



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION IV  
611 RYAN PLAZA DRIVE, SUITE 400  
ARLINGTON, TEXAS 76011-4005

December 5, 2007

Terry J. Garrett, Vice President  
Engineering  
Wolf Creek Nuclear Operating Corporation  
P.O. Box 411  
Burlington, KS 66839

SUBJECT: WOLF CREEK GENERATING STATION - NRC LICENSE RENEWAL  
INSPECTION REPORT 05000482/2007007

Dear Mr. Garrett:

On October 26, 2007, a U.S. Nuclear Regulatory Commission (NRC) team completed the onsite portion of its inspection of your application for license renewal of your Wolf Creek Generating Station. The team discussed the inspection results with you and your staff during an exit meeting conducted on October 26, 2007. The enclosed report documents these results, which the team leader will present on December 11, 2007, during a public meeting in Burlington, Kansas.

This inspection examined the plant activities and documents that support the application for a renewed license of the Wolf Creek Generating Station. The inspection reviewed the screening and scoping of nonsafety-related systems, structures and components, as required in 10 CFR 54.4(a)(2), and determined whether the proposed aging management programs will be capable of reasonably managing the effects of aging. These NRC inspection activities constitute one of several inputs into the NRC review process for license renewal applications.

The team concluded that your staff implemented the screening and scoping of nonsafety-related systems, structures and components, as required in 10 CFR 54.4(a)(2), and conducted the aging management portion of the license renewal activities, as described in the License Renewal Application. The team concluded that the documentation supporting the application was in an auditable and retrievable form. The team identified a number of issues that resulted in changes to the application, programs, or procedures.

Overall, the inspection results support the conclusion that the proposed activities will reasonably manage the effects of aging in the systems, structures and components identified in your application and that the intended functions of these systems, structures and components will be maintained during the period of extended operation.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

**/RA/**

Linda J. Smith, Chief  
Engineering Branch 2  
Division of Reactor Safety

Docket: 50-482  
License: NPF-42

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w/Attachments: Supplemental Information

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SUNSI Review Completed:  LJS  ADAMS: **X Yes**       No      Initials:  LJS   
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GAPick	SMAIferink	BWTindell	GWMeyer	SKCHaudhary
<b>/RA/</b>	<b>/RA/E</b>	<b>/RA/E</b>	<b>/RA/E</b>	<b>NA(no response)</b>
11/29/07	11/26/07	11/29/07	11/20/07	12/5/07

PM:NRR/LRP	C:EB2	C:DRP/PBB	C:EB2	
VMRodriguez	LJSmith	VGGaddy	LJSmith	
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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket: 50-482

License: NPF-42

Report No.: 05000482/2007007

Applicant: Wolf Creek Nuclear Operating Corporation

Facility: Wolf Creek Generating Station

Location: 1550 Oxen Lane NE  
Burlington, Kansas

Dates: September 10, through October 26, 2007

Team Leader: G. Pick, Senior Reactor Inspector, Engineering Branch 2, Region IV

Team: G. Meyer, Senior Reactor Inspector, Region I  
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Approved By: Linda J. Smith, Chief  
Engineering Branch 2  
Division of Reactor Safety

## SUMMARY OF FINDINGS

IR 05000482/2007007; 09/10/2007 - 10/26/2007; Wolf Creek Generating Station; Scoping of nonsafety-related systems and the proposed aging management programs for the Wolf Creek Generating Station application for renewed license.

NRC inspectors from Region IV and Region I and the responsible license renewal project manager performed onsite inspections of the applicant's license renewal activities. The team performed their evaluations in accordance with NRC Manual Chapter 2516, "Policy and Guidance for the License Renewal Inspection Programs," and Inspection Procedure 71002, "License Renewal Inspection." The team did not identify any findings as defined in NRC Manual Chapter 0612. The team concluded the applicant performed screening and scoping of non-safety related systems, structures and components as required in 10 CFR 54.4(a)(2). Generally, the applicant implemented the aging management programs as described in the License Renewal Application. The team found that the applicant provided the documentation that supported the application and inspection process in an auditable and retrievable form. The team identified a number of areas that resulted in changes to the application, programs, and procedures.

Overall, the team determined that the applicant had established programs and processes such the proposed activities will reasonably manage the effects of aging in the systems, structures and components identified in the License Renewal Application and that the applicant will maintain the intended functions of these systems, structures and components during the period of extended operation.

## Report Details

### **4. OTHER ACTIVITIES (OA)**

#### 4OA5 Other - License Renewal

##### a. Inspection Scope (IP 71002)

NRC inspectors from Region IV and Region I and the license renewal project manager performed this inspection to evaluate the thoroughness and accuracy of the screening and scoping of nonsafety-related systems, structures, and components, as required in 10 CFR 54.4(a)(2). The team evaluated whether aging management programs will be capable of managing identified aging effects in an appropriate manner.

For scoping of nonsafety-related systems, structures, and components, the team selected a number of systems, components and structures for review to determine if the methodology applied by the applicant appropriately addressed the nonsafety-related systems affecting the safety functions of a system, structure, or component within the scope of license renewal.

The team selected a sample of aging management programs to verify the adequacy of the applicant's guidance, implementation activities, and documentation. The team evaluated the programs to determine whether the applicant would appropriately manage the effects of aging and to verify that the applicant would maintain the component safety functions during the period of extended operation.

The team reviewed supporting documentation and interviewed the applicant personnel to confirm the accuracy of the License Renewal Application conclusions. For a sample of plant systems and structures, the team performed visual examinations of accessible portions of the systems to observe aging effects.

##### b.1 Scoping of Nonsafety-Related Systems, Structures, and Components

For scoping and screening, the team reviewed (1) the applicant's program guidance procedures and (2) summaries of scoping and screening results for the facility to assess the thoroughness and accuracy of the methods used to bring systems, structures, and components within the scope of the License Renewal Application. Further, the team assessed the applicant's activities related screening nonsafety-related systems, structures, and components, as required in 10 CFR 54.4(a)(2). The team verified the applicant established procedures consistent with the NRC accepted guidance contained in NEI 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 – The License Renewal Rule," Revision 6, Appendix F, Sections 3, 4, and 5. Specifically, the applicant evaluated: (1) nonsafety-related systems, structures and components within the scope of the current licensing basis, (2) nonsafety-related systems, structures and components directly connected to safety-related systems, structures and components, and (3) nonsafety-related systems, structures and components not directly connected to safety-related systems, structures and components, respectively.

The team reviewed the set of license renewal drawings, which had been color-coded to indicate systems and components in scope for 10 CFR 54.4(a)(1), (a)(2) and (a)(3). The team interviewed personnel, reviewed program documents and independently walked down numerous areas within the plant. The team confirmed that the applicant: (1) included the appropriate systems, structures and components within the license renewal scope; (2) established an acceptable basis to exclude systems, structures and components excluded from the license renewal scope; and (3) appropriately determined the license renewal scope boundaries for the systems, including seismic supports and anchors.

The in-plant areas and systems reviewed included the following:

- Auxiliary Building
- Turbine Building
- Diesel Generator Building
- Control Building
- Communications Corridor
- Fuel Building
- Essential Service Water Pump House
- Circulating Water Screen House, including Diesel Fire Pump
- Condensate Storage Tank and Pipe Tunnel
- Engineered Safety Features Switchgear Rooms 1 and 2
- Auxiliary Feedwater System
- Heating, Ventilation and Air Conditioning Systems

For systems, structures and components selected related to potential spatial interaction (failure of nonsafety-related components adversely affecting adjacent safety-related components), the team determined that the applicant accurately and acceptably categorized the in-plant configuration within the license renewal documents. The team determined the personnel involved in the process were knowledgeable and appropriately trained. While the team identified a few errors and inaccuracies among the drawings and database, these instances represented isolated, minor errors and the applicant promptly corrected the deficiencies during the inspection.

For systems, structures and components selected regarding structural interaction (seismic design of safety-related components dependent upon nonsafety-related components), the team determined that the applicant accurately identified and categorized the structural boundaries within the program documents. Based on independent sampling of the isometric drawings and the seismic boundary determinations, the team determined that the applicant appropriately identified the seismic design boundaries and correctly included the applicable component types in the license renewal application. The team noted a short cross-connection line between air start trains for the emergency diesel generators, which appeared to contribute to the seismic support for the line but was not included within the license renewal scope. The applicant agreed to add this section of the starting air line to the license renewal scope.

The team reviewed the applicant justification for not including the pressurizer spray head as an in-scope component relied upon to provide intended functions, as described in 10 CFR 54.4(a)(1). The team discussed this issue with the applicant and reviewed relevant documentation. The applicant demonstrated that the pressurizer spray did not



function to maintain any pressure boundary function, was not a component critical (i.e., required) to safely shut down the plant during an accident, and was isolated in response to a control room fire. NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," Revision 1, Table 2.3-1, described conditions that would require the pressurizer spray head to be in or out of scope. The team agreed with the applicant position that, since the pressurizer spray head had no safety function, the disposition guidance in the standard review plan supported not including the pressurizer spray head in scope.

In summary, the team concluded that the applicant had implemented an acceptable method of scoping and screening of nonsafety-related systems, structures and components and that this method resulted in accurate scoping determinations. The applicant resolved all the minor and isolated errors and inconsistencies identified by the team during the scoping and screening review.

## b.2 Aging Management Programs

The team selected the following aging management programs for review. The paragraph numbering follows the convention listed in the License Renewal Application, Appendix B, Section B1.5, "Aging Management Programs." Whether or not the applicant took exception to the recommendations of the NUREG-1801, "Generic Aging Lessons Learned (GALL) Report Tabulation of Results," Volume 2, Revision 1 (GALL Report), the team evaluated whether the applicant processes when implemented would manage the effects of aging.

### B2.1.2 Water Chemistry Control Programs

The Water Chemistry Program is an existing program credited with managing the effects of aging caused by corrosion, cracking, and fouling mechanisms in the reactor coolant system and steam generators. The team determined that the applicant had established an acceptable program with an exception consistent with the GALL Report. The applicant committed to following Electric Power Research Institute Guidelines rather than performing sampling three times each week during wet layup conditions. The applicant managed the effects of aging by monitoring and controlling primary and secondary water chemistry. Specifically, the applicant minimized contaminants that cause corrosion by adding chemicals that inhibit degradation. The One-Time Inspection Program described inspections planned to verify the effectiveness of chemistry control programs by evaluating whether significant degradation will have occurred prior to entry into the period of extended operation.

