

**From:** [Brady, Bennett](#)  
**To:** [Purtscher, Pat](#)  
**Cc:** [Oesterle, Eric](#)  
**Subject:** MDLR comments on PNNL's Guidelines for Harvesting Materials for SLR  
**Date:** Tuesday, March 20, 2018 5:19:23 PM  
**Attachments:** [DMLR Specific Comments on PNNL-27120.docx](#)  
[DMLR General Comments on PNNL -27120.docx](#)

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Pat

Following your request, I asked eight of our technical review staff to review and provide comments on PNNL's technical letter report on harvesting materials. Attached are general comments on the report and specific comments that I have compiled in redline/strikeout version of the report itself. Some of the comments are repetitious of comments made by other reviews. I have tried to group similar comments together. When you have had a chance to review them, please see me if you have any questions. I will try to answer your questions or get you to the right reviewer.

In spite of the rather negative comments on this report, we continue to believe that the Materials Harvesting Project will be in valuable in the future as the NRC deals with aging plants and needs an organized approach for selecting materials for harvesting with the increased availability of sources.

Bennett

*Bennett M. Brady*

Senior Project Manager

Division of License Renewal

Office of Nuclear Reactor Regulation

O 11 – D8

301-415-2981

Note to requester: Both attachments to this email are following this email message. Following the attachments are records from the technical reviewers as mentioned in this email message. The FOIA Office received some of these as stand-alone records, with no forwarding emails. We are providing them to you as we received them. The 3/20/2018 email, its attachments, and the additional records address the fifth bullet in your 5/19/2020 letter.

PNNL-27120

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

P Ramuhalli	SW Glass
R Devanathan	K Knobbs
RM Meyer	

December 2017

Prepared for  
the U.S. Nuclear Regulatory Commission  
under a Related Services Agreement  
~~with~~With the U.S. Department of Energy  
Contract DE-AC05-76RL01830

Pacific Northwest National Laboratory  
Richland, Washington 99352

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## **GENERAL COMMENTS ON PNNL-27120**

- In a meeting with the Director of DMLR, George Wilson, he recommended that the information or criteria for harvesting to be captured on the sample to be harvested include an estimate of the cost of the material, including the cost of shipping it from the source to the research facility and the cost of storing the sample for later use.
- He also suggested that priority be given in the following order to:
  - Domestic sources
  - International sources where the research would be done in collaboration with other research organizations (such as the Haldon Reactor projects) with the results and cost to be shared
  - Other international sources

- This report is very misleading about the need for and impact of data from harvesting efforts. In particular, this report cites the following:

[REDACTED] (b)(5)

This statement is flat wrong. The issuance of the GALL-SLR and the SRP-SLR reports provides (b)(5) without any additional information from harvesting. And, SLR could proceed without any information from harvesting in the future.

- The roles/benefits of data from harvested materials are:
  - Confirmation of the current GALL-SLR approaches for aging management.
  - The potential to reduce margins if the data from harvested materials indicate such a possibility.
- The form, function, and characteristics of the "information tools" in section 5 should be reconsidered by NRC staff, both RES and NRR. The description provided is very ambitious and may not have clear benefits to either harvesting activities or plant regulation.
- From the UNR, NRR was expecting the project to provide a database of potential components with specific materials and potential sources of components and guidance on determining the selection of materials to be harvested. Section 5 appears to go beyond that which may be difficult in times of reduced budgets and staff.
- The report (or follow-on work) could provide a substantial benefit by identifying harvesting efforts over the last 30 plus years, not just those since 2010. Such a review will greatly aid in the technical "lessons learned" from past harvesting

efforts and help to identify those areas with true holes in harvested data in a comprehensive manner.

