Oconee Nuclear Station

High Energy Line Break License Amendment Public Meeting

One White Flint, Rockville, MD

November 6, 2019

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Attendees

Duke Attendees:

- Howard T Grant (Todd), General Manager, Oconee Engineering
- Dean M Hubbard (Dean), Director, Oconee Regulatory Projects
- Timothy D Brown (Tim), Manager, Oconee Regulatory Projects
- Christopher P King (Chris), Manager, Oconee Regulatory Projects
- Jason A Patterson (Jason), Lead Engineer, Oconee Regulatory Projects
- McLain M Hubbard (McLain), Senior Engineer, Oconee Regulatory Projects
- Michael E Henshaw (Eric), Principal Engineer, Corporate Safety Analysis
- Christopher J Wasik (Chris), Licensing Consultant, Corporate Regulatory Affairs and Licensing

Agenda

- Opening Remarks
- Oconee High Energy Line Break (HELB) Current Licensing Basis (CLB)
- HELB Licensing Timeline
- Existing HELB Commitments
- New HELB Licensing Basis (LB)
- New HELB Licensing Documentation
- Discussion of HELB LAR
- New HELB Conforming Actions
- Closing Remarks

Opening Remarks

High Energy Line Break License Amendment Request

- Oconee Nuclear Station submitted a license amendment on 8/28/2019 to clarify and update the High Energy Line Break (HELB) licensing basis.
- The submittal supersedes the original 1973 HELB current licensing basis and the 2011 LAR submittal.
- This is the culmination of many hours of analysis, plant surveys, and meetings with the NRC technical staff.
- The revised LAR is based on over 3600 breaks/cracks postulated per unit and over sixty new calculations that were created in the reconstitution project.
- The remaining 2017 re-baselined HELB commitments are to be completed. New conforming actions are provided in this LAR.

Oconee HELB CLB

- HELB was originally licensed during the 1973 timeframe to the Giambusso/Schwencer requirements.
  - Safe shutdown capability maintained following HELB.
  - No structural damage preventing ability to reach cold shutdown.
  - Single active failure required.
  - Environmental conditions shall not impact mitigating electrical equipment.

Oconee HELB CLB

- Oconee responded to the Giambusso/Schwencer letters through design report MDS OS-73.2, “Analysis of Effects Resulting from Postulated Piping Breaks Outside Containment for Oconee Nuclear Station, Units 1, 2, & 3.”
  - High Energy (HE) Systems are defined as systems whose normal service (100% power) operating temperature is greater than 200 degrees F or normal service operating pressure greater than 275 psig.
  - Approximately 40 break locations were postulated and descriptions were provided of the safe shutdown strategies for those breaks that affect the response of the core and Reactor Coolant System (e.g. Postulated ruptures in the Main Steam and Main Feedwater systems).
  - HELB was not defined as a design basis event in the Oconee CLB.
- The Atomic Energy Commission approved the design report as part of the initial Units 2 & 3 SER (7/6/1973).

HELB Licensing Timeline

- July 1998 Oconee completes a self assessment of the HELB Design Basis.
- December 1998 NRC Inspection Report violations - Oconee committed to reconstitute the HELB licensing basis.
- 2001-2005 Oconee worked with the NRC to gain agreement on criteria for identifying high energy systems, postulated break and crack locations, modes of plant operations applicable to the postulation of breaks, and application of single failures.
- 2007 NRC letter provided general agreement with the criteria to be used in the HELB analyses (“McGinty Letter”).
- 2008-2009 Oconee submitted unit specific LARs.

HELB Licensing Timeline

- 2011 The Unit specific LARs were consolidated into one LAR and resubmitted.
- 2012 The NRC suspended review of the HELB LAR to concentrate on licensing PSW (which was credited in the HELB LAR).
- PSW SER Received – August 13, 2014.
- PSW Installation Complete – December 22, 2015.
- Revised HELB LAR submitted – August 28, 2019.
- NRC accepted revised HELB LAR for review – October 1, 2019.

HELB Commitments

HELB Commitments from 2017 Re-baseline

- 45 Original Commitments.
- 8 Remain to be completed.

Notable HELB Commitments Completed

- Protected Service Water.
- Flood outlet devices, flood impoundment, and exterior door improvements for the Units 1, 2, & 3 East Penetration Room (EPR) and Auxiliary Building.

Notable HELB Commitments Completed / continued

- Remote operators for Unit 1 and 3 valves HP-103 & HP-107 on the individual suction-lines to the 'A' & 'B' High Pressure Injection (HPI) pumps.
- Operator change out of Unit 2 and 3 normal letdown valves HP-1 & HP-2.

HELB Commitments

Remaining HELB Commitments

- Structural modifications to selected columns in the Turbine Building.
- Control Complex Cooling modifications.
- Remote operators for Unit 2 valves HP-103 & HP-107 on the individual suction-lines to the 'A' & 'B' High Pressure Injection (HPI) pumps.
- Operator change out of Unit 1 normal letdown valves HP-1 & HP-2.

