MEETING BETWEEN THE NRC AND EXELON
LICENSE RENEWAL APPLICATION FOR
DRESDEN, UNITS 2 AND 3
QUAD CITIES, UNITS 1 AND 2
MAY 20, 2002

- PROPOSED AGENDA -

I.	Introduction	NRC	1:00 - 1:05 p.m.
II.	Exelon Nuclear Presentation of the License Renewal Application (LRA)	Exelon	1:05 - 2:35 p.m.

A. Links Between Chapters 2 and 3
B. Single application for both plants
C. Reactor coolant pressure boundary
D. System descriptions
E. Typical example
F. Determination of system boundaries
G. Boundary drawings
H. Chapter 3 issues

1. Approach to "consistent with GALL"
2. Approach to components not in GALL
3. One unit only does not apply
4. Further evaluations

III.	Public Comment		2:35 - 2:45 p.m.
	Break		2:45 - 3:00 p.m.
IV.	Discussion	NRC/Exelon	3:00 - 3:45 p.m.
V.	Public Comment	NRC	3:45 - 4:00 p.m.
VI.	Adjourn	NRC	4:00 p.m.

Attachment 2

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Dresden/Quad Cities License Renewal Application

Fred Polaski

Mike Hayse Jose Dubon

John Hilbish Eric Blocher

May 20, 2002

Attachment 3

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Dresden/Quad Cities License Renewal Application

- Purpose of today's meeting
  - Present Exelon's planned format of the DQC application
  - Receive NRC feedback on the format
  - Discuss lessons learned from previous SRP format applications

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Agenda

- Project Organization
- License Renewal Approach
- Application format
- Application Table of Contents
- Single application for two plants, four units
- Chapter 2
  - System information
  - Reactor Coolant Pressure Boundary
  - Boundary diagrams
- Chapter 3
  - Table 3.X-1
  - Table 3.X-2
- Appendix B, Aging Management Programs
- Filing Format
- Schedule
- Meeting Closure

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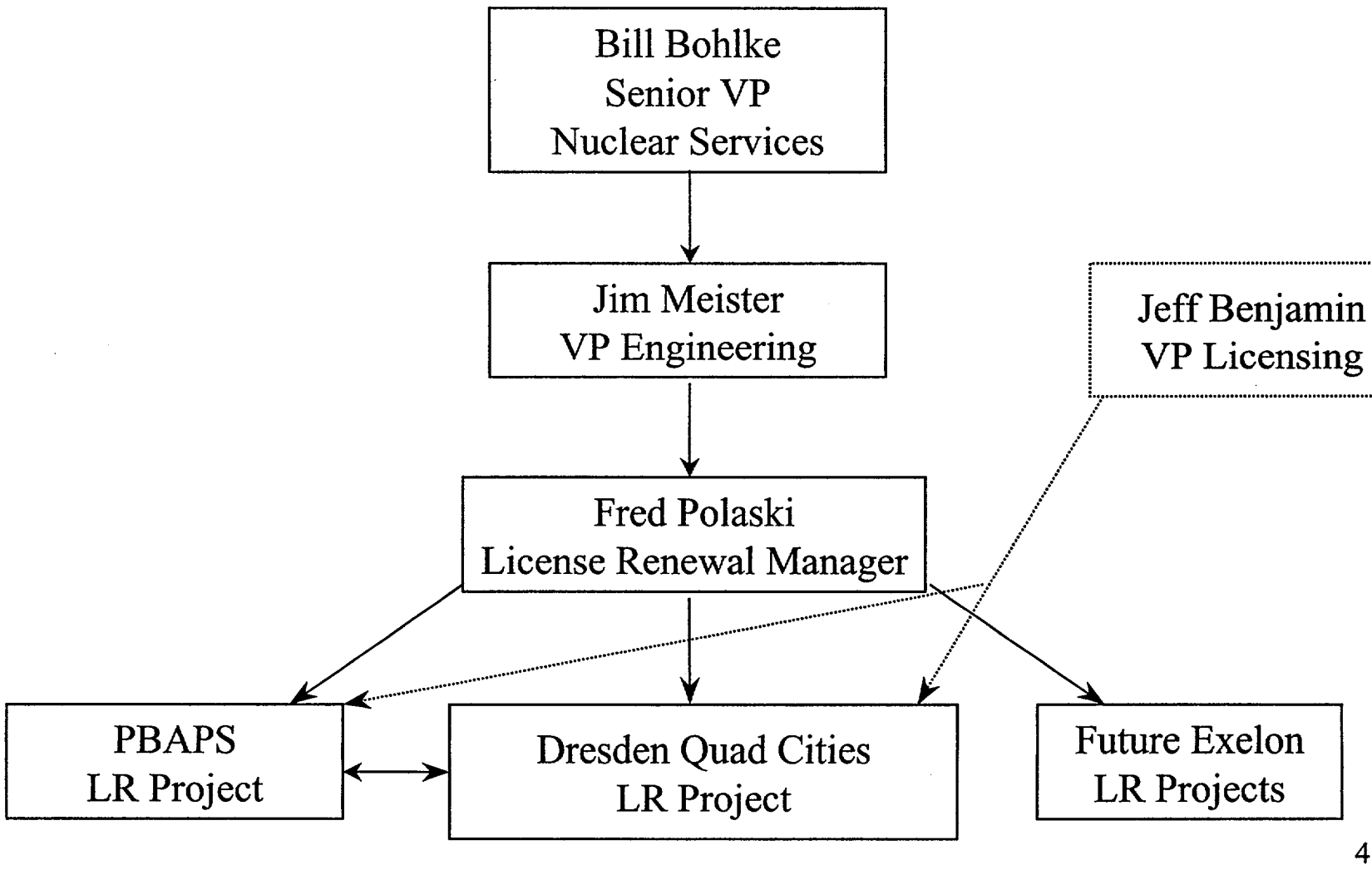
Project Organization