The team verified that the applicant administered their water chemistry programs in accordance with the Technical Specifications and guidance contained in Electrical Power Research Institute Reports TR-1002884, "Pressurized Water Reactor Primary Water Chemistry Guidelines," and TR-1008224, "Pressurized Water Reactor Secondary Water Chemistry Guidelines." The team reviewed: site strategic plans for chemistry; chemistry operating experience evaluations; chemistry procedures; chemistry-related condition reports; chemistry health reports; three Electric Power Research Institute assessments of chemistry activities completed during the operating cycle, shutdown, and outage, respectively; and chemistry data for the current operating cycle. In addition, the team interviewed water chemistry specialists.

For the Water Chemistry Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects for the reactor coolant system and the steam generators during the period of extended operation.

#### B2.1.3 Reactor Head Closure Studs Program

The Reactor Head Closure Studs Program is an existing program credited with managing cracking and loss of material of the Reactor Head Closure Studs. The team determined that the applicant had established an acceptable program consistent with the GALL Report. The programs consist of inspections on the bolts for material loss and cracking as recommended by American Society of Mechanical Engineers (ASME) Code, Section XI, and approved ASME Code cases.

The team reviewed program documentation, aging management review documents, information regarding the hydraulic tensioning of the studs, and evaluations for potential adverse conditions affecting the studs. In addition, the team performed a historical review to determine if the applicant currently managed aging effects on the studs because the license renewal program would continue using current practices. The team did not physically evaluate the condition of the studs since the applicant did not have an outage during the inspection.

For the Reactor Head Closure Studs Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects for the reactor head studs during the period of extended operation.

#### B2.1.5 Nickel-Alloy Penetration Nozzles Welded to Upper Reactor Vessel Closure Heads – PWR Program

The Nickel-Alloy Penetration Reactor Vessel Head Penetration Nozzle Program is an existing program credited with managing weld metal alloy cracking that resulted from primary water stress corrosion cracking. The applicant implemented the Nickel-Alloy Reactor Vessel Head Penetration Nozzle Program in response to NRC bulletins and Order EA-03-009. The team determined that the applicant had established an acceptable program consistent with the GALL Report with an enhancement. The program required that the applicant determine their susceptibility ranking for their reactor head and specified the frequency of vessel penetration inspections. The team verified the applicant included in the implementing procedures the requirement to consider the nickel-alloy welds as "high" susceptibility after identifying any evidence of cracking.

The team reviewed the applicant responses to NRC bulletins and Order EA-03-009 and industry technical reports related to cracking of Alloy 600. The team evaluated applicant procedures, reviewed reactor vessel head inspection results, and previous NRC inspection evaluations of the applicant reactor vessel head penetration nozzle inspections. The team determined that the applicant had appropriately evaluated industry operating experience documents and had remained knowledgeable of the most recent requirements and findings related to cracking of nickel-alloy welds.

For the Nickel-Alloy Penetration Reactor Vessel Head Penetration Nozzle Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging on nickel-alloy welds. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects during the period of extended operation. The applicant indicated that they would incorporate subsequent regulatory requirements, as applicable.

#### B2.1.6 Flow Accelerated Corrosion Program

The Flow Accelerated Corrosion Program is an existing program credited with managing the aging effects of wall thinning in carbon and low alloy steel components in systems containing flowing water or wet steam. The team determined that the applicant had established an acceptable program with exceptions consistent with the GALL Report. The applicant included or excluded systems and components from the program based on their level of susceptibility to flow accelerated corrosion. The level of susceptibility of systems and components to flow accelerated corrosion depends on many factors such as component material, steam quality, fluid characteristics, and the amount of time the system is in operation.

The applicant managed the aging effects by performing non-destructive volumetric examinations (e.g., ultrasonic or radiographic testing) to detect wall thinning and by predicting wear rates to support proactive repair or replacement of system piping and components. In addition, the program provided for the performance of follow-up inspections to confirm predictions and to determine the need for repairs or replacements as necessary.

The team reviewed the implementing procedures, ultrasonic testing results from the previous four outages, and a report of condition reports and work orders related to the Flow Accelerated Corrosion Program. In addition, the team interviewed the program manager and noted that the applicant performed additional analyses in a few instances to demonstrate the piping section would not fail during continued service. The team verified no instances when the as left measured wall thickness was less than the minimum acceptable wall thickness.

The team determined that the expanded scope criteria contained in implementing Procedure AI 23H-003, "Guidelines for Implementation of the Flow Accelerated Corrosion Program," Revision 2, provided high level guidance for expanding the inspection scope related to unexpected or inconsistent inspection results without providing any detailed discussion related to criteria for expanding the inspection scope. The team determined that flow accelerated corrosion computer program, CHECWORKS, contained specific criteria for recommending scope expansion and

identified when measurements exceeded the acceptance criteria. The applicant initiated Condition Report 2007-4030 because of the potential for a deficient procedure. As corrective action, the applicant will evaluate the need for additional guidance for expanding the inspection scope in the implementing procedure.

For the Flow Accelerated Corrosion Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging on low alloy steel components in wet systems. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects during the period of extended operation

#### B2.1.7 Bolting Integrity Program

The Bolting Integrity Program is an existing program credited with managing the aging effects related to cracking, loss of material, and loss of preload for pressure retaining bolting and ASME component support bolting. The team determined that the applicant had established an acceptable program consistent with the GALL Report with one exception. The applicant identified other aging management programs that supplemented the Bolting Integrity Program, which included the Inservice Inspection Program, Boric Acid Corrosion Program and the Structures Monitoring Program.

The team reviewed license renewal program basis documentation, aging management review documents and procedures, work orders – such as boric acid program evaluations and inspections and corrective action documents. The team reviewed the plant specific operating experience through a corrective action program search for degraded bolting and verified that the applicant had considered the operating experience when determining their plant specific aging effects. The inspector also observed bolting conditions during a plant walk down, and from pictures attached to boric acid evaluations.

The exception to the recommendations in the GALL Report related to evaluating the preload on installed ASME bolting. The team reviewed the programs that ensure bolting has not lost the necessary preload. The team agreed that the: (1) Boric Acid Program evaluations would result in identifying bolting pressure connections that leak because of loss of preload and (2) Vibration Monitoring Program evaluations would result in identifying component support bolting that lost preload. The applicant will visually inspect ASME Class 1 bolting during opportunistic maintenance evolutions. The applicant adopted ASME Code Case N-652, which allows examining the bolt without removal. The team found this acceptable since no industry operating experience could be found indicating that ASME Class 1 bolt cracking resulted from other than corrosion resulting from boric acid leaks.

For the Bolting Integrity Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging on pressure retaining and ASME component support bolting. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects during the period of extended operation

### B2.1.9 Open-Cycle Cooling Water System Program

The Open-Cycle Cooling Water System Program is an existing program credited with managing the aging effects resulting from material loss and fouling for components in, or cooled by, open-cycle cooling water systems. The team determined that the applicant had established an acceptable program consistent with the GALL Report. The aging effects of material loss and heat transfer reduction are managed by surveillance tests and control techniques addressed by Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment," dated July 18, 1989. The systems affected included the essential service water; component cooling water; spent fuel pool cooling and clean-up; stand-by emergency diesel generator, containment cooling; and heating, ventilation, and air conditioning systems. The applicant included the nonsafety-related service water and chemical and volume control systems in the program because of their potential for spatial interactions and included the essential service water chemical addition system because of structural integrity concerns.

The team reviewed the implementing procedures, lake water self assessment, lake water program health report, ultrasonic testing results from the essential service water system, heat exchanger trending data, and a report of condition reports and work orders related to the Open-Cycle Cooling Water System Program. In addition, the team interviewed program manager and walked down accessible portions of the essential service water system. The team noted that, although the applicant has not detected any zebra mussels to date in the ultimate heat sink, the applicant proactively developed a biocide treatment program to respond upon detecting zebra mussels.

For the Open-Cycle Cooling Water System Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging in components cooled by open-cycle cooling water. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects during the period of extended operation

### B2.1.12 Fire Protection Program

The Fire Protection Program is an existing program modified for the purpose of aging management and credited with managing the aging effects in the fire barrier, diesel-driven fire pump, and halon suppression systems. The team determined that the applicant had established an acceptable program consistent with the GALL Report after enhancements and with an exception. The Fire Protection Program managed: (1) loss of material for fire rated doors, fire dampers, the diesel-driven fire pump and the halon suppression system; (2) cracking, spalling, and loss of material for fire barrier walls, ceilings and floors; and (3) hardening and shrinkage resulting from weathering of penetration seals. The applicant manages the aging effects by performing periodic visual inspections of penetration seals, fire dampers, fire barrier walls, ceilings and floors. The applicant also managed the aging effects by performing periodic visual inspections and functional tests of fire rated doors, the diesel-driven fire pump and the halon suppression system. Periodic testing of the diesel-driven fire pump ensures that there is no loss of function resulting from aging of diesel fuel lines.

The team reviewed the implementing procedures, program enhancements, the Fire Protection Program health report, completed surveillance procedures, and a report of condition reports and work orders related to the Fire Protection Program. In addition, the team interviewed fire protection personnel and walked down various fire barriers throughout the plant to observe the physical condition of the barriers and to assess the effectiveness of the existing program. The team also walked down the diesel-driven fire pump and accessible portions of the associated fuel supply line.

For the Fire Protection Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging in the affected fire protection features or components. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects during the period of extended operation

#### B2.1.13 Fire Water System Program

The Fire Water System Program is an existing program credited with managing the aging effects in water-based fire protection systems. The team determined that the applicant had established an acceptable program consistent with the GALL Report with exceptions. The Fire Water System Program manages loss of material resulting from general corrosion, pitting, crevice, and galvanic corrosion; microbiological corrosion; or biofouling of carbon steel, cast-iron, copper, bronze, brass, galvanized, and ductile iron components in fire protection systems exposed to water. The Fire Water System Program manages the aging of hose stations, piping, piping components, pump casing, spray nozzles and sprinkler heads. The applicant managed the aging effects using periodic hydrant inspections, fire main flushing, sprinkler inspections, and flow tests.

The team reviewed the implementing procedures, program enhancements, completed surveillance procedures, and a report of condition reports and work orders related to the Fire Water System Program. In addition, the team interviewed fire protection personnel and walked down various portions of the fire water system to observe the physical condition in order to assess the effectiveness of the existing program.

