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**Constellation Energy**
Nuclear Generation Group

May 22, 2009

U. S. Nuclear Regulatory Commission
Washington, DC 20555

**ATTENTION:** Document Control Desk

**SUBJECT:** **R.E. Ginna Nuclear Power Plant**
Docket No. 50-244

**Fourth Interval Inservice Inspection Program**
**Submittal of 10 CFR 50.55a Request Number 24**

Pursuant to 10 CFR 50.55a(a)(3)(i), R.E. Ginna Nuclear Power Plant, LLC (Ginna LLC) hereby requests NRC approval of the enclosed request for the Fourth Interval Inservice Inspection Program.

The proposed alternative provides an acceptable level of quality and safety and is described in detail in the attached enclosure.

Ginna LLC requests approval of Request Number 24 by August 28, 2009, to support the refueling outage currently scheduled to commence in September. The request is a result of the recent rule change to 10 CFR 50.55a.

There are no regulatory commitments contained in this letter. Should you have questions regarding this matter, please contact Thomas Harding (585) 771-5219, or Thomas.hardingjr@constellation.com.

Very truly yours,

Joseph E. Pacher

Enclosure: 10 CFR 50.55a REQUEST NO. 24, R.E. Ginna Nuclear Power Plant – Fourth Interval Inservice Inspection Program Proposed Alternative for Bottom Mounted Instrumentation Examinations

cc: S. J. Collins, NRC
D. V. Pickett, NRC
Resident Inspector, NRC

A047
NRR

WPLNRC-1002140

# 10 CFR 50.55a REQUEST NO. 24

## R.E. Ginna Nuclear Power Plant – Fourth Interval Inservice Inspection Program Proposed Alternative for Bottom Mounted Instrumentation Examinations

**10 CFR 50.55a REQUEST NO. 24**
**R.E. Ginna Nuclear Power Plant – Fourth Interval Inservice Inspection Program**
**Proposed Alternative for Bottom Mounted Instrumentation Examinations**

**Proposed Alternative**
**In Accordance with 10 CFR 50.55a (a)(3)(i)**
**-Alternative Provides Acceptable Level of Quality and Safety-**

## 1. ASME Code Component(s) Affected

The component is the Reactor Vessel which has a unique equipment identification number RRC01. The class 1 Reactor Vessel includes the sub components of 36 Inconel 600 Bottom Mounted Instrumentation (BMI) nozzles. The specific nozzle component numbers are:

| | | | | | |
|---|---|---|---|---|---|
| A65 | A68-2 | A71 | A75 | A80 | A86 |
| A66-1 | A69 | A72 | A76 | A81 | A87 |
| A66-2 | A70-1 | A73-1 | A77 | A82 | A88-1 |
| A67-1 | A70-2 | A73-2 | A78-1 | A83 | A88-2 |
| A67-2 | A70-3 | A74-1 | A78-2 | A84 | A89-1 |
| A68-1 | A70-4 | A74-2 | A79 | A85 | A89-2 |

## 2. Applicable Code Edition and Addenda

The R.E. Ginna Fourth Interval Inservice Inspection (ISI) Program Plan is prepared to ASME Section XI code, 1995 Edition with 1996 Addenda.

## 3. Applicable Code Requirement

10CFR50.55a incorporates additional,requirements, one of which is the ASME Code Case N-722 "Additional examinations for (PWR) Pressure Retaining Welds in Class 1 Components Fabricated with Alloy 600/82/182 Materials with conditions, Section XI, Division 1." Table 1 Examination Categories Item No. B15.80 RPV Bottom Mounted Instrument Penetration.

## 4. Reason for Request

The NRC has endorsed Code Case N-722 with conditions in 10CFR 50.55a (g)(6)(ii)(E)(2) through (4). These requirements describe the need for a bare metal visual examination of the BMI nozzles during every other refueling outage starting with the first refueling outage after January 1, 2009. Code Case N-722 Table 1 referenced note 3, 4, 5 provide specific examination requirements.

R.E. Ginna is not able to perform a complete bare metal visual examination as defined in ASME Code Case N-722 due to paint in the nozzle annulus. The extent of paint occluded nozzle annulus (where paint is in the gap between the nozzle OD and the nozzle bore in the vessel) has been documented and ranges from 12.5% to 100%, with 10 nozzles being 100% occluded with paint.

