Note to requester: Attachment is immediately following.

From: Hiser, Matthew
Sent: Wed, 19 Jul 2017 17:46:43 +0000
To: Moyer, Carol
Subject: FW: FW: PLiM abstract on harvesting
Attachments: Harvesting IAEA PLim 2 page synopsis USNRC.docx

Hi Carol,

I was looking back at this email you sent. Would you just like to reply to Robert Krivanek from your original email to see whether it was accepted? I suspect it may have fallen through the cracks since you weren't able to submit through their system…

Thanks!
Matt

From: Moyer, Carol
Sent: Thursday, June 01, 2017 5:25 PM
To: Hiser, Matthew
Cc: Tregoning, Robert
Subject: FW: FW: PLiM abstract on harvesting

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Carol

From: KRIVANEK, Robert [mailto:R.Krivanek@iaea.org]
Sent: Friday, May 26, 2017 2:55 AM
To: Moyer, Carol <Carol.Moyer@nrc.gov>
Cc: KHAELSS, Martina <M.Khaelss@iaea.org>
Subject: [External_Sender] FW: PLiM abstract on harvesting

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Best regards,

Mr Robert KRIVANEK | Senior Safety Officer |
LTO Programme Manager
Operational Safety Section |Division of Nuclear Installation Safety|Department of Nuclear Safety and Security |
International Atomic Energy Agency | Vienna International Centre, PO Box 100, 1400 Vienna, Austria |
Email: r.krivanek@iaea.org | T: (+43-1) 2600-22018 | F: (+43-1) 2600-26007 |

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Sr. Materials Engineer
U.S. Nuclear Regulatory Commission

Office of Nuclear Regulatory Research
MS: T-10A36
Washington, DC 20555-0001
carol.moyer@nrc.gov
301-415-2153

From: R.Krivanek@iaea.org [mailto:R.Krivanek@iaea.org]
Sent: Friday, April 21, 2017 8:44 AM
To: R.Krivanek@iaea.org
Subject: [External_Sender] CN246_PLiM_Abstract deadline extended to 19 May 2017

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Harvesting of Aged Materials from Operating and Decommissioning Nuclear Power Plants

M. Hiser[a], P. Purtscher[a], P. Ramuhalli[b], A. B. Hull[a], R. Tregoning[a], and C. E. Moyer[a]
[a]U.S. Nuclear Regulatory Commission (NRC), Washington, D.C., USA
[b]Pacific Northwest National Laboratory (PNNL), Richland, WA, USA

Recent developments in the nuclear industry include stronger interest in extended plant operation and plans to shut down a number of nuclear power plants (NPPs) In the U.S., there is strong interest in extending NPP lifespans through subsequent license renewal (SLR) from 60 to 80 years. Extended plant operation and SLR raise a number of technical issues that may require further research to understand aging mechanisms. U.S. utilities and the U.S. Nuclear Regulatory Commission (NRC) have focused on the aging of systems, structures, and components and in particular four key SLR issues: reactor pressure vessel (RPV) embrittlement, irradiation-assisted stress corrosion cracking of reactor internals, concrete structures and containment degradation, and electrical cable qualification and condition assessment. Meanwhile, in recent years, a number of NPPs, both in the U.S. and internationally, have shut down or announced plans to shut down for various reasons, including economic, political, and technical challenges. Unlike in the past when there were very few plants shutting down, these new developments provide opportunities for harvesting components that were aged in representative light water reactor (LWR) environments. In a third related development, economic challenges and limited budgets have restricted the resources available to support new research, including harvesting programs. Given this constrained budget environment, aligning interests and leveraging with other organizations is important to allow maximum benefit and value for future research programs.

NRC has recently undertaken an effort, with the assistance of Pacific Northwest National Lab (PNNL), to develop a strategic approach for harvesting aged materials from NPPs. Due to limited opportunities, past harvesting efforts have been reactive to individual plants shutting down and beginning decommissioning. Given the expected availability of materials from numerous plants and anticipated research needs to better understand aging out to 80 years of operation, the NRC is pursuing a more proactive approach to prioritize the data needs best addressed by harvesting and identify the best sources of materials to address high-priority data needs for regulatory research.

The first step in this strategic approach is to prioritize data needs for harvesting. A data need describes a particular degradation scenario (combination of material and environment) and should be defined with as much detail as appropriate in terms of the material (alloy, composition, etc.) and environment (temperature, fluence, chemistry, etc.).

A number of criteria may be considered when prioritizing the data needs for harvesting, including:

- Applicability of harvested material for addressing critical gaps
    - Harvesting for critical gaps prioritized over less essential technical gaps.

- Ease of laboratory replication of the degradation scenario
    - For example, simultaneous thermal and irradiation conditions are difficult to replicate or accelerated aging may not be feasible for a mechanism sensitive to dose rate.
- Unique field aspects of degradation
    - For example, unusual operating experience or legacy materials (fabrication methods, composition, etc.) no longer available.
- Fleet-wide vs. plant-specific applicability of data
    - Greater value in addressing an issue applicable to a larger number of plants.
- Harvesting cost and complexity
    - For example, harvesting unirradiated concrete or electrical cables less expensive and less complex than harvesting from the reactor internals or RPV.
- Availability of reliable in-service inspection (ISI) techniques for the material / component
    - If mature inspection methods exist and are easy to apply to monitor degradation, harvesting may be less valuable.
- Availability of materials for harvesting
- Timeliness of the expected research results relative to the objective.

The above potential criteria provide a systematic approach to prioritize data needs for harvesting. Different organizations may weigh and consider each of these criteria differently based on their interests and perspectives, but each criteria is likely relevant to some degree for any organization. NRC is interested in engaging with other organizations to prioritize data needs for harvesting and identify areas of common interest.

Another activity NRC is pursuing is the potential development of a database for sources of materials for harvesting, which could include both previously harvested materials and those available for future harvesting. This database would allow for aligning of high-priority data needs to the available sources of materials. As with the data needs effort, the level of detail for the sources of materials database should be appropriate for the factors influencing decision-making. NRC is interested in engaging with other organizations to develop a database for sources of materials for harvesting.

NRC's experience is that harvesting can yield highly representative and valuable data on materials aging, but these efforts may be expensive and challenging. Having a clearly defined objective and early engagement with other stakeholders, including the NPP from which harvesting will take place, are key to success. As specific harvesting opportunities are identified through this strategic approach, the NRC welcomes opportunities for cooperation and leveraging resources with other interested research organizations.

Note to requester: Attachment is immediately following.

From: Moyer, Carol
Sent: Thu, 1 Jun 2017 21:24:38 +0000
To: Hiser, Matthew
Cc: Tregoning, Robert
Subject: FW: FW: PLiM abstract on harvesting
Attachments: Harvesting IAEA PLim 2 page synopsis USNRC.docx

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Subject: FW: PLiM abstract on harvesting
Attachments: Harvesting IAEA PLim 2 page synopsis USNRC.docx

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Sent: Friday, 19 May 2017 23:19
To: KRIVANEK, Robert <R.Krivanek@iaea.org>
Cc: KANG, Ki-Sig <K.S.Kang@iaea.org>; Tregoning, Robert <Robert.Tregoning@nrc.gov>
Subject: RE: CN246_PLiM_Abstract deadline extended to 19 May 2017

Dear Mr. Krivanek,

The U.S. NRC intends to submit several abstracts for consideration for the PLiM conference in October. We have a short delay in completing one of our abstracts. I will be submitting it early next week, and I hope that you still will be able to consider it for the conference.

Thank you,
Carol Moyer

Carol E. Moyer
Sr. Materials Engineer
U.S. Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
MS: T-10A36
Washington, DC 20555-0001
carol.moyer@nrc.gov
301-415-2153

From: R.Krivanek@iaea.org [mailto:R.Krivanek@iaea.org]
Sent: Friday, April 21, 2017 8:44 AM
To: R.Krivanek@iaea.org
Subject: [External_Sender] CN246_PLiM_Abstract deadline extended to 19 May 2017

Dear all,

Please be informed that we extended the abstract submission deadline to 19 May 2017 and updated the conference accordingly.

Best regards,

Mr Robert KRIVANEK | Senior Safety Officer |
LTO Programme Manager
Operational Safety Section |Division of Nuclear Installation Safety|Department of Nuclear Safety and Security |
International Atomic Energy Agency | Vienna International Centre, PO Box 100, 1400 Vienna, Austria |
Email: r.krivanek@iaea.org | T: (+43-1) 2600-22018 | F: (+43-1) 2600-26007 |

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This email message is intended only for the use of the named recipient. Information contained in this email message and its attachments may be privileged, confidential and protected from disclosure. If you are not the intended recipient, please do not read, copy, use or disclose this communication to others. Also please notify the sender by replying to this message and then delete it from your system.

Harvesting of Aged Materials from Operating and Decommissioning Nuclear Power Plants

M. Hiser[a], P. Purtscher[a], P. Ramuhalli[b], A. B. Hull[a], R. Tregoning[a], and C. E. Moyer[a]
[a]U.S. Nuclear Regulatory Commission (NRC), Washington, D.C., USA
[b]Pacific Northwest National Laboratory (PNNL), Richland, WA, USA

Recent developments in the nuclear industry include stronger interest in extended plant operation and plans to shut down a number of nuclear power plants (NPPs) In the U.S., there is strong interest in extending NPP lifespans through subsequent license renewal (SLR) from 60 to 80 years. Extended plant operation and SLR raise a number of technical issues that may require further research to understand aging mechanisms. U.S. utilities and the U.S. Nuclear Regulatory Commission (NRC) have focused on the aging of systems, structures, and components and in particular four key SLR issues: reactor pressure vessel (RPV) embrittlement, irradiation-assisted stress corrosion cracking of reactor internals, concrete structures and containment degradation, and electrical cable qualification and condition assessment. Meanwhile, in recent years, a number of NPPs, both in the U.S. and internationally, have shut down or announced plans to shut down for various reasons, including economic, political, and technical challenges. Unlike in the past when there were very few plants shutting down, these new developments provide opportunities for harvesting components that were aged in representative light water reactor (LWR) environments. In a third related development, economic challenges and limited budgets have restricted the resources available to support new research, including harvesting programs. Given this constrained budget environment, aligning interests and leveraging with other organizations is important to allow maximum benefit and value for future research programs.

NRC has recently undertaken an effort, with the assistance of Pacific Northwest National Lab (PNNL), to develop a strategic approach for harvesting aged materials from NPPs. Due to limited opportunities, past harvesting efforts have been reactive to individual plants shutting down and beginning decommissioning. Given the expected availability of materials from numerous plants and anticipated research needs to better understand aging out to 80 years of operation, the NRC is pursuing a more proactive approach to prioritize the data needs best addressed by harvesting and identify the best sources of materials to address high-priority data needs for regulatory research.

The first step in this strategic approach is to prioritize data needs for harvesting. A data need describes a particular degradation scenario (combination of material and environment) and should be defined with as much detail as appropriate in terms of the material (alloy, composition, etc.) and environment (temperature, fluence, chemistry, etc.).

A number of criteria may be considered when prioritizing the data needs for harvesting, including:

- Applicability of harvested material for addressing critical gaps
    - Harvesting for critical gaps prioritized over less essential technical gaps.

- Ease of laboratory replication of the degradation scenario
    - For example, simultaneous thermal and irradiation conditions are difficult to replicate or accelerated aging may not be feasible for a mechanism sensitive to dose rate.
- Unique field aspects of degradation
    - For example, unusual operating experience or legacy materials (fabrication methods, composition, etc.) no longer available.
- Fleet-wide vs. plant-specific applicability of data
    - Greater value in addressing an issue applicable to a larger number of plants.
- Harvesting cost and complexity
    - For example, harvesting unirradiated concrete or electrical cables less expensive and less complex than harvesting from the reactor internals or RPV.
- Availability of reliable in-service inspection (ISI) techniques for the material / component
    - If mature inspection methods exist and are easy to apply to monitor degradation, harvesting may be less valuable.
- Availability of materials for harvesting
- Timeliness of the expected research results relative to the objective.

The above potential criteria provide a systematic approach to prioritize data needs for harvesting. Different organizations may weigh and consider each of these criteria differently based on their interests and perspectives, but each criteria is likely relevant to some degree for any organization. NRC is interested in engaging with other organizations to prioritize data needs for harvesting and identify areas of common interest.

Another activity NRC is pursuing is the potential development of a database for sources of materials for harvesting, which could include both previously harvested materials and those available for future harvesting. This database would allow for aligning of high-priority data needs to the available sources of materials. As with the data needs effort, the level of detail for the sources of materials database should be appropriate for the factors influencing decision-making. NRC is interested in engaging with other organizations to develop a database for sources of materials for harvesting.

NRC's experience is that harvesting can yield highly representative and valuable data on materials aging, but these efforts may be expensive and challenging. Having a clearly defined objective and early engagement with other stakeholders, including the NPP from which harvesting will take place, are key to success. As specific harvesting opportunities are identified through this strategic approach, the NRC welcomes opportunities for cooperation and leveraging resources with other interested research organizations.

Note to requester:
Attachments are immediately following.

From: Purtscher, Patrick
Sent: Mon, 13 Feb 2017 10:47:24 -0500
To: Ramuhalli, Pradeep
Cc: Hiser, Matthew
Subject: FW: RE: Draft slides
Attachments: Ex-Plant Materials Harvesting Workshop.pptx, NRC Technical Data Needs for Harvesting.pptx

Hi Pradeep,

Thank you for sharing these slides. We've attached a PP that we are distributing to speakers and attendees describing the workshop overall as well as expectations for each session. We just developed this in the past few days, and are starting to distribute now. Please take a look for your awareness.

These slides are a good starting point, but are a little too broad for the sessions we're envisioning.

For the first presentation in session 2, focus on capturing Section 3.3 from the draft report you sent a couple days ago. So focus on the criteria for prioritizing harvesting data needs and the examples that PNNL analyzed in the report: CASS, cables, DMWs, internals. We are planning a very short NRC slot in session 2 to cover more comprehensively NRC's data needs for harvesting; we want you to cover the criteria and 4 examples and we'll lay out the whole range of high-priority data needs for metals, cables, and concrete. ITe current draft of our slides is attached for you awareness. Plus, we don't want to explicitly focus on SLR, but talk about long-term operation.

From the slides you have now for session 2, here are some suggestions:

- I would delete slide 2 because it is high-level and should be captured in Session 1.
- Keep slide 3 to capture briefly Ch. 2 ideas: why do harvesting , which leads to prioritization criteria
- Add a slide to capture Section 3.1/3.2 on lit review / basis for information
- Add slide or two on criteria: why these criteria, how are they applied/used
- Add several slides going through examples (maybe 1 slide/example) and how criteria led to an outcome
    - In other words, explain why we're interested in harvesting cables, CASS, and internals, but not DM welds so much
- That's it!

For session 5 slides, put the focus on Section 4.2 from your report with references to 4.1 (harvesting experience) as needed to explain why we'd like various pieces of information for harvesting planning. Suggestions on specific slides:

- Delete slides 11/12 – don't need to cover info tool in this presentation
- Maybe 1 or 2 background slides referring to harvesting experience (Ch. 4.1) in general
- Focus several slides on Section 4.2 going in-depth on what information is needed for harvesting planning

- This presentation sets the stage in Session 5 for a discussion of harvesting plans from the various participants, so we want to thoroughly systematically lay out what information we think is helpful for informed decision-making

Thanks!
Matt and Pat

From: Ramuhalli, Pradeep [mailto:Pradeep.Ramuhalli@pnnl.gov]
Sent: Friday, February 03, 2017 10:37 AM
To: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Subject: [External_Sender] RE: Draft slides

Shoot! Will resend in a bit.

With best regards,
Pradeep

Pradeep Ramuhalli, PhD.
Senior Research Scientist
Pacific Northwest National Laboratory
pradeep.ramuhalli@pnnl.gov
509-375-2763

Sent from my Android phone using Symantec TouchDown (www.symantec.com)

-----Original Message-----
From: Hiser, Matthew [Matthew.Hiser@nrc.gov]
Received: Friday, 03 Feb 2017, 4:46AM
To: Ramuhalli, Pradeep [Pradeep.Ramuhalli@pnnl.gov]; Purtscher, Patrick [Patrick.Purtscher@nrc.gov]
Subject: RE: Draft slides

FYI – slides didn't make it through…

From: Ramuhalli, Pradeep [mailto:Pradeep.Ramuhalli@pnnl.gov]
Sent: Friday, February 03, 2017 1:36 AM
To: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>
Cc: Hiser, Matthew <Matthew.Hiser@nrc.gov>
Subject: [External_Sender] Draft slides

Symantec Mail Security replaced Harvesting workshop slides draft.pptx with this text message. The original file was a malformed file, therefore it cannot be scanned and was quarantined.

ID:HQPWMSMRS04::SYQ3370fc312
The email message was also quarantined.

NRC High-Priority Data Needs for Harvesting

Metals

- High fluence reactor internals
  - >50 dpa 304 SS from high core outlet temp plant
  - Bounding temperature and high fluence for void swelling
- Thermally aged unirradiated CASS
  - >30 years at ~320°C; Validate accelerated aging data
- Moderate fluence (1-2 dpa) CASS
  - Bolster technical basis for embrittlement in this fluence range
- RPV
  - High fluence vessel with relatively high levels of minor alloying elements (Mn, P, etc.)
  - Through thickness section
    - Measure fluence, toughness, and chemistry as a function of depth
    - Validate fluence calculations

Metals

- Components with known flaws
  - Ex: weld overlays over known flaws
  - Could be used for:
    - NDE evaluations,
    - effectiveness of mitigation techniques
- Components with limiting fatigue life
  - Confirm fatigue calculations are accurate by inspecting for flaws

Electrical

- Cables
  - Power cables energized and energized in normal operation
  - Cables from in containment applications
- Electrical components
  - 1E MOVs from harsh and mild environments
  - 1E Air operated valves
  - 4160 1E breakers
  - 1E Molded case breakers 480V, 250V DC, 125 VDC,
  - 1E Relays from mild environment GE – HFA, Agastat timing relays, any from Westinghouse, Potter Brumfield, Stuthers Dunn etc.,

Concrete

- High fluence irradiated concrete?
- ASR?
- Large sections for structural testing?

Ex-Plant Materials Harvesting Workshop

March 7-8, 2017

USNRC HQ

Rockville, MD, USA

Meeting Logistics

- Workshop will be held at NRC's Three White Flint North building
  - Directly adjacent to the White Flint Metro station
  - Nearest hotel within walking distance: Bethesda North Marriott Hotel & Conference Center
- Workshop is a non-public meeting to encourage open discussion
  - Presentations and meeting summary will be distributed among meeting participants only
- GoToMeeting webinar will be available to support additional attendees
  - Webinar attendees will be primarily observers
    - Limited opportunities for webinar attendee participation in discussion if time allows
  - Discussion will be recorded through GoToMeeting software to aid capturing discussion in meeting summary

Motivation

- With plants shutting down both in the U.S. and internationally, there are increasing opportunities to harvest components from decommissioning plants
  - Past harvesting efforts generally more reactive as opportunities arose, rather than proactively planned
- Ex-plant materials may be valuable because they have been exposed to actual in-service plant operating conditions
  - Can reduce the uncertainty associated with the applicability of the aging conditions
- Insights from research on harvested materials can address technical data needs identified for extended plant operation
- Lessons learned from past harvesting programs can help improve future harvesting efforts
  - Challenges encountered in previous programs can be shared and mitigated or avoided in future programs

Approach

- Domestic and international researchers, industry, regulators, and decommissioning companies' discuss benefits and challenges with ex-plant harvesting
  - Encourage sharing of lessons learned as well as areas of common interest
- Workshop consists of topical sessions with short presentations and significant time for open discussion
  - Goal is to maximize engagement among meeting participants
- Scope includes any materials aging issue that could benefit from harvesting, including metals, cables, and concrete

Expected Outcome

- Participants become better informed and aware of the benefits and challenges associated with ex-plant harvesting
- Discussions help identify areas of common interest for harvesting to address technical data needs
- Presentations and discussions provide the starting point for a “database” of harvested materials and future harvesting opportunities
- Contacts are made among research organizations to allow for further discussion of specific harvesting projects

Session Expectations

- Session 1 Motivation for Harvesting
  - Perspective from panel participants on their organizations' interest in and motivation for harvesting
  - Brief (5-10 minute) presentation from each panel member followed by general discussion
- Session 2 Technical Data Needs for Harvesting
  - Presenters share high-priority data needs that may be best addressed by harvesting
    - Where does harvesting hold particular value compared to other sources of technical data
  - 15-20 minute presentations followed by open discussion of technical data needs for harvesting

Session Expectations

- Session 3 Sources of Materials
  - Information on previously harvested materials and future harvesting opportunities
    - Materials located at research and vendor facilities
    - Decommissioning plants that may allow for future harvesting
  - Short 5-10 minute presentations followed by open discussion
  - Starting point for potential database of previously harvested materials and future harvesting opportunities
- Session 4 Harvesting Experience: Lessons Learned and Practical Aspects
  - Improving future efforts with lessons learned from past programs
    - Pitfalls to avoid and strategies to improve likelihood of success
  - Practical perspective from non-researchers on how harvesting interfaces with the decommissioning process
  - International decommissioning and harvesting experience
  - 20-30 minute presentations followed by open discussion

Session Expectations

- Session 5 Future Harvesting Program Planning
  - Technical and logistical information needed when planning a specific harvesting program
  - Perspective from panel participants on the workshop
  - Next steps and actions from workshop
  - Potential areas of common interest for future harvesting programs
  - Brief (5-10 minute) presentation from each panel member followed by general discussion

Note to requester:
Attachments are immediately following.

From: Tregoning, Robert
Sent: Tue, 20 Dec 2016 14:49:39 +0000
To: Purtscher, Patrick
Subject: FW: Harvesting Workshop Announcement
Attachments: Condensed Workshop Agenda 12-12-16.docx, Harvesting Workshop Announcement.docx

Forgot to include you on this....

Robert Tregoning
Technical Advisor for Materials
US Nuclear Regulatory Commission
Two White Flint North, M/S T-10 A36
11545 Rockville Pike
Rockville, MD 20852-2738
ph: 301-415-2324
fax: 301-415-6671

-----Original Message-----
From: Tregoning, Robert
Sent: Tuesday, December 20, 2016 9:47 AM
To: Soneda, Naoki <soneda@criepi.denken.or.jp>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Cc: Rosseel, Thomas M. <rosseeltm@ornl.gov>; Sokolov, Mikhail A. <sokolovm@ornl.gov>; Arai, Taku <arait@criepi.denken.or.jp>; 坂本 一信 <kazunobu_sakamoto@nsr.go.jp>; Tregoning, Robert <Robert.Tregoning@nrc.gov>
Subject: RE: Harvesting Workshop Announcement

Dear Dr. Sonada:

Thank you so much for your email and your inquiry about the harvesting workshop. I apologize for not responding to you sooner, but last week was very busy for me. I've attached a workshop announcement as well as a condensed workshop agenda for your information. You can see that we are planning five unique sessions as part of the workshop. Each session has a specific theme, or objective, as outlined below (and in the attached agenda).
1. Session 1 will consist of short presentations and a panel discussion on the motivation for harvesting.
2. Session 2 will discuss data needs best met through harvesting.
3. Session 3 will discuss sources of materials for harvesting programs 4. Session 4 will discuss lessons-learned from past harvesting programs and practical aspects associated with harvesting.
5. Session 5 will attempt to summarize the workshop and planning a harvesting program, as well as discuss actions and next steps

Do you have a particular session in mind where you would like to make a presentation? If so, can you please send me a proposed title?

Also, we are trying to keep the workshop participation fairly small to make sure that we can have meaningful discussion. I've been in contact with Kazu Sakamoto from NRAJ and want to make sure that we work together to get the right organizations from Japan to participate. Can you tell me what other organizations are interested in participating?

Thank you again for your interest. I'm hoping that the workshop will be successful for all participants. I hope you and your family have a Happy Holidays and a prosperous New Year as well.

