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Operated by Nuclear Management Company, LLC

April 2, 2002 10 CFR 50.54(f)

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

Ladies/Gentlemen:

Docket Numbers 50-305, 50-266 and 50-301
Kewaunee Nuclear Power Plant (KNPP)
Point Beach Nuclear Plant (PBNP), Units 1 and 2
Response To NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation And Reactor Coolant Pressure Boundary Integrity"

On March 18, 2002, the Nuclear Regulatory Commission (NRC) issued NRC Bulletin 2002-01, "Reactor Pressure Vessel Head Degradation and Reactor Coolant Pressure Boundary Integrity," that required pressurized water reactor (PWR) addressees to submit:

(1) Information related to the integrity of the reactor coolant pressure boundary, including the reactor pressure vessel (RPV) head and the extent to which inspections have been undertaken to satisfy applicable regulatory requirements, and

(2) The basis for concluding that the plants satisfy applicable regulatory requirements related to the structural integrity of the reactor coolant pressure boundary and how future inspections will ensure continued compliance with applicable regulatory requirements, and

(3) A written response to the NRC in accordance with the provisions of Title 10, Section 50.54(f), of the Code of Federal Regulations (10 CFR 50.54(f)) if unable to provide the information or cannot otherwise meet the requested completion dates.

Attachment 1 to this correspondence provides the KNPP site-specific information related to NRC Bulletin 2002-01, and Attachment 2 to this correspondence provides the PBNP Units 1 and 2 site-specific information related to NRC Bulletin 2002-01.

This letter contains no new regulatory commitments.

To the best of my knowledge and belief, the statements contained in this document are true and correct. In some respects, these statements are not based entirely on my personal knowledge, but on information furnished by cognizant NMC employees and consultants. Such information has been reviewed in accordance with company practice and I believe it to be reliable.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on April 2, 2002.

Mark E. Warner
Site Vice President

RDS/kmd

Attachments: 1 - KNPP Response to NRC Bulletin 2002-01
2 - PBNP Response to NRC Bulletin 2002-01

cc: NRC Regional Administrator
NRC Project Manager - KNPP
NRC Project Manager - PBNP
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Attachment 1

Kewaunee Nuclear Power Plant

Response to

NRC Bulletin 2002-01

NRC Request

1.A. "a summary of the reactor pressure vessel head inspection and maintenance programs that have been implemented at your plant,"

KNPP Response

As reported in Table 2-1 of EPRI Report 1006284, dated August 2001, PWR Materials Reliability Program Response to NRC Bulletin 2001-01 (MRP-48), Kewaunee Nuclear Power Plant (KNPP) has block contoured vessel head insulation. Specifically, KNPP insulation consists of mirror panels fabricated of 4 inch thick perforated metal block insulation located inside a metal shroud.

Historically, personnel at KNPP have performed inspections and examinations of the reactor vessel head required by Section XI of the American Society of Mechanical Engineers (ASME) Code, and when industry issues warrant, have conducted additional proactive examinations.

Historical activities include the following:

1. Visual examination of accessible portions of Control Rod Drive Mechanisms (CRDMs).
2. Visual examination of the bare metal exterior surface of the reactor vessel head during 1989 and 2001. An effective visual examination of 100% of the exterior surface area of the reactor vessel head hemisphere (including all reactor vessel head penetrations) was performed in 2001 in accordance with US NRC Bulletin 2001-01.
3. Volumetric and magnetic particle examination of the reactor vessel head to flange weld over a ten-year frequency.
4. Dye penetrant examination of 10% of the full penetration butt welds on peripheral CRDMs on a ten-year frequency.
5. Visual examination of carbon steel conoseal bolting on the thermocouple columns.
6. Cleaning of the reactor vessel studs and nuts each scheduled refueling outage. (This practice can help readily identify any potential damage including wastage.)
7. Ultrasonic and magnetic particle examination of the reactor vessel studs and nuts on a ten-year frequency.
8. Visual examination of the reactor vessel closure head washers on a ten-year frequency.
9. Visual examination of the reactor vessel head with emphasis placed on the detection of leakage at the reactor vessel flange and CRDM mechanical joints during the Class 1 system pressure test performed each refueling outage.

