

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-456/84-09(DPRP); 50-457/84-09(DPRP)

Docket Nos. 50-456; 50-457

Licenses No. CPPR-132; CPPR-133

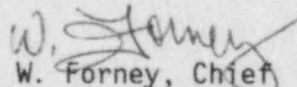
Licensee: Commonwealth Edison Company
Post Office Bcx 767
Chicago, IL 60690

Facility Name: Braidwood Nuclear Power Station, Units 1 and 2

Inspection Conducted: May 1 through June 4, 1984

Inspectors: L. G. McGregor

R. Schulz

Approved By: 
W. Forney, Chief
Projects Section 1A

6/29/84
Date

Inspection Summary

Inspection on May 1 through June 4, 1984 (Report No. 50-456/84-09(DPRP); 50-457/84-09(DPRP))

Areas Inspected: Routine, unannounced safety inspection of licensee action on previous inspection findings, work activities observed during plant tours, safety related piping, whip restraints, piping post weld heat treatment, piping material verification program, Field Change Requests, electrical installations, structural steel drawing control, craft training, safety related equipment, and preoperational test performance. The inspection consisted of 292 inspector-hours onsite by two NRC inspectors including 30 inspector-hours onsite during off shifts.

Results: Of the twelve areas inspected, no items of noncompliance or deviations were identified in ten areas; one item of noncompliance was identified in each of the remaining areas (failure to stipulate physical clearance criteria - Paragraph 3; failure to install the correct whip restraint plate - paragraph 5.

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DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

M. Wallace, Project Manager
R. Cosaro, Construction Superintendent
*C. Schroeder, Licensing and Compliance Superintendent
*D. L. Shamblin, Construction Superintendent
T. Quaka, Quality Control Supervisor
L. Tapella, Engineer
G. Groth, Lead Mechanical Engineer
B. Tanouyi, Engineer
S. Hunsader, Quality Assurance Supervisor
G. Fitzpatrick, Assistant Manager Quality Assurance Corporate
M. Curinka, Engineer
*C. J. Tomashek, Startup Superintendent
E. R. Wendorf, Project Field Engineering Mechanical Supervisor
*S. J. Reutcke, Quality Assurance Engineer
J. D. Deress, Engineer
C. Mennecke, Engineer
*K. Steele, Electrical Supervisor
*E. R. Netzel, Quality Assurance Supervisor
*R. J. Farr, Project Mechanical Superintendent
*R. Wrucke, Licensing Engineer
*M. Gorski, Engineer
*C. D. Gray, Project Structural Supervisor
*W. D. Bruns, Staff Assistant

Phillips Getschow Company (PGCo)

T. G. O'Connor, Site Manager
K. J. Hamilton, Consultant
J. Carlson, Quality Control Supervisor
L. J. Butler, Assistant Quality Control Supervisor
M. Galloway, Assistant Project Engineer
J. Stewart, Project Engineer
S. Hamilton, NDE-Level II
R. Hamilton, Welding Supervisor

G. K. Newberg Company

J. J. Hairston, Quality Assurance Manager
R. Voss, Project Engineer

L. K. Comstock and Company, Inc. (LKC)

I. Dewald, Quality Control Manager
R. E. Marino, Quality Assurance Manager Corporate
L. G. Seese, Assistant Quality Control Manager Site
R. M. Saklak, Quality Control Supervisor

Sargent and Lundy (S&L)

W. C. Cleff, Project Manager
D. A. Gallagher, Field Supervisor
T. B. Thorsell, Project Engineer
S. L. Wahlert, Engineer

*Denotes those personnel attending the exit interview.

2. Licensee Action on Previously Identified Items

(Closed) Noncompliance (50-456/82-06-06B): Potentially nonconforming cable reels. This item of noncompliance was retracted by a Region III letter to the licensee dated May 23, 1983.

3. Plant Tours

The inspectors observed work activities in-progress, completed work, and plant status during general inspections of the plant. Observation of work included high strength bolting, safety-related pipe welding, anchor bolts, structural welds, and cable trays in the containments and auxiliary building. Particular note was taken of material identification, nonconforming material identification, housekeeping, and equipment preservation. Craft personnel were interviewed in the work areas.