Regards,

Rob

Robert Tregoning
Technical Advisor for Materials
US Nuclear Regulatory Commission
Two White Flint North, M/S T-10 A36
11545 Rockville Pike
Rockville, MD 20852-2738
ph: 301-415-2324
fax: 301-415-6671

-----Original Message-----
From: Soneda, Naoki [mailto:soneda@criepi.denken.or.jp]
Sent: Wednesday, December 14, 2016 4:18 AM
To: Tregoning, Robert <Robert.Tregoning@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Cc: Rosseel, Thomas M. <rosseeltm@ornl.gov>; Sokolov, Mikhail A. <sokolovm@ornl.gov>; Arai, Taku <arait@criepi.denken.or.jp>
Subject: [External_Sender] Harvesting Workshop Announcement

Dear Dr. Tregoning and Dr. Hiser,

Dr. Rosseel of ORNL kindly let me know that the USNRC is organizing a material harvesting workshop in March, and I am writing you to ask if there is any chance for us to participate and contribute, somehow, to the workshop.

We, CRIEPI, are working with Tom and Dr. Sokolov of ORNL on the characterization of RPV materials from Zion Unit 1 under the US-Japan collaboration. We also have some discussions in Japan about materials harvesting from decomissioned Japanese LWRs because some of the Japanese utilities decided permanent shutdown of some of the old LWRs. So, materials harvesting is becoming a hot topic in Japan, and we are very much interested in participating in the workshop.

I would appreciate if our participation in the workshop is acceptable with the USNRC, and if so, please let me know your current idea about the scope of the workshop so that we can discuss how we can contribute to the workshop.

I would like to send at least one researcher from CRIEPI, but some people from other organizations in Japan may also like to participate.

I look forward to hearing from you.

Best regards,
Naoki

--

Naoki Soneda, Dr.
Director, Materials Science Research Laboratory CRIEPI
2-6-1 Nagasaka, Yokosuka-shi, Kanagawa 240-0196
Phone: 070-6568-9287
Fax: 046-856-5571
E-mail: soneda@criepi.denken.or.jp

Draft Agenda – March 7-8, 2017 Harvesting Workshop

Tuesday, March 7, 2017
Introduction

- Overview of workshop purpose and objectives

Session 1: Motivation for Harvesting

- Solicited presentations from EPRI, DOE, NRC, and international organizations followed by panel discussion

Session 2: Technical data needs best addressed by harvesting

- Solicited presentations from EPRI, DOE, NRC, and international organizations followed by open discussion

Session 3: Sources of Materials

- Solicited presentations from EPRI, DOE, NRC, and international organizations followed by open discussion

Wednesday, March 8, 2017

Session 4: Harvesting Experience: Lessons learned and practical aspects

- Solicited presentations from EPRI, DOE, NRC, U.S. utility, decommissioning companies, and international organizations followed by open discussion

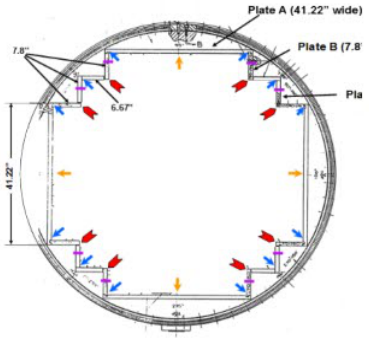
Session 5: Future Harvesting Program Planning

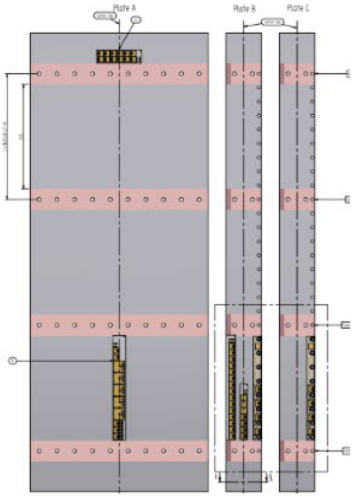
- Solicited presentations from EPRI, DOE, NRC, and international organizations followed by open and panel discussion

Ex-Plant Materials Harvesting Workshop

Location: NRC Headquarters in Rockville, MD, USA

Dates: March 7-8, 2017





Motivation:

- There are increasing opportunities to harvest the safety-critical components from decommissioning plants, both domestic and international.
- The harvested materials are valuable because they have been exposed to actual in-service plant operating conditions (temperature, irradiation, coolant, etc.), unlike virgin materials tested under simulated conditions in the lab.
- Data from ex-plant materials should help address technical gaps identified for extended operation of nuclear power plants due to highly relevant aging conditions.

Purpose and Objective:

- For NRC staff and interested stakeholders to have greater awareness and knowledge of the benefits and challenges associated with ex-plant harvesting.
- Facilitate contacts and communication to enable specific cooperative ex-plant harvesting programs to be initiated.

Workshop Topics:

- Harvesting decision-making and prioritization
  - Technical data needs best addressed by harvesting
  - Technical information needed in advance of harvesting
- Sources of materials:
  - Decommissioning reactors
  - Operating reactors – replaced components
  - Previous harvesting programs – “boneyards”
  - Tracking available materials
- Harvesting process
  - Lessons learned from harvesting experience
  - Perspective of utility-owner and decommissioning contractor on harvesting
  - Communication and coordination between decommissioning and researchers
- International collaborative programs on specific components at specific plants

Workshop will consist of solicited presentations followed by discussion periods. If interested in attending or learning more about the workshop, please reach out to the contacts below.

Contacts: Robert Tregoning, Robert.Tregoning@nrc.gov
Matthew Hiser, Matthew.Hiser@nrc.gov
Patrick Purtscher, Patrick.Purtscher@nrc.gov

Note to requester: Attachments are immediately following.

From: Tregoning, Robert
Sent: Tue, 31 Jan 2017 13:20:01 +0000
To: Arai, Taku;Sadao Higuchi
Cc: 'Soneda, Naoki';Hiser, Matthew;Purtscher, Patrick
Subject: FW: Re: Harvesting Workshop Announcement
Attachments: Ex-Plant Materials Harvesting Workshop.pptx, Harvesting Workshop Announcement.docx, Condensed Workshop Agenda.docx

Dr. Arai and Dr. Higuchi:

Thank you for your interest and willingness to participate in the workshop. I have attached the workshop announcement and condensed agenda along with a few slides describing the motivation for the workshop and the expectations for each session. The workshop is divided into 5 sessions, each with a combination of presentations and discussion:

1. Session 1 will consist of short presentations and a panel discussion on the motivation for harvesting.
2. Session 2 will discuss data needs best met through harvesting.
3. Session 3 will discuss sources of materials for harvesting programs
4. Session 4 will discuss lessons-learned from past harvesting programs and practical aspects associated with harvesting.
5. Session 5 will attempt to summarize the workshop and planning a harvesting program, as well as discuss actions and next steps

We would like to invite you to present in any of Sessions 2, 3, or 4. For session 3, we are looking for brief 5-10 minute presentations, so just a few slides at most on sources of materials. For sessions 2 and 4, the presentations are anticipated to be longer, perhaps 20-30 minutes, covering data needs best addressed through harvesting (session 2) and lessons learned from previous harvesting experience (session 4).

Please let me know if you would be able to participate and which sessions you would be willing to support, along with presentation titles. We will look forward to your participation and contribution to the workshop!

Warm regards,

Rob

Robert Tregoning
Technical Advisor for Materials
US Nuclear Regulatory Commission
Two White Flint North, M/S T-10 A36
11545 Rockville Pike
Rockville, MD 20852-2738
ph: 301-415-2324
fax: 301-415-6671

-----Original Message-----
From: Soneda, Naoki [mailto:soneda@criepi.denken.or.jp]
Sent: Monday, January 30, 2017 8:38 AM
To: Tregoning, Robert <Robert.Tregoning@nrc.gov>
Cc: Arai, Taku <arait@criepi.denken.or.jp>; Sadao Higuchi <higuchi@criepi.denken.or.jp>
Subject: [External_Sender] Re: Harvesting Workshop Announcement

Dear Rob,

Sorry for my late response. I talked to several stakeholders about our presentation at the workshop. At this point of time, it looks we should make a presentation in Session I on the motivation for harvesting.
CRIEPI has a lot of experiences on characterizing materials from nuclear reactors. We would like to talk about our motivation for harvesting in light of such experiences.

I learned that I need to stay within Japan during that week, and Dr.
Taku Arai and Dr. Sadao Higuchi will participate the workshop from CRIEPI. These two people are deeply involved in the discussions on future possible researches of decommissioned materials in Japan, even though such discussions are still in a very early stage. So I think they can contribute to discussions in other sessions as well.

I would appreciate if you could provide me with any new information about the workshop so that my colleagues can start preparing for the workshop. You can find their e-mail addresses in the Cc: fields of this message.

Best regards,
Naoki

Tregoning, Robert wrote on 2017/01/04 20:40:
> Naoki:
>
> That sounds great. I look forward to hearing from you.
>
> Regards,
>
> Rob
>
> -----Original Message-----
> From: Soneda, Naoki [mailto:soneda@criepi.denken.or.jp]
> Sent: Tuesday, January 03, 2017 7:01 PM
> To: Tregoning, Robert <Robert.Tregoning@nrc.gov>; Hiser, Matthew
> <Matthew.Hiser@nrc.gov>
> Cc: Rosseel, Thomas M. <rosseeltm@ornl.gov>; Sokolov, Mikhail A.
> <sokolovm@ornl.gov>; Arai, Taku <arait@criepi.denken.or.jp>; 坂本 一信
> <kazunobu_sakamoto@nsr.go.jp>
> Subject: [External_Sender] Re: Harvesting Workshop Announcement
>
> Rob,
>
> Thank you for the information. The end of January is a good target because I will have time to discuss several people who are interested in working on harvesting activities. Let's keep in tough.
>
> Best regards,
> Naoki
>
> Tregoning, Robert wrote on 2017/01/03 21:23:
>> Naoki:
>>
>> Thank you for your reply and interest in the workshop. We would certainly like CRIEPI to attend and hopefully participate in the workshop. We're just now starting to planning the talks for the individual sessions so there is certainly time for you to discuss with your colleagues the contribution that you would like to propose. I am hoping that we can have the titles and speakers for all the talks confirmed by the end of January. We will certainly be in contact with you during this planning period. Please let me know if you have any other questions in the interim.
>>
>> Warm regards,
>>
>> Rob

>>
>> -----Original Message-----
>> From: Soneda, Naoki [mailto:soneda@criepi.denken.or.jp]
>> Sent: Monday, December 26, 2016 1:49 AM
>> To: Tregoning, Robert <Robert.Tregoning@nrc.gov>; Hiser, Matthew
>> <Matthew.Hiser@nrc.gov>
>> Cc: Rosseel, Thomas M. <rosseeltm@ornl.gov>; Sokolov, Mikhail A.
>> <sokolovm@ornl.gov>; Arai, Taku <arait@criepi.denken.or.jp>; 坂本 一信
>> <kazunobu_sakamoto@nsr.go.jp>
>> Subject: [External_Sender] Re: Harvesting Workshop Announcement
>>
>> Dear Rob,
>>
>> Thank you very much for your response. We am now discussing with our Japanese colleagues on the session where we can make a contribution. I would appreciate if you could allow us some more time. In any case, CRIEPI would like to participate the workshop if it is acceptable with you.
>>
>> At this moment, I have no idea about the organizations, other than NRA, which are interested in participating.
>>
>> Best regards,
>> Naoki
>>
>> Tregoning, Robert wrote on 2016/12/20 23:47:
>>> Dear Dr. Sonada:
>>>
>>> Thank you so much for your email and your inquiry about the harvesting workshop. I apologize for not responding to you sooner, but last week was very busy for me. I've attached a workshop announcement as well as a condensed workshop agenda for your information. You can see that we are planning five unique sessions as part of the workshop. Each session has a specific theme, or objective, as outlined below (and in the attached agenda).
>>> 1. Session 1 will consist of short presentations and a panel discussion on the motivation for harvesting.
>>> 2. Session 2 will discuss data needs best met through harvesting.
>>> 3. Session 3 will discuss sources of materials for harvesting
>>> programs 4. Session 4 will discuss lessons-learned from past harvesting programs and practical aspects associated with harvesting.
>>> 5. Session 5 will attempt to summarize the workshop and planning a
>>> harvesting program, as well as discuss actions and next steps
>>>
>>> Do you have a particular session in mind where you would like to make a presentation? If so, can you please send me a proposed title?
>>>
>>> Also, we are trying to keep the workshop participation fairly small to make sure that we can have meaningful discussion. I've been in contact with Kazu Sakamoto from NRAJ and want to make sure that we work together to get the right organizations from Japan to participate. Can you tell me what other organizations are interested in participating?
>>>
>>> Thank you again for your interest. I'm hoping that the workshop will be successful for all participants. I hope you and your family have a Happy Holidays and a prosperous New Year as well.
>>>
>>> Regards,
>>>
>>> Rob
>>>
>>> Robert Tregoning
>>> Technical Advisor for Materials
>>> US Nuclear Regulatory Commission
>>> Two White Flint North, M/S T-10 A36

>>> 11545 Rockville Pike
>>> Rockville, MD 20852-2738
>>> ph: 301-415-2324
>>> fax: 301-415-6671
>>>
>>>
>>> -----Original Message-----
>>> From: Soneda, Naoki [mailto:soneda@criepi.denken.or.jp]
>>> Sent: Wednesday, December 14, 2016 4:18 AM
>>> To: Tregoning, Robert <Robert.Tregoning@nrc.gov>; Hiser, Matthew
>>> <Matthew.Hiser@nrc.gov>
>>> Cc: Rosseel, Thomas M. <rosseeltm@ornl.gov>; Sokolov, Mikhail A.
>>> <sokolovm@ornl.gov>; Arai, Taku <arait@criepi.denken.or.jp>
>>> Subject: [External_Sender] Harvesting Workshop Announcement
>>>
>>> Dear Dr. Tregoning and Dr. Hiser,
>>>
>>> Dr. Rosseel of ORNL kindly let me know that the USNRC is organizing a material harvesting workshop in March, and I am writing you to ask if there is any chance for us to participate and contribute, somehow, to the workshop.
>>>
>>> We, CRIEPI, are working with Tom and Dr. Sokolov of ORNL on the characterization of RPV materials from Zion Unit 1 under the US-Japan collaboration. We also have some discussions in Japan about materials harvesting from decomissioned Japanese LWRs because some of the Japanese utilities decided permanent shutdown of some of the old LWRs. So, materials harvesting is becoming a hot topic in Japan, and we are very much interested in participating in the workshop.
>>>
>>> I would appreciate if our participation in the workshop is acceptable with the USNRC, and if so, please let me know your current idea about the scope of the workshop so that we can discuss how we can contribute to the workshop.
>>>
>>> I would like to send at least one researcher from CRIEPI, but some people from other organizations in Japan may also like to participate.
>>>
>>> I look forward to hearing from you.
>>>
>>> Best regards,
>>> Naoki
>>>
>>> --
>>> ---
>>> Naoki Soneda, Dr.
>>> Director, Materials Science Research Laboratory CRIEPI
>>> 2-6-1 Nagasaka, Yokosuka-shi, Kanagawa 240-0196
>>> Phone: 070-6568-9287
>>> Fax: 046-856-5571
>>> E-mail: soneda@criepi.denken.or.jp
>>>
>> --
>> ---
>> Naoki Soneda, Dr.
>> Materials Science Research Laboratory CRIEPI
>> 2-6-1 Nagasaka, Yokosuka-shi, Kanagawa 240-0196
>> Phone: 070-6568-9287
>> Fax: 046-856-5571
>> E-mail: soneda@criepi.denken.or.jp

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> ---
> Naoki Soneda, Dr.
> Materials Science Research Laboratory
> CRIEPI
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> Phone: 070-6568-9287
> Fax: 046-856-5571
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>
>

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Naoki Soneda, Dr.
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Phone: 070-6568-9287
Fax: 046-856-5571
E-mail: soneda@criepi.denken.or.jp

Ex-Plant Materials Harvesting Workshop

March 7-8, 2017

USNRC HQ

Rockville, MD, USA

Motivation

- With plants shutting down both in the U.S. and internationally, there are increasing opportunities to harvest components from decommissioning plants
  - Past harvesting efforts generally more reactive as opportunities arose, rather than proactively planned
- Ex-plant materials may be valuable because they have been exposed to actual in-service plant operating conditions
  - Can reduce the uncertainty associated with the applicability of the aging conditions
- Insights from research on harvested materials can address technical data needs identified for extended plant operation
- Lessons learned from past harvesting programs can help improve future harvesting efforts
  - Challenges encountered in previous programs can be shared and mitigated or avoided in future programs

Approach

- Domestic and international researchers, industry, regulators, and decommissioning companies' discuss benefits and challenges with ex-plant harvesting
  - Encourage sharing of lessons learned as well as areas of common interest
- Workshop consists of topical sessions with short presentations and significant time for open discussion
  - Goal is to maximize engagement among meeting participants
- Scope includes any materials aging issue that could benefit from harvesting, including metals, cables, and concrete

Expected Outcome

- Participants become better informed and aware of the benefits and challenges associated with ex-plant harvesting
- Discussions help identify areas of common interest for harvesting to address technical data needs
- Presentations and discussions provide the starting point for a “database” of harvested materials and future harvesting opportunities
- Contacts are made among research organizations to allow for further discussion of specific harvesting projects

Session Expectations

- Session 1 Motivation for Harvesting
  - Perspective from panel participants on their organizations' interest in and motivation for harvesting
  - Brief (5-10 minute) presentation from each panel member followed by general discussion
- Session 2 Technical Data Needs for Harvesting
  - Presenters share high-priority data needs that may be best addressed by harvesting
    - Where does harvesting hold particular value compared to other sources of technical data
  - 15-20 minute presentations followed by open discussion of technical data needs for harvesting

Session Expectations

- Session 3 Sources of Materials
  - Information on previously harvested materials and future harvesting opportunities
    - Materials located at research and vendor facilities
    - Decommissioning plants that may allow for future harvesting
  - Short 5-10 minute presentations followed by open discussion
  - Starting point for potential database of previously harvested materials and future harvesting opportunities
- Session 4 Harvesting Experience: Lessons Learned and Practical Aspects
  - Improving future efforts with lessons learned from past programs
    - Pitfalls to avoid and strategies to improve likelihood of success
  - Practical perspective from non-researchers on how harvesting interfaces with the decommissioning process
  - International decommissioning and harvesting experience
  - 20-30 minute presentations followed by open discussion

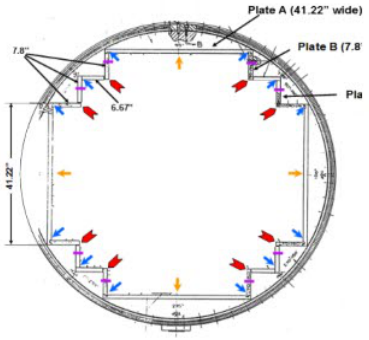
Session Expectations

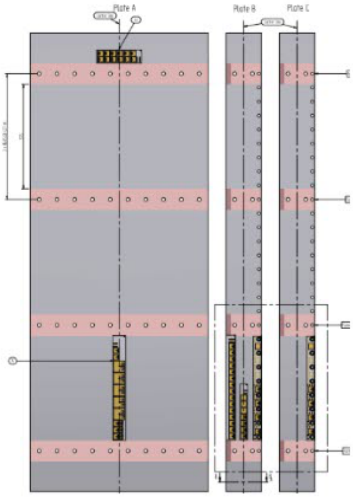
- Session 5 Future Harvesting Program Planning
  - Technical and logistical information needed when planning a specific harvesting program
  - Perspective from panel participants on the workshop
  - Next steps and actions from workshop
  - Potential areas of common interest for future harvesting programs
  - Brief (5-10 minute) presentation from each panel member followed by general discussion

Ex-Plant Materials Harvesting Workshop

Location: NRC Headquarters in Rockville, MD, USA

Dates: March 7-8, 2017





Motivation:

- There are increasing opportunities to harvest the safety-critical components from decommissioning plants, both domestic and international.
- The harvested materials are valuable because they have been exposed to actual in-service plant operating conditions (temperature, irradiation, coolant, etc.), unlike virgin materials tested under simulated conditions in the lab.
- Data from ex-plant materials should help address technical gaps identified for extended operation of nuclear power plants due to highly relevant aging conditions.

Purpose and Objective:

- For NRC staff and interested stakeholders to have greater awareness and knowledge of the benefits and challenges associated with ex-plant harvesting.
- Facilitate contacts and communication to enable specific cooperative ex-plant harvesting programs to be initiated.

Workshop Topics:

- Harvesting decision-making and prioritization
  - Technical data needs best addressed by harvesting
  - Technical information needed in advance of harvesting
- Sources of materials:
  - Decommissioning reactors
  - Operating reactors – replaced components
  - Previous harvesting programs – “boneyards”
  - Tracking available materials
- Harvesting process
  - Lessons learned from harvesting experience
  - Perspective of utility-owner and decommissioning contractor on harvesting
  - Communication and coordination between decommissioning and researchers
- International collaborative programs on specific components at specific plants

Workshop will consist of solicited presentations followed by discussion periods. If interested in attending or learning more about the workshop, please reach out to the contacts below.

Contacts: Robert Tregoning, Robert.Tregoning@nrc.gov
Matthew Hiser, Matthew.Hiser@nrc.gov
Patrick Purtscher, Patrick.Purtscher@nrc.gov

Draft Agenda – March 7-8, 2017 Harvesting Workshop

Tuesday, March 7, 2017
Introduction

- Overview of workshop purpose and objectives

Session 1: Motivation for Harvesting

- Solicited presentations from EPRI, DOE, NRC, and international organizations followed by panel discussion

Session 2: Technical data needs best addressed by harvesting

- Solicited presentations from EPRI, DOE, NRC, and international organizations followed by open discussion

Session 3: Sources of Materials

- Solicited presentations from EPRI, DOE, NRC, and international organizations followed by open discussion

Wednesday, March 8, 2017

Session 4: Harvesting Experience: Lessons learned and practical aspects

- Solicited presentations from EPRI, DOE, NRC, U.S. utility, decommissioning companies, and international organizations followed by open discussion

Session 5: Future Harvesting Program Planning

- Solicited presentations from EPRI, DOE, NRC, and international organizations followed by open and panel discussion

From: Purtscher, Patrick
Sent: Fri, 7 Oct 2016 09:58:51 -0400
To: Hiser, Matthew
Subject: Harvesting Workshop Announcement ptp comments 10-7-16
Attachments: Harvesting Workshop Announcement ptp comments 10-7-16.docx

Note to requester: Attachment is immediatly following.

Reworded the motivation section for your consideration.

Pat

Ex-Plant Materials Harvesting Workshop

Location: NRC HQ in Rockville, MD

Potential Dates:

- March 9-10, 2017 – Thursday/Friday before RIC
- March 16-17, 2017 – Thursday/Friday of RIC week
- March 20-21, 2017 – Monday/Tuesday after RIC

Motivation:

- Extended plant life produces additional aging degradation to safety-critical components and systems in a LWR.
- Validation of aging degradation associated with life extension is critical for effective regulation.
- ~~With a number of plants shutting down both in the U.S. and internationally, t~~There are increasing opportunities to harvest the safety-critical components from decommissioning plants, both domestic and international.
-
- ~~Ex-plant~~The harvested materials are valuable because they have been exposed to actual in-service plant operating conditions (temperature, irradiation, coolant, etc.), unlike virgin materials tested under simulated conditions in the lab.
- ~~, which reduces the uncertainty associated with the applicability of the aging conditions~~.

Purpose and Objective:

- For NRC staff and interested stakeholders to have greater awareness and knowledge of the benefits and challenges associated with ex-plant harvesting.
- Facilitate contacts and communication to enable specific cooperative ex-plant harvesting programs to be initiated.

Workshop Topics:

- Harvesting decision-making and prioritization
  - Technical data needs best addressed by harvesting
  - Technical information needed in advance of harvesting
- Sources of materials:
  - Decommissioning reactors
  - Operating reactors – replaced ~~or failed~~ components
  - Previous harvesting programs – “boneyards”
  - Tracking available materials
- Harvesting process
  - Lessons learned from harvesting experience
  - Perspective of utility-owner and decommissioning contractor on harvesting
  - Communication and coordination between decommissioning and researchers
- International collaborative programs on specific components at specific plants

Commented [PP1]: I thought more clearly linking this to SLR is important.