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Project Organization

- Technical Lead – Rob Stachniak
  - Mike Hayse
  - Jay Patel
  - Rajan John
- Project Manager – Marv Lohmann
- Licensing Lead – Jose Dubon
- Environmental – Bill Maher
- Part 54 Contractor – GE, with Parsons as subcontractor
- Part 51 Contractor – Tetra Tech NUS

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Lessons Learned from Peach Bottom

- Detail in the scoping methodology description in the LRA
- Determination of system boundaries and interfaces
- Detail in the system descriptions to include boundary information
- Scoping per ISG on 54.4(a)(2) and SBO
- License Renewal boundary drawings

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Project Schedule

TLAA Report Complete	5/22/02	On Track
Environmental Reports ready for review	7/19/02	On Track
AMR's complete	7/24/02	On Track
LRA ready for project team review	9/4/02	On Track
Project team review complete	9/13/02	On Track
Station, PORC & NSRB review and approval	10/21/02	On Track
LRA submittal	1/3/03	On Track

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License Renewal Approach

- Followed Guidance in NUREG 1800 and 1801, and NEI 95-10.
- Scoping done on a system and structure basis
  - All systems (including electrical) were included in the scoping process
  - LRA includes scoping results for each plant system and structure
- Screening identified components requiring Aging Management Reviews (AMRs)
- AMRs are based on NUREG 1801 Volume 2
  - Mechanical and Civil/Structural AMRs performed using a commodity and environment basis
  - Electrical AMRs performed using Spaces Approach

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Application Format

- Format is based on NUREG 1800
- Format includes early lessons learned from Fort Calhoun Station
- A single application for Dresden and Quad Cities

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Table of Contents

- The Dresden/Quad Cities application Table of Contents is based on NUREG 1800.
- See Handout 1

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Single Application

- The Part 54 submittal will be a single application for Dresden Units 2 and 3 and Quad Cities Units 1 and 2.
  - Information presented only once
  - Differences will be identified
- Separate UFSAR Supplements
- Separate Part 51 Submittals

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Single Application (cont'd)

- Examples of single application presentation for 2 plants, 4 units
  - Table 2.2-1 for Reactor Vessel, Internals, and Reactor Coolant System (See Handout 2)
  - Table 2.2-1 for Auxiliary Systems (See Handout 3)

Chapter 2

- System Information
- Reactor Coolant Pressure Boundary
- Boundary Diagrams

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System Information

- System Description
- UFSAR References
- License Renewal Boundary Diagram References
- System Intended Functions
- Components Requiring Aging Management Review, including links to Chapter 3
- See Handout 4 for an example

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System Description and Boundaries

- The system descriptions are provided and include information on boundaries.
- Structure descriptions are provided.
- No system descriptions for electrical systems. Spaces approach used for all electrical components.

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Reactor Coolant Pressure Boundary

- RCPB as defined in NUREG 1800 and 1801 is made up of parts of multiple systems.
- Exelon approach:
  - Scope and screen RCPB components in their associated plant systems
  - AMR results for RCPB components are presented in LRA Section 3.1 (Reactor Vessel, Internals and Reactor coolant Systems) in accordance with NUREG 1800 and 1801

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Reactor Coolant Pressure Boundary (cont'd)

- Scoping results in Table 2.2-1 (Handout 2)
- Reactor Coolant Pressure Boundary description in LRA Section 2.3.1.8 (Handout 5)
- System Descriptions (Main Steam Example 2.3.4.1 – Handout 4)
  - Description (RCPB identified)
  - System Intended Function (pressure boundary)
  - Components requiring aging management (Table 2.3.4-1 Handout 4)
  - Aging management review results reference provided in Sections 3.1 and 3.4 per NUREG 1800

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Boundary Diagrams

- Will be provided to show boundaries of all in scope mechanical systems.
  - These will show in scope and out of scope components
- One electrical single line
- One site plan to show buildings
- Separate drawings for Dresden and Quad Cities

Chapter 3

- Two tables in each section 3.X-1 and 3.X-2
- Table 3.X-1 contains components where the Component Group, material, environment, and aging effect/mechanism are the same as those in NUREG 1801 Volume 2.
- Table 3.X-2 contains components where material, environment, and/or aging effect/mechanism are not identified in NUREG 1801.

