U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-334/86-17

Docket No. 50-334

License No. DPR-66

Licensee: Duquesne Light Company
Post Office Box 4
Shippingport, Pennsylvania 15077

Facility Name: Beaver Valley Power Station, Unit 1

Inspection At: Shippingport, Pennsylvania

Inspection Conducted: July 14-August 1, 1986

Inspectors: Audrey J. Lodewyk — 9/4/86
A. J. Lodewyk, Reactor Engineer — date

Approved by: J. T. Wiggins — 9/4/86
J. T. Wiggins, Chief, Materials and Processes Section, EB, DRS — date

Inspection Summary: Routine, unannounced inspection conducted July 14-August 1, 1986 (Report No. 50-334/86-17) of the licensee's Inservice Inspection (ISI) activities during the fifth refueling outage.

Areas Inspected: Those areas inspected include previously identified NRC items, plant modifications and subsequent incorporation into the ISI Program, Inservice Inspection Department interfaces, ISI data records, quality assurance activities and steam generator 1A tube expansion.

Results: During this inspection, one previously identified NRC item was updated. One resolved item was opened regarding the incorporation of plant modifications into the ISI Program and one unresolved item was opened regarding the plant operational start-up checklist. No violations were identified.

DETAILS

1.0 Persons Contacted

Duquesne Light Company (DLCo)

*Dennis Weakland, Supervisor ISI Services
William Sikorski, Director of ISI
Ronald A. Perry, Supervisor of NDE Services
*Brian Sepelak, Licensing

United States Nuclear Regulatory Commission

*W. Troskoski, Senior Resident Inspector
*A. Asars, Resident Inspector

*Indicates those who attended the exit meeting on August 1, 1986.

The inspector also interviewed other site and corporate personnel during the inspection.

2.0 Unresolved Items

(Open) Unresolved Item (334/85-24-01) Loose parts in feedwater system secondary piping. Maintenance and inspection of A, B, and C feed regulating valves identified the failure of the valve plugs' anti-rotation device. Review of the licensee's actions to retrieve loose parts and identification of any damage to piping or steam generator tubing is being followed as Unresolved Item 50-334/85-24-01. Reliability of the feedwater control valves is discussed further in inspection report 50-334/86-06.

The parts consist of a 2" x 1/2" bolt, a washer, a star washer, and tabs from star washers. The areas the licensee inspected for retrievel of loose parts included:

- accessible portions of the steam generator tube sheet
- feed rings and J tubes
- feedwater lines from MOV-FW-156A, B, and C to the loop seals
- loop seals (through use of a boroscope)
- lines from MOV-FW-156A, B, and C to the first elbow elevation change
- lines from the feed regulating valves to the downstream manual isolation valves

Inservice Inspection Program eddy current testing did not indicate that steam generator tubes were degraded due to the loose parts found.

Reportedly, the following loose parts remain:

Steam Generator 1A:	1 bolt 2 star washers 5 star washer tabs
Steam Generator 1B:	2 bolts 2 block washers 2 star washers 4 star washer tabs
Steam Generator 1C:	3 bolts 4 block washers 3 star washers 13 star washer tabs

The inspector reviewed the Westinghouse evaluation report which concluded it was acceptable to operate the steam generators until the sixth refueling outage. The Westinghouse report was found to be conservative in its analysis of steam generator tube wear which determined that continued steam generator operation is not an unresolved safety issue as described under 10 CFR 50.59. However, an evaluation has not been provided which assures the continued operability and reliability of system components downstream of the feed regulating valves where loose parts may lodge (e.g. isolation valves or check valves). Unresolved Item 50-334/85-24-01 will remain open pending NRC review of the licensee's analysis and evaluation of the downstream component operability with loose parts remaining in the system.

