• Advance reactors may have lower consequences
  – What does this mean and how can this be put to the designer’s advantage?
    • Functional Containment
    • Longer inspection intervals
    • Higher flaw tolerance

• Safety Consequences vs. Asset Management
Reliability and Integrity Management

• ASME Section XI, Div 2
• Establishes Reliability Targets for components
  – Derived from PRA
• Develops RIM strategies
  – Wide variety of strategies – provides flexibility
  – Intended to ensure Reliability Targets are met
• Demonstrates RIM strategies can meet Reliability Targets
• Establishes NDE demonstration requirements
• Utilizes expert panels
• Includes feedback and program adjustments
Where is More Work Needed?

• Develop industry accepted means for establishing reliability targets
• Develop simplified means for demonstrating that strategies can be successful at meeting targets
• Test materials in environments to determine crack initiation periods and growth rates
• Refine flaw analysis techniques
Can ISI be Eliminated?

• To eliminate ISI
  – Very high confidence that components will not degrade
    • Knowledge level of degradation mechanisms needs to be high
    • Margins need to exist
    • Uncertainty needs to be very low
    • Experience with materials in the operating environments is needed to gain this level of knowledge and to reduce uncertainties
  – Consequences need to be low
  – Defense in depth needs to be employed.

• We are not at this point yet.
Conclusions

• Non-LWRs have unique environmental and material challenges for traditional ISI
• Fewer safety significant components and overdesign might mean consequences of failure might be lower
• Much more work needs to be done before NRC could consider eliminating an ISI program requirement
Questions?
Panel discussion and Q/A from the audience
Working Group on Codes and Standards
Workshop on In-Service Inspection

Break
Workshop will resume in 10 minutes

Day 4 – Thursday 14 April 2022
Session 4
Design for inspection
Mr Andrew HOLT
Office for Nuclear Regulation, United Kingdom
Design for Inspectability

Andrew Holt
Professional Lead for Structural Integrity
Office for Nuclear Regulation
Design for Inspectability

• Origins
• Regulatory Position
• Effect
Design for Inspectability - Origins

UK gas-cooled reactors - not, in general, designed with inspection in mind (1960s-1970s)

- Novel techniques often applied
- Complex deployment techniques
- Integrity claims increased or unexpected degradation found

Transition to PWR technology (1980s)

- Light water reactor study group (Marshall and Hirsch reports)
- Recognised the importance of qualified ultrasonic inspection
- Inspection only as good as the access
- Detail geometry needs different for UT compared with RT
Regulatory Position

Reduce Risks so far as is Reasonably Practicable (SFAIRP)

- Legal Duty on Licensees

Safety Assessment Principles (SAPS)

‘ONR’s inspectors use these Safety Assessment Principles (SAPs), together with supporting Technical Assessment Guides (TAGs), to guide their regulatory judgements and recommendations when undertaking technical assessments of nuclear site licensees’ safety submissions. Underpinning these is the legal duty on licensees to reduce risks so far as is reasonably practicable, and this informs the use of these SAPs. In addition, the SAPs are used to guide our assessments of proposed new nuclear facilities designs that may come forward for eventual construction at sites in the UK.’

(225 pages – all topics)
Relevant SAPs

**EMC.8**

<table>
<thead>
<tr>
<th>Engineering principles: integrity of metal components and structures: design</th>
<th>Providing for examination</th>
<th>EMC.8</th>
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</table>
Geometry and access arrangements should have regard to the need for examination.

**EMC.13**

<table>
<thead>
<tr>
<th>Engineering principles: integrity of metal components and structures: manufacture and installation</th>
<th>Materials</th>
<th>EMC.13</th>
</tr>
</thead>
</table>
Materials employed in manufacture and installation should be shown to be suitable for the purpose of enabling an adequate design to be manufactured, operated, examined and maintained throughout the life of the facility.
How does it work in practice?

