Duquesne Light

Nuclear Group
P.O. Box 4
Shippingport, PA 15077-0004

Telephone (412) 393-6000

June 14, 1985

Nuclear Regulatory Commission
Attn: Hugh L. Thompson, Jr., Director
Division of Licensing
Office of Nuclear Reactor Regulation
Washington, DC 20555

Reference: Beaver Valley Power Station, Unit No. 1
Docket No. 50-334, License No. DPR-66
Generic Letter 85-02

Gentlemen:

Attached is the Beaver Valley Power Station Unit 1 response to the information requested in Enclosures 1 and 2 of Generic Letter 85-02, "Staff Recommended Actions Stemming from NRC Integraged Program for the Resolution of Unresolved Safety Issues Regarding Steam Generator Tube Integrity".

If you have any questions concerning this response, please contact my office.

Very truly yours,

J. J. Carey/bos
J. J. Carey
Vice President
Nuclear Group

Attachment

cc: Mr. W. M. Troskoski, Resident Inspector
U.S. Nuclear Regulatory Commission
Beaver Valley Power Station
Shippingport, PA 15077

U.S. Nuclear Regulatory Commission
c/o Document Management Branch
Washington, DC 20555

Director, Safety Evaluation & Control
Virginia Electric & Power Company
P.O. Box 26666
One James River Plaza
Richmond, VA 23261

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DUQUESNE LIGHT COMPANY
Beaver Valley Power Station
Unit No. 1

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

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

Staff Recommended Action

Visual inspection 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.

Response

Duquesne Light has an informal visual inspection program for the secondary side of the steam generator tubesheet, which was first initiated in the Third Refueling Outage. The guidelines utilized to determine if a visual inspection of the secondary side of the tubesheet is necessary are as follows:

a. If any modifications are done in the upper regions of the steam generator, then a visual inspection is recommended.

b. If maintenance operations which require the steam generator to be drained are to be performed, then a visual inspection is recommended.

c. If the loose parts monitoring system indicates that a foreign object may be present, a visual inspection should be scheduled at the earliest opportunity.

d. If Eddy Current examinations display indications indicative of foreign objects on the secondary side of the steam generator, a visual inspection is recommended.

Currently, there are no plans to inspect the secondary side of any of the steam generators at this time due to the following:

a. All three steam generators were visually inspected during the third refueling outage in 1983 and again during the fourth refueling outage in 1984.

b. Although foreign objects were found during the inspection of the third refueling outage, virtually nothing was found during the inspection conducted during the fourth refueling outage.

c. No work is currently planned in the upper regions of the steam generators.

d. By keeping the steam generators in wet lay-up, the chances of introducing oxygen and other contaminates are minimized.

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).

Response

The procedures for performing work inside steam generators at BVPS Unit 1 contain controls to preclude the introduction of foreign objects into the steam generators. The administrative procedures which control the implementing procedures define specific housekeeping criteria for controlling material such as tools and equipment, personnel accountability and cleanliness standards for material which transgress designated housekeeping zones. Quality control holdpoints are performed at appropriate steps in the procedures to verify that housekeeping and cleanliness criteria are being met.

Appropriate administrative procedures will be improved by adding guidance on controlling personal effects such as eye glasses and badges.

The scope of present procedures for work inside steam generators does not encompass the removal of internal parts, however guidance will be added to the procedure writers log to address accountability of components removed from the internals of steam generators in any appropriate procedures which may be written in the future.

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.

Response

The official Inservice Inspection Program committed to by Duquesne Light is that program described in Regulatory Guide 1.83. However, in the third refueling outage Duquesne Light exceeded the requirements by improving the quality and scope of Eddy Current inspections by performing a multi-frequency, full-length tube inspection.

During the third refueling outage, 100% of the tubes in 'C' steam generator were inspected full-length, then in the fourth refueling outage 100% of the tubes in 'A' steam generator were inspected full-length. Currently, 100% of the tubes in 'B' steam generator are scheduled for full-length inspection during the upcomming fifth refueling outage. The practice of inspecting 100% of the tubes in one steam generator full-length each outage is anticipated to continue in the future.

The present inspection practice exceeds the Technical Specification requirements and the above recommended action.

2.b INSERVICE INSPECTION PROGRAM (INPSECTION 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.

Response

BVPS Unit 1 Technical Specification 4.4.5.3 is equivalent to the Standard Technical Specification (Revision 4) with the exception of part b of the specification. Part b differs from the Standard Technical Specification in that it requires a reduction in the sample period to 20 months when the results of a third sample inspection fall into Category C-3. The Standard Technical Specification requires a reduction in the sample period to 20 months when the results of any inspection fall into Category C-3.

BVPS Unit 1 Technical Specifications do not contain any requirements that would limit the maximum time between eddy current inspections of an individual steam generator to 72 months. As noted in the response to item 2.a, Duquesne Light has exceeded the requirements by performing full-length inspections of 100% of the tubes in individual steam generators during the past two refueling outages, and expects to continue this practice in the future. This practice of inspecting one steam generator each refueling outage on a rotating schedule meets the recommended 72 month maximum interval between individual steam generator inspections.

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 Owners 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.

Response

The Beaver Valley Secondary Water Chemistry Monitoring Program addresses the measures taken to minimize steam generator corrosion. It addresses that corrective actions must be taken for out of specification water chemistry condition, including plant shutdown, when appropriate. Specific functional individuals are designated as having the responsibility and authority to interpret plant water chemistry information and initiate corrective actions as necessary. The program also sets specific chemistry limits.

