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10 CFR 54

RS-04-088

June 22, 2004

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-001

Dresden Nuclear Power Station, Units 2 and 3
Facility Operating License Nos. DPR-19 and DPR-25
NRC Docket No. 50-237 and 50-249

Quad Cities Nuclear Power Station, Units 1 and 2
Facility Operating License Nos. DPR-29 and DPR-30
NRC Docket Nos. 50-254 and 50-265

Subject: Follow-up Response to License Renewal Safety Evaluation Report for the Dresden and Quad Cities Nuclear Power Stations

References:
(1) Letter from Pao-Tsin Kuo (U.S. NRC) to John Skolds (Exelon Generation Company, LLC), "License Renewal Safety Evaluation Report for the Dresden and Quad Cities Nuclear Power Stations," dated February 12, 2004

(2) Letter from Patrick Simpson (Exelon Generation Company, LLC) to U. S. NRC, "Response to License Renewal Safety Evaluation Report for the Dresden and Quad Cities Nuclear Power Stations," dated April 9, 2004

(3) Letter from Patrick Simpson (Exelon Generation Company, LLC) to U. S. NRC, "Follow-up Response to License Renewal Safety Evaluation Report for the Dresden and Quad Cities Nuclear Power Stations," dated May 18, 2004

Exelon Generation Company, LLC (EGC) is submitting a revised response to Open Item 3.5.2.3.2-1 that was submitted in Reference 2 and is included as Attachment 1. Enclosed as Attachment 2 are answers to questions that were sent to EGC via email on June 1, June 3, June 10, and June 14, 2004 that are related to our response to SER Open Item 2.1-1 submitted in Reference 3. Also, enclosed as Attachment 3 is additional information in response to RAI B.1.16-01 concerning aging management of the instrument air system.

A097
A098

Should you have any questions, please contact Al Fulvio at 610-765-5936.

I declare under penalty of perjury that the foregoing is true and correct.

Respectfully,

6/22/04
Executed on

Patrick R. Simpson
Manager – Licensing

Attachment 1: Response to SER Open Item 3.5.2.3.2-1
Attachment 2: Response to additional questions related to SER Open Item 2.1-1
Attachment 3. Additional Information in response to RAI B.1.16-01

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Quad Cities Nuclear Power Station
NRC Senior Resident Inspector – Dresden Nuclear Power Station
Illinois Emergency Management Agency – Division of Nuclear Safety

Attachment 1

Response to SER Open Item 3.5.2.3.2-1

OI-3.5.2.3.2-1: (Section 3.5.2.3.2- ASME Section XI, Subsection IWF (B.1.27))

The applicant's response to RAI B.1.27 did not address the staff's concern regarding the inspection of Class MC Supports. The applicant's existing IWF program is NOT consistent with GALL in that it does not include the inspection of Class MC supports. The staff requested additional information as detailed in the SER section cited above.

Response

In a letter dated April 9, 2004, Exelon provided a response to Open Item OI-3.5.2.3.2-1 concerning incorporation of Class MC components supports into the ASME Section XI Subsection IWF inspection programs at Dresden and Quad Cities. In this response, Exelon divided the Class MC component supports installed at each site into four groups based on the section of the containment to which they are attached. These groups are:

Drywell
Suppression chamber
Vent system between the drywell and suppression chamber
Piping that penetrates the primary containment.

In the Dresden and Quad Cities License Renewal Application, as clarified in the response to RAI B.1.27, Exelon committed to include the Class MC component supports attached to the Drywell, Suppression chamber, and the Vent system between the drywell and suppression chamber within the scope of the ASME Section XI Subsection IWF inspection programs for both sites.

However, Exelon stated that while several piping systems penetrating the primary containment were classified as MC piping systems, the pipe supports for these systems would not be included in the ASME Section XI, Subsection IWF program at either site. The technical basis for this exclusion was provided in the response to OI-3.5.2.3.2-1. 10CFR50.55a(g)(4) does not require the inspection of Class MC piping supports. Additionally, ASME Section XI, Subsection IWF-2500, Table IWF-2500-1 does not specify any inspection criteria for Class MC piping supports. The piping classification of the MC piping systems forms the current licensing basis. As discussed in the statements of consideration for 10CFR54, the current regulatory process is adequate to ensure that the licensing bases of all current operating plants provides and maintains an acceptable level of safety during the extended period of operation. Additionally, the plant specific licensing basis must be maintained during the renewal term in the same manner and to the same extent as during the original licensing term. Exelon believes that the classification of these piping systems as MC is correct and accurately portrays the current licensing basis for both Dresden and Quad Cities. In addition, Exelon will maintain the current licensing basis for these piping systems during the period of extended operation.

Class MC piping supports on lines that penetrate the primary containment are included in the Structures Monitoring Program as described in the License Renewal Application, Appendix B, B.1.30, "Structures Monitoring Program". However, to ensure that the sample population of Class MC piping supports is commensurate with the requirements of ASME Section XI, Subsection IWF, Exelon will revise the license renewal aging management program B.1.30 "Structures Monitoring Program". This response supercedes the previous commitments concerning Class MC piping supports contained

in Item 1(d) of the response to Open Item OI-3.5.2.3.2-1 in a letter dated April 9, 2004. The Structures Monitoring Program will be revised as follows for Class MC piping supports:

- Similar to the sample requirements specified in Table IWF-2500-1 for Class 2 Piping Supports, Exelon will perform a VT-3 visual inspection of 15% of the non-exempt Class MC pipe supports once every 10 years.

- Similar to the sample requirements specified in Table IWF-2500-1, the total percentage sample shall be comprised of supports from each system containing Class MC pipe where the individual sample sizes are proportional to the total number of non-exempt supports of each type and function within each system.

- Similar to subsection IWF-1230, Class MC pipe supports exempt from the examination requirements specified above are similar to those connected to components and items exempted from examination under IWC-1220 and IWD-1220 which includes piping NPS 4" and smaller.

- Personnel performing the inspection of non-exempt Class MC pipe supports will be certified to perform VT-3 visual inspections.

The total number of Class MC supports varies per unit. A review of plant drawings has identified a population of 25 to 37 Class MC piping supports per unit that would be included in the sample population described above. The following systems contain Class MC piping with supports that would be included (non-exempt > 4" NPS) in the sample population and inspection requirements described above:

- Reactor Building Closed Cooling Water
- Primary Containment Vent and Purge

The following systems contain Class MC piping with supports that are excluded from the sample population and inspection requirements describe above. In each system listed, the Class MC piping is less than or equal to 4" NPS and is exempt. However, the Class MC piping supports contained in the systems listed below will be subject to aging management program B.1.30, Structures Monitoring:

- Isolation Condenser (Dresden only)
- Low Pressure Coolant Injection (Dresden only)
- Instrument Air
- Reactor Core Isolation Cooling (Quad Cities only)
- Service Air
- Demineralized Water
- Reactor Building Equipment Drains
- Process Sampling
- Containment Atmospheric Dilution
- Fuel Pool Cooling (Dresden only)
- Traverse In-Core Probe
- High Pressure Coolant Injection (Quad Cities only)
- Reactor Recirculation Sampling (Quad Cities only)
- Containment Atmospheric Monitoring

As a result of the commitments made above, the following changes will be made to Appendix B of the License Renewal Application as well as Appendix A, Updated Final Safety Analysis report (UFSAR) Supplement. (Also includes changes from supplemental information request RAI B.1.30 in response to confirmatory Item 3.0.3.14.2-1.):

B.1.30 Structures Monitoring Program

Description

The structures monitoring program provides for aging management of various structures and external surfaces of mechanical components within the scope of license renewal. The program, which was developed for structures monitoring under 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," is based on the guidance in Regulatory Guide 1.160 Revision 2, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," and NUMARC 93-01 Revision 2, "Industry Guidelines for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," and implemented through procedures. The program is not credited for managing protective coatings.

The program will provide for visual inspections of structures and components not included in the ASME Section XI, Subsection IWF (B.1.27) aging management program.

NUREG-1801 Consistency

With enhancements the structures monitoring aging management program is consistent with the ten elements of aging management program XI.S6, "Structures Monitoring Program," specified in NUREG-1801.

Enhancements

- The program will provide for inspections of structural steel components in secondary containment, flood barriers, electrical panels and racks, junction boxes, instrument racks and panels, offsite power structural components and their foundations, and the Quad Cities discharge canal weir as part of the ultimate heat sink.
- The program will provide for periodic reviews of chemistry data on below-grade water to confirm that the environment remains non-aggressive for the license renewal term for the aging mechanisms of corrosion of embedded steel and aggressive chemical attack of concrete.
- The program will provide for inspection of a sample of non-insulated indoor piping external surfaces at locations immediately adjacent to periodically inspected piping supports and inspection of standard components such as snubbers, struts, and spring cans.
- Program procedures will reference specific insulation inspection criteria for existing cold weather preparation and inspection procedures for outdoor insulation, and establish new inspections for various indoor area piping and equipment insulation.
- The program will provide for inspection parameter specificity for non-structural joints, roofing, grout pads and isolation gaps.

- The program will extend inspection criteria to the structural steel, concrete, masonry walls, equipment foundations, and component support sections of the program to provide consistency with NUREG-1801 component supports.
- **The program will provide for a VT-3 visual inspection of 15% of the non-exempt Class MC pipe supports once every 10 years.**

Enhancements are scheduled for implementation prior to the period of extended operation.

Operating Experience

Roof leaks were detected and corrective actions taken for the Dresden turbine building and main control room and for the Quad Cities reactor building and turbine building. Minor degradation of concrete has been detected such as cracks with water stains, pitting, and leaching for various structures including the Dresden reactor building and crib house. Similar degradation has been detected in the Quad Cities reactor building and circulating water intake bays. The degradation was evaluated and dispositioned in accordance with the corrective action process.

Cracks and small gaps were detected in elastomer seals at both Dresden and Quad Cities. Most of the degraded conditions were attributed to man-made occurrences. None were determined to be significant.

Damage and degradation of insulation has been observed and repaired.

Conclusion

The structures monitoring program for aging management provides reasonable assurance that the aging effects are adequately managed so that the intended functions of structures within the scope of license renewal are maintained during the period of extended operation.

A.1.30 Structures Monitoring Program (Dresden)

The structures monitoring aging management program includes periodic inspection and monitoring of the condition of structures; supports not included in the "ASME Section XI, Subsection IWF" aging management program; and external surfaces of mechanical and electrical components. The program ensures that aging degradation leading to loss of intended functions will be detected and that the extent of degradation can be determined. This program was developed under 10 CFR 50.65 and is based on NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 2 and Regulatory Guide 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 2.

Prior to the period of extended operation the program will be revised to include:

- Inspections of structural steel components in secondary containment, flood barriers, electrical panels and racks, junction boxes, instrument panels and racks, and offsite power structural components and their foundations.

