Perry Nuclear Power Plant (PNPP)

License Renewal (60 Year) Application Pre-Submittal Meeting

energy harbor

February 16, 2023

Opening Remarks and Introductions

Opening Remarks

- NRC
- Energy Harbor

Speakers

- Mark Bensi (Energy Harbor, LR Team, Project Manager)
- Theodore Hilston (Energy Harbor, LR Team, Technical Lead)

Participants

- Michael Koberling (Energy Harbor, Director of Site Engineering, Project Sponsor)
- Paul Roney (Energy Harbor, LR Team, Mechanical)
- Mohammed Alvi (Energy Harbor, LR Team, Structural)
- Barry Schneidman (Energy Harbor, LR Team, Mechanical)
- George Kyle (Energy Harbor, LR Team, Electrical)
- Benjamin Spiesman (Energy Harbor, LR Team, ER/SAMA and OE)
- Stuart Thickman (Energy Harbor, LR Team, TLAA)
- Steven Dort (Energy Harbor, LR Team, LRA Author)
- Justin Truxall (Energy Harbor, AMP implementation Coordinator)
- Paul Bessette (Morgan Lewis, Legal Support)

Agenda

- General Information
- Plant Overview
- Application Preparation Approach
  - Scoping and Screening
  - Aging Management Reviews (AMRs)
  - Aging Management Programs (AMPs)
  - Time-Limited Aging Analyses (TLAA)
  - Operating Experience
- Topics of Interest
  - PNPP Unit 2 impact on LR
  - PNPP Property Boundaries
  - Pre-PEO LR implementation
- Schedule and Closing Remarks
- Questions and Answers

energy harbor

General Information

Licensee Information

- Operator – Energy Harbor Nuclear Corp.
- Owner - Energy Harbor Nuclear Generation LLC
  - Energy Harbor Nuclear Corp. and Energy Harbor Nuclear Generation LLC are owned by Energy Harbor Corp.

Perry's License Renewal Application

- Perry's current operating license expires at midnight on 11/07/2026.
- Perry was granted an exemption from specific requirements of Title 10 of the *Code of Federal Regulations* (10 CFR), 10 CFR 54.17(a)'s requirement that an application for a renewed license be in accordance with Subpart A of 10 CFR Part 2, and, more specifically, 10 CFR 2.109(b). Section 2.109(b) provides timely renewal protection to licensees that submit sufficient license renewal applications at least five years before the expiration of the existing license. Thus, this exemption allows EHNC to submit a license renewal application for PNPP at least three years prior to the expiration of its existing license and, if the application is sufficient, to still receive timely renewal protection.

General Information (cont.)

Perry Nuclear Power Plant, PNPP Unit 1

- General Electric BWR-6, Mark III containment
- Located in northeast Ohio, 35 miles northeast of Cleveland
- Current rated core thermal power of 3,758 MWt
- Current gross electrical output of 1,327.6 MWe, net output of 1,277 MWe
- Full power Operating License issued 11/13/1986

Power Uprate History

- 105% power uprate implemented in 2000
  - NRC approved on June 1, 2000 via License Amendment 112
  - Increased rated thermal power from 3,579 MWt to 3,758 MWt
- PNPP has not implemented an extended power uprate

General Information (cont.)

Perry Nuclear Power Plant, PNPP Unit 2

- Intended to be nearly identical to Unit 1
- Some PNPP structures originally intended to serve as common between both units
- Construction activities formally terminated in 1994
- Some unit 2 structures, systems and components (SSCs) support unit 1 operation
  - Some unit 2 SSCs are in unit 1 LR scope

License Renewal Application

- LRA written to NUREG-1801 Rev. 2 and LR-ISGs
- LRA submittal planned for early 3rd quarter 2023
- This License Renewal Application is limited to the first 20-year period of extended operation and does not address operation beyond 60 years.
  - Regulatory guidance that addresses subsequent license renewal is considered from the perspective of operating experience.

