### U. S. NUCLEAR REGULATORY COMMISSION

### REGION I

Report No.	50-412/85-06				
Docket No.	50-412				
License No.	CPPR-105	Priority		Category	В
Licensee:	Duquesne Light Robinson Plaza Suite #210, PA Pittsburgh, Pen	Company Building No. 2 Route 60 nsylvania			
Facility Name:	Beaver Valley Power Station, Unit 2				
Inspection At:	Shippingport, Pennsylvania				
Inspection Conduc	ted: March 4 -	29, 1985			
Inspectors: <u>H. A. Walton</u> G. A. Walton, Senior Resident Inspector <u>04-05-85</u> date					
Approved by:	g. Walton Johnson, Reside . Jupp Tripp Chief, R tion 3A	nt Inspector eactor Projects		04-05-85 date 4/10/85 date	_

Inspection Summary: Inspection on March 4 - 29, 1985 (Report No. 50-412/85-06).

Areas Inspected: Routine, unannounced inspection by two resident inspectors (100 hours) of activities pertaining to previously identified unresolved items, review of radiographic film for piping welds and welder qualification; review of nonconformance and disposition reports and daily site tours.

Findings: No violations or unresolved items were identified. The licensee has completed the fatigue analysis and testing of "Gap-A-Lets", used in piping socket welds, which demonstrates their acceptability. Reviews of radiographic film for welders and production welds were found acceptable.

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# DETAILS

# 1. Persons Attending Exit Interview

### Duquesne Light Company

- L. E. Arch, Sr. Project Engineer
- R. Coupland, Director, QC
- C. R. Davis, Director, QA
- D. W. Denning, Assistant Director, QC
- C. E. Ewing, Manager, QA
- E. J. Horvath, Construction Liaison, Engineering
- J. A. Hultz, Construction Liaison
- C. E. Kirschner, Senior QA Engineer
- J. Stabb, Compliance Engineer

## Stone and Webster Engineering

A. A. Dasenbrock, Senior Construction Manager A. C. McIntyre, Superintendent of Engineering J. G. Novak, Superintendent of Construction R. C. Wittschen, Licensing Engineer

# 2. Construction Site Walk-Through Inspections

Daily tours of the construction site were made to observe work activities in progress, completed work, and plant status of the construction site. The presence of quality control inspectors and quality records were observed. All areas observed were found acceptable.

# 3. Licensee Action on Previous Inspection Findings

(Closed) Unresolved Item (83-05-09) Cable Tray Fill

This item was unresolved because the licensee had insufficient controls on the amounts of cable overfill allowed. Also, the FSAR did not adequately describe the amount of tray fills for certain cables and the licensee was not performing inspections to determine when trays were overfilled. Tray fill controls are necessary to assure support adequacy, ampacity rating, and access for tray covers to meet cable separation requirements. The licensee has revised the appropriate engineering specifications, Quality Control inspection procedures, field construction procedures, and "Licensing Document Change" to reflect the controls for maximum overfill. The controls are fully described in Inspection Report No. 50-412/83-05 and 84-09. Effective January 4, 1985, all applicable project procedures had been revised and issued incorporating the modified cable tray fill criteria (1-1/2 inches maximum above the tray siderail). On January 4, 1985, Quality Control commenced inspecting for cable overfill as new cable was pulled. Furthermore, the licensee has determined that there are no cable trays that had all their scheduled cable pulled. Therefore, a back inspection of cable trays to verify acceptability of cable fill is not needed because it will be inspected when additional cables are pulled.

The inspector reviewed the revised procedures and verified they were modified to include all commitments made to the NRC. In addition, the inspector performed visual inspections in several areas of the plant to verify cable trays were not being overfilled without engineering approval. The inspector found all areas reviewed acceptable and this item is closed.

