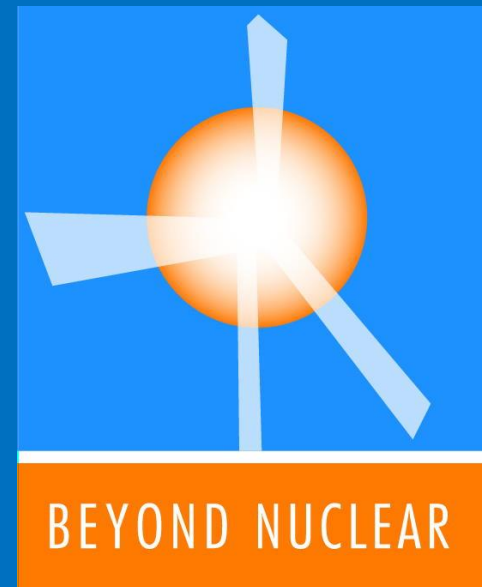


# **Decommissioning's Critical Link to Reactor Safety & Operating License Extensions**

**March 30, 2021  
EESI Virtual Congressional Briefing**

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**“You can’t manage what you don’t measure”**



Red Rusty Boric Acid Deposits on Vessel Flange (12RFO)



**Stress Corrosion Cracking is one known age-related degradation mechanism with safety-critical “knowledge gaps” about how it attacks reactor systems, structures and components**



# **“Age Management” is more safety-critical as operating license extensions are more extreme**



- **94 units remain in US operating fleet;**
- **85 units NRC approved or operating in the “initial” 40- to 60-year extension period;**
- **4 units NRC approved for “subsequent” 60- to 80-years extension period with more applications under review or declared;**
- **NRC has convened public meetings on the 80- to 100-year extension period and increase the relicensing interval from 20- to 40-years;**
- **Reactors are closing (11 units since 2013) & decommissioning is accelerating**

# **NRC: Decommissioning is the “opportunity” to support license extension safety reviews**



- **Develop a long range strategy for the timely acquisition of age degradation information for metals, weld materials, internals, concrete and electrical cable**
- **... “but has been very difficult or impossible to obtain from the operating fleet.”**
- **There is a need to harvest and analyze “experiential real-world” materials from decommissioning nuclear power plants**

**“In many cases, the scientific basis for understanding and predicting long-term environmental degradation behavior of materials in NPP is incomplete.”**

**[NRC-HQ-60-15-T-0023, NRC contract w/ PNNL, 09-04-2015, FOIA 2018-000831]**

# NRC/PNNL contract for a “Strategic Approach for Obtaining Material and Component Aging Information”



- PNNL shall identify and document “information and technical gaps”;
- In “identifying gaps”, PNNL shall include industry practices endorsed by NRC with respect to addressing degradation & the assurance of retention of design margins during license extension period;
- PNNL shall recommend experimentation and analytical model development;
- “deliverables shall be in the form of technical letter reports” (TLR)

[NRC-HQ-60-15-T-0023, NRC contract w/ PNNL, September 4, 2015, FOIA 2018-000813]





# **NRC / DOE LABORATORY INTERAGENCY AGREEMENT**

**“The biggest challenges for the NRC and the industry will be addressing the major technical issues for this second “subsequent” license renewal (SLR) beyond sixty years.”**

- Reactor pressure vessel (RPV) neutron embrittlement;**
- Irradiation assisted degradation (IAD) of reactor internals and primary components;**
- Concrete and containment degradation;**
- Electrical cable qualification and condition assessment**



## Criteria and Planning Guidance for Ex-Plant Harvesting to Support Subsequent License Renewal

December 2017

P Ramuhalli  
R Devanathan  
RM Meyer

SW Glass  
K Knobbs



Prepared for the U.S. Nuclear Regulatory Commission  
under a Related Services Agreement with the U.S. Department of Energy  
CONTRACT DE-AC05-75RL01830

U.S. DEPARTMENT OF  
**ENERGY**

## Technical Letter Report excerpts (PNNL-27120), posted Dec. 2017

Technical knowledge “gaps” cited 60 times

“Further, a number of technical gaps have been identified in the understanding of degradation growth in specific materials.”

“Harvested materials can be used to address critical knowledge gaps in two areas; 1) calibration and validation of current accelerated testing procedures; and 2) assessment of combined effects of thermal aging, coolant effects and neutron irradiation.”

“Harvested materials can be used to address technical gaps related to crack initiation susceptibility and crack growth rates.”



