Oconee RPS/ESPS Digital Upgrade Licensing Experience

May 6, 2009

RPS/ESPS Digital Upgrade Overview

- Digital Upgrade
  - Replaces Analog Reactor Protection System and Engineered Safeguards Protection System
  - 18 cabinets
  - Uses existing reactor trip and accident mitigation sensor inputs
  - Adds diverse LPI and HPI Actuation Systems
- Licensing Activities
  - Duke License Amendment Request along with separate Cyber Security Submittal – January 2008
  - Two Rounds of RAIs for each submittal
  - 16 LAR Supplements, 3 Cyber Security Supplements
  - 142 Documents submitted to NRC
  - 4 NRC audits (Oconee Site, AREVA Alpharetta Office, and Erlangen Germany Test Field)

Licensing Review Timeline

RPS/ESPS LAR Submittal	January 31, 2008
NRC LAR Acceptance Review	April 24, 2008
1st Set of LAR RAIs	August 20, 2008
1st Set of Cyber Security RAIs	September 26, 2008
Response to 1st Set of LAR RAIs	September 30, 2008
Response to 1st Set of Cyber Security RAIs	November 6, 2008
2nd Set of LAR & Cyber Security RAIs	March 9, 2009
Response to 2nd Set of RAIs	April 3, 2009
Draft SE to DORL	July 2009
SE Issuance	Fall 2009

LAR Format and Content

- Numerous pre-application meetings to address format and content
  - NEI 06-02 for basic format and content
  - Regulatory Guide 1.206 C.I.7 for technical portion
  - SRP BTP 7-14 for software QA
- LAR Enclosure 1 provides evaluation of the proposed change
  - Chapter 1 provides summary description
  - Chapter 2 describes proposed design change
    - ✓ Provides information consistent with RG 1.206, C.I.7.2, C.I.7.3, & C.I.7.8
  - Chapter 3
    - ✓ Provides information consistent with RG 1.206 C.I.7
    - ✓ Addresses compliance with IEEE 603-1998 and IEEE 7-4.3.2-2003 by clause
    - ✓ Testing performed or planned
    - ✓ Summary of FMEA
    - ✓ Operation, maintenance and support aspects of new system
  - Chapter 4 – Regulatory Evaluation
  - Chapter 5 – Environmental Considerations
- LAR Enclosure 2 provides evaluation of proposed Technical Specification change
- LAR Enclosure 3 provides list of regulatory commitments
- LAR Enclosure 6 provides documents needed for acceptance review

Cyber Security Submittal

- May 1, 2007 Meeting Duke and NRC Staff agreed security sensitive information should be provided separately
- Regulatory Guide 1.152, Revision 2 describes method acceptable by NRC Staff for complying with cyber security regulations
  - Directly applicable to new designs
  - Requires correlation to previously approved designs
- Submittal addresses cyber security aspects of the system from the concepts phase through the retirement phase

First –of–a Kind Licensing Challenges

- Oconee RPS/ESPS LAR is the first complete RPS/ES replacement reviewed by NRC
- NRC ISG's for Digital I&C Reviews did not exist during submittal development – most were issued just prior to submittal
- TELEPERM XS Platform used by Oconee approved May 2000
  - Long time interval between approval & Oconee Project Review
  - NRC concerns with changes since platform approval and control of changes
  - Lack of detail in Topical Report SER caused re-review of many facets of platform design

Changing Regulatory Guidance

- NRC Review Guidance out of date or did not exist during Oconee LAR development
- Interim Staff Guidance (ISG) developed to provide predictable, and timely licensing process for both new and existing plants
- ISGs issued during LAR development or after LAR submittal were applied to the Oconee application
  - As a result, significant effort required to correlate old guidance to new guidance
  - ISG-02 on Diversity and Defense in Depth
    - ✓ Impact of 30 minute operator response time assumption (re-review of manual actions credited for existing safety analyses not affected by digital upgrade)
  - ISG-04 on Communication Independence
    - ✓ Interchannel communication
    - ✓ Permanent connection of Service Unit to MSI
  - ISG-01 on Cyber Security
    - ✓ Mapped nuclear safety activities to cyber security topics to meet NRC lifecycle process focus
    - ✓ One-way hardware device used in gateway subject to extensive review
  - Draft ISG-06 on licensing process

Affect of NRC Position on Tools

- Duke advised during acceptance review that use of simulation test tool (SIVAT) was an issue presenting a significant challenge to completing LAR review
- NRC position is that use of simulation test tool requires review and approval prior to use for validation testing
- Changed Oconee V&V Plan for Software Integration Testing
- Software Integration Testing to be performed during Factory Acceptance Testing for all 3 Units
- AREVA to submit TELEPERM XS SIVAT Topical Report to NRC for review and approval

Factory Acceptance Testing

- Test Performed for Oconee RPS/ESPS System
  - Software – RPS, ESFAS, GSM, GW, & Cyber Security
  - Hardware – RPS and ESF Response Time, HW Failures, DHPIAS, and DLPIAS
  - System – One Pump Coastdown, SBLOCA, Startup/Shutdown
- Test Duration – 7 weeks
- NRC audited primarily the software aspects of FAT

Current Licensing Status

- RAIs Addressed
- NRC Preparing Safety Evaluation Report
- Weekly Telecons Being Used to Address NRC Staff questions while writing SE
- Favorable Outcome Expected Based on Preliminary NRC Feedback
- First installation plan on Unit 1 in Spring 2011 Outage

Closing Remarks