- Periodic reviews of chemistry data on below-grade water to confirm that the environment remains non-aggressive for aggressive chemical attack of concrete or corrosion of embedded steel.
- Inspection of a sample of non-insulated indoor piping external surfaces at locations immediately adjacent to periodically inspected piping supports.
- Reference to specific insulation inspection criteria for existing cold weather preparation and inspection procedures for outdoor insulation, and the establishment of new inspections for various indoor area piping and equipment insulation.
- Addition of specific inspection parameters for non-structural joints, roofing, grout pads and isolation gaps.
- Extension of inspection criteria to the structural steel, concrete, masonry walls, equipment foundations, and component support sections of the program.
- **A VT-3 visual inspection of 15% of the non-exempt Class MC pipe supports once every 10 years.**

A.1.30 Structures Monitoring Program (Quad Cities)

The structures monitoring aging management program includes periodic inspection and monitoring of the condition of structures; supports not included in the "ASME Section XI, Subsection IWF" aging management program; and external surfaces of mechanical and electrical components. The program ensures that aging degradation leading to loss of intended functions will be detected and that the extent of degradation can be determined. This program was developed under 10 CFR 50.65 and is based on NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 2 and Regulatory Guide 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 2.

Prior to the period of extended operation the program will be revised to include:

- Inspections of structural steel components in secondary containment, flood barriers, electrical panels and racks, junction boxes, instrument panels and racks, and offsite power structural components and their foundations, and the discharge canal weir as part of the ultimate heat sink.
- Periodic reviews of chemistry data on below-grade water to confirm that the environment remains non-aggressive for aggressive chemical attack of concrete or corrosion of embedded steel.
- Inspection of a sample of non-insulated indoor piping external surfaces at locations immediately adjacent to periodically inspected piping supports.
- Reference to specific insulation inspection criteria for existing cold weather preparation and inspection procedures for outdoor insulation, and the establishment of new inspections for various indoor area piping and equipment insulation.
- Addition of specific inspection parameters for non-structural joints, roofing, grout pads and isolation gaps.
- Extension of inspection criteria to the structural steel, concrete, masonry walls, equipment foundations, and component support sections of the program.
- **A VT-3 visual inspection of 15% of the non-exempt Class MC pipe supports once every 10 years.**

The following changes will also be required to Appendix A of the draft SER:

Item Number	Commitment	UFSAR Supplement Location (LRA App. A)	Implementation Schedule	Source
30) Structures Monitoring	Existing program is credited. The program will be enhanced to add the following: (1) Inspections of structural steel components in secondary containment, flood barriers, electrical panels and racks, junction boxes, instrument panels and racks, and offsite power structural components and their foundations, and the Quad Cities discharge canal weir as part of the ultimate heat sink. (2) Periodic reviews of chemistry data on below-grade water to confirm that the environment remains non-aggressive for aggressive chemical attack of concrete or corrosion of embedded steel. (3) Inspection of a sample of non-insulated indoor piping external surfaces at locations immediately adjacent to periodically inspected piping supports. (4) Program reference to specific insulation inspection criteria for existing cold weather preparation and inspection procedures for outdoor insulation, and the establishment of new inspections for various indoor area piping and equipment insulation. (5) Inspection parameters for non-structural joints, roofing, grout pads and isolation gaps. (6) Extension of inspection criteria to the structural steel, concrete, masonry walls, equipment foundations, and component support sections of the program. **(7) VT-3 visual inspection of 15% of the non-exempt Class MC pipe supports once every 10 years.**	A.1.30	Prior to the period of extended operation	LRA Sections B.1.30, 3.3.1.2.1, 3.5.1.1.7, 3.5.1.2.6,and 3.5.1.2.7; response to Supplemental RAI B.1.27, letter RS-04-046, dated March 25, 2004. Response to Open Item 3.5.2.3.2-1, letter RS-04-057, dated April 9, 2004 and letter RS-04-088 dated June xx, 2004.

Attachment 2

Response to additional questions related to SER Open Item 2.1-1

Clarifications Needed for Applicant's Response to SER Open Item 2.1-1

2.3.3.3 CRD Hydraulic System

1. You stated that you added all of the CRDH components shown on revised boundary diagrams. Do you mean all the components shown *highlighted* on the drawings but not all the components shown on the drawings?

Response:

The statement should have read as follows:

"All of the **highlighted** control rod drive hydraulic components shown on revised boundary diagrams ... have been included within the scope of license renewal."

2. You stated that the four new component groups shown above are for Quad Cities only because the same components at Dresden are already in the scope with a different component intended function. The component groups, filters/strainers and tubing were in scope for both Dresden and Quad Cities under different intended functions in the original LRA. Why do you add these two components groups to scope only for Quad Cities but not for Dresden?

Response:

Dresden and Quad Cities both added additional piping & fittings (spatial interaction) and valves (spatial interaction) to the scope of the rule. These components are already addressed in the LRA Table 2.3.3-3 and therefore the additional scope was added to the drawings only and did not require an LRA Table revision.

At Quad Cities only, additional filters/strainers (spatial interaction), pumps (spatial interaction), tubing (spatial interaction), and restrictive orifices (spatial interaction) were added to the scope of the rule. As these were not previously addressed in the LRA, an LRA Table revision was submitted in addition to the drawing changes.

2.3.3.4 Reactor Water Cleanup System

1. Revised boundary diagram LR-DRE-M-30 shows piping component line 2-3319-2"-L highlighted in addition to 2-3324-1"-H, 2/3-1223-8-LX, and 2-3318-1-L stated in the response. Is piping component line 2-3319-2"-L also in scope?

Response:

Line 2-3319-2"-L was included in the scope of license renewal and should have been referenced in the response to Open Item 2.1-1 along with lines 2-3324-1"-H, 2/3-1223-8-LX, and 2-3318-1-L.

2.3.3.12 Diesel Generator Cooling Water System

1. The piping with intended function of spatial interaction is highlighted as being within the scope of license renewal, why it is not added to LRA Table 2.3.3-12 being subject to an AMR?

Response:

The response to Open Item 2.1-1 should have included a new component group for "Piping and Fittings (spatial interaction)" to LRA Table 2.3.3-12 for aging management as shown below:

LRA Table 2.3.3-12

Component	Component Intended Function	Aging Management Ref
Piping and Fittings (spatial interaction)	**Leakage Boundary (spatial)**	**3.3.1.5, 3.3.1.15**

2.3.3.16 Service Water System

1. Heat exchangers are shown highlighted on boundary diagrams to indicate that they are in scope (e.g., 1B-3802 at location E-5 on revised boundary diagram LR-QDC-M-22-1). These are passive and long-lived components and thus be subject an AMR and listed in Table 2.3.3-16.

Response:

The heat exchangers highlighted on the boundary diagrams were evaluated with the "Piping and Fittings (spatial interaction)" component group on Table 2.3.3-16 for aging management. Because these heat exchangers have been added to the scope of license renewal for spatial interaction, the "Heat Transfer" function does not require aging management. Only the "Leakage Boundary (spatial)" function must be maintained and requires aging management. The heat exchanger leakage boundary is comprised of the same materials and experiences the same environment as the components evaluated under the "Piping and Fittings (spatial interaction)" component group. Therefore they are subject to the same aging effects and are managed by the same aging management programs. The response to Open Item 2.1-1 should have revised the component group for "Piping and Fittings (spatial interaction)" to LRA Table 2.3.3-16 for aging management as shown below. Additionally, the response should have included the clarifications to Table 3.3-1, Reference Number 3.3.1.15, adding heat exchanger shells as shown at the end of this response.

LRA Table 2.3.3-16

Component	Component Intended Function	Aging Management Ref
Piping and Fittings (spatial interaction) **(includes heat exchanger shells)**	Leakage Boundary (spatial)	3.3.1.5, 3.3.1.15, **3.3.2.40**

2. Oil coolers are shown highlighted on boundary diagrams to indicate that they are in scope (e.g., 2-202-51C at location F-2 on revised boundary diagram

LR-DRE-M-22 and 1-202-50B at location F-2 on revised boundary diagram LR-QDC-M-22-5). These are passive and long-lived components and thus be subject an AMR and listed in Table 2.3.3-16.

Response:

Note: Components with noun names that include cooler, such as water or oil coolers have been treated as heat exchangers.

The oil coolers (heat exchangers) highlighted on the boundary diagrams were evaluated with the "Piping and Fittings (spatial interaction)" component group on Table 2.3.3-16 for aging management. Because these oil coolers (heat exchangers) have been added to the scope of license renewal for spatial interaction, the "Heat Transfer" function does not require aging management. Only the "Leakage Boundary (spatial)" function must be maintained and requires aging management. The oil cooler (heat exchangers) leakage boundary is comprised of the same materials and experiences the same environment as the components evaluated under the "Piping and Fittings (spatial interaction)" component group. Therefore they are subject to the same aging effects and are managed by the same aging management programs. The response to Open Item 2.1-1 should have revised the component group for "Piping and Fittings (spatial interaction)" to LRA Table 2.3.3-16 for aging management as shown above. Additionally, the response should have included the clarifications to Table 3.3-1, Reference Number 3.3.1.15, adding heat exchanger shells as shown at the end of this response.

3. Generator stator water coolers are shown highlighted on boundary diagrams to indicate that they are in scope (e.g., 3-7002-A at location E-10 on revised boundary diagram LR-DRE-M-355). These are passive and long-lived components and thus be subject an AMR and listed in Table 2.3.3-16.

Response:

Note: Components with noun names that include cooler, such as water or oil coolers have been treated as heat exchangers.

The generator stator water coolers (heat exchangers) highlighted on the boundary diagrams were evaluated with the "Piping and Fittings (spatial interaction)" component group on Table 2.3.3-16 for aging management. Because these generator stator water coolers (heat exchangers) have been added to the scope of license renewal for spatial interaction, the "Heat Transfer" function does not require aging management. Only the "Leakage Boundary (spatial)" function must be maintained and requires aging management. The generator stator water cooler (heat exchangers) leakage boundary is comprised of the same materials and experiences the same environment as the components evaluated under the "Piping and Fittings (spatial interaction)" component group. Therefore they are subject to the same aging effects and are managed by the same aging management programs. The response to Open Item 2.1-1 should have revised the component group for "Piping and Fittings (spatial interaction)" to LRA Table 2.3.3-16 for aging management as shown above. Additionally, the response

should have included the clarifications to table 3.3-1, Reference Number 3.3.1.15 adding heat exchanger shells as shown at the end of this response.

2.3.3.17 Reactor Building Closed Cooling Water System

1. Cooling water expansion tank, 1-3703, is shown highlighted on revised boundary diagram LR-QDC-M-33-1 to indicate that it is in scope. This is a passive and long-lived component and thus be subject an AMR and listed in Table 2.3.3-17. Table 2.3.3-17 lists component group tanks only for Dresden but not for Quad Cities.