Items 1, 3 – 5, and 7 – 9 are performed in accordance with the existing site ISI Plans.

Additionally, the reactor vessel head is disassembled each refueling outage. During this process, various portions of the reactor vessel head are exposed, worked on, and re-assembled. These maintenance activities provide a high degree of confidence that leakage and/or accumulation of boric acid have not occurred and gone undetected. Reactor Engineering is sensitive to the issue of potential boric acid wastage and proactively identifies signs of leakage such as boric acid accumulation.

During the 2001 refueling outage, the shroud on the reactor vessel head was modified to include visual inspection ports. These inspection ports enhance examination of the reactor vessel head insulation.

Following reactor head re-assembly and during startup, personnel from Reactor Engineering and the ANI/ANII have historically and routinely conducted additional visual examinations to ensure that any leakage of the reactor vessel head including mechanical joints would not go undetected.

NRC Request

1.B. "an evaluation of the ability of your inspection and maintenance programs to identify degradation of the reactor pressure vessel head including, thinning, pitting, or other forms of degradation such as the degradation of the reactor pressure vessel head observed at Davis-Besse,"

KNPP Response

Visual examinations performed on the bare metal exterior surface of the reactor pressure vessel head were performed in 1989 and 2001. These examinations confirm that the reactor vessel head is free of thinning, pitting, or other forms of degradation. Additional nondestructive examinations over and above those required by Section XI of the Code, such as straight beam and angle beam ultrasonic examination of the dome, were not performed at this time since no evidence of degradation was found during the visual examinations. A summary of the results of the most recent bare metal visual examination performed in 2001 for NRC Bulletin 2001-01 was provided to the NRC in letter number NRC-02-004, dated January 3, 2002.

Additionally, when leakage has occurred at mechanical joints on the core exit thermocouples in the past, it was promptly identified, the joint was repaired, and any boric acid was removed from the structure of the reactor vessel head. The most recent bare metal inspection performed in 2001 confirms that when leakage through mechanical joints did occur in the past, as indicated in Table 1, boric acid did not accumulate on the reactor vessel head and cause degradation.

RCS leakage is monitored and corrective actions are taken if predefined limits are exceeded.

To date, the combination of these visual inspections, maintenance, and operation practices has allowed the plant to identify and correct leakage before boric acid accumulation, thinning, pitting, or other forms of degradation (such as the degradation of the reactor vessel head at Davis-Besse) have occurred on the KNPP reactor vessel head.

Furthermore, when Code required inspections are performed, both procedures and personnel are qualified in accordance with Section XI of the ASME Code. The site internal assessment group performs audits to ensure that personnel and procedure qualification requirements are satisfied. The ASME Code requires that reviews be performed of ANI/ANII activities, which provide further assurance that the site is implementing Section XI of the Code.

NRC Request

1.C. “a description of any conditions identified (chemical deposits, head degradation) through the inspection and maintenance programs described in 1.A that could have led to degradation and the corrective actions taken to address such conditions,”

KNPP Response

KNPP has experienced leakage in the past from mechanical joints on the core exit thermocouples.

Table 1
Summary of Historical Core Exit Thermocouple Leakage

Year	Description
1981	Significant conoseal leak. Boric acid accumulation on insulation. Boric acid was removed from insulation.
1986	Minor Boric Acid on Marmon Clamps. Removed boric acid from clamps and replaced bolts.
1989	Minor leakage during startup, depressurized, and repaired joint. No boric acid accumulation on insulation.
1991	Minor leakage during startup, joint was repaired. No boric acid accumulation on insulation.
2000	Minor leakage during startup, depressurized, and repaired joint. No boric acid accumulation on insulation.
2001	Minor boric acid stains in CRDM housings. No boric acid accumulation on insulation.