New HELB LB

- Proposes the PSW system or SSF for HELB mitigation when a HELB results in the loss of plant systems needed for safe shutdown (SSD) inside the turbine building (TB).
- Proposes normal plant systems (i.e., high pressure injection (HPI), emergency feedwater (EFW)) or the SSF for HELB mitigation when a HELB results in the loss of plant systems needed for SSD inside the auxiliary building (AB).
- Proposes normal plant systems for HELB mitigation when a HELB occurs outside of the TB or AB.
- Excludes certain systems and subsystems from HELB consideration due to the short time these systems operate at HE conditions.

New HELB LB

- Modifies break selection criteria as allowed by Generic Letter (GL) 87-11 and portions of the Standard Review Plan (SRP) Branch Technical Position (BTP) Mechanical Engineering Branch (MEB) 3-1.
- Proposes the use of NUREG/CR-2913 for the determination of effective length of jets from a HELB or critical crack.
- Proposes the use of a repair strategy for establishment of cold shutdown (CSD) for breaks postulated to occur in the TB.
- Maintains HELB as a separate and distinct requirement versus the pipe ruptures considered as design basis events (e.g. Main Steam Line Breaks).

New HELB Licensing Documentation

- Licensing Document Changes
  - Supersedes original 1973 CLB responses to the Giambusso/Schwencer letters.
  - Supersedes the 2011 LAR submittal and associated RAIs.
  - Significant rewrite of UFSAR Chapter 3.6, including:
    - Methodology for the identification of HE systems.
    - Methodology for the identification of break/crack locations.
    - Methodology for the determination of break types.
    - Shutdown Sequence Evaluation Criteria.
    - Interaction Evaluation Criteria.
    - Overall HELB Mitigation Strategy (including Safe Shutdown objectives and functions to meet those objectives).
  - No changes to Technical Specifications.

Discussion of HELB LAR

- LAR Composition (NEI 06-02 guidelines)
  - Cover Letter
  - Enclosure
    - 1.0 Summary Description.
    - 2.0 Detailed Description.
      - System Design and Operation.
      - Current Technical Specifications Requirements.
      - Reason for the Proposed Change.
      - Description of the Proposed Change.
      - UFSAR Changes.

Discussion of HELB LAR

- LAR Composition / continued
  - Enclosure / continued
    - 3.0 Technical Evaluation.
      - Purpose and Methodology.
      - HELB Strategy.
      - Regulatory Requirements.
      - Arbitrary Intermediate HELBs and Critical Cracks.
      - Excluded Systems.
      - Operations Response, Training and Procedures.
      - Thermal Hydraulic Analyses.

Discussion of HELB LAR

- LAR Composition / continued
  - Enclosure / continued
    - 4.0 Regulatory Evaluation.
      - Applicable UFSAR.
      - Precedent.
      - Significant Hazards Consideration.
    - 5.0 Environmental Consideration.
    - 6.0 References.
    - 7.0 Acronyms.

Discussion of HELB LAR

- LAR Composition / continued
  - Attachments
    - Attachment 1 Commitments/Conforming Actions
    - Attachment 2 UFSAR Markups.
    - Attachment 3 UFSAR Retypes.
    - Attachment 4 Thermal Hydraulic Models for High Energy Line Break Transient Analysis (Proprietary).
    - Attachment 5 Thermal Hydraulic Models for High Energy Line Break Transient Analysis (Non-Proprietary).
    - Attachment 6 Thermal Hydraulic Transient Analysis for Evaluation of High Energy Line Breaks.

Discussion of HELB LAR

- LAR Composition / continued
  - Attachments / continued
    - Attachment 7 Duke Proprietary Affidavit.
    - Attachment 8 Framatome Proprietary Affidavit.
    - Attachment 9 Regulatory Requirements.
    - Attachment 10 Definitions.
    - Attachment 11 Time Critical Operator Actions.
    - Attachment 12 Feasibility Assessment for New Time Critical Operator Actions.

New HELB Conforming Actions

- QA-1 SSF CR Instrumentation for Steam Generator pressure, nuclear instrumentation, core exit thermocouples, pressurizer temperature, and temperature compensated pressurizer level.
- Elimination of cross connect Control Rod Drive power between units.
- Upgraded SSF Letdown line.
- Environmental Qualification of SSF related components located in the West Penetration and the Cask Decontamination Tank Rooms.
- Modification to isolate Low Pressure Service Water valves 1,2,3LPSW-1119 and 1120.
- Time Critical Operator Action Validation

Closing Remarks

- Oconee Nuclear Station license amendment on High Energy Line Break will clarify and update the site's license basis for HELB.
  - Substantial resources and time have been invested to address regulatory questions and to assure that the site is prepared to respond to an unlikely HELB event.
  - A majority of the prior HELB commitments have been met including significant plant modifications that have already been completed.
  - Additional modifications to support an updated HELB response are planned and budgeted to complete the site's HELB response.
- The site looks forward to working with the NRC to complete the HELB LAR review.


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