- The word “gap” is overused in the report – 63 times.
- Consider a different word choice instead of “technical gap” which has a pejorative connotation of no knowledge or no basis for regulatory decisions.
- Many statements of “fact” are presented without attribution – these should have references to support them. As an example, there should be a reference cited in Section 3.4.4, item 6, which states

(b)(5)

(b)(5)

(b)(5)

(b)(5)

Similarly in the second paragraph of section 3.4.1, the statement

(b)(5) should be supported by a reference.

- The phrase “real-world” should be replaced with more accurate terminology – for example, “in-service conditions,” “service aging,” or “operating reactor service time,” depending on the context. Otherwise it implies that current guidance is not based on relevant data/knowledge.
- Page 3, 2<sup>nd</sup> full paragraph – Text states that (b)(5)  
(b)(5) This is incorrect as the GALL/GALL-SLR reports are predominantly based on lessons learned from plant operating experience and review of license renewal applications. Note that the first GALL report (Rev. 0) was issued in 2000 and PMDA was not issued until 2007. It would be correct to state that (b)(5)  
(b)(5) This context should be added to other places in the report as well.
- The NRR technical staff did a review of the five volumes of EMDA and noted any new issues or component types of materials that were not in GALL 2. These items were all viewed by the expert panels and dispositioned as to whether they should be included in GALL-SLR. They did not review the PMDA as the EMDA authors had reviewed the PMDA tables and updated them in the EMDA.
- Harvesting components is GREAT and getting more data/information is a nice to have. But there are places in the report that seem to indicate/imply that without this information from harvesting that going into SLR is a concern. I am not sure this is the correct messaging, considering the NRC just issued the GALL-SLR and SRP-SLR.
- Throughout the report, the tone seems to be that harvesting activities NEED to be performed otherwise failure of components will lead to unsafe operation of plants. I disagree with this notion – the whole premise of aging management is to inspect/manage so that issues are detected before they happen or early



enough before there is a loss of intended function of a component. The inspection/aging management is normally commensurate with how much we know about the material and degradation. For example - If we know less – there should be more inspections. If we know more –inspections may not need to be as frequent.

- The report is full of statements that could lead a reader to believe that we have an inadequate basis for the GALL-SLR Report and by extension, we should not be issuing renewed licenses for plants in the [redacted] time frame. I am confident that this is not the authors' intent. The report either needs to be significantly toned down in regard to knowledge gaps or we need to include the basis for why we are moving forward with SLR in light of knowledge gaps. (b)(5)

- I get what the authors are trying to state. However, if I was an intervener, I would use this document to shutdown SLRAs. I did not see any "robust" text in the report that tempered the words or put them into a context that we are confident in the means of managing aging effects for the four classes of SSCs of concern (e.g., concrete, cables). For example, this statement: [redacted] (b)(5)

(b)(5)

(b)(5)

If this is our basis for why the GALL-SLR Report is adequate, it's pretty weak compared to the below underlined sentences. Further, the same paragraph goes on to state, [redacted] (b)(5)

(b)(5)

(b)(5)

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

- In the Abstract, the author states:

[redacted] (b)(5)

How did we issue the GALL-SLR Report with technical gaps and how are we going to be able to issue a renewed license if there are technical gaps to reaching a reasonable assurance conclusion?

- On page 2, the second full paragraph, the author states

(b)(5)

For the first underlined sentence, does this mean that we won't have (b)(5) (b)(5) In that case, how can we issue a renewed license for (b)(5) years before the testing is completed? Will we generate license conditions to restrict how far into the SPEO a licensee can operate before the testing is complete? This statement is too broad. For the second underlined sentence, should I infer that the (b)(5) (b)(5)

- The next paragraph says

(b)(5)

Similar comment to the above, are these knowledge gaps addressed in the applicable GALL-SLR AMPs, with compensatory measures in place?

- The first paragraph in section 3.3 page 5 states:

(b)(5)

This provides another good example of the report stating that we lack sufficient information to understand failure mechanisms.

- The GALL report is the NRC staff's generic evaluation of the acceptable aging management for the period of extended operation based on the technical basis developed in the EMDA and PMDA.

