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SUBJECT: Forwards response to Generic Ltr 85-02 to resolve unresolved safety issues re steam generator tube integrity.

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June 17, 1985

Director of Nuclear Reactor Regulation
Attention: Mr. John A. Zwolinski, Chief
Operating Reactors Branch No. 5
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Resolution of Unresolved Safety Issues Regarding Steam Generator Tube Integrity (Generic Letter 85-02)
R. E. Ginna Nuclear Power Plant
Docket No. 50-244

Dear Mr. Zwolinski:

The enclosures to this letter respond to the Staff Recommended Actions and Review Guidelines and to the Request for Information Concerning Category C-2 Steam Generator Tube Inspections which were transmitted by Generic Letter 85-02.

Very truly yours,

Roger W. Kober

Roger W. Kober

Enclosures

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Enclosure 1

Response to NRC Generic Letter 85-02

1.a Prevention and Detection of Loose Parts (Inspections)

Ginna Station has Westinghouse Model 44 steam generators, which have a peripheral region accessible along its entirety.

Camera inspections using a miniature video camera have been performed on the steam generator secondary tubesheet along the entire periphery for the purpose of identifying loose parts and external damage to the peripheral tubes at Ginna every refueling/maintenance outage since 1982. Past experience has shown that a visual inspection of the tubelane from each handhole is adequate for the prevention and detection of loose parts. A normal inspection has consisted of first viewing along the entire annulus for loose parts, then viewing the tube bundle periphery for tube damage. Loose parts or foreign objects which are found are evaluated for size, composition, and location. A decision is then made whether a retrieval effort is required or not necessary. The current eddy current program at Ginna includes all peripheral tubes, so any tube observed to have visual damage is evaluated by using eddy current and plugged if found to be defective.

These visual inspections have been performed 1) for both steam generators during each refueling and/or steam generator maintenance outage, 2) after any secondary side modifications, repairs, or inspections of steam generator internals, and 3) when eddy current indications are found in the free span of peripheral tubes which show results from damage by a loose part or foreign object since 1982.

The potential for corrosion while the tube bundle is exposed to air is minimized by the exclusive use of experienced workers who have received extensive mockup training in the use of video inspection and retrieval equipment. All tools and materials that may be needed are present at this job site and verified to be in proper working order prior to the start of the job. The potential impact of chemical species recognized to be potential corrodents, such as chloride and sulfur, are carefully considered in the selection of materials and equipment used in the inspection program.

1.b Prevention and Detection of Loose Parts (Quality Assurance)

Current steam generator maintenance procedures at Ginna require notification of the Quality Control section and initialization of Quality Control Inspection Procedure-78, (QCIP-78) Logging of Equipment and Materials Used in Open Vessels. This procedure exists to preclude introduction of foreign objects into either the primary or secondary side of the steam generator whenever it is opened unless openings have been positively sealed (nozzle dams, scaffolding, etc.).

The purpose of QCIP-78 is to provide accountability of equipment and/or material entering/exiting open vessels during maintenance or modificaton activities. Instructional steps of QCIP-78 include 1) logging of all items that enter and exit an open vessel using serial numbers or size designation, 2) limiting the number of weld rods and accounting of weld stubs removed, 3) similar items that are numerous shall be marked with a number prior to their entry, 4) dimensionally listing material in such a manner that it can be identified upon exit by length, size, shape, diameter, thickness, etc., and 5) material cut from a vessel as a result of a modification shall be marked and retained for accountability.

Maintenance procedures have specific precautional steps that require control on foreign objects such as eyeglasses (require safety straps) and film badges (inside protective clothing and taped).

Maintenance procedures for components which could result in foreign object migration into the steam generators were reviewed and changed as necessary to require strict material control or a final cleanliness inspection.

QCIP-5, Cleanliness Inspection of Systems and Components, is used for preclosure cleanliness inspection. Documentation of satisfactory completion of a cleanliness inspection is by either a signoff or report by a Quality Control Inspector.