Response:

The cooling water expansion tank was included within the scope of license renewal at both Dresden and Quad Cities and does require aging management. The response to Open Item 2.1-1 should have included a new component group for "Tanks (spatial interaction)" to LRA Table 2.3.3-17 for aging management as shown below:

LRA Table 2.3.3-17

Component	Component Intended Function	Aging Management Ref
Tanks (spatial interaction)	Leakage Boundary (spatial)	3.3.1.5, 3.3.1.13

2. Drywell coolers, recirculation pumps, and drywell equipment drain sump heat exchanger are shown not in scope although the piping connected to these components are shown in scope on revised boundary diagram LR-QDC-M-33-2. Please explain.

Response:

Note: Components with noun names that include cooler, such as water or oil coolers have been treated as heat exchangers.

The recirculation pumps shown on boundary diagram LR-QDC-M-33-2 and LR-QDC-M-75-2 are included in the scope of license renewal and were evaluated in LRA Section 2.3.1.3, Reactor Coolant System (See LR-QDC-M-35-2 and LR-QDC-M-77-2). Aging management for these components is included on Table 2.3.1-5 of the LRA. The recirculation pumps should have been highlighted in green on the revised boundary diagram with boundary flags to the Reactor Recirculation System. The drywell coolers (heat exchangers) and drywell equipment drain sump heat exchanger were added to the scope of license renewal due to spatial interaction and should have been highlighted on the revised boundary diagram. These components were evaluated with the "Heat Exchanger (spatial interaction)" component group on Table 2.3.3-17 for aging management.

2.3.3.18 Turbine Building Closed Cooing Water system

1. Boundary diagram LR-QDC-M-367-4 is listed twice. Is the second repeated by mistake of should it represent another drawing?

Response:

In the draft response to Open Item 2.1-1, LR-QDC-M-367-4 was listed twice. This was corrected in the formal response provided to the NRC dated May 18, 2004.

2. You stated that the four new component groups shown above are for Quad Cities only because the same components at Dresden are already in the scope with a different component intended function. However, the component group pumps, which is one of the four component groups listed, is not listed in Table 2.3.3-18 for Dresden. Please clarify.

Response:

In the response to Open Item 2.1-1 dated May 18, 2004, Exelon stated that the four new component groups added to LRA Table 2.3.3-18 applied to Quad Cities only. This statement was incorrect. All four component groups apply to Dresden and Quad Cities and have the potential to spatially interact with safety related components located in the same general area at both sites.

3. Heat exchangers are shown highlighted on boundary diagrams to indicate that they are in scope (e.g., cooling water heat exchangers, 1A-3802 at location D-3 on revised boundary diagram LR-QDC-M-21 and 2-3802B at location D-6 on revised boundary diagram LR-DRE-M-21). These are passive and long-lived components and thus be subject an AMR and listed in Table 2.3.3-18.

Response:

The heat exchangers highlighted on the boundary diagrams were evaluated with the "Piping and Fittings (spatial interaction)" component group on Table 2.3.3-18 for aging management. Because these heat exchangers have been added to the scope of license renewal for spatial interaction, the "Heat Transfer" function does not require aging management. Only the "Leakage Boundary (spatial)" function must be maintained and requires aging management. The heat exchanger leakage boundary is comprised of the same materials and experiences the same environment as the components evaluated under the "Piping and Fittings (spatial interaction)" component group. Therefore they are subject to the same aging effects and are managed by the same aging management programs. The response to Open Item 2.1-1 should have revised the component group for "Piping and Fittings (spatial interaction)" to LRA Table 2.3.3-18 for aging management as shown below Additionally, the response should have included the clarifications to table 3.3-1, Reference Number 3.3.1.13 adding heat exchanger shells as shown at the end of this response.

LRA Table 2.3.3-18

Component	Component Intended Function	Aging Management Ref
Piping and Fittings (spatial interaction) (includes heat exchanger shells)	Leakage Boundary (spatial)	3.3.1.5, 3.3.1.13, 3.3.2.137

4. Coolers are shown highlighted on boundary diagrams to indicate that they are in scope (e.g., the alternator cooler at location E-9 on revised boundary diagram LR-QDC-M-21 and bus duct coolers and alternator exciter coolers on revised boundary diagram LR-DRE-M-21). These are passive and long-lived components and thus be subject an AMR and listed in Table 2.3.3-18.

Response:

Note: Components with noun names that include cooler, such as water or oil coolers have been treated as heat exchangers.

The coolers (heat exchangers) highlighted on the boundary diagrams were evaluated with the "Piping and Fittings (spatial interaction)" component group on Table 2.3.3-18 for aging management. Because these coolers (heat exchangers) have been added to the scope of license renewal for spatial interaction, the "Heat Transfer" function does not require aging management. Only the "Leakage Boundary (spatial)" function must be maintained and requires aging management. The leakage boundary of the cooler (heat exchangers) is comprised of the same materials and experiences the same environment as the components evaluated under the "Piping and Fittings (spatial interaction)" component group. Therefore they are subject to the same aging effects and are managed by the same aging management programs. The response to Open Item 2.1-1 should have revised the component group for "Piping and Fittings (spatial interaction)" to LRA Table 2.3.3-18 for aging management as shown above. Additionally, the response should have included the clarifications to Table 3.3-1, Reference Number 3.3.1.13 adding heat exchanger shells as shown at the end of this response.

5. Service air compressor, 2-4601, is shown highlighted on revised boundary diagram LR-DRE-M-21 (at location F-1) to indicate that it is in scope. This appears to be a passive and long-lived component and thus be subject an AMR and listed in Table 2.3.3-18.

Response:

Only the jacket cooler (heat exchangers) on the service air compressor was included within the scope of license renewal. The remaining portions of the air compressor do not contain a fluid that could spatially interact with safety related equipment located in the same general area. Only the "Leakage Boundary (spatial)" function must be maintained and requires aging management. The pressure boundary of the cooler (heat exchangers) is comprised of the same materials and experiences the same environment as the components evaluated under the "Piping and Fittings (spatial interaction)" component group. Therefore they are subject to the same aging effects and are managed by the same aging management programs. The response to Open Item 2.1-1 should have revised the component group for "Piping and Fittings (spatial interaction)" to LRA Table

2.3.3-18 for aging management as shown above. Additionally, the response should have included the clarifications to Table 3.3-1, Reference Number 3.3.1.15 adding heat exchanger shells as shown at the end of this response.

2.3.3.19 Demineralized Water Makeup System

1. Revised boundary diagram LR-QDC-M-58-1 quadrant C4 shows a section on piping as being within scope of license renewal. Explain why only this portion of the piping is consider to be within scope of license renewal.

Response:

Line 0-3352-4" was the only pipe highlighted in quadrant C-4 of the boundary diagram because a portion of this pipe is physically located in the same general area with safety related equipment and has the potential to spatially interact. The other piping components located in quadrant C-4 of the boundary diagram are not located in general areas that contain safety related equipment and are separated from safety related components by physical barriers, such as concrete walls, which prevent spatial interaction.

2.3.3.23 Fuel Pool Cooling and Filter Demineralizers System

1. Heat exchangers are highlighted as being within the scope of license renewal, why they are not added to LRA Table 2.3.3-23 being subject to an AMR ?

Response:

The heat exchangers highlighted on the boundary diagrams were evaluated with the "Piping and Fittings (spatial interaction)" component group on Table 2.3.3-23 for aging management. Because these heat exchangers have been added to the scope of license renewal for spatial interaction, the "Heat Transfer" function does not require aging management. Only the "Leakage Boundary (spatial)" function must be maintained and requires aging management. The heat exchanger leakage boundary is comprised of the same materials and experiences the same environment as the components evaluated under the "Piping and Fittings (spatial interaction)" component group. Therefore they are subject to the same aging effects and are managed by the same aging management programs. The response to Open Item 2.1-1 should have revised the component group for "Piping and Fittings (spatial interaction)" to LRA Table 2.3.3-23 for aging management as shown below. Additionally, the response should have included the clarifications to Table 3.3-2, Reference Number 3.3.2.143, respectively, adding heat exchanger shells as shown at the end of this response.

LRA Table 2.3.3-23

Component	Component Intended Function	Aging Management Ref
Piping and Fittings (spatial interaction) **(includes heat exchanger shells)**	Leakage Boundary (spatial)	3.3.1.1, 3.3.2.40, **3.3.1.5, 3.3.2.21, 3.3.2.143, 3.3.2.145, 3.3.2.302**

2.3.3.31 Zinc Injection System

1. On Dwgs. LR-DRE-M-4431, 4431A and LR-QDC-M-15-4, 62-4 the components such as; dissolution column, strainer, FE, etc. are marked indicating they are in the scope. Whereas, in the LRA tables requiring AMR, these components are not listed. Please clarify.

Response:

The dissolution columns, strainers, and flow elements highlighted on the boundary diagrams were evaluated with the "Piping and Fittings (spatial interaction)" component group on Table 2.3.3-31 for aging management. Because these components have been added to the scope of license renewal for spatial interaction, the typical component functions that would apply such as "Pressure Boundary" or "Filtration" do not require aging management. Only the "Leakage Boundary (spatial)" function must be maintained and requires aging management. The leakage boundary for these components are comprised of the same materials and experiences the same environment as the components evaluated under the "Piping and Fittings (spatial interaction)" component group. Therefore they are subject to the same aging effects and are managed by the same aging management programs. The response to Open Item 2.1-1 should have revised the component group for "Piping and Fittings (spatial interaction)" to LRA Table 2.3.3-31 for aging management as shown below. Additionally, the response should have included the clarifications to Table 3.3-1 Reference Number 3.3.1.5 adding dissolution columns. The response should have also included clarifications to Table 3.3-2, Reference 3.3.2.143 adding dissolution columns, strainers and flow elements as shown at the end of this response.

LRA Table 2.3.3-31

Component	Component Intended Function	Aging Management Ref
Piping and Fittings (spatial interaction) **(includes dissolution columns, strainers and flow elements)**	Leakage Boundary (spatial)	3.3.1.5, 3.3.2.143

2.3.4.1 Main Steam System

1. Please explain why the main steam supply lines to the radwaste reboiler is only addressed for Dresden. Was a walk down also performed for Quad Cities? If so what was the results.

Response:

Quad Cities does not have a radwaste reboiler subsystem. As such, the scoping of the main steam supply lines to the radwaste reboiler only applies to Dresden.

2.3.4.3 Condensate and Condensate Storage System

1. The piping section that are being brought into scope contains post strainers and a number of flow elements and thermocouples / thermowells (see Quad Cities drawings M-16, and M-18) none of which are identified in the component groups being added to LRA table 2.3.4.3. Please explain why theses components were not included. (Note: Dresden drawing also contain flow element and thermocouples) Also discuss why the drain coolers and feedwater heaters and their connecting piping were not included in scope.