For the Fire Water System Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging in water-based systems. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects during the period of extended operation.

#### B2.1.14 Fuel Oil Chemistry Program

The Fuel Oil Chemistry Program is an existing program credited with managing the loss of material on internal component surfaces in the emergency diesel fuel oil storage and transfer system and diesel-driven fire pump fuel oil system. The team determined that the applicant had established an acceptable program consistent with the GALL Report with exceptions and enhancements.

The team reviewed program basis documents, plant procedures, operating experience, and interviewed personnel. The program included: (a) surveillance and monitoring procedures for fuel oil quality by control of contaminants in accordance with applicable ASTM (American Society for Testing and Material) Standards, (b) periodic drainage of water from fuel oil tanks, (c) visual inspection of internal surfaces during periodic draining and cleaning, (d) ultrasonic measurement of wall thickness, (e) inspection of new fuel oil and (f) one-time inspections of a representative sample of components in systems that contain fuel oil. The team walked down portions of the emergency diesel generators fuel oil system.

During the inspection, the team identified a concern related to plant-specific operating experience. The applicant had identified stripping or flaking of the coating in the emergency diesel generator fuel tanks, which could have resulted from microbiologically influenced corrosion. The applicant dispositioned the tank condition for use "as-is." However, the team identified from review of performance improvement requests several inconsistencies related to effectively adding biocides to these tanks. The team identified these inconsistencies as a program weakness since the applicant took an exception to the GALL Report. Specifically, the applicant indicated they did not intend to add fuel oil stabilizers, corrosion inhibitors, or biocides on a periodic basis. The team interviewed responsible personnel who acknowledged that these inconsistencies reflected a weakness in their aging management program. The applicant developed a strategic plan for chemistry related to the diesel fuel oil systems to minimize the identified inconsistencies and avoid losing critical operational history for these tanks.

The team determined that the Wolf Creek Diesel Fuel Systems Strategic Plan, Revision 1, described: (1) the technical bases for the diesel fuel chemistry program; (2) the various fuel oil chemistry control strategies and initiatives used in the industry, (3) regulatory guidance and background information, (4) plant-specific and industry operating experience, (5) instructions for chemistry sampling and analysis, and (6) surveillance requirements. In addition, the team evaluated particulate concentration data collected for the Train A and B emergency diesel generator fuel oil tanks and found them to be within an acceptable range.

The team concluded that the applicant provided reasonable assurance for managing the effects of aging of fuel oil chemistry by implementing the Diesel Fuel Systems Strategic Plan. The applicant will review the strategic plan each refueling cycle and anytime new information becomes available. In addition, the team found that the applicant established appropriate controls to drain, clean, and inspect the tanks, and established appropriate guidance for initiating corrective actions when particulate concentrations in the fuel oil tanks increase.

For the Fuel Oil Chemistry Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging in the affected diesel oil transfer systems. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects during the period of extended operation.

#### B2.1.16 One-Time Inspection Program

The One-Time Inspection Program is a new program credited with verifying the effectiveness of other aging management programs, which included the water, lubricating oil, and fuel oil chemistry programs, through non-destructive evaluation of a sample of components maintained by these chemistry programs. Non-destructive evaluation will be performed by qualified personnel using procedures and processes consistent with the ASME Boiler and Pressure Vessel Code and 10 CFR Part 50, Appendix B. The One-Time Inspection Program will not involve periodic inspections, will be implemented after 30 years of operation, and will be completed prior to the period of extended operation.

The team reviewed the program description, draft program procedure, implementing procedures, and inspection sample basis; the team discussed the planned activities with the responsible staff. The team noted the need for clarification regarding the sample selection and acceptance criteria. The applicant intended to base sample sizes on a 90 percent confidence that 90 percent of the material/environment population is not experiencing significant aging effects (90/90). Nonetheless, the license renewal application referenced, "the method described in Electric Power Research Institute Report TR-107514," that discussed the 90/90 sampling plan along with other assumptions and analyses that the applicant had no plans to apply. The applicant agreed to amend the license renewal application to clarify use of the 90/90 sampling plan of the Electric Power Research Institute Report TR-107514, "Age-Related Degradation Inspection Method and Demonstration," April 1998.

The planned acceptance criteria for the one-time inspections referred to loss of intended function and minimum wall thickness, despite the program objective of confirming that aging effects are negligible and periodic inspection is not needed. The applicant agreed to include guidance that identification of aging effects would result in re-evaluation of the affected aging management program. The applicant revised the draft program procedure to clarify sample selection, the use of the sampling plan, and acceptance criteria to address the above concerns.

The team determined that the applicant documented the need for the License Renewal Application change in Condition Report 2007-4037. The team determined that the applicant submitted a revision to the License Renewal Application by Letter WO 07-0029, "Wolf Creek Generating Station License Renewal Application, Amendment 5," dated November 16, 2007.

For the One-Time Inspection Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging in the affected systems. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects during the period of extended operation.

#### B2.1.17 Selective Leaching Program

The Selective Leaching Program is a new program that is credited with managing the aging of components made of cast iron, bronze, brass, and other alloys exposed to raw water, treated water, soil or other environments that may lead to selective leaching. The



program will include a one-time visual inspection and hardness measurement of selected components that may be susceptible to selective leaching to determine whether loss of material had occurred and to determine whether any selective leaching, if it had occurred, would affect the ability of the components to perform their intended function during the period of extended operation.

The team reviewed the program description, implementation plan and inspection sample basis, and discussed the planned activities with the responsible staff. The applicant had not determined the basic soil chemistry near plant structures, systems or components at the time of this inspection and had not established the program. However, the applicant informed the team that they had reviewed soil chemistry evaluations adjacent to the owner-controlled area. The applicant concluded that a very high likelihood existed that the chemistry within the owner-controlled area would be similarly benign. The applicant based this conclusion on historical evidence of the same leaching results within the owner-controlled area.

For the Selective Leaching Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging in components and systems that have metal alloys subject to this mechanism. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects during the period of extended operation.

#### B2.1.18 Buried Piping and Tanks Inspection Program

The Buried Piping and Tanks Inspection Program is a new program credited with managing the effects of corrosion on the pressure-retaining capability of carbon steel, gray cast iron or ductile iron components and assess the condition of stainless steel components. The applicant will evaluate their capability to manage the effects of aging through inspection either during an excavation for other maintenance (opportunistic) or during a specifically planned excavation. The applicant would perform the planned excavation within the first 10 years of the period of extended operation. This program includes piping related to the essential service water system, emergency diesel generator fuel oil system, the auxiliary feedwater supply piping from the ultimate heat sink, the fire system piping and the piping from the refueling water storage tank.

The team reviewed the program documents, system drawings, corrective actions for previous buried piping issues, operating experience evaluations and draft procedures. The team also reviewed the upgrades to the cathodic protection system. The team interviewed the essential service water system engineer, the cathodic protection system engineer, and work planners who plan and implement excavation of buried piping.

The team determined that the applicant initiated satisfactory actions to upgrade their cathodic protection system in response to buried piping deficiencies identified in 1987. The team reviewed the life cycle management evaluation completed by a contractor. The applicant will perform detailed evaluations of their buried essential service water piping during the next refueling outage, using: (1) close interval surveys that will provide detailed mapping of the differential voltage potential along piping to better enable leak predictions and (2) direct current voltage gradient surveys to identify the location of coating holidays (i.e., gaps) in the pipe wrapping.

For the Buried Piping and Tanks Inspection Program, the team concluded that the applicant had performed appropriate evaluations of their piping conditions and considered pertinent industry experience and plant operating history to determine the effects of aging on buried piping and tanks. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects during the period of extended operation.

#### B2.1.19 One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program

The One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program is an existing program credited with managing the effects of cracking of ASME Code Class 1 piping less than or equal to 4 inches. The applicant took an exception to the GALL Report since they will evaluate selected welds on 4-inch and smaller diameter stainless steel piping, as specified in the risk-informed inservice inspection program. The risk-informed inservice inspection program requires ultrasonic volumetric examinations on selected weld locations to detect cracking. The applicant selects the weld locations in accordance with the guidelines provided in Procedure WCRE-12, "Risk Informed Inservice Inspection (RI-ISI) Basis Document," Revision 3. The applicant specified that they will take credit for the ultrasonic volumetric examinations during the fourth inservice inspection program interval.

The team reviewed the program basis document, the applicable portions of the risk-informed inservice inspection program, and applicable sections of the ASME Boiler and Pressure Vessel Code. The team determined that the exception that the applicant has taken resulted in more frequent inspection and evaluation of the effects of aging by performing the ultrasonic volumetric examinations. Specifically, the ASME code requires surface examinations of these welds and the GALL Report required a one-time ultrasonic volumetric evaluation in the last 10-year interval prior to entering the period of extended operation. As a result of implementing a risk-informed inservice inspection program, the applicant completes ultrasonic volumetric evaluations in each 10-year inservice inspection interval prior to and after entry into the period of extended operation, which exceeds the program requirements.

For the One-Time Inspection of ASME Code Class 1 Small-Bore Piping Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging in small-bore ASME Class 1 piping. The team concluded that, if continued to be implemented during each 10-year inservice inspection interval, the applicant will ensure aging effects are appropriately identified and addressed during the period of extended operation.

#### B2.1.20 External Surfaces Monitoring Program

The External Surfaces Monitoring Program is an existing program credited with managing loss of material for external surfaces of steel components and hardening and loss of strength for elastomers in ventilation and mechanical systems. The team determined that the applicant had established an acceptable program consistent with the GALL Report. The program entails inspections by system engineers of external surfaces of components subject to aging effects. The team determined that other

applicant programs that interfaced with the external surfaces monitoring program included the Boric Acid Corrosion, Buried Piping and Tanks Inspection, and Structures Monitoring Programs.

The team interviewed the system engineering supervisor involved with development of the walk-down sheets and reviewed the initial set of external walk down results. In addition, the team reviewed station procedures and condition reports generated during system walk downs. The team determined that the applicant had appropriately considered industry experience.

For the External Surfaces Monitoring Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging on the external surfaces of the included components. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects during the period of extended operation.

#### B2.1.22 Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program

The Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components is a new program credited with managing cracking, loss of material and hardening - loss of strength. The team determined that the applicant had not identified fouling as an aging effect. The applicant plans to perform the visual inspections of the internal surfaces of piping, piping components, ducting and other components as identified in the list of components included in the program.