Leakage was detected and corrected during startup prior to boric acid accumulation in all of these cases except for the situation in 1981. In 1981, following completion of the operating cycle, KNPP had to remove boric acid from above the insulation of the reactor vessel head.

Additionally, minor amounts of boric acid staining have been observed on CRDMs above the reactor vessel head during visual examinations performed in response to Generic Letter 88-05 and Bulletin 2001-01.

Boric acid accumulation did not occur on the external surface of the reactor vessel head as a result of any of the cases identified in Table 1. The condition of the external surface of the reactor vessel head is known to be free of thinning, pitting, or other forms of degradation because the bare metal head was visually examined using Section XI qualified personnel and procedures in 1989 and 2001.

If boric acid accumulation is located on the reactor vessel head insulation, it is documented and evaluated in accordance with plant procedures. In the past when boric acid was observed on the reactor vessel head insulation, the boric acid was removed prior to returning the plant to service.

NRC Request

1.D. "your schedule, plans, and basis for future inspections of the reactor pressure vessel head and penetration nozzles. This should include the inspection method(s), scope, frequency, qualification requirements, and acceptance criteria"

KNPP Response

MRP-48 estimates that it will take KNPP 21.9 EFPY of additional operation from March 1, 2001, to reach the same time-at-temperature as Oconee 3 at the time that leaking nozzles were discovered in March 2001. KNPP will not reach this condition during its forty (40) year design life since the operating license is only in effect through December 21, 2013. Thus, through-wall leakage as a result of stress corrosion cracking of the Alloy 600 j-groove welds and CRDM tubing is not predicted to occur at KNPP.

Although through-wall leakage is not predicted to occur, KNPP plans to continue to proactively perform required inspections and follow the status of this issue through involvement with the EPRI MRP, ASME Code, NEI and other industry groups to ensure that adequate activities are scheduled and performed to ensure structural integrity of the reactor vessel head.

Long-term plans include the following:

1. Visual examination of CRDM tubing and reactor vessel head insulation through existing inspection ports cut in the reactor vessel head shroud.
2. Visual examination of carbon steel conoseal bolting on the thermocouple columns each scheduled refueling outage.
3. Cleaning of the reactor vessel studs and nuts each scheduled refueling outage. (This practice can help readily identify any potential damage).
4. ASME Section XI required exams of the reactor vessel head.
5. Visual examination of the bare-metal exterior surface of the reactor vessel head during future refueling outages.

Additionally, KNPP is assessing modification of the insulation on the reactor vessel head to provide inspection ports to permit visual examination of the bare metal exterior surface of the reactor vessel head during future refueling outages.

Each of these code examinations will be performed using personnel and procedures that satisfy requirements specified in Section XI of the ASME Code. Any damage or leakage that may be observed will be evaluated using the acceptance criteria specified in Section XI of the ASME Code.

NRC Request

1.E. "your conclusion regarding whether there is reasonable assurance that regulatory requirements are currently being met (see the Applicable Regulatory Requirements, above). This discussion should also explain your basis for concluding that the inspections discussed in response to Item 1.D will provide reasonable assurance that these regulatory requirements will continue to be met. Include the following specific information in this discussion:

(1) If your evaluation does not support the conclusion that there is reasonable assurance that regulatory requirements are being met, discuss your plans for plant shutdown and inspection.

(2) If your evaluation supports the conclusion that there is reasonable assurance that regulatory requirements are being met, provide your basis for concluding that all regulatory requirements discussed in the Applicable Regulatory Requirements section will continue to be met until the inspections are performed."

KNPP Response

KNPP has reviewed the regulatory requirements noted in Bulletin 2002-01, the current licensing basis, and corresponding plant programs and activities. The current licensing basis addresses each of the regulatory items discussed in Bulletin 2002-01. Furthermore, KNPP has identified and implements programs and activities to ensure compliance with the current licensing basis.