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Table 3.X-1

- Table 3.1-1 for the reactor vessel, internals and reactor coolant system is shown in Handout 6 as an example
- Format of Table 3.X-1 provides:
  - SRP Reference number for Chapter 2 link
  - Column 2 through 4 based on NUREG-1800 (LR-SRP)
  - Discussion column that provides conclusions and clarifying notes

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Aging Management Review Component Groups

- Components evaluated within each group are based on components identified by individual NUREG 1801 line items
- Components not identified in NUREG 1801 are evaluated with a NUREG 1801 component group if:
  - Constructed of same material
  - Assigned the same intended function
  - Located in the same environment
  - Classified in the DQC class category
- Component Group Tables are provided for each mechanical section (3.1, 3.2, 3.3 and 3.4)
- Handout 7 provides more information

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Conclusions for Table 3.X-1

- Consistent with NUREG 1801
- Exceptions to NUREG 1801
- Consistent with NUREG 1801 with exceptions
- Further evaluation results
- Plant specific aging management activities
- Handout 8 provides more information

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Discussion Column in Table 3.X-1

- NUREG 1801 conclusion (See Handout 6)
- Further evaluations
  - Titled based on NUREG-1800 (LR-SRP) title (Table 3.1-1, Ref. 3.1.1.2)
  - Refers to LRA section and evaluation summary (Table 3.1-1, Ref. 3.1.1.2)
  - Results of plant specific aging management reviews (Table 3.1-1, Ref. 3.1.1.3)
  - References to TLAA results (Table 3.1-1, Ref. 3.1.1.1)

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Discussion Column in Table 3.X-1 (cont'd)

- Discussion of GALL exceptions
  - GALL Line Item exceptions (Table 3.1-1, Ref. 3.1.1.6)
  - Appendix B Aging Management Program exceptions (Table 3.1-1, Ref. 3.1.1.2)
- Clarifying Notes
  - Items applicable to Dresden only or Quad Cities only (Table 3.1-1, Ref. 3.1.1.3)
  - Items not in scope of license renewal
  - Other notes and clarifications (Table 3.1-1, Ref. 3.1.1.5)

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Table 3.X-2

- Traditional "Six" Column Table
  - Reference number
  - Component
  - Material
  - Environment
  - Aging Effect
  - Aging Management Activity
  - Discussion
- Table 3.1-2 is shown in Handout 9 as an example

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Appendix B for NUREG 1801 AMPs

- Description of AMP (Handout 10)
- NUREG 1801 consistency
  - NUREG 1801 AMP consistency
  - DQC AMP enhancements required for NUREG 1801 consistency
  - NUREG 1801 exceptions identified and explained
- Operating experience
- Conclusion

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Appendix B for Non-GALL AMPs

- Description of AMP
- Presentation of AMP 10 program elements based on NUREG 1800 Appendix A1 generic program elements
- Conclusion

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Filing Format

- CD ROM's with the UFSAR
- Hard Copies (if desired)
- Boundary Diagrams as separate submittal
- Separate CD ROMs with Environmental Report only
- Quantities of the above to be determined
- 1 CD ROM for NRC Website w/o UFSAR

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Schedule

- Exelon plans to submit the Dresden/Quad Cities License Renewal Application on Friday January 3, 2003

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Meeting Closure

- Additional questions or comments
- Action items
- Final NRC and Exelon statements
- Adjourn

Handouts for Meeting between Exelon and the NRC Dresden / Quad Cities License Renewal Application May 20, 2002

Attachment 4

Handout 1

This handout contains a copy of the Dresden / Quad Cities License Renewal Application Table of Contents as of May 7, 2002.

TABLE OF CONTENTS

APPENDIX B
AGING MANAGEMENT PROGRAMS

APPENDIX C
COMMODITY GROUPS (Optional) - Not Used

APPENDIX D
TECHNICAL SPECIFICATION CHANGES

APPENDIX E
ENVIRONMENTAL INFORMATION – Dresden Nuclear Power Station

APPENDIX F
ENVIRONMENTAL INFORMATION – Quad Cities Nuclear Power Station

Handout 2

This handout contains an example of a typical table that illustrates how the results of Plant Level Scoping are tabulated in the application. It also provides an example of how plant specific characteristics are described in the Comments column.

Table 2.2-1 Mechanical Systems Scoping Results

REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM			
Description	**Dresden In-Scope?**	**Quad Cities In Scope?**	**Comments**
Reactor Vessel and Internals	Yes	Yes	
Reactor Recirculation System	Yes	Yes	
Reactor Vessel Head Vents	Yes	Yes	
Nuclear Boiler Instrumentation	Yes	Yes	
Head Spray System (Dresden only)	Yes	N/A	
Fuel Assembly	Yes	Yes	
Control Blades	Yes	Yes	
Reactor Coolant Pressure Boundary	Yes	Yes	The reactor coolant pressure boundary components of the following systems are evaluated with their associated systems: Main Steam System Feedwater System High Pressure Coolant Injection System Reactor Core Isolation Cooling System (Quad Cities only) Isolation Condenser System (Dresden only) Core Spray System Residual Heat Removal System (Quad Cities only) Low Pressure Coolant Injection System (Dresden only) Shutdown Cooling System (Dresden only) Control Rod Drive Hydraulic System Standby Liquid Control System Reactor Water Cleanup System

Handout 3

This handout contains an example of a typical table that illustrates how the results of Mechanical System Scoping are tabulated in the application. It also provides an example of how plant specific characteristics are described in the comments column.