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## Excerpted PNNL Recommendations

**“Many of remaining questions regarding degradation of materials will likely require a combination of laboratory studies as well as other research conducted on materials sampled from plants (decommissioning and operating).” [Summary]**

**“Where available, benchmarking can be performed using surveillance specimens. In most cases, however, benchmarking of laboratory tests will require harvesting materials from reactors.” [2.0 Nuclear Plant Materials Harvesting]**





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**“Big picture, I think that the entire report needs to be scrubbed for text that points to gaps and if issued we will need a stronger basis for why we will grant renewed licenses before the harvesting and testing is completed.”**

**Anonymous, “General Comments,” technical staff NRC Nuclear Reactor Regulation/ License Renewal Division on PNNL-27120, March 20, 2018, (NRC FOIA 2018-000831)**

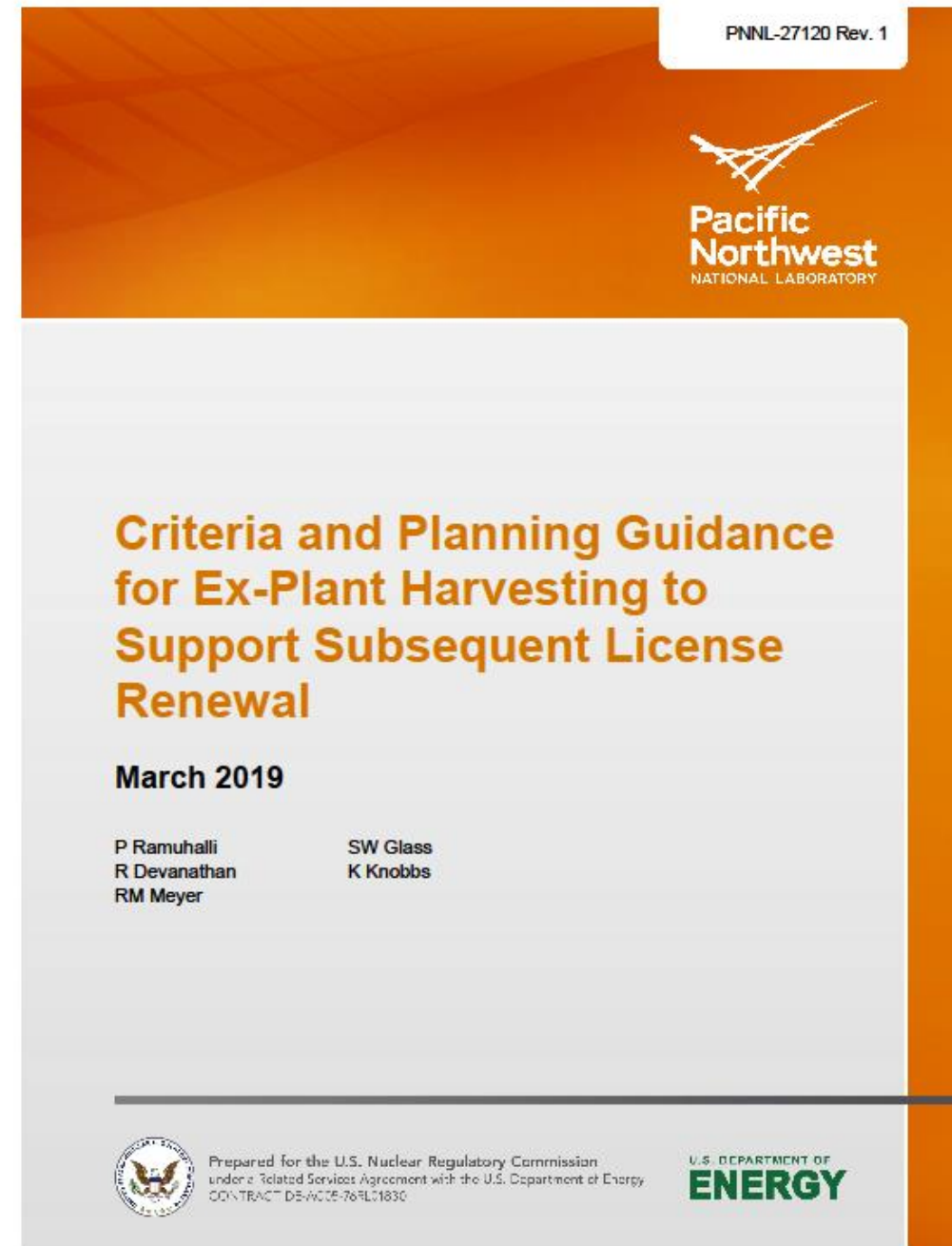
**The Technical Letter Report (TLR) was publicly released December 2017 on three government websites:**

- **PNNL**
- **DOE Office of Scientific and Technical Information (OSTI)**
- **IAEA International Nuclear Information System (INIS)**

**September 2018 NRC pulls the TLR;**

**April 2019 NRC publishes scrubbed revision (PNNL-27120 Rev. 1);**

**NRC provides no commentary on deleting recommendations to “require” harvesting/analysis and how or if the deleted “knowledge gaps” were scientifically addressed.**



**As Subsequent License Renewals are proceeding, there is a need for regulatory transparency and industry accountability to harvest aged samples for the qualifying science necessary to the license extension review process**



## **Suggested Action**

**Government Accountability  
Office (GAO)**

**Congressional Hearings**





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