Our evaluation as indicated herein supports the conclusion that there is reasonable assurance that the current licensing basis is being met and will continue to be met throughout the remaining lifetime of the KNPP. The basis for this conclusion is as follows:

1. The bare metal external surface of the reactor vessel head was inspected in 1989 and 2001. No boric acid accumulation or degradation was observed including, thinning, pitting, or other forms of degradation such as the degradation of the reactor pressure head observed at Davis-Besse.
2. Water chemistry guidelines have been established to reduce the likelihood of stress corrosion cracking of stainless steel and nickel base materials.
3. RCS leakage is monitored and corrective actions are taken if predefined limits are exceeded.
4. The design of the reactor pressure vessel satisfies Section III of the ASME Code.

5. RCS leakage other than steam generator tubes, valve bonnets, packing, instrument fittings, or similar primary system boundaries not indicative of major component exterior wall leakage is not permitted and requires plant shutdown.
6. The reactor pressure vessel head and CRDMs are inspected in accordance with Section XI of the Code.
7. Inspections of the reactor pressure boundary are performed in accordance with US NRC Bulletin 2001-01 and Generic Letters 88-05.
8. Acceptance criteria included in Section XI of the ASME Code are used for visual, surface, and volumetric examinations of the reactor coolant pressure boundary.
9. Procedures have been established in accordance with Section XI of the ASME Code for visual, surface, and volumetric examination of the reactor coolant pressure boundary.
10. Additional inspection guidance has been developed by EPRI and is used for visual examination of the reactor vessel head for NRC Bulletin 2001-01.

In summary, KNPP has determined that there is reasonable assurance that structural integrity of the KNPP reactor vessel head will continue to be maintained. This determination is based upon historically low unidentified RCS leakage, the susceptibility evaluation documented in MPR-48, and evidence of no boric acid accumulation (and degradation) on the reactor vessel head through visual inspections performed in 2001.

Attachment 2

Point Beach Nuclear Plant
Units 1 and 2

Response to

NRC Bulletin 2002-01

NRC Request

1.A. “a summary of the reactor pressure vessel head inspection and maintenance programs that have been implemented at your plant,”

PBNP Response

As reported in Table 2-1 of EPRI Report 1006284, dated August 2001, PWR Materials Reliability Program Response to NRC Bulletin 2001-01 (MRP-48), Point Beach Nuclear Plant (PBNP) Unit 1 and Unit 2 have block contoured RPV head insulation. The insulation consists of three inch blocks coated with ¼ inch of Fiberfrax cement. The insulation is in direct contact with the reactor vessel head. The top of the insulation is sealed with a waterproof coating.

Historically, personnel at PBNP have performed inspections and examinations of the reactor vessel head required by Section XI of the American Society of Mechanical Engineers (ASME) Code, and when industry issues warrant, have conducted additional proactive examinations.

Historical activities include the following:

1. Visual examination of all accessible portions of Control Rod Drive Mechanisms (CRDMs) for canopy seal weld leakage.
2. A 100% eddy current examination of the weld region of forty-one reactor vessel head penetrations on Unit 1 was conducted in 1994. This examination was performed on the inside diameter of the CRDM housing. The examination volume was the inside diameter up to 50 mm above the uppermost portion of the j-groove weld to 50 mm below the lowermost portion of the j-groove weld. In addition to the forty-one penetrations that were fully inspected, the remaining eight outermost sleeved penetrations were partially inspected. The partial inspections did examine the high stress regions of each CRDM housing. Final analysis of all of the eddy current data detected no defects in any of the penetrations.
3. Volumetric and magnetic particle examination of the reactor vessel head to flange weld over a ten-year frequency.
4. Dye penetrant examination of 10% of the full penetration butt welds on peripheral CRDMs on a ten-year frequency.
5. Visual examination of conoseal bolting on the thermocouple columns during the VT-2 system leakage test performed at the end of each refueling outage.
6. Cleaning of the reactor vessel studs and nuts each scheduled refueling outage. (This practice can help readily identify any potential damage including wastage.)
7. Ultrasonic examination of the reactor vessel studs on a ten-year frequency.
8. Visual examination of the reactor vessel closure head nuts and washers on a ten-year frequency.
9. Visual examination of the reactor vessel head with emphasis placed on the detection of leakage at the reactor vessel flange and CRDM mechanical joints during the ASME, Section XI, Class 1 system pressure test performed each refueling outage.