3.0 Steam Generator Tube Expansion

The inspector reviewed portions of the licensee's activities regarding Design Change Package (DCP) 764 "Steam Generator Tube Expansion". The design objective for DCP 764 is to arrest the steam generator cold leg thinning phenomenon previously discussed in inspection report 50-334/-86-09. While the exact mechanism which causes this thinning remains unknown, Westinghouse model tests revealed that reduced tube vibrational amplitudes of expanded steam generator tubes retard the thinning phenomenon. Westinghouse further believes that decreasing the tube-tube support plate gap will also limit the fluid flow and chemical concentration replenishment; this approach has shown, experimentally, to result in a lower corrosion rate. BVPS DCP 764 is the first field application of the Westinghouse automatic hydraulic tube expansion equipment.

The portions of the reactor coolant pressure boundary affected by this change include fifty sample tubes selected for expansion on the cold leg side of steam generator 1A. The representative sample was selected from:

(1) tubes located on the outer periphery of the steam generator (this is where steam generator fluid cross-flows enhance tube vibration)

(2) tubes with less than 29% measured through wall tube degradation (to assure tube thickness will remain within technical specification plugging limits with additional thinning due to tube expansion)

(3) known degradation area is within the first two support plates (The reach of the current expansion unit's automated movement mechanism is limited to the first two support plates and approximately 87% of tube degradation attributed to cold leg thinning occurs in this lower region. Automated positioning of the expansion mechanism is preferred over manual movement to minimize radiation exposures.)

DCP 764 includes post-modification Eddy Current Testing (ECT) of the expanded tubes with bobbin coil, rotating pancake coil and profilometry techniques to provide baseline data after expansion.

Nuclear Engineering Management procedure (NEMP) 2.8, Revision 3, "Handling of Design Change Packages" Section III(C) 1 (k) requires an OSC review of proposed Design Concept packages. The inspector attended the OSC meeting called to review the proposed steam generator tube expansion. OSC members discussed the following pertinent issues regarding implementation of DCP 764:

(a) effect on licensing commitments (DCP 764 implementation does not result in an unresolved safety question or a change in the UFSAR or technical specifications, as described in 10 CFR 50.59)

(b) consequences of improperly expanding a tube (reviewing the possibility of bursting a tube due to excessive hydraulic expansion and techniques to assure appropriate tubes are expanded or plugged)

(c) procedures to be used (The licensee defined quality control hold points and assessed personnel exposures for ALARA considerations)

(d) contents of the draft Safety Evaluation (SE) (e.g. cold leg thinning history and test conclusions, fluid chemistry and possible changes in the corrossive environment)

The inspector verified the design concept package presented to the Onsite Safety Committee (OSC) included those sections required by NEMP 2.8, Section III (C) 1 (b). The inspector concluded the OSC had completed a thorough review of the proposed Design Concept Package and had no further questions.

Subsequent inspector follow-up found that the field implementation of DCP 764 had resulted in plugging six of the fifty sample tubes. Plugging was due to expansion of these six tubes beyond the tube support plate. The unacceptable expansion process conditions were dispositioned in accordance with Procedural corrective actions and ECT acceptance criteria.

Post-modification ECT results of all expanded tubes are to be incorporated into the BVPS Inservice Inspection Program. The effectiveness of this modification will be reviewed by the licensee during the next scheduled refueling outage. An updated SE is to be issued at that time also.

4.0 Inservice Inspection Department (ISID) Interface within DLCo

4.1 Operational Interfaces

During this inspection, various documents, including the following, were reviewed to assess the adequacy of the ISID interfaces under station policy.