The applicant will specify the requirements in the work control process so that any time maintenance is performed on in-scope components, maintenance personnel will visually assess cracking, loss of material, or material hardening.

The team determined that the applicant had established a preliminary sampling plan to evaluate for the number of opportunities that had occurred within the 10-year period prior to the period of extended operation. At the time of the inspection, the applicant had established 50 maintenance opportunities as a cutoff to identify that the system or component would not require a specific review. When questioned whether the maintenance items identified in the "trial" methodology provided a true representative sample rather than the same set of component maintenance performed numerous times, the applicant had not yet evaluated to that level of detail. In response to the team questions, the applicant initiated a tracking item to ensure that personnel would review the maintenance items to verify that the actual operating conditions for different components and systems were representative.

For the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging. The team concluded that, if implemented as described along with appropriate consideration of the above comment, the applicant will appropriately manage the effects of aging on internal piping and ventilation duct components during the period of extended operation.

### B2.1.23 Lubricating Oil Analysis Program

The Lubricating Oil Analysis Program is an existing program credited with managing loss of material and reduction of heat transfer for components that are within the scope of license renewal. The team determined that the applicant had established an acceptable program with exception consistent with the GALL Report. The program: (1) maintained lubricating oil contaminants within acceptable limits, (2) included lube oil acceptance criteria, (3) performed ferrography on oil samples, (4) monitored and trended lubricating oil analysis results, and (5) applied corrective actions after exceeding action levels or limits.

The team reviewed program basis documents, plant procedures, operating experience, and interviewed personnel. The team also performed walk downs of the emergency diesel generators lube oil system. The team determined that the exception involved the use of fire point analysis instead of flash point testing in the Lubricating Oil Analysis Program. However, the team determined that this was acceptable since both parameters indicated the flammability of lubricating oil and would indicate the presence of diluted lubricating oil.

The team determined from review of performance improvement requests and work orders that poor lubricating oil quality or water pooling in the lube oil systems did not cause any equipment failures. The team reviewed the oil analysis results and concluded the reports provided sufficient data to identify any deleterious trend in oil quality. The team determined that applicant procedures provided appropriate guidance to increase sampling frequency, oil filtration and change, visual inspections, and corrective maintenance, as necessary.

For the Lubricating Oil Analysis Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging for in-scope components that use lubricating oil. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects during the period of extended operation.

### B2.1.24 Electrical Cables and Connections Not Subject to 10 CFR 50.49 Requirements Program

The Non-Environmentally Qualified Insulated Cables and Connections Program is a new program credited with managing the aging effects in cables and connections exposed to adverse localized environments. The aging effects managed included embrittlement, melting, cracking, swelling, surface contamination or discoloration of cables in accessible areas. The applicant monitors the aging effects through periodic visual inspections to identify jacket surface anomalies of in-scope cables in adverse environments and engineering evaluations of inaccessible in-scope cables.

Since the applicant had not completed any actions identified in the program, the team could not assess the effectiveness of the program implementation. The team reviewed draft procedures, drawings, conducted walk downs, and interviewed plant personnel to assess the proposed program and assure it will be capable of managing aging effects. The team identified three concerns related to the program implementation.

First, from walk downs and review of operating history, the team determined that electrical conduits inside the plant experienced water intrusion. Historically, the applicant resolved the water intrusion by sealing the conduit ends, trapping the water in the conduit. The team questioned whether the applicant could detect the presence of water in conduits in the future because the current program does not specify any methods other than walk downs to identify the conditions (this only identified water external to the conduits). This concern applies to both environmentally and non-environmentally qualified cables since the team continued to question whether the installed cables were qualified for submergence. The applicant stated that these cables were qualified for being submerged; however, the team disagreed with this position. The Office of Nuclear Reactor Regulation, the team, and the resident inspectors continued to evaluate the qualification of these submerged cables as a current license issue in accordance with the requirements of 10 CFR Part 50.

Second, the team questioned whether electric cables inside of conduit experienced an adverse temperature environment and the capability of the applicant to determine accurately the temperatures inside conduits. The draft procedures had personnel measure the temperature on the outside of conduits. The team challenged that this practice failed to account for temperature increases because of the enclosed environment. Depending upon geometry, heat load, and cable fill in a conduit, the cables inside conduits could experience a higher temperature than at the surface. Because of these factors and the uncertainty in the adverse environment temperature definition, the team concluded that the applicant could not accurately determine the actual temperature inside conduits. Subsequently, the applicant revised draft Procedure MPE CI-002, "Inspection of Cables and Connections Not Subject to EQ Requirements," to establish a 10°F safety factor lower than the adverse temperature threshold that affected the cables. Based upon additional questions by the team, the applicant implemented the following additional changes to draft Procedure MPE CI-002: (1) evaluate adverse conditions and recommend corrective actions and (2) include in scope cables energized greater than 25 percent of the time. The team considered these resolutions appropriate.

Third, the applicant had two indoor cable vaults covered by manholes that contain cables related to the offsite power supply and the essential service water pumps. The team expressed concerns that the applicant would not evaluate the feeder cable for Engineered Safety Features Transformer 2 as part of the Inaccessible Medium Voltage Cable Program. The applicant committed to define these cable vaults covered by manholes as accessible, so that the applicant will lift the manholes and inspect the cables in accordance with this aging management program in the future. In addition, the applicant specified that any cables found submerged will be added to the Inaccessible Medium Voltage Cable Program.

During a walk down of an exterior cable vault, the team identified that medium-voltage cables for Essential Service Water Pump B were submerged. The applicant initiated Condition Report 2007-3567 for this deficiency. Consequently, the team concluded that cables inside the indoor cable vaults could be submerged since the elevations were below the lake water level. During the switchyard walk down, the team identified anchor bolts for the 345 kV transmission towers and electrical disconnects that should be in scope for aging management. The applicant added these deficiencies to Condition

Report 2007-4037 in order to amend the License Renewal Application. The team determined that the applicant submitted a revision to the License Renewal Application by Letter WO 07-0029, "Wolf Creek Generating Station License Renewal Application, Amendment 5," dated November 16, 2007. The applicant added these components to the Structures Monitoring Program (B2.1.32).

For the Non-Environmentally Qualified Insulated Cables and Connections Program, the team concluded that the applicant performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging in accessible cables. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects during the period of extended operation.

#### B2.1.26 Inaccessible Medium-Voltage Cables Not Subject to 10 CFR 50.49 Environmental Requirements Program

The Non-Environmentally Qualified Inaccessible Medium-Voltage Cable Program is a new program credited with managing the aging effects in inaccessible medium-voltage cables exposed to significant moisture simultaneously with applied voltage. The applicant plans to manage the aging effects by periodic inspection for water collection in cable manholes and conduit, and draining water as needed. The applicant will periodically test in-scope cables to provide an indication of the condition of the conductor insulation.

Since the applicant had not completed any actions identified in the program, the team reviewed draft procedures, conducted walk downs, and discussed the proposed program with electrical engineers. The team evaluated whether the proposed program had acceptable testing methods that would identify age-related deficiencies.

The team questioned why the applicant had not included the Engineered Safety Features Transformer 2 feeder cable within the scope of this program despite being inaccessible. The applicant agreed to treat the cable as an accessible cable as discussed in Section B2.1.24. The team expressed concern that the draft procedure failed to ensure that in-scope inaccessible cables remained dry during the period of extended operation. In response, the applicant revised the draft procedure to include operating history when determining the frequency of cable vault pumping and clarified that the cables were required to remain dry prior to entry into the period of extended operation. In addition, the applicant changed the procedure to ensure for any cable found submerged: (1) initiate a work request, (2) pump the manhole dry, (3) increase the inspection frequency, and (4) if personnel find water during the increased frequency inspection, the applicant must implement additional actions to keep the cables from becoming submerged.

The applicant stated that these cables were qualified for being submerged; however, the team disagreed with this position. The Office of Nuclear Reactor Regulation, the team, and the resident inspectors continued to evaluate the qualification of these submerged cables as a current license issue in accordance with the requirements of 10 CFR Part 50.

For the Non-Environmentally Qualified Inaccessible Medium-Voltage Cable Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging for inaccessible cables. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects during the period of extended operation.

#### B2.1.31 Masonry Wall Program

The Masonry Wall Program is an existing program credited with managing the aging effects related to masonry walls and the structural steel restraint systems related to the masonry walls. The team determined that the applicant had established a program consistent with the GALL Report with planned enhancements. The applicant had established the program in response to Bulletin 80-11, "Masonry Wall Design," and Information Notice 87-67, "Lessons Learned from Regional Inspections of Applicant Actions in Response to IE Bulletin 80-11." The applicant manages the aging effects by visually inspecting the masonry walls for cracking. The applicant inspected high safety-significant masonry walls on a 5-year cycle and the rest on a 10-year cycle.

The team reviewed the program basis documents, plant procedures, prior inspection results, discussed the program with responsible personnel, and a visually examined accessible masonry walls to assess the effectiveness of the program. The team determined that the applicant had: (1) developed effective procedures to track changes to masonry wall conditions and (2) performed inspections to substantiate the masonry wall analyses and classifications. The team verified from maintenance history that the applicant had identified no degradation (such as cracks) of masonry block walls, providing evidence that the walls continued to provide their intended structural design function.

For the Masonry Wall Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging on masonry walls and supports. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects during the period of extended operation.

#### B2.1.32 Structures Monitoring Program

The Structures Monitoring Program is an existing program credited with managing cracking, loss of material, and change in material properties by monitoring the condition of structures and structural supports. The team determined that the applicant had established an acceptable program consistent with the GALL Report with enhancements planned. The applicant will add the requirement to monitor parameters related to treated wood structures. During electrical switchyard walk downs described in Section B2.1.24, the team identified some components that the applicant added to the scope of this aging management program.

The team verified that the applicant had established an appropriate program, as specified in Regulatory Guide 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 2, and NUMARC 93-01, "Industry Guidelines for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 2. The

applicant managed the effects of aging by periodic visual inspections. The team determined that the applicant performed the following assessments during the visual inspections. The applicant inspected: (1) concrete structures for loss of material, cracking, and a change in material properties; (2) steel components for loss of material resulting from corrosion; (3) component supports for loss of material, reduction or loss of isolation function, and reduction in anchor capacity because of local concrete degradation; and (4) bolting surfaces for loss of material (corrosion), loose nuts, missing bolts, or other indications of loss of pre-load. The applicant established four distinct categories to represent degradation representative of aging effects (i.e., no degradation, minor degradation, normal degradation and major degradation).