Plant Overview

Major Plant Structures

1. Unit 1 Reactor Building
2. Unit 2 Reactor Building
3. Unit 1 Turbine Building
4. Unit 2 Turbine Building
5. Control Complex
6. Diesel Generator Building
7. Unit 1 Off-Gas Building
8. Unit 1 Turbine Power Complex
9. RadWaste Building
10. Emergency Service Water Pumphouse
11. Service Water Pumphouse
12. Water Treatment Building
13. Lake Erie (UHS)
14. Switchyard
15. Unit 2 Heater Bay

Not visible in image

- Unit 1 Auxiliary Building
- Unit 2 Auxiliary Building
- Intermediate Building
- Fuel Handling Building
- Unit 2 Turbine Power Complex
- Unit 1 Heater Bay
- Unit 2 Off-Gas Building

energy harbor

Scoping and Screening

Scoping and Screening Process Highlights

- Nuclear Safety Related, 10 CFR 54.4(a)(1)
- Regulated Events 10 CFR 54.4(a)(3)
  - Fire Protection 10 CFR 50.48
  - Environmental Qualification 10 CFR 50.49
  - Anticipated Transient Without Scram 10 CFR 50.62
  - Station Black Out 10 CFR 50.63
  - Pressurized Thermal Shock 10CFR50.61 - not applicable to BWRs

- Non-Safety Affecting Safety, 10 CFR 54.4(a)(2)
  - Spaces approach consistent with NEI 95-10, App. F
  - ANSI B31.1 piping attached to ASME class (1, 2 or 3) piping
  - Non-safety piping inside seismic category I buildings (spatial)
  - Protection design features for flooding, missiles, tornadoes, pipe whip, and jet impingement