From: Tregoning, Robert
Sent: Tue, 20 Dec 2016 15:41:53 +0000
To: 'tlyon@epri.com'
Subject: Harvesting Workshop
Attachments: Harvesting Workshop Announcement.docx, Condensed Workshop Agenda 12-12-16.docx

T.G.:

I hope that this email finds you well and that you and your family are now settled in (b)(6) I'm writing for a favor from you. In early March, we're hosting a materials harvesting workshop. I've attached the workshop announcement and the condensed agenda.

You can see that we are planning five unique sessions as part of the workshop. Each session has a specific theme, or objective, as outlined below (and in the attached agenda).
1. Session 1 will consist of short presentations and a panel discussion on the motivation for harvesting.
2. Session 2 will discuss data needs best met through harvesting.
3. Session 3 will discuss sources of materials for harvesting programs
4. Session 4 will discuss lessons-learned from past harvesting programs and practical aspects associated with harvesting.
5. Session 5 will attempt to summarize the workshop and planning a harvesting program, as well as discuss actions and next steps

Robin Dyle and Sherry Bernhoft are participating from EPRI and will provide that perspective. However, we are also looking for some targeted international participation. We were therefore thinking that someone from MAI might be good to participate in Session 2 (or possibly another session).

What are your thoughts on this idea and, if you think MAI may be able to contribute to the workshop, do you have a POC that you can provide me so that I can see if they're interested?

I hope you and your family have a Happy Holidays and a prosperous New Year.

Regards,

Rob

Robert Tregoning
Technical Advisor for Materials
US Nuclear Regulatory Commission
Two White Flint North, M/S T-10 A36
11545 Rockville Pike
Rockville, MD 20852-2738
ph: 301-415-2324
fax: 301-415-6671

From: Chaouadi Rachid [mailto:rachid.chaouadi@sckcen.be]
Sent: Wednesday, December 14, 2016 4:36 AM
To: Tregoning, Robert <Robert.Tregoning@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Cc: van Walle Eric <eric.van.walle@sckcen.be>
Subject: [External_Sender] RE: [External] FW: Harvesting Workshop Announcement

Dear Bob, dear Matt
As you probably know, SCK•CEN is willing to attend the harvesting workshop USNRC is preparing and that would take place in the US in March 2017. If the workshop can be scheduled week 13 (27 to 31 March), that would be great because Eric and myself will be in the US. If case another date is selected, I will be able to attend but not Eric (other commitments). We are preparing a presentation that overviews what was already done worldwide in the field of post-mortem tests on decommissioned vessel materials. Please let us know as soon as possible the final planning that we can start with the necessary arrangements.
Looking forward to see you and discuss future actions for a fruitful international collaboration.
Best regards
Rachid

From: Rosseel, Thomas M. [mailto:rosseeltm@ornl.gov]
Sent: dinsdag 13 december 2016 23:23
To: Naoki Soneda; van Walle Eric; Chaouadi Rachid
Cc: Jan.BENS@FANC.FGOV.BE; Sokolov, Mikhail A.; Leonard, Keith J.
Subject: FW: [External] FW: Harvesting Workshop Announcement
Importance: High

Dear Naoki, Eric and Rachid,
As noted below, Rob Tregoning has requested that you contact him (Robert.Tregoning@nrc.gov) and Matt Hiser (Matthew.Hiser@nrc.gov) directly concerning the latest workshop planning information and possible speaking opportunities.
Kind regards and best wishes for happy holidays,
Tom

Thomas M. Rosseel, Ph. D.
Past Chair, International Committee on Irradiated Concrete and
Materials Aging and Degradation, Deputy Pathway Lead
Light Water Reactor Sustainability Program
Materials, Science and Technology Division
Oak Ridge National Laboratory
4500S MS 6132

PO Box 2008
Oak Ridge, TN 37831

TEL: 1-865-574-5380
rosseeltm@ornl.gov

From: "Tregoning, Robert" <Robert.Tregoning@nrc.gov>
Date: Tuesday, December 13, 2016 at 1:24 PM
To: "T. M. Rosseel" <rosseeltm@ornl.gov>, "Hiser, Matthew" <Matthew.Hiser@nrc.gov>
Cc: Mikhail Sokolov <sokolovm@ornl.gov>, "Leonard, Keith J." <leonardk@ornl.gov>, Kathryn Mccarthy <kathryn.mccarthy@inl.gov>, Richard Reister <Richard.Reister@nuclear.energy.gov>
Subject: RE: FW: [External] FW: Harvesting Workshop Announcement

Tom:

Thanks for the email letting us know about the inquiries you've received. We actually want foreign participation.

Could you put Eric and Naoki in touch with me or Matt? We'll then share the latest workshop planning information with them and see if there's a good fit for them to come and speak or possibly attend. We've been working with Rich and Sherry from EPRI to develop a preliminary agenda, which we're hoping will be mature enough to share with you shortly so that you can start planning as well. Let me know if you have any other questions.

Regards,

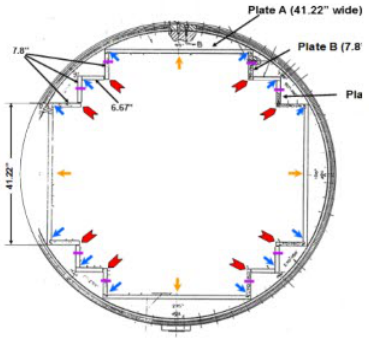
Rob

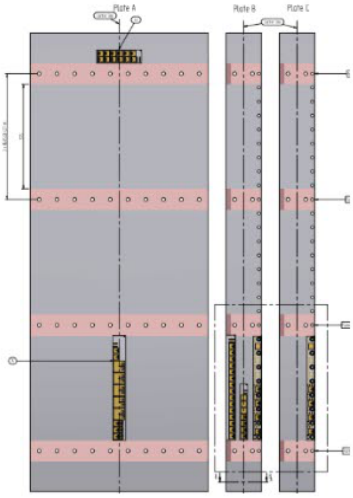
Robert Tregoning
Technical Advisor for Materials
US Nuclear Regulatory Commission
Two White Flint North, M/S T-10 A36
11545 Rockville Pike
Rockville, MD 20852-2738
ph: 301-415-2324
fax: 301-415-6671

Ex-Plant Materials Harvesting Workshop

Location: NRC Headquarters in Rockville, MD, USA

Dates: March 7-8, 2017





Motivation:

- There are increasing opportunities to harvest the safety-critical components from decommissioning plants, both domestic and international.
- The harvested materials are valuable because they have been exposed to actual in-service plant operating conditions (temperature, irradiation, coolant, etc.), unlike virgin materials tested under simulated conditions in the lab.
- Data from ex-plant materials should help address technical gaps identified for extended operation of nuclear power plants due to highly relevant aging conditions.

Purpose and Objective:

- For NRC staff and interested stakeholders to have greater awareness and knowledge of the benefits and challenges associated with ex-plant harvesting.
- Facilitate contacts and communication to enable specific cooperative ex-plant harvesting programs to be initiated.

Workshop Topics:

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  - Tracking available materials
- Harvesting process
  - Lessons learned from harvesting experience
  - Perspective of utility-owner and decommissioning contractor on harvesting
  - Communication and coordination between decommissioning and researchers
- International collaborative programs on specific components at specific plants

Workshop will consist of solicited presentations followed by discussion periods. If interested in attending or learning more about the workshop, please reach out to the contacts below.

Contacts: Robert Tregoning, Robert.Tregoning@nrc.gov
Matthew Hiser, Matthew.Hiser@nrc.gov
Patrick Purtscher, Patrick.Purtscher@nrc.gov

Draft Agenda – March 7-8, 2017 Harvesting Workshop

Tuesday, March 7, 2017
Introduction

- Overview of workshop purpose and objectives

Session 1: Motivation for Harvesting

- Solicited presentations from EPRI, DOE, NRC, and international organizations followed by panel discussion

Session 2: Technical data needs best addressed by harvesting

- Solicited presentations from EPRI, DOE, NRC, and international organizations followed by open discussion

Session 3: Sources of Materials

- Solicited presentations from EPRI, DOE, NRC, and international organizations followed by open discussion

Wednesday, March 8, 2017

Session 4: Harvesting Experience: Lessons learned and practical aspects

- Solicited presentations from EPRI, DOE, NRC, U.S. utility, decommissioning companies, and international organizations followed by open discussion

Session 5: Future Harvesting Program Planning

- Solicited presentations from EPRI, DOE, NRC, and international organizations followed by open and panel discussion

Note to requester: The attachments are immediately following.

From: Moyer, Carol
Sent: Fri, 9 Jun 2017 17:05:24 +0000
To: plim2@iaea.org
Cc: KRIVANEK, Robert
Subject: Late abstracts for PLiM
Attachments: Abstract for 4th PLiM_NRC RES SLR.DOCX, Harvesting IAEA PLim 2 page synopsis USNRC.DOCX

Dear Mr. Krivanek and Mr. Kang,

I have attempted to submit two abstracts for this year's PLiM conference from the US NRC Office of Nuclear Regulatory Research. The abstracts are attached to this message.

Mr. Krivanek may already have submitted the first one on our behalf. The second was sent after the deadline – even the extended deadline, I'm afraid, due to a holiday here in the US (b)(6) (b)(6) As a result, I was not successful in entering either of these into the Indico system.

I am sorry for the trouble, but is it still possible to have both of these abstracts considered? I understand that you have received many proposed papers, so of course we will understand if these both cannot be included in the program.

Again, I do apologize for causing trouble. Please let me know whether you need any additional information from me.

Best regards,

Carol E. Moyer
Sr. Materials Engineer
U.S. Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
MS: T-10A36
Washington, DC 20555-0001
carol.moyer@nrc.gov
301-415-2153

From: KRIVANEK, Robert [mailto:R.Krivanek@iaea.org]
Sent: Friday, May 26, 2017 2:55 AM
To: Moyer, Carol <Carol.Moyer@nrc.gov>
Cc: KHAELSS, Martina <M.Khaelss@iaea.org>
Subject: [External_Sender] FW: PLiM abstract on harvesting

Dear Carol,

Thank you for your synopsis. We have opened INDICO system for this week, so please submit it through the system.

Best regards,

Mr Robert KRIVANEK | Senior Safety Officer |
LTO Programme Manager
Operational Safety Section |Division of Nuclear Installation Safety|Department of Nuclear Safety and Security |
International Atomic Energy Agency | Vienna International Centre, PO Box 100, 1400 Vienna, Austria |
Email: r.krivanek@iaea.org | T: (+43-1) 2600-22018 | F: (+43-1) 2600-26007 |

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From: Carol.Moyer@nrc.gov [mailto:Carol.Moyer@nrc.gov]
Sent: Friday, 26 May 2017 00:19
To: KRIVANEK, Robert <R.Krivanek@iaea.org>
Cc: Hiser, Matthew <Matthew.Hiser@nrc.gov>; Tregoning, Robert <Robert.Tregoning@nrc.gov>; Frankl, Istvan <Istvan.Frankl@nrc.gov>
Subject: PLiM abstract on harvesting

Dear Mr. Krivanek,

The US NRC would like to propose one more presentation for this autumn's PLiM conference, on harvesting of materials from operating and decommissioning power plants. I understand from Sherry Bernhoft that you already have an impressive number of abstracts, so I will understand if there is not room in the program for this one. Nevertheless, we would appreciate your consideration of this proposal.

Again, please let me know if you need any additional information. Many thanks,

Carol

Carol E. Moyer
Sr. Materials Engineer
Office of Nuclear Regulatory Research
RES/DE/CMB
carol.moyer@nrc.gov
301-415-2153

From: KRIVANEK, Robert [mailto:R.Krivanek@iaea.org]
Sent: Tuesday, May 23, 2017 2:41 AM
To: Moyer, Carol <Carol.Moyer@nrc.gov>
Subject: [External_Sender] RE: RE: CN246_PLiM_Abstract deadline extended to 19 May 2017

Dear Carol,

I will arrange it. Thank you.

Best regards,

Mr Robert KRIVANEK | Senior Safety Officer |
LTO Programme Manager
Operational Safety Section |Division of Nuclear Installation Safety|Department of Nuclear Safety and Security |
International Atomic Energy Agency | Vienna International Centre, PO Box 100, 1400 Vienna, Austria |
Email: r.krivanek@iaea.org | T: (+43-1) 2600-22018 | F: (+43-1) 2600-26007 |

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From: Carol.Moyer@nrc.gov [mailto:Carol.Moyer@nrc.gov]
Sent: Monday, 22 May 2017 20:44
To: KRIVANEK, Robert <R.Krivanek@iaea.org>
Subject: RE: RE: CN246_PLiM_Abstract deadline extended to 19 May 2017

Dear Mr. Krivanek,

Since the formal deadline for abstract submissions has passed, I am no longer able to access the Indico system through the PLiM website (https://conferences.iaea.org/indico/event/134/). My abstract and Form B are attached.

Are you able to work with these documents? Is there anything else that you need me to do at this time?

Thanks again for your patience and assistance,
Carol

From: Moyer, Carol
Sent: Monday, May 22, 2017 10:59 AM
To: 'KRIVANEK, Robert' <R.Krivanek@iaea.org>
Cc: Frankl, Istvan <Istvan.Frankl@nrc.gov>
Subject: RE: RE: CN246_PLiM_Abstract deadline extended to 19 May 2017

Dear Mr. Krivanek,

My abstract is attached to this message, for your info. Separately, I will submit it through the Indico system. Please let me know if you need any other information at this stage.

Thank you,
Mrs. Carol Moyer

From: KRIVANEK, Robert [mailto:R.Krivanek@iaea.org]
Sent: Monday, May 22, 2017 2:56 AM
To: Moyer, Carol <Carol.Moyer@nrc.gov>
Cc: Tregoning, Robert <Robert.Tregoning@nrc.gov>
Subject: [External_Sender] RE: CN246_PLiM_Abstract deadline extended to 19 May 2017

Dear Mr Moyer,

It will be fine if you submit your abstracts this week.
We are looking forward to see a strong NRC delegation in Lyon.

Best regards,

Mr Robert KRIVANEK | Senior Safety Officer |
LTO Programme Manager
Operational Safety Section |Division of Nuclear Installation Safety|Department of Nuclear Safety and Security |
International Atomic Energy Agency | Vienna International Centre, PO Box 100, 1400 Vienna, Austria |
Email: r.krivanek@iaea.org | T: (+43-1) 2600-22018 | F: (+43-1) 2600-26007 |

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From: Carol.Moyer@nrc.gov [mailto:Carol.Moyer@nrc.gov]
Sent: Friday, 19 May 2017 23:19
To: KRIVANEK, Robert <R.Krivanek@iaea.org>
Cc: KANG, Ki-Sig <K.S.Kang@iaea.org>; Tregoning, Robert <Robert.Tregoning@nrc.gov>
Subject: RE: CN246_PLiM_Abstract deadline extended to 19 May 2017

Dear Mr. Krivanek,

The U.S. NRC intends to submit several abstracts for consideration for the PLiM conference in October. We have a short delay in completing one of our abstracts. I will be submitting it early next week, and I hope that you still will be able to consider it for the conference.

Thank you,
Carol Moyer

_____
Carol E. Moyer

Sr. Materials Engineer
U.S. Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
MS: T-10A36
Washington, DC 20555-0001
carol.moyer@nrc.gov
301-415-2153

From: R.Krivanek@iaea.org [mailto:R.Krivanek@iaea.org]
Sent: Friday, April 21, 2017 8:44 AM
To: R.Krivanek@iaea.org
Subject: [External_Sender] CN246_PLiM_Abstract deadline extended to 19 May 2017

Dear all,

Please be informed that we extended the abstract submission deadline to 19 May 2017 and updated the conference accordingly.

Best regards,

Mr Robert KRIVANEK | Senior Safety Officer |
LTO Programme Manager
Operational Safety Section |Division of Nuclear Installation Safety|Department of Nuclear Safety and Security |
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Proposed Abstract for 4th PLiM
C. Moyer (RES/DE/CMB)
5/19/2017

Regulatory Research on the Aging Management of Structures, Systems and Components in Nuclear Power Plants Supporting License Renewal

C. E. Moyer, M. Sircar, J. Philip, J. E. Pires, D. D. Murdock, T. Koshy, A. B. Hull
U.S. Nuclear Regulatory Commission (NRC), Washington, D.C., USA

The U.S. Nuclear Regulatory Commission (NRC) issues licenses for commercial power reactors to operate for up to 40 years. These licenses may be renewed for multiple 20-year increments. Now that 47 of the 99 operating commercial reactors in the U.S. have entered their first period of extended operation (PEO) to operate for up to 60 years, several licensees have indicated intention to apply within the next few years for subsequent license renewal (SLR) for an additional 20-year period. The NRC has revised its key guidance documents to be ready for the review of SLR applications and to communicate expectations for the aging management of passive, long-lived plant systems, structures, and components (SSCs). Regulatory research on the aging management of SSCs is being conducted now and will continue beyond the receipt of the initial SLR applications to confirm the adequacy of these guidance documents through the SLR period. Should regulatory research identify concerns related to aging management, regulatory guidance may be revised to reflect the new results. Regulatory research is ongoing in the following four areas: reactor pressure vessel neutron embrittlement, irradiation assisted stress corrosion cracking of reactor vessel internals, concrete and containment degradation, and electrical cable qualification and condition assessment. This paper will focus on regulatory research related to concrete degradation, including alkali-silica reaction and irradiation damage to concrete, and condition assessment of electrical cables.

Harvesting of Aged Materials from Operating and Decommissioning Nuclear Power Plants

M. Hiser[a], P. Purtscher[a], P. Ramuhalli[b], A. B. Hull[a], R. Tregoning[a], and C. E. Moyer[a]
[a]U.S. Nuclear Regulatory Commission (NRC), Washington, D.C., USA
[b]Pacific Northwest National Laboratory (PNNL), Richland, WA, USA

Recent developments in the nuclear industry include stronger interest in extended plant operation and plans to shut down a number of nuclear power plants (NPPs) In the U.S., there is strong interest in extending NPP lifespans through subsequent license renewal (SLR) from 60 to 80 years. Extended plant operation and SLR raise a number of technical issues that may require further research to understand aging mechanisms. U.S. utilities and the U.S. Nuclear Regulatory Commission (NRC) have focused on the aging of systems, structures, and components and in particular four key SLR issues: reactor pressure vessel (RPV) embrittlement, irradiation-assisted stress corrosion cracking of reactor internals, concrete structures and containment degradation, and electrical cable qualification and condition assessment. Meanwhile, in recent years, a number of NPPs, both in the U.S. and internationally, have shut down or announced plans to shut down for various reasons, including economic, political, and technical challenges. Unlike in the past when there were very few plants shutting down, these new developments provide opportunities for harvesting components that were aged in representative light water reactor (LWR) environments. In a third related development, economic challenges and limited budgets have restricted the resources available to support new research, including harvesting programs. Given this constrained budget environment, aligning interests and leveraging with other organizations is important to allow maximum benefit and value for future research programs.

NRC has recently undertaken an effort, with the assistance of Pacific Northwest National Lab (PNNL), to develop a strategic approach for harvesting aged materials from NPPs. Due to limited opportunities, past harvesting efforts have been reactive to individual plants shutting down and beginning decommissioning. Given the expected availability of materials from numerous plants and anticipated research needs to better understand aging out to 80 years of operation, the NRC is pursuing a more proactive approach to prioritize the data needs best addressed by harvesting and identify the best sources of materials to address high-priority data needs for regulatory research.

The first step in this strategic approach is to prioritize data needs for harvesting. A data need describes a particular degradation scenario (combination of material and environment) and should be defined with as much detail as appropriate in terms of the material (alloy, composition, etc.) and environment (temperature, fluence, chemistry, etc.).

A number of criteria may be considered when prioritizing the data needs for harvesting, including:

- Applicability of harvested material for addressing critical gaps
    - Harvesting for critical gaps prioritized over less essential technical gaps.

- Ease of laboratory replication of the degradation scenario
    - For example, simultaneous thermal and irradiation conditions are difficult to replicate or accelerated aging may not be feasible for a mechanism sensitive to dose rate.
- Unique field aspects of degradation
    - For example, unusual operating experience or legacy materials (fabrication methods, composition, etc.) no longer available.
- Fleet-wide vs. plant-specific applicability of data
    - Greater value in addressing an issue applicable to a larger number of plants.
- Harvesting cost and complexity
    - For example, harvesting unirradiated concrete or electrical cables less expensive and less complex than harvesting from the reactor internals or RPV.
- Availability of reliable in-service inspection (ISI) techniques for the material / component
    - If mature inspection methods exist and are easy to apply to monitor degradation, harvesting may be less valuable.
- Availability of materials for harvesting
- Timeliness of the expected research results relative to the objective.

The above potential criteria provide a systematic approach to prioritize data needs for harvesting. Different organizations may weigh and consider each of these criteria differently based on their interests and perspectives, but each criteria is likely relevant to some degree for any organization. NRC is interested in engaging with other organizations to prioritize data needs for harvesting and identify areas of common interest.

Another activity NRC is pursuing is the potential development of a database for sources of materials for harvesting, which could include both previously harvested materials and those available for future harvesting. This database would allow for aligning of high-priority data needs to the available sources of materials. As with the data needs effort, the level of detail for the sources of materials database should be appropriate for the factors influencing decision-making. NRC is interested in engaging with other organizations to develop a database for sources of materials for harvesting.

NRC's experience is that harvesting can yield highly representative and valuable data on materials aging, but these efforts may be expensive and challenging. Having a clearly defined objective and early engagement with other stakeholders, including the NPP from which harvesting will take place, are key to success. As specific harvesting opportunities are identified through this strategic approach, the NRC welcomes opportunities for cooperation and leveraging resources with other interested research organizations.

Note to requester:
Attachment is
immediately following.

From: Moyer, Carol
Sent: Thu, 25 May 2017 22:19:25 +0000
To: KRIVANEK, Robert
Cc: Hiser, Matthew;Tregoning, Robert;Frankl, Istvan
Subject: PLiM abstract on harvesting
Attachments: Harvesting IAEA PLim 2 page synopsis USNRC.docx

Dear Mr. Krivanek,

The US NRC would like to propose one more presentation for this autumn's PLiM conference, on harvesting of materials from operating and decommissioning power plants. I understand from Sherry Bernhoft that you already have an impressive number of abstracts, so I will understand if there is not room in the program for this one. Nevertheless, we would appreciate your consideration of this proposal.

Again, please let me know if you need any additional information. Many thanks,

Carol

Carol E. Moyer
Sr. Materials Engineer
Office of Nuclear Regulatory Research
RES/DE/CMB
carol.moyer@nrc.gov
301-415-2153

From: KRIVANEK, Robert [mailto:R.Krivanek@iaea.org]
Sent: Tuesday, May 23, 2017 2:41 AM
To: Moyer, Carol <Carol.Moyer@nrc.gov>
Subject: [External_Sender] RE: RE: CN246_PLiM_Abstract deadline extended to 19 May 2017

Dear Carol,

I will arrange it. Thank you.

Best regards,

Mr Robert KRIVANEK | Senior Safety Officer |
LTO Programme Manager
Operational Safety Section |Division of Nuclear Installation Safety|Department of Nuclear Safety and Security |
International Atomic Energy Agency | Vienna International Centre, PO Box 100, 1400 Vienna, Austria |
Email: r.krivanek@iaea.org | T: (+43-1) 2600-22018 | F: (+43-1) 2600-26007 |

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From: Carol.Moyer@nrc.gov [mailto:Carol.Moyer@nrc.gov]
Sent: Monday, 22 May 2017 20:44
To: KRIVANEK, Robert <R.Krivanek@iaea.org>
Subject: RE: RE: CN246_PLiM_Abstract deadline extended to 19 May 2017

Dear Mr. Krivanek,

Since the formal deadline for abstract submissions has passed, I am no longer able to access the Indico system through the PLiM website (https://conferences.iaea.org/indico/event/134/). My abstract and Form B are attached.

Are you able to work with these documents? Is there anything else that you need me to do at this time?