The team reviewed the program basis documents, plant procedures and prior inspection results; interviewed personnel; and visually examined accessible structural items (e.g., reinforced concrete, structural steel members, and bolts) to assess the effectiveness of the current program. The applicant specified a 5-year frequency for evaluating high safety significance structures in accessible areas and specified a 10-year frequency for the other structures. The team expressed concern that the applicant had not trended or analyzed the monitoring results/observations. Subsequently, the applicant demonstrated that personnel had documented the inspection results/observations in retrievable files. The team verified that the inspection records indicated no visible degradation or any deterioration that would enable a trend to be developed. The team determined that the short operating life for the concrete structures in the mild environment resulted in minimal to no deterioration.

For the Structures Monitoring Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging on affected structures. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects during the period of extended operation.

#### B2.1.33 Regulatory Guide 1.127, "Inspection of Water-Control Structures Associated with Nuclear Power Plants Program"

The Inspection of Water-Control Structures Program is an existing program credited with managing the aging effects resulting from extreme environmental conditions and the effects of natural phenomena. The team determined that the applicant had established an acceptable program consistent with the GALL Report with enhancements planned. The applicant planned to enhance this program by including the inspection of main dam and the auxiliary spillways.

The team reviewed the program basis documents, plant procedures and prior inspection results; interviewed personnel; and visually examined accessible structural items to assess the effectiveness of the current program. The applicant managed the aging effects by periodically inspecting water control structures (i.e., breakwaters, jetties, and revetments) for loss of material, cracking, change in material properties, change or loss of form of structure and the slopes. The applicant had inspected the concrete structures below the waterline and service and auxiliary spillway on 5-year intervals and had dredged the ultimate heat sink after 15 years.



For the Water-Control Structures Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging on water control structures. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects during the period of extended operation.

#### B2.1.34 Nickel-Alloy Management Program

The plant specific Nickel-Alloy Aging Management Program is an existing program credited with managing cracking resulting from primary water stress corrosion cracking in all plant locations that contain Alloy 600. The team determined that the applicant had established an acceptable program consistent with the GALL Report. The applicant included Alloy 600 material and Alloy 82/182 weld material included in the reactor coolant system and engineered safety feature locations. The applicant discussed the nickel-alloy program for the vessel penetration nozzles in a separate section.

The team verified the applicant established guidance in Procedure WCRE-15, "Program Plan for Management of Alloy 600 Components and Alloy 82/182 Welds," Revision 1, consistent with regulatory and industry guidance (i.e., Order EA-03-009, Bulletin 2004-01 and MRP-139 (TR-1010087), "Materials Reliability Program: Primary System Piping Butt Weld Inspection and Evaluation Guideline," dated July 14, 2004). The team determined that the applicant inspected their high susceptibility nickel-alloy pressurizer welds documented in WCAP-16228-P, "PWSCC Susceptibility Assessment of the Alloy 600 and Alloy 82/182 Components in Wolf Creek," April 2004. After identifying circumferential cracking in the highest susceptibility nickel-alloy welds, the applicant applied weld overlays with Nickel-Alloy 52/152 weld material.

For the Nickel-Alloy Aging Management Program, the team concluded that the applicant had performed appropriate evaluations and considered pertinent industry experience and plant operating history to determine the effects of aging on nickel-alloy welds. The team concluded that, if implemented as described, the applicant provided guidance to appropriately identify and address aging effects during the period of extended operation.

#### c. Overall Conclusions

Overall, the team concluded that the proposed activities will reasonably manage the effects of aging in the systems, structures and components identified in the License Renewal Application and that the intended functions of these systems, structures and components will be maintained in the period of extended operation. The team concluded that the applicant provided documentation supporting the inspection and application review activities in an auditable and retrievable form.

40A6 Meetings, Including Exit

The team presented the inspection results to Mr. T. Garrett, Vice President Engineering, and other members of his staff in an exit meeting on October 26, 2007. The applicant had no objections to the NRC observations. The team scheduled a Public meeting to present the results and allow the applicant to provide comments on December 11, 2007. The team returned all proprietary information reviewed during this inspection to the applicant.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Applicant Personnel

L. Bell, License Renewal Project Manager  
R. Denton, Chemistry Supervisor  
D. Dixon, License Renewal – Lead Electrical Engineer  
R. Foust, Lead Design Engineer  
K. Fredrickson, Licensing Engineer  
T. Garrett, Vice President Engineering  
P. Guevel, Manager Major Modifications  
D. Hooper, Supervisor Licensing  
C. Medenci, Licensing Engineer  
G. Pendergrass, Manager Systems Engineering  
L. Ratzlaff, Manager Support Engineering  
E. Ray, Manager Chemistry/Health Physics  
W. Selbe, License Renewal Engineer  
R. Traudt, License Renewal Engineer  
J. Weeks, Diesel System Engineer

#### Strategic Teaming And Resource Sharing (STARS) Center of Business Personnel

E. Blocher, Project Manager  
G. Chen, Mechanical Engineer  
J. Johnson, Structural Lead  
A. Saunders, Mechanical Lead  
L. Samdal, Arizona Public Service Company Observer  
G. Warner, Electrical Lead

#### NRC

C. Long, Resident Inspector

### **DOCUMENTS REVIEWED**

#### **Scoping and Screening**

##### Aging Management Review Technical Basis Documents

Wolf Creek License Renewal Application Chapter 2, "Scoping and Screening Methodology"

##### Drawings

Complete set of License Renewal Application boundary drawings (124 drawings)  
1101J22, "Westinghouse Electric Corporation Pressurizer General Arrangement Drawing"  
6469E39, "Head Vent Pipe Supports Assembly," Revision 2  
6469E72, "Head Vent System Support Locations," Revision 0

M-1C0241, "Condensate & Demin Water Storage Tanks Pipe Trench," Revision 0  
M-13LB01, "Roof Drains, Auxiliary Building Train A," Revision 0  
M-13LB02, "Roof Drains, Auxiliary Building Train B and Hot Machine Shop," Revision 0  
M-13LB06, "Roof Drains, Diesel Generator Building Train A & B," Revision 1  
M-13LB07, "Roof Drains, Control Building," Revision 2  
M-13LB08, "Roof Drains, Communications Corridor," Revision 2  
M-13LB11, "Roof Drains, Fuel Building," Revision 2  
M-15FB01, "Hanger Location Drawing - Auxiliary Steam System," Revision 2  
M-19KA21, "Hanger Location Drawing Small Pipe Instrument Air, Aux Bldg 2000'," Revision 9

#### NRC Correspondence

Safety Evaluation Report – "Acceptance for Referencing of Generic License Renewal Program Topical Report Entitled, License Renewal Evaluation: Aging Management Evaluation for Pressurizers," WCAP-14574, Revision 0

#### Procedures

TR-6, "Criterion (a)(2) License Renewal Position Paper," Revision 1

#### Vendor Reports

WCAP-14574-A, "License Renewal Evaluation: Aging Management Evaluation for Pressurizers," December 2000

#### Miscellaneous

Appendix 1, "PFSSD Function Evaluations (Reactor Makeup) to Calculation XX-E-013"

### **B2.1.2 Water Chemistry**

#### Aging Management Review Technical Basis Documents

License Renewal Program Evaluation Report B2.1.2, "Water Chemistry," Revision 3

#### Condition Reports

2006-2233    2006-3281

#### Procedures

AP 02-002, "Chemistry Surveillance Program," Revision 28  
AP 02-003, "Chemistry Specification Manual," Revision 29  
AP 02A-001, "Primary Chemistry Control," Revision 12  
AP 02B-001, "Secondary Chemistry Control," Revision 12

## Technical Reports

TR-1002884, "Pressurized Water Reactor Primary Water Chemistry Guidelines," Revision 5  
TR-1008224, "Pressurized Water Reactor Secondary Water Chemistry Guidelines," Revision 6  
"Wolf Creek Cycle 15 – Primary Chemistry Review," September 2007  
"Wolf Creek Cycle 15 – Secondary Chemistry Review & Hideout Return Study," April 2007  
"Review of Wolf Creek RF 15 Primary Chemistry Shutdown & Startup," September 2007

## Miscellaneous

Chemistry Health Report, September 2007  
Secondary Trend Meeting Notes, dated February 9, 2007  
Steam Generator Average Sodium 12 Month Trend Chart to August 13, 2007  
Chemistry/Operations Action Forms, Listing of Oct. & Nov 2006  
Chemistry/Operations Action Form 1798  
6 months (most recent) of primary chemistry data trending charts  
"Strategic Primary Water Chemistry Plan," Revision 2  
"Strategic Primary Water Chemistry Plan," Revision 3  
"Strategic Secondary Water Chemistry Plan," Revision 3

## **B2.1.3 Reactor Head Closure Studs**

### Aging Management Review Technical Basis Documents

WCGS-AMP-B2.1.3, "Reactor Head Closure Studs," Revision 2

### Problem Improvement Requests

1994-1953      1994-1591      1994-1593

### Procedures

FHP 02-009A, "Reactor Vessel Stud Removal," Revision 2  
FHP 02-009B, "Reactor Vessel Stud Installation," Revision 2

### Work Orders

04-259835-001      05-274074-001

### Miscellaneous

Material Safety Data Bulletin 600114-00, "Mobil DTE 797 Oil"

## **B2.1.5 Nickel Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors**

### Aging Management Review Technical Basis Documents

WCGS-AMP-B2.1.5, "Nickel Alloy Penetration Nozzles Welded to The Upper Reactor Vessel Closure Heads of Pressurized Water Reactors," Revision 1

License Renewal Component List for AMP-XI.M11A, "Nickel Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors," B2.1.5

Operating Experience List for AMP-XI.M11A, "Nickel Alloy Penetration Nozzles Welded to the Upper Reactor Vessel Closure Heads of Pressurized Water Reactors"

### Problem Improvement Requests

1997-1092	2001-1981	2002-0642	2002-0897	2003-1450
2001-1528	2001-2193	2002-0824	2003-0610	2003-3240
2005-0174	2005-1060	2006-0196		

### Applicant Letters

ET 97-0085, "120 Day Response to Generic Letter 97-01, 'Degradation of Control Rod Drive Mechanism Nozzle and Other Vessel Closure Head Penetrations,'" dated July 24, 1997

ET 98-0001, "Supplemental Response to Generic Letter 97-01," dated January 5, 1998

