UNION ELECTRIC COMPANY
1901 Gratiot Street, St. Louis

Donald F. Schnell
Vice President

June 19, 1985

Mr. Hugh L. Thompson, Jr.
Director, Division of Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Thompson: ULNRC-1115

RESPONSE TO GENERIC LETTER 85-02
STAFF RECOMMENDED ACTIONS STEMMING FROM
NRC INTEGRATED PROGRAM FOR THE RESOLUTION OF
UNRESOLVED SAFETY ISSUES REGARDING
STEAM GENERATOR TUBE INTEGRITY

Union Electric Company received the subject NRC Generic Letter 85-02 in April 1985. The Generic Letter requested that licensees furnish information pertaining to their programs for steam generator tube integrity and their comments and comparisons to the Staff recommended actions regarding steam generator tube integrity. This submittal provides the requested information. The responses address each of the Staff recommended actions and incorporate Union Electric comments on NUREG-0844.

We wish to point out that our responses are based on the current Callaway program for maintenance and inspection of steam generators and secondary system components. This program is subject to change as plant conditions or technology advances evolve. Such changes will be reviewed to assure they do not adversely impact plant safety (i.e., review based on 10CFR50.59).

If additional information is required, please let us know.

Very truly yours,

Donald F. Schnell

Donald F. Schnell

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Enclosures

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STATE OF MISSOURI)
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CITY OF ST. LOUIS)

Donald F. Schnell, of lawful age, being first duly sworn upon oath says that he is Vice President-Nuclear and an officer of Union Electric Company; that he has read the foregoing document and knows the content thereof; that he has executed the same for and on behalf of said company with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By Donald F. Schnell
Donald F. Schnell
Vice President
Nuclear

SUBSCRIBED and sworn to before me this 19th day of June, 1985.

Barbara J. Pfaff
BARBARA J. PFAFF
NOTARY PUBLIC, STATE OF MISSOURI
MY COMMISSION EXPIRES APRIL 22, 1989
ST. LOUIS COUNTY

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UNION ELECTRIC'S POSITION IN REGARD TO GENERIC LETTER 85-02 (STAFF RECOMMENDED ACTIONS AND REVIEW GUIDELINES STEMMING FROM NRC INTEGRATED PROGRAM FOR THE RESOLUTION OF UNRESOLVED SAFETY ISSUES REGARDING STEAM GENERATOR TUBE INTEGRITY)

1.a PREVENTION AND DETECTION OF LOOSE PARTS (INSPECTIONS)

Staff Recommended Action

Visual inspections should be performed on the steam generator secondary side in the vicinity of the tube sheet, both along the entire periphery of the tube bundle and along the tube lane, for purposes of identifying loose parts or foreign objects on the tubesheet, and external damage to peripheral tubes just above the tubesheet. An appropriate optical device should be used (e.g., mini-TV camera, fiber optics). Loose parts or foreign objects which are found should be removed from the steam generators. Tubes observed to have visual damage should be eddy current inspected and plugged if found to be defective.

These visual inspections should be performed: (1) for all steam generators at each plant at the next planned outage for eddy current testing, (2) after any secondary side modifications, or repairs, to steam generator internals, and (3) when eddy current indications are found in the free span portion of peripheral tubes, unless it has been established that the indication did not result from damage by a loose part or foreign object.

For PWR OL applicants, such inspections should be part of the preservice inspection.

For steam generator models where certain segments of the peripheral region can be shown not to be accessible to an appropriate optical device, licensees and applicants should implement alternative actions to address these inaccessible areas, as appropriate.

Licensees should take appropriate precautions to minimize the potential for corrosion while the tube bundle is exposed to air. The presence of chemical species such as sulfur may aggravate this potential, and may make exposure to the atmosphere inadvisable until appropriate remedial measures are taken.

Reference

Section 2.1 of NUREG-0844.

Union Electric Position

1a) At this time Callaway has an operational loose part monitor and therefore should not be required to inspect the tube sheet for loose parts unless there is an alarm or an eddy current finding that would indicate a loose part in the steam generator secondary side.

