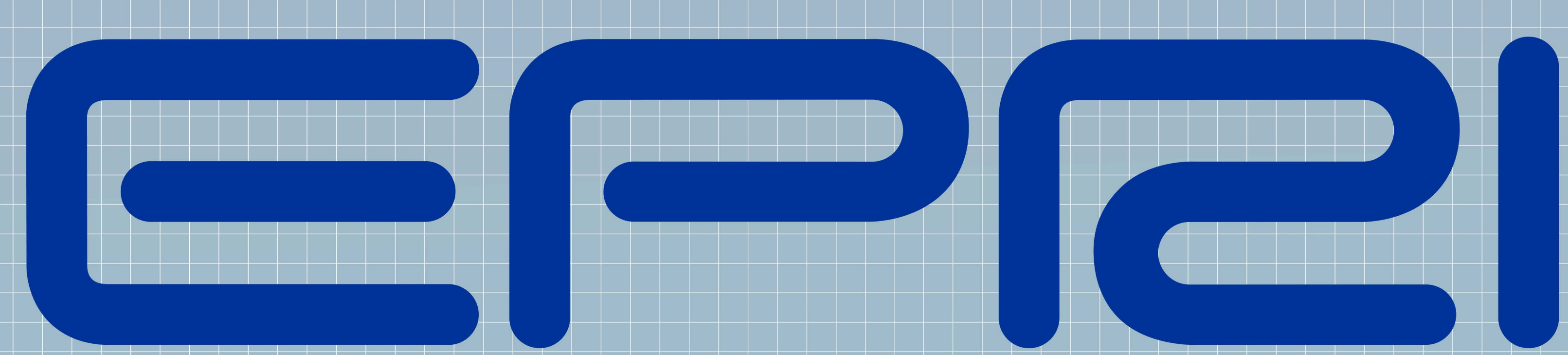




2024 TECHNOLOGY TRANSFER AWARD WINNER

PIONEERING AGING MANAGEMENT FOR
NEUTRON ABSORBERS ACROSS GLOBAL
NUCLEAR PLANTS

KOREA HYDRO & NUCLEAR POWER
CO., LTD. (KHNP)