ET 01-0025, "Response to NRC Bulletin 2001-01, 'Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles,'" dated August 29, 2001

ET 02-0018, "Response to NRC Bulletin 2002-01, 'Reactor Pressure Vessel Head Degradation and Reactor Coolant Boundary Integrity,'" dated April 3, 2002

CT 02-0029, "30 Day Response for NRC Bulletin 2002-01, 'Reactor Pressure Vessel Head Degradation and Reactor Coolant Boundary Integrity,'" dated May 24, 2002

ET 02-0037, "Response to NRC Bulletin 2002-02, 'Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Programs,'" dated September 11, 2002

ET 06-0035, "Relaxation Request from the First Revised NRC Order EA-03-009 Regarding Requirements for Nondestructive Examination of Nozzles Below the J Groove," dated October 5, 2006

ET 06-0048, "Additional Information Related to the Relaxation Request from the First Revised NRC Order EA-03-009 Regarding Requirements for Nondestructive Examination of Nozzles below the J Groove," dated November 1, 2006

WM 03-0007, "Response to Request for Additional Information for NRC Bulletin 2002-01, 'Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity,'" dated January 31, 2003

WM 04-0001, "60 Day Report for NRC Order EA-03-009, 'Issuance of Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors,'" dated January 22, 2004

WM 04-0004, "Response to NRC Order, Issuance of First Revised Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," dated March 4, 2004

### NRC Correspondence

Information Notice 1990-10, "Primary Water Stress Corrosion Cracking (PWSCC) of Inconel 600," dated February 23, 1990

Information Notice 2001-05, "Through Wall Circumferential Cracking of Reactor Pressure Vessel Head Control Rod Drive Mechanism Penetration Nozzles at Oconee Nuclear Station, Unit 3," dated April 30, 2001

Information Notice 2002-11, "Recent Experience with Degradation of Reactor Pressure Vessel Head," dated March 12, 2002

Information Notice 2002-13, "Possible Indicators of Ongoing Reactor Pressure Vessel Head Degradation," dated April 2, 2002

Information Notice 2004-08, "Reactor Coolant Pressure Boundary Leakage Attributable to Propagation of Cracking in Reactor Vessel Nozzle Welds," dated April 22, 2004

Bulletin 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles," dated August 3, 2001

Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity," dated March 18, 2002

Bulletin 2002-02, "Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Programs," dated August 9, 2002

Order EA-03-009, "Issuance of Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," dated February 11, 2003

Order EA-03-009, "Issuance of First Revised NRC Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," dated February 20, 2004

Generic Letter 97-01, "Degradation of Control Rod Drive Mechanism Nozzle and Other Vessel Head Closure Penetrations," dated April 1, 1997

Memorandum entitled, "Non Proprietary Version of the Staff Preliminary Technical Assessment of Reactor Pressure Vessel Head Penetration Nozzle Cracking," dated December 11, 2001

Regulatory Issue Summary 2003-13, "NRC Review of Responses to Bulletin 2002-01, 'Reactor

Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity," dated July 29, 2003

Safety Evaluation for "Wolf Creek Generating Station – Request to Relax Nondestructive Examination of Reactor Pressure Vessel Head Penetration Nozzles in Revised Order EA-03-009 (TAC No. MD3210)," dated December 7, 2006

#### NRC Inspection Reports

05000482/2002-02    05000482/2003-06    05000482/2005-03    05000482/2006-05

#### Procedures

AP 29A-007, "Alloy 600 Program Management," Revision 0  
STS PE-040E, "RPV Head Bare Metal Inspection," Revision 0  
STS PE-040H, "RPV Head NDE Examination," Revision 0

#### Technical Reports

MRP-2001-050, "Response to NRC Review Comments Transmitted by Letter Dated June 22, 2001, to the Nuclear Energy Institute Relating to PWR Materials Program Interim Alloy 600 Safety Assessment for US PWR Plants (MRP-44) Part 2: Reactor Vessel Top Head Penetrations," dated June 29, 2001

MRP-2004-05, "Needed Action for Visual Inspection of Alloy 82/182 Butt Welds and Good Practice Recommendations for Weld Joint Configurations," dated April 2, 2004

MRP-44 (TR-1001491, Part 2), "PWR Materials Reliability Project Interim Alloy 600 Safety Assessments for US PWR Plants, Part 2: Reactor Vessel Top Head Penetrations," April 2001

MRP-48 (TR-1006284), "PWR Materials Reliability Program Response to NRC Bulletin 2001-01," August 2001

MRP-126 (TR-1009561), "Materials Reliability Program: Generic Guidance for Alloy 600 Management," November 2004

WCAP-16589-NP, "Structural Integrity Evaluation of Reactor Vessel Head Penetrations to Support Continued Operation: Wolf Creek," Revision 0

WCRE-15, "Program Plan for Management of Alloy 600 Components and Alloy 82/182 Welds," Revision 1

WCRE-16, "Inservice Inspection Program Plan Wolf Creek Generating Station Interval 3," Revision 0

WCRE-18, "Boric Acid Corrosion Control Program Plan," Revision 0



## **B2.1.6 Flow Accelerated Corrosion**

### Aging Management Review Technical Basis Documents

WCGS-AMP-B2.1.6, "Flow-Accelerated Corrosion," Revision 2

License Renewal Aging Management PIR Operating Experience Report for AMP-XI.M17, "Flow Accelerated Corrosion," B2.1.6

License Renewal Aging Management Work Order Operating Experience Report for AMP-I.M17, "Flow Accelerated Corrosion," B2.1.6

License Renewal Component List for AMP XI.M17, "Flow-Accelerated Corrosion," B2.1.6

### Calculations

052507-01, "Wolf Creek Nuclear Generating Station FAC System Susceptibility Evaluation (SSE)," Revision 0

052507-02, "Wolf Creek Nuclear Generating Station FAC Susceptible Non-Modeled (SNM) Program," Revision 0

### Corrective Action Documents

1999-2958	2001-1949	2003-3181	2004-1376	2004-1378
2000-2032	2003-2761	2004-0944	2004-1377	2004-1379
2005-1691				

### Applicant Letters

ET 07-0028, "Followup Response to NRC Requests for Additional Information Related to Wolf Creek Generating Station License Renewal Application," dated July 11, 2007

### Procedures

AI 23H-002, "Guidelines for Implementation of the FAC Program," Revision 2

AP 23H-002, "Flow Accelerated Corrosion (FAC) Program," Revision 1

AP 28-007, "Nonconformance Control," Revision 3A

QCP-20-503, "Ultrasonic Examination for Component Wall Thinning," Revision 1

QCP-20-517, "Radiographic Examination for Component Wall Thinning," Revision 1

QCP-20-518, "Visual Examination of Heat Exchangers and Piping Components," Revision 4

### Work Orders

02-234547-000	02 234906-000	02-236586-000
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Miscellaneous

WCNOC-126, "Summary of Operating Cycle 10 Flow Accelerated Corrosion Small Bore RT Inspection Results," Revision 0

WCNOC-147, "Summary of Evaluations of WCGS Pipe Wall Thickness UT Inspections for RF11," Revision 0

WCNOC-152, "Summary of Evaluations of WCGS Pipe Wall Thickness UT Inspections for RF12," Revision 0

WCNOC-155, "Summary of Evaluations of WCGS Pipe Wall Thickness UT Inspections for RF13," Revision 0

**B2.1.7 Bolting Integrity**

Aging Management Review Technical Basis Documents

WCGS-AMP-B2.1.7, "Bolting Integrity," Revision 1

Applicant Letters

KQWLK 85-010, "QA Response to NRC IEB 82-02," December 1989

NRC Correspondence

Inspection Report 50-482/85-08

Bulletin 82-02, "Degradation of Threaded Fasteners in the Reactor Coolant Pressure Boundary of PWR Plants," dated June 2, 1982

Problem Improvement Requests

1996-2322	1999-1489	1999-1491	2003-1032
1999-0195	1999-1490	1999 3201	2003-1886

Procedures

MPM M711Q-04, "Steam Generator Secondary Manway Removal/Installation," Revision 14

Work Orders

05-277590-000      06-283456-022      99-208471-001

Miscellaneous

M-711-00482, "Examination of MT Indications on a Steam Generator Primary Stud," Revision 1

ASME Code Case N-566-2, "Corrective Action for Leakage for Identified at Bolted Connections," dated March 28, 2001

ASME Code Case N-652, "Alternative Requirements to Categories B-G-1, B-G-2, and C-D Bolting Examination Methods and Selection Criteria Section XI, Division II," dated August 14, 2001

### **B2.1.9 Open Cycle Cooling Water System**

#### Aging Management Review Technical Basis Documents

WCGS-AMP-B2.1.9, "Open-Cycle Cooling Water System," Revision 2

License Renewal Aging Management PIR Operating Experience Report for AMP-XI.M20, "Open-Cycle Cooling Water System," B2.1.9

License Renewal Aging Management Work Order Operating Experience Report for AMP XI.M20, "Open-Cycle Cooling Water System," B2.1.9

License Renewal Component List for AMP-XI.M20, "Open-Cycle Cooling Water System," B2.1.9

#### Procedures

AI 07A-008, "Lake Water Chemical Treatment Program," Revision 13

AP 23L-001, "Lake Water Systems Corrosion and Fouling Mitigation Program," Revision 2

AP 23L-002, "Heat Exchanger Program," Revision 1

QCP-20-518, "Visual Examination of Heat Exchangers and Piping Components," Revision 4

WCRE-13, "Lake Water Systems Structural Integrity Program," Revision 2

#### Work Orders

07-293251-000

07-293258-000

#### Miscellaneous

ASS02, "Lake Water Corrosion, Fouling and Chemistry," dated April 26, 2007

Heat Exchanger Trending Data

Lake Water Program Health Report, dated October 2007

Summary of RF15 ESW results

WCEM 05-012, "Microfouling, Asiatic Clam and Zebra Mussel Control Program for Wolf Creek Generating Station," dated June 22, 2006

## **B2.1.12 Fire Protection**

### Aging Management Review Technical Basis Documents

WCGS-AMP-B2.1.12, "Fire Protection," Revision 4

License Renewal Aging Management PIR Operating Experience Report for AMP-XI.M26, "Fire Protection," B2.1.12

License Renewal Aging Management Work Order Operating Experience Report for AMP-XI.M26, "Fire Protection," B2.1.12