Only effective at the design stage

- Applied during ‘Generic Design Assessment’ process (GDA)
- UK EPR
- AP1000
- UK ABWR
- HPR1000
- Rolls Royce SMR (commenced)

(Would be applied during the licensing phase if a vendor moved directly to licensing)
Expectations

• The design for access and inspectability for NDE should be explicitly considered in the design of the item to be inspected

• Reference designs may not have anticipated this, but it is expected that, where appropriate, design modification would be considered to improve performance of the inspection

• The extent to which any modifications are considered will depend on the structural integrity classification of the component and the role of NDE in assuring structural integrity

• Highest reliability components would attract the greatest attention (components where either no, or a limited consequence of failure case is offered, and the safety case relies on either discounting failure or showing that the likelihood of failure is very low)
Examples

UK EPR Main Coolant Line Crossover

## Example - UKHPR1000 Design modifications to enhance NDT


<table>
<thead>
<tr>
<th>Component</th>
<th>Limitation</th>
<th>Design Improvement</th>
</tr>
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<tbody>
<tr>
<td>Main coolant line welds</td>
<td>The length of flat surface adjacent to some welds was insufficient to allow continuous scanning of ultrasonic probes. The position of the counterbore was too close to the weld, thereby limiting inspection from the bore and generating confusing echoes.</td>
<td>The orientation of the primary nozzles is modified to allow a longer straight section of the pipes adjacent to welds. The counterbore region was extended thereby eliminating these restrictions.</td>
</tr>
<tr>
<td>RPV upper dome to flange weld</td>
<td>Lifting lugs on the upper dome restrict scanning at some circumferential position.</td>
<td>The welded dome to flange was replaced by a single piece forging thereby removing the need for a weld inspection.</td>
</tr>
<tr>
<td>Main steam line welds</td>
<td>A radiographic access hole restricted the scanning of welds 10, 11, 12 and 13. The counterbore region was too short for welds outside of the containment, which could generate confusing signals. There was a tapered region on the valve side of the MSIV to pipe weld, that would interfere with probe scanning. Inspection of the steam generator secondary outlet nozzle safe-end to MSL pipe weld was restricted due to a change of section.</td>
<td>The access hole was removed thereby removing the scanning obstruction. The position of the counterbore transition was moved to 70mm from the weld centreline. The tapered section of the surface was moved away from the weld to facilitate scanning from the valve side. The straight section adjacent to the weld was increased thereby improving the scanning access.</td>
</tr>
<tr>
<td>Pressuriser upper/low dome to shell weld</td>
<td>There was no straight section on the dome side of the weld, thereby presenting difficulties for the detection of transverse defects.</td>
<td>A flat region of 80mm was applied to the dome surface to facilitate circumferential scans.</td>
</tr>
<tr>
<td>Pressuriser nozzle to dome welds</td>
<td>The surge line nozzle to dome weld inspection is complicated by the geometry.</td>
<td>The dome to surge line nozzle weld was replaced by a single piece forging, eliminating the requirement for a weld inspection.</td>
</tr>
<tr>
<td>Steam generator feedwater nozzle to transition piece weld (non-HIC weld)</td>
<td>The available scanning distance did not satisfy the criteria of the guidance document.</td>
<td>The nozzle to transition piece was replaced with a single nozzle forging thereby removing the need for a weld inspection.</td>
</tr>
</tbody>
</table>
Thank you for listening

Any questions?
Mr Tom ROBERTS
ASME
ASME Section XI Division 2 – RIM - Importance Of Designing For Inspection For Advanced Reactor Technologies

OECD/NEA/US NRC WGCS International Workshop on Mechanical Codes and Standards

A. Thomas Roberts
Co-Vice Chair - ASME XI Standards Committee
&
Sub-Group - Chair ASME XI Division 2

POMO18 Consult LLC
Section XI Division 2 Reliability Integrity Management (RIM) overview.

What is RIM (i.e., ASME XI Division 2) and why is it essential to advanced reactor designs?

What is important about RIM during design and what elements do advanced reactor designers need to consider from early design through detailed design phases for a plant intending on using RIM?
Section XI Division 2 Reliability Integrity Management (RIM) overview.