A visual inspection of the secondary side of the steam generators in the vicinity of the tube sheet is currently planned for the first refueling outage. Subsequent visual inspections will be performed following significant repair or modification to the secondary side of the steam generators and if eddy current results provide indications of tube denting or damage not explainable by other identified corrosion or denting mechanism.

Procedures exist for draining the steam generators while maintaining a nitrogen blanket on the secondary side of the steam generators. Normally the steam generators will be placed in wet lay-up with a nitrogen overpressure on the secondary side during cold shutdown to minimize the potential for corrosion. However, if maintenance or inspection activities are required, the steam generators will be sampled prior to draining and the nitrogen blanket will be maintained on the secondary side during the draining process.

1.b PREVENTION AND DETECTION OF LOOSE PARTS (QUALITY ASSURANCE)

Staff Recommended Action

Quality assurance/quality control procedures for steam generators should be reviewed and revised as necessary to ensure that an effective system exists to preclude introduction of foreign objects into either the primary or secondary side of the steam generator whenever it is opened (e.g., for maintenance, sludge lancing, repairs, inspection operations, modifications). As a minimum, such procedures should include: (1) detailed accountability procedures for all tools and equipment used during an operation, (2) appropriate controls on foreign objects such as eye glasses and film badges, (3) cleanliness requirements, and (4) accountability procedures for components and parts removed from the internals of major components (e.g., reassembly of cut and removed components).

Reference

Section 2.1 of NUREG-0844.

Union Electric Position

Union Electric plant procedure, MDP-ZZ-C0001, addresses the required aspects concerning prevention and detection of loose parts. The procedure prescribes, as a minimum, the following actions to preclude foreign material entry whenever fluid systems are opened to the atmosphere.

(a) Openings into the system such as manways, open valve bodies, flanges or open pipe ends will have the openings covered with sheetplastic, blank flanges or other suitable material whenever personnel are not present or work is not in progress.

(b) Tools, equipment or other material which could fall into openings in the system beyond the reach of personnel will be secured by either a lanyard or tag line to the individual or to a suitable anchorage while in use.

(c) Adequate provisions will be made to preclude debris from other work in adjacent areas from entering the open system. This may include protective screening or curtains as appropriate.

(d) Loose objects on the individuals clothing such as pencils, cigarettes, identification badges, etc. will either be removed or secured in place with tape or other suitable means.

(e) An initial inspection of the component(s) and accessible system interior surfaces will be made whenever systems or components are opened. Unusual or deficient conditions will be documented on the work request and appropriate notifications made.

(f) As a minimum, whenever Class A or B systems are opened, material accountability will be used to track material entry into and removal from the system.

This includes, but is not limited to, tools, replacement parts, parts removed from the component by either mechanical means or cutting, etc.

(g) Residues from lapping, grinding, drilling, machining, etc. will be removed from components and systems surfaces prior reassembly on closure. An approved solvent may be used followed by flushing with acceptable quality water or by wiping the surface with lint free rags saturated with acceptable quality water.

(h) When possible protective wrappings or preservative coatings will be removed from parts or components prior to bringing them to the work site. In all cases, protective wrappings, shipping containers, etc. will not be opened over the open system.

In addition to the items listed above, the Quality Control procedure QCP-ZZ-04001 requires that in those cases where ASME Class 1, 2, or 3 piping systems are opened during the course of maintenance, Quality Control will perform a system cleanliness inspection prior to system closure.

System cleanliness requirements are contained in plant administrative procedure APA-ZZ-00360. This procedure provides the criteria for different cleanliness requirements and system cleanliness classifications. For example cleanliness classification Class A is defined as a very high level of cleanliness in which there is no evidence of a surface contaminant either under visual examination, with or without magnification, or with the aid of sensitive detection methods. Class B cleanliness classification is defined as a high level of cleanliness in which surfaces appear "metal clean" when examined without magnification; scattered areas of rust are permitted provided the aggregate area does not exceed 2 sq. in. in any 1 sq. ft. area. The surface shall be free of particulate contaminants such as sand, metal chips, weld slag, etc., and organic films and contaminants such as oils, paint, and preservatives.

The Work Request Processing procedure PDP-ZZ-00003 also provides guidance to planning work for cleanliness control by including it as a checkoff item on the Planning Checklist for the Work Request.