Thanks again for your patience and assistance,
Carol

From: Moyer, Carol
Sent: Monday, May 22, 2017 10:59 AM
To: 'KRIVANEK, Robert' <R.Krivanek@iaea.org>
Cc: Frankl, Istvan <Istvan.Frankl@nrc.gov>
Subject: RE: RE: CN246_PLiM_Abstract deadline extended to 19 May 2017

Dear Mr. Krivanek,

My abstract is attached to this message, for your info. Separately, I will submit it through the Indico system. Please let me know if you need any other information at this stage.

Thank you,
Mrs. Carol Moyer

From: KRIVANEK, Robert [mailto:R.Krivanek@iaea.org]
Sent: Monday, May 22, 2017 2:56 AM
To: Moyer, Carol <Carol.Moyer@nrc.gov>
Cc: Tregoning, Robert <Robert.Tregoning@nrc.gov>
Subject: [External_Sender] RE: CN246_PLiM_Abstract deadline extended to 19 May 2017

Dear Mr Moyer,

It will be fine if you submit your abstracts this week.
We are looking forward to see a strong NRC delegation in Lyon.

Best regards,

Mr Robert KRIVANEK | Senior Safety Officer |
LTO Programme Manager
Operational Safety Section |Division of Nuclear Installation Safety|Department of Nuclear Safety and Security |
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From: Carol.Moyer@nrc.gov [mailto:Carol.Moyer@nrc.gov]
Sent: Friday, 19 May 2017 23:19
To: KRIVANEK, Robert <R.Krivanek@iaea.org>
Cc: KANG, Ki-Sig <K.S.Kang@iaea.org>; Tregoning, Robert <Robert.Tregoning@nrc.gov>
Subject: RE: CN246_PLiM_Abstract deadline extended to 19 May 2017

Dear Mr. Krivanek,

The U.S. NRC intends to submit several abstracts for consideration for the PLiM conference in October. We have a short delay in completing one of our abstracts. I will be submitting it early next week, and I hope that you still will be able to consider it for the conference.

Thank you,
Carol Moyer

Carol E. Moyer
Sr. Materials Engineer
U.S. Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
MS: T-10A36
Washington, DC 20555-0001
carol.moyer@nrc.gov
301-415-2153

From: R.Krivanek@iaea.org [mailto:R.Krivanek@iaea.org]
Sent: Friday, April 21, 2017 8:44 AM
To: R.Krivanek@iaea.org
Subject: [External_Sender] CN246_PLiM_Abstract deadline extended to 19 May 2017

Dear all,

Please be informed that we extended the abstract submission deadline to 19 May 2017 and updated the conference accordingly.

Best regards,

Mr Robert KRIVANEK | Senior Safety Officer |
LTO Programme Manager
Operational Safety Section |Division of Nuclear Installation Safety|Department of Nuclear Safety and Security |
International Atomic Energy Agency | Vienna International Centre, PO Box 100, 1400 Vienna, Austria |
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Harvesting of Aged Materials from Operating and Decommissioning Nuclear Power Plants

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From: Hiser, Matthew
Sent: Mon, 23 May 2016 20:22:50 +0000
To: Iyengar, Raj;Hull, Amy
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Works for me – my calendar should be up to date.

Thanks!
Matt

From: Iyengar, Raj
Sent: Monday, May 23, 2016 4:19 PM
To: Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Amy/Matt,

Can we meet for 30 minutes tomorrow to finalize this draft for Steve's review? He would like to see a clean version from us.
I can set up a time slot?

Raj

From: Iyengar, Raj
Sent: Friday, May 20, 2016 12:35 PM
To: Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Amy/Matt,

Because this is only a draft for DLR's consideration, there will be ample opportunity to talk to DLR as they finalize the need within NRR. There may be other opinions that DLR staff and NRR management may have that will reshape this UNR.

Based on Steve's e-mail, we can generalize the title. Any suggestions?

When we respond to the incoming UNR, we can specify detailed activities within tasks and schedule/resources.

So, please provide any comments and please let me know if we can converge on a draft version for Steve's review. We had promised to give this to DLR during early May. Thank you.

Raj

From: Iyengar, Raj
Sent: Friday, May 20, 2016 12:05 PM
To: Frankl, Istvan <Istvan.Frankl@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Cc: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Steve,

I did not know about this initiative of umbrella UNRs you are referring to. Please feel free to revise/change title, as you see fit.

Amy/Matt, Please send any additional comments/revisions to Steve for his review.

Thanks.

Raj

From: Frankl, Istvan
Sent: Friday, May 20, 2016 11:45 AM
To: Iyengar, Raj <Raj.Iyengar@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Cc: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Thanks, Raj.

Given the challenges we have had with getting UNRs through management review and concurrence, less UNRs may be better. If necessary, the title can be changed to reflect broader scope. By the way, the UNRs we expect to receive from NRO and NMSS will also be "umbrella" type UNRs.

Steve

From: Iyengar, Raj
Sent: Friday, May 20, 2016 11:15 AM
To: Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Cc: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Frankl, Istvan <Istvan.Frankl@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Amy/Matt,

I have incorporated Matt's revisions to task c. I have also provided responses to your comments. Based on our discussion this AM. I would recommend a different UNR for the AMP audits and the strategic harvesting task (task c here), because of the longer time-frame that may be needed. Besides, these two activities may spill over beyond the receipt of first SLR application (later 2018).

This major purpose of this UNR to bring a closure to the EMDA issues, to the extent possible (and recommend further technical activities for unresolved or new emergent issues), through workshops/meetings (Task A) and through disposition documents prepared by RES staff (Task B), before the first application comes in.

Please feel free to make your final recommendations/suggestions to the comment boxes and send the document to Steve. Also feel free to add/revise language as you see fit. No need to put that on track changes.

(b)(6) Not sure if I will be here this PM.

Thank so much for your help and support.

Raj

From: Hiser, Matthew
Sent: Thursday, May 19, 2016 8:33 PM
To: Hull, Amy <Amy.Hull@nrc.gov>; Iyengar, Raj <Raj.Iyengar@nrc.gov>
Cc: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Hi Raj and Amy,

Please find attached (whenever this email gets to you!) my edits of the harvesting section. I am also ccing Pat Purtscher to provide any input on Task C.

Thanks!
Matt

Matthew Hiser
Materials Engineer
US Nuclear Regulatory Commission | Office of Nuclear Regulatory Research
Division of Engineering | Corrosion and Metallurgy Branch
Phone: 301-415-2454 | Office: TWFN 10D62
Matthew.Hiser@nrc.gov

From: Hull, Amy
Sent: Thursday, May 19, 2016 7:45 AM
To: Iyengar, Raj <Raj.Iyengar@nrc.gov>
Subject: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj, my two cents worth.

From: Iyengar, Raj
Sent: Fri, 27 May 2016 11:05:18 -0400
To: Frankl, Istvan;Purtscher, Patrick;Hull, Amy;Hiser, Matthew
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Another option to consider is to briefly mention this as an item in the last task (Task E) on technical assistance.
This is a catch-all task and can fit there well.
From: Iyengar, Raj
Sent: Friday, May 27, 2016 10:49 AM
To: Frankl, Istvan; Purtscher, Patrick; Hull, Amy; Hiser, Matthew
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Pat/Steve,
I looked into the additions proposed by Pat (highlighted in yellow). These are very valuable thoughts and should be pursued under the new UNR for IAD. I believe that is in progress.
This really does not fit the objective of developing a general database for ex-plant materials (metals, concrete and cables).
Further, these points were not vetted with DLR during our staff and management briefings on this UNR. I would prefer not to surprise them by inserting things like this, which are not directly addressing the objective.
If you still insist, I will add these to the final version.
Raj
The EMDA ranking of each aging-related degradation phenomena incorporates multiple factors that may not be adequately resolved by additional coupon testing of ex-plant materials. Part of this user need will be to examine where testing of larger-scale specimens may be appropriate to provide validation of the prediction of component performance from coupon testing.
Deliverable: RES should develop a strategic database for strategic harvesting that covers the four topical areas outlined in SRM on SECY 14-0016, which containsing information on:
• research gaps for SLR that may be best addressed by harvesting due to challenges in simulating actual service conditionsunique and significant materials aging degradation diverse sources (operating experience, other nuclear facilities, other long-lived industrial plants, other materials organizations such as ASM and NACE),
• assessment of appropriate testing program that would reduce the concern associated with the EMDA ranking,

From: Frankl, Istvan
Sent: Friday, May 27, 2016 10:22 AM
To: Iyengar, Raj; Purtscher, Patrick; Hull, Amy; Hiser, Matthew
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj,

I have not yet sent the final revs to DLR, so please consider incorporating Pat's inputs into the final version (this may require copy and paste into the final rev you sent me late yesterday).

Thanks,

Steve

From: Iyengar, Raj
Sent: Friday, May 27, 2016 10:04 AM
To: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Cc: Frankl, Istvan <Istvan.Frankl@nrc.gov>
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Pat,

Steve has the final version. Your points can be included in the response that we provide.

What do you think?
Raj

From: Purtscher, Patrick
Sent: Friday, May 27, 2016 9:23 AM
To: Iyengar, Raj; Hull, Amy; Hiser, Matthew
Cc: Frankl, Istvan
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

I added some additional comments on the harvesting to be considered.

Pat

From: Iyengar, Raj
Sent: Friday, May 20, 2016 11:15 AM
To: Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Cc: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Frankl, Istvan <Istvan.Frankl@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Amy/Matt,

I have incorporated Matt's revisions to task c. I have also provided responses to your comments. Based on our discussion this AM. I would recommend a different UNR for the AMP audits and the strategic harvesting task (task c here), because of the longer time-frame that may be needed. Besides, these two activities may spill over beyond the receipt of first SLR application (later 2018).

This major purpose of this UNR to bring a closure to the EMDA issues, to the extent possible (and recommend further technical activities for unresolved or new emergent issues), through workshops/meetings (Task A) and through disposition documents prepared by RES staff (Task B), before the first application comes in.

Please feel free to make your final recommendations/suggestions to the comment boxes and send the document to Steve. Also feel free to add/revise language as you see fit. No need to put that on track changes.

(b)(6) [redacted] Not sure if I will be here this PM.

Thank so much for your help and support.

Raj

From: Hiser, Matthew
Sent: Thursday, May 19, 2016 8:33 PM
To: Hull, Amy <Amy.Hull@nrc.gov>; Iyengar, Raj <Raj.Iyengar@nrc.gov>
Cc: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>
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Hi Raj and Amy,

Please find attached (whenever this email gets to you!) my edits of the harvesting section. I am also ccing Pat Purtscher to provide any input on Task C.

Thanks!
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Matthew Hiser
Materials Engineer
US Nuclear Regulatory Commission | Office of Nuclear Regulatory Research
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Matthew.Hiser@nrc.gov

From: Hull, Amy
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To: Iyengar, Raj <Raj.Iyengar@nrc.gov>
Subject: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj, my two cents worth.

Note to requester: Attachment is immediately following.

From: Iyengar, Raj
Sent: Fri, 20 May 2016 11:14:48 -0400
To: Hull, Amy;Hiser, Matthew
Cc: Purtscher, Patrick;Frankl, Istvan
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx
Attachments: 2016-NRR-UNR-Draft-May 2016 abh rev-rmi-mhiser.docx

Amy/Matt,

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US Nuclear Regulatory Commission | Office of Nuclear Regulatory Research

Division of Engineering | Corrosion and Metallurgy Branch
Phone: 301-415-2454 | Office: TWFN 10D62
Matthew.Hiser@nrc.gov

From: Hull, Amy
Sent: Thursday, May 19, 2016 7:45 AM
To: Iyengar, Raj <Raj.Iyengar@nrc.gov>
Subject: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj, my two cents worth.

Research Request

Evaluate Aging Management of systems, structures, and components (SSCs) for Subsequent License Renewal (SLR)

Background:

Although the NRC staff can accept subsequent license renewal applications now, the review would be based on guidance provided in NUREGs-1800 and -1801. Because the guidance in these NUREGs is based on plant operation from 40-60 years, additional review would be needed to ensure that the applicant addressed issues unique to 60-80 years of plant operation for subsequent license renewal. Such reviews would be longer and more resource-intensive.

In cooperation with the DOE Light Water Reactor Sustainability (LWRS) Program, the NRC completed NUREG/CR-7153, "Expanded Materials Degradation Assessment (EMDA), Vol. 1-5" (ADAMS Accession Nos. ML14279A321, ML14279A331, ML14279A349, ML14279A430, ML14279A461), to identify the most significant technical issues for nuclear power reactor operations beyond 60 years. The EMDA ranked the significance, current knowledge, and uncertainty associated with aging-related degradation phenomena that could affect systems, structures, and components over 80 years of operation. As outlined in the SRM on SECY 14-0016, the major technical issue areas are:

- Reactor pressure vessel neutron embrittlement at high fluence;
- Irradiation assisted stress corrosion cracking of reactor internals and primary system components;
- Concrete and containment degradation; and
- Electrical cable qualification and condition assessment.

For SLR, the staff used NUREG-1800 and NUREG-1801 as the basis for developing the guidance for SLR applicants and NRC staff. The development of the guidance was based on an evaluation of domestic and international operating experience of nuclear plants, lessons learned from staff review of previous license renewal applications, and assessment of recent research findings. The guidance documents were issued in mid-December of 2015, as draft "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report," (NUREG-2191, Volumes 1 and 2) and draft "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants" (SRP-SLR) (NUREG-2192).

Since the draft guidance documents were issued, the staff has held several public meetings with stakeholders and the public to discuss the proposed revisions and bases for the revisions. The most recent meetings were held on January 21 and February 19, 2016. Going forward, the NRC staff will continue to lead outreach activities to stakeholders and the public in order to provide information on the proposed changes to the guidance documents, solicit feedback on the documents, and revise the documents, as appropriate, to reflect stakeholder and public feedback. The final guidance documents are expected to be issued in mid-2017.

To support the review of an SLR application, an applicant will need to demonstrate how the effects of aging will be managed, including those associated with the technical issues listed above. Although the industry is conducting research to address these major technical issues for SLRs, not all the research will be completed before the first application is submitted. For those

Commented [HA1]: Raj, you are off to a great start. I just have some big picture comments for now. I would like to informally talk to Bennett about this for more ideas before providing much more. Is that OK with you? (Bennett and I worked together to write the last UNR) Also feedback is needed now from people such as John Burke who has been really closely involved with SLR work. Can I also talk to John?

Raj: Certainly, you can talk to Bennett and John or others. We have had several meetings with DLR staff and management on the five tasks describe here. Allen wanted Task C to be separate from A. Also, we will not close the old UNR (2010-006) at this point. I believe DLR wanted the compendium document done before closing.

That said, the purpose of this UNR is to have a closure on EMDA issues and be ready for SLR application review by early 2019. So, I am not sure if your suggested change in the title implies that we are still not certain about the technical issues related to SLR.

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Commented [HA4]: Most of the changes actually came from the Compendium, it is not mentioned herein. The report from the first plants is a public TLR. There was talk about wanting to do more AMP effectiveness audits. That should be a task in the UNR.

This statement was burrowed from the recent communication made to the Congress by NRR/DLR. I think we can add the reference to compendium when we send our response to NRR.
Please see my earlier comment on the AMP audits. We can change the references. This section intended to early draft for DLR. They may want to write a different background section.

(5/20) After our discussion, I would recommend another UNR to focus on AMP effectiveness audits and the strategic harvesting database. This will allow for timeframe beyond the first SLR application. I would prefer to focus this UNR on preparedness measures for the staff review of initial SLR applications.

issues that the industry has not yet developed a generic technical basis to support its resolution, the NRC will request applicants to address the technical issues with plant-specific programs in their SLR applications. The staff will review these plant-specific programs that address the SLR technical issues, but anticipates a longer application review process in these cases.

The requested research described below would provide information to support the staff in effectively evaluating aging management practices and developing staff positions to augment staff's preparedness for the evaluation of the feasibility of future applications for an SLR period. These requested products should build upon analysis methods, tools, and expertise developed as part of ongoing research activities and new research activities focused specifically on aging effects during an SLR period of extended operation (i.e., 60 to 80 years).

Description of Scope and Tasks

A. Hold NRC/industry workshop(s) on status of domestic and international research activities and operating experience to address and evaluate the status of materials degradation issues, identified in the EMDA reports, for a subsequent license renewal

Technical Need: In February 2008, the NRC and DOE first co-sponsored a "Workshop on U.S.
Nuclear Power Plant Life Extension Research and Development" (ADAMS Accession Number ML080570419), which requested stakeholder input into aging management research areas for "Life Beyond 60." Since then, there have been multiple workshops/meetings on the research activities, as well as on operating experience, regarding aging management of SSCs for a SLR period of operations. These meetings have been helpful in facilitating technical discussions, disseminating knowledge and information, and enabling the understanding of technical challenges, and paving the path-forward for resolution of the challenges and issues related to materials degradation during the SLR period of operations. As the NRC staff prepare for the review of the future SLR submittals, there is a need for continued engagement with domestic nuclear industry and other industries, DOE and other federal organizations, academia, international partners, and interested public stakeholders, through workshops targeted toward the status and resolutions of major technical issues outlined in the SRM and identified in EMDA.

Deliverable: RES staff should facilitate several workshops/meetings on operating experience from the initial license renewal period, research results on materials degradation issues and aging management of SSCs during a SLR period of operations. These meetings should specifically be targeted toward the resolution of technical issues for effective aging management of SSCs for a SLR period of operations. RES staff should provide an annual technical letter report summarizing the understanding gained through the workshops/meetings. The summary should include the status of domestic and international research activities in addressing materials degradation issues and aging management practices for an SLR period of operations. The report should also discuss (1) areas of progress and issues resolution, (2) areas of insufficient progress that may warrant additional NRC interactions, and (3) any newly identified technical issues that should be considered for an SLR period of operations.

Commented [HA5]: I think this should not be the first. AMP effectiveness audits are much more important. I want to informally talk with Bennett about this UNR before revising.

Raj: Please see my earlier comment. We can certainly consider a different UNR for AMP audits or can be rolled into the last task on emergent needs.

Commented [HA6]: Please talk to Rob about status of IFRAM. It should perhaps be explicitly mentioned in this UNR.

Raj: Thanks, I will take care of it.
(5/20) I talked with Rob. We can mention about the IFRAM activities when we send our response to NRR to this UNR.

Schedule: The effort should last no more than 36 months from the period of inception of this user need request.

B. Provide RES staff assessments of the current knowledge and disposition of materials degradation issues identified in the EMDA documents

Technical Need: As mentioned earlier, the EMDA volumes identified significant technical issues for nuclear power reactor operations beyond 60 years related to materials degradation. The major materials degradation issues fall under the following four topical areas, as outlined in SRM on SECY 14-0016:

- Reactor pressure vessel neutron embrittlement at high fluence;
- Irradiation assisted stress corrosion cracking of reactor internals and primary system components;
- Concrete and containment degradation; and
- Electrical cable qualification and condition assessment.

The NRC, DOE, and industry are addressing the key technical issues related to materials degradation at NPPs, in order to gain better understanding of the materials aging and degradation mechanisms and their implications of structural and component integrity. DOE/LWRS and the industry have initiated numerous research activities on the four major technical areas. The NRC staff conducts confirmatory research, through several user need requests on specific technical issues, to independently verify licensee data, determine safety margins, and explore uncertainties. Results from NRC's research will be used, in part, to confirm the adequacy of industry's technical basis for SLR and the associated AMPs. The AMPs are cornerstones for managing materials degradation in SSCs during SLR. In addition, the NRC research will support and increase the efficiency of staff review of SLR applications. To fully support the staff review of the SLR applications, RES should develop staff assessments of the current knowledge and disposition of materials degradation issues related to the four major technical areas. The assessments should also include recommendations on the need for:

- any interim staff guidance (ISG) to address aging management issues, and
- new regulatory guidance and/or revision of existing ones to address uncertainties in knowledge and/or potential non-conservativisms.

Deliverable: Deliver a technical letter report that summaries the state-of-knowledge and current knowledge and disposition of materials degradation issues identified in EMDA. The report should also include recommendations on the need for any new or revised guidance to address component integrity of aging structures.

Schedule: The effort should last no more than 36 months from the period of inception of this user need request. The initial draft report should be completed by the end of FY 2018.

C. Develop a long-term strategy for obtaining information from decommissioned NPPs as well as from ex-plant components from operating plants.

Technical Need: The NRC performs confirmatory research to inform and develop the technical basis for regulatory decisions related to aging management programs for

Commented [HA7]: I think maybe this should be higher in the listing of tasks. Check with Matt for any changes. Maybe the review panel for strategic harvesting should weigh in.

Matt is taking a look at this.

(5/20) I accepted all of Matt's revisions.

license renewal. Historically, this research has included laboratory testing on fresh materials under simulated aging conditions as well as testing and characterization of ex-plant materials harvested from nuclear power plants. Ex-plant materials are extremely valuable because they have been exposed to actual in-service plant operating conditions (temperature, irradiation, coolant, etc.), unlike fresh materials tested under simulated conditions in the lab. Ex-plant materials reduce the uncertainty associated with the applicability of the aging conditions compared to fresh materials aged under simulated conditions. Therefore, this research is expected to provide fundamental insights on reactor materials degradation and information addressing potential technical issues or identified gaps to support anticipated future NRC needs. It will also further inform the value of existing databases based on simulated aging conditions by assessing their applicability to in-service conditions.

Based on the recent experience of recovering materials from decommissioned plants, such as Zion, Crystal River and Zorita (Spain), the efforts of planning, coordination and eventual harvesting of these materials is resource-intensive and time-challenging. Future efforts to retrieve materials from decommissioned plants should be focused on the highest value SSCs by proactively developing a strategic database for obtaining unique and significant materials aging degradation information from ex-plant components. Such a database will enable the NRC to focus its harvesting efforts and expeditiously obtain materials and components from plants to be decommissioned in the near future and develop information and knowledge to access the efficacy of the AMPs.

Deliverable: RES should develop a database for strategic harvesting containing information on:

- research gaps for SLR that may be best addressed by harvesting due to challenges in simulating actual service conditions, and
- materials that can be harvested from to-be-decommissioned NPPs and ex-plant components from operating plants to better inform the NRC's AMPs and aging-related regulatory oversight and to better plan research activities.

RES should deliver periodic reports assessing the effectiveness of such programs and recommending any improvements for a subsequent license renewal period.

Schedule: The effort should last no more than 36 months from the period of inception of this user need request.

D. Continue to Develop Domestic and International Partnerships to Share Expertise, Capabilities and Resources Related to Aging Management Research for Long-Term Operations (LTO)

Technical Need: Various domestic and foreign research organizations, government agencies, utilities and research organizations are presently engaged in aging management research, the results of which may be of value to the NRC regarding plant operations during a subsequent license renewal period. Additionally, the Electric Power Research Institute (EPRI) is engaged with various international research organizations to develop data on aging mechanisms/effects. As such, it benefits the agency to be engaged in domestic and international research partnerships in order to

Commented [HA8]: May need more time, we need to discuss further.

I will wait to hear from Matt.

Matt: I have no objection to this timeline. If the purpose is simply to assess high-priority harvesting needs and available materials, 3 years should be sufficient. Of course this does not include implementing any actual harvesting programs.
(5/20): See my response to the last comment on page 1.

Commented [HA9]: This is closely related to the first task. Maybe they should be together or adjacent. Please mention IFRAM and other currently known activities.

Raj: Allen wanted this to be a separate task.

evaluate all available operating experience and relevant research, leverage resources and minimize unnecessary duplication of efforts. It would be advantageous to the agency to develop partnerships with these entities such that the various research programs could be better coordinated and focused on high-priority needs.

Deliverable: Continue to develop agreements with domestic and international partners to collaborate on aging management research that results in information to help inform agency decisions regarding a subsequent license renewal and long-term operations. Integrate as appropriate the results of these collaborative research and information exchanges from international partnerships into Tasks A and B. Provide an annual summary of international collaborative research results and status of interactions (e.g., references to meeting minutes, presentations, technical reports, etc.), highlighting international activities and results that may affect a subsequent license renewal.

Schedule: The effort should continue until the closure of this user need request.