Items 1, 3 – 5, and 7 – 9 are performed in accordance with the existing site ISI Plans.

Additionally, the reactor vessel head is disassembled each refueling outage. During this process, various portions of the reactor vessel head are exposed, worked on, and re-assembled. These maintenance activities provide a high degree of confidence that leakage and/or accumulation of boric acid does not occur and go undetected.

Following reactor head re-assembly and during startup, personnel from the Engineering Departments conduct visual examinations to ensure that any leakage of the reactor vessel head, CRDMs, and mechanical joints is detected. Engineering is sensitive to the issue of potential boric acid wastage and proactively identifies signs of leakage such as boric acid accumulation.

NRC Request

1.B. "an evaluation of the ability of your inspection and maintenance programs to identify degradation of the reactor pressure vessel head including, thinning, pitting, or other forms of degradation such as the degradation of the reactor pressure vessel head observed at Davis-Besse,"

PBNP Response

A 100% visual examination of the bare metal exterior surface of PBNP reactor vessel heads has not yet been performed. As discussed in the subsequent sections, visual examinations of 100% of the exterior surface area of the reactor vessel heads are scheduled for PBNP Units 1 and 2 in October and April 2002, respectively.

Although the insulated portion of the external surface of the PBNP reactor vessel heads has not been visually inspected to date, their structural integrity is known for the following reasons:

a. The eddy current inspection of Unit 1 CRDM vessel penetrations in 1994 found no defects. The examination provided assurance that there was no ID initiated cracking of the CRDM pressure housings in the areas inspected.

b. The top of the reactor vessel head insulation is sealed with a waterproof coating. No metal covering is in place that could mask damaged or wetted insulation. As stated previously, this insulation is visually examined each refueling outage. Historically, damage to the insulation has been infrequent and minor in size. In instances when damaged insulation was identified, the insulation was removed, inspected, and replaced. Additionally, the insulation covering has been resealed to ensure its watertight characteristics. Examinations performed have indicated that no significant staining, discoloration, bulging, or other readily identifiable damage to the insulation has been recorded and the insulation is in good condition. Experience with boric acid leakage from other RCS insulated components has resulted in boric acid accumulation at joints, staining, and/or deformation/damage to the insulation. PBNP has concluded, based on engineering judgment, that RCS leakage from the reactor vessel head has not occurred, because the existing reactor vessel head insulation is in good condition. Furthermore, if it were conservatively assumed that a through-wall CRDM crack existed during power operation, pressurized primary water containing boric acid would escape from the crack upward into the annular space between the reactor pressure vessel head and the penetration. As the pressure decreases, some of the water would flash to steam, which would produce a high velocity steam jet. During this process, boric acid would remain in the liquid phase. However, the liquid would then boil because it is exposed to a high temperature environment, i.e., it is in contact with hot (>212 °F) metal or insulation. As the liquid escapes and boils, only non-volatile species in the water will remain (i.e., boric acid). Over a period of time, this process would be expected to lead to an accumulation of boric acid and voluminous corrosion products (significantly greater than the volume of wasted carbon steel) at the head/insulation interface, in the annulus between the insulation and penetration tube, or above the insulation. It would be expected that this accumulation would eventually exert enough force on the insulation to create: (1) a localized bulge, crack, displacement, etc., of the insulation blocks, which would be visually detectable, and/or (2) crystalline deposits around the penetration or on top of the insulation, which would also be visible. This displacement is due to the fact that the insulation consists of tight fitting block insulation that is covered by a layer of Fiberfrax cement with a final waterproof coating. The insulation blocks are dense and inflexible (as demonstrated by minor surface cracking), and would therefore be expected to crack and be displaced upward. The escaping steam, if the leak were large enough, would also be expected to erode the insulation and thus produce visible evidence of leakage. It would also be detectable by RCS leakage detection systems. During cooldown, cool liquid under pressure could reach the top of the head when metal temperature is below 212 °F. Some evaporation will still occur as the temperature drops to ambient. The insulation around the leak location could soak up water during this period, but as soon as the head heats up again, the water will evaporate. Consequently, the leakage would be expected to produce visible evidence of insulation distortion and crystalline deposit.

