

Surveillance Program Updates

PWR Coordinated Surveillance Capsule Programs

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Presentation Outline

- **Future Sources of High Fluence Capsule Data**
 - PWR Coordinated Reactor Vessel Surveillance Program (CRVSP)
 - MRP-326, Revision 1
 - PWR Supplemental Surveillance Program (PSSP)
 - MRP-412



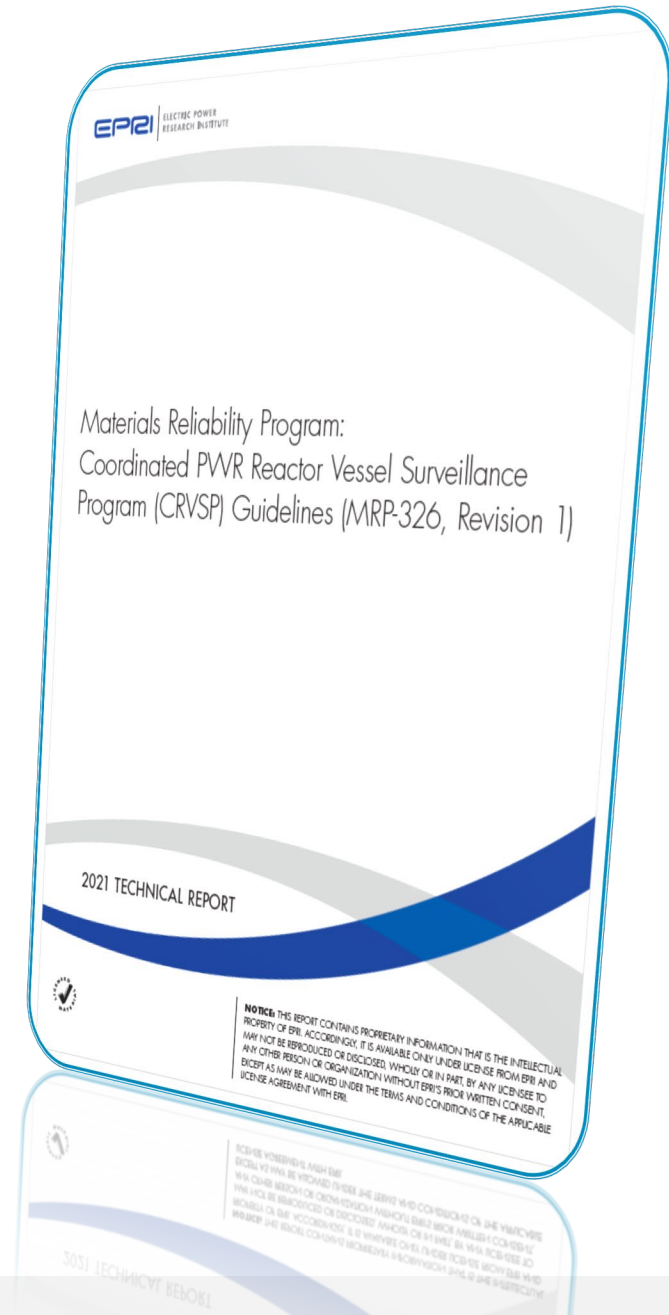
Update to the CRVSP, MRP-326, Revision 1

Coordinated PWR Reactor Vessel Surveillance Program (CRVSP)

- Materials Issue Being Addressed:
 - Optimize the U.S. PWR surveillance capsule withdrawal schedules to increase the amount of high-fluence ($f > 3.0 \times 10^{19}$ n/cm²) surveillance data which can be used to inform development of embrittlement trend correlations (ETCs) applicable for RPV operation to high fluence (60+ years)
- Objectives of the Project
 - Revision 0 (2011): Review the reactor vessel surveillance programs (RVSPs) of the operating U.S. PWR fleet and recommend changes to selected RVSP withdrawal schedules in order to increase the amount of high fluence surveillance data by 2025
 - Revision 1 (2021): Review of how we did, what has occurred, what's left to do, and when it is most likely to happen across the US fleet
- Updates to the evaluation include
 - Evaluated capsules withdrawn since 2011
 - Future capsule pull schedules
 - Capsule fluence values
 - Analysis of closed (or to be closed) plants

Update to the CRVSP, MRP-326, Revision 1

- Current high fluence capsule withdrawal results
 - 16 out of 30 CRVSP Capsules are tested or planned to be tested
 - There are 14 remaining CRVSP Capsules
 - Half of these are not planned to be tested (i.e., due to plant shutdown) or will be delayed beyond 2025
- Summary of available high fluence data
 - 48 U.S. capsules have been tested at $f > 3.0 \times 10^{19}$ n/cm²
 - 4 of these are $f > 8.0 \times 10^{19}$ n/cm²
 - By 2025, the remaining 7 planned CRVSP capsules will be tested at $f > 3.0 \times 10^{19}$ n/cm²
 - 2 of these are predicted to be $f > 8.0 \times 10^{19}$ n/cm²





PWR Supplemental Surveillance Program (PSSP)

PWR Supplemental Surveillance Program (PSSP)