Response:

Note: Components with noun names that include cooler, such as water or oil coolers have been treated as heat exchangers.

The dissolution post strainers, flow elements and thermocouples highlighted on the boundary diagrams were evaluated with the "Piping and Fittings (spatial interaction)" component group on Table 2.3.4-3 for aging management. Because these components have been added to the scope of license renewal for spatial interaction, the typical component functions that would apply such as "Pressure Boundary" or "Filtration" do not require aging management. Only the "Leakage Boundary (spatial)" function must be maintained and requires aging management. The leakage boundary for these components are comprised of the same materials and experiences the same environment as the components evaluated under the "Piping and Fittings (spatial interaction)" component group. For this reason, these components were evaluated with the "Piping and Fittings (spatial interaction)" component group on Table 2.3.4-3.

The drain coolers (heat exchangers) and feedwater heaters (heat exchangers) were also included in the scope of license renewal and require aging management. Because these components were added to the scope of license renewal for spatial interaction, the "Heat Transfer" function does not require aging management. Only the "Leakage Boundary (spatial)" function must be maintained and requires aging management. The leakage boundary of the drain coolers (heat exchangers) and feedwater heaters (heat exchangers) is comprised of the same materials and experiences the same environment as the components evaluated under the "Piping and Fittings (spatial interaction)" component group. Therefore, they are subject to the same aging effects and are managed by the same aging management programs. The response to Open Item 2.1-1 should have revised the component group for "Piping and Fittings (spatial interaction)" to LRA Table 2.3.4-3 for aging management as shown below. Additionally, the response should have included the clarifications to Table 3.4-1, Reference Numbers 3.4.1.2, 3.4.1.3, and 3.4.1.4, adding strainers, flow elements and heat exchanger shells as shown at the end of this response.

The piping connecting the drain coolers and feedwater heaters is also included within the scope of the rule. However, these components were evaluated under the Feedwater Heater Drains and Vents system described in section 2.3.4.9 of the response provided to the NRC dated May 18, 2004.

LRA Table 2.3.4-3

Component	Component Intended Function	Aging Management Ref
Piping and Fittings (spatial interaction) **(includes strainers, flow elements, thermocouples and heat exchanger shells)**	Leakage Boundary (spatial)	3.4.1.2, 3.4.1.3, 3.4.1.4, **3.4.2.11, 3.4.2.35**

2.3.4.5 Main Turbine and Auxiliary Systems

1. Please provide the basis for including the EHC coolers as part of the Filters/Strainer component group

Response:

Note: Components with noun names that include cooler, such as water or oil coolers have been treated as heat exchangers.

Because the EHC coolers (heat exchangers) were added to the scope of license renewal for spatial interaction, the "Heat Transfer" function does not require aging management. Only the "Leakage Boundary (spatial)" function must be maintained and requires aging management. The leakage boundary of the EHC cooler (heat exchangers) is comprised of the same materials and experiences the same environment as the components evaluated under the "Filter/Strainer (spatial interaction)" component group. Therefore they are subject to the same aging effects and are managed by the same aging management programs. The response to Open Item 2.1-1 should have revised the component group for "Filter/Strainer (spatial interaction)" to LRA Table 2.3.4-5 for aging management as shown below. Additionally, the response should have included the clarifications to Table 3.4-2, Reference Numbers 3.4.2.11 and 3.4.2.56, adding heat exchanger shells as shown at the end of this response.

LRA Table 2.3.4-5

Component	Component Intended Function	Aging Management Ref
Filter/Strainer (spatial interaction) **(includes heat exchanger shells)**	Leakage Boundary (spatial)	3.4.2.11, 3.4.2.56

2.3.4.6 Turbine Oil System

1. Why do component Groups for piping and fittings (attached support) and Valves (attached support), which has an intended function of structural integrity remain as Quad Cities only? Should this apply to Dresden also?

Response:

At Quad Cities only, there is a 2 inch oil transfer line connection between the safety related high pressure coolant injection oil subsystem and the main turbine lube oil piping. This connection is shown on boundary diagram LR-QDC-M-46-3 at coordinate C-6. This non-safety related pipe and fittings are attached to the safety

related HPCI oil junction box. The components associated with this line are evaluated in component groups "Piping and Fittings (attached support)" and "Valves (attached support)" shown on Table 2.3.4-6. Since this piping configuration only applies to Quad Cities, these component groups only apply to Quad Cities.

2. Lube Oil Mist Eliminators and Vapor Extractor are identified as components in scope of license renewal on the Dresden license renewal boundary drawings. These components are not included in LRA table 2.3.4-6. Please explain why these components were omitted.

Response:

Because the lube oil mist eliminator and vapor extractor were added to the scope of license renewal for spatial interaction, typical component functions associated with these types of components such as "Filtration" or "Pressure Boundary" do not require aging management. Only the "Leakage Boundary (spatial)" function must be maintained and requires aging management. The leakage boundary of the lube oil mist eliminator and vapor extractor are comprised of the same materials and experience the same environment as the components evaluated under the "Piping and Fittings (spatial interaction)" component group. Therefore they are subject to the same aging effects and are managed by the same aging management programs. The response to Open Item 2.1-1 should have revised the component group for "Piping and Fittings (spatial interaction)" to LRA Table 2.3.4-6 for aging management as shown below. Additionally, the response should have included the clarifications to Tables 3.4-1 and 3.4-2, Reference Numbers 3.4.1.3 and 3.4.2.32, respectively, adding oil mist eliminators and vapor extractors as shown at the end of this response.

LRA Table 2.3.4-6

Component	Component Intended Function	Aging Management Ref
Piping and Fittings (spatial interaction) **(includes oil mist eliminators and vapor extractors)**	Leakage Boundary (spatial)	3.4.1.3, 3.4.2.32

2.3.4.7 Main Generator and Auxiliaries

1. The applicant stated that the word "Quad Cities Only" was removed from six component groups on LRA Table 2.3.4-7. Why isn't it also removed from the "closure bolting" component group? Should this component group also apply to Dresden?

Response:

The "closure bolting" component group does apply to Dresden and Quad Cities. The words "Quad Cities Only" were inadvertently omitted from this component group in the original LRA and were therefore not noted as being deleted in the response to Open Item 2.1-1.

2. Filters, Generator Filters, and Stator Water Demineralizers are identified as components in scope of license renewal on the Quad Cities license renewal boundary drawings. These components are not included in LRA table 2.3.4-7. Please explain why these components were omitted.

Response:

The filters, generator filters, and stator water demineralizers highlighted on the boundary diagrams were evaluated with the "Housings (spatial interaction)" component group on Table 2.3.3-31 for aging management. Because these components have been added to the scope of license renewal for spatial interaction, the typical component functions that would apply such as "Pressure Boundary" or "Filtration" do not require aging management. Only the "Leakage Boundary (spatial)" function must be maintained and requires aging management. The leakage boundary for these components are comprised of the same materials and experiences the same environment as the components evaluated under the "Housings (spatial interaction)" component group. Therefore they are subject to the same aging effects and are managed by the same aging management programs. The response to Open Item 2.1-1 should have revised the component group for "Piping and Fittings (spatial interaction)" to LRA Table 2.3.4-7 for aging management as shown below. Additionally, the response should have included the clarifications to Table 3.4-2, Reference Numbers 3.4.2.11 and 3.4.2.21, adding filters and demineralizers as shown at the end of this response.

LRA Table 2.3.4-7

Component	Component Intended Function	Aging Management Ref
Housings (spatial interaction) **(includes filters and demineralizers)**	Leakage Boundary (spatial)	3.4.2.11, 3.4.2.21

2.3.4.8 Extraction Steam System

1. LP heaters and Heater Flash Tanks are identified as components in scope of license renewal on the Quad Cities license renewal boundary drawings. These components are not included in LRA table 2.3.4-8. Please explain why these components were omitted.

Response:

The LP heaters and Heater Flash Tanks highlighted on the boundary diagrams are included within the scope of license renewal and require aging management. However, these components were evaluated as part of the Condensate and Condensate Storage System, which is discussed in Section 2.3.4.3 above.

2.3.4.9 Feedwater Heater Drains and Vents

1. LP heaters, Flash Tanks, Drain Coolers, and Condensing Chambers are identified as components in scope of license renewal on the Quad Cities license renewal

boundary drawings. These components are not included in LRA table 2.3.4-9. Please explain why these components were omitted.

Response:

The LP heaters, Flash Tanks, Drain Coolers, and Condensing Chambers highlighted on the boundary diagrams are included within the scope of license renewal and require aging management. However, these components were evaluated as part of the Condensate and Condensate Storage System. The LP heaters and Drain Coolers are discussed in Section 2.3.4-3 above. The Flash Tanks and Condensing Chambers are evaluated in the component group "Tanks" found in Table 2.3.4-3 included in the Exelon response dated May 18, 2004.

LRA Table 3.3-1

Ref No	Component	Components Evaluated	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.5	Components in ventilation systems, diesel fuel oil system, and emergency diesel generator systems; external surfaces of carbon steel components	NUREG-1801 Components Air Accumulator Vessels Air Handlers Heating/ Cooling (CR HVAC) Carbon Steel Components Doors, Closure Bolts, Equip Frames Ducts & Fittings, Access Doors, Closure Bolts, Equip Frames Filters/ Strainers Housings and Supports Mufflers Piping and Fittings Evaluated with NUREG-1801 Components Dampeners, Filters/ Strainers, Flame Arrestors, Lubricators, Pumps, Valves, Heat Exchangers, Restricting Orifices, Orifice Bodies, Sight Glasses, Sprinklers, Tanks, Strainer bodies, Thermowells, Tubing, Diffusers, Flow Elements, Traps, **Dissolution Columns**	Loss of material due to general, pitting, and crevice corrosion, and MIC	Plant specific	Yes, plant specific	Further evaluation of Loss of Material due to General, Microbiologically Influenced, Pitting, and Crevice Corrosion is described in Section 3.3.1.1.7. ~~The primary containment heating and cooling coils evaluated in NUREG-1801, line VII.F3.2-a are not within the scope of license renewal.~~ Dresden and Quad Cities do not have diesel fuel oil system valves or pumps, identified in NUREG-1801, lines VII.H1.2 and VII.H1.3, located outdoors. Dresden and Quad Cities do not have material-environment combination evaluated in NUREG-1801 lines VII.F1.2-a, VII.F2.2-a, VII.F2.4-a, VII.F4.2-a. Filter housing and supports identified in NUREG-1801, line VII.F2.4-a are not included in Dresden and Quad Cities auxiliary and radwaste area ventilation systems.