(a) BVPS Unit 1 Operating Manual Chapter 50, Issue 3, Revision 0, "Station Startup", Section 3 - Normal System Arrangement (checklists)

(b) proposed Nuclear Group ND1N01 "Prerequisites for Plant Startup" checklist dated July 28, 1986

(c) BVPS Operating Manual 1.48.9, Section (H), "Station Startup After Extended Outage Test and Maintenance"

O.M. 1.48.9 (H) requires preparation of a prerequisite checklist of specific outage related activities for plant startup. The checklist information is to include completion of the deficiency reports initiated within plant support departments. The list is to be signed by each cognizant department representative to assure resolution of deficiencies prior to plant release for operation. The list is designed to supplement station startup procedures ((a) above) and is not intended to replace the startup checklists. The supplemental list prepared for the fifth refueling outage ((b) above) was reviewed in part by the inspector. The proposed checklist indicates all ISID identified deficiencies will be resolved prior to changing from Mode 5 (Cold Shutdown) to Mode 4 (Hot Shutdown).

BVPS Technical Specifications Section 4.0.5 stipulates that ISI surveillance requirements are to be performed in accordance with the ASME B&PV Code. ASME Section IWB-5200, requires a Class 1 leakage inspection to be performed at operating pressure and temperature after every refueling outage. Operating Surveillance Test (OST) 1.6.1 "Reactor Coolant System Leak Test" stipulates initial RCS conditions of 2235 psig and 350 F, which meet ASME Code requirements. The inspector verified that the proposed prerequisite checklist included performance of OST 1.6.1. The Class 1 leakage inspection is to be completed prior to leaving operational Mode 3 (Hot Standby) to Mode 2 (Startup Mode).

During a review of Operating Manual 1.50.3 checklist, the inspector noted the inclusion of mandatory test OST 1.55A.2 "ISI - Safety and Relief

Tracking", scheduled to be completed every refueling outage. The inspector notified the licensee that OST 1.55A.2 had been deleted in Issue 1, Rev.20 of the OM chapter 50 checklist. A subsequent licensee review determined the OST had been superseded by BVT 1.5-1.60.5. This item will remain unresolved pending the licensee's revision to OM 1.50.3 checklist to correct this discrepency. (50-334/86-17-01)

4.2 Quality Assurance Involvement in ISI

10 CFR 50, Appendix B, Criterion XVIII, requires an independent organization to perform periodic audits of quality related activities. QA/QC audit findings are to be documented, resolved and reevaluated. To facilitate the audit program, BVPS surveillance activities are completed in accordance with prepared checklists.

The inspector reviewed portions of the following select documents and records to assist in the evaluation of the licensee's activities regarding Criterion XVIII requirements:

- QAP OP-16, Audits
- QAD Audit No. BV-1-84-04, BV-Inservice Inspection Program
- QAD Audit No. BV-1-85-07, Inservice Inspection (NDE)
- QAD Audit No. BV-1-86-01, Inservice Inspection Department
- DLCo Quality Assurance Unit, Surveillance Nos. ISI 07-86, ISI 08-86, ISI 09-86, ISI 10-86, ISI 11-86, and ISI 13-86.

During the Unit 1 fifth refueling outage, QC performed ISI surveillances in accordance with checklists which were found to be technically comprehensive. Each QC inspection checklist included details and parameters from applicable nondestructive examination procedures. Such details included:

- examiner qualification (e.g. at least level II for examiner, level I for assistant)
- procedure requirements (e.g. calibration of magnetizing yoke for magnetic particle testing of stop valve stud)
- equipment use (e.g. size of ultrasonic transducer search unit)
- recording criteria (e.g. visual examination indications recorded for stop valve stud)

Administrative information documented on individual checklists included QC inspector, surveillance date and the reference document for examination requirements. During this inspection, the NRC inspector

verified QC surveillance report information by comparing it with radiation work permit sign-in sheets, data sheets, and ISI Program requirements.