Beomgyu Kim
Yongdeog Kim

Kiyoung Kim
Donghee Lee
Taehyung Na

Taehyeon Kim
Kyungho Roh

EDF-ENERGY

Chris Sharrock

Chris Veale

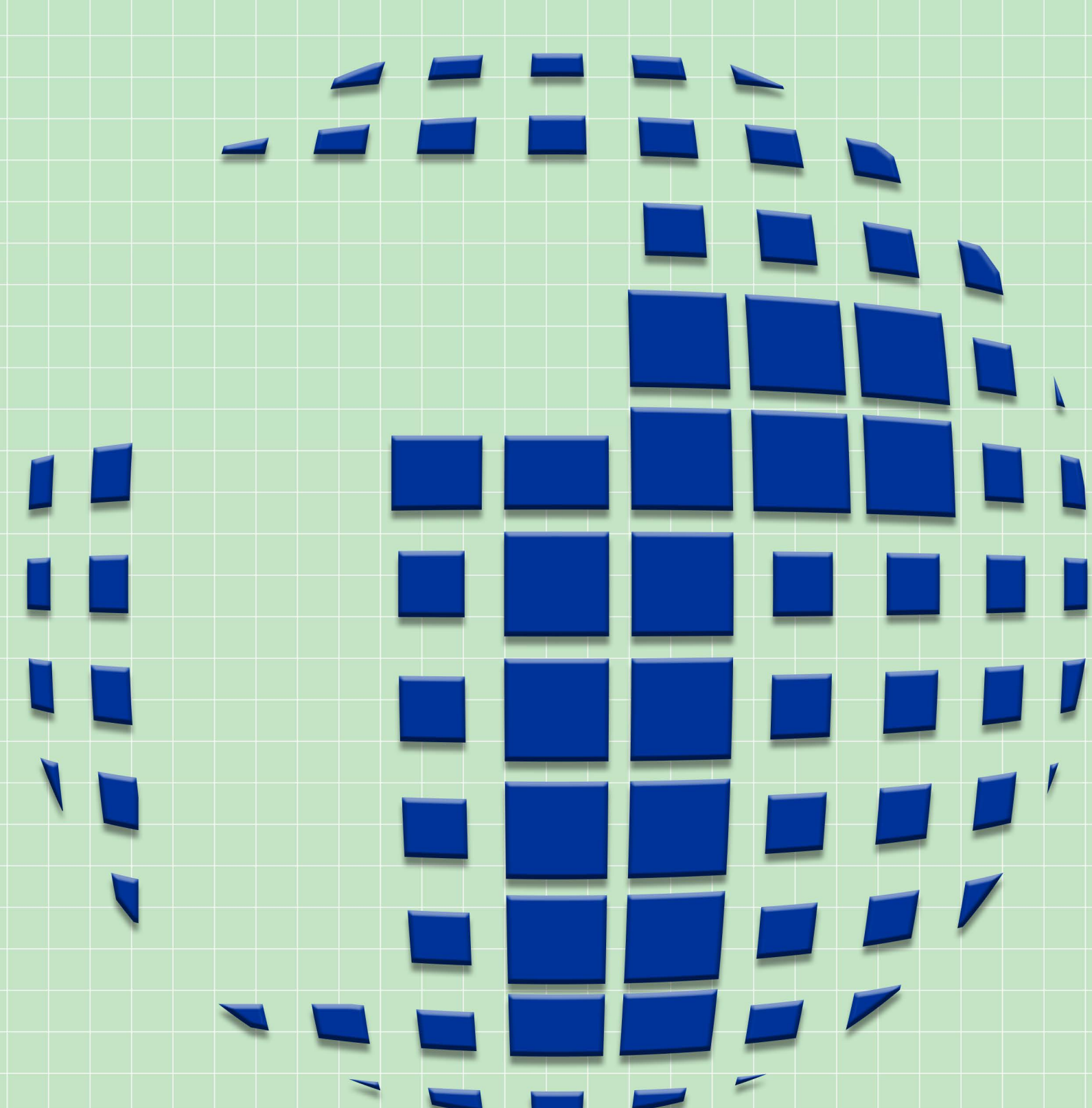
Ryan Sanderson

SOUTHERN NUCLEAR OPERATING CO.

Ernest Bates
Hannah Brock

TENNESSEE VALLEY AUTHORITY (TVA)

Andrew Whitener
Zita Martin



TECHNOLOGY TRANSFER AWARD

Utilities Pioneer Aging Management for Neutron Absorbers Across Global Nuclear Plants

Four utilities – EDF Energy, Korea Hydro & Nuclear Power (KHNP), Tennessee Valley Authority (TVA), and Southern Nuclear Operating Co. – collaborated with EPRI on three different projects to address a pressing industry need: the long-term monitoring of neutron absorber materials (NAMs) in spent fuel pools (SFPs). These materials are essential for maintaining criticality safety margins in high-capacity storage racks. Regulatory requirements mandate aging management plans (AMPs) for NAMs, but many plants lack sustainable monitoring programs. Conventional approaches, like in-situ testing and coupon monitoring, are costly and prone to inaccuracies, leading to operational disruptions and significant expenditures.

To resolve these challenges, these utilities turned to EPRI’s Industrywide Learning Aging Management Program (i-LAMP), a global initiative providing reliable, cost-effective NAM monitoring solutions.

Benefits

The adoption of i-LAMP transformed NAM monitoring practices at all four of the utilities. Unlike traditional methods, i-LAMP allows utilities to use surrogate data while enabling global data trending for earlier detection of potential issues. This approach has reduced the need for in-situ measurements, which cost approximately \$500,000 per campaign, and eliminated risks associated with cutting panels for analysis, a \$2 million operation fraught with technical challenges.

Utilities implementing i-LAMP have avoided the costly consequences of unreliable in-situ measurements, such as false degradation reports that can lead to fuel re-racking costs ranging from \$10–20 million. By transitioning to i-LAMP, utilities have ensured regulatory compliance while saving millions in operational costs.

Moreover, based on findings from EPRI’s comparative analysis project, the program introduced sustainable practices to preserve global coupon populations. These include halting the drying process to maintain coupon integrity and re-inserting them into SFPs, as well as transferring coupons from decommissioned facilities to sibling SFPs without monitoring programs. These practices, already implemented by utilities where feasible, enhance long-term data availability and program reliability.