Table 2.2-1 Mechanical Systems Scoping Results (Continued)

AUXILIARY SYSTEMS			
Description	**Dresden In Scope?**	**Quad Cities In Scope?**	**Comments**
Refueling Equipment	Yes	Yes	
Shutdown Cooling System (Dresden only)	Yes	N/A	
Control Rod Drive Hydraulic System	Yes	Yes	
Reactor Water Cleanup System	Yes	Yes	
Process Radiation Monitoring	Yes	Yes	
Fire Protection System	Yes	Yes	
Emergency Diesel Generators and auxiliaries	Yes	Yes	
HVAC – Main Control Room	Yes	Yes	
Station Blackout (diesels and auxiliaries)	Yes	Yes	
DG Service (Cooling) Water System	Yes	Yes	
Diesel Fuel Oil System	Yes	Yes	
Process Sampling (Containment O2 sampling, Turbine Bldg and radwaste air particulate sampling, drywell air particulate sampling, off gas bldg particulate sampling)	Yes	Yes	
Carbon Dioxide System	Yes	Yes	
Service Water System	Yes	No	At Dresden only, the Service Water System is credited in Appendix R evaluations with providing cooling to other required equipment.
Reactor Building Closed Cooling Water System	Yes	No	At Dresden only, the RBCCW System is credited in Appendix R evaluations with providing cooling to the Shutdown Cooling Heat Exchangers. For Quad Cities only, the primary containment isolation valves are included in the evaluation of primary containment and suppression pool piping system.
Turbine Building Closed Cooling Water System	Yes	No	At Dresden only, TBCCW System is credited in Appendix R evaluations with providing a flow path for cooling of other required equipment.
Make Up Demineralizers System	Yes	No	For Dresden only, Make-Up Demineralizer System is credited in Appendix R evaluations with providing make up cooling water to the Isolation Condenser. For Quad Cities only, the primary containment isolation valves are included in the evaluation of primary containment and suppression pool piping system.
Residual Heat Removal Service Water (Quad Cities only)	N/A	Yes	
Containment Cooling Service Water System (Dresden only)	Yes	N/A	
Fuel Pool Cooling System and Filter Demineralizers	No	No	

AUXILIARY SYSTEMS			
Description	**Dresden In Scope?**	**Quad Cities In Scope?**	**Comments**
Liquid Radwaste and Equipment Drains	No	No	Primary containment isolation valves and components associated with drywell floor drain and equipment drain sump pump discharges are included in the evaluation of primary containment and suppression pool piping system.
Solid Radwaste	No	No	

Handout 4

This handout contains an example of a typical mechanical system scoping and screening results. It illustrates how Mechanical System Scoping and Screening results are summarized and tabulated in the application. It contains a description of the system, description of the evaluated boundaries, UFSAR and drawing references, intended functions and a tabulated list of the components requiring aging management review.

2.3.4.1 Main Steam System

System Description

The main steam system delivers steam from the reactor pressure vessel to the main turbine and auxiliary systems such as gland seal system, steam jet air ejectors, off-gas preheater and booster air ejectors, and maximum recycle reboiler. The main steam system includes the main steam piping from the reactor pressure vessel nozzles to the main turbine main steam stop valves. Venturi-type flow restrictors, one per main steam line, are located between the safety and relief valves and the inboard main steam isolation valves. Main steam isolation valves, two per main steam line, are located inboard and outboard of primary containment.

The safety, relief and safety/relief valves are part of the main steam system and are located on main steam piping, inside primary containment. Selected relief valves are actuated by signals from the automatic depressurization system. The automatic depressurization system and its intended functions are further described in Section 2.3.2.13.

The evaluation boundary for the main steam system extends from the reactor pressure vessel nozzle safe-ends to the main steam safety valves and to the turbine bypass valves. The main steam drain lines to the condenser are also included in the evaluation boundary. Also included are manual isolation valves associated with main steam line flow transmitters and components associated with certain instrument racks that are assigned from the feedwater level control system. The air accumulator, check valve and vent valves associated with the main steam safety relief valves and the MSIVs are included in the main steam system.

The portion of piping between the reactor pressure vessel and the outboard main steam isolation valve is considered part of the reactor coolant pressure boundary. The main steam drain line including the outboard isolation valve is also part of the reactor coolant pressure boundary. The reactor coolant pressure boundary is evaluated in Section 3.1 in accordance with NUREG-1801.

UFSAR References

Dresden Station UFSAR Section(s): 5.0

Quad Cities Station UFSAR Section(s): 5.0

License Renewal Boundary Diagram References

Dresden Station:
LR-DRE-030-A-M-12-1, LR-DRE-030-A-M-12-2, LR-DRE-030-A-M-25,
LR-DRE-030-A-M-345-1, LR-DRE-030-A-M-345-2, and LR-DRE-030-A-M-356

Quad Cities Station:
LR-QDC-030A-M-13-1, LR-QDC-030A-M-13-2, LR-QDC-030A-M-34-1,
LR-QDC-030A-M-60-1, LR-QDC-030A-M-60-2, and LR-QDC-030A-M-76-1

Intended Functions within the Scope of License Renewal

Pressure boundary – maintains pressure boundary integrity and provides steam-line isolation to support the reactor coolant pressure boundary.