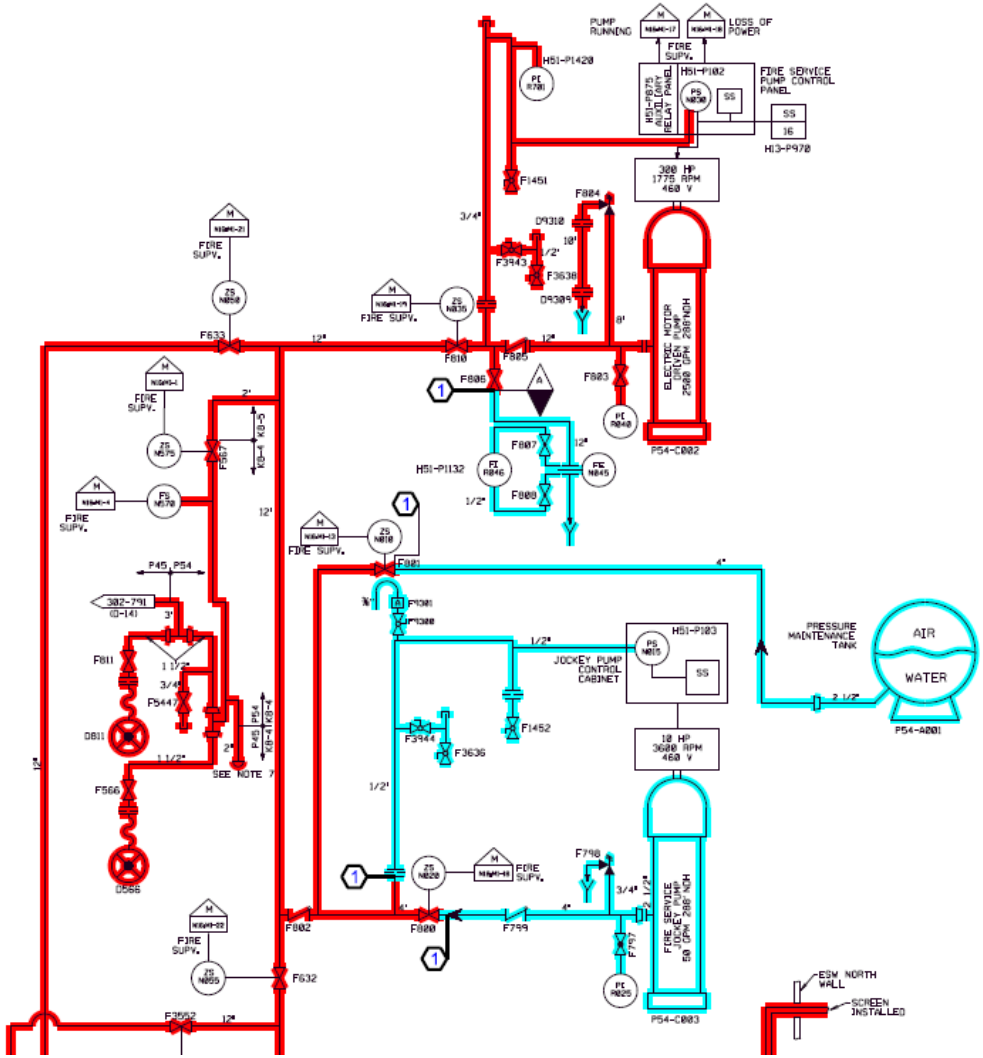
SSC Intended Functions

- System intended function sources: UFSAR, MRBDs, TS, FPR, docketed correspondence
- Component intended functions consistent with NEI 95-10 Rev. 6

LR Scoping and Screening

Credited by CLB for performing an intended function per 10CFR54.4(a)(1), (a)(2) or (a)(3)

In scope for 10CFR54.4(a)(2) spatial concerns.



Example (partial) of mechanical scoping drawing

energy harbor

Aging Management Reviews

AMR Process Highlights

- Results documented consistent with NEI 95-10 (9-column tables)
  - Generic notes document level of consistency with NUREG-1801
    - Majority are note A through E (98.7%) – Consistent with the GALL

Component Type	Intended Function(s)	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes

Aging Management Programs

AMPs Applicable to PNPP

- PNPP will have 43 AMPs
  - 34 are existing programs
  - 9 new programs
  - 19 existing programs will be enhanced for license renewal purposes
  - 5 programs involve exceptions to NUREG-1801
  - No site-specific AMPs

AMPs Not Applicable to PNPP (PWR-Specific AMPs not listed)

- X.S1, Concrete Containment Tendon Prestress
- XI.M12, Thermal Aging Embrittlement of Cast Austenitic Stainless Steel (CASS)
- XI.M22, Boraflex Monitoring
- XI.M25, BWR Reactor Water Cleanup System
- XI.S5, Masonry Walls
- XI.E4, Metal Enclosed Bus

Aging Management Programs

AMPs with exceptions to the GALL

	AMP	Exception
1	XI.M2 Water Chemistry	NUREG-1801 XI.M2 indicates the use of BWRVIP-190 (BWR Water Chemistry Guideline – 2008 Revision). Perry has adopted BWRVIP-190, BWR Water Chemistry Guideline, Revision 1, 2019 Interim Guidance
2	XI.M3 Rx Head Closure Stud Bolting	NUREG-1801 recommends use of bolting materials for closure studs that have an actual measured yield strength less than 150 ksi. The Perry stud assembly material is SA 540 Grade B23 or B24 carbon steel, Class 3. The stud assemblies are assumed to have an actual yield strength of greater than 150 ksi.
3	XI.M4 BWR Vessel ID Attachment Welds	NUREG-1801 XI.M4 indicates the use of the inspection and flaw evaluation criteria in BWRVIP-48-A to detect cracking and monitor the effects of cracking. Perry's Attachment Welds Program is based on the requirements of BWRVIP-48, Revision 1.

Aging Management Programs

AMPs with exceptions to the GALL

	AMP	Exception
4	XI.M5 BWR Feedwater Nozzle	NUREG-1801 states that the inspection schedule for the feedwater nozzles should in accordance with Table 6-1 of GE NE-523-A71-0594, Rev. 1. Note (2) of this table states, in part, that in no case shall the maximum allowable time between inspections exceed 10 years. Perry's program performs examinations of a minimum of 25 percent of the population of the feedwater nozzle inner radii each inspection interval.
5	XI.M33 Selective Leaching	Materials exposed to contaminated fuel oil and water-contaminated lube oil are managed under the XI.M39 Lubricating Oil Analysis and XI.M30 Fuel Oil Chemistry programs. These programs assure the exclusion of water such that materials susceptible to selective leaching are not exposed to water contamination.