Mockup testing has shown that it is likely that the paint wicked up into the annulus when it was initially applied. As a result, the ability to remove paint to meet the intent of a bare metal visual inspection may not be met.

## 5. Proposed Alternative and Basis for Use

R.E. Ginna is proposing to perform a detailed visual examination of the BMI nozzle surfaces during the next refueling outage in 2009 and the following refueling outage in 2011 without skipping a refueling outage. In addition, a volumetric examination will be performed during the 2011 refueling outage.

It is the R.E. Ginna position that a detailed visual examination on a combination of bare metal and painted metal surfaces during the 2009 and 2011 refueling outages, supplemented with a volumetric examination during the 2011 refueling outage, provides reasonable assurance of reactor vessel "BMI" nozzle integrity.

The proposed alternative would include performing a detailed visual inspection unimpeded with insulation on a combination of a bare metal, and painted metal surfaces during the 2009 and 2011 refueling outage. The R.E. Ginna site specific procedure EP-VT-116 "Visual Examination of Reactor Vessel Head" also identifies the requirement to look for paint that is bulging or deteriorated in the annulus area. The R.E. Ginna procedure also has a higher visual resolution requirement (VT-1) than that required in Code Case N-722. Based upon Code Case N-722 requirements to perform a bare metal visual every other refueling outage, an improvement to detect potential leakage from reactor vessel BMIs is realized by performing a high resolution and detailed visual examination during each refueling outage.

The R.E. Ginna Reactor Vessel bottom head paint is not considered a pressure boundary, and was applied by original design as a protective coating and has performed its design function. In addition, the grey paint provides a good contrast for boric acid detection.

Visual Examination

R.E. Ginna has performed videotaped VT-1 resolution inspections on the BMI during several refueling outages. These videotaped inspections have been compared to historical videotaped inspections. These videotapes serve as a baseline for comparison with future inspections and exceed the visual resolution requirements specified in ASME Code Case N-722. R.E. Ginna's Nondestructive Level III VT certified personnel with additional training in detection of borated water leakage are required to review all lower Reactor Vessel head videotape data. The history of resources applied to perform these visual inspections is summarized in Table 1.

All detailed visual examination requirements identified in ASME Code Case N-722 with conditions in 10CFR 50.55a (g)(6)(ii)(E)(2) through (3) will be complied with during the 2009 and 2011 refueling outage except the 100% bare metal visual requirement.

Table 1

| **Refueling outage and results** | **Visual inspection detail** | **Commitment and RFO scope details** |
|---|---|---|
| 2003 RFO<br><br>Final examination results - No Detection of leakage | All BMI nozzles annulus inspected to a VT-1 resolution, reactor vessel lower head base metal inspection was also performed with a VT-3 resolution, inspection performed by qualified VT personnel. 100% of inspection videotape recorded as found and 100% inspection videotaped recorded post cleaning for future comparison | NRC bulletin 2003-02 response.<br><br>R.E. Ginna built a support structure to lower the tight fitting insulation. Boric acid samples were analyzed to assure benign source. Cleaned boric acid residue from general head location to improve detection capabilities. |
| 2005 RFO<br><br>Final examination results - No Detection of leakage | All BMI nozzles inspected to a combination VT-1 / VT-3 resolution, reactor vessel lower head base metal also inspected with a VT-3 resolution, inspection performed by qualified VT personnel. 100% of inspection videotape recorded as found for future comparison | NRC bulletin 2003-02 response.<br><br>Removed tight fitting original insulation and modified lower head insulation at considerable dose and resources to accommodate visual examination. |
| 2006 RFO<br><br>Final examination results - No Detection of leakage | All BMI nozzles inspected to a VT-1 resolution, reactor vessel lower head base metal also inspected with a VT-3 resolution, inspection performed by qualified VT personnel. 100% of inspection videotape recorded as found for future comparison | NRC bulletin 2003-02 response. |
| 2008 RFO<br><br>Final examination results - No Detection of leakage | All BMI nozzles inspected to a VT-1 resolution, reactor vessel lower head base metal also inspected with a VT-3 resolution, inspection performed by qualified VT personnel. 100% of inspection videotaped recorded as found for future comparison | Letter From Maria Korsnick (R.E. Ginna LLC) to (NRC), Subject: Modification of Commitment to Perform Bare Metal Inspection of the Reactor Lower Head Bottom Mounted Instrumentation Nozzles in accordance with NRC Bulletin 2003-02, dated September 19, 2006 |