2.a INSERVICE INSPECTION PROGRAM (FULL LENGTH TUBE INSPECTION)

Staff Recommended Action

The Standard Technical Specifications (STS) and Regulatory Guide 1.83, Part C.2.f, currently define a U-tube inspection as meaning an inspection of the steam generator tube from the point of entry on the hot-leg side completely around the U-bend to the top support of the cold-leg side. The staff recommends that tube inspections should include an inspection of the entire length of the tube (tube end to tube end) including the hot leg side, U-bend, and cold leg side.

This recommended action does not mean that the hot leg inspection sample and the cold leg inspection sample should necessarily involve the same tubes. That is, it does not preclude making separate entries from the hot and cold leg sides and selecting different tubes on the hot and cold leg sides to meet the minimum sampling requirements for inspection.

Consistent with the current STS requirement, supplemental sample inspections (after the initial 3% sample) under this staff recommended action may be limited to a partial length inspection provided the inspection includes those portions of the tube length where degradation was found during initial sampling.

Reference

Section 2.2.2 of NUREG-0844.

Union Electric's Position

This was not a requirement during Preservice Inspection, but Callaway performed full length tube inspection of all Steam Generator tubes on all four (4) Steam Generators.

For Inservice Inspection we intend at a minimum to inspect 6 percent of the tubes on each of two (2) Steam Generators. Per EDP-ZZ-01003, we intend to inspect the full length of those tubes.

2.b INSERVICE INSPECTION PROGRAM (INSPECTION INTERVAL)

Staff Recommended Action

The maximum allowable time between eddy current inspections of an individual steam generator should be limited in a manner consistent with Section 4.4.5.3 of the Standard Technical Specifications, and in addition should not extend beyond 72 months.

Reference

Section 2.2.4 of NUREG-0844.

Union Electric's Position

Per Callaway Technical Specifications the maximum interval for eddy current inspections is 40 months which is consistent with Standard Technical Specifications.

3.a SECONDARY WATER CHEMISTRY PROGRAM

Staff Recommended Action

Licensees and applicants should have a secondary water chemistry program (SWCP) to minimize steam generator tube degradation.

The specific plant program should incorporate the secondary water chemistry guidelines in SGOG Special Report EPRI-NP-2704, "PWR Secondary Water Chemistry Guidelines," October 1982, and should address measures taken to minimize steam generator corrosion, including materials selection, chemistry limits, and control methods. In addition, the specific plant procedures should include progressively more stringent corrective actions for out-of-specification water chemistry conditions. These corrective actions should include power reductions and shutdowns, as appropriate, when excessively corrosive conditions exist. Specific functional individuals should be identified as having the responsibility/authority to interpret plant water chemistry information and initiate appropriate plant actions to adjust chemistry as necessary.

The referenced SGOG guidelines above were prepared by the Steam Generator Owner Group Water Chemistry Guidelines Committee and represent and consensus opinion of a significant portion of the industry for state-of-the-art secondary water chemistry control.

Reference

Section 2.5 of NUREG-0844.

Union Electric's Position

The Callaway Secondary Chemistry Program procedures cover all the guidelines listed under this section. Callaway Plant Administrative Procedure APA-ZZ-00630, "Secondary Chemistry Program" details guidelines and limits for secondary chemistry in order to minimize steam generator (S/G) tube degradation. This program incorporates guidelines specified in SGOG Special Report EPRI-NP-2704.

Measures taken to minimize S/G corrosion are covered in the procedure as follows:

a) Samples selected are ensured to be uniform and to properly represent the composition of the material from which they are taken. The formal sampling schedule for critical parameters and operating range for these parameters follows the program delineated in CDP-ZZ-00200, "Chemistry Schedule and Water Specifications."

b) Three Action Levels that may be initiated due to certain out-of-specification conditions are described in detail. Each has implementation statements, a desired objective and specific corrective actions to take with and without power reductions and shutdowns. Corrective actions become more stringent and time/power dependent as the level progresses from Level 1 to Level 3.

c) Steam Generator Status modes are detailed by paragraph and in tables attached to this procedure. These tables, taken from the Special Report, give materials selection, chemistry limits and control guidelines for minimizing corrosion to the S/G's based on plant operational modes.