2.a Inservice Inspection Program (Full Length Tube Inspection)

The Ginna Inservice Inspection Program requires that the extent and selection of steam generator tube examinations is in accordance with Sections C.4 and C.5 of Regulatory Guide 1.83, with the interpretation that examinations in a leg of all previously defective tubes (>20% detectable wall penetration) and up to a maximum of two hundred previously defect-free tubes (<20% detectable wall penetration), is deemed sufficient in meeting the requirements of Regulatory Guide 1.83.

At each inspection a minimum of 3% of the tubes are examined for their full length. Presently, 20-25% of the tubes are examined full length each year to assure complete tubing coverage at least once every five years. Also each year, every tube in the hot leg (inlet) has been examined to at least the first tube support plate with a random sample being taken in the cold leg (outlet).

2.b Inservice Inspection Program (Inspection Interval)

The Ginna Inservice Inspection Program requires that the inservice inspecton intervals for the examination of steam generator tubes shall not be more than 24 months. However, if over a nominal 2 year period, (e.g., two normal fuel cycles), at least two examinations of the separate legs results in less than 10% of the tubes with detectable wall penetration (>20%) and no significant (>10%) further penetration of tubes with previous indications, the inspection interval of the individual legs may be extended to once every 40 months.

Since 1974, it has been standard practice to perform a steam generator inspection at each refueling and maintenance outage, which is approximately every 10-12 months.

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3.a Secondary Water Chemistry Program

RG&E has long recognized the critical need to maintain an effective water chemistry control program in order to minimize steam generator tube degradation. Employing existing industry standards as a minimum control criteria, RG&E has maintained a comprehensive secondary water chemistry program since initial plant operation. In June, 1980, RG&E completed development of 'Secondary Water Chemistry Monitoring Program' complying with the format suggested by the NRC in Amendment No. 33 to the Ginna Provisional Operating License. That monitoring program was updated in 1983 to incorporate, wherever possible, the limiting conditions identified in the October, 1982, issusance of the 'PWR Secondary Water Chemistry Guidelines, Revision 0' (NP-2704-SR), and was again recently modified to reflect the additional controls suggested by the June, 1984, Revision 1 of the Guidelines. RG&E has actively supported and assisted in the SGOG-sponsored efforts to provide chemistry guidance to the utility industry.

The major elements of the Ginna Secondary Water Chemistry Monitoring Program are summarized in Plant Procedure WC-15 and appropriately referenced in Plant Operating Procedures used during specific steam generator status modes. Secondary chemistry limitations are established for cold shutdown, heat-up and power operation. The chemistry monitoring procedure includes sections that identify (1) critical steam generator blowdown parameters, (2) action level objectives, (3) limiting control specifications that become progressively more stringent and can result in plant shutdown, (4) schedular requirements for sampling and analysis, (5) data recording requirements, and (6) the sequence of reporting out-of-normal chemistry conditions to specific functional individuals. The Ginna procedure utilizes the three steam generator blowdown Action Levels and limitations identified in the SGOG Guidelines as our Levels 2, 3 and 4. The Ginna Action Level 1 objective is to identify and correct the cause for a parameter value which is "out-of-the-historical-normal" for the Plant and recognizes that the existing SGOG Action Levels might not be sufficient for insuring long-term integrity. Action Level 1 steam generator blowdown limitations include cation conductivity at < 0.20 uMHOS, sodium at < 10 ppb, chloride at < 10 ppb, and sulfate at < 10 ppb. In the one area, makeup water dissolved oxygen, where equipment limitations preclude meeting of the Guideline recommendations options for improving oxygen control are being investigated.