Application

Through i-LAMP, EPRI and utilities across the globe have created an international framework for NAM monitoring. Utilities provided their NAM data, which EPRI analyzed to establish program parameters.

The i-LAMP program was reviewed and approved by the U.S. Nuclear Regulatory Commission (NRC) as an alternative monitoring approach to meet AMP requirements. Today, i-LAMP is operational at facilities worldwide, with databases maintained by EPRI to support global data sharing and analysis.

EPRI’s Used Fuel and High-Level Waste Management Program produced the research that supports this project, including:

Industrywide Learning Aging Management Program (i-LAMP): Global Neutron Absorber Material Monitor Program for Spent Fuel Pools, 3002018497

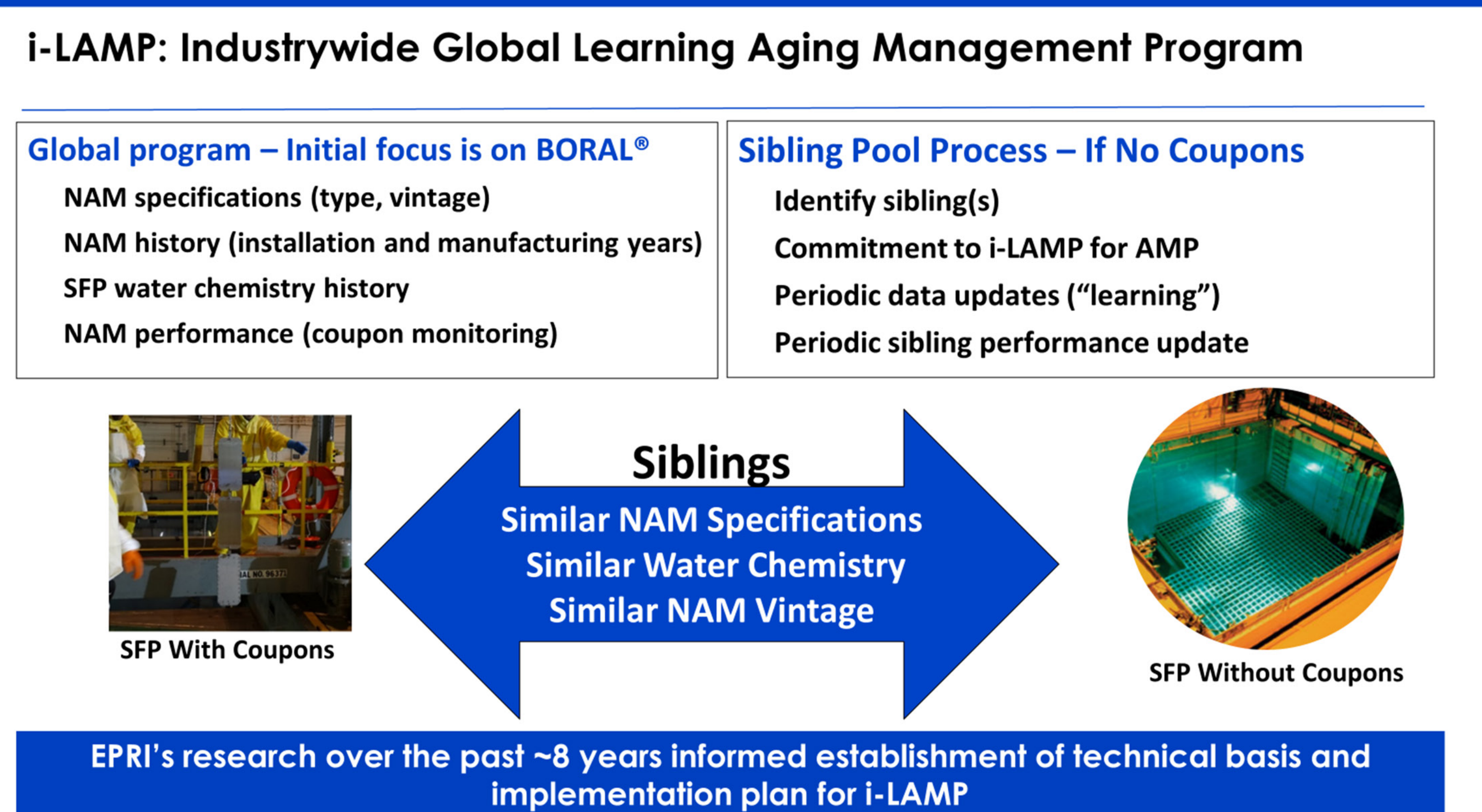


Figure 1
These additional EPRI-published reports help establish a technical basis for effective aging management programs