Core cooling – in conjunction with the automatic depressurization system, supports emergency core cooling by depressurizing the reactor pressure vessel as required to support low pressure coolant injection and low pressure core spray operation.

Overpressure protection – provides overpressure protection in transient or accident events which increase pressure in the reactor pressure vessel.

Primary containment isolation – provides containment isolation for those portions of the system that interface with the primary containment.

Supports ESF function(s) – provides process signals for initiation of ESF functions, limits coolant inventory loss rate in some LOCA events, and provides steam supply for operation of the HPCI and RCIC Systems (RCIC is applicable only at Quad Cities.)

Credited in regulated event(s) – provides overpressure protection, reactor vessel isolation capability and pressure control capability credited in mitigation of the Appendix R Fire, ATWS and SBO events.

Post-accident plateout of MSIV bypass leakage – provides surfaces for plateout of iodine releases resulting from MSIV bypass leakage.

Components Requiring Aging Management Review

Table 2.3.4-1 Components Requiring Aging Management Review - Main Steam System

Component	Component Intended Function	Aging Management Review Reference
Piping	Pressure Boundary	3.1.1.1, 3.1.1X, 3.4.1.X
Restricting Orifice	Pressure Boundary	3.4.1.X,
Restricting Orifice	Throttle	3.4.1.X
Sight Glass	Pressure Boundary	3.4.2.X
Tanks	Pressure Boundary	3.4.2.X
Thermowells	Pressure Boundary	3.1.1.X, 3.4.1.X
Valve Body and Bonnet	Pressure Boundary	3.4.1.X

Aging management review results for the main steam system are provided in Section 3.1 for the reactor coolant pressure boundary functions and Section 3.4 for the additional main steam functions.

Handout 5

This handout contains a preview of how the non-traditional BWR Reactor Coolant Pressure Boundary system was evaluated in the Integrated Plant Assessment (IPA) that supports the Dresden / Quad Cities License Renewal Application. It provides a list of the systems that have components which make up the "non-traditional BWR" Reactor Coolant Pressure Boundary system, in a tabulated format. Those systems that are plant unique have been identified.

2.3.1.8 Reactor Coolant Pressure Boundary Components

Reactor coolant pressure boundary is not a traditional BWR system. In addition to the systems and components described in preceding subsections, reactor coolant pressure boundary components normally assigned to other BWR plant systems are evaluated in NUREG-1800 and NUREG-1801 as part of the reactor vessel, internals and reactor coolant system. In Section 2.3, the reactor coolant pressure boundary components requiring aging management review have been maintained in the plant system to which they are normally assigned, rather than grouped together with the reactor vessel, internals and reactor coolant system. Table 2.3.1-8 presents a list of plant systems having reactor coolant pressure boundary components evaluated in NUREG-1800 and NUREG-1801 as part of the reactor vessel, internals and reactor coolant system.

For each of these systems, applicable system descriptions, UFSAR references, license renewal boundary diagram references, system intended functions, and complete listings of component groups requiring aging management review are presented in the application section indicated in the Table 2.3.1-8.

Aging management review results for these reactor coolant pressure boundary components are presented in Section 3.1 in a similar manner to the presentation in NUREG-1801.

Table 2.3.1-8 Application sections where additional reactor coolant pressure boundary components are evaluated.

System Name	Application Section Which Contain Reactor Coolant Pressure Boundary Components
High Pressure Coolant Injection System	2.3.2.1
Core Spray System	2.3.2.2
Reactor Core Isolation Cooling System (Quad Cities, only)	2.3.2.4
Isolation Condenser System (Dresden, only)	2.3.2.5
Residual Heat Removal System (Quad Cities, only)	2.3.2.6
Low Pressure Coolant Injection System (Dresden, only)	2.3.2.7
Standby Liquid Control System	2.3.2.8
Shutdown Cooling System (Dresden, only)	2.3.3.2
Control Rod Drive Hydraulic System	2.3.3.3
Reactor Water Cleanup System	2.3.3.4
Main Steam System	2.3.4.1
Feedwater System	2.3.4.2

Handout 6

This handout contains an example of Table 3.X-1 from Chapter 3. The tables provide the reference identifier that is used in sections of Chapter 2 to link the evaluated SSC to the appropriate aging management program.

Table 3.1-1 Aging management programs evaluated in the NUREG-1801 Report that are relied on for license renewal for the reactor vessel, internals, and reactor coolant system

Reference No.	Component Group	Aging Effect/Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.1	Reactor coolant pressure boundary components	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	Yes, TLAA	See Section 3.1.1.1.1
3.1.1.2	Small-bore reactor coolant system and connected systems piping	Crack initiation and growth due to SCC, intergranular SCC, and thermal and mechanical Loading	Inservice inspection; water chemistry; one-time inspection	Yes, parameters monitored/ inspected and detection of aging effects are to be further evaluated	Consistent with NUREG-1801, with exception described in Section B.1.1 Further evaluation Crack initiation and growth due to thermal and mechanical loading or stress corrosion cracking described in Section 3.1.1.1.2
3.1.1.3	Jet pump sensing line and reactor vessel flange leak detection line	Crack initiation and growth due to SCC, intergranular stress corrosion cracking (IGSCC), or cyclic loading	Plant specific (XI.M1 Inservice Inspection)	Yes, plant specific	Consistent with NUREG-1801 Further evaluation of aging management for Quad Cities described Section 3.1.1.1.3. Note: This component group applies only to Quad Cities. The reactor vessel leak detection line is constructed of carbon steel at Dresden (and is evaluated in Section 3.1.2) and therefore, not susceptible to cracking due to SCC or IGSCC.