During the general plant tours the inspectors have noticed numerous items in close contact or direct contact with each other, such as safety-related small bore piping in contact with safety-related large bore pipe, safety-related conduit in close proximity to or in contact with safety-related pipe, and safety-related pipe in contact with or in close proximity to safety-related duct work. The NRC construction resident inspector investigated these physical clearance concerns and discovered that physical clearance criteria had not been established by the design engineer, Sargent and Lundy, other than for small bore piping, ≤ 2 " ASME Section III, Subsection NC and Subsection ND. This physical clearance which was stipulated as 3" in Specification F/L-2739, Piping System Installation, was prescribed for only 2" and under pipe installations, Subsections NC and ND, because this pipe was allowed to be field run, deviating from the design drawings. The design engineer failed to address the fact that numerous electrical items such as conduit or cable trays, large bore piping components, or HVAC components would be installed or revised after the small bore piping installations and also these items required prescribed physical clearance criteria due to the placement of the field run small bore pipe. Further investigation revealed that the licensee committed to ANSI N45.2.8, 1975 through Regulatory Guide 1.116 in their Quality Assurance Manual and Topical Report. ANSI N45.2.8 requires, in paragraph 2.9, that engineering limitations be incorporated in procedures and instructions and shall include physical clearances, and paragraph 2.1 requires that activities shall be planned and documented to be consistent with engineering and design requirements.

The NRC inspectors met with Commonwealth Edison and Sargent and Lundy on May 17, 1984, and the licensee was informed of the NRC concerns. On May 30, 1984, the NRC met with Sargent and Lundy and Commonwealth Edison and the licensee was informed that a violation for failure to establish physical clearance acceptance criteria would be issued based on the fact that Sargent and Lundy did not prescribe in documented instructions, procedures, or drawings clearance criteria for safety-related HVAC components or safety-related large bore (2") piping in relation to other items such as equipment, conduit, cable tray, or piping nor prescribe clearance criteria for safety-related electrical items, such as cable tray or conduit, in relation to all piping, HVAC components, or equipment. As a result, design control measures for installation and inspection activities were not adequate in that they did not address:

- . Hydraulic and thermal considerations that require flexibility and movement of items, including pipe supports, and the affect on items due to their close proximity or direct contact with each other,
- . Stress and compatibility of materials due to metal to metal contact and therefore subsequent item deterioration, degradation, or failure resulting from factors such as piping thermal expansion,
- . Accessibility of items for in-service inspection, maintenance, and repair, such as interferences preventing the opening of junction boxes,
- . Functional reliability of a component or item due to interferences, such as obstructing HVAC damper linkage, impeding the manual operation of valves, and blocking HVAC filter access doors.

Furthermore, clearance installation limitations have not been required to be met by the contractors and therefore physical clearances have not been planned by craft personnel or documented in quality control inspection reports to assure the prompt identification of installation conditions adverse to quality.

Failure to prescribe physical clearance criteria prior to installations is in violation of 10 CFR 50 Appendix B, Criteria V (456/84-09-01; 457/84-09-01).

During a tour of the containments the inspector noticed that the bolts for the steam generator lower lateral, inner frame, support columns had inadequate thread engagement. Further investigation revealed that Nuclear Installation Services Company had written nonconformance reports 3009-96 and 3009-97 identifying these deficiencies for corrective action. The inspector considers this issue controlled and closed.

4. Safety Related Piping

Main Steam piping welds between the inner and outer Unit 1 containment walls at elevation 386' were inspected, as were Feedwater piping welds between the inner and outer Unit 1 containment walls at elevation 390'.

Attributes checked included: quality of the welds, identification of the weld and welder, and identification of the spool piece. Subsequently, documentation was examined for the following welds and associated spool pieces:

<u>System</u>	<u>Weld No.</u>	<u>Spools</u>	<u>Size</u>	<u>ASME Class</u>
Main Steam	FW-4	MS-18-3/MS-18-4	32.75"	2
Main Steam	FW-5	MS-18-5/Penetration 86	32.75"	2
Main Steam	FW-3	MS-17-2/MS-17-3	32.75"	