# (Closed) Unresolved Item (85-01-02): Procedure for Battery/Inverter Testing Not Available for Review.

This item concerned a change that was made to Preoperational Test Procedure PO-2.39.01, 2-1 and 2-2, Batteries, Inverters and Chargers Test. The procedure change was made using handwritten notes and line-outs of certain sections and the portion of the test that was deleted had not yet been incorporated into another procedure. Also, the Startup Manual (SUM) had not yet been issued to specify test procedure revision requirements. The inspector reviewed the subsequently issued SUM to verify that test procedure revision procedures allow handwritten changes to be made if typing is not available and test performance is pending. Also, the inspector reviewed a subsequently issued change to PO-2.39.01, 2-1 and 2-2 to verify that the previously deleted portions of the test had been reincorporated into the procedure. The change had initially been made because battery testing was disrupted due to removal of two sets of batteries for use in BVPS Unit 1. The inspector considers this action satisfactory as the test procedure revision was made in accordance with approved administrative guidelines, and the test procedure has since been returned to its initial status. This item is closed.

# (Closed) Violation (84-12-01): Walkdown Personnel are not Certified/ Qualified Except Group Leaders and SQC Personnel.

This violation concerns inspection and examinations conducted during official walkdown of systems to verify that these systems were acceptable for testing. Some personnel performing these inspections were not certified per ANSI N45.2.6-1978 requirements. The inspections being conducted were: (1) system walkdown per FCP-509 to verify installed condition for stress reconciliation calculations and (2) system walkdowns for system turnover from construction to SUG per FCP-51. The licensee has initiated a training program to certify walkdown participants other than those Site Quality Control (SOC) and Start-Up Group (SUG) personnel who had been previously certified. The inspector reviewed selected training records of the Engineering personnel who participated in system walkdowns for installed condition verification to verify that they were adequately trained for the particular job task required. Additionally, FCP-509 has been revised to require that non-QC personnel assigned to perform system walkdowns be certified as Level 1 inspectors. The inspector considered these actions to be satisfactory.

In order to ensure QC participation in system walkdowns conducted for system turnover from construction to SUG, the licensee initiated a new procedure, FCP-56, which requires an independent QC inspection to be completed, in addition to other construction or SUG walkdowns, prior to system turnover. Subsequent SUG walkdowns will include a QC representative to ensure that the results and conditions existing at the time of the initial QC inspection have not been invalidated. The administrative controls are in place and functioning although to date, no QC inspections have been performed under the new requirements. The inspector considers the above actions satisfactory to ensure adequate QC involvement in system walkdowns, and this violation is closed.

### (Closed) Unresolved Item (84-17-02): Quality Assurance Audits

The inspector questioned the basis for not performing unscheduled audits in the electrical cable separation area or vendor wiring of panels as specified in Duquesne Light Company's Quality Assurance Department Procedure DC-18.

The licensee performed two electrical installation/construction audits in 1984, which included the scope of Field Construction Procedure FCP-422, "Electrical Separation Walkdown Procedures" and Inspection Procedure 8.5.5 "Inspection of Vendor Internal Wiring." In addition, two engineering audits, performed during 1984, included the subject of electrical separation. The licensee determined the electrical separation and vendor wiring of panels was adequately covered by scheduled audits and therefore, unscheduled audits were unnecessary. The licensee has advised the intent of Procedure DC-18 was to meet the requirements of ANSI N45.2, which permits the use of scheduled and/or unscheduled audits as deemed necessary to adequately audit problem areas.

To more clearly state the intent, the licensee revised DC-18, Revision 5 to state:

"Duquesne Light Company has full responsibility for its nuclear power plants in meeting all local, state and federal regulations, and, in particular, the requirements of 10CFR50, Appendix B. It is essential that the Duquesne Light Company Quality Assurance Unit have a comprehensive method of determining the adequacy of the quality activities of Duquesne Light Company, Architect Engineer/Constructor, NSS Supplier, and their Contractors and Subcontractors. It is equally essential, after such determination has been made, that initial and continuing implementation of quality programs be verified, and any breakdown or deficiency be promptly identified and corrected. This is accomplished by audits conducted periodically or on a random, unscheduled basis, or both."

The inspector reviewed the licensee's audits performed in the electrical area and found the four scheduled audits were sufficient without performing any additional unscheduled audits. This item is closed.