ASME Section XI Sub-Group – RIM developed the new ASME XI Division 2

- It was first published in 2019 Edition.
- It replaced the former Div. 2 and Div. 3 of ASME XI.

Reliability and Integrity Management (RIM)

- RIM is a methodology to establish inservice criteria regardless of nuclear technology.

  - RIM is "technology neutral" and can be applied to all reactor designs.

  - RIM criteria may be established by deterministic or probabilistic means depending on the specific reactor design/technology and it sets a Reliability Target (RT) value for risk significant SSC.

  - RIM requires Monitoring and NDE (MANDE) be assigned to SSC based on credible degradation mechanisms and an individual SSC’s contribution to risk.
Section XI Division 2 Reliability Integrity Management (RIM) overview.

RIM does not set, nor does it employ any SSC classification hierarchy (e.g., Class 1, 2, etc.)

Instead, the selection of SSC to be included in the RIM program is based on the individual SSCs risk contribution to the safe operation of the facility regardless of the technology employed as established by the Owner/Designer.

RIM Strategies must be developed for SSC scoped into the program.

- RIM Strategies more often will a form of MANDE but alternate strategies are permitted.
- For example, planned component replacement before anticipated degradation.

The MANDE methodology(s) selected for an SSC is based on “FOR CAUSE” in order to detect the onset of credible and anticipated degradation mechanisms applicable to the SSC.
Section XI Division 2 Reliability Integrity Management (RIM) overview.

**MANDE selected is based upon:**

- A SSC credible and postulated **material degradation assessment**.
- MANDE must be "**Performance Demonstrated**" to confirm that a required SSC’s Reliability Targets is met.

**Any SSC affecting plant reliability is to be scoped into the RIM program.**

- All SSC are initially evaluated to determine if they need to be included within the program scope.
- **Including Non-Safety Related SSC deemed risk significant must also be considered to be contained in RIM program.**

- This contrasts the existing ASME XI Div. 1 Class 1, Class 2, Class 3, Class MC, Class CC, etc. ISI approach, with each class of SSC having different graduated for ISI, rather than individual SSC contribution to risk significance.
Section XI Division 2 Reliability Integrity Management (RIM) overview.

There are two required Expert Panels established in the RIM process.

– The RIM Expert Panel (RIMEP)

– The MANDE Expert Panel (MANDEEP)
Section XI Division 2 Reliability Integrity Management (RIM) overview.

The **RIMEP** consists of the individuals who are **responsible for:**

- Determining the SSC to be included in the RIM Program.
- Setting the Reliability Target Values for SSC (using either deterministic or probabilistic methods).
- Coordinating with the MANDE Expert Panel members to establish what MANDE method(s) should be assigned.
- Coordinating with the plant Owner/Designer to assure specific SSC scoped in the program can accommodate selected MANDE.
- Validating that uncertainties from initial PRA use or from MANDE selection and performance demonstration actions do not adversely impact intended RT values.
Section XI Division 2 Reliability Integrity Management (RIM) overview.

• The MANEEP consists of individuals who are responsible for:

  – Selecting FOR CAUSE MANDE methodology(s) to be used for RIM SSC.
  – Establishing periodicity of selected MANDE.
  – Establishing sampling protocol for selected MANDE.
  – Establishing Performance Demonstration criteria for selected MANDE.
  – Assisting the RIM Expert Panel with establishing acceptance criteria where no industry standard criteria may exist.
  – Providing uncertainty results obtained from Performance Demonstrations to the RIMEP to assure RT values will be met.
Section XI Division 2 Reliability Integrity Management (RIM) overview.

Overview Pictorial Illustration of RIM Process

1. RIM scope definition and SSC selection based on PRA
2. Degradation Mechanism Assessment
3. Plant and SSC Reliability Target Allocation
4. Identification and establishment of RIM strategies and MANDE
5. Evaluation of Uncertainties
6. RIM Program implementation
7. Continuous monitoring and RIM Program and MANDE updates
Section XI Division 2 Reliability Integrity Management (RIM) overview.