Root cause information regarding the Davis Besse incident notes that other containment building related conditions such as iron oxide, boric acid and moisture found in radiation monitor filters and boric acid accumulations on the air coolers can provide further indication of CRDM nozzle leakage.

c. When instances of CRDM canopy seal weld and conoseal joint leakage have occurred, any boric acid accumulation was removed. The waterproof insulation coating precludes boric acid from coming in direct contact with the reactor vessel head.

d. RCS leakage is closely trended and monitored. Methods used for assessing RCS leakage include monitoring of containment gases, containment sump levels, and RCS inventory. A review of containment airborne radioactivity data has been performed without record of an upward trend of airborne activity. Furthermore, there is currently zero reported unidentified RCS leakage for PBNP Units 1 and 2.

In addition to the factors listed above, the PBNP inspection and maintenance programs assist in the establishment of structural integrity of the reactor vessels. Field inspections performed during initial plant pressurization, and ASME Section XI visual examinations conducted during system pressure testing (performed during startup), confirm that the reactor vessel head is free of boric acid accumulation and known leakage.

Although no written records of the inspections were identified, discussions with numerous site personnel revealed that portions of the reactor vessel head were exposed at various times over the plant life. However, no formal ASME Section XI inspections were performed during these maintenance activities. These discussions also revealed that a small amount of damage occurred to the PBNP Unit 1 reactor vessel head as a result of boric acid corrosion and/or steam impingement in the early 1970's. The extent of damage is described as a small and shallow area of wastage, said to be approximately 1/8 to 3/8 inches deep, covering an area of only a few square inches. This is a first hand account by a PBNP staff member who was involved in repair of the insulation.

Since 1991, system engineers at PBNP have performed field inspections of the CRDM canopy seal welds during reactor startup. A review of these inspection records did not indicate that boric acid accumulation had been observed on the insulation of the reactor vessel heads.

These activities, in addition to other work performed in close proximity of the reactor vessels (e.g., disassembly and re-assembly of the reactor vessel heads), assist in the assurance that the plant is not returned to service with known leakage or boric acid accumulation on the insulation of the reactor vessel heads. The combination of these inspection, maintenance, and operation practices has allowed the plant to identify and correct leakage before boric acid accumulation and damage have occurred on the reactor vessel heads.

Furthermore, when Code required inspections are performed, both procedures and personnel are qualified in accordance with Section XI of the ASME Code. The site internal assessment group performs audits to ensure that personnel and procedure qualification requirements are satisfied. The ASME Code requires that reviews be performed of ANI/ANII activities, which provide further assurance that the site is implementing Section XI of the Code.

NRC Request

1.C. "a description of any conditions identified (chemical deposits, head degradation) through the inspection and maintenance programs described in 1.A that could have led to degradation and the corrective actions taken to address such conditions,"

PBNP Response

Discussions with site personnel have recently revealed that a small amount of damage occurred to the PBNP Unit 1 reactor vessel head due to either steam impingement and/or boric acid corrosion early in plant life. The extent of damage is described as a small and shallow area of wastage said to be approximately 1/8 to 3/8 inches deep, covering an area of only a few square inches. The design thickness of the reactor vessel head is 5.375 inches, while the as received thickness of the head is approximately 5 5/8 inches. Thus, from the information available to date, the local area wall thickness has not been reduced by more than 10% which is the threshold cited in paragraph IWA-5250 (b) of Section XI for when a component shall be evaluated to determine whether the component may be acceptable for continued service, or whether repair or replacement is required. This condition is judged to be superficial in nature and is considered to not pose a safety concern since it involves only a small area of wastage that does not exceed 10% of the minimum design wall thickness. This discontinuity does not possess characteristics that are crack like in nature, and represents an as left geometry without sharp edges that would cause stress concentration.