I do not believe that the EMDA and PMDA present the complete technical basis for the GALL-SLR report. We issued an entire NUREG 2221 which provides the complete technical bases for the technical bases for all the changes that were made in the GALL 2 and SRP Revision 2. Before beginning the revision of the GALL and SRP, the NRR staff reviewed the EMDA reports to see if there were any new issues that needed to be addressed for SLR. The staff did not review the PMDA as the EMDA was an update and expansion of the PMDA and the PMDA only addressed operation to 60 years.

(b)(5) • Table 1, 8<sup>th</sup> row, GALL-SLR, [REDACTED]

(b)(5) • Table 2, 8<sup>th</sup> row, GALL-SLR, [REDACTED]

(b)(5) [REDACTED]

- What data would be sought from the harvested material and how would it be used to inform aging management? An example could be cast austenitic stainless steel (CASS) from RV internals. The data sought are fracture toughness of CASS material subject to both irradiation and thermal aging at the same time. The use of this data could be to perform flaw evaluations if cracks are ever found in CASS components, or flaw tolerance evaluations to determine the appropriate interval for inspections, or to avoid inspection altogether.
- Are there any mitigating factors for the degradation mechanism? For example, for CASS in RV internals, maybe fracture toughness is not so important since CASS is known to be very resistant to stress corrosion cracking initiation. Without an active cracking mechanism, fracture toughness data are less important. So this would tend to lower the priority of harvesting CASS from RV internals.
- The report doesn't always do an adequate job of distinguishing between age-related degradation mechanisms, failure mechanisms, and intended functions. In addition, after reading some of the statements in the PNNL report, I come away with the impression the report sets the tone that, if the RES/PNNL recommended harvesting and supplemental testing activities are performed, the results of those activities would be (by themselves) sufficient to ensure reasonable assurance of component structural integrity intended functions. Instead, the results of such studies only provide additional insights into how a given age-related degradations mechanisms is occurring and progressing, and possibly how a component would fail. The harvesting activities and supplement studies (by themselves) would not constitute a sufficient basis for drawing conclusions on reasonable assurance of



component structural integrity or component intended function(s). That would need to be done by each licensee as part of its design and licensing basis.

- One thing to note is that the report refers back to the Office of Research's (RES) PMDA and EMDA studies for SLR, in which RES made recommendations on some of the areas NRR/DLR (before we turned into DMLR) would need to focus on when going through its GALL-SLR (NUREG-2191) and SRP-SLR (NUREG-2192) update efforts. When we started our efforts in late 2014 to perform the updated guidance reviews, we were instructed by our management team to review the EMDA recommended actions to see if we agreed with the actions RES was recommending. From a historical perspective, it is important to point that the staff did not always agree with the RES's PMDA / EMDA recommended actions for updating the GALL-SLR and SRP-SLR reports. For your knowledge, the Technical Basis Report for the SLR updates provides the technical bases for the changes we incorporated into NUREG-2191 and NUREG-2192, NUREG-2221 and NUREG-2222 from the prior versions of the reports (NUREG-1801, Revision 2 and NUREG-1800, Revision 2).

Note to requester: The yellow highlighted portions was in the version of this document provided to the FOIA team.