G. **Provide technical assistance, as needed, for preparation of review of SLR applications.**

Technical Need: As the NRR staff prepares for the anticipated SLR application in FY18, technical assistance from RES staff on emergent issues may be needed. Such issues may include, but not restricted to, technical support for aging management program audits, public meetings related to communication efforts, and confirmatory reviews of licensee submittals.

Schedule: The effort, as needed, should continue until the closure of this user need request.

Commented [HA10]: I think RES would also be involved in reviewing technical adequacy of plant-specific AMPs submitted as part of application. Such as for XI.M16. The RES SMEs who were involved in developing specific AMPS would be a great contribution to reviewing what will be sent in by the applicant and developing RAIa, etc.

Raj: I agree. At this moment, because we do not have any specific need, this task can be used as a catch-all task to provide the needed technical assistance on emergent needs.

From: Iyengar, Raj
Sent: Thu, 19 May 2016 10:11:00 -0400
To: Hull, Amy
Cc: Frankl, Istvan;Hiser, Matthew
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx
Attachments: 2016-NRR-UNR-Draft-May 2016 abh rev-rmi.docx

Note to requester: Attachment is immediately following.

Amy,

I have attached my responses to your comments. I will modify the references to include the compendium document.
Matt is taking a look at the strategic harvesting task.

Let me know if you have some time to discuss this today. Steve wanted to see this on Friday, if possible.

Raj

From: Iyengar, Raj
Sent: Thursday, May 19, 2016 9:33 AM
To: Hull, Amy <Amy.Hull@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Amy,

Thank you very much for your insightful comments. I will address your comments and send a revised one. We had promised DLR to provide this early May. I had been pressed with other issues.

We did have a brief with both DLR staff and management on the four items. Certainly, you can talk with Bennett.

I think the AMP effectiveness audits and any plant-specific AMP can be captured in the last technical assistance task, as more specifics emerge as time goes on.

I agree with you on combining Task A and C. The Task C on Domestic and international collaboration was added as a separate item because Allen requested that.

This UNR was initially specific to getting a closure on EMDA issues and disposition (Task A-C). I would prefer restricting this UNR to 2-3 years. We could move the strategic harvesting to a different UNR if that would require more time.

Let me know if you want to discuss further.

Raj

From: Hull, Amy
Sent: Thursday, May 19, 2016 7:45 AM
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Subject: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj, my two cents worth.

Research Request

Review Parameters Affecting Degradation and ~~Evaluate~~ Aging Management of systems, structures, and components (SSCs) for~~during a~~ Subsequent License Renewal (SLR) ~~Period~~

Background:

Although the NRC staff can accept subsequent license renewal applications now, the review would be based on guidance provided in NUREGs-1800 and -1801. Because the guidance in these NUREGs is based on plant operation from 40-60 years, additional review would be needed to ensure that the applicant addressed issues unique to 60-80 years of plant operation for subsequent license renewal. Such reviews would be longer and more resource-intensive.

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- Electrical cable qualification and condition assessment.

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To support the review of an SLR application, an applicant will need to demonstrate how the effects of aging will be managed, including those associated with the technical issues listed

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Certainly, you can talk to Bennett and John or others. We have had several meetings with DLR staff and management on the five tasks describe here. Allen wanted Task C to be separate from A. Also, we will not close the old UNR (2010-006) at this point. I believe DLR wanted the compendium document done before closing.

That said, the purpose of this UNR is to have a closure on EMDA issues and be ready for SLR application review by early 2019. So, I am not sure if your suggested change in the title implies that we are still not certain about the technical issues related to SLR.

Commented [HA2]: Title needs some work to reflect what will be done. As originally written, it implies that work will be done concurrent with the SLR period, some years from now.

As I mentioned earlier, this UNR was specific to disposition of EMDA issues. I tagged along the harvesting project because this would be an easy vehicle. We can consider a different UNR to include work that needs to be concurrent during the UNR period. This different UNR could include any future AMP audits etc.

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Please see my earlier comment on the AMP audits. We can change the references. This section intended to early draft for DLR. They may want to write a different background section.

above. Although the industry is conducting research to address these major technical issues for SLRs, not all the research will be completed before the first application is submitted. For those issues that the industry has not yet developed a generic technical basis to support its resolution, the NRC will request applicants to address the technical issues with plant-specific programs in their SLR applications. The staff will review these plant-specific programs that address the SLR technical issues, but anticipates a longer application review process in these cases.

The requested research described below would provide information to support the staff in effectively evaluating aging management practices and developing staff positions to augment staff's preparedness for the evaluation of the feasibility of future applications for an SLR period. These requested products should build upon analysis methods, tools, and expertise developed as part of ongoing research activities and new research activities focused specifically on aging effects during an SLR period of extended operation (i.e., 60 to 80 years).

Description of Scope and Tasks

A. Hold NRC/industry workshop(s) on status of domestic and international research activities and operating experience to address and evaluate the status of materials degradation issues, identified in the EMDA reports, for a subsequent license renewal

Technical Need: In February 2008, the NRC and DOE first co-sponsored a "Workshop on U.S.
Nuclear Power Plant Life Extension Research and Development" (ADAMS Accession Number ML080570419), which requested stakeholder input into aging management research areas for "Life Beyond 60." Since then, there have been multiple workshops/meetings on the research activities, as well as on operating experience, regarding aging management of SSCs for a SLR period of operations. These meetings have been helpful in facilitating technical discussions, disseminating knowledge and information, and enabling the understanding of technical challenges, and paving the path-forward for resolution of the challenges and issues related to materials degradation during the SLR period of operations. As the NRC staff prepare for the review of the future SLR submittals, there is a need for continued engagement with domestic nuclear industry and other industries, DOE and other federal organizations, academia, international partners, and interested public stakeholders, through workshops targeted toward the status and resolutions of major technical issues outlined in the SRM and identified in EMDA.

Deliverable: RES staff should facilitate several workshops/meetings on operating experience from the initial license renewal period, research results on materials degradation issues and aging management of SSCs during a SLR period of operations. These meetings should specifically be targeted toward the resolution of technical issues for effective aging management of SSCs for a SLR period of operations. RES staff should provide an annual technical letter report summarizing the understanding gained through the workshops/meetings. The summary should include the status of domestic and international research activities in addressing materials degradation issues and aging management practices for an SLR period of operations. The report should also discuss (1) areas of progress and issues resolution, (2) areas of insufficient progress that may warrant additional NRC interactions, and (3) any newly identified technical issues that should be considered for an SLR period of operations.

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Please see my earlier comment. We can certainly consider a different UNR for AMP audits or can be rolled into the last task on emergent needs.

Commented [HA7]: Please talk to Rob about status of IFRAM. It should perhaps be explicitly mentioned in this UNR.

Thanks, I will take care of it.

Schedule: The effort should last no more than 36 months from the period of inception of this user need request.

B. Provide RES staff assessments of the current knowledge and disposition of materials degradation issues identified in the EMDA documents

Technical Need: As mentioned earlier, the EMDA volumes identified significant technical issues for nuclear power reactor operations beyond 60 years related to materials degradation. The major materials degradation issues fall under the following four topical areas, as outlined in SRM on SECY 14-0016:

- Reactor pressure vessel neutron embrittlement at high fluence;
- Irradiation assisted stress corrosion cracking of reactor internals and primary system components;
- Concrete and containment degradation; and
- Electrical cable qualification and condition assessment.

The NRC, DOE, and industry are addressing the key technical issues related to materials degradation at NPPs, in order to gain better understanding of the materials aging and degradation mechanisms and their implications of structural and component integrity. DOE/LWRS and the industry have initiated numerous research activities on the four major technical areas. The NRC staff conducts confirmatory research, through several user need requests on specific technical issues, to independently verify licensee data, determine safety margins, and explore uncertainties. Results from NRC's research will be used, in part, to confirm the adequacy of industry's technical basis for SLR and the associated AMPs. The AMPs are cornerstones for managing materials degradation in SSCs during SLR. In addition, the NRC research will support and increase the efficiency of staff review of SLR applications. To fully support the staff review of the SLR applications, RES should develop staff assessments of the current knowledge and disposition of materials degradation issues related to the four major technical areas. The assessments should also include recommendations on the need for:

- any interim staff guidance (ISG) to address aging management issues, and
- new regulatory guidance and/or revision of existing ones to address uncertainties in knowledge and/or potential non-conservativisms.

Deliverable: Deliver a technical letter report that summaries the state-of-knowledge and current knowledge and disposition of materials degradation issues identified in EMDA. The report should also include recommendations on the need for any new or revised guidance to address component integrity of aging structures.

Schedule: The effort should last no more than 36 months from the period of inception of this user need request. The initial draft report should be completed by the end of FY 2018.

C. Develop a long-term strategy for obtaining information from decommissioned NPPs as well as from ex-plant components from operating plants.

Technical Need: The NRC maintains operating experience databases and also has

Commented [HA8]: I think maybe this should be higher in the listing of tasks. Check with Matt for any changes. Maybe the review panel for strategic harvesting should weigh in.

Matt is taking a look at this.

access to industry and international operating experience databases which deal with failures of SSCs experienced during plant operation. Because the first plants have just recently entered the initial renewed license operating period, there is limited operating experience information specifically related to aging management issues. To address this gap, research activities are in place to obtain materials degradation data through laboratory tests. However, obtaining data from materials harvested from decommissioned plants and ex-plant components will be crucial bridging the gap between data obtained from simulated experiments in laboratory and service-life components. This research is expected to provide fundamental insights on reactor materials degradation and information addressing potential technical issues or identified gaps to support anticipated future NRC needs. Thus, the NRC needs to keep abreast of opportunities to recover materials from plants that are being decommissioned or from ex-plant components.

Based on the recent experience of recovering materials from the decommissioned plants, such as Zion and Crystal River, the efforts of planning, coordination and eventual collection of these materials could be resource-intensive and time-challenging. Future efforts to retrieve materials from decommissioned plants could be accelerated by pro-actively developing a strategic database for obtaining unique and significant materials aging degradation information from diverse sources. Such a database will enable the NRC to expeditiously obtain materials and components from plants to be decommissioned in the near future and develop information and knowledge to access the efficacy of the AMPs.

Deliverable: RES should develop a strategic database containing information on:

- unique and significant materials aging degradation diverse sources (operating experience, other nuclear facilities, other long-lived industrial plants, other materials organizations such as ASM and NACE), and
- materials that can be harvested from to-be-decommissioned NPPs and ex-plant components from operating plants to better inform the NRC's AMPs and aging-related regulatory oversight and to better plan research activities.

RES should deliver periodic reports assessing the effectiveness of such programs and recommending any improvements for a subsequent license renewal period.

Schedule: The effort should last no more than 36 months from the period of inception of this user need request.

D. Continue to Develop Domestic and International Partnerships to Share Expertise, Capabilities and Resources Related to Aging Management Research for Long-Term Operations (LTO)

Technical Need: Various domestic and foreign research organizations, government agencies, utilities and research organizations are presently engaged in aging management research, the results of which may be of value to the NRC regarding plant operations during a subsequent license renewal period. Additionally, the Electric Power Research Institute (EPRI) is engaged with various international research organizations to develop data on aging mechanisms/effects. As such, it benefits the agency to be engaged in domestic and international research partnerships in order to

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I will wait to hear from Matt.

Commented [HA10]: This is closely related to the first task. Maybe they should be together or adjacent. Please mention IFRAM and other currently known activities.

Allen wanted this to be a separate task.

evaluate all available operating experience and relevant research, leverage resources and minimize unnecessary duplication of efforts. It would be advantageous to the agency to develop partnerships with these entities such that the various research programs could be better coordinated and focused on high-priority needs.

Deliverable: Continue to develop agreements with domestic and international partners to collaborate on aging management research that results in information to help inform agency decisions regarding a subsequent license renewal and long-term operations. Integrate as appropriate the results of these collaborative research and information exchanges from international partnerships into Tasks A and B. Provide an annual summary of international collaborative research results and status of interactions (e.g., references to meeting minutes, presentations, technical reports, etc.), highlighting international activities and results that may affect a subsequent license renewal.

Schedule: The effort should continue until the closure of this user need request.

G. **Provide technical assistance, as needed, for preparation of review of SLR applications.**

Technical Need: As the NRR staff prepares for the anticipated SLR application in FY18, technical assistance from RES staff on emergent issues may be needed. Such issues may include, but not restricted to, technical support for aging management program audits, public meetings related to communication efforts, and confirmatory reviews of licensee submittals.

Schedule: The effort, as needed, should continue until the closure of this user need request.

Commented [HA11]: I think RES would also be involved in reviewing technical adequacy of plant-specific AMPs submitted as part of application. Such as for XI.M16. The RES SMEs who were involved in developing specific AMPS would be a great contribution to reviewing what will be sent in by the applicant and developing RAIa, etc.

I agree. At this moment, because we do not have any specific need, this task can be used as a catch-all task to provide the needed technical assistance on emergent needs.

Note to requester: Attachment is immediately following.

From: Iyengar, Raj
Sent: Fri, 27 May 2016 12:03:32 -0400
To: Frankl, Istvan;Purtscher, Patrick;Hull, Amy;Hiser, Matthew
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx
Attachments: 2016-NRR-UNR-Draft-May 2016-Enclosure-CLEAN-FINAL.docx

Steve,
I have attached a revised version of the enclosure that includes some of Pat's comments. The assessment of appropriate testing is referenced in Task E.
On the "gap" of small-scale vs. large scale testing is not new. There has been ample work. But, for components experiencing IAD, there may not be a full understanding.
I do not think there was a public comment on this for GALL-SLR. But, I could be wrong.
As you had suggested, we can an internal alignment on Pat's idea and pursue it with NRR.
There are at least couple of options - Task E (emergent need) from this UNR or IAD UNR.
Perhaps, there are more options.

For now, I have added a phrase (highlighted) in the deliverable of Task E.
"Such issues may include, but not restricted to, providing an assessment of effect of specimen size on the prediction of component performance, technical support for aging management program audits, public meetings related to communication efforts, and confirmatory reviews of licensee submittals."
Raj

From: Frankl, Istvan
Sent: Friday, May 27, 2016 11:27 AM
To: Iyengar, Raj; Purtscher, Patrick; Hull, Amy; Hiser, Matthew
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj,

Was this issue raised during the public comment period of the GALL-SLR or SRP-SLR?

If the identification of a gap in EMDA is new, it needs to be communicated to RES/DE management before we send specifics on it in a draft document to DLR. The EMDA is a RES deliverable, so obviously, RES/DE management should be briefed on it before we notify our counterparts in NRR. Perhaps, you or Pat could add wording to the draft that will allow us to be more specific in our response.

Any thoughts?

Steve

From: Iyengar, Raj
Sent: Friday, May 27, 2016 11:11 AM
To: Frankl, Istvan <Istvan.Frankl@nrc.gov>; Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Hull, Amy

<Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Steve,

I just sent another approach. I realized we need to address Pat's idea soon. This will be important for the disposition document. We can also consider his idea in Task B, as part of the recommendations that we will be providing.

I will look over all of Pat's changes and incorporate them (except the one on testing) in Task C.

Raj

From: Frankl, Istvan
Sent: Friday, May 27, 2016 11:05 AM
To: Iyengar, Raj; Purtscher, Patrick; Hull, Amy; Hiser, Matthew
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj,

I agree with your overall assessment. However, I recommend that we (and RES/DE management) should first align with Pat's recommendations and then we discuss our recommendation with DLR either during our review of their final draft (before they submit the draft UNR for NRR management review / approval), or during the drafting of the RES response.

Also, are there other revisions/changes from Pat that should be implemented in our final draft?

Thanks,

Steve

From: Iyengar, Raj
Sent: Friday, May 27, 2016 10:49 AM
To: Frankl, Istvan <Istvan.Frankl@nrc.gov>; Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Pat/Steve,

I looked into the additions proposed by Pat (highlighted in yellow). These are very valuable thoughts and should be pursued under the new UNR for IAD. I believe that is in progress.

This really does not fit the objective of developing a general database for ex-plant materials (metals, concrete and cables).

Further, these points were not vetted with DLR during our staff and management briefings on this UNR. I would prefer not to surprise them by inserting things like this, which are not directly addressing the objective.

If you still insist, I will add these to the final version.

Raj

The EMDA ranking of each aging-related degradation phenomena incorporates multiple factors that may not be adequately resolved by additional coupon testing of ex-plant materials. Part of this user need will be to examine where testing of larger-scale specimens may be appropriate to provide validation of the prediction of component performance from coupon testing.

Deliverable: RES should develop a strategic database for strategic harvesting that covers the four topical areas outlined in SRM on SECY 14-0016, which containsing information on:

• research gaps for SLR that may be best addressed by harvesting due to challenges in simulating actual service conditionsunique and significant materials aging degradation diverse sources (operating experience, other nuclear facilities, other long-lived industrial plants, other materials organizations such as ASM and NACE),
• assessment of appropriate testing program that would reduce the concern associated with the EMDA ranking,

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From: Frankl, Istvan
Sent: Friday, May 27, 2016 10:22 AM
To: Iyengar, Raj; Purtscher, Patrick; Hull, Amy; Hiser, Matthew
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj,

I have not yet sent the final revs to DLR, so please consider incorporating Pat's inputs into the final version (this may require copy and paste into the final rev you sent me late yesterday).

Thanks,

Steve

From: Iyengar, Raj
Sent: Friday, May 27, 2016 10:04 AM

To: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Cc: Frankl, Istvan <Istvan.Frankl@nrc.gov>
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Pat,

Steve has the final version. Your points can be included in the response that we provide.

What do you think?
Raj

From: Purtscher, Patrick
Sent: Friday, May 27, 2016 9:23 AM
To: Iyengar, Raj; Hull, Amy; Hiser, Matthew
Cc: Frankl, Istvan
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

I added some additional comments on the harvesting to be considered.

Pat

From: Iyengar, Raj
Sent: Friday, May 20, 2016 11:15 AM
To: Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Cc: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Frankl, Istvan <Istvan.Frankl@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Amy/Matt,

I have incorporated Matt's revisions to task c. I have also provided responses to your comments. Based on our discussion this AM. I would recommend a different UNR for the AMP audits and the strategic harvesting task (task c here), because of the longer time-frame that may be needed. Besides, these two activities may spill over beyond the receipt of first SLR application (later 2018).

This major purpose of this UNR to bring a closure to the EMDA issues, to the extent possible (and recommend further technical activities for unresolved or new emergent issues), through workshops/meetings (Task A) and through disposition documents prepared by RES staff (Task B), before the first application comes in.

Please feel free to make your final recommendations/suggestions to the comment boxes and send the document to Steve. Also feel free to add/revise language as you see fit. No need to put that on track changes.

(b)(6) [redacted] Not sure if I will be here this PM.

Thank so much for your help and support.

Raj

From: Hiser, Matthew
Sent: Thursday, May 19, 2016 8:33 PM
To: Hull, Amy <Amy.Hull@nrc.gov>; Iyengar, Raj <Raj.Iyengar@nrc.gov>
Cc: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Hi Raj and Amy,

Please find attached (whenever this email gets to you!) my edits of the harvesting section. I am also ccing Pat Purtscher to provide any input on Task C.

Thanks!
Matt

Matthew Hiser
Materials Engineer
US Nuclear Regulatory Commission | Office of Nuclear Regulatory Research
Division of Engineering | Corrosion and Metallurgy Branch
Phone: 301-415-2454 | Office: TWFN 10D62
Matthew.Hiser@nrc.gov

From: Hull, Amy
Sent: Thursday, May 19, 2016 7:45 AM
To: Iyengar, Raj <Raj.Iyengar@nrc.gov>
Subject: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj, my two cents worth.

User Need

Evaluate the Aging Management of Systems, Structures, and Components for Subsequent License Renewal

Background:

Although the NRC staff can accept subsequent license renewal (SLR) applications now, the review would be based on guidance provided in NUREG-1800, Revision 2, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants" and NUREG-1801, Revision 2, "Generic Aging Lessons Learned (GALL) Report – Final Report." Because this guidance applies to plants operating from 40-60 years, additional review would be needed to ensure that the applicant addressed issues anticipated during 60-80 years of plant operation for SLR. Such reviews would be longer and more resource-intensive. To improve the efficiency of SLR application reviews, the NRC staff has undertaken several activities to revise the guidance documents. These activities include reviews of aging management practices, plant audits, technical information exchanges with industry and Department of Energy (DOE), and confirmatory research.

In cooperation with the DOE Light Water Reactor Sustainability (LWRS) Program, the NRC completed NUREG/CR-7153, "Expanded Materials Degradation Assessment (EMDA), Vol. 1-5" (ADAMS Accession Nos. ML14279A321, ML14279A331, ML14279A349, ML14279A430, ML14279A461) to identify the most significant technical issues for nuclear power reactor operation beyond 60 years. The EMDA ranked the significance, current knowledge, and uncertainty associated with aging-related degradation phenomena that could affect systems, structures, and components (SSCs) over 80 years of operation. As outlined in the staff requirements memorandum (SRM) on SECY 14-0016, the major technical issue areas are:

- Reactor pressure vessel neutron embrittlement at high fluence;
- Irradiation-assisted stress corrosion cracking of reactor internals and primary system components;
- Concrete and containment degradation; and
- Electrical cable qualification and condition assessment.

The NRC staff conducted several audits to investigate the effectiveness of aging management programs (AMPs). The findings are documented in the report titled, "Summary of Aging Management Program Effectiveness Audits to Inform Subsequent License Renewal: R.E. Ginna Nuclear Power Plant and Nine Mile Point Nuclear Station, Unit 1" (ML13122A007). The development of SLR guidance was based on NUREG-1800 and NUREG-1801, the understanding gained from the audits, NUREG/CR-7153 (EMDA), an evaluation of domestic and international operating experience of nuclear plants, lessons learned from staff review of previous license renewal applications, and assessment of recent research findings. Draft SLR guidance documents were issued in December 2015, as draft "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report," (NUREG-2191, Volumes 1 and 2) and draft "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants" (SRP-SLR) (NUREG-2192).

Since the draft guidance documents were issued, the staff has held several public meetings with stakeholders and the public to discuss the proposed revisions and bases for the revisions. The most recent meetings were held on January 21 and February 19, 2016. Going forward, the NRC staff will continue to lead outreach activities to stakeholders and the public in order to

provide information on the proposed changes to the guidance documents, solicit feedback on the documents, and revise the documents, as appropriate, to reflect stakeholder and public feedback. The final guidance documents are expected to be issued in mid-2017.

To support the review of an SLR application, an applicant will need to demonstrate how the effects of aging will be managed, including those associated with the technical issues listed above. Although the industry is conducting research to address these major technical issues for SLR, not all the research will be completed before the first application is submitted. For those issues that the industry has not yet developed a generic technical basis to support its resolution, the NRC will request applicants to address the technical issues with plant-specific programs in their SLR applications. The staff will review these plant-specific programs that address the SLR technical issues, but anticipates a longer application review process in these cases.

The requested research described below would provide information to support the staff in effectively evaluating AMPs and developing staff positions on the technical issues identified in EMDA reports. This effort will also augment the staff's preparedness for the evaluation of the feasibility of future applications for an SLR period. These requested products should build upon analysis methods, tools, and expertise developed as part of ongoing research activities and new research activities focused specifically on aging effects during an SLR period.

Description of Scope and Tasks

A. Hold NRC/industry workshop(s) on status of domestic and international research activities and operating experience to address and evaluate the status of materials degradation issues identified in the EMDA reports for SLR.

Technical Need: In February 2008, the NRC and DOE first co-sponsored a "Workshop on U.S. Nuclear Power Plant Life Extension Research and Development" (ADAMS Accession Number ML080570419), which requested stakeholder input into aging management research areas for "Life Beyond 60." Since then, there have been multiple workshops/meetings on the research activities and operating experience that may impact aging management of SSCs for an SLR period. These meetings have been helpful in facilitating technical discussions, disseminating knowledge and information, enabling the understanding of technical challenges, and paving the path forward for resolution of the challenges and issues related to materials degradation during the SLR period. As the NRC staff prepares for the review of SLR applications, there is a need for continued engagement with domestic industry, DOE and other federal organizations, academia, international partners, and interested public stakeholders through workshops focused on the status and resolution of major technical issues outlined in the SRM and identified in EMDA.