Historical RCS Leakage at or near the PBNP reactor vessel heads has been largely composed of CRDM canopy seal weld leaks. The following table outlines several incidences of RCS leakage at the CRDM canopy seal welds**:**

Table 1
Summary of PBNP Canopy Seal Weld Leaks

Year	Description
1972	Several minor Unit 2 canopy seal weld leaks
1974	Minor Unit 2 canopy seal weld leak
1976	Unit 2 canopy seal weld leak
1985	Minor Unit 2 canopy seal weld leak
1990	Minor Unit 2 canopy seal weld leak
1990	Several Unit 1 canopy seal weld leaks

A review of the past maintenance records indicated that when boric acid was observed on the reactor vessel head insulation, from the leaks described in Table 1, the boric acid was removed prior to returning the plant to service.

As a result of the Unit 1 CRDM canopy seal weld leaks in 1990, the canopy seal welds were repaired, the boric acid was cleaned from the reactor vessel head area, and the reactor vessel head insulation was resealed with waterproof sealant. The insulation sealant on Unit 2 has also been recoated.

Additionally, a review of past maintenance records revealed two other instances of minor conoseal mechanical joint leaks. The first of these leaks occurred on Unit 1 in 1992. The second leak occurred on Unit 2 in 2000. When these events occurred, the leaks were repaired and the boric acid residue was removed.

NRC Request

1.D. “your schedule, plans, and basis for future inspections of the reactor pressure vessel head and penetration nozzles. This should include the inspection method(s), scope, frequency, qualification requirements, and acceptance criteria, and”

PBNP Response

MPR-48 estimates that it will take PBNP Unit 1 and 2, 11.5 EFPY and 9.6 EFPY, respectively, of additional operation from March 1, 2001, to reach the same time-at-temperature as Oconee 3 at the time that leaking nozzles were discovered in March 2001. When considering future non operating time for scheduled refueling outages, PBNP Unit 1 will not reach this condition during its forty (40) year design life since the operating license is only in effect through October 5, 2010. Similarly, PBNP Unit 2 will not reach this condition until very late in its operating license. The PBNP Unit 2 operating license is valid through March 8, 2013. Thus, while degrading Alloy 600 j-groove welds and CRDM tubing is an immediate industry concern, these estimates provide additional assurance of the structural integrity of the PBNP reactor vessels.

Although through-wall cracking is not predicted to occur, PBNP plans to continue to proactively perform required inspections and follow the status of this issue through involvement with the EPRI MRP, ASME Code, NEI and other industry groups to ensure that adequate activities are scheduled and performed to ensure structural integrity of the reactor vessel head.

Refueling outages are scheduled for April 2002 and October 2002 for PBNP Unit 2 and 1, respectively. Per the PBNP response to NRC Bulletin 2001-01, dated September 4, 2001 (supplemented on January 3, 2002), complete removal of the reactor vessel head insulation and the performance of an effective visual examination of the bare-metal exterior surface will be performed during these outages. If the inspection results are indeterminate for any given reactor pressure vessel (RPV) nozzle due to masking or inaccessibility, the RPV nozzle will be examined from underneath the head using techniques capable of ensuring no through-wall pressure boundary leakage is present. As a result of the findings at Davis-Besse, PBNP will also perform a ultrasonic test (UT) examination of the reactor vessel head around each CRDM penetration. It is expected that in excess of 90% of the surface area will be examined. Additionally, the inspection plans for Unit 1 in October 2002 will be expanded as necessary, based on the results of the Unit 2 inspection in April 2002.