## Harvesting Report Comments (A. Hiser)

### General

1. This report is very misleading about the need for and impact of data from harvesting efforts. In particular, this report cites the following: [REDACTED] (b)(5)  
[REDACTED] (b)(5)  
[REDACTED] (b)(5) – this statement is flat wrong. The issuance of the GALL-SLR and the SRP-SLR reports provides [REDACTED] (b)(5) without any additional information from harvesting. And, SLR could proceed without any information from harvesting in the future.
  - a. The roles/benefits of data from harvested materials are:
    - i. Confirmation of the current GALL-SLR approaches for aging management.
    - ii. The potential to reduce margins if the data from harvested materials indicate such a possibility.
2. The form, function and characteristics of the “information tools” in section 5 should be reconsidered by NRC staff, both RES and NRR. The description provided is very ambitious and may not have clear benefits to either harvesting activities or plant regulation.
3. The report (or follow-on work) could provide a substantial benefit by identifying harvesting efforts over the last 30+ years, not just those since 2010. Such a review will greatly aid in the technical “lessons learned” from past harvesting efforts and help to identify those areas with true holes in harvested data in a comprehensive manner.
4. The word “gap” is overused in the report – see comment 1 above.
5. Many statements of “fact” are presented without attribution – these should have references to support them. As an example, there should be a reference cited in bullet 6 of Section 3.4.4, which states [REDACTED] (b)(5)  
[REDACTED] (b)(5) Similarly in the second paragraph of section 3.4.1, the statement [REDACTED] (b)(5)  
[REDACTED] (b)(5) should be supported by a reference.
6. The phrase “real-world” should be replaced with more accurate terminology – for example, “in-service conditions,” “service aging,” or “operating reactor service time,” depending on the context. Otherwise it implies that current guidance is not based on relevant data/knowledge.
7. Consider a different word choice instead of “technical gap”, which has a pejorative connotation of no knowledge or no basis for regulatory decisions.

### Specific Comments

1. See the attached file for specific comments and questions in the report – I apologize that many of the comments may require interpretation.
2. Page 3, 2<sup>nd</sup> full paragraph – Text states that [REDACTED] (b)(5)  
[REDACTED] (b)(5) This is incorrect as the GALL/GALL-SLR reports are predominantly based on lessons learned from plant operating experience and review of license renewal applications. Note that the first



GALL report (Rev. 0) was issued in 2000 and PMDA was not issued until 2007. It would be correct to state that [REDACTED]

(b)(5)

(b)(5) [REDACTED] This context should be added to other places in the report as well.

PNNL-27120



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**December 2017**

P Ramuhalli  
R Devanathan  
RM Meyer

SW Glass  
K Knobbs



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*need to look  
further back  
than 2010...*

*need to supply  
sources for  
many statements  
of "fact"*

*"real world"  
"gap"  
"life expectancy"*

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Note to requester: The document provided to the FOIA staff also included skipped numbers before page 1. There are no missing pages.

PNNL-27120

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

P Ramuhalli	SW Glass
R Devanathan	K Knobbs
RM Meyer	

December 2017

Prepared for  
the U.S. Nuclear Regulatory Commission  
under a Related Services Agreement  
with the U.S. Department of Energy  
Contract DE-AC05-76RL01830

Pacific Northwest National Laboratory  
Richland, Washington 99352

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U.S. DEPARTMENT OF  
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I have comments on the following paragraphs. My comments are in bold italics and I underlined specific portions of the excerpt that I am commenting on. I stopped commenting on these specific examples after the first four (I have other comments as shown below).

I get what the authors are trying to state. However, if I was an intervener, I would use this document to shutdown SLRAs. I did not see any "robust" text in the following pages that tempered the following words or put them into a context that we are confident in the means of managing aging effects for the four classes of SSCs of concern (e.g., concrete, cables). For example, this statement:

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If this is our basis for why the GALL-SLR Report is adequate, it's pretty weak compared to the below underlined sentences. Further, the same paragraph goes on to state,

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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 need a stronger basis for why we will grant renewed licenses before the harvesting and testing is completed.**

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(b)(5)

**How did we issue the GALL-SLR Report with technical gaps and how are we going to be able to issue a renewed license if there are technical gaps to reaching a reasonable assurance conclusion?**

(b)(5)

(b)(5)

**For the first underlined sentence, does this mean that we won't have** (b)(5)

(b)(5) **In that case, how can we issue a renewed license for (b)(5) years before the testing is completed? Will we generate license conditions to restrict how far into the SPEO a licensee can operate before the testing is complete? This statement is too broad. For the second underlined sentence, should I infer that the** (b)(5)