Deliverable: RES staff should facilitate several workshops/meetings on operating experience from the initial license renewal period, research results on materials degradation issues, and aging management of SSCs during the SLR period.

These meetings should be specifically targeted toward the resolution of technical issues for effective aging management of SSCs during the SLR period. RES staff should provide an annual technical letter report summarizing the understanding gained through the workshops/meetings. The summary should include the status of domestic and international research activities in addressing materials degradation issues and aging management practices during the SLR period. The report should also discuss (1) areas of progress and issues resolution, (2) areas of insufficient progress that may warrant additional NRC-driven

interactions, and (3) any newly identified technical issues that should be considered.

Schedule: The effort should last no more than 36 months from the period of inception of this user need request.

B. Provide RES staff assessments of the current knowledge and disposition of materials degradation issues identified in the EMDA reports

Technical Need: As mentioned earlier, the EMDA reports identified significant technical issues for nuclear power reactor operations beyond 60 years related to materials degradation. These issues fall under the following four topical areas, as outlined in SRM on SECY 14-0016:

- Reactor pressure vessel neutron embrittlement at high fluence;
- Irradiation-assisted stress corrosion cracking of reactor internals and primary system components;
- Concrete and containment degradation; and
- Electrical cable qualification and condition assessment.

The NRC, DOE, and industry are addressing the key technical issues related to materials degradation at NPPs. In order to gain better understanding of the materials aging and degradation mechanisms and their implications of structural and component integrity, DOE and the industry have initiated numerous research activities on the four major technical areas. The NRC staff conducts confirmatory research, through several user need requests on specific technical issues, to independently verify licensee data, determine safety margins, and explore uncertainties. In addition, the NRC research will support and increase the efficiency of staff review of SLR applications. To fully support the staff review of the SLR applications, RES should develop staff assessments of the current knowledge and disposition of materials degradation issues related to the four major technical areas. The assessments should also include recommendations on the need for:

- any interim staff guidance (ISG) to address aging management issues, and
- new regulatory guidance and/or revision of existing regulatory guides (RGs) to address uncertainties in knowledge and/or potential non-conservativism.

Deliverable: Deliver a technical letter report that summarizes the current knowledge and disposition of materials degradation issues identified in EMDA. The report should also include recommendations on the need for any new or revised guidance to address component integrity of aging structures.

Schedule: The effort should last no more than 36 months from the period of inception of this user need request. The initial draft report should be completed by the end of FY 2018.

C. Develop and implement a long-term strategy for obtaining information on materials degradation from decommissioned NPPs, as well as from ex-plant components from operating plants.

Technical Need: The NRC performs confirmatory research to inform and develop the technical basis for regulatory decisions related to aging management programs for

SLR. Historically, this research has included testing small-scale specimens or coupons on virgin materials under simulated aging conditions, as well as testing and characterization of ex-plant materials harvested from nuclear power plants. Ex-plant materials are valuable because they have been exposed to actual in-service plant operating conditions (temperature, irradiation, coolant, etc.), unlike virgin materials tested under simulated conditions in the lab. Testing ex-plant materials also reduces the uncertainty associated with the applicability of the aging conditions. Therefore, this effort is expected to provide fundamental insights on reactor materials degradation and information addressing potential
technical issues or identified gaps to support anticipated future NRC needs. It will also inform the value of existing databases based on simulated aging conditions by assessing their applicability to in-service conditions.

Based on the recent experience of recovering materials from decommissioned plants, such as Zion, Crystal River and Zorita (Spain), the efforts of planning, coordination and eventual harvesting of these materials could be resource-intensive and time-challenging. Future efforts to retrieve materials from decommissioned plants should be focused on the highest value SSCs by proactively developing a strategic database for obtaining unique and significant materials aging degradation information from ex-plant components. Such a database will enable the NRC to focus its harvesting efforts and expeditiously obtain materials and components from plants to be decommissioned in the near future and develop information and knowledge to assess the efficacy of the AMPs.

Deliverable: RES should develop a database covering the four topical areas outlined in SRM on SECY 14-0016 and containing information on:

- research gaps for SLR that may be best addressed by harvesting due to challenges in simulating actual service conditions, and
- materials that can be harvested from to-be-decommissioned NPPs and ex-plant components from operating plants to better inform the NRC's AMPs and aging-related regulatory oversight and to better plan research activities.

RES should deliver periodic reports assessing the effectiveness of such programs and recommending any improvements for the SLR period.

Schedule: The effort should last no more than 36 months from the period of inception of this user need request.

D. Continue to Develop Domestic and International Partnerships to Share Expertise, Capabilities and Resources Related to Aging Management Research for Long-Term Operations (LTO)

Technical Need: Various domestic and foreign research organizations, government agencies, utilities and research organizations are presently engaged in aging management research, the results of which may be of value to the NRC regarding plant operations during the SLR period. Additionally, the Electric Power Research Institute (EPRI) is engaged with various international research organizations to develop data on aging mechanisms/effects. As such, it benefits the NRC to be engaged in domestic and international research partnerships in order to evaluate all available operating experience and relevant research, leverage resources and minimize unnecessary

duplication of efforts. It would be advantageous to the NRC to develop partnerships with these entities such that the various research programs could be better coordinated and focused on high-priority needs.

Deliverable: Continue to develop agreements with domestic and international partners to collaborate on aging management research that results in information to help inform agency decisions regarding SLR and long-term operations. Integrate as appropriate the results of these collaborative research and information exchanges from international partnerships into Tasks A and B. Provide an annual summary of international collaborative research results and status of interactions (e.g., references to meeting minutes, presentations, technical reports, etc.), highlighting international activities and results that may affect SLR.

Schedule: The effort should continue until the closure of this user need request.

E. **Provide technical assistance, as needed, for preparation of review of SLR applications.**

Technical Need: As the NRR staff prepares for the anticipated SLR application in FY18, technical assistance from RES staff on emergent issues may be needed. Such issues may include, but not restricted to, providing an assessment of effect of specimen size on the prediction of component performance, technical support for aging management program audits, public meetings related to communication efforts, and confirmatory reviews of licensee submittals.

Schedule: This effort, as needed, should continue until the closure of this user need request.

From: Hull, Amy
Sent: Mon, 23 May 2016 16:33:07 -0400
To: Iyengar, Raj;Hiser, Matthew
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Works for me.

From: Iyengar, Raj
Sent: Monday, May 23, 2016 4:19 PM
To: Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Amy/Matt,

Can we meet for 30 minutes tomorrow to finalize this draft for Steve's review? He would like to see a clean version from us.
I can set up a time slot?

Raj

From: Iyengar, Raj
Sent: Friday, May 20, 2016 12:35 PM
To: Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Amy/Matt,

Because this is only a draft for DLR's consideration, there will be ample opportunity to talk to DLR as they finalize the need within NRR. There may be other opinions that DLR staff and NRR management may have that will reshape this UNR.

Based on Steve's e-mail, we can generalize the title. Any suggestions?

When we respond to the incoming UNR, we can specify detailed activities within tasks and schedule/resources.

So, please provide any comments and please let me know if we can converge on a draft version for Steve's review. We had promised to give this to DLR during early May. Thank you.

Raj

From: Iyengar, Raj
Sent: Friday, May 20, 2016 12:05 PM
To: Frankl, Istvan <Istvan.Frankl@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>

Cc: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Steve,

I did not know about this initiative of umbrella UNRs you are referring to. Please feel free to revise/change title, as you see fit.

Amy/Matt, Please send any additional comments/revisions to Steve for his review.

Thanks.

Raj

From: Frankl, Istvan
Sent: Friday, May 20, 2016 11:45 AM
To: Iyengar, Raj <Raj.Iyengar@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Cc: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Thanks, Raj.

Given the challenges we have had with getting UNRs through management review and concurrence, less UNRs may be better. If necessary, the title can be changed to reflect broader scope. By the way, the UNRs we expect to receive from NRO and NMSS will also be "umbrella" type UNRs.

Steve

From: Iyengar, Raj
Sent: Friday, May 20, 2016 11:15 AM
To: Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Cc: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Frankl, Istvan <Istvan.Frankl@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Amy/Matt,

I have incorporated Matt's revisions to task c. I have also provided responses to your comments. Based on our discussion this AM. I would recommend a different UNR for the AMP audits and the strategic harvesting task (task c here), because of the longer time-frame that may be needed. Besides, these two activities may spill over beyond the receipt of first SLR application (later 2018).

This major purpose of this UNR to bring a closure to the EMDA issues, to the extent possible (and recommend further technical activities for unresolved or new emergent issues), through workshops/meetings (Task A) and through disposition documents prepared by RES staff (Task B), before the first application comes in.

Please feel free to make your final recommendations/suggestions to the comment boxes and send the document to Steve. Also feel free to add/revise language as you see fit. No need to put that on track changes.

(b)(6) [redacted] Not sure if I will be here this PM.

Thank so much for your help and support.

Raj

From: Hiser, Matthew
Sent: Thursday, May 19, 2016 8:33 PM
To: Hull, Amy <Amy.Hull@nrc.gov>; Iyengar, Raj <Raj.Iyengar@nrc.gov>
Cc: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Hi Raj and Amy,

Please find attached (whenever this email gets to you!) my edits of the harvesting section. I am also ccing Pat Purtscher to provide any input on Task C.

Thanks!
Matt

Matthew Hiser
Materials Engineer
US Nuclear Regulatory Commission | Office of Nuclear Regulatory Research
Division of Engineering | Corrosion and Metallurgy Branch
Phone: 301-415-2454 | Office: TWFN 10D62
Matthew.Hiser@nrc.gov

From: Hull, Amy
Sent: Thursday, May 19, 2016 7:45 AM
To: Iyengar, Raj <Raj.Iyengar@nrc.gov>
Subject: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj, my two cents worth.

Note to requester: Attachment is immediately following.

From: Hiser, Matthew
Sent: Fri, 20 May 2016 00:33:10 +0000
To: Hull, Amy;Iyengar, Raj
Cc: Purtscher, Patrick
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx
Attachments: 2016-NRR-UNR-Draft-May 2016 abh rev-rmi.docx

Hi Raj and Amy,

Please find attached (whenever this email gets to you!) my edits of the harvesting section. I am also ccing Pat Purtscher to provide any input on Task C.

Thanks!
Matt

Matthew Hiser
Materials Engineer
US Nuclear Regulatory Commission | Office of Nuclear Regulatory Research
Division of Engineering | Corrosion and Metallurgy Branch
Phone: 301-415-2454 | Office: TWFN 10D62
Matthew.Hiser@nrc.gov

From: Hull, Amy
Sent: Thursday, May 19, 2016 7:45 AM
To: Iyengar, Raj <Raj.Iyengar@nrc.gov>
Subject: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj, my two cents worth.

Research Request

Review Parameters Affecting Degradation and ~~Evaluate~~ Aging Management of systems, structures, and components (SSCs) for~~during a~~ Subsequent License Renewal (SLR) ~~Period~~

Background:

Although the NRC staff can accept subsequent license renewal applications now, the review would be based on guidance provided in NUREGs-1800 and -1801. Because the guidance in these NUREGs is based on plant operation from 40-60 years, additional review would be needed to ensure that the applicant addressed issues unique to 60-80 years of plant operation for subsequent license renewal. Such reviews would be longer and more resource-intensive.

In cooperation with the DOE Light Water Reactor Sustainability (LWRS) Program, the NRC completed NUREG/CR-7153, "Expanded Materials Degradation Assessment (EMDA), Vol. 1-5" (ADAMS Accession Nos. ML14279A321, ML14279A331, ML14279A349, ML14279A430, ML14279A461), to identify the most significant technical issues for nuclear power reactor operations beyond 60 years. The EMDA ranked the significance, current knowledge, and uncertainty associated with aging-related degradation phenomena that could affect systems, structures, and components over 80 years of operation. As outlined in the SRM on SECY 14-0016, the major technical issue areas are:

- Reactor pressure vessel neutron embrittlement at high fluence;
- Irradiation assisted stress corrosion cracking of reactor internals and primary system components;
- Concrete and containment degradation; and
- Electrical cable qualification and condition assessment.

For SLR, the staff used NUREG-1800 and NUREG-1801 as the basis for developing the guidance for SLR applicants and NRC staff. The development of the guidance was based on an evaluation of domestic and international operating experience of nuclear plants, lessons learned from staff review of previous license renewal applications, and assessment of recent research findings. The guidance documents were issued in mid-December of 2015, as draft "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report," (NUREG-2191, Volumes 1 and 2) and draft "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants" (SRP-SLR) (NUREG-2192).

Since the draft guidance documents were issued, the staff has held several public meetings with stakeholders and the public to discuss the proposed revisions and bases for the revisions. The most recent meetings were held on January 21 and February 19, 2016. Going forward, the NRC staff will continue to lead outreach activities to stakeholders and the public in order to provide information on the proposed changes to the guidance documents, solicit feedback on the documents, and revise the documents, as appropriate, to reflect stakeholder and public feedback. The final guidance documents are expected to be issued in mid-2017.

To support the review of an SLR application, an applicant will need to demonstrate how the effects of aging will be managed, including those associated with the technical issues listed

Commented [HA1]: Raj, you are off to a great start. I just have some big picture comments for now. I would like to informally talk to Bennett about this for more ideas before providing much more. Is that OK with you? (Bennett and I worked together to write the last UNR) Also feedback is needed now from people such as John Burke who has been really closely involved with SLR work. Can I also talk to John?

Certainly, you can talk to Bennett and John or others. We have had several meetings with DLR staff and management on the five tasks describe here. Allen wanted Task C to be separate from A. Also, we will not close the old UNR (2010-006) at this point. I believe DLR wanted the compendium document done before closing.

That said, the purpose of this UNR is to have a closure on EMDA issues and be ready for SLR application review by early 2019. So, I am not sure if your suggested change in the title implies that we are still not certain about the technical issues related to SLR.

Commented [HA2]: Title needs some work to reflect what will be done. As originally written, it implies that work will be done concurrent with the SLR period, some years from now.

As I mentioned earlier, this UNR was specific to disposition of EMDA issues. I tagged along the harvesting project because this would be an easy vehicle. We can consider a different UNR to include work that needs to be concurrent during the UNR period. This different UNR could include any future AMP audits etc.

Commented [HA3]: Be consistent for references,. Either spell out as you did with EMDA or have a reference list.

Commented [HA4]: Please define all acronyms when first used.

Commented [HA5]: Most of the changes actually came from the Compendium, it is not mentioned herein. The report from the first plants is a public TLR. There was talk about wanting to do more AMP effectiveness audits. That should be a task in the UNR.

Please see my earlier comment on the AMP audits. We can change the references. This section intended to early draft for DLR. They may want to write a different background section.

above. Although the industry is conducting research to address these major technical issues for SLRs, not all the research will be completed before the first application is submitted. For those issues that the industry has not yet developed a generic technical basis to support its resolution, the NRC will request applicants to address the technical issues with plant-specific programs in their SLR applications. The staff will review these plant-specific programs that address the SLR technical issues, but anticipates a longer application review process in these cases.

The requested research described below would provide information to support the staff in effectively evaluating aging management practices and developing staff positions to augment staff's preparedness for the evaluation of the feasibility of future applications for an SLR period. These requested products should build upon analysis methods, tools, and expertise developed as part of ongoing research activities and new research activities focused specifically on aging effects during an SLR period of extended operation (i.e., 60 to 80 years).

Description of Scope and Tasks

A. Hold NRC/industry workshop(s) on status of domestic and international research activities and operating experience to address and evaluate the status of materials degradation issues, identified in the EMDA reports, for a subsequent license renewal

Technical Need: In February 2008, the NRC and DOE first co-sponsored a "Workshop on U.S.
Nuclear Power Plant Life Extension Research and Development" (ADAMS Accession Number ML080570419), which requested stakeholder input into aging management research areas for "Life Beyond 60." Since then, there have been multiple workshops/meetings on the research activities, as well as on operating experience, regarding aging management of SSCs for a SLR period of operations. These meetings have been helpful in facilitating technical discussions, disseminating knowledge and information, and enabling the understanding of technical challenges, and paving the path-forward for resolution of the challenges and issues related to materials degradation during the SLR period of operations. As the NRC staff prepare for the review of the future SLR submittals, there is a need for continued engagement with domestic nuclear industry and other industries, DOE and other federal organizations, academia, international partners, and interested public stakeholders, through workshops targeted toward the status and resolutions of major technical issues outlined in the SRM and identified in EMDA.

Deliverable: RES staff should facilitate several workshops/meetings on operating experience from the initial license renewal period, research results on materials degradation issues and aging management of SSCs during a SLR period of operations. These meetings should specifically be targeted toward the resolution of technical issues for effective aging management of SSCs for a SLR period of operations. RES staff should provide an annual technical letter report summarizing the understanding gained through the workshops/meetings. The summary should include the status of domestic and international research activities in addressing materials degradation issues and aging management practices for an SLR period of operations. The report should also discuss (1) areas of progress and issues resolution, (2) areas of insufficient progress that may warrant additional NRC interactions, and (3) any newly identified technical issues that should be considered for an SLR period of operations.

Commented [HA6]: I think this should not be the first. AMP effectiveness audits are much more important. I want to informally talk with Bennett about this UNR before revising.

Please see my earlier comment. We can certainly consider a different UNR for AMP audits or can be rolled into the last task on emergent needs.

Commented [HA7]: Please talk to Rob about status of IFRAM. It should perhaps be explicitly mentioned in this UNR.

Thanks, I will take care of it.

Schedule: The effort should last no more than 36 months from the period of inception of this user need request.

B. Provide RES staff assessments of the current knowledge and disposition of materials degradation issues identified in the EMDA documents

Technical Need: As mentioned earlier, the EMDA volumes identified significant technical issues for nuclear power reactor operations beyond 60 years related to materials degradation. The major materials degradation issues fall under the following four topical areas, as outlined in SRM on SECY 14-0016:

- Reactor pressure vessel neutron embrittlement at high fluence;
- Irradiation assisted stress corrosion cracking of reactor internals and primary system components;
- Concrete and containment degradation; and
- Electrical cable qualification and condition assessment.

The NRC, DOE, and industry are addressing the key technical issues related to materials degradation at NPPs, in order to gain better understanding of the materials aging and degradation mechanisms and their implications of structural and component integrity. DOE/LWRS and the industry have initiated numerous research activities on the four major technical areas. The NRC staff conducts confirmatory research, through several user need requests on specific technical issues, to independently verify licensee data, determine safety margins, and explore uncertainties. Results from NRC's research will be used, in part, to confirm the adequacy of industry's technical basis for SLR and the associated AMPs. The AMPs are cornerstones for managing materials degradation in SSCs during SLR. In addition, the NRC research will support and increase the efficiency of staff review of SLR applications. To fully support the staff review of the SLR applications, RES should develop staff assessments of the current knowledge and disposition of materials degradation issues related to the four major technical areas. The assessments should also include recommendations on the need for:

- any interim staff guidance (ISG) to address aging management issues, and
- new regulatory guidance and/or revision of existing ones to address uncertainties in knowledge and/or potential non-conservativisms.

Deliverable: Deliver a technical letter report that summaries the state-of-knowledge and current knowledge and disposition of materials degradation issues identified in EMDA. The report should also include recommendations on the need for any new or revised guidance to address component integrity of aging structures.

Schedule: The effort should last no more than 36 months from the period of inception of this user need request. The initial draft report should be completed by the end of FY 2018.

C. Develop a long-term strategy for obtaining information from decommissioned NPPs as well as from ex-plant components from operating plants.

Technical Need: The NRC performs confirmatory research to inform and develop the

Commented [HA8]: I think maybe this should be higher in the listing of tasks. Check with Matt for any changes. Maybe the review panel for strategic harvesting should weigh in.

Matt is taking a look at this.

technical basis for regulatory decisions related to aging management programs for license renewal. Historically, this research has included laboratory testing on fresh materials under simulated aging conditions as well as testing and characterization of ex-plant materials harvested from nuclear power plants. ~~maintains operating experience databases and also has access to industry and international operating experience databases which deal with failures of SSCs experienced during plant operation. Because the first plants have just recently entered the initial renewed license operating period, there is limited operating experience information specifically related to aging management issues.~~ Ex-plant materials are extremely valuable because they have been exposed to actual in-service plant operating conditions (temperature, irradiation, coolant, etc.), unlike fresh materials tested under simulated conditions in the lab. Ex-plant materials reduce the uncertainty associated with the applicability of the aging conditions compared to fresh materials aged under simulated conditions.~~To address this gap, research activities are in place to obtain materials degradation data through laboratory tests. However, obtaining data from materials harvested from decommissioned plants and ex-plant components will be crucial bridging the gap between data obtained from simulated experiments in laboratory and service-life components.~~ Therefore, ~~T~~this research is expected to provide fundamental insights on reactor materials degradation and information addressing potential technical issues or identified gaps to support anticipated future NRC needs. It will also further inform the value of existing databases based on simulated aging conditions by assessing their applicability to in-service conditions. ~~Thus, the NRC needs to keep abreast of opportunities to recover materials from plants that are being decommissioned or from ex-plant components.~~

Based on the recent experience of recovering materials from ~~the~~ decommissioned plants, such as Zion~~, and~~ Crystal River and Zorita (Spain), the efforts of planning, coordination and eventual ~~collection~~ harvesting of these materials is~~could be~~ resource-intensive and time-challenging. Future efforts to retrieve materials from decommissioned plants should be focused on the highest value SSCs~~could be accelerated~~ by pro-actively developing a strategic database for obtaining unique and significant materials aging degradation information from ex-plant components~~diverse sources~~. Such a database will enable the NRC to focus its harvesting efforts and expeditiously obtain materials and components from plants to be decommissioned in the near future and develop information and knowledge to access the efficacy of the AMPs.

Deliverable: RES should develop a ~~strategic~~ database for strategic harvesting containing information on:

- research gaps for SLR that may be best addressed by harvesting due to challenges in simulating actual service conditions~~unique and significant materials aging degradation diverse sources (operating experience, other nuclear facilities, other long-lived industrial plants, other materials organizations such as ASM and NACE)~~, and
- materials that can be harvested from to-be-decommissioned NPPs and ex-plant components from operating plants to better inform the NRC's AMPs and aging-related regulatory oversight and to better plan research activities.

RES should deliver periodic reports assessing the effectiveness of such programs and recommending any improvements for a subsequent license renewal period.

Schedule: The effort should last no more than 36 months from the period of inception of this user need request.

D. Continue to Develop Domestic and International Partnerships to Share Expertise, Capabilities and Resources Related to Aging Management Research for Long-Term Operations (LTO)

Technical Need: Various domestic and foreign research organizations, government agencies, utilities and research organizations are presently engaged in aging management research, the results of which may be of value to the NRC regarding plant operations during a subsequent license renewal period. Additionally, the Electric Power Research Institute (EPRI) is engaged with various international research organizations to develop data on aging mechanisms/effects. As such, it benefits the agency to be engaged in domestic and international research partnerships in order to evaluate all available operating experience and relevant research, leverage resources and minimize unnecessary duplication of efforts. It would be advantageous to the agency to develop partnerships with these entities such that the various research programs could be better coordinated and focused on high-priority needs.

Deliverable: Continue to develop agreements with domestic and international partners to collaborate on aging management research that results in information to help inform agency decisions regarding a subsequent license renewal and long-term operations. Integrate as appropriate the results of these collaborative research and information exchanges from international partnerships into Tasks A and B. Provide an annual summary of international collaborative research results and status of interactions (e.g., references to meeting minutes, presentations, technical reports, etc.), highlighting international activities and results that may affect a subsequent license renewal.

Schedule: The effort should continue until the closure of this user need request.

G. **Provide technical assistance, as needed, for preparation of review of SLR applications.**

Technical Need: As the NRR staff prepares for the anticipated SLR application in FY18, technical assistance from RES staff on emergent issues may be needed. Such issues may include, but not restricted to, technical support for aging management program audits, public meetings related to communication efforts, and confirmatory reviews of licensee submittals.

Schedule: The effort, as needed, should continue until the closure of this user need request.

Commented [HA9]: May need more time, we need to discuss further.

I will wait to hear from Matt.