PBNP is in the process of procuring replacement metal reflective insulation to be installed on the reactor vessel heads following the asbestos abatement process. The design includes inspection ports to permit visual examination of the bare-metal exterior surface of the reactor vessel heads during future refueling outages. Since all of the thermal insulation is scheduled to be removed, and ASME Section XI personnel and procedures will be utilized for the visual examination, the small area of wastage reported on the PBNP Unit 1 reactor vessel head will be further characterized and documented.

Long-term plans include the following:

1. Continued visual examination of CRDM tubing during each refueling outage for any signs of leakage.
2. Cleaning of the reactor vessel studs and nuts each scheduled refueling outage. (This practice can help readily identify any potential damage)
3. Visual examination of conoseal bolting on the thermocouple columns each scheduled refueling outage.
4. ASME Section XI required exams of the reactor vessel head.
5. Visual examination of the bare-metal exterior surface of the reactor vessel head during future refueling outages.

Each of these examinations will be performed using personnel and procedures that satisfy requirements specified in Section XI of the ASME Code. Any damage or leakage that may be observed will be evaluated using the acceptance criteria specified in Section XI of the ASME Code.

NRC Request

1.E. "your conclusion regarding whether there is reasonable assurance that regulatory requirements are currently being met (see the Applicable Regulatory Requirements, above). This discussion should also explain your basis for concluding that the inspections discussed in response to Item 1.D will provide reasonable assurance that these regulatory requirements will continue to be met. Include the following specific information in this discussion:

(1) If your evaluation does not support the conclusion that there is reasonable assurance that regulatory requirements are being met, discuss your plans for plant shutdown and inspection.

(2) If your evaluation supports the conclusion that there is reasonable assurance that regulatory requirements are being met, provide your basis for concluding that all regulatory requirements discussed in the Applicable Regulatory Requirements section will continue to be met until the inspections are performed."

PBNP Response

PBNP has reviewed the regulatory requirements noted in Bulletin 2002-01, the current licensing basis, and corresponding plant programs and activities. The current licensing basis addresses each of the regulatory items discussed in Bulletin 2002-01. Furthermore, PBNP has identified and implements programs and activities to ensure compliance with the current licensing basis.

Our evaluation as indicated herein supports the conclusion that there is reasonable assurance that the current licensing basis is being met and will continue to be met throughout the remaining lifetime of the PBNP. The basis for this conclusion is as follows:

1. Water chemistry guidelines have been established to reduce the likelihood of stress corrosion cracking of stainless steel and nickel base materials.
2. RCS leakage is monitored and corrective actions are taken if predefined limits are exceeded.
3. The design of the reactor pressure vessel satisfies Section III of the ASME Code.
4. RCS leakage other than steam generator tubes, valve bonnets, packing, instrument fittings, or similar primary system boundaries not indicative of major component exterior wall leakage is not permitted and requires plant shutdown.
5. The reactor pressure vessel head and CRDMs are inspected in accordance with Section XI of the Code.
6. Inspections of the reactor pressure boundary are performed in accordance with US NRC Bulletin 2001-01 and Generic Letter 88-05.
7. Acceptance criteria included in Section XI of the ASME Code are used for visual, surface, and volumetric examinations of the reactor coolant pressure boundary.
8. Procedures have been established in accordance with Section XI of the ASME Code for visual, surface, and volumetric examination of the reactor coolant pressure boundary.
9. Additional inspection guidance has been developed by EPRI and will be used for visual examination of the reactor vessel head for NRC Bulletin 2001-01.
10. No defects were found during the eddy current inspections performed on the Unit 1 reactor vessel head penetrations in 1994.

In summary, PBNP has determined that there is reasonable assurance that structural integrity of the PBNP Unit 1 and 2 reactor vessel heads are being maintained. This determination is based upon historically low unidentified RCS leakage (currently zero), the susceptibility evaluation documented in MPR-48, and site programs/activities that inspect the reactor vessel head for leakage and prevent the accumulation of boric acid on the reactor vessel head insulation. Furthermore, verification of the structural integrity will be enhanced in the future through performance of the scheduled bare-metal external surface visual examinations.