Ref No	Component	Components Evaluated	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.13	Components in or serviced by closed cycle cooling water system	NUREG-1801 Components Orifice Bodies Piping and Fittings Pumps Tanks Valves Evaluated with NUREG-1801 Components Manifolds Piping and Fittings Pumps Tanks Thermowells Tubing Valves **Heat Exchanger Shells**	Loss of material due to general, pitting, and crevice corrosion, and MIC	Closed-cycle cooling water system (B.1.14)	No	Consistent with NUREG-1801. ~~The fuel pool cooling heat exchangers identified in NUREG-1801, line VII.A4.4 are not in the scope of license renewal.~~ The reactor water cleanup system nonregenerative heat exchangers identified in NUREG-1801, line VII.E3.4 are not in the scope of license renewal. The control room, auxiliary and radwaste , primary containment, and diesel generator building HVAC systems identified in NUREG-1801, lines VII.F1.3-a, VII.F2.3-a, VII.F3.3-a, and VII.F4.3-a do not include hot or cold chemically treated water environments. ~~Only Dresden has components in the scope of license renewal that apply to this line item.~~

Ref No	Component	Components Evaluated	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.3.1.15	Components in or serviced by open-cycle cooling water systems	NUREG-1801 Components Orifice Bodies Piping and Fittings Pumps Strainer Bodies Valves Evaluated with NUREG-1801 Components Dampeners Flow Elements Flow Orifices Pulsation Dampeners Sight Glasses Strainer Screens **Tanks** Thermowells Tubes Tubing **Heat Exchanger Shells**	Loss of material due to general, pitting, crevice, and galvanic corrosion, MIC, and biofouling; buildup of deposit due to biofouling	Open-cycle cooling water system (B.1.13)	No	Consistent with NUREG-1801, with exception. The exceptions to biofouling for a(2) components are described in Section 3.3.1.2.2. The exceptions to Open-Cycle Cooling Water System are described in Section B.1.13. Dresden and Quad Cities do not have material-environment combination evaluated in NUREG-1801 lines VII.C1.3-a and VII.C1.3-b. NUREG-1801, line VII.C3.2-a does not apply to valve material at Dresden. Quad Cities does not have any ultimate heat sink valves in the scope of license renewal. Brass and bronze instrument pulsation dampeners are only used at Quad Cities. ~~Only Quad Cities heat exchangers use this material/environment combination.~~

LRA Table 3.3-2

Ref No	Component Group	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Discussion
3.3.2.143	Piping and Fittings (includes dissolution columns, strainers, flow elements) and heat exchanger shells	Carbon Steel	Treated water	Loss of material/ General, pitting, and crevice corrosion	Water Chemistry (B.1.2) and One-Time Inspection (B.1.23)	NUREG-1801 does not address non-safety related components in a treated water environment.

LRA Table 3.4-1

Ref No	Component	Components Evaluated	Aging Effect/Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.2	Piping and fittings, valve bodies and bonnets, pump casings, tanks, tubes, tubesheets, channel head and shell (except main steam system)	NUREG-1801 Components Piping and Fittings Valves Evaluated with NUREG-1801 Components Thermowells Strainers Flow Elements Heat Exchanger Shells	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Water chemistry (B.1.2) and one-time inspection (B.1.23)	Yes, detection of aging effects is to be further evaluated	Consistent with NUREG-1801, with exception. The exceptions to Water Chemistry are described in Section B.1.2. Further evaluation of Loss of Material due to General, Pitting, and Crevice Corrosion is described in Section 3.4.1.1.2. ~~Condensate pumps identified in NUREG-1801, line VIII.E.3-a and feedwater pumps identified in line VIII.D2.3-b are not in the scope of license renewal.~~ ~~Piping and fittings for the steam turbine and extraction steam systems identified in NUREG-1801, lines VIII.A.1-b and VIII.C1-b are not in the scope of license renewal.~~ ~~The condensate cleanup system components identified in NUREG-1801 line VII.E.6-a are not in the scope of license renewal.~~ ~~The condensate coolers / condensers in the condensate system identified in NUREG-1801, lines VIII.E.4-a and VIII.E.4-d and valves in the extraction steam system identified in line VIII.C.2-b are not in the scope of license renewal.~~ Dresden and Quad Cities do not use carbon steel or stainless steel for the CST tanks as identified in NUREG-1801, lines VIII.E.5-a and VIII.E.5-b. Dresden and Quad Cities CST tanks are aluminum.

Ref No	Component	Components Evaluated	Aging Effect/Mechanism	Aging Management Program	Further Evaluation Recommended	Discussion
3.4.1.3	External surface of carbon steel components	NUREG-1801 Components Carbon Steel Components (piping and fittings, valves, restricting orifices, thermowells, filters/strainers, tanks) **Evaluated with NUREG-1801** **Flow Elements,** **Heat Exchanger Shells** **Oil Mist Eliminators** **Vapor Extractors**	Loss of material due to general corrosion	Plant specific	Yes, plant specific	Further evaluation of General Corrosion is described in Section 3.4.1.1.3.
3.4.1.4	Carbon steel *piping and* valve bodies	NUREG-1801 *Components* Piping and Fittings Valves Evaluated with NUREG-1801 Components Restricting Orifices Thermowells **Strainers** **Flow Elements** **Heat Exchanger Shells**	Wall thinning due to *flow-accelerated* corrosion	Flow-accelerated corrosion (B.1.11)	No	Consistent with NUREG-1801, with exception. The exceptions to flow accelerated corrosion are described in Section 3.4.1.2.1. ~~Piping and fittings for the steam turbine and extraction steam system identified in NUREG-1801, VIII.A.1-a and VIII.C.1-a are not in the scope of license renewal.~~ ~~Valves for the extraction steam system and feedwater pumps in the feedwater system discussed in NUREG-1801, lines VIII.C.2-a and VIII.D2.3-a are not in the scope of license renewal.~~

LRA Table 3.4-2

Ref No	Component Group	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Discussion
3.4.2.11	Component External Surfaces (piping and fittings, valves, dampeners, **heat exchanger shells**, tanks, tubing, accumulators, heat exchangers, housings, pumps, **filters**, demineralizers)	Stainless Steel	Air, moisture, and humidity < 100°C (212°F)	None	None	NUREG-1801 does not address stainless steel in a plant indoor environment. Plant indoor environment is not an aggressive wetted environment conducive to promoting aging degradation of stainless steel components.
3.4.2.21	Housings **(includes filters, demineralizers)**	Stainless Steel	Demineralized Water - Stator Liquid Cooling	Loss of material/ Pitting and crevice corrosion	Main Generator Stator Cooling Water Chemistry (B.2.7)	NUREG-1801 does not address NSR components in the main generator stator cooling environment.
3.4.2.32	Piping and Fittings **(includes oil mist eliminators and vapor extractors)**	Carbon Steel	Generator Hydrogen Seal Oil	Loss of material/ Pitting and crevice corrosion	One-Time Inspection (B.1.23), Lube Oil Monitoring Activities (B.2.5)	NUREG-1801 does not address carbon steel components in a hydrogen seal oil environment.
3.4.2.56	**Filters/Strainers (includes heat exchanger shells)**	Stainless Steel	Turbine EHC Fluid	Loss of material/ Pitting and crevice corrosion	One-Time Inspection (B.1.23), Lube Oil Monitoring Activities (B.2.5)	NUREG-1801 does not address stainless steel components in a turbine EHC fluid environment.

Dresden-Quad AMR Questions

1. Question related to Laundry Drains System

In RAI B.1.23-2.2, the staff asked for additional justification for the use of a one-time inspection for such items as carbon steel vents, drains, piping, and valves in moisture, humidity, and leaking fluid. By letter dated January 26, 2004, the applicant stated that the corrosion rates would be sufficiently slow because the components are attached to normally closed isolation valves and are not expected to contain moisture. The applicant also stated that the vents were periodically operated and monitored during operation, and any appreciable leakage or condensation would be identified and corrective actions initiated, if applicable. From this, the staff concurred that the rate of corrosion would be slow and that the rate would not change significantly over time.

The above justification for a one-time inspection does not appear to apply to the piping and fittings in the Dresden laundry waste treatment system. The applicant is requested to provide justification for the use of a one-time inspection for this component group.

Response

The above justification does apply to the piping and fittings in the Dresden laundry waste treatment system. The portion of Dresden laundry waste treatment system included within the scope of license renewal is the discharge piping that transfers water from the laundry storage tank to the Radwaste system. The laundry drain system is infrequently operated, approximately quarterly, and has the same operating environment as the rest of the vents and drains.

The proposed one-time inspections will confirm the assumption that loss of material due to corrosion is occurring at a sufficiently slow rate. In the event that the results of the one-time inspections fail to provide this confirmation, evaluations will be performed in accordance with the site corrective action process to identify alternate actions, including possible periodic inspections of these drains.

2. Question related to Main Steam System

The staff reviewed the AMR of the new component groups. The staff questions the use of AMR reference 3.4.1.2, which was not previously used for this system. This GALL reference is for corrosion of carbon steel and stainless steel in steam or treated water environments. For the expanded scope of the main steam system, this reference is used for piping and valves in the steam lines to the radwaste reboilers. The GALL recommends further evaluation of this aging effect. The applicant discussed its further evaluation in Section 3.4.1.1.2 of the LRA, which states that one-time inspections will be performed of areas that are generally exposed to stagnant water, but that occasionally experience flow to replenish the oxygen supply. The LRA lists several components that will be tested as leading indicators of aging degradation in the SPCS. It is not clear to the staff how the components listed in Section 3.4.1.1.2 of the LRA will provide a leading indicator of the new piping and valves in the main steam system, due to differences in operating conditions. The applicant is requested to provide additional information on the use of AMR reference 3.4.1.2 for piping, fittings, and valves in the main steam system.

Response

Components on the steam supply to the radwaste reboiler credit AMR reference 3.4.1.4 (Flow accelerated corrosion) and AMR reference 3.4.1.2 (water chemistry and one time inspection) for aging management. The in-scope piping and valves associated with the radwaste reboiler are subject to environments of high moisture steam at temperatures greater than 212 °F and condensate (treated water) with occasional flow to replenish the oxygen supply. Each unit contains one radwaste reboiler, however, only one reboiler is required to support radwaste operations. As such, the radwaste reboilers are used intermittently and experience stagnant flow conditions. For this reason, components on the steam supply can experience both wall thinning due to flow accelerated corrosion and general corrosion in stagnant conditions. Water chemistry and one time inspection of equipment were also credited for aging management as a result of the potential stagnant conditions. The components chosen for the one time inspection (HPCI) are discussed in Section 3.4.1.1.2 of the LRA. They are made of the same materials and experience the same fluids as those in the steam supply to the reboiler. However, the HPCI components see flow on a monthly basis during surveillance testing. Each time the system is run, a new supply of oxygen is introduced to the environment. The re-generation of oxygen for the HPCI components is greater than those experienced on the steam supply to the reboiler. As such, the corrosion rate is greatest in the HPCI population of components which is why they were chosen as a limiting case for one time inspection. .