(b)(5)

[Redacted]

(b)(5)

(b)(5) [Redacted] **Similar comment to the above, are these knowledge gaps addressed in the applicable GALL-SLR AMPs, with compensatory measures in place?**

[Redacted]

(b)(5)

(b)(5) [Redacted] **I don't have any new comments for this one; I included it because it's another good example of the report stating that we lack sufficient information to understand failure mechanisms.**

Additional comments not related to the above:

The GALL report is the NRC staff's generic evaluation of the acceptable aging management for the period of extended operation based on the technical basis developed in the EMDA and PMDA. **I do not believe that the EMDA and PMDA present the complete technical basis for the GALL-SLR report. We issued an entire NUREG with the technical basis. None of the changes I generated to GALL-SLR Chapter V, VII, and VIII are based on the above cited documents.**

(b)(5) Table 1, 8<sup>th</sup> row, GALL-SLR, [Redacted]

(b)(5) Table 2, 8<sup>th</sup> row, GALL-SLR, [Redacted]

(b)(5) [Redacted]

This record is responsive to the second sixth bullet point in your 5/19/2020 letter: the emails that Mr. Purtscher received from Mr. Hiser.

**From:** Hiser, Matthew  
**Sent:** Mon, 27 Aug 2018 15:27:01 +0000  
**To:** Purtscher, Patrick  
**Subject:** RE: TLR Update

Hi Pat,

I had also rewritten the first paragraph and deleted the last paragraph from the summary and path forward section (see screenshots below), so I'm definitely in agreement at a high level with where changes should be made.

(b)(5)

I'd suggest reworking the first sentence to avoid commenting on whether and how technical gaps are addressed by GALL-SLR. Here's my suggestion, which has some similarities to what I had in tracked changes on Friday. Feel free to take this below and pull from the couple sentences in the screenshot above if that would be useful.

(b)(5)

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](mailto:Matthew.Hiser@nrc.gov)

---

**From:** Purtscher, Patrick

**Sent:** Monday, August 27, 2018 11:11 AM

**To:** Hiser, Matthew <Matthew.Hiser@nrc.gov>

**Subject:** RE: TLR Update

Matt,

Can you could give me any comments you might have on these changes for the (b)(5)

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Pradeep originally had this for the first paragraph

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I also think we should recommend the last paragraph shown below, be deleted.

(b)(5)

Pat

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**From:** Hiser, Matthew  
**Sent:** Friday, August 24, 2018 2:29 PM  
**To:** Purtscher, Patrick <[Patrick.Purtscher@nrc.gov](mailto:Patrick.Purtscher@nrc.gov)>  
**Subject:** RE: TLR Update

Hi Pat,

Here's my edits and comments on the whole report. I went through pretty closely up through section 3.3, then mostly skimmed focusing on areas where NRR staff had major comments.

It's definitely a lot better, but needs a lot of cleaning up. I think we might need to iterate again with Pradeep and have him do a more thorough scrub before sending back to NRR.

Thanks!

Matt

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**From:** Hiser, Matthew  
**Sent:** Thursday, August 23, 2018 2:28 PM  
**To:** Purtscher, Patrick <[Patrick.Purtscher@nrc.gov](mailto:Patrick.Purtscher@nrc.gov)>  
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Hi Pat,

OK, here's my fairly extensive editing of everything up to Ch. 2. I'll keep plugging on Ch. 3 and beyond tomorrow...

Thanks!  
Matt

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**From:** Purtscher, Patrick  
**Sent:** Thursday, August 23, 2018 9:13 AM  
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I still think "technical issue" would raise the same concern from NRR as "technical gap". It should be OK to use "technical gap" for pre-GALL-SLR documents, but not after that.

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I like what you've written – I think it's pretty similar to this text in the Abstract (my tracked changes marked there), but that may need to be pulled into the Intro section as well.