Table 3.1-1 Aging management programs evaluated in NUREG-1801 that are relied on for license renewal for the reactor vessel, internals, and reactor coolant system (Continued)

Reference No.	Component Group	Aging Effect/Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.1.1.4	CASS pump casing and valve body	Loss of fracture toughness due to thermal aging embrittlement	Inservice inspection	No	Consistent with NUREG-1801
3.1.1.5	CASS piping	Loss of fracture toughness due to thermal aging embrittlement	Thermal aging embrittlement of CASS	No	Note: CASS piping material does not exist at Dresden or Quad Cities, therefore this line is not applicable
3.1.1.6	BWR piping and fittings; steam generator components	Wall thinning due to flow accelerated corrosion	Flow accelerated corrosion	No	Consistent with NUREG-1801, with exception discussed in Section 3.1.1.2.1
3.1.1.7	Nozzle safe ends, recirculation pump casing, connected systems piping and fittings, body and bonnet of valves	Crack initiation and growth due to SCC, IGSCC	BWR stress corrosion cracking; water chemistry	No	Consistent with NUREG-1801, with exception described in Section B.1.1

3.1.1.1 Further Evaluation of Aging Management as Recommended by NUREG-1801 for the reactor vessel, internals, and reactor coolant system

3.1.1.1.1 Cumulative fatigue damage

Fatigue is a TLAA and is evaluated in accordance with 10 CFR 54.21 (c). Refer to Section 4.3 for individual TLAA evaluations for cumulative fatigue damage

3.1.1.1.2 Crack initiation and growth due to thermal and mechanical loading or stress corrosion cracking

An inspection of small bore reactor coolant piping is to be conducted in accordance with XI.M32 One Time Inspection – Aging Management Programs will be augmented by verifying that service-induced weld cracking is not occurring in the small-bore piping less than 4 inches including pipe, fittings and branch connections.

3.1.1.1.3 Crack initiation and growth due to thermal and mechanical loading or stress corrosion cracking

Quad Cities - NUREG-1801, Table IV, item A1.1.5 calls for a plant specific aging management program for the reactor vessel flange leak detection line. The reactor vessel flange leak detection line at Quad Cities is a Class 2 line. The line is stainless steel and therefore, it is susceptible to cracking due to SCC and IGSCC. The Quad Cities ISI Program, Relief Request PR-02 (Relief granted per SER dated 9/15/95), proposes an alternate inspection of the reactor vessel flange leak detection line. The alternate examination utilizes a VT-2 visual examination on the line during vessel flood-up during a refueling outage.

3.1.1.2 Aging Management Programs or Evaluations that are Different then those described in the NUREG-1801 Report for the reactor vessel, internals, and reactor coolant system

3.1.1.2.1 Exception to NUREG-1801 for HPCI and RCIC Systems for flow accelerated corrosion

An exception to the GALL is taken by assuming no flow accelerated corrosion exists in the HPCI systems and RCIC (Quad Cities only) system and consequently not crediting the FAC Program for aging management (GALL Item no. IV C1.1-a, VD2.3-a, and VIII.B2.1-b) based on the following:

- NUREG-1557, "Summary of Technical Information and Agreements from Nuclear Management and Resources Council Industry Reports Addressing License Renewal", states that erosion/corrosion in HPCI and the RCIC turbine steam supply piping is non-significant due to the low flow range.
- EPRI NSAC-202L-R2, "Recommendations for an Effective Flow-Accelerated Corrosion Program", allows an exclusion from FAC for systems that operate less than 2% of plant operating time.
- EPRI TR-114882, "Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools", states that flow rates less than 6 ft/sec do not need to be considered for FAC.

Based on these exclusions and parameters, the HPCI and RCIC (Quad Cities only) systems, which contain carbon steel components, are determined not to be susceptible to FAC. Therefore, an exception to GALL is taken by not crediting the FAC Program for the HPCI and RCIC (Quad Cities only) systems and the HPCI and RCIC (Quad Cities only) steam line drains.

Plant experience has shown that the carbon steel Quad Cities HPCI steam line drains have continuous flow, sufficient enough to cause FAC. This carbon steel line is susceptible to FAC and will continue to be managed by the FAC Program.

Handout 7

This handout contains a preview example of the aging management review component groups in the Dresden / Quad cities LRA. Section 3.1 for the reactor vessel, internals, and reactor coolant system is presented as an example. The information provided is in preliminary draft form.