Although the overall quality and thoroughness on the technical parameters surveyed by QC was judged to be good, the inspector noted that surveillance report No. ISI 13-86 did not document an apparent discrepancy between an ISI drawing and the actual field locations of reactor vessel closure head welds. Interviews with the QC inspector and other licensee representatives determined that the QC inspector was aware of the apparent discrepency in weld locations and that, at the time of the QC surveillance, the nondestructive examiners intended to inspect all apparent weld locations to assure complete coverage of ASME Section XI required examination areas. However, in addition to QC reviewing technical aspects, the NRC inspector is concerned that QC should verify the adequacy of documentation and drawings used for ISI activities. Effective nondestructive examinations cannot be completed if ISI Program weld locations are not verified. The NRC inspector discussed this concern with licensee management at the exit meeting and the licensee acknowledged this concern. Resolution of the reactor vessel head weld locations is discussed previously in inspection report 50-334/86-09. The inspector's concern regarding QC documentation will be pursued in connection with Unresolved Item 50-334/86-09-01.

Quality Assurance audit reports were reviewed for content as required by QAP OP-16 and were found to be acceptable. Attributes inspected included audit planning, reporting and follow-up requirements. The inspector determined that full implementation of the ISID responses to the audit findings involved an extensive period of time due to the scope of audit findings, to the inter-departmental coordination, which was required and due to the extent of the modifications to the ISI Program during these audit periods. When these aspects were considered, the inspector concluded that the ISID responses were timely.

4.3 Incorporation of Plant Modifications into the ISI Program

One QA audit finding (BV-1-85-07 Finding No.1) concerned incorporation of plant modifications resulting from design change packages (DCP's) and maintenance work requests (MWR's) into the ISI Program. The NRC inspector reviewed the ISID response, QC verification, and associated documentation for this finding.

As a result of the QA audit finding, DLCo developed procedures which require various departments other than ISID to determine if a plant modification may impact the ISI program. Guidelines have been established to assist in this determination and, if applicable, plant modification documents are required to be routed to ISID for incorporation. NRC inspector interviews with licensee representatives indicated that not all personnel involved with plant modifications were familiar with the ISI guidelines. It should also be noted that although QC and ISID are both within the QA organization, documents routed to QC are not neccessarily reviewed by ISID. Although the inspector reviewed a small sample of DCP's and MWR's and did not find

7.0 Exit Interview

The inspector met with licensee
at the conclusion of the inspec
summarized the purpose and scop
findings. At no time during th
by the inspector to the license

any routing discrepencies, this may be an area in which further licensee attention is warranted. Identification and routing of change documents for incorporation into the ISI Program appeared to rely on individual knowledge, not upon a general understanding of ISID interface and ISI technical requirements.

The effectiveness of the licensee's program regarding the incorporation of design changes into the ISI Program will be subject to further review by both the NRC and the licensee's QA/QC organization.

This item will remain unresolved pending further NRC sampling of site MWR's and DCP's (1) to review routing of appropriate documents to ISID and subsequent incorporation of change documents into the ISI Program and (2) to verify field modification activities which involve ISI Program equipment are accurately documented. This is unresolved item 50-334/86-17-02.

5.0 ISID Data Records Review

Data associated with the nondestructive examination of various welds and components were reviewed to ascertain compliance with applicable code and administrative requirements. The following data sheets were included in the inspector's review:

- UT data sheet for figure No. B4.5.3, Reactor Coolant circumferential weld
- PT data sheet for figure No. B4.5.3.1, Reactor Coolant circ. weld
- PT data sheet for figure No. C2.1.7.2, Recirc. Spray circ. butt weld
- UT data sheet for figure No. B4.5.14, Safety Injection circ. weld
- PT data sheet for figure No. B4.5.14.1, Safety Injection circ. weld

This review indicated that the methods, techniques and extent of examinations comply with programmatic and procedural requirements as do the recording, evaluation and disposition of findings. The inspector had no further questions regarding the documentation of examination results and findings at this time.

6.0 Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, violations or deviations. Unresolved items are discussed in Section 4.1 and 4.3 of this report.

7.0 Exit Interview

The inspector met with licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on August 1, 1986. The inspector summarized the purpose and scope of this inspection and discussed the findings. At no time during this inspection was written material provided by the inspector to the licensee.