#### (Closed) Unresolved Item (83-16-02): Socket Welding using Gap-A-Lets (GAL).

This unresolved item identified a potential problem of Gap-A-Lets breaking loose inside the piping and flowing through the system during operation and possibly causing the system to be less than fully operational.

#### Background:

Socket welding requires, by code, a minimum gap of 1/16 inch between the pipe end and the socket fitting shoulder. The past practice used by most utilities was to scribe lines, before fit-up, on the outside diameter of each connecting part. After fit-up and welding, the separation between scribe lines were measured to assure the 1/16 inch separation was accomplished.

A new device was invented in 1981 called Gap-A-Lets, which eliminated the tedious job of fitting and maintaining the 1/16 inch separation. The device is a deformed ring which is formed from flattened wire to about a 330 degrees arc with a diameter slightly greater than the socket fittings inside diameter.

The ring is deformed out-of-plane at three equidistant locations. This deformation establishes the 1/16 inch root gap. The rings used at Beaver Valley are produced from austenitic stainless steel, Grade 316L and solution annealed after forming to eliminate the potential problem of intergranular stress corrosion cracking. The GAL is placed on the shoulder of the fitting, then the pipe is inserted. The Gap-A-Let maintains the 1/16 inch gap. No scribe lines or precise fitting requirements are necessary. During welding, when the separation may be reduced by thermal expansion, the ring will flatten and allow enough movement to keep the weld from cracking. The ring is not welded.

The licensee has used approximately 10,000 GALs on socket welds two inches and smaller at Beaver Valley, Unit 2. Stainless steel GALs are used for both carbon steel and stainless steel socket fillet welds. The licensee has inspected less than 50 percent of the completed fit-ups due to the inaccessibility of the inside surface. The inspectable joints are visually examined by either the Field Welding Supervisors (20%) or by Q.C. inspectors (80%). If the pre-weld fitup fails to meet the acceptance criteria, it is re-fit as an in-process correction. A Nonconformance and Disposition is not written if the fit-up is correctable.

The GALs were used almost exclusively from 1982 until September 11, 1983. On that date, the licensee requested that the use of GALs be suspended until further evaluation was performed on their use. On November 22, 1983, new instructions were issued. They were: (1) use of alignment tool where possible, then; (2) alignment by scribe where feasible, and lastly (3) use of Gap-A-Lets. This position is still in effect.

From discussions with the licensee and contractor personnel, inspections have rarely found any protrusion of the GALs into the flow path; however, it has occurred and the potential for the GAL breaking loose and flowing into the system is a concern. The licensee was asked to evaluate this concern.

Stone and Webster Engineering Corporation contracted Alden Research Laboratory to provide an analysis of the GAL, including mechanical flow testing and analytic evaluation.

Both steady and unsteady hydrodynamic loads were predicted analytically for the most severe protrusion geometrics possible. The analysis identified the most severe combinations were; water at room temperature, with GAL deformation representing both cantilevered and restrained beams in two inch diameter piping connected to fittings. Flow tests using water in two inch piping were conducted to assess the stresses and material behavior. The study found that measured stresses were less than the allowable stress, resulting in the conclusion that GALs would not fail in service.

Longevity tests exposing numerous deformed GALs in various fittings to the maximum hydrodynamic loads were conducted for an extended period. No failures occurred during the test period. Since the number of cycles tested, 10<sup>7</sup>, were greater than the accepted number of cycles used to define the endurance strength for infinite life GAL, failure would not occur for average water velocities of 20 Ft/sec. or less. The report which details the analytical work and flow test was reviewed by the inspector.

Stone and Webster Engineering performed a review of all safety-related systems which possibly contained GALs to determine the system fluid and velocity. Their study found that the worst case scenario was water in the two inch safety injection lines to the hot and cold legs which could achieve flows of 17 Ft./sec.

In addition to the analysis and tests described above, the licensee is inspecting for loose GALs during flushing and cleaning. This included inspecting temporarily installed strainers used during flushing. To date, no loose GALs have been found.

The inspector reviewed the test data and other associated data. Based on this review, the inspector has determined the licensee has performed extensive tests to assure GALs will not come loose and be a problem during operation. To date, no (ALs have been found loose or broken. In addition, the licensee has curtailed the extensive use of GALs. Based on this data, this item is closed.