3.1 AGING MANAGEMENT OF REACTOR VESSEL, INTERNALS, AND REACTOR COOLANT SYSTEM

The following systems are evaluated as part of the reactor vessel, internals, and reactor coolant system:

- Reactor vessel and internals
- Recirculation system, recirculation flow control, and MG sets
- Reactor vessel head vents
- Nuclear boiler instrumentation
- Head Spray System (Dresden only)
- Reactor coolant pressure boundary components of the following systems:
  - Main steam system
  - Feedwater system
  - High pressure coolant injection system
  - Reactor core isolation cooling system (Quad Cities only)
  - Isolation condenser system (Dresden only)
  - Core spray system
  - Residual heat removal system (Quad Cities only)
  - Low Pressure Coolant Injection system (Dresden only)
  - Shutdown cooling system (Dresden only)
  - Control rod drive hydraulic system
  - Standby liquid control system
  - Reactor water cleanup system

Component Groups

Note: Only the component groups referenced in M04 and M05 AMRs are provided.

The component groups identified below are evaluated as part of the reactor vessel, internals, and reactor coolant system. Components evaluated within each NUREG-1801 component group are established based on components identified or described in individual NUREG-1801 line items. All components with the same intended function, material, and environment were evaluated as a component group to confirm consistency with the aging effects and aging management activities identified by each NUREG-1801 line item.

In some cases, a component not identified or described in NUREG-1801 was assigned to a NUREG-1801 component group. Components not identified or described in NUREG-1801 were assigned to and evaluated with a NUREG-1801 component group if the component met each of the following four criteria:

- Constructed of the same material as components in the NUREG-1801 component group,
- Assigned the same Intended Function as components in the NUREG-1801 component group,
- Located in the same environment as components in the NUREG-1801 component group, and
- Were classified in the same Dresden and Quad Cities class category as other NUREG-1801 components in the component group.

Components Evaluated within NUREG-1801 Component Groups
(Note: This is a partial list developed from 2 AMRs)

Component Group	Components Evaluated
Top head enclosure	Vessel flange leak detection line
Piping and fittings	Piping and fittings Tubing (not in NUREG-1801) Thermowells (not in NUREG-1801) Tank [includes condensing chamber, drain pot] (not in NUREG-1801) Restricting orifice [includes pulsation dampeners] (not in NUREG-1801) Flow element (not in NUREG-1801)
Valves	Body Bonnet Valve bodies [includes manifold assembly] (not in NUREG-1801)
Recirculation Pump	Casing

The aging management review results for components that are not evaluated as part of a NUREG-1801 component group are presented in Tables 3.X-2.

(Note: This Table will include all BWR related items directly from Chapter 3 of the SRP and are to be provided word for word)

Handout 8

This handout contains a preview of the descriptions for the various methods used to comply with the guidance contained in NUREG-1801. Use of the descriptions provided here can be found in the tables in Chapter 3.

Each line of the 3.X-1 Tables provides a discussion column that identifies:

- Consistent with NUREG-1801
  Identifies aging management reviews that are consistent with the NUREG-1801. This means that the component group, material and environment are applicable, the aging effect and aging mechanisms identified require management, the aging management program identified is appropriate, and the review results of the key elements provided in Appendix B concludes that the program elements are consistent with those elements provided in Chapters X and IX of NUREG-1801. In these cases, the discussion states – Consistent with NUREG-1801.

- Exceptions to NUREG-1801
  Identifies those evaluations which are an exception to the NUREG-1801 aging effects or aging management program or activity and provides reference to the Section in Section 3 and/or Appendix B which providing further explanation and justification. In these cases, the exception refers to all of the NUREG-1801 line items. In these cases, the discussion states – Exception to NUREG-1801.

- Consistent to NUREG-1801, with exception
  Identifies those evaluations where several of the individual NUREG-1801 line items may be evaluated as consistent with NUREG-1801 while other line items in the same NUREG-1800 line may be evaluated as exception to NUREG-1801. In these cases, the discussion states – Consistent with NUREG-1801 with exception identified in Section 3.X.X and or Appendix B.

- Further evaluations recommended by NUREG-1801
  Identifies and provides reference to sections providing further evaluation of aging management recommended by NUREG-1801

- Plant specific aging management activities
  Identifies the aging management program or activity when a plant specific aging management activity is recommended by NUREG-1801.

- Notes to clarify
  Provides notes to clarify NUREG-1801 Volume 2 line items such as that are not in scope of license renewal or not installed at Dresden or Quad Cities.

Handout 9

This handout contains an example of Table 3.X-2 from Chapter 3. The example provided is for the reactor vessel, internals, and reactor coolant system. The tables provide the reference identifier that is used in sections of Chapter 2 to link the evaluated SSC to the appropriate aging management program

3.1.2 Components or Aging Effects that are not addressed in the NUREG-1801 Report for the reactor vessel, internals, and reactor coolant system

Table 3.1-2 contains aging management review results for the reactor vessel, internals, and reactor coolant system for components that are not addressed in the NUREG-1801 Report.

The following combinations of materials and environments exist for components subject to aging management in the reactor vessel, internals, and reactor coolant system are not addressed in NUREG-1801.