Also, Plant personnel with responsibility for maintaining and implementing the Secondary Chemistry Program are delineated in this procedure. Personnel authorized to interpret chemistry information and initiate plant actions to adjust chemistry are the Superintendent, Chemistry and the Superintendent, Operations.

3.b CONDENSER INSERVICE INSPECTION PROGRAM

Staff Recommended Action

Licensees should implement a condenser inservice inspection program. The program should be defined in plant specific safety-related procedures and include:

1. Procedures to implement a condenser inservice inspection program that will be initiated if condenser leakage is of such a magnitude that a power reduction corrective action is required more than once per three month period; and

2. Identification and location of leakage source(s), either water or air;

3. Methods of repair of leakage;

4. Methodology for determining the cause(s) of leakage;

5. A preventive maintenance program.

Reference

Section 2.6 of NUREG-0844.

Union Electric's Position

Plant chemistry procedures require daily monitoring of condenser hotwell cation conductivity and sodium via the use of installed process monitors. In addition the same parameters plus total conductivity and dissolved oxygen levels are monitored daily on the discharge of the condensate pumps. The plant administrative procedure governing the secondary chemistry program establishes limits for condensate pump dissolved oxygen and requires initiation of action to reduce air in-leakage if dissolved oxygen exceeds limits established by EPRI PWR Secondary Water Chemistry Guidelines. This procedure also requires initiation of hot well sampling to determine the presence of a potential condenser tube leak if cation conductivity is outside allowable ranges. A procedure is currently being developed which will initiate corrective actions to locate sources of condenser air in-leakage based on condenser air in-leakage measurements as well as condensate pump dissolved oxygen levels. This procedure will define condenser leak detection methods to be employed for locating both condenser air in-leakage and condenser tube leaks. A record will be maintained of all air leakage locations detected to aid in future identification and detection.

As leaks are located they are repaired in accordance with plant work control procedures.

In addition to the programs in place for identification and repair of air and water in-leakage, a program of visual inspection and corrosion monitoring of the condenser, including eddy current inspection of selected condenser tubes is being developed. This program is summarized in the following table. We intend to fully implement this program following the first refueling outage.

TABLE FOR RESPONSE (ITEM 3.b)

DESCRIPTION	FREQUENCY
Calculate and trend the following performance parameters: Fouling Factor Terminal Difference Condenser ΔT for each Section Air Inleakage Condensate Pump Dissolved Oxygen Hotwell Temperature	Daily
Monitor and trend the following hotwell Chemistry parameters to indicate potential tube failures: Cation Conductivity Sodium Condensate Pump Dissolved Oxygen	Continuous Inline Monitoring
Pull one tube at each refueling for inspection and analysis.	Refueling
Monitor condenser performance through inspection and evaluation of test condenser tubes and performance.	Monthly
Inspect all hotwell and condenser tube regions visually.	Refueling
Inspect at least one waterbox in each condenser during any outage of sufficient scheduled duration.	Variable-at least each refueling
Obtain eddy current inspection information - concentrate on the S.S. air cooler section.	Refueling
Monitor condenser parameters for verification of proper mechanical performance.	To be established
Develop and implement an air inleakage monitoring and reduction program with progressive action levels.	Daily

4. PRIMARY TO SECONDARY LEAKAGE LIMIT

Staff Recommended Action

All PWRs that have Technical Specifications limits for primary to secondary leakage rates which are less restrictive than the Standard Technical Specifications (STS) limits should implement the STS limits.

Reference

Section 2.8 of NUREG-0844.

Union Electric's Position

Chemistry Procedure CTP-ZZ-02590, "Determination of Steam Generator Tube Leak Rate" describes three methods for determining primary to secondary leakage rates with S/G tube leaks. These methods are based on steady-state operating conditions and implement STS limits. The methods are as follows:

1) RCS Gross Beta-Gamma
2) RCS Na-25, and
3) RCS and Condenser Off-Gas Xe-133

Specific formulas and an attachment are provided in the procedure for calculating and summarizing these results. For unusual plant conditions, this procedure allows the Superintendent of Chemistry to opt for alternative calculation methods to determine leak rates.