License Renewal Component List for AMP-XI.M26, "Fire Protection" B2.1.12

### Applicant Letters

ET 07-0011, "Response to NRC Requests for Additional Information Related to Wolf Creek Generating Station License Renewal Application," dated May 2, 2007

### Procedures

AP 10-100, "Fire Protection Program," Revision 10A  
STN FP-209, "Fire Pump Performance and Sequential Start Test," Revision 12  
STN FP-211, "Diesel Fire Pump Monthly Operation and Fuel Level Check," Revision 10B  
STN FP-225, "Fire Barrier Inspection," Revision 4  
STN FP-400A, "Halon Sys/South Pene Rm (KC-226)," Revision 5  
STN FP-400B, "Halon Sys/North Pene Rm (KC-224)," Revision 5  
STN FP-400C, "Halon Sys/Control Cab Load Center/M.G. Sets Rm (KC-225)," Revision 6  
STN FP-401A, "Halon System/ESF Switchgear Room 1 (KC-222)," Revision 4  
STN FP-401B, "Halon System/ESF Switchgear Room 2 (KC-222)," Revision 4  
STN FP-402A, "Train A Halon System Checkout for KC-230," Revision 7  
STN FP-402B, "Train B Halon System Checkout for KC-230," Revision 7  
STN FP-403, "Control Room & Trenches Halon System Checkout," Revision 8  
STN FP-440, "Fire Door Visual Inspection," Revision 6  
STN FP-450, "Fire Damper Inspection and Drop Test," Revision 10  
STN FP-452, "Fire Barrier Penetration Seals Inspection," Revision 4

### Work Orders

05-279334-000	06-289928-000	07-292054-005	07-292484-000
06-289851-000	06-289934-000	07-292194-000	

### Miscellaneous

00078-00-0008-TD-001, "Fire Protection Surveillance Optimization Study," Revision 0  
Fire Protection Program Health Report, August 2007  
TR-3, "Fire Protection License Renewal Position Paper," Revision 1

### **B2.1.13 Fire Water System**

#### Aging Management Review Technical Basis Documents

WCGS-AMP-B2.1.13, "Fire Water System," Revision 1

License Renewal Aging Management PIR Operating Experience Report for AMP-XI.M27, "Fire Water System," B2.1.13

License Renewal Aging Management Work Order Operating Experience Report for AMP-XI.M27, "Fire Water System," B2.1.13

License Renewal Component List for AMP XI.M27, "Fire Water System," B2.1.13

#### Corrective Action Documents

1996-2029      2001-1829

#### Procedures

AI 07A-008, "Lake Water Chemical Treatment Program," Revision 13

AP 10-100, "Fire Protection Program," Revision 10A

STN FP-202, "Yard Loop & Hydrant Flush & Hydrant Inspection," Revision 10

STN FP-204, "Fire Protection C-Factor Test," Revision 21

STN FP-207, "Visual Inspection of Pipe Headers and Nozzle/Sprinkler Areas," Revision 2

STN FP-209, "Fire Pump Performance and Sequential Start Test," Revision 12

STN KC-206, "Spray and Sprinkler System Functional Testing," Revision 13

#### Work Orders

96-111925-002

### **B2.1.14 Fuel Oil Chemistry**

#### Aging Management Review Technical Basis Documents

WCGS-AMP-B2.1.14, "License Renewal Program Evaluation Report Fuel Oil Chemistry," Revision 3

License Renewal Component List for AMP-XI.M30, "Fuel Oil Chemistry," B2.1.14

License Renewal Aging Management PIR Operating Experience Report for AMP-XI.M30, "Fuel Oil Chemistry," B2.1.14

Operating Experience List for AMP-XI.M30, "Fuel Oil Chemistry"

License Renewal Aging Management Work Order Operating Experience Report for AMP-XI.M30, "Fuel Oil Chemistry," B2.1.14

Drawings

M-1G051, "Equipment Location, Control and Diesel Generator Buildings and Communication Corridor Plan Elevation 2000'-0" And Elevation 2016'-0"," Revision 10

M-1G002, "Equipment Location, Machine Shop, Refueling Water Storage Tank and Reactor Makeup Water Tank, Elevation 2000'-0"," Revision 2

Performance Improvement Request

1997-0185	1998-2986	1999-1174	2002-1679	2003-0200
1997-2687	1998-3263	2000-3135	2002-2274	2003-0201
1997-3954	1998-3788	2000-3355	2002-2651	2003-2205
1998-1332	1998-3913	2001-2204	2002-2901	2004-2817
1998-1997	1999-0068	2001-3044	2003-0177	2005-0549
2005-1129	2005-2234	2005-2635		

Procedures

AP 28-007, "Nonconformance Control," Revision 4

AP 02-002, "Chemistry Surveillance Program," Revision 4

AP 02-003, "Chemistry Specification Manual," Revision 4

STN MT-002, "Standby Diesel Fuel Oil Storage Tanks Drain and Clean," Revision 4

Work Orders

02-235284-006    02-235284-007    02-235284-019    02-235284-021  
02-235307-000

Vendor Reports

Fuel Tank Maintenance Company, "Diesel Fuel Oil Tank Inspection Report," April 2002

Miscellaneous

LRA Section A1.14, "Fuel Oil Chemistry USAR Supplement"

LRA Section B2.1.14, "Fuel Oil Chemistry AMP"

NRC Audit Questions: AMPA085, AMPA086, AMPA087, AMPA088, AMPA089 and AMPA090

Emergency Diesel Generators A and B, Particulate Trending Graphs

Engineering Disposition for WO 02-235307-000, Revision 1

Engineering Disposition for WO 02-235284-000, Revision 0

WCGS Diesel Fuel Systems Strategic Plan, Revision 1

**B2.1.16 One Time Inspection**

Aging Management Review Technical Basis Documents

WCGS-AMP-B2.1.16, "One-Time Inspection," Revision 2

## Procedures

AP 28-011, "Resolving Deficiencies Impacting SSCs," Revision 1A  
QCP 20-504, "Ultrasonic Examination for Flaw Detection," Revision 3  
QCP 20-540, "VT-1 Visual Examination," Revision 0  
QCP 30-103, "Qualification and Certification of Examination Personnel," Revision 6  
One-Time Inspection Program (Draft)  
One-Time Inspection Program (Draft) – Revised

## Technical Reports

EPRI TR-107514, "Age-Related Degradation Inspection Method and Demonstration," April 1998

### **B2.1.17 Selective Leaching of Materials**

#### Aging Management Review Technical Basis Documents

WCGS-AMP-B2.1.17, "Selective Leaching of Materials," Revision 2  
License Renewal Component List for AMP-XI.M33, "Selective Leaching of Materials," B2.1.17

#### Problem Improvement Request

2002-0048

## Procedures

"Inspection for Selective Leaching Degradation of Components," Draft  
AP 16C-006, "MPAC Work Requests/Work Order Process Controls," Revision 8

## Miscellaneous

Information Notice 94-59, "Accelerated Dealloying of Cast Aluminum Bronze Valves Caused by Microbiologically Induced Corrosion," dated August 17, 1994

EPRI TR-1003056, "Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools,"  
Revision 3

### **B2.1.18 Buried Piping and Tanks Inspection**

#### Aging Management Review Technical Basis Documents

WCGS-AMP-B2.1.18, "Buried Piping and Tanks Inspection," Revision 3

License Renewal Component List for AMP-XI.M34, "Buried Piping and Tanks Inspection,"  
B2.1.18

WCGS-AER-EF, "Aging Evaluation Report – Essential Service Water," Revision 1

## Drawings

E-0091, "Cathodic Protection Plan," Sheet 1, Revision 5  
E-0091, "Cathodic Protection Plan," Sheet 10, Revision 0  
E-0091, "Remote Anode Bed Topsoil Storage Area Cathodic Protection," Sheet 7, Revision 1  
WIP-E-0091-A-A-2, "Cathodic Protection Plan – Waste Water Treatment Facility," Revision 0  
WIP-E-0091-XX-A-9, "E-0091, "Cathodic Protection Plan," Revision 2  
WIP-E-0091-XX-A-12, "E-0091, "Cathodic Protection Plan – Miscellaneous Areas," Revision 1

## Procedures

AI 23I-002, "Inspection of Buried Pipes and Tanks," Revision 0  
AI 16C-007, "Work Order Planning," Revision 18 (draft)  
CNT-MC-651, "Ground Penetration Permit," Revision 1

## Vendor Reports

DC-GX-02-WC, "Design Criteria for Cathodic Protection System," dated November 11, 1975  
  
SIR-03-002, "Wolf Creek Generating Station Life Cycle Management of Buried Piping,"  
Revision 0

## Work Orders

07-295599-000

## Miscellaneous

Top Equipment Issue Description for Lake Water Piping  
Plant Health Committee Presentation on Essential Service Water Piping, dated June 20, 2007

## **B2.1.19 One Time Inspection of ASME Code Class 1 Small Bore Piping**

### Aging Management Review Technical Basis Documents

WCGS-AMP-B2.1.19, "One Time Inspection of ASME Code Class 1 Small Bore Piping,"  
Revision 2

License Renewal Component List for AMP-XI.M35, "One Time Inspection of ASME Code  
Class 1 Small Bore Piping," B2.1.19

Operating Experience Report for AMP-XI.M35, "One-Time Inspection of ASME Code Class 1  
Small Bore Piping," B2.1.19

## Applicant Letters

ET 01-0009, "Relief Request for Application of an Alternative to the American Society of  
Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, Examination  
Requirements for Class 1 and 2 Piping Welds," dated February 1, 2001



ET 01-0028, "Response to Request for Additional Information Regarding Relief Request for Application of an Alternative to the ASME Boiler and Pressure Vessel Code Section XI Examination Requirements for Class 1 and 2 Piping Welds," dated September 27, 2001

#### Procedures

WCRE-12, "Risk Informed Inservice Inspection (RI ISI) Basis Document," Revision 3

WCRE-16, "Inservice Inspection Program Plan – Wolf Creek Generating Station Interval 3," Revision 0

#### NRC Inspection Reports

05000482/2002-02    05000482/2003-06    05000482/2005-03    05000482/2006-05

#### Problem Improvement Request

1998-0238

#### Vendor Reports

WCAP-15973-P -A, "Low-Alloy Steel Component Corrosion Analysis Supporting Small Diameter Alloy 600/690 Nozzle Repair/Replacement Programs," Revision 0