# (Closed) Noncompliance (82-01-01): Welding - Inadequate Taper

This violation identified that piping welds were not faired to the required 3 to 1 taper from the weld surface to the adjacent base material as required by the ASME B&PV Code Section III, Winter 72 Addenda for Class 3 components. In order to preclude the existence of such condition, the licensee revised Specifications 2BVS-920 and 2BVS-58. Also, Quality Control inspection plans were revised by July 15, 1982, and included specific acceptance standards. A reinspection by QC of 729 ASME Class 3 components revealed 51 to be unacceptable to the criteria. One hundred seventy-seven welds were inaccessible.

The licensee has proposed the following actions regarding the unacceptable and inaccessible conditions.

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- (a) A total of 25 Class 3 butt-welded valves, all accessible, which do not meet the criteria were reworked to meet the criteria.
- (b) A total of 26 accessible pipe to fitting welds which do not meet the criteria and 177 inaccessible pipe to fitting welds are acceptable as is based on the following:

The stress intensification factors required by ASME III ND/NC-3672 range typically between 1.3 and 4.5 for the Tee and Ell fittings, thus requiring the maximum allowable moment loadings to be reduced by the amount of the factor. Since the fittings eccentricity and excess base metal tend to increase with increasing diameter, along with the stress intensification factors, the currently required stress intensification factors for fittings also sufficiently offset potential weld surface conditions at their connecting butt welds. Calculations were performed by the licensee to justify this position.

Inspection Report No. 50-412/85-02 discussed the review and acceptance by the NRC of the calculations. The remaining open items on this issue were a resubmittal by the licensee of an amended letter to correct the total number of welds involved and sample inspections by the inspector of re-worked and accepted pipe welds.

On February 14, 1985, the licensee submitted a supplement letter to their March 14, 1984, letter on this issue. The supplement changed the total number of welds involved from 752 to 729.

The inspector performed reviews of the revised 2BVS-920 and 2BVS-58 specifications to assure the revision complied with ASME Section III Code for fairing the welds into the base material. In addition, the inspector verified the Quality Control Inspection Procedures contained appropriate acceptance standards as specified in ASME Section III.

The inspector performed inspections of various Class 3 pipe to valve welds to confirm they meet the acceptance standards. Various repaired welds were also inspected to verify they were properly reworked.

All areas reviewed by the inspector were found acceptable. This item is closed.

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### 4. Radiographic Film Review

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The inspector reviewed the radiographic film for qualification samples and ten piping welds to ascertain compliance with the licensee's procedure and ASME Section III. The following radiographic film and accompaning reader sheets were reviewed:

- Welder qualification samples identified as F632 and FACK.

- Piping welds Number 2 CHS-288-F503,

2 SIS-005-F524, 2 SIS-005-F529, 2 SIS-006-F529, 2 CHS-014-F521, 2 FWE-107-F501, 2 FWE-116-F504, 2 FWE-116-F503, 2 RCS-110-F01, 2 RCS-039-F500

The inspector verified the weld quality, film quality, film density, weld coverage, penetrameter size location and detectability and reader sheet interpretation met the Quality Control Inspection Procedure. The inspector also verified the inspection personnel were qualified to perform their assignments. The inspector found all areas inspected were in compliance with the Q.C. procedure and Section III of the ASME Code.

### 5. Review of Nonconformance and Disposition Reports

The inspector performed sample inspection of dispositioned Nonconformance and Disposition (N&D) Reports to ascertain compliance with NRC requirements. The sample included N&D's from the mechanical and electrical disciplines. The N&D's reviewed were recently dispositioned by Engineering. The inspector verified the N&D's were reviewed by engineers delegated and qualified to perform reviews in specific disciplines.

The inspector found the dispositions were adequate and generally performed in a timely manner.

#### 6. Exit Interview

An exit interview was held on April 1, 1985, with members of the licensee's staff and contractors as denoted in Paragraph 1. The inspector discussed the scope and findings of the inspection. No proprietary information was identified as being included in this report.