EARLY DESIGN INPUTS NEEDED FOR RIM
Section XI Division 2 Reliability Integrity Management (RIM) overview.
Section XI Division 2 Reliability Integrity Management (RIM) overview.

- RIM is an on-going "Living Program" that applies over the entire plant life cycle:
  - It is required to be continually updated based on gained Operating Experience,
  - RIM is not focused exclusively on weld examinations,

Periodicity for prescribed MANDE is based on SSC's:

- Active degradation mechanisms,
- Reliability Target value and,
- Operating conditions (e.g., different fuel, different moderators, different fluid coolants, different operating temperatures, etc.)
Section XI Division 2 Reliability Integrity Management (RIM) overview.

RIM can also be supplemented with strategies other than MANDE

- Example: Preemptive SSC replacement before anticipated degradation mechanism onset.

All RIM strategies are required to be developed and documented under the RIM process.

- These documents form the basis for an individualized RIM program’s development.
Section XI Division 2 Reliability Integrity Management (RIM) overview.

- Advanced nuclear reactors have varied designs
  - Alternative-approach to current ISI activities are needed to accommodate new technologies.
  - Reactor technology is moving to designs other than traditional LWRs.
  - Some proposed reactors are intended for applications other than just power production (e.g., medical isotope production, desalination, process heat, etc.).
  - RIM was developed to address and accommodate these new designs and various applications.
MANDE is not limited to traditional NDE methods used for traditional ISI although these may be used if appropriate.

- It might include such things as "on-line monitoring systems" (e.g., pressure, temperature, radiation monitoring, surveillance capsules, etc.),

Regardless of any MANDE method(s) selected, it must be performance demonstrated as being reliable and any numerical uncertainty established and if appropriate factored back into the SSC Reliability Target value assigned to the SSC.

- This is a dramatic departure from traditional ISI programs, including ASME XI Division 1, where only UT is performance demonstrated.
Section XI Division 2 Reliability Integrity Management (RIM) overview.

Users of RIM should be aware that Division 2 relies in part on ASME XI Division 1.

Where collateral roles, responsibilities, technical criteria are the same, there are direct references from Division 2 back to Division 1.
Section XI Division 2 Reliability Integrity Management (RIM) overview.

RIM currently has two technology specific supplements outlining various degradation mechanisms and acceptance criteria applicable to those specific technologies (i.e., LWR and HTGR) that are to be considered in developing a RIM program.

The RIM committees are developing other technology supplement criteria for LMR and MSR.

Additionally, work is also underway to develop LEFM flaw evaluation criteria for high temperature (i.e., creep) operating regime designs as well as MANDE criteria for non-metallics (e.g., structural graphite applications.)
Section XI Division 2 Reliability Integrity Management (RIM) overview.

Because some technology specific supplements are not yet published and in the course of preparation, it may be incumbent for designers of advanced reactors systems to develop their own criteria of degradation mechanisms and acceptance criteria.

The foundational process for completing a FOAK effort to meet RIM is however provided in Non-Mandatory Appendix A of RIM.
Section XI Division 2 Reliability Integrity Management (RIM) overview.

The USNRC has issued Draft Regulatory Guide (RG) DG-1383 to endorse RIM.

The public comment to the Draft RG period ended in late 2021.

There were 10 public comments that the USNRC received, and they are evaluating these comments in their consideration of publishing the final RG.

It is currently anticipated that the final RG to endorse RIM will be published in June 2022.
Section XI Division 2 Reliability Integrity Management (RIM) overview.

QUESTIONS

???????????????????????????
Panel discussion and Q/A from the audience
Final session
Harmonisation discussion
Dr David RUDLAND  US Nuclear Regulatory Commission
Dr Sangmin LEE  KINS, Korea
Dr Nawal PRINJA  WNA Cordel
Dr Seiji ASADA  SDO Convergence Board
Mr Thomas ROBERTS  ASME
Mr Ronan TANGUY  WNA Cordel
Conclusion of the workshop
Thank you for your participation
Please visit www.oecd-nea.org