Time Limited Aging Analysis and Exemptions Identification

Assessment Method

- Keyword search of selected licensing documents to identify potential TLAAs
  - Updated Safety Analysis Report (USAR)
  - Facility Operating License
  - NRC Safety Evaluation Reports (SERs)
  - 10 CFR 50.12 Exemption Requests
  - EPRI BWRVIP documents (incorporated by reference in the CLB)
- Comparison of the identified potential TLAAs to the TLAAs in industry documents
  - NUREG-1800, Rev. 2
  - NUREG-1801, Rev. 2
  - NEI 95-10, Rev. 6
  - Electric Power Research Institute (EPRI) Report TR-105090
- Comparison of identified potential TLAAs to other BWR license renewal applicants
- Review of current exemptions to identify potential TLAAs involved with these exemptions
- Review of BWRVIP documents referenced in the PNPP BWRVIP implementing procedure

Results

- No exemptions based on TLAAs were identified
- No plant specific TLAAs

Operating Experience

Industry (External) OE Review

- Review period from GALL Rev. 2 issuance (December 2010 through January 2023)
- Includes generic communications such as Bulletins and Information Notices
- Ensures aging effects not identified in industry guidance documents are addressed by PNPP AMPs
- Utilizes Nuclear Energy Institute (NEI) license renewal task force (LRTF) working group external OE results

Site (Internal) OE Review (Condition Reports)

- Review ten-year period of January 2013 through January 2023
- Searches performed in EHNC CAP database (DevonWay)
- Provides representative set of plant-specific instances of age-related degradation
- 262 keywords used in extensive OE search
- Approx. 27,000 results from this search, approx. 6% relevant to license renewal