#### Miscellaneous

"Approval of Relief Request for Application of Risk Informed Inservice Inspection Program for American Society of Mechanical Engineers Boiler and Pressure Vessel Code Class 1 and 2 Piping for Wolf Creek Generating Station," dated December 13, 2001

ASME Code Case N-578, "Risk Informed Requirements for Class 1, 2, and 3 Piping Method B, Section XI, Division 1," dated September 2, 1997

Information Notice 97-48, "Unisolable Crack in High Pressure Injection Piping," dated July 9, 1997

Regulatory Guide 1.178, "An Approach For Plant Specific Risk Informed Decision Making For Inservice Inspection of Piping," Revision 1

Ultrasonic Examination Data Sheet DMH-004 for Weld BB-01-S401-10

### **B2.1.20 External Surfaces Monitoring Program**

#### Aging Management Review Technical Basis Documents

WCGS-AMP-B2.1.20, "External Surfaces Monitoring Program," Revision 2

License Renewal Component List for AMP-XI.M36, "External Surfaces Monitoring Program," B2.1.20

Work Order Operating Experience Report for AMP-XI.M36, "External Surfaces Monitoring Program," B2.1.20

Problem Improvement Requests

2003-2733

Procedures

AP 23-006, "System Engineering Program," Revision 16  
AP 23-006-02, "System Walk down Results Form," Revision 1

Work Orders

06-289310-00    06-289365-00    06-289530-00    06-289609-00    06-289726-00

Miscellaneous

Reviewed system engineer walk down sheets from November 2006 through April 2007

**B2.1.22 Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components**

Aging Management Review Technical Basis Documents

WCGS-AMP-B2.1.22, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," Revision 1

License Renewal Component List for AMP-XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," B2.1.22

Miscellaneous

Evaluation of the maintenance activities performed for each affected system from 1996 through 2006

Number of components identified in a material to environment exposure grid

**B2.1.23 Lubricating Oil Analysis**

Aging Management Review Technical Basis Documents

WCGS-AMP-B2.1.23, "License Renewal Program Evaluation Report Lube Oil Chemistry," Revision 1

License Renewal Component List for AMP-XI.M39, "Lube Oil Analysis," B2.1.23

Implementing Procedures and References List for AMP-XI.M39, "Lubricating Oil Analysis"

License Renewal Aging Management PIR Operating Experience Report for AMP-XI.M39, "Lubricating Oil Analysis," B2.1.23

License Renewal Aging Management Industry Operating Experience Report for AMP-XI.M39, "Lubricating Oil Analysis," B2.1.23

Operating Experience List, XI.M39, "Lubricating Oil Analysis"

License Renewal Aging Management Work Order Operating Experience Report for AMP-XI.M39, "Lubricating Oil Analysis," B2.1.23

### Drawings

M-1G051, "Equipment Location, Control and Diesel Generator Buildings and Communication Corridor Plan Elevation 2000'-0" and Elevation 2016'-0", " Revision 10

M-1G002, "Equipment Location, Machine Shop, Refueling Water Storage Tank and Reactor Makeup Water Tank, Elevation 2000'-0", " Revision 2

### NRC Letters

Information Notice 79-23, "Emergency Diesel Generator Lube Oil Coolers," dated September 5, 1979

IE Circular 80-05, "Emergency Diesel-Generator Lubricating Oil Addition and Onsite Supply," dated April 1, 1980

IE Circular 80-11, "Emergency Diesel Generator Lube Oil Cooler Failures," dated May 15, 1980

### Performance Improvement Request

1998-1390

### Procedures

I-ENG-004, "Lubricating Oil Analysis"  
AP 28-007, "Nonconformance Control," Revision 3

### Work Orders

LRAL003      LRBB001

### Miscellaneous

LRA Section A1.23 – "Lube Oil Analysis USAR Supplement"  
LRA Section B2.1.23 – "Lube Oil Analysis Aging Management Program"  
NRC Audit Questions: AMP-A077, AMP-A078  
EPRI/NMAC Lubrication Guide, Revision 3, (EPRI 1003085, Formerly NP-4916-R2)

## **B2.1.24 Electrical Cables and Connections Not Subject to 50.49 Environmental Qualification Requirements**

### Aging Management Review Technical Basis Documents

WCGS-AMP-B2.1.24, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 EQ Requirements," Revision 0

### Applicant Letters

KQWLK 85-010, "QA Response to NRC IEB 82-02," December 1989

### Problem Improvement Requests

1999-0195    1999-3201    2003-1032    2003-3533    2003-2597

### Procedures

MPE CI-002, "Inspection of Cables and Connections Not Subject to EQ Requirements," Draft

### Technical Reports

TR-1003057, "Plant Support Engineering: License Renewal Electrical Handbook," Revision 1

TR-109619, "Guideline for the Management of Adverse Localized Equipment Environments," June 1999

### Vendor Reports

Specification 10466-E-029 (Q), "Technical Specification for 5,000 Volt and 15,000 Volt Single Conductor Power Cable for the Standardized Nuclear Unit Power Plant System (SNUPPS)"

### Work Orders

03-255235-000    03-255236-000

### Miscellaneous

Report 0234-8-2007, Infrared Thermography Report 345-53

IEEE 1205-2000, "IEEE Guide for Assessing, Monitoring, and Mitigating Aging Effects on Class 1E Equipment Used in Nuclear Power Generating Stations," March 2000

Change Package 011449

Electrical Component Aging Evaluation License Renewal Technical Report, Revision 0

## **B2.1.26 Inaccessible Medium Voltage Cables Not Subject to 50.49 Environmental Qualification Requirements**

### Aging Management Review Technical Basis Documents

WCGS-AMP-B2.1.26, "Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements," Revision 1

### Drawings

E-KR0231, "Raceway Plot Plan Essential Service Water System Plan and Sections," Revision 9

### NRC Correspondence

Information Notice 2002-12, "Submerged Safety Related Electrical Cables," dated April 21, 2002

Generic Letter 2007-01, "Inaccessible or Underground Power Cable Failures that Disable Accident Mitigation Systems or Cause Plant Transients," dated February 7, 2007

### Problem Improvement Requests

2004-2683    2006-0352    2003-2597    2004-0880

### Procedures

MPE CI-003, "Testing of Inaccessible Medium Voltage Cables Not Subject to EQ Requirements," Draft

MPE CI-004, "Inspection of Cable Manholes Containing Non-EQ Inaccessible Medium Voltage Cables," Draft

## **B2.1.31 Masonry Wall Program**

### Aging Management Review Technical Basis Documents

Program Evaluation Report B2.1.31, "Masonry Wall Program," Revision 0  
License Renewal Component List for AMP-XI.S5, "Masonry Wall Program," B2.1.31

### NRC Correspondence

Bulletin 80-11, "Masonry Wall Design," dated May 8, 1980

Generic Letter 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors (USI A-46)," dated February 19, 1987

Information Notice 87-67, "Lessons Learned from Regional Inspections of Licensee Actions in Response to NRC IE Bulletin 80-11," dated December 31, 1987

Procedures

AI 23M-001, "WCGS Maintenance Rule Program," Revision 5

AI 23M-007, "Structures Monitoring Program," Revision 3

AI 23M-020, "Engineering Desktop Instruction Determining the Safety Significance Of Structures, Systems and Components Within the scope of Maintenance Rule," Revision 2

TN FP-225, "Fire Barrier Inspections," Revision 3

Miscellaneous

Structures Monitoring Program Report, Baseline Inspection Report 1998, (Evaluation of Maintenance Rule Observations, Revision 0 - 4/17/98 (Package)).

**B2.1.32 Structures Monitoring Program**

Aging Management Review Technical Basis Documents

Program Evaluation Report B2.1.32, "Structures Monitoring Program"  
WCGS Operating Experience Summary Report XI.S6, "Structures Monitoring Program"  
License Renewal Component List for AMP-XI.S6, "Structures Monitoring Program," B2.1.32

Problem Improvement Requests

1995-1265	1998-2781	2002-1049	2002-2377
1997-1707	2000-0241	2002-2742	2003-0088
1998-0023	2000-2125	2002-2339	2003-2597
2003-2732	2003-3442	2003-3673	2003-3704
2004-0972	2005-1006	2005-1597	2005-2388

Procedures

AI 23M-001, "WCGS Maintenance Rule Program," Revision 5  
AI 23M-007, "WCGS Structures Monitoring Program," Revision 3

Work Orders

94-100927-000	95-100154-000	95-100294-000	03-257637-000
03-257638 000	04-261091-000		

Miscellaneous

Structures Monitoring Program Observation Reports Baseline Inspections-1998

### **B2.1.33 Regulatory Guide 1.127, Inspection of Water Control Structures Associated with Nuclear Power Plant**

#### Aging Management Review Technical Basis Documents

Program Evaluation Report B2.1.33, "Inspection of Water Control Structures"

License Renewal Component List for AMP-XI.S7 Regulatory Guide 1.127, "Inspection of Water Control Structured Associated with Nuclear Power Plants"

#### NRC Correspondence

Regulatory Guide 1.127, "Inspection of Water Control Structured Associated with Nuclear Power Plants," April 1977

#### Procedures

AP 29D-001, "UHS Monitoring Program," Revision 2

AP 29D-005, "Examination of Safety-Related Concrete water Control Structures," Revision 1

#### Technical Reports

Specification C-404 (Q), "Periodic Surveillance of Safety related Water Control Structures and Reservoir," Revision 5

### **B2.1.34 Nickel-Alloy Aging Management**

#### Aging Management Review Technical Basis Documents

WCGS-AMP-PSNI, "Nickel-Alloy Aging Management," Revision 2

License Renewal Component List for Nickel-Alloy Aging Management B2.1.34

Operating Experience Summary Report – Nickel-Alloy Aging Management

#### Problem Improvement Requests

1995-3058	2002-1188	2003-0054	2004-1271
2000-3097	2003-0052	2003-0055	2005-1060
2001-0935	2003-0053	2003-0477	

#### Procedures

AP 29A-007, "Alloy 600 Program Management," Revision 0

STS PE-040E, "RPV Head Bare Metal Inspection," Revision 0

STS PE-040H, "RPV Head NDE Examination," Revision 0

### Applicant Letters

WM 03-0044, "Response to NRC Bulletin 2003-02, 'Leakage from Reactor Pressure Vessel Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity,'" dated September 19, 2003

WM 04-0002, "60 Day Report for NRC Bulletin 2003-02, 'Leakage from Reactor Pressure Vessel Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity,'" dated January 22, 2004

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