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I've started working through with a clean version of what Pradeep sent to make my suggested edits (attached). I'm hoping to get all the way through it today if possible and share with you.

Thanks!  
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What do you think?

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Phone: 301-415-3942 | Office: TWFN 10A49  
[ptp1@nrc.gov](mailto:ptp1@nrc.gov)

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**From:** Ramuhalli, Pradeep [<mailto:Pradeep.Ramuhalli@pnnl.gov>]  
**Sent:** Friday, August 17, 2018 2:45 PM  
**To:** Hiser, Matthew <[Matthew.Hiser@nrc.gov](mailto:Matthew.Hiser@nrc.gov)>; Purtscher, Patrick <[Patrick.Purtscher@nrc.gov](mailto:Patrick.Purtscher@nrc.gov)>  
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The update so far is attached. This still needs some cleanup and citations included; I am working on a tech editor on these.

With best regards,

Pradeep

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Senior Research Scientist,  
Applied Physics Group  
Pacific Northwest National Laboratory  
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P.O.Box 999, MSIN K5-26  
Richland, WA 99352  
Tel: 509-375-2763  
Email: [pradeep.ramuhalli@pnnl.gov](mailto:pradeep.ramuhalli@pnnl.gov)  
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**Attachments:** DMLR Specific Comments on PNNL-27120-pr mah 8-24.docx

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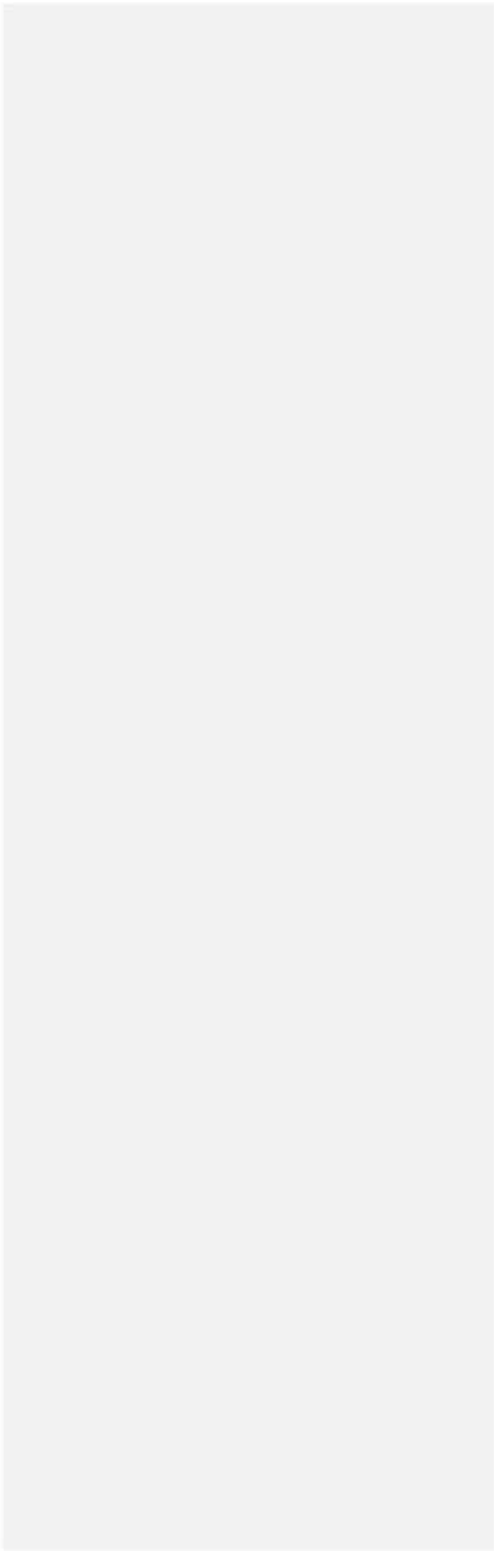
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US Nuclear Regulatory Commission | Office of Nuclear Regulatory Research  
Division of Engineering | Corrosion and Metallurgy Branch  
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[ptp1@nrc.gov](mailto:ptp1@nrc.gov)