5. COOLANT IODINE ACTIVITY LIMIT

Staff Recommended Action

PWRs that have Technical Specifications limits and surveillance for coolant iodine activity that are less restrictive than the Standard Technical Specification (STS) should implement the STS limits. Those plants identified above that also have low head high pressure safety injection pumps should either: (1) implement iodine limits which are 20% of the STS values, or (2) implement reactor coolant pump trip criteria which will ensure that if offsite power is retained, no loss of forced reactor coolant system flow will occur for steam generator tube rupture events up to and including the design basis double-ended break of a single steam generator tube, and implement iodine limits consistent with the STS.

Reference

Section 2.9 of NUREG-0844.

Union Electric's Position

Callaway Plant is presently complying with the STS limits for this item by implementing procedures CDP-ZZ-00200, "Chemistry Schedule and Water Specifications" and CSP-ZZ-07600, "RCS Activity Determination."

Procedure CDP-ZZ-00200 is comprised of tables which summarize the Chemistry sampling program for plant systems and components. The tables contain columns listing the analyses, control, Technical Specification/Departmental Specification limit required, frequency, procedure to be used and references for various systems and components.

Procedure CSP-ZZ-07600 specifies Technical Specification coolant iodine activity limits, sample/analysis frequency, and mode applicability that are Technical Specification surveillance requirements. This procedure also provides guidance as to which sampling/analyses procedures to implement and where to record data.

6. SAFETY INJECTION SIGNAL RESET

Staff Recommended Action

The control logic associated with the safety injection pump suction flow path should be reviewed and modified as necessary, by licensees, to minimize the loss of safety function associated with safety injection reset during an SGTR event. Automatic switchover of safety injection pump suction from the boric acid storage tanks (BAST) to the refueling water storage tanks should be evaluated with respect to whether the switchover should be made on the basis of low BAST level alone without consideration of the condition of the SI signal.

Reference

Section 2.11 of NUREG-0844.

Union Electric's Position

The incident at Ginna involved a failure to automatically transfer from Boric Acid Storage Tank to RWST following reset of S.I. The problem at Ginna is not applicable to the Callaway Plant since the safety injection pumps at Callaway have no pathway to the BAST. In addition a manual alignment to the VCT would most likely never occur during a steam generator tube rupture. The centrifugal charging pumps would be removed as soon as possible after an S.I. reset to assure pressure reduction in the RCS (ie, to equalize RCS/secondary pressures as quickly as possible). At Callaway a safety injection actuation signal aligns centrifugal charging pump, safety injection, and residual heat removal pump suctions to the RWST. If the safety injection is reset and the CCP suction valves are realigned to provide a suction path from the VCT, an automatic transfer back to the RWST would occur on the VCT level. The SI and RHR pumps would remain aligned to the RWST.

ENCLOSURE 2

REQUEST FOR INFORMATION CONCERNING CATEGORY C-2

STEAM GENERATOR TUBE INSPECTIONS

Information Requested

The enclosed draft NUREG-0844 Section 2.2.1.2 describes certain limitations which the staff believes to be inherent in the present Technical Specification steam generator ISI requirements pertaining to Callaway C-2 inspection results. Licensees and applicants are requested to provide a description of their current policy and actions relative to this issue and any recommendations they have concerning how existing Technical Specification steam generator ISI requirements pertaining to Category C-2 inspection results could be improved to better ensure that adequate inspections will be performed. This description should include a response to the following questions:

1. What factors do, or would, the licensee or applicant consider in determining (a) whether additional tubes should be inspected beyond what is required by the Technical Specifications, (b) whether all steam generators should be included in the inspection program, and (c) when the steam generators should be reinspected.

2. To what extent do these factors include consideration of the degradation mechanism itself and its potential for causing a tube to be vulnerable to rupture during severe transients or postulated accident before rupture or leakage of that tube occurs during normal operation.

Reference

Section 2.2 of NUREG-0844.

Union Electric's Position

It is our opinion that the present Technical Specification Category C-2 is adequate until tube failures, as detected by eddy current inspections, discovered during Inservice Inspection indicate an adverse trend. If tube failures are evaluated to be excessive, then inspection requirements will be augmented based on the data available at that time.