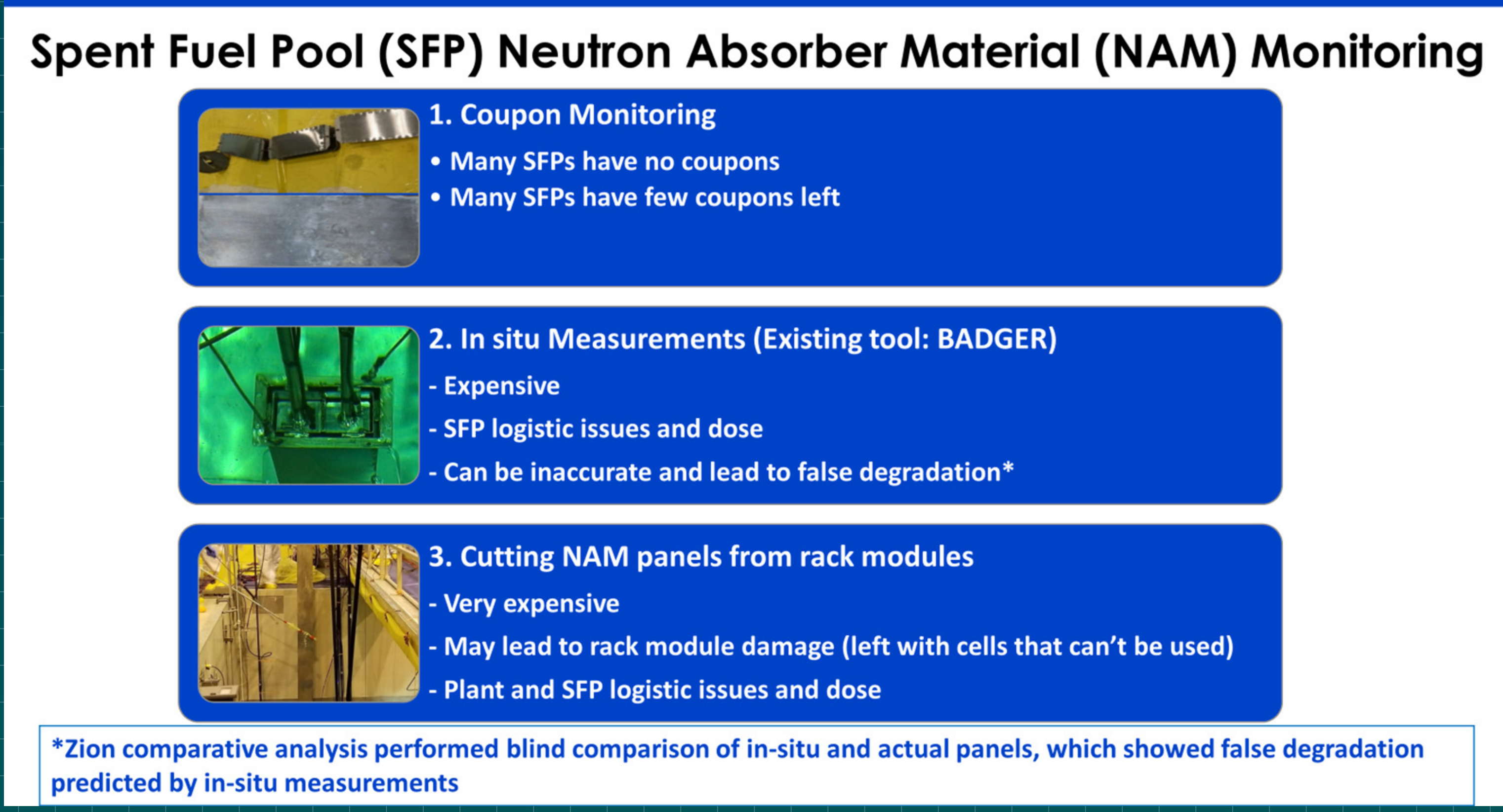


Figure 2
The three key components of SFP NAM monitoring are shown here

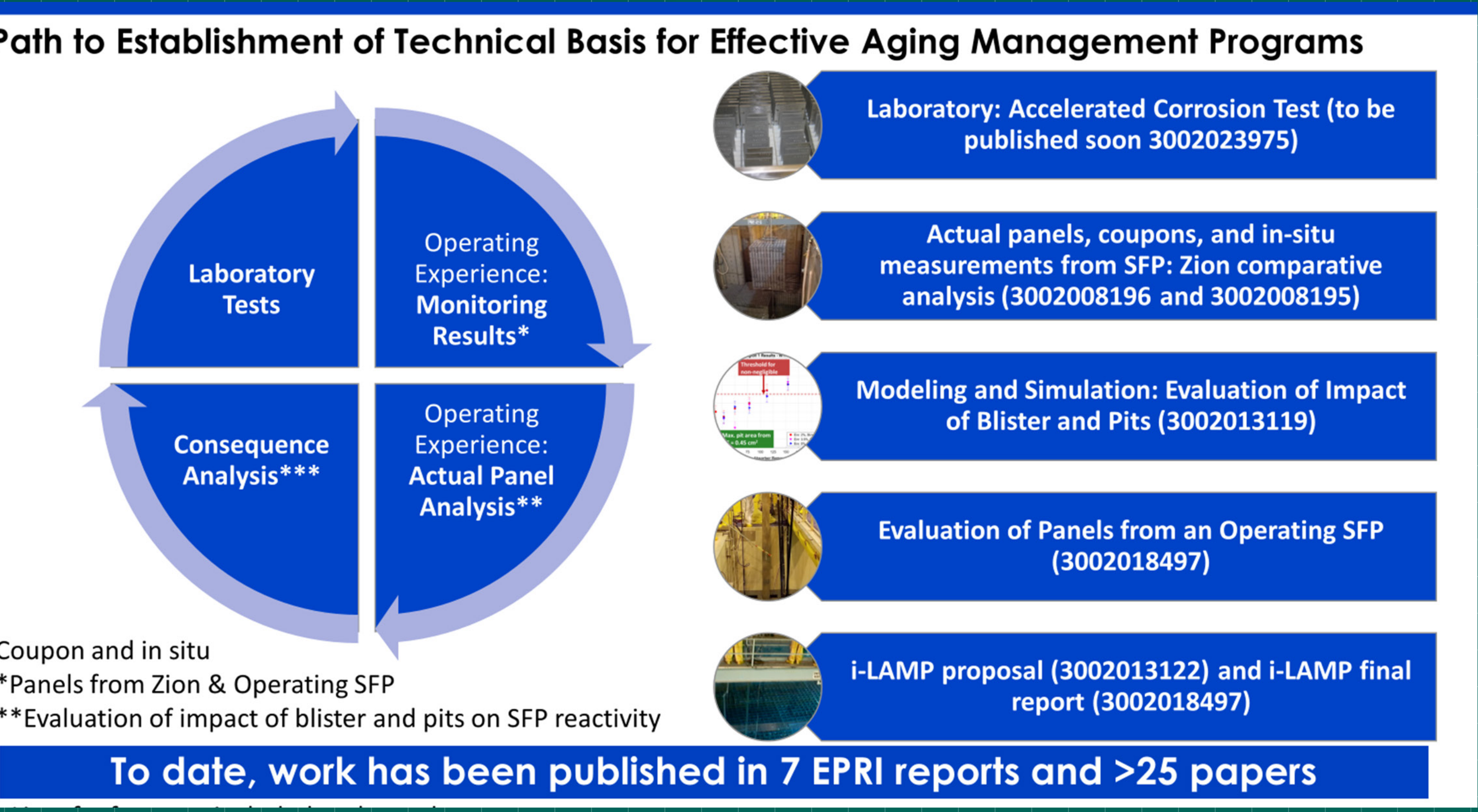


Figure 3
EPRI’s research over the past eight years has informed the technical basis and implementation plan for i-LAMP.implementation plan for i-LAMP



Figure 4
The Zion module is removed from the SFP

Figure 5
A panel is removed from SFP-2