3. Question related to Diesel Generator Cooling System

LRA Section 2.3.3-12 for the diesel generator cooling water system includes a new component group for tanks (spatial interaction) (Quad Cities only). Aging management reference 3.3.1.15 does not currently include tanks and it is not clear if tanks are included in the credited aging management program B.1.13. Clarify if reference 3.3.1.15 will be revised to include tanks and verify that AMP B.1.13 includes these tanks.

Response

Aging management reference 3.3.1.15 was updated to include tanks in the "Components Evaluated" column in the response to the NRC's questions "Clarifications Needed for Applicant's Response to SER Open Item 2.1-1", LRA Section 2.3.3.12. The B.1.13 Open Cycle Cooling Water aging management program will manage these tanks.

4. Question related to Reactor Recirculation System

Additional piping and components from the reactor recirculation system were added to the scope of license renewal at Quad Cities due to the potential for spatial interaction with safety related components. Specifically, the recirculation motor generator oil subsystem was added to the scope of license renewal at Quad Cities. The system did not require a boundary expansion at Dresden because the physical plant layout is different than Quad Cities. As a result of the scoping change, the applicant added component groups for pumps and tanks for spatial interaction (Quad Cities only) to LRA Table 2.3.3-1. The applicant also added three new (e.g., not previously in the LRA) AMR references to address the new component groups.

To address the general corrosion of the external surfaces of carbon steel and cast iron components, the applicant credits the Bolting Integrity AMP (B.1.12) or the Structures Monitoring AMP (B.1.30). These AMPs were evaluated in Sections 3.0.3.5 and 3.0.3.14 and found to be acceptable for managing this aging effect. To address the corrosion of cast iron and carbon steel components in lubricating oil (with contaminants and/or moisture), the applicant credits the One-Time Inspection AMP (B.1.23). The staff asked whether there are any controls on the quality of the oil. Are there periodic tests of the oil? If not, is there a reasonable expectation that the aging degradation will occur at a constant rate?

Response

Aging management program B.2.5, Lubricating Oil Monitoring Activities, will be revised to include the recirculation motor generator oil subsystem at Quad Cities. The program provides guidance on periodic sampling and testing of the oil. The sample results are compared to normal, alert and fault ranges for physical properties, wear metal and contaminants/additives. One of the specific physical properties monitored is water. According to EPRI TR-114882 Mechanical Tools, Appendix C, there are no aging effects for components exposed to a lube oil environment when there is no water contamination. The Lubricating Oil Monitoring Activities AMP (B.2.5) and One-Time Inspection AMP (B.1.23) will provide reasonable assurance that aging of the recirculation motor generator oil subsystem will be effectively managed during the period of extended operation.

Table 3.1.2 is revised to include aging management program B.2.5 for aging references 3.1.2.66 and 3.1.2.68 as shown below.

Ref No	Component Group	Material	Environment	Aging Effect/Mechanism	Aging Management Program	Discussion
3.1.2.66	**Pumps**	**Cast Iron**	**Lubricating oil (with contaminants and/or moisture)**	**Loss of material/ General pitting crevice corrosion**	**One-Time Inspection (B.1.23) and Lube Oil Monitoring Activities (B.2.5)**	**NUREG-1801 does not address cast iron in a Lubricating oil (with contaminants and/or moisture) environment.**
3.1.2.68	**Tanks**	**Carbon Steel**	**Lubricating oil (with contaminants and/or moisture)**	**Loss of material/ General galvanic pitting and crevice corrosion**	**One-Time Inspection (B.1.23) and Lube Oil Monitoring Activities (B.2.5)**	**NUREG-1801 does not address carbon steel in a Lubricating oil (with contaminants and/or moisture) environment.**

LRA Appendix A, Quad Cities Units 1 and 2, Section A.2.5, "Lubricating Oil Monitoring Activities," is revised as follows (Also includes changes from RAI B.1.23-2 and supplemental information requests RAI B.1.23-02.3 and RAI B.1.23-02.4):

The lubricating oil monitoring activities aging management program manages corrosion, loss of material, and cracking in lubricating oil heat exchangers and other specific components in the scope of license renewal by monitoring physical and chemical properties in lubricating oil. Sampling, testing, and trending verify lubricating oil properties. Oil analysis permits identification of specific wear mechanisms, contamination, and oil degradation within operating machinery.

These activities apply to the emergency diesel generator system, station blackout diesel generator system, HPCI system, electro-hydraulic control system, reactor core isolation cooling system, **reactor recirculation motor generator oil system**, and generator hydrogen seal oil system. The complete aging management program for the emergency diesel generator oil coolers, station blackout diesel generator oil coolers, and HPCI oil coolers also includes secondary-side (heat sink) chemistry controls, performance monitoring, and inspections. Those portions of the lubricating oil heat exchanger management program are described in:

- Section A.1.14, "Closed-Cycle Cooling Water System," for the diesel generator and station blackout diesel generator oil coolers; and in
- Section A.2.6, "Heat Exchanger Test and Inspection Activities," for the HPCI oil coolers.

LRA Appendix B, Aging Management Programs is revised as follows (Also includes changes from RAI B.1.23-2 and supplemental information requests RAI B.1.23-02.3 and RAI B.1.23-02.4):

B.2.5 Lubricating Oil Monitoring Activities

Description

The lubricating oil monitoring activities manage loss of material and cracking in lubricating oil heat exchangers in the scope of license renewal. Additionally, the lubricating oil monitoring activities manage loss of material and cracking of other components in certain selected systems in the scope of license renewal. These activities include measures to minimize corrosion and to mitigate loss of material and cracking in heat exchangers by monitoring lubricating oil properties. Sampling, testing, and trending verify lubricating oil properties and ensure that the intended functions of the heat exchangers and other system components are not lost. Oil analysis permits identification of specific wear mechanisms, contamination, and oil degradation within operating machinery.

The activities manage physical and chemical properties in lubricating oil. The complete aging management program for lubricating oil heat exchangers also includes secondary-side (heat sink) chemistry controls, performance monitoring, and inspections. Those portions of the lubricating oil heat exchanger management program are described in:

- Section B.1.14, Closed-Cycle Cooling Water System, for the diesel generator and station blackout diesel generator oil coolers; and in
- Section B.2.6, Heat Exchanger Test and Inspection Activities, for the HPCI oil coolers.

Evaluation and Technical Basis

(1) ***Scope of Activity:*** The following lubricating oil heat exchangers are subject to this program:

- Dresden Unit 2 and 3 HPCI lubricating oil coolers
- Dresden Unit 2, 3 and 2/3 diesel generator lubricating oil coolers
- Dresden Units 2 and 3 station blackout (SBO) diesel generator lubricating oil coolers
- Quad Cities Unit 1 and 2 HPCI lubricating oil coolers
- Quad Cities Unit 1, 2, and 1/2 diesel generator lubricating oil coolers
- Quad Cities Unit 1 and 2 station blackout (SBO) diesel generator lubricating oil coolers

Additionally, components in the following systems, which are exposed to a lubricating oil environment, are subject to this program:

- Quad Cities reactor core isolation (RCIC) cooling system
- Quad Cities generator hydrogen seal oil system (HSO)
- High pressure coolant injection system (HPCI)
- Emergency diesel generator and auxiliaries system
- Station blackout diesel and auxiliaries system (SBO)
- Main turbine and auxiliaries system - electro-hydraulic control (EHC) oil subsystem
- **Quad Cities reactor recirculation motor generator oil system**

(2) ***Preventive Actions:*** Monitoring and control of oil impurities and properties mitigates loss of material and cracking in lubricating oil systems.

(3) ***Parameters Monitored/Inspected:*** The program includes specifications for known oil degradation indicators and degradation characteristics, sampling and analysis frequencies, and corrective actions for control of lubricating oil properties. Lubricating oil physical properties are tested to standard ASTM and ISO methods, for the applicable oil type, to provide accurate quantitative numbers with repeatable results. Samples are taken monthly for emergency diesel generators, EHC oil, **reactor recirculation motor generator oil,** and HSO; quarterly for HPCI and SBO diesel generators; semi-annually for the RCIC pump, and every 24 months for the RCIC turbine. Surveillance testing and operational surveillances verify proper heat exchanger performance to support associated system operability.

Oil is analyzed for indications of degraded chemical and physical properties depending on oil type and type of service. Analyses include:

- Chemical parameters and viscosity, total acid number, total base number, rotary bomb oxidation test, water demulsability, particle count, fuel and combustion by-products, sediment, water, anti-foaming characteristics, whole particle counting, air release and emission spectrum.

Normal, alert, and fault levels for oil chemical and physical properties, wear metals, contaminants, and additives are established for the specific oil type and application.

(4) ***Detection of Aging Effects:*** Monitoring activities maintain lubricating oil properties within predefined limits to both mitigate and detect the effects of aging. Oil analysis has become an accurate method for identifying specific wear mechanisms, contamination, and oil degradation characteristics within operating machinery. The program includes normal, alert, and fault action levels for oil chemical and physical properties, wear metals, contaminants, and additives, for the specific oil type and application. Increased impurities and degradation of oil properties indicate degradation of materials in lubricating oil systems. Monitoring of the diagnostic parameters indicates degradation due to aging effects prior to loss of intended function.

Samples are taken monthly for emergency diesel generators, EHC oil, **reactor recirculation motor generator oil,** and HSO; quarterly for HPCI and SBO diesel generators; semi-annually for the RCIC pump, and every 24 months for the RCIC turbine. Sampling frequency is increased if plant and equipment operating conditions indicate a need to do so.

(5) ***Monitoring and Trending:*** See Items 3 and 4, above for parameters and frequencies. The lubricating oil analysis results are evaluated for acceptability, and are trended and evaluated using computer software and a database.

(6) ***Acceptance Criteria:*** Normal, alert, and fault levels have been established for the various chemical and physical properties, wear metals, additives, and contaminant levels based on information from oil manufacturers, equipment manufacturers, and industry guidelines, for the specific oil type and application. The program maintains contaminant and parameter limits within the application-specific limits. The procedures outline potential actions to be taken at alert and fault levels, and actions can be chosen based on the level of deviation. Aging effects or unacceptable results are evaluated and appropriate corrective actions are taken.

(7) ***Corrective Actions:*** Lubricating oil chemical and physical test results or contaminants outside the allowable limits are returned to the acceptable range within reasonable time periods as identified in industry guidelines. Evaluations are performed for test or inspection results that do not satisfy established criteria and a condition report is initiated to document the concern in accordance with plant administrative procedures. The corrective actions program ensures that conditions adverse to quality are promptly corrected. If the deficiency is found to be significantly adverse to quality, the cause of the condition is determined and an action plan is developed to preclude recurrence.

(8) ***Confirmation Process:*** Site quality assurance procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B.