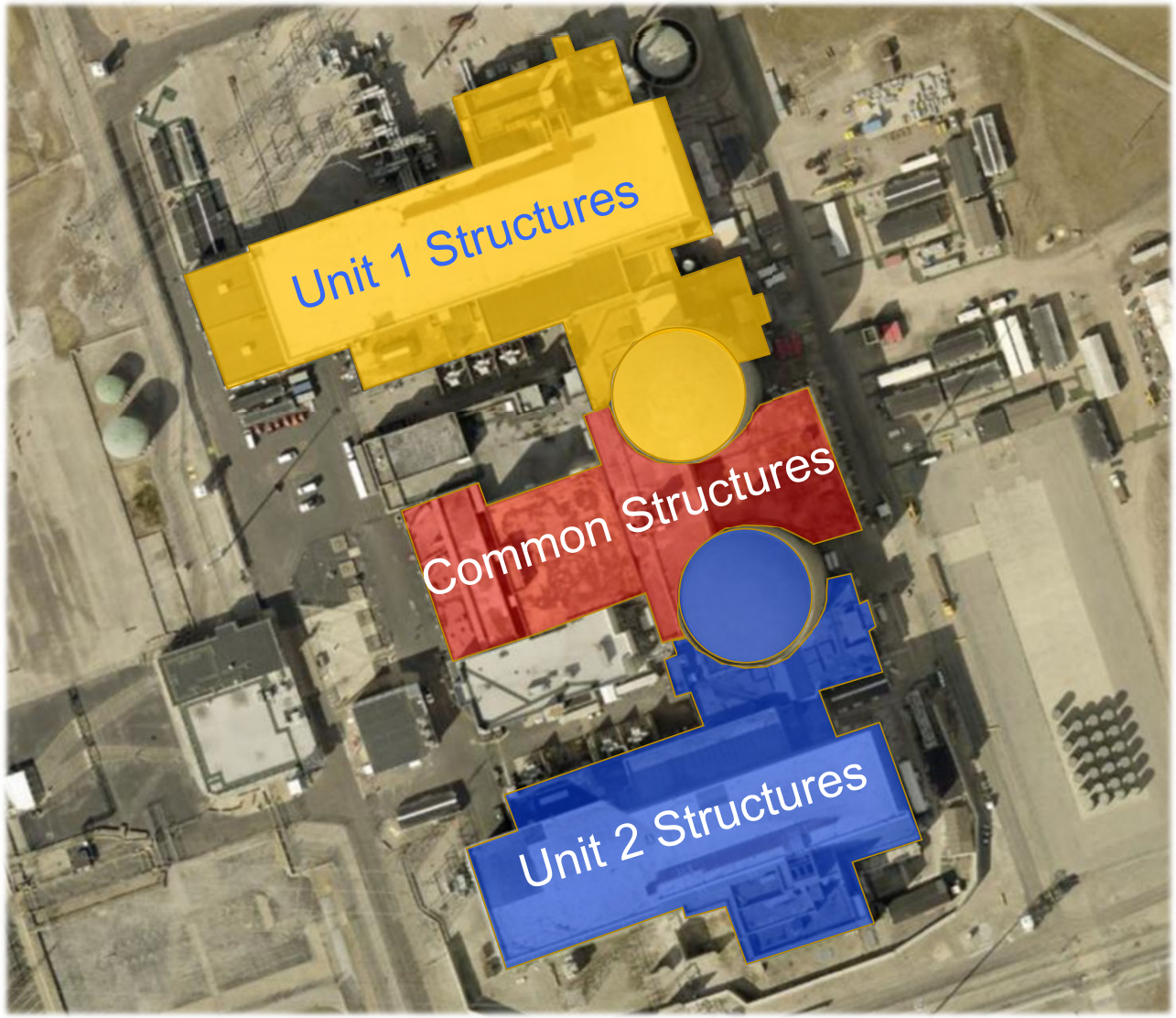
Additional OE Information

- GALL-SLR and SLR-ISGs are considered as operating experience
- Lessons learned from RAIs/RCIs and supplements are incorporated into AMRs and AMPs

PNPP Topics of Interest

PNPP Unit 2

- Unit 2 construction formally terminated in 1994
- All unit 2 structures and many systems and components completed
- Some unit 2 SSCs support unit 1 operation
- Consequently, some unit 2 SSCs are in scope for PNPP unit 1 LRA
  - Examples include portions of the unit 2 Shield Building wall which serves as the wall for the Fuel Handling and Intermediate Buildings; unit 2 Turbine Power Complex houses active equipment
- Measures are completed that positively delineate boundaries between active and abandoned/retired unit 2 equipment



energy harbor

PNPP Topics of Interest

PNPP Property

- PNPP situated on approx. 1030 acres in NE Ohio
- All property previously owned by subsidiaries of previous parent company (FE)
- Several parcels retained by FE following Perry's license transfer to Energy Harbor
  - PNPP Switchyard
  - Quincy Substation
  - Southwest area
- Energy Harbor has obtained easements on switchyard and Quincy; EH progressing with FE to reacquire southwest area.
- Small parcel at southern boundary claimed under eminent domain
  - Easement obtained

energy harbor

PNPP Topics of Interest

Pre-PEO Implementation Activities

- PNPP has a truncated pre-PEO period due to the License Renewal Application (LRA) submittal date (July 2023) and license expiration (November 2026)
  - Requires license renewal implementation activities in parallel with LRA development
- One-Time Inspections
  - 59 of 216 Pre-PEO one-time inspections complete to date, more scheduled by end of year
  - PNPP will use the remaining two refueling outages to complete inspections
    - 1R19 in February/March 2023
    - 1R20 in 2025
  - Approx. 50% of one-time inspections to be complete by end of refueling outage (1R19), with the remainder complete by end of the following refueling outage (1R20)
    - One-time Class 1 small bore piping inspections to be performed in 1R19 (2023)
    - Bolting integrity exams to be performed in 1R20 (2025)
- Aging management program owners identified; majority trained

Scheduling and Closing Remarks

- PNPP is on track to submit a License Renewal Application in July 2023
- PNPP will submit a high-quality application which will support efficient Staff reviews
  - Highly knowledgeable team with significant LR experience
  - Participation in industry working groups and meetings
  - Industry Peer Reviews of LRA is ongoing
  - Monitoring on-going applicant processes
  - Reviews of recent applicant RAIs, RCIs and Supplements
- PNPP's License Renewal Application will be consistent with NRC requirements for initial LRA, industry practices and recent precedent

Questions and Answers