I have no objection to this timeline. If the purpose is simply to assess high-priority harvesting needs and available materials, 3 years should be sufficient. Of course this does not include implementing any actual harvesting programs.

Commented [HA10]: This is closely related to the first task. Maybe they should be together or adjacent. Please mention IFRAM and other currently known activities.

Allen wanted this to be a separate task.

Commented [HA11]: I think RES would also be involved in reviewing technical adequacy of plant-specific AMPs submitted as part of application. Such as for XI.M16. The RES SMEs who were involved in developing specific AMPS would be a great contribution to reviewing what will be sent in by the applicant and developing RAIa, etc.

I agree. At this moment, because we do not have any specific need, this task can be used as a catch-all task to provide the needed technical assistance on emergent needs.

Note to requester: Attachment is immediately following.

From: Hiser, Matthew
Sent: Fri, 27 May 2016 18:58:28 +0000
To: Iyengar, Raj;Frankl, Istvan;Purtscher, Patrick;Hull, Amy
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx
Attachments: 2016-NRR-UNR-Draft-May 2016-Enclosure-CLEAN-FINAL.DOCX

Hi,

Sorry I'm a little late to this conversation on a Friday before Memorial Day!

I agree with capturing Pat's suggestion on specimen size in Task E. I did have one edit to remove the reference to "small-scale specimens and coupons" in Task C, since the specimen size comment is being incorporated into Task E. See tracked changes in the attached.

My thoughts on this topic in general:

- Looking at K/size effects in irradiated materials is different from what I thought Pat's original proposal was for "testing of larger-scale specimens". To me, looking at K/size effects may involve repeat tests on 0.25T, 0.5T and 1T CT specimens (for example), to see the effects of specimen size and determine K validity as specimens size decreases. When Pat was describing "larger-scale testing" I thought he was envisioning full-size piping mockups or something of that nature, which is far different than varying CT specimen size. Pat, can you clarify what you are envisioning?
- For the K/size effect question, I know EPRI's Primary Systems Corrosion Research (PSCR) is already planning and sponsoring testing on the Zorita materials to look at K/size effects by testing multiple CT specimen sizes. The results from that project may at least partially address Pat's suggestion.
- For this whole discussion on what to include in the UNR regarding specimen size or large vs small-scale testing, I think it would probably be appropriate to get Rob's perspective and insight on what we need to be focusing on from his SL technical perspective.

Hope everyone has a great weekend and see you next week!

Thanks!
Matt

From: Iyengar, Raj
Sent: Friday, May 27, 2016 12:23 PM
To: Frankl, Istvan <Istvan.Frankl@nrc.gov>; Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Steve,

Sorry for confusing you. What I meant by disposition document was the deliverable under Task B. This is the disposition of EMDA issues and offering recommendations on less-resolved issues.

I am OK with the draft. No additional input from me.

Raj

From: Frankl, Istvan
Sent: Friday, May 27, 2016 12:19 PM
To: Iyengar, Raj; Purtscher, Patrick; Hull, Amy; Hiser, Matthew
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Thanks, Raj.

I also like your Task E implementation of Pat's input.

You mentioned in your email below that "This will be important for the disposition document." This is why I asked question on public comments (my understanding is that the disposition document addresses these comments)

I will not send the drafts to DLR until later today. This will allow all contributors to "reflect". If you need more time, I can hold off until Monday.

Thanks,

Steve

From: Iyengar, Raj
Sent: Friday, May 27, 2016 12:18 PM
To: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Frankl, Istvan <Istvan.Frankl@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Thanks, Pat.

We can pursue this further next week.

All, Have a wonderful long week and Happy Memorial Day!

Raj

From: Purtscher, Patrick
Sent: Friday, May 27, 2016 12:12 PM

To: Iyengar, Raj; Frankl, Istvan; Hull, Amy; Hiser, Matthew
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

I think section E is appropriate place to mention the size effects. I think one example could be the K/size criterion issue for IASCC crack growth that is discussed extensively in NUREG/CR-7027.

Pat

From: Iyengar, Raj
Sent: Friday, May 27, 2016 12:04 PM
To: Frankl, Istvan <Istvan.Frankl@nrc.gov>; Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Steve,

I have attached a revised version of the enclosure that includes some of Pat's comments. The assessment of appropriate testing is referenced in Task E.

On the "gap" of small-scale vs. large scale testing is not new. There has been ample work. But, for components experiencing IAD, there may not be a full understanding.

I do not think there was a public comment on this for GALL-SLR. But, I could be wrong.

As you had suggested, we can an internal alignment on Pat's idea and pursue it with NRR. There are at least couple of options - Task E (emergent need) from this UNR or IAD UNR. Perhaps, there are more options.

For now, I have added a phrase (highlighted) in the deliverable of Task E.

"Such issues may include, but not restricted to, providing an assessment of effect of specimen size on the prediction of component performance, technical support for aging management program audits, public meetings related to communication efforts, and confirmatory reviews of licensee submittals."

Raj

From: Frankl, Istvan
Sent: Friday, May 27, 2016 11:27 AM
To: Iyengar, Raj; Purtscher, Patrick; Hull, Amy; Hiser, Matthew
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj,

Was this issue raised during the public comment period of the GALL-SLR or SRP-SLR?

If the identification of a gap in EMDA is new, it needs to be communicated to RES/DE management before we send specifics on it in a draft document to DLR. The EMDA is a RES deliverable, so obviously, RES/DE management should be briefed on it before we notify our counterparts in NRR. Perhaps, you or Pat could add wording to the draft that will allow us to be more specific in our response.

Any thoughts?

Steve

From: Iyengar, Raj
Sent: Friday, May 27, 2016 11:11 AM
To: Frankl, Istvan <Istvan.Frankl@nrc.gov>; Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Steve,

I just sent another approach. I realized we need to address Pat's idea soon. This will be important for the disposition document. We can also consider his idea in Task B, as part of the recommendations that we will be providing.

I will look over all of Pat's changes and incorporate them (except the one on testing) in Task C.

Raj

From: Frankl, Istvan
Sent: Friday, May 27, 2016 11:05 AM
To: Iyengar, Raj; Purtscher, Patrick; Hull, Amy; Hiser, Matthew
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj,

I agree with your overall assessment. However, I recommend that we (and RES/DE management) should first align with Pat's recommendations and then we discuss our recommendation with DLR either during our review of their final draft (before they submit the draft UNR for NRR management review / approval), or during the drafting of the RES response.

Also, are there other revisions/changes from Pat that should be implemented in our final draft?

Thanks,

Steve

From: Iyengar, Raj
Sent: Friday, May 27, 2016 10:49 AM
To: Frankl, Istvan <Istvan.Frankl@nrc.gov>; Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Pat/Steve,

I looked into the additions proposed by Pat (highlighted in yellow). These are very valuable thoughts and should be pursued under the new UNR for IAD. I believe that is in progress.

This really does not fit the objective of developing a general database for ex-plant materials (metals, concrete and cables).

Further, these points were not vetted with DLR during our staff and management briefings on this UNR. I would prefer not to surprise them by inserting things like this, which are not directly addressing the objective.

If you still insist, I will add these to the final version.

Raj

The EMDA ranking of each aging-related degradation phenomena incorporates multiple factors that may not be adequately resolved by additional coupon testing of ex-plant materials. Part of this user need will be to examine where testing of larger-scale specimens may be appropriate to provide validation of the prediction of component performance from coupon testing.

Deliverable: RES should develop a strategic database for strategic harvesting that covers the four topical areas outlined in SRM on SECY 14-0016, which containsing information on:

• research gaps for SLR that may be best addressed by harvesting due to challenges in simulating actual service conditionsunique and significant materials aging degradation diverse sources (operating experience, other nuclear facilities, other long-lived industrial plants, other materials organizations such as ASM and NACE),
• assessment of appropriate testing program that would reduce the concern associated with the EMDA ranking,

From: Frankl, Istvan
Sent: Friday, May 27, 2016 10:22 AM
To: Iyengar, Raj; Purtscher, Patrick; Hull, Amy; Hiser, Matthew
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj,

I have not yet sent the final revs to DLR, so please consider incorporating Pat's inputs into the final version (this may require copy and paste into the final rev you sent me late yesterday).

Thanks,

Steve

From: Iyengar, Raj
Sent: Friday, May 27, 2016 10:04 AM
To: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Cc: Frankl, Istvan <Istvan.Frankl@nrc.gov>
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Pat,

Steve has the final version. Your points can be included in the response that we provide.

What do you think?
Raj

From: Purtscher, Patrick
Sent: Friday, May 27, 2016 9:23 AM
To: Iyengar, Raj; Hull, Amy; Hiser, Matthew
Cc: Frankl, Istvan
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

I added some additional comments on the harvesting to be considered.

Pat

From: Iyengar, Raj
Sent: Friday, May 20, 2016 11:15 AM
To: Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Cc: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Frankl, Istvan <Istvan.Frankl@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Amy/Matt,

I have incorporated Matt's revisions to task c. I have also provided responses to your comments. Based on our discussion this AM. I would recommend a different UNR for the AMP audits and the strategic harvesting task (task c here), because of the longer time-frame that may be needed. Besides, these two activities may spill over beyond the receipt of first SLR application (later 2018).

This major purpose of this UNR to bring a closure to the EMDA issues, to the extent possible (and recommend further technical activities for unresolved or new emergent issues), through workshops/meetings (Task A) and through disposition documents prepared by RES staff (Task B), before the first application comes in.

Please feel free to make your final recommendations/suggestions to the comment boxes and send the document to Steve. Also feel free to add/revise language as you see fit. No need to put that on track changes.

(b)(6) [redacted] Not sure if I will be here this PM.

Thank so much for your help and support.

Raj

From: Hiser, Matthew
Sent: Thursday, May 19, 2016 8:33 PM
To: Hull, Amy <Amy.Hull@nrc.gov>; Iyengar, Raj <Raj.Iyengar@nrc.gov>
Cc: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Hi Raj and Amy,

Please find attached (whenever this email gets to you!) my edits of the harvesting section. I am also ccing Pat Purtscher to provide any input on Task C.

Thanks!
Matt

Matthew Hiser
Materials Engineer
US Nuclear Regulatory Commission | Office of Nuclear Regulatory Research
Division of Engineering | Corrosion and Metallurgy Branch
Phone: 301-415-2454 | Office: TWFN 10D62
Matthew.Hiser@nrc.gov

From: Hull, Amy
Sent: Thursday, May 19, 2016 7:45 AM

To: Iyengar, Raj <Raj.Iyengar@nrc.gov>
Subject: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj, my two cents worth.

User Need

Evaluate the Aging Management of Systems, Structures, and Components for Subsequent License Renewal

Background:

Although the NRC staff can accept subsequent license renewal (SLR) applications now, the review would be based on guidance provided in NUREG-1800, Revision 2, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants" and NUREG-1801, Revision 2, "Generic Aging Lessons Learned (GALL) Report – Final Report." Because this guidance applies to plants operating from 40-60 years, additional review would be needed to ensure that the applicant addressed issues anticipated during 60-80 years of plant operation for SLR. Such reviews would be longer and more resource-intensive. To improve the efficiency of SLR application reviews, the NRC staff has undertaken several activities to revise the guidance documents. These activities include reviews of aging management practices, plant audits, technical information exchanges with industry and Department of Energy (DOE), and confirmatory research.

In cooperation with the DOE Light Water Reactor Sustainability (LWRS) Program, the NRC completed NUREG/CR-7153, "Expanded Materials Degradation Assessment (EMDA), Vol. 1-5" (ADAMS Accession Nos. ML14279A321, ML14279A331, ML14279A349, ML14279A430, ML14279A461) to identify the most significant technical issues for nuclear power reactor operation beyond 60 years. The EMDA ranked the significance, current knowledge, and uncertainty associated with aging-related degradation phenomena that could affect systems, structures, and components (SSCs) over 80 years of operation. As outlined in the staff requirements memorandum (SRM) on SECY 14-0016, the major technical issue areas are:

- Reactor pressure vessel neutron embrittlement at high fluence;
- Irradiation-assisted stress corrosion cracking of reactor internals and primary system components;
- Concrete and containment degradation; and
- Electrical cable qualification and condition assessment.

The NRC staff conducted several audits to investigate the effectiveness of aging management programs (AMPs). The findings are documented in the report titled, "Summary of Aging Management Program Effectiveness Audits to Inform Subsequent License Renewal: R.E. Ginna Nuclear Power Plant and Nine Mile Point Nuclear Station, Unit 1" (ML13122A007). The development of SLR guidance was based on NUREG-1800 and NUREG-1801, the understanding gained from the audits, NUREG/CR-7153 (EMDA), an evaluation of domestic and international operating experience of nuclear plants, lessons learned from staff review of previous license renewal applications, and assessment of recent research findings. Draft SLR guidance documents were issued in December 2015, as draft "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report," (NUREG-2191, Volumes 1 and 2) and draft "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants" (SRP-SLR) (NUREG-2192).

Since the draft guidance documents were issued, the staff has held several public meetings with stakeholders and the public to discuss the proposed revisions and bases for the revisions. The most recent meetings were held on January 21 and February 19, 2016. Going forward, the NRC staff will continue to lead outreach activities to stakeholders and the public in order to

provide information on the proposed changes to the guidance documents, solicit feedback on the documents, and revise the documents, as appropriate, to reflect stakeholder and public feedback. The final guidance documents are expected to be issued in mid-2017.

To support the review of an SLR application, an applicant will need to demonstrate how the effects of aging will be managed, including those associated with the technical issues listed above. Although the industry is conducting research to address these major technical issues for SLR, not all the research will be completed before the first application is submitted. For those issues that the industry has not yet developed a generic technical basis to support its resolution, the NRC will request applicants to address the technical issues with plant-specific programs in their SLR applications. The staff will review these plant-specific programs that address the SLR technical issues, but anticipates a longer application review process in these cases.

The requested research described below would provide information to support the staff in effectively evaluating AMPs and developing staff positions on the technical issues identified in EMDA reports. This effort will also augment the staff's preparedness for the evaluation of the feasibility of future applications for an SLR period. These requested products should build upon analysis methods, tools, and expertise developed as part of ongoing research activities and new research activities focused specifically on aging effects during an SLR period.

Description of Scope and Tasks

A. Hold NRC/industry workshop(s) on status of domestic and international research activities and operating experience to address and evaluate the status of materials degradation issues identified in the EMDA reports for SLR.

Technical Need: In February 2008, the NRC and DOE first co-sponsored a "Workshop on U.S. Nuclear Power Plant Life Extension Research and Development" (ADAMS Accession Number ML080570419), which requested stakeholder input into aging management research areas for "Life Beyond 60." Since then, there have been multiple workshops/meetings on the research activities and operating experience that may impact aging management of SSCs for an SLR period. These meetings have been helpful in facilitating technical discussions, disseminating knowledge and information, enabling the understanding of technical challenges, and paving the path forward for resolution of the challenges and issues related to materials degradation during the SLR period. As the NRC staff prepares for the review of SLR applications, there is a need for continued engagement with domestic industry, DOE and other federal organizations, academia, international partners, and interested public stakeholders through workshops focused on the status and resolution of major technical issues outlined in the SRM and identified in EMDA.

Deliverable: RES staff should facilitate several workshops/meetings on operating experience from the initial license renewal period, research results on materials degradation issues, and aging management of SSCs during the SLR period.

These meetings should be specifically targeted toward the resolution of technical issues for effective aging management of SSCs during the SLR period. RES staff should provide an annual technical letter report summarizing the understanding gained through the workshops/meetings. The summary should include the status of domestic and international research activities in addressing materials degradation issues and aging management practices during the SLR period. The report should also discuss (1) areas of progress and issues resolution, (2) areas of insufficient progress that may warrant additional NRC-driven

interactions, and (3) any newly identified technical issues that should be considered.

Schedule: The effort should last no more than 36 months from the period of inception of this user need request.

B. Provide RES staff assessments of the current knowledge and disposition of materials degradation issues identified in the EMDA reports

Technical Need: As mentioned earlier, the EMDA reports identified significant technical issues for nuclear power reactor operations beyond 60 years related to materials degradation. These issues fall under the following four topical areas, as outlined in SRM on SECY 14-0016:

- Reactor pressure vessel neutron embrittlement at high fluence;
- Irradiation-assisted stress corrosion cracking of reactor internals and primary system components;
- Concrete and containment degradation; and
- Electrical cable qualification and condition assessment.

The NRC, DOE, and industry are addressing the key technical issues related to materials degradation at NPPs. In order to gain better understanding of the materials aging and degradation mechanisms and their implications of structural and component integrity, DOE and the industry have initiated numerous research activities on the four major technical areas. The NRC staff conducts confirmatory research, through several user need requests on specific technical issues, to independently verify licensee data, determine safety margins, and explore uncertainties. In addition, the NRC research will support and increase the efficiency of staff review of SLR applications. To fully support the staff review of the SLR applications, RES should develop staff assessments of the current knowledge and disposition of materials degradation issues related to the four major technical areas. The assessments should also include recommendations on the need for:

- any interim staff guidance (ISG) to address aging management issues, and
- new regulatory guidance and/or revision of existing regulatory guides (RGs) to address uncertainties in knowledge and/or potential non-conservativism.

Deliverable: Deliver a technical letter report that summarizes the current knowledge and disposition of materials degradation issues identified in EMDA. The report should also include recommendations on the need for any new or revised guidance to address component integrity of aging structures.

Schedule: The effort should last no more than 36 months from the period of inception of this user need request. The initial draft report should be completed by the end of FY 2018.

C. Develop and implement a long-term strategy for obtaining information on materials degradation from decommissioned NPPs, as well as from ex-plant components from operating plants.

Technical Need: The NRC performs confirmatory research to inform and develop the technical basis for regulatory decisions related to aging management programs for

SLR. Historically, this research has included testing ~~small-scale specimens or coupons on~~ virgin materials under simulated aging conditions, as well as testing and characterization of ex-plant materials harvested from nuclear power plants. Ex-plant materials are valuable because they have been exposed to actual in-service plant operating conditions (temperature, irradiation, coolant, etc.), unlike virgin materials tested under simulated conditions in the lab. Testing ex-plant materials also reduces the uncertainty associated with the applicability of the aging conditions. Therefore, this effort is expected to provide fundamental insights on reactor materials degradation and information addressing potential
technical issues or identified gaps to support anticipated future NRC needs. It will also inform the value of existing databases based on simulated aging conditions by assessing their applicability to in-service conditions.

Based on the recent experience of recovering materials from decommissioned plants, such as Zion, Crystal River and Zorita (Spain), the efforts of planning, coordination and eventual harvesting of these materials could be resource-intensive and time-challenging. Future efforts to retrieve materials from decommissioned plants should be focused on the highest value SSCs by proactively developing a strategic database for obtaining unique and significant materials aging degradation information from ex-plant components. Such a database will enable the NRC to focus its harvesting efforts and expeditiously obtain materials and components from plants to be decommissioned in the near future and develop information and knowledge to assess the efficacy of the AMPs.

Deliverable: RES should develop a database covering the four topical areas outlined in SRM on SECY 14-0016 and containing information on:

- research gaps for SLR that may be best addressed by harvesting due to challenges in simulating actual service conditions, and
- materials that can be harvested from to-be-decommissioned NPPs and ex-plant components from operating plants to better inform the NRC's AMPs and aging-related regulatory oversight and to better plan research activities.

RES should deliver periodic reports assessing the effectiveness of such programs and recommending any improvements for the SLR period.

Schedule: The effort should last no more than 36 months from the period of inception of this user need request.

D. Continue to Develop Domestic and International Partnerships to Share Expertise, Capabilities and Resources Related to Aging Management Research for Long-Term Operations (LTO)

Technical Need: Various domestic and foreign research organizations, government agencies, utilities and research organizations are presently engaged in aging management research, the results of which may be of value to the NRC regarding plant operations during the SLR period. Additionally, the Electric Power Research Institute (EPRI) is engaged with various international research organizations to develop data on aging mechanisms/effects. As such, it benefits the NRC to be engaged in domestic and international research partnerships in order to evaluate all available operating experience and relevant research, leverage resources and minimize unnecessary

duplication of efforts. It would be advantageous to the NRC to develop partnerships with these entities such that the various research programs could be better coordinated and focused on high-priority needs.

Deliverable: Continue to develop agreements with domestic and international partners to collaborate on aging management research that results in information to help inform agency decisions regarding SLR and long-term operations. Integrate as appropriate the results of these collaborative research and information exchanges from international partnerships into Tasks A and B. Provide an annual summary of international collaborative research results and status of interactions (e.g., references to meeting minutes, presentations, technical reports, etc.), highlighting international activities and results that may affect SLR.

Schedule: The effort should continue until the closure of this user need request.

E. **Provide technical assistance, as needed, for preparation of review of SLR applications.**

Technical Need: As the NRR staff prepares for the anticipated SLR application in FY18, technical assistance from RES staff on emergent issues may be needed. Such issues may include, but not restricted to, providing an assessment of effect of specimen size on the prediction of component performance, technical support for aging management program audits, public meetings related to communication efforts, and confirmatory reviews of licensee submittals.

Schedule: This effort, as needed, should continue until the closure of this user need request.

Note to requester: Attachment is immediately following.

From: Purtscher, Patrick
Sent: Fri, 27 May 2016 09:23:51 -0400
To: Iyengar, Raj;Hull, Amy;Hiser, Matthew
Cc: Frankl, Istvan
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx
Attachments: draft 2016-NRR-UNR-Draft-May 2016 abh rev-rmi.docx

I added some additional comments on the harvesting to be considered.

Pat

From: Iyengar, Raj
Sent: Friday, May 20, 2016 11:15 AM
To: Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Cc: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Frankl, Istvan <Istvan.Frankl@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Amy/Matt,

I have incorporated Matt's revisions to task c. I have also provided responses to your comments. Based on our discussion this AM. I would recommend a different UNR for the AMP audits and the strategic harvesting task (task c here), because of the longer time-frame that may be needed. Besides, these two activities may spill over beyond the receipt of first SLR application (later 2018).

This major purpose of this UNR to bring a closure to the EMDA issues, to the extent possible (and recommend further technical activities for unresolved or new emergent issues), through workshops/meetings (Task A) and through disposition documents prepared by RES staff (Task B), before the first application comes in.

Please feel free to make your final recommendations/suggestions to the comment boxes and send the document to Steve. Also feel free to add/revise language as you see fit. No need to put that on track changes.

(b)(6) [redacted] Not sure if I will be here this PM.

Thank so much for your help and support.

Raj

From: Hiser, Matthew
Sent: Thursday, May 19, 2016 8:33 PM
To: Hull, Amy <Amy.Hull@nrc.gov>; Iyengar, Raj <Raj.Iyengar@nrc.gov>
Cc: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Hi Raj and Amy,

Please find attached (whenever this email gets to you!) my edits of the harvesting section. I am also ccing Pat Purtscher to provide any input on Task C.

Thanks!
Matt

Matthew Hiser
Materials Engineer
US Nuclear Regulatory Commission | Office of Nuclear Regulatory Research
Division of Engineering | Corrosion and Metallurgy Branch
Phone: 301-415-2454 | Office: TWFN 10D62
Matthew.Hiser@nrc.gov

From: Hull, Amy
Sent: Thursday, May 19, 2016 7:45 AM
To: Iyengar, Raj <Raj.Iyengar@nrc.gov>
Subject: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj, my two cents worth.

Research Request

Review Parameters Affecting Degradation and ~~Evaluate~~ Aging Management of systems, structures, and components (SSCs) for~~during a~~ Subsequent License Renewal (SLR) ~~Period~~

Background:

Although the NRC staff can accept subsequent license renewal applications now, the review would be based on guidance provided in NUREGs-1800 and -1801. Because the guidance in these NUREGs is based on plant operation from 40-60 years, additional review would be needed to ensure that the applicant addressed issues unique to 60-80 years of plant operation for subsequent license renewal. Such reviews would be longer and more resource-intensive.