The program at Beaver Valley does not incorporate the "PWR Secondary Water Chemistry Guidelines", EPRI-NP-2704, at this time. Beaver Valley Secondary Chemistry control differs from all other PWRs in this country in that morpholine has been included (along with hydrazine and ammonia) in the all volatile treatment program since the plant first went critical in 1976. Use of morpholine has produced sludge free steam generators; without the presence of sludge to concentrate impurities, the steam generators have been free of the three major chemical corrosion mechanisms, i.e., denting, intergranular attack, and intergranular stress corrosion cracking. Exactly how morpholine functions in the steam cycle is uncertain, but its use does lead to slightly elevated cation conductivities. Because of the limited ability of the existing blowdown system to handle chemistry transients, adoption of the EPRI guidelines is not practical at this time. An improved, higher capacity blowdown cleanup system (DCP-129) is currently being installed. The EPRI guidelines will be incorporated into the Beaver Valley Secondary Water Chemistry Program within thirty days after the improved blowdown cleanup system is fully operational and meeting its design criteria.

Two other items in the staff recommended action are not addressed. The first, material selection, is not addressed because the secondary system, with the exception of the moisture separator reheaters, contains no copper alloys. The second, control methods, is presently limited to only two choices: steam generator blowdown and steam generator drain and refill. Since draining a steam generator is an option only when the plant is in cold shutdown, steam generator blowdown is normally the only control method available.

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.

Response

The Station Administrative Procedures 26 describes a Balance of Plant Quality Program which provides optimum reliability of equipment which is non-safety re essential to the electric generating capacity of the plant. ndenser is included in this program.

The program provides for:

a. Condenser tube eddy curren uired.

b. Identifying and locating using various techniques, performed during operation tartup from major outages.

c. Condenser performance checks nding.

d. Condenser preventive maintenanc and good operating practices which include:

   - Condenser chemistry control

   - Visual inspection of the condenser hotwell prior to startup after turbine outages

   - Condenser cleaning using scrapers and hydrolaser

Condenser leakage is repaired by maintenance after the leakage source is identified using appropriate methods of repair. BVPS Unit 1 also retubed the entire condenser during the last refueling outage.

The root causes of condenser leakage are determined using sound engineering practices. For example, a material study was performed before the condenser retubing which resulted in the selection of a new tube material to provide increased corrosion resistance.

BVPS Unit 1 recognizes the importance of maintaining condenser integrity in controlling secondary water chemistry. However, since the condenser is not a safety-related piece of equipment, the practices described above are not defined in plant specific safety-related procedures.

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.

Response

BVPS Unit 1 Technical Specification limits for primary to secondary leakage rates are equivalent to the Standard Technical Specification (revision 4) limits.

5. COOLANT IODINE ACTIVITY

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.

Response

BVPS Unit 1 Technical Specification limits and surveillance for coolant iodine activity are equivalent to the Standard Technical Specifications (revision 4) with the exception of the following minor differences in the surveillance requirements:

a. The BVPS Unit 1 Technical Specification surveillance sample frequency for Gross Activity Determination is more restrictive than the Standard Technical Specification (revision 4).

b. The BVPS Unit 1 Technical Specification Table 4.4-12 does not have the footnote regarding when the sample for Radiochemical $\bar{E}$ Determination should be taken after startup from a reactor shutdown of 48 hours or longer.

BVPS Unit 1 does not have low head high pressure safety injection pumps. Therefore, no additional limits on coolant iodine activity are necessary.

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.

Response

The safety injection system was reviewed to determine if a potential for loss of safety function as described above exists at BVPS Unit 1. Upon receipt of a safety injection (SI) signal the suction of the high head safety injection (HHSI) pumps realign to the refueling water storage tank (RWST). The HHSI pumps continue to take suction from the RWST until transfer to the SI recirculation phase. Reset of the SI signal does not alter the system arrangement. Since BVPS Unit 1 has a different SI system arrangement than identified in Generic Letter 85-02, the reset of the SI signal does not cause a loss of safety function and no modifications are necessary.

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 Category 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.

Response

1a. The current escalation of sample size upon determining that the results of the inital sample fall into the C-2 Category with an additional sample of steam genertor tubes is reasonable. The history of the steam generator tubing, with the additional sample results, can be utilized to determine if the defects found represent a generic problem or not.

An escalation of the sample size beyond the current Technical Specification requirement would only be done if the problem was determined to be generic in nature and therefore, highly probable that these defects would be present in the other steam generators and therefore, impact the steam generator's operability.

1b. The expansion of the sampling into other steam generators would be done only if the comparison of the current inspection data to the historical results indicate a generic problem which would lead the utility to expect that the steam generator would be inoperable prior to the next scheduled maintenance and refueling outage.

1c. The reinspection time frame of a steam generator that was found to fall into the C-2 Category would be dependent upon the failure mechanism of the tubes. If the failure mechanism was determined to be generator specific and not due to mechanical impingement, the subject steam generator should be reinspected more frequently than the routine 72 month cycle. If the problem is thought to be generic to all steam generators, then a sampling of the next scheduled steam generator should be sufficient to determine whether or not the failure mechanism has been active since the previous inspection.

2. The factors concerning the degradation mechanism and its potential to render a tube vulnerable to rupture would be one of the prime considerations utilized in determining if an expansion of the inspection scope to include other steam generators should be undertaken. Additionally, these factors would be utilized in determining if an increased inspection frequency is prudent and warranted for any given steam generator.