(9) ***Administrative Controls:*** See Item 8, above.

(10) ***Operating Experience:*** The overall effectiveness of lubricating oil monitoring activities is indicated by the Dresden and Quad Cities operating experience. Lubricating oil sampling and analysis have detected particulate or water contamination (or both) in lubricating oil systems. In some cases these events resulted in systems being declared inoperable until repaired, and until the oil was flushed or replaced. Operating experience has produced procedure and program changes, which have improved the effectiveness of lubricating oil testing and inspection activities.

Conclusion
The lubricating oil preventive, inspection, and testing activities mitigate, detect, monitor, and trend the effects of loss of material and cracking in lubricating oil coolers. The program provides reasonable assurance that intended functions are maintained consistent with the current licensing basis during the period of extended operation.

5. Question related to Main Condenser

The staff reviewed the AMR of the main condenser. The staff notes that all of the AMR references have previously been accepted for use for the main condenser. However, the material/environment is carbon steel in steam and treated water, which would be subject to loss of material due to various corrosion mechanisms. The applicant determined that there are no aging effects requiring management based on the intended function of containment, holdup, and plateout of iodine. The applicant demonstrated that the intended function was achieved by the physical presence of the main condenser, and that the ability of the main condenser to maintain vacuum during normal operation was sufficient to demonstrate that the intended function (physical presence) was met, so no additional aging management was needed.

However, for the components brought into scope, the intended function is leakage boundary (spatial). It is not clear that the above arguments can be used to justify that no additional aging management is needed for these carbon steel components in steam and treated water environments. The applicant is requested to provide additional justification that no aging management is required for the main condenser.

Response

The integrity of the leakage boundary is assured by the ability of the main condenser to maintain vacuum during normal operation. If degradation due to corrosion were to lead to a main condenser boundary leak, it would result in loss of vacuum and unit shutdown prior to spatially interacting with a safety related component. Plant operation would not continue if such a condition were to exist resulting in immediate identification and repair. As such, no additional aging management has been credited.

6. Question related to Turbine Oil System

Clarification Item: In response to questions on the One-Time Inspection AMP, the applicant committed to use the Lube Oil Monitoring Activities AMP in conjunction with the One-Time Inspection AMP for the components covered by the AMR links used for the expanded scope of this system. There were no updates to the AMR links. Clarify whether both of these AMPs will be applied to the expanded scope of this system.

Response

The May 18, 2004 response should have included the AMR links provided in the revised Table 3.4-2 as shown at the end of this response.

7. Question related to Extraction Steam System

The staff reviewed the AMR of the new component groups. The staff questions the use of AMR reference 3.4.1.2 for this system. This GALL reference is for corrosion of carbon steel and stainless steel in steam or treated water environments. The applicant discussed its further evaluation in Section 3.4.1.1.2 of the LRA, which states that one-time inspections will be performed of areas that are generally exposed to stagnant water, but that occasionally experience flow to replenish the oxygen supply. The LRA lists several components that will be tested as leading indicators of aging degradation in the SPCS. It is not clear to the staff how the components listed in Section 3.4.1.1.2 of the LRA will provide a leading indicator of the piping and valves in the extraction steam system, due to differences in operating conditions. The applicant is requested to provide additional information on the use of AMR reference 3.4.1.2 for piping, fittings, and valves in the extraction steam system.

Response

Components on the extraction steam system credit AMR reference 3.4.1.4 (Flow accelerated corrosion) and AMR reference 3.4.1.2 (water chemistry and one time inspection) for aging management. During normal operating conditions, components on the extraction steam system are subject to environments of high moisture steam at temperatures greater than 212 °F. During periods when shutdown, the components experience environments subject to condensate (treated water) with occasional flow to replenish the oxygen supply. For this reason, components on the steam supply can experience both wall thinning due to flow accelerated corrosion and general corrosion in stagnant conditions. Water chemistry and one time inspection of equipment were also credited for aging management as a result of the potential stagnant conditions.

AMR reference 3.4.1.2 contains a discussion concerning NUREG 1801 Items VIII.C.1-b and VIII.C.2-b, piping and valves associated with the Extraction Steam System, that are subject to environments of continuous high moisture steam. These two GALL line items recommend water chemistry and one time inspection as appropriate aging management programs which are included in AMR reference 3.4.1.2. The components chosen for the one time inspection (HPCI) are discussed in Section 3.4.1.1.2 of the LRA. They are made of the same materials and experience the same fluids as those in the extraction steam system. However, the HPCI components see flow on a monthly basis during

surveillance testing. Each time the system is run, a new supply of oxygen is introduced to the environment. The re-generation of oxygen for the HPCI components is greater than those experienced on the extraction steam system. As such, the corrosion rate is greatest in the HPCI population of components which is why they were chosen as a limiting case for one time inspection.

8. Question related to Feedwater Heater Drains and Vents System

The staff reviewed the AMR of the new component groups. The staff questions the use of AMR reference 3.4.1.2 for this system. This GALL reference is for corrosion of carbon steel and stainless steel in steam or treated water environments. The applicant discussed its further evaluation in Section 3.4.1.1.2 of the LRA, which states that one-time inspections will be performed of areas that are generally exposed to stagnant water, but that occasionally experience flow to replenish the oxygen supply. The LRA lists several components that will be tested as leading indicators of aging degradation in the SPCS. It is not clear to the staff how the components listed in Section 3.4.1.1.2 of the LRA will provide a leading indicator of the piping and valves in the feedwater heater drains and vents system, due to differences in operating conditions. The applicant is requested to provide additional information on the use of AMR reference 3.4.1.2 for piping, fittings, and valves in the feedwater heater drains and vents system.

Response

Components on the feedwater heater drains and vents system credit AMR reference 3.4.1.4 (Flow accelerated corrosion) and AMR reference 3.4.1.2 (water chemistry and one time inspection) for aging management. During normal operating conditions, components on the feedwater heater drains and vents system are subject to environments of high moisture steam at temperatures greater than 212 °F and condensate (treated water) with occasional flow to replenish the oxygen supply. For this reason, components on the steam supply can experience both wall thinning due to flow accelerated corrosion and general corrosion in stagnant conditions. Water chemistry and one time inspection of equipment were also credited for aging management as a result of the potential stagnant conditions.

AMR reference 3.4.1.2 credits NUREG 1801 Items VIII.D.1.1-c and VIII.D.1.2-b because the in-scope piping and valves associated with the Feedwater Heater Drains and Vents System are subject to environments of condensate (treated water). The GALL recommended aging management programs are water chemistry and one time inspection which are credited in AMR reference 3.4.1.2. The components chosen for the one time inspection (HPCI) are discussed in Section 3.4.1.1.2 of the LRA. They are made of the same materials and experience the same fluids as those in the feedwater heater drains and vents system. However, the HPCI components see flow on a monthly basis during surveillance testing. Each time the system is run, a new supply of oxygen is introduced to the environment. The re-generation of oxygen for the HPCI components is greater than those experienced on the feedwater heater drains and vents system. As such, the corrosion rate is greatest in the HPCI population of components which is why they were chosen as a limiting case for one time inspection.

Table 3.4-2 Aging management review results for the steam and power conversion system that are not addressed in NUREG-1801 (Revised)

Ref No	Component Group	Material	Environment	Aging Effect/ Mechanism	Aging Management Program	Discussion
3.4.2.16	Filters/Strainers	Carbon Steel	Generator Hydrogen Seal Oil	Loss of material/ Pitting and crevice corrosion	One-Time Inspection (B.1.23), Lube Oil Monitoring Activities (B.2.5)	NUREG-1801 does not address carbon steel components in a generator hydrogen seal oil environment.
3.4.2.29	Accumulators	Stainless Steel	Turbine EHC Fluid	Loss of material/ Pitting and crevice corrosion	One-Time Inspection (B.1.23), Lube Oil Monitoring Activities (B.2.5)	NUREG-1801 does not address stainless steel components in a turbine EHC fluid environment.
3.4.2.32	Piping and Fittings	Carbon Steel	Generator Hydrogen Seal Oil	Loss of material/ Pitting and crevice corrosion	One-Time Inspection (B.1.23), Lube Oil Monitoring Activities (B.2.5)	NUREG-1801 does not address carbon steel components in a hydrogen seal oil environment.
3.4.2.36	Piping and Fittings	Stainless Steel	Turbine EHC Fluid	Loss of material/ Pitting and crevice corrosion	One-Time Inspection (B.1.23), Lube Oil Monitoring Activities (B.2.5)	NUREG-1801 does not address stainless steel components in a turbine EHC fluid environment.
3.4.2.37	Pumps	Cast Iron	Generator Hydrogen Seal Oil	Loss of material/ Pitting and crevice corrosion	One-Time Inspection (B.1.23), Lube Oil Monitoring Activities (B.2.5)	NUREG-1801 does not address cast iron components in a generator hydrogen seal oil environment.
3.4.2.43	Tanks	Carbon Steel	Generator Hydrogen Seal Oil	Loss of material/ Pitting and crevice corrosion	One-Time Inspection (B.1.23), Lube Oil Monitoring Activities (B.2.5)	NUREG-1801 does not address carbon steel components in a generator hydrogen seal oil environment.
3.4.2.48	Tubing	Stainless Steel	Turbine EHC Fluid	Loss of material/ Pitting and crevice corrosion	One-Time Inspection (B.1.23), Lube Oil Monitoring Activities (B.2.5)	NUREG-1801 does not address stainless steel components in a turbine EHC fluid environment.
3.4.2.50	Valves	Carbon Steel	Generator Hydrogen Seal Oil	Loss of material/ Pitting and crevice corrosion	One-Time Inspection (B.1.23), Lube Oil Monitoring Activities (B.2.5)	NUREG-1801 does not address carbon steel components in a generator hydrogen seal oil environment.
3.4.2.55	Valves	Stainless Steel	Turbine EHC Fluid	Loss of material/ Pitting and crevice corrosion	One-Time Inspection (B.1.23), Lube Oil Monitoring Activities (B.2.5)	NUREG-1801 does not address stainless steel components in a turbine EHC fluid environment.

Attachment 3

Additional Information in response to RAI B.1.16-01

RAI B.1.16-01 Supplemental Information Request

1. Exelon stated that corrosion, corrosion products, and dirt buildup identified in instrument air system piping, positioners, and valve operators actually occurred in the process fluid portions of these components, not the instrument air portion.

   a) Is this process fluid portion in the scope of license renewal? What was corrective action for this?
   b) Discuss how this re-analysis was performed (i.e. review of work orders, documents, etc.) to determine that problem was not in-scope portion of instrument air. It would be helpful if this was discussed in the cover letter or background section of the revision submitted to the staff.