In cooperation with the DOE Light Water Reactor Sustainability (LWRS) Program, the NRC completed NUREG/CR-7153, "Expanded Materials Degradation Assessment (EMDA), Vol. 1-5" (ADAMS Accession Nos. ML14279A321, ML14279A331, ML14279A349, ML14279A430, ML14279A461), to identify the most significant technical issues for nuclear power reactor operations beyond 60 years. The EMDA ranked the significance, current knowledge, and uncertainty associated with aging-related degradation phenomena that could affect systems, structures, and components over 80 years of operation. As outlined in the SRM on SECY 14-0016, the major technical issue areas are:

- Reactor pressure vessel neutron embrittlement at high fluence;
- Irradiation assisted stress corrosion cracking of reactor internals and primary system components;
- Concrete and containment degradation; and
- Electrical cable qualification and condition assessment.

For SLR, the staff used NUREG-1800 and NUREG-1801 as the basis for developing the guidance for SLR applicants and NRC staff. The development of the guidance was based on an evaluation of domestic and international operating experience of nuclear plants, lessons learned from staff review of previous license renewal applications, and assessment of recent research findings. The guidance documents were issued in mid-December of 2015, as draft "Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report," (NUREG-2191, Volumes 1 and 2) and draft "Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants" (SRP-SLR) (NUREG-2192).

Since the draft guidance documents were issued, the staff has held several public meetings with stakeholders and the public to discuss the proposed revisions and bases for the revisions. The most recent meetings were held on January 21 and February 19, 2016. Going forward, the NRC staff will continue to lead outreach activities to stakeholders and the public in order to provide information on the proposed changes to the guidance documents, solicit feedback on the documents, and revise the documents, as appropriate, to reflect stakeholder and public feedback. The final guidance documents are expected to be issued in mid-2017.

To support the review of an SLR application, an applicant will need to demonstrate how the effects of aging will be managed, including those associated with the technical issues listed

Commented [HA1]: Raj, you are off to a great start. I just have some big picture comments for now. I would like to informally talk to Bennett about this for more ideas before providing much more. Is that OK with you? (Bennett and I worked together to write the last UNR) Also feedback is needed now from people such as John Burke who has been really closely involved with SLR work. Can I also talk to John?

Certainly, you can talk to Bennett and John or others. We have had several meetings with DLR staff and management on the five tasks describe here. Allen wanted Task C to be separate from A. Also, we will not close the old UNR (2010-006) at this point. I believe DLR wanted the compendium document done before closing.

That said, the purpose of this UNR is to have a closure on EMDA issues and be ready for SLR application review by early 2019. So, I am not sure if your suggested change in the title implies that we are still not certain about the technical issues related to SLR.

Commented [HA2]: Title needs some work to reflect what will be done. As originally written, it implies that work will be done concurrent with the SLR period, some years from now.

As I mentioned earlier, this UNR was specific to disposition of EMDA issues. I tagged along the harvesting project because this would be an easy vehicle. We can consider a different UNR to include work that needs to be concurrent during the UNR period. This different UNR could include any future AMP audits etc.

Commented [HA3]: Be consistent for references,. Either spell out as you did with EMDA or have a reference list.

Commented [HA4]: Please define all acronyms when first used.

Commented [HA5]: Most of the changes actually came from the Compendium, it is not mentioned herein. The report from the first plants is a public TLR. There was talk about wanting to do more AMP effectiveness audits. That should be a task in the UNR.

Please see my earlier comment on the AMP audits. We can change the references. This section intended to early draft for DLR. They may want to write a different background section.

above. Although the industry is conducting research to address these major technical issues for SLRs, not all the research will be completed before the first application is submitted. For those issues that the industry has not yet developed a generic technical basis to support its resolution, the NRC will request applicants to address the technical issues with plant-specific programs in their SLR applications. The staff will review these plant-specific programs that address the SLR technical issues, but anticipates a longer application review process in these cases.

The requested research described below would provide information to support the staff in effectively evaluating aging management practices and developing staff positions to augment staff's preparedness for the evaluation of the feasibility of future applications for an SLR period. These requested products should build upon analysis methods, tools, and expertise developed as part of ongoing research activities and new research activities focused specifically on aging effects during an SLR period of extended operation (i.e., 60 to 80 years).

Description of Scope and Tasks

A. Hold NRC/industry workshop(s) on status of domestic and international research activities and operating experience to address and evaluate the status of materials degradation issues, identified in the EMDA reports, for a subsequent license renewal

Technical Need: In February 2008, the NRC and DOE first co-sponsored a "Workshop on U.S.
Nuclear Power Plant Life Extension Research and Development" (ADAMS Accession Number ML080570419), which requested stakeholder input into aging management research areas for "Life Beyond 60." Since then, there have been multiple workshops/meetings on the research activities, as well as on operating experience, regarding aging management of SSCs for a SLR period of operations. These meetings have been helpful in facilitating technical discussions, disseminating knowledge and information, and enabling the understanding of technical challenges, and paving the path-forward for resolution of the challenges and issues related to materials degradation during the SLR period of operations. As the NRC staff prepare for the review of the future SLR submittals, there is a need for continued engagement with domestic nuclear industry and other industries, DOE and other federal organizations, academia, international partners, and interested public stakeholders, through workshops targeted toward the status and resolutions of major technical issues outlined in the SRM and identified in EMDA.

Deliverable: RES staff should facilitate several workshops/meetings on operating experience from the initial license renewal period, research results on materials degradation issues and aging management of SSCs during a SLR period of operations. These meetings should specifically be targeted toward the resolution of technical issues for effective aging management of SSCs for a SLR period of operations. RES staff should provide an annual technical letter report summarizing the understanding gained through the workshops/meetings. The summary should include the status of domestic and international research activities in addressing materials degradation issues and aging management practices for an SLR period of operations. The report should also discuss (1) areas of progress and issues resolution, (2) areas of insufficient progress that may warrant additional NRC interactions, and (3) any newly identified technical issues that should be considered for an SLR period of operations.

Commented [HA6]: I think this should not be the first. AMP effectiveness audits are much more important. I want to informally talk with Bennett about this UNR before revising.

Please see my earlier comment. We can certainly consider a different UNR for AMP audits or can be rolled into the last task on emergent needs.

Commented [HA7]: Please talk to Rob about status of IFRAM. It should perhaps be explicitly mentioned in this UNR.

Thanks, I will take care of it.

Schedule: The effort should last no more than 36 months from the period of inception of this user need request.

B. Provide RES staff assessments of the current knowledge and disposition of materials degradation issues identified in the EMDA documents

Technical Need: As mentioned earlier, the EMDA volumes identified significant technical issues for nuclear power reactor operations beyond 60 years related to materials degradation. The major materials degradation issues fall under the following four topical areas, as outlined in SRM on SECY 14-0016:

- Reactor pressure vessel neutron embrittlement at high fluence;
- Irradiation assisted stress corrosion cracking of reactor internals and primary system components;
- Concrete and containment degradation; and
- Electrical cable qualification and condition assessment.

The NRC, DOE, and industry are addressing the key technical issues related to materials degradation at NPPs, in order to gain better understanding of the materials aging and degradation mechanisms and their implications of structural and component integrity. DOE/LWRS and the industry have initiated numerous research activities on the four major technical areas. The NRC staff conducts confirmatory research, through several user need requests on specific technical issues, to independently verify licensee data, determine safety margins, and explore uncertainties. Results from NRC's research will be used, in part, to confirm the adequacy of industry's technical basis for SLR and the associated AMPs. The AMPs are cornerstones for managing materials degradation in SSCs during SLR. In addition, the NRC research will support and increase the efficiency of staff review of SLR applications. To fully support the staff review of the SLR applications, RES should develop staff assessments of the current knowledge and disposition of materials degradation issues related to the four major technical areas. The assessments should also include recommendations on the need for:

- any interim staff guidance (ISG) to address aging management issues, and
- new regulatory guidance and/or revision of existing ones to address uncertainties in knowledge and/or potential non-conservativisms.

Deliverable: Deliver a technical letter report that summaries the state-of-knowledge and current knowledge and disposition of materials degradation issues identified in EMDA. The report should also include recommendations on the need for any new or revised guidance to address component integrity of aging structures.

Schedule: The effort should last no more than 36 months from the period of inception of this user need request. The initial draft report should be completed by the end of FY 2018.

C. Develop a long-term strategy for obtaining information from decommissioned NPPs as well as from ex-plant components from operating plants.

Technical Need: The NRC performs confirmatory research to inform and develop the

Commented [HA8]: I think maybe this should be higher in the listing of tasks. Check with Matt for any changes. Maybe the review panel for strategic harvesting should weigh in.

Matt is taking a look at this.

technical basis for regulatory decisions related to aging management programs for license renewal. Historically, this research has included ~~laboratory~~ testing small-scale specimens or coupons o~~n~~ fresh materials under simulated aging conditions as well as testing and characterization of ex-plant materials harvested from nuclear power plants. ~~maintains operating experience databases and also has access to industry and international operating experience databases which deal with failures of SSCs experienced during plant operation. Because the first plants have just recently entered the initial renewed license operating period, there is limited operating experience information specifically related to aging management issues.~~ Ex-plant materials are extremely valuable because they have been exposed to actual in-service plant operating conditions (temperature, irradiation, coolant, etc.), unlike fresh materials tested under simulated conditions in the lab. Ex-plant materials reduce the uncertainty associated with the applicability of the aging conditions compared to fresh materials aged under simulated conditions.~~To address this gap, research activities are in place to obtain materials degradation data through laboratory tests. However, obtaining data from materials harvested from decommissioned plants and ex-plant components will be crucial bridging the gap between data obtained from simulated experiments in laboratory and service-life components.~~ Therefore, ~~T~~this ~~research~~approach of coupon testing of ex-plant materials is expected to provide fundamental insights on reactor materials degradation and information addressing potential technical issues or identified gaps to support anticipated future NRC needs. It will also further inform the value of existing databases based on simulated aging conditions by assessing ~~-~~their applicability to in-service conditions.

~~Thus, the NRC needs to keep abreast of opportunities to recover materials from plants that are being decommissioned or from ex-plant components.~~

Based on the recent experience of recovering materials from ~~the~~ decommissioned plants, such as Zion~~, and~~ Crystal River and Zorita (Spain), the efforts of planning, coordination and eventual ~~collection~~ harvesting of these materials is~~could be~~ resource-intensive and time-challenging. Future efforts to retrieve materials from decommissioned plants should be focused on the highest value SSCs~~could be accelerated~~ by pro-actively developing a strategic database for obtaining unique and significant materials aging degradation information from ex-plant components~~diverse sources~~. Such a database will enable the NRC to focus its harvesting efforts and expeditiously obtain materials and components from plants to be decommissioned in the near future and develop information and knowledge to access the efficacy of the AMPs.

The EMDA ranking of each aging-related degradation phenomena incorporates multiple factors that may not be adequately resolved by additional coupon testing of ex-plant materials. Part of this user need will be to examine where testing of larger-scale specimens may be appropriate to provide validation of the prediction of component performance from coupon testing.

Deliverable: RES should develop a ~~strategic~~ database for strategic harvesting ~~-~~that covers the four topical areas outlined in SRM on SECY 14-0016, which contains~~ing~~ information on:

- research gaps for SLR that may be best addressed by harvesting due to challenges in simulating actual service conditions~~unique and significant materials aging degradation diverse sources (operating experience, other nuclear facilities, other long-lived industrial plants, other materials organizations such as ASM and NACE)~~,
- assessment of appropriate testing program that would reduce the concern associated with the EMDA ranking, ~~–~~and
- materials that can be harvested from to-be-decommissioned NPPs and ex-plant components from operating plants to better inform the NRC's AMPs and aging-related regulatory oversight and to better plan research activities.

RES should deliver periodic reports assessing the effectiveness of such programs and recommending any improvements for a subsequent license renewal period.

Schedule: The effort should last no more than 36 months from the period of inception of this user need request.

D. Continue to Develop Domestic and International Partnerships to Share Expertise, Capabilities and Resources Related to Aging Management Research for Long-Term Operations (LTO)

Technical Need: Various domestic and foreign research organizations, government agencies, utilities and research organizations are presently engaged in aging management research, the results of which may be of value to the NRC regarding plant operations during a subsequent license renewal period. Additionally, the Electric Power Research Institute (EPRI) is engaged with various international research organizations to develop data on aging mechanisms/effects. As such, it benefits the agency to be engaged in domestic and international research partnerships in order to evaluate all available operating experience and relevant research, leverage resources and minimize unnecessary duplication of efforts. It would be advantageous to the agency to develop partnerships with these entities such that the various research programs could be better coordinated and focused on high-priority needs.

Deliverable: Continue to develop agreements with domestic and international partners to collaborate on aging management research that results in information to help inform agency decisions regarding a subsequent license renewal and long-term operations. Integrate as appropriate the results of these collaborative research and information exchanges from international partnerships into Tasks A and B. Provide an annual summary of international collaborative research results and status of interactions (e.g., references to meeting minutes, presentations, technical reports, etc.), highlighting international activities and results that may affect a subsequent license renewal.

Schedule: The effort should continue until the closure of this user need request.

G. Provide technical assistance, as needed, for preparation of review of SLR applications.

Technical Need: As the NRR staff prepares for the anticipated SLR application in FY18, technical assistance from RES staff on emergent issues may be needed. Such issues

Commented [HA9]: May need more time, we need to discuss further.

I will wait to hear from Matt.

I have no objection to this timeline. If the purpose is simply to assess high-priority harvesting needs and available materials, 3 years should be sufficient. Of course this does not include implementing any actual harvesting programs.

Commented [HA10]: This is closely related to the first task. Maybe they should be together or adjacent. Please mention IFRAM and other currently known activities.

Allen wanted this to be a separate task.

may include, but not restricted to, technical support for aging management program audits, public meetings related to communication efforts, and confirmatory reviews of licensee submittals.

Schedule: The effort, as needed, should continue until the closure of this user need request.

Commented [HA11]: I think RES would also be involved in reviewing technical adequacy of plant-specific AMPs submitted as part of application. Such as for XI.M16. The RES SMEs who were involved in developing specific AMPS would be a great contribution to reviewing what will be sent in by the applicant and developing RAIa, etc.

I agree. At this moment, because we do not have any specific need, this task can be used as a catch-all task to provide the needed technical assistance on emergent needs.

From: Frankl, Istvan
Sent: Sat, 28 May 2016 09:22:57 -0400
To: Hiser, Matthew;Iyengar, Raj;Purtscher, Patrick;Hull, Amy
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Great discussion and inputs on subject draft UNR!

I will hold off sending the draft to DLR until Pat and perhaps Rob can clarify issue on specimen size.

Enjoy your weekend!

Steve

From: Hiser, Matthew
Sent: Friday, May 27, 2016 2:58 PM
To: Iyengar, Raj <Raj.Iyengar@nrc.gov>; Frankl, Istvan <Istvan.Frankl@nrc.gov>; Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Hi,

Sorry I'm a little late to this conversation on a Friday before Memorial Day!

I agree with capturing Pat's suggestion on specimen size in Task E. I did have one edit to remove the reference to "small-scale specimens and coupons" in Task C, since the specimen size comment is being incorporated into Task E. See tracked changes in the attached.

My thoughts on this topic in general:

- Looking at K/size effects in irradiated materials is different from what I thought Pat's original proposal was for "testing of larger-scale specimens". To me, looking at K/size effects may involve repeat tests on 0.25T, 0.5T and 1T CT specimens (for example), to see the effects of specimen size and determine K validity as specimens size decreases. When Pat was describing "larger-scale testing" I thought he was envisioning full-size piping mockups or something of that nature, which is far different than varying CT specimen size. Pat, can you clarify what you are envisioning?
- For the K/size effect question, I know EPRI's Primary Systems Corrosion Research (PSCR) is already planning and sponsoring testing on the Zorita materials to look at K/size effects by testing multiple CT specimen sizes. The results from that project may at least partially address Pat's suggestion.
- For this whole discussion on what to include in the UNR regarding specimen size or large vs small-scale testing, I think it would probably be appropriate to get Rob's perspective and insight on what we need to be focusing on from his SL technical perspective.

Hope everyone has a great weekend and see you next week!

Thanks!
Matt

From: Iyengar, Raj
Sent: Friday, May 27, 2016 12:23 PM
To: Frankl, Istvan <Istvan.Frankl@nrc.gov>; Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Steve,

Sorry for confusing you. What I meant by disposition document was the deliverable under Task B. This is the disposition of EMDA issues and offering recommendations on less-resolved issues.

I am OK with the draft. No additional input from me.

Raj

From: Frankl, Istvan
Sent: Friday, May 27, 2016 12:19 PM
To: Iyengar, Raj; Purtscher, Patrick; Hull, Amy; Hiser, Matthew
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Thanks, Raj.

I also like your Task E implementation of Pat's input.

You mentioned in your email below that "This will be important for the disposition document." This is why I asked question on public comments (my understanding is that the disposition document addresses these comments)

I will not send the drafts to DLR until later today. This will allow all contributors to "reflect". If you need more time, I can hold off until Monday.

Thanks,

Steve

From: Iyengar, Raj
Sent: Friday, May 27, 2016 12:18 PM
To: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Frankl, Istvan <Istvan.Frankl@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Thanks, Pat.

We can pursue this further next week.

All, Have a wonderful long week and Happy Memorial Day!

Raj

From: Purtscher, Patrick
Sent: Friday, May 27, 2016 12:12 PM
To: Iyengar, Raj; Frankl, Istvan; Hull, Amy; Hiser, Matthew
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

I think section E is appropriate place to mention the size effects. I think one example could be the K/size criterion issue for IASCC crack growth that is discussed extensively in NUREG/CR-7027.

Pat

From: Iyengar, Raj
Sent: Friday, May 27, 2016 12:04 PM
To: Frankl, Istvan <Istvan.Frankl@nrc.gov>; Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Steve,

I have attached a revised version of the enclosure that includes some of Pat's comments. The assessment of appropriate testing is referenced in Task E.

On the "gap" of small-scale vs. large scale testing is not new. There has been ample work. But, for components experiencing IAD, there may not be a full understanding.

I do not think there was a public comment on this for GALL-SLR. But, I could be wrong.

As you had suggested, we can an internal alignment on Pat's idea and pursue it with NRR. There are at least couple of options - Task E (emergent need) from this UNR or IAD UNR. Perhaps, there are more options.

For now, I have added a phrase (highlighted) in the deliverable of Task E.

"Such issues may include, but not restricted to, providing an assessment of effect of specimen size on the prediction of component performance, technical support for aging management program audits, public meetings related to communication efforts, and confirmatory reviews of licensee submittals."

Raj

From: Frankl, Istvan
Sent: Friday, May 27, 2016 11:27 AM
To: Iyengar, Raj; Purtscher, Patrick; Hull, Amy; Hiser, Matthew
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj,

Was this issue raised during the public comment period of the GALL-SLR or SRP-SLR?

If the identification of a gap in EMDA is new, it needs to be communicated to RES/DE management before we send specifics on it in a draft document to DLR. The EMDA is a RES deliverable, so obviously, RES/DE management should be briefed on it before we notify our counterparts in NRR. Perhaps, you or Pat could add wording to the draft that will allow us to be more specific in our response.

Any thoughts?

Steve

From: Iyengar, Raj
Sent: Friday, May 27, 2016 11:11 AM
To: Frankl, Istvan <Istvan.Frankl@nrc.gov>; Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Steve,

I just sent another approach. I realized we need to address Pat's idea soon. This will be important for the disposition document. We can also consider his idea in Task B, as part of the recommendations that we will be providing.

I will look over all of Pat's changes and incorporate them (except the one on testing) in Task C.

Raj

From: Frankl, Istvan
Sent: Friday, May 27, 2016 11:05 AM
To: Iyengar, Raj; Purtscher, Patrick; Hull, Amy; Hiser, Matthew
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj,

I agree with your overall assessment. However, I recommend that we (and RES/DE management) should first align with Pat's recommendations and then we discuss our recommendation with DLR either during our review of their final draft (before they submit the draft UNR for NRR management review / approval), or during the drafting of the RES response.

Also, are there other revisions/changes from Pat that should be implemented in our final draft?

Thanks,

Steve

From: Iyengar, Raj
Sent: Friday, May 27, 2016 10:49 AM
To: Frankl, Istvan <Istvan.Frankl@nrc.gov>; Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Pat/Steve,

I looked into the additions proposed by Pat (highlighted in yellow). These are very valuable thoughts and should be pursued under the new UNR for IAD. I believe that is in progress.

This really does not fit the objective of developing a general database for ex-plant materials (metals, concrete and cables).

Further, these points were not vetted with DLR during our staff and management briefings on this UNR. I would prefer not to surprise them by inserting things like this, which are not directly addressing the objective.

If you still insist, I will add these to the final version.

Raj

The EMDA ranking of each aging-related degradation phenomena incorporates multiple factors that may not be adequately resolved by additional coupon testing of ex-plant materials. Part of this user need will be to examine where testing of larger-scale specimens may be appropriate to provide validation of the prediction of component performance from coupon testing.

Deliverable: RES should develop a strategic database for strategic harvesting that covers the four topical areas outlined in SRM on SECY 14-0016, which containsing information on:

• research gaps for SLR that may be best addressed by harvesting due to challenges in simulating actual service conditionsunique and significant materials aging degradation diverse sources (operating experience, other nuclear facilities, other long-lived industrial plants, other materials organizations such as ASM and NACE),
• assessment of appropriate testing program that would reduce the concern associated with the EMDA ranking,

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From: Frankl, Istvan
Sent: Friday, May 27, 2016 10:22 AM
To: Iyengar, Raj; Purtscher, Patrick; Hull, Amy; Hiser, Matthew
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj,

I have not yet sent the final revs to DLR, so please consider incorporating Pat's inputs into the final version (this may require copy and paste into the final rev you sent me late yesterday).

Thanks,

Steve

From: Iyengar, Raj
Sent: Friday, May 27, 2016 10:04 AM
To: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Cc: Frankl, Istvan <Istvan.Frankl@nrc.gov>
Subject: Re: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Pat,

Steve has the final version. Your points can be included in the response that we provide.

What do you think?
Raj

From: Purtscher, Patrick
Sent: Friday, May 27, 2016 9:23 AM
To: Iyengar, Raj; Hull, Amy; Hiser, Matthew
Cc: Frankl, Istvan
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

I added some additional comments on the harvesting to be considered.

Pat

From: Iyengar, Raj
Sent: Friday, May 20, 2016 11:15 AM
To: Hull, Amy <Amy.Hull@nrc.gov>; Hiser, Matthew <Matthew.Hiser@nrc.gov>
Cc: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>; Frankl, Istvan <Istvan.Frankl@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Amy/Matt,

I have incorporated Matt's revisions to task c. I have also provided responses to your comments. Based on our discussion this AM. I would recommend a different UNR for the AMP audits and the strategic harvesting task (task c here), because of the longer time-frame that may be needed. Besides, these two activities may spill over beyond the receipt of first SLR application (later 2018).

This major purpose of this UNR to bring a closure to the EMDA issues, to the extent possible (and recommend further technical activities for unresolved or new emergent issues), through workshops/meetings (Task A) and through disposition documents prepared by RES staff (Task B), before the first application comes in.

Please feel free to make your final recommendations/suggestions to the comment boxes and send the document to Steve. Also feel free to add/revise language as you see fit. No need to put that on track changes.

(b)(6) [redacted] Not sure if I will be here this PM.

Thank so much for your help and support.

Raj

From: Hiser, Matthew
Sent: Thursday, May 19, 2016 8:33 PM
To: Hull, Amy <Amy.Hull@nrc.gov>; Iyengar, Raj <Raj.Iyengar@nrc.gov>
Cc: Purtscher, Patrick <Patrick.Purtscher@nrc.gov>
Subject: RE: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Hi Raj and Amy,

Please find attached (whenever this email gets to you!) my edits of the harvesting section. I am also ccing Pat Purtscher to provide any input on Task C.

Thanks!
Matt

Matthew Hiser
Materials Engineer
US Nuclear Regulatory Commission | Office of Nuclear Regulatory Research
Division of Engineering | Corrosion and Metallurgy Branch
Phone: 301-415-2454 | Office: TWFN 10D62
Matthew.Hiser@nrc.gov

From: Hull, Amy
Sent: Thursday, May 19, 2016 7:45 AM
To: Iyengar, Raj <Raj.Iyengar@nrc.gov>
Subject: 2016-NRR-UNR-Draft-May 2016 abh rev.docx

Raj, my two cents worth.