- Materials Issue Being Addressed:
 - Additional high-fluence ($f > 5.0 \times 10^{19}$ n/cm²) surveillance data is needed to inform development of embrittlement trend correlations (ETCs) applicable for RPV operation to high fluence (60+ years)
- Objectives of the Project:
 - Fill projected gaps in the tested surveillance capsule database
 - Inform future ETCs using actual RPV surveillance materials from commercial PWRs (not test reactor data)
- Project Goal: Irradiate two supplemental surveillance capsules for ~10 total years before withdrawal, testing, evaluation and publication of capsule test reports
 - These two surveillance capsules have 288 Charpy Specimens from 27 unique plates, forgings and welds
 - The data generated from these capsules will ultimately yield 24 new transition temperature shift results and 3 additional upper shelf energy results
 - Fluence levels of the to be evaluated specimens will range from $\sim 4.5E+19$ up to $\sim 1.2E+20$ (n/cm²)

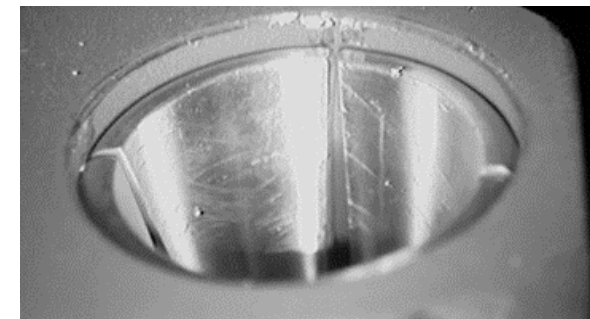
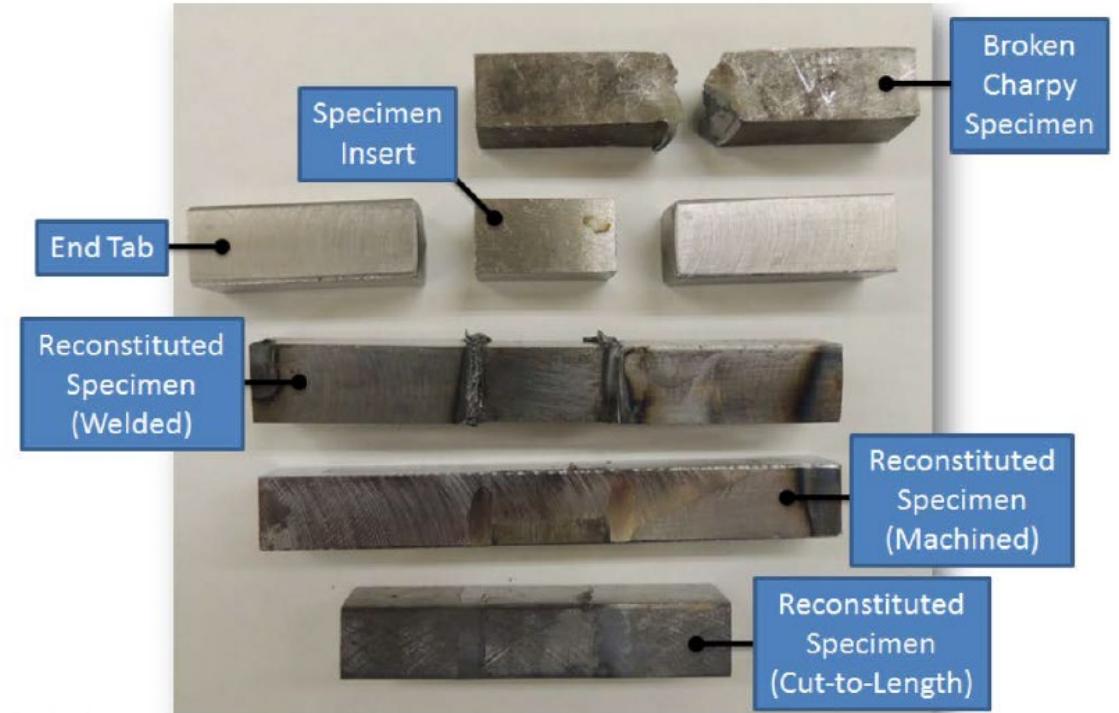
PWR Supplemental Surveillance Program

- Project History
 - Program designed and fabricated 2 supplemental surveillance capsules containing previously-irradiated, reconstituted PWR materials
 - EPRI MRP sponsored the fabrication of these 2 surveillance capsules:
 - ALA-P; 14 materials (Host: Farley 1), inserted October 2016
 - CQL-P; 13 materials (Host: Shearon Harris), inserted April 2018
 - MRP-412 (PSSP Capsule Fabrication report) was published in 2016



PWR Supplemental Surveillance Program

- Current Project Status and Timeline
 - Farley 1 Capsule P to be withdrawn in Spring 2027; Shearon Harris Capsule P in Fall 2028 per MRP-326,R1
 - Testing of surveillance capsules and data evaluation in 2028-2030
 - Anticipated Project Deliverable Date:
 - Capsule report within ~18 months of each capsules' withdrawal date (2 reports total)
 - Data evaluation and impact on future ETCs in 2030-2032



PSSP Capsule seated in its holder



Questions / Discussion

A blue-tinted photograph of four people, two men and two women, standing together. They are dressed in professional attire, including lab coats and a hard hat. The text 'Together...Shaping the Future of Energy™' is overlaid in white on the image.

Together...Shaping the Future of Energy™