Table 3.1-2 Aging Management Review Results for the reactor vessel, internals, and reactor coolant system that are not addressed in the NUREG-1801 Report

Reference No.	Component	Material	Environment	Aging Effect	Aging Management Activity	Discussion
3.1.2.1	Piping and fittings	Aluminum	Condensate	Loss of material/Pitting and Crevice Corrosion	• XI.M2 Water Chemistry	Aluminum was not considered in reactor grade water environment in NUREG-1801
3.1.2.2	Thermowell	Aluminum	Condensate	Loss of Material/Pitting and Crevice Corrosion	XI.M2 Water Chemistry	Aluminum was not considered in reactor grade water environment in NUREG-1801
3.1.2.3	Piping and fittings	Chrome Moly	Reactor coolant or steam	Loss of material/Pitting Corrosion	M2 Water Chemistry	Chrome moly was not considered in reactor grade water environment in NUREG-1801
3.1.2.4	Valves (Dresden only)	Carbon Steel	Reactor coolant or steam	Loss of material/Crevice and Pitting Corrosion	M2 Water Chemistry	Vessel flange leak detection line is constructed of carbon steel at Dresden

Handout 10

This handout contains a preview of a typical format for those aging management programs that are to be credited for License Renewal. The example also contains wording for how the existing program will comply with NUREG-1801 following proposed enhancements.

B.1.1 M2 Water Chemistry

Description

Water chemistry aging management program activities consist of preventive measures that are used to manage aging of components exposed to reactor water, condensate and feedwater, condensate tank water, and control rod drive water. The program activities provide for monitoring and controlling of water chemistry using station procedures and processes based on EPRI TR-103515, "BWR Water Chemistry Guidelines - 2000 Revision."

NUREG-1801 Consistency

The water chemistry aging management program activities are consistent with the ten elements of aging management program XI.M2, Water Chemistry, specified in NUREG-1801, Generic Aging Lessons Learned (GALL) Report, April 2001, including the exceptions described below.

NUREG-1801 states that the concentration of corrosive impurities listed in the EPRI TR-103515 guidelines, which include dissolved oxygen and hydrogen peroxide are monitored to mitigate degradation of structural materials. NUREG-1801 also states that water quality (pH and conductivity) is maintained in accordance with the guidance.

Hydrogen peroxide monitoring is not included in the Dresden and Quad Cities water chemistry aging management program activities. Per EPRI TR-103515, BWR Water Chemistry Guidelines (2000 revision), section 5.2.1.13, due to the very rapid decomposition of peroxide to water and oxygen in reactor coolant sample lines, reliable data is exceptionally difficult to obtain. In addition, the monitoring of hydrogen peroxide is not discussed under EPRI TR-103515, section 4.3.3 "Water Chemistry Guidelines for Power Operation". Therefore, hydrogen peroxide is not monitored in the RCS Chemistry.

Note: The actual application would include more information on pH, conductivity, and dissolved oxygen.

Operating Experience:

Water chemistry aging management program activities have been successful in monitoring and controlling known detrimental contaminants. The program provides guidance for maintaining contaminants below specific limits. Procedures provide guidance for effectively monitoring and controlling known detrimental contaminants in reactor coolant such as chlorides, dissolved oxygen and sulfate concentrations. Procedures also provide guidance for monitoring and controlling feedwater conductivity, dissolved oxygen level and concentrations of iron and copper; condensate storage tank water known detrimental contaminants such as chlorides and sulfate concentrations; and control rod drive water dissolved oxygen.

Periodic self-assessments have been performed and will continue to be performed to identify areas that need improvement. When water chemistry problems have been identified corrective actions have been taken to prevent recurrence. The identified problems would not have caused significant impact on the safety of plant operations

Examples of corrective actions follow.

- Air inleakage through the isolation valve of a Dresden condensate pump that was taken out of service for preventive Maintenance in June of 1997 caused elevated feedwater oxygen exceeding limit of 200 ppb. The situation was corrected by closing the valve.
- Many occurrences of elevated sulfate in reactor water at Dresden and Quad Cities have been identified from 1995 through 2001. An action plan was developed. Causes such as reactor water

- cleanup system out of service, flow fluctuation through demineralizer bed, and resin bleed through more pleated filters were identified and corrective actions were implemented.
- A Quad Cities self-assessment performed for the first quarter of 1999 indicated the leakage through the standby coolant isolation valves to the emergency service water makeup line of Unit 1 caused a slight adverse impact on reactor water quality. The standby coolant isolation valves were repaired during the next planned surveillance outage.
- In May of 1999 it was discovered at Dresden that the sample point for condensate storage tanks was not giving an accurate representation of condensate storage tank water. The sample location was found to be connected to a 16" pipe that is the input for radwaste tanks to condensate storage tank. The procedure was revised to require a 30-minute waiting period after completion of the transfer from radwaste tanks to the condensate storage tank before starting to pull a sample of the condensate storage tank water.
- A Quad Cities self-assessment performed in November of 1999 resulted in a change in the method used to pre-coat the condensate demineralizer elements to minimize the feedwater iron excursion.
- Several problems were identified at Quad Cities in 2000 and 2001 relative to elevated conductivity and dissolved oxygen concentration in control rod drive water. An action plan was developed. Causes were identified such as inadequate condensate reject flow (August 2001), use of alternate source from condensate storage tank due to condensate reject valve being out of service (May 2000, March and April 2001), and loss of loop seal that introduced air into the condensate (April 2000). Corrective actions were initiated; such as adjustment of condensate reject flow and re-establishing the loop seal.

Conclusion

The M2 water chemistry aging management program provides reasonable assurance that the intended functions of components within the scope of license renewal that are exposed to reactor water, condensate and feedwater, condensate tank water, and control rod drive water are not lost due to cracking or loss of material.