Ginna applies All-Volatile-Treatment (AVT) chemistry control with ammonium hydroxide as the pH additive and hydrazine as an oxygen scavenger; full-flow deep bed condensate polishers are used continuously for the reduction of ionic impurities and corrosion product transport. RG&E maintains an internal capability for the

identification and location of air and lake water inleakage, and upgrades that capability as more sensitive techniques are developed. The issue of secondary system materials selection is not specifically addressed in a procedure. The engineering practice has been that as components of the secondary system require modification or replacement, chemistry impact is strongly considered in the materials selection process. Several practical examples of this philosophy include replacement of the copper alloy 3A/3B low pressure feedwater heaters and moisture separator-reheater tube bundles with ferrous alloy tubing.

RG&E has an established water chemistry monitoring program directed at maintaining chemistry control in the secondary circuit. That program continues to be reviewed and revised based on our experiences and those of the industry. Ginna chemistry monitoring procedures, in conjunction with the general philosophy of operation, limit corrosion damage and help insure the long-term integrity of the steam generators.

3.b Condenser Inservice Inspection Program

RG&E recognizes that a condenser inservice inspection program is essential to steam generator water chemistry control and has implemented a condenser inservice inspection program. Administrative procedure (A-1025) has been developed which describes identification and location of leakage sources, methods of repair, methodology for determining cause and a preventive maintenance program.

Since 1975, condenser inservice inspection has been performed utilizing the eddy current examination method to assure the integrity of the tubing. This typically has included approximately 100% inspection of one water box with a random sampling of tubes in the other three water boxes each year. This sample includes areas where previous damage or leaks were found and the air removal sections.

4. Primary to Secondary Leakage Limit

The Ginna Technical Specification limit of less than .1 gpm leakage from primary to secondary is more restrictive than the Standard Technical Specification limit of 1 gpm.

5. Coolant Iodine Activity Limit

Ginna has intermediate head high pressure safety injection pumps. Reactor coolant pump trip criteria have been incorporated into the Ginna procedures which will ensure that if offsite power is retained, reactor coolant pumps are not tripped for steam generator tube rupture events up to and including the design basis double-ended break of a single steam generator tube. In addition, the current reactor coolant iodine activity Technical Specification limit is 0.2 uCi/gm, 20% of the Standard Technical Specification limit.

6. Safety Injection Signal Reset

A modification to the safety injection pump suction switchover has been implemented such that only a low Boric Acid Storage Tank (BAST) level is required for the switchover from the BAST to the Refueling Water Storage Tank.

Enclosure 2

Response to Generic Letter 85-02
Information Concerning Steam Generator Tube Inspection Category C-2

The factors considered in determining whether additional tubes should be inspected beyond the requirements of the Inservice Inspection Program are as follows:

a) Historically, where has previous degradation been seen in the plant's steam generators?

b) Historically, what degradation mechanisms have been active in the plant's steam generators?

c) Operating cycles secondary water chemistry control and contaminants which may have hidden out, in crevices of sludge piles.

d) What new mechanisms have been seen in similar steam generators with or without the same water chemistry history?

The factors considered in determining whether all steam generators should be included in the inservice inspection program for a given year are as follows:

a) Are the materials, heat treatments and design the same?

b) Historically, have the steam generators seen the same operating chemistry?

c) Historically, have the steam generators experienced the same operating duty, such as conditions during startup and shutdown, steaming rates, and blowdown rates?

d) Historically, have the same degradation mechanisms been seen in each steam generator?

e) Is the damage mechanism related to a unique circumstance such as foreign objects in a steam generator?

The factors considered in determining when the steam generators should be reinspected are as follows:

a) Historically, what is the growth rate of the damage mechanism at the specific plant and at other plants?

b) What is the limit of detectability for the specific damage mechanism such as the differences in detectability of wastage to pitting to cracking to intergranular attack?

c) What is the worst leak that could occur if a degraded area was perforated? Would it be within technical specification limits or above, and what is the potential for a burst resulting in very high leak rates during normal operation, severe transients or postulated accident conditions?

d) Has there been any chemistry excursion resulting in degraded chemistry conditions which could trigger or increase the growth rate of the damage mechanism?

e) The commercial considerations of having a forced outage versus a scheduled and planned outage for inspection and repair.