Ultrasonic Examination

The performance of the volumetric examination of the 36 BMI nozzles, including the volume of the tube and the weld interface, will be performed to the meet the intent of the ASME Section XI Appendix VIII process during the 2011 refueling outage. The R.E. Ginna specific 2 loop design shall be used for all mockups. The following requirements shall also be implemented:

1. The use of industry proven hot isostatic process (HIP) squeezed EDM notches which are simulated crack flaw types that produce NDE responses similar to cracks will be used to augment the existing EPRI 2 loop blind sample library of cold isostatic process (CIP) notches. The HIP process is similar to the CIP process where a pressure is used to squeeze the EDM notches. The HIP process uses the simultaneous application of pressure and temperature in an enclosed vessel to squeeze the EDM notches. The time under these conditions is controlled to obtain optimum material properties. The crack size, crack shape and location are controlled and well known for procedure or personnel qualification. The HIP process is very useful in establishing eddy current and ultrasonic examination capabilities. This CIP and HIP processes produce a tight crack tip. Typically, the radius of the squeezed notch crack tip used in BMI mockups are 0.0004" (10 microns) which is smaller than the 0.002" (51 microns) required by ASME Section XI, Appendix VIII. This squeezed crack tip dimension has been shown to produce a comparable ultrasonic examination response (ultrasonic amplitude and echo dynamic features were also similar) to an actual PWSCC flaw from Bugey. This has been documented in a publicly available report "Demonstration of Inspection Technology for Alloy 600 CRDM Head Penetrations" EPRI TR-106260, October 1996, Palo Alto, CA. This HIP process has been in use to support ASME Section XI Appendix VIII for over 15 years and has been documented in an EPRI report (1008007), "Dissimilar Metal Piping Weld Examination – Guidance and Technical Basis for Qualification: Volume 1" EPRI, Palo Alto, CA, 2003.

2. A BMI nozzle 2 loop mock-up qualification will be required prior to the R.E. Ginna field examination. False call criteria, detection parameters and sizing parameters are in the process of being established for this qualification. These requirements will be an improvement to the present industry demonstrations.

3. With the absence of an ASME Section XI Appendix VIII specific supplement for BMI nozzle base metal examination, the conceptual mock-up manufacturing flaw matrix will meet the intent of Appendix VIII.

4. The number of flaws will provide the minimum requirement for procedure qualification. Introduction of potential manufacturing anomalies that may provide false positives or impede examination quality will also be considered.

5. To address the unique geometries of the R.E. Ginna BMI nozzle 2 loop examination, some additional vendor requirements will be specified. Vendor NDE examination personnel training prerequisites will be established prior to performing the 2 loop qualification. This will establish minimum training requirements for both data acquisition and analyses.

6. Personnel qualification will be performed with a minimum of 10 flaws. All procedure and personnel qualifications will be performed on blind test samples.

7. The qualification essential variables will be documented to assure qualification examination conditions and results can be compared to field examination conditions and results.

8. The volume of inspection will comply with Figure 1 Volume A-B-C-D to an axial distance of "a" at a minimum. The intent of the volumetric examination will be to examine 100% of the required volume. An examination that meets ASME Section XI for essentially 100% of the required volume (Code Case N-460) will be considered to be 100% examined. The extent of the examination volume for each nozzle will be documented for each penetration in % of examination coverage.

In conclusion, the 2011 RFO qualified ultrasonic examination results and the 2009 RFO and 2011 RFO detailed visual results will provide an alternative that exceeds the bare metal visual examination required by ASME Code Case N-722 based upon the following discussion.

The joint configuration at the reactor lower head BMI nozzle is such that the penetrations are welded to the vessel lower head by means of a J-groove weld 360° around the penetration. Visual examination can detect active leakage from degradation from this weld joint. An ultrasonic examination of the examination area of Figure 1 is expected to show degradation that may be in the initiation stage or early growth stage of the BMI nozzle. The examination would provide volumetric indication of any active degradation prior to propagating through-wall as opposed to the visual examination which relies solely upon a pressure boundary breach to detect active degradation.

Therefore, an ultrasonic examination of the Figure 1 examination area (A-B-C-D at a distance of "a") which would identify potential flaws prior to through wall leakage combined with the enhanced visual examination of the annulus space will provide reasonable assurance that the capability to detect degradation of the BMI penetration base material and J-groove weld will be equal to or better than the detection capabilities identified in ASME Code Case N-722.

<u>Industry Reactor Vessel BMI Experience</u>

Reactor vessel BMI leakage was discovered from visual inspection at South Texas Project (STP) unit 1, during an April 2003 refueling outage. Ultrasonic examinations were used to characterize the flaws and to confirm the leak path. The NRC issued Bulletin 2003-02 on August 21, 2003 which required plants to perform visual examinations on the reactor vessel BMI nozzles. Since the NRC issued Bulletin 2003-02, no evidence of BMI pressure boundary leakage has been reported to date. In addition, several plants have performed voluntary ultrasonic volumetric examinations since 2004 with no cracks detected. A total of 20 plants in the United States with over 1042 BMI nozzles have been inspected as of March 2009 with ultrasonic examinations, or a combination of ultrasonic and eddy current examinations. These examinations have resulted in no additional indications of service induced flaws detected to date.

Additional Bases for R. E. Ginna Operation through 2011 Refueling Outage

In addition to the proposed alternative examinations, R.E. Ginna has sufficient primary system leakage detection capability and operator response to safely operate until the 2011 RFO.

There are numerous methods for detecting leakage from the R.E. Ginna Reactor Coolant System (RCS) boundary. Radioactivity detection systems are included for monitoring both particulate and gaseous activities because of their sensitivities and rapid responses to RCS leakage. Section 5.2.5 of the R.E. Ginna Final Safety Analysis Report states that the containment air particulate monitor, R-11, is the most sensitive instrument available for detection of RCS leakage in containment. Assuming a complete dispersion of leaking radioactive solids consistent with very little or no fuel cladding leakage, R-11, is capable of detecting leaks as small as approximately 0.018 gpm within 20 minutes. The containment gaseous monitor, R-12, is much less sensitive, but can detect a leak of 2.0 to 10.0 gpm within 1 hour and is considered to be a backup to the particulate monitor. The containment sump level can measure approximately a 2.0 gpm leak within 1 hour. Operability of these monitors is addressed in Technical Specification (TS) 3.4.15. Alternative means also exist to monitor RCS leakage inside containment, which include humidity detectors, air temperature and pressure monitoring, and condensate flow rate from the air coolers. It should be noted that while the Technical Specifications only require that the RCS inventory balance be checked every 72 hours, R.E. Ginna procedurally performs this once per shift. The RCS leakage surveillances also include a review of containment sump actuations, containment fan cooler condensate collection dumps, and containment gaseous and particulate radioactivity monitor status.

The capability of these systems to detect RCS leakage is influenced by several factors including the containment free volume and detector location. The capability to detect a low leakage of 0.018 gpm for the R-11 detector is attributed to R.E. Ginna's relatively small containment volume of approximately 970,000 cubic feet and effective recirculation of air inside the containment. The R.E. Ginna containment ventilation includes the reactor compartment cooling system which supplies cool air to the annulus between the reactor vessel and the primary shield. The system fans take a suction from the containment atmosphere and cool the air before discharging through supply dampers to the area near containment sump A (directly under the reactor vessel). Air exits to the containment atmosphere around the loop nozzles and vessel seal ring area. This maintains the area of the BMI in good communication with the remainder of the containment atmosphere and therefore any leakage in this area would be detected by the radiation monitors.

The operator response to a leak in the area of the BMI nozzles would be the same as a response to any RCS leak that is detected.

Simulator training emphasizes abnormal and emergency condition responses. Use of in-house and industry operating experience enhances realism in simulator training. Operators practice plant transient and emergency response in the simulator using abnormal operating procedures, emergency operating procedures (EOPs), and emergency plan implementing procedures to attain knowledge and skills to demonstrate competent job performance. This includes Loss of Coolant Accidents (LOCA) at various sizes and at various locations which are diagnosed utilizing the RCS leakage detection systems described above.

To ensure a low threshold for identifying RCS leakage, the operators monitor for RCS leakage utilizing the leakage detection systems. The site procedures associated with RCS leakage detection include escalation criteria to further investigate sources and require additional actions to be taken in the event there is an increase in leakage. A separate procedure exists as well if there is any significant increase in RCS leakage. This procedure set would also direct entry into the site procedure AP-RCS.1, Reactor Coolant Leak, depending on the extent of the leakage.

### 6. Duration of Proposed Alternative

A detailed visual examination of the BMI nozzle surface annulus will be performed during the 2009 and 2011 refueling outages. The volumetric examination will be performed during the 2011 refueling outage. Future activities will be determined following the review and evaluation of the 2011 examination results, incorporating industry activities and industry operating experience.

### 7. Precedents

Indian Point Nuclear Generating Unit No. 3, Relief Request RR-3-48

Exelon Generating Company, LLC, Relief Request 13R-04

### 8. References

10 CFR 50.55a

ASME Section XI R.E. Ginna current code year 1995 edition 1996 addenda.

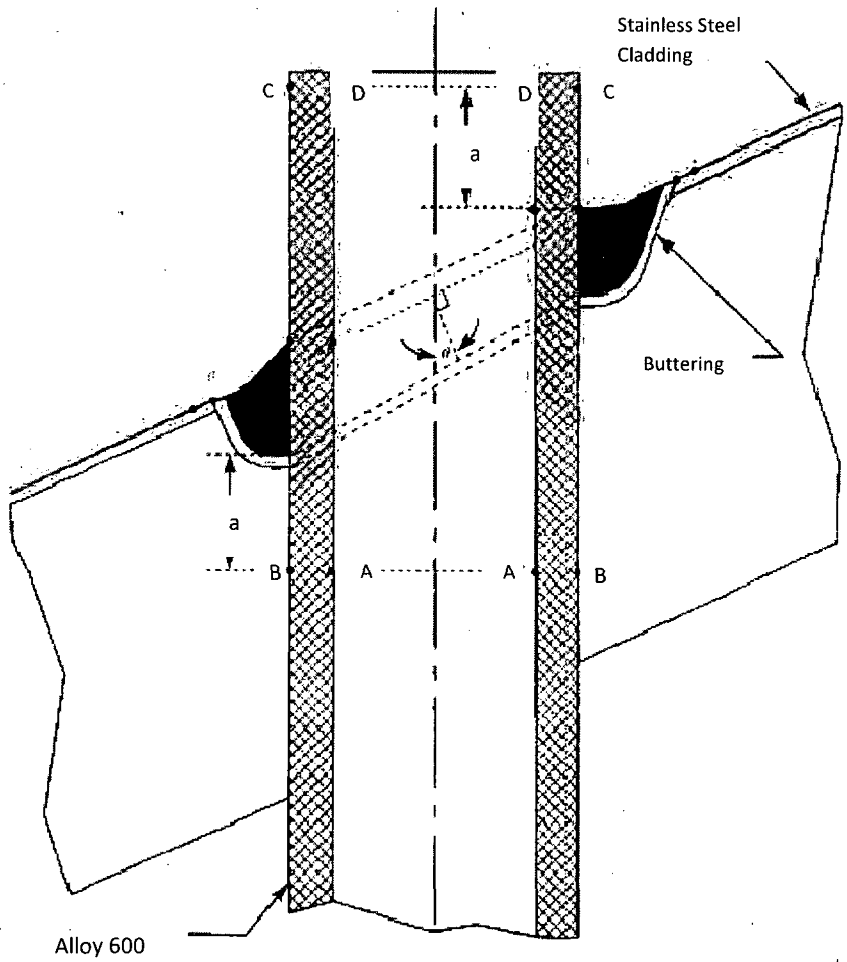
ASME Code Case N-722

ASME Code Case N-460

Demonstration of Inspection Technology for Alloy 600 CRDM Head Penetrations EPRI TR-106260, October 1996, Palo Alto, CA

Dissimilar Metal Piping Weld Examination – Guidance and Technical Basis for Qualification: Volume 1 EPRI, Palo Alto, CA, 2003. 1008007

FIGURE 1 EXAMINATION VOLUME FOR NOZZLE BASE METAL AND EXAMINATION AREA FOR WELD AND NOZZLE BASE METAL




a = 1.5 in. for incidence angle less than or equal to 30 degrees

a = 1.0 in. for incidence angle greater than 30 degrees

A-B-C-D = Extent of volumetric examination for the tube (base metal)