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**From:** Ramuhalli, Pradeep [<mailto:Pradeep.Ramuhalli@pnnl.gov>]  
**Sent:** Friday, August 17, 2018 2:45 PM  
**To:** Hiser, Matthew <[Matthew.Hiser@nrc.gov](mailto:Matthew.Hiser@nrc.gov)>; Purtscher, Patrick <[Patrick.Purtscher@nrc.gov](mailto:Patrick.Purtscher@nrc.gov)>  
**Subject:** [External\_Sender] TLR Update

The update so far is attached. This still needs some cleanup and citations included; I am working on a tech editor on these.

With best regards,

Pradeep

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Note to requester: After searching further, the 8/17/2018 Email from PNNL to NRC staff with the subject line "[External_Sender] TLR Update" could not be located.
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Note to requester: The document provided to the FOIA staff also included skipped numbers before page 1. There are no missing pages.

PNNL-27120

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

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R Devanathan	K Knobbs
RM Meyer	

December 2017

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Pacific Northwest National Laboratory  
Richland, Washington 99352

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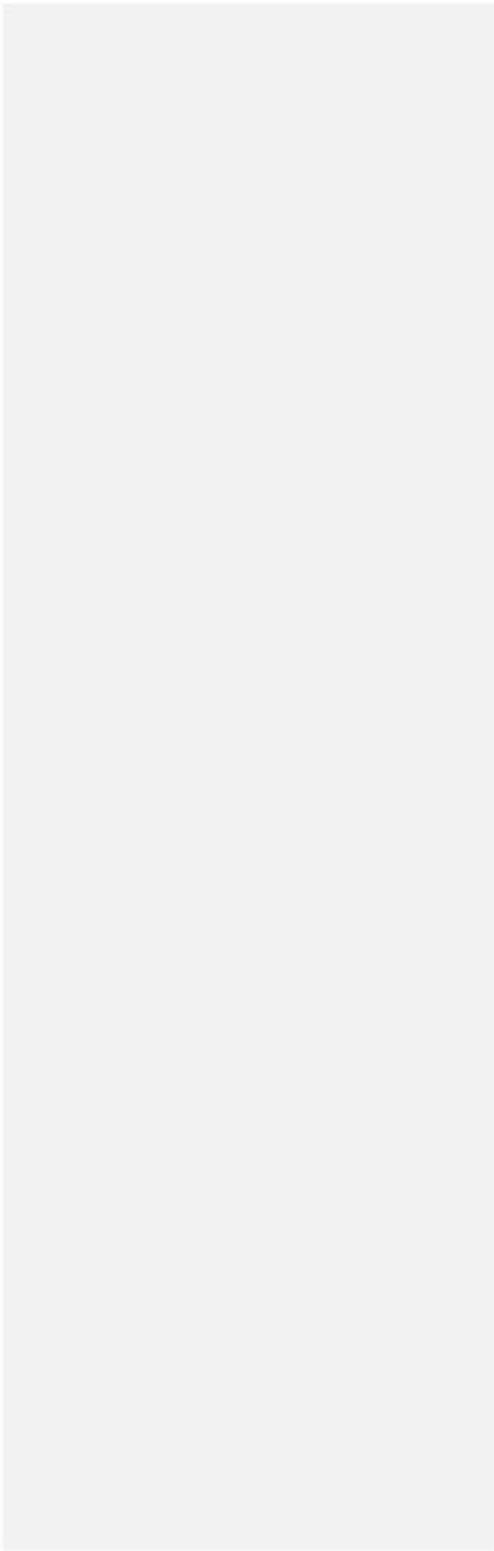
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