   Response:

   a) The process fluid portions come from several different systems. Most of these components are in the scope of license renewal (e.g. CRD hydraulic accumulators, Reactor Water Clean Up valve, HPCI valve, HVAC drain valve, Fire Pump solenoid, etc.). The only components that are not in the scope of license renewal are components that have been abandoned in place due to previous modifications.

      The corrective actions varied for the specific components. The components were cleaned (removed corrosion) or replaced, tested and returned to service.

   b) The Aging Management Review (AMR) report for the "Gas and Ventilation Air Environment" was reviewed. All of the Operating Experience entries (Work Orders) for this AMR that indicated the cause of the problem was due to "Loss of Material" (corrosion) at Dresden were listed. This list included twenty-six Work Orders. The review determined that in no case was the discussed problem associated with the instrument air supplied side of an in-scope component.

2. Is the Dresden air receiver listed in Table 3 of the LRA? If the air receiver is not within scope of license renewal, why is aging management performed in the AMP?
   a) The staff could not find the air receiver in the LRA.
   b) The compressed air system is not in scope of license renewal since it is fail-safe. Explain which air system components are in-scope? Is air needed to operate the MSIVs and PORVs? LRA identifies the following compressed air components:
      1. RC - valves, tubing
      2. ESF - tank, piping, fittings, tubing, valves
      3. Aux - piping, fitting, valve, strainers, filters, tubing
      4. SPCS - accumulators, filters/strainer, valves.

Response:

   a) The Dresden air receiver tank is not listed in the LRA because the receiver tank is outside the scope of license renewal. The aging management performed is not to mitigate aging of the receiver tank, but is performed to prevent moisture accumulation in the receiver tank as a mitigating function for the downstream portion of the instrument air system.
   The portions of the instrument air system that are in the scope of license renewal include the supply to the Outboard MSIVs, CRDs, and safety related HVAC dampers. The components include local accumulators and boundary check valves.

Additionally, the Drywell Pneumatic System, which is also in the scope of license renewal, supplies the compressed nitrogen for the Inboard MSIVs and Electromatic Relief Valves.

3. Exelon stated that trap failure was determined to be the cause of corrosion in the air receiver.
   a) Has the root cause of the trap failure been determined?
   b) Are there similar traps in-scope for license renewal and have the corrective actions been implemented for these traps?

Response:

   a) See 7c below.
   b) No, there are no similar traps in the instrument air system that are in-scope for license renewal.

4. The revised AMP/SER drafted by Exelon states that "Dresden has experienced recent occurrences of corrosion, corrosion product buildup, and dirt in the instrument air system receivers and dryers." Explain the occurrences other than the air receiver failure.

Response:

The original AMP in LRA Section B.1.16 made this incorrect statement. Per response 1.b above, Exelon has since determined there were no other instrument air occurrences after the 1994 failure. The revised AMP attached to this response has corrected the statement in question.

5. The revised AMP/SER drafted by Exelon contains the statement, "The applicant indicates that Dresden and Quad Cities have not experienced a failure of a pneumatic component within the scope of license renewal due to corrosion, corrosion product buildup, or dirt since 1993. This experience is consistent with the implementation of corrective actions in response to GL 88-14." Explain the failure that occurred in 1993 and how the corrective actions in response to GL 88-14 corrected this problem.

Response:

The date of the air receiver tank failure was April 30, 1994. The threaded piping on the inlet side of the 2A instrument air receiver tank broke, allowing the system to depressurize. This piping is not in the scope of license renewal. The corrective actions associated with the event are discussed in 7c below.

There was no specific failure of a pneumatic component within the scope of license renewal in 1993. The intent of the quoted statement was to describe the favorable operating experience for pneumatic components since implementation of GL 88-14. The wording of the attached AMP has been clarified to address this point.

6. What will final revision look like? It should be a revised AMP write-up from the LRA, not a markup of the SER.

Response:

The revised LRA Section A.1.16 (Dresden only) and revised AMP B.1.16 are provided. In addition, a suggested revision to SER Commitment No. 16 is included following the AMP.

A.1.16 Compressed Air Monitoring [Dresden]

The compressed air monitoring aging management program consists of inspection, monitoring, and testing of the entire system, including (1) pressure decay testing, visual inspections, and walkdowns of various system locations; and (2) preventive monitoring that checks air quality at various locations in the system to ensure that dewpoint, particulates, and suspended hydrocarbons are kept within the specified limits. This program is consistent with responses to NRC Generic Letter 88-14, "Instrument Air Supply Problems," and ANSI/ISA-S7.3-1975, "Quality Standard for Instrument Air." Prior to the period of extended operation, the program will be enhanced to include inspections of instrument air distribution piping based on EPRI TR-108147, "Compressor and Instrument Air System Maintenance Guide," and periodic blowdown of instrument air ~~distribution piping~~ receiver tanks.

B.1.16 Compressed Air Monitoring (Revision)

Description

The compressed air monitoring aging management program activities manage loss of material due to general, crevice, and pitting corrosion for portions of the instrument air system within the scope of license renewal. Program activities consist of air quality testing, pressure decay testing, and visual inspections at various system locations. The activities are consistent with Dresden and Quad Cities responses to NRC Generic Letter 88-14, "Instrument Air Supply Problems," and ANSI/ISA-S7.3-1975, "Quality Standard for Instrument Air." Testing and monitoring activities are implemented through station specific procedures and associated predefined tasks.

NUREG-1801 Consistency

With enhancements the compressed air monitoring aging management program is consistent with the ten elements of aging management program XI.M24, "Compressed Air Monitoring," specified in NUREG-1801 with the following exceptions.

Exceptions to NUREG-1801

NUREG-1801 indicates that the program is based on responses to GL 88-14 and INPO SOER 88-01, "Instrument Air System Failures," as well as EPRI NP-7079-1990, EPRI TR-108147, "Compressor and Instrument Air System Maintenance Guide," ASME OM-S/G-1998 and ANSI/ISA-S7.0.01-1996. The Dresden and Quad Cities programs are based on the guidance provided in the GL 88-14 and ANSI/ISA-S7.3-1975 documents, which are part of the current licensing basis. Enhancements include inspection of instrument air distribution piping based on EPRI TR-108147.

NUREG-1801 indicates that inservice inspection and testing is performed to verify proper air quality, and confirm that maintenance practices, emergency procedures and training are adequate to ensure that the intended function of the air system is maintained. Inservice inspections at Dresden and Quad Cities do not verify air quality because air quality testing

is performed in accordance with specific procedures based on ANSI/ISA-S7.3-1975. Maintenance practices, emergency procedures, and training are plant performance issues that are not directly related to aging management of the instrument air systems. Aging management consists of air quality tests and pressure decay tests of MSIV and safety/relief valve pneumatic systems including accumulators, piping, and check valves, and periodic inspections to verify the integrity of the systems.

Enhancements

- The program will provide for new periodic inspections for those portions of instrument air distribution piping at Dresden and Quad Cities that are within the scope of the rule.

- The program will provide for periodic blowdowns of instrument air ~~distribution piping~~ receiver tanks located upstream of the instrument air system dryers at Dresden.

Enhancements are scheduled for implementation prior to the period of extended operation.

Operating Experience

Dresden has experienced ~~recent occurrences of~~ corrosion, corrosion product buildup, and dirt buildup in instrument air system receiver tanks and dryers leading to a receiver tank connection failure in 1994. ~~piping, positioners, and valve operators.~~ The program enhancement of crediting periodic blowdowns of instrument air receiver tanks ~~distribution piping~~ addresses this condition. No similar failure has occurred at Dresden since the receiver tank blowdowns were implemented.

Dresden and Quad Cities have ~~has~~ not experienced a failure of a pneumatically operated ~~pneumatic~~ component within the scope of license renewal due to ~~corrosion, corrosion product buildup, or dirt buildup since 1993~~ aging effects in the instrument air system since implementation of ~~This experience is consistent with the implementation of~~ corrective actions in response to GL 88-14.

Dresden and Quad Cities have experienced equipment failures including MSIVs, dampers, and process valves due to instrument air leaks. These failures were to individual components and did not propagate to other components within the system. Dresden and Quad Cities have not experienced a common mode failure caused by the instrument air system. The Dresden and Quad Cities enhancements of performing predefined tasks that require periodic inspections of instrument air distribution piping address this condition.

Conclusion

The compressed air monitoring aging management program provides reasonable assurance that loss of material aging effects are adequately managed so that the intended functions of the instrument air components within the scope of license renewal are maintained during the period of extended operation.

7. Need to answer all ACRS questions:
   a) What impact has the Dresden compressed air blowdown program had on the reliability of the system, if any?
   b) What are the proposed fixes if the blowdown program does not solve the problem?

c) Has the root cause of the moisture been identified?

Response:

a) There have been no additional failures since 1994. Although the trap was replaced with a more reliable design, no changes to the preventive maintenance activities were necessary other than implementing the receiver tank blowdowns.

b) The compressor receiver tank, moisture separator, drain traps and portions of the inlet and discharge pipe were replaced. A check valve was installed at the receiver discharge to prevent header depressurization following a tank, compressor, relief valve or pipe failure. The inlet/outlet piping was replaced using a stainless steel material and an epoxy coating was applied to the interior of the receiver tanks. An improved moisture trap design was installed which is much less susceptible to debris plugging. Periodic blowdowns of the air receiver tanks through the drain trap are performed to prevent moisture buildup. These corrective actions have been effective in preventing recurrence.

c) Moisture and condensation are a natural byproduct of compressing air. The root cause of the failure was oxidation of the carbon steel pipe in the presence of moisture leading to mechanical failure of the threaded portion of the inlet air supply piping to the Unit 2A Instrument Air Receiver Tank. The layered appearance of the oxide indicates the corrosion had taken place over a period of years, the pipe eventually failed when it could no longer withstand system operating pressure. Contributing to this failure were the receiver tank inlet and discharge connections, which were threaded versus welded. A manual drain valve was connected at the base of the moisture separator. A 12 x 5 inch rectangular section was cut from the moisture separator to facilitate destructive examination. The tank base drain location was found plugged solid with debris, approximately two to three inches of rust and scale had accumulated in the base of the tank. The moisture separator drain trap was connected at a sight glass port five (5) inches above the base of the tank. Although the available documentation does not explicitly state that the debris prevented the trap from performing its function, the trap replacement and blowdowns of the receiver tank have prevented recurrence of the failure.

Appendix A – D/QCNPS Commitment List Associated with Renewal of the Operating License				
Item Number	Commitment	UFSAR Supplement Location (LRA App. A)	Implementation Schedule	Source
16) Compressed Air Monitoring	Existing program is credited. The program will be enhanced to include periodic inspections on those portions of the instrument air distribution piping in the scope of license renewal. The program will also include additional air sample points representative of the in-scope piping. Additionally, at Dresden only, periodic blowdowns will be provided of the instrument air ~~distribution piping~~ receiver tanks.	A.1.16	Prior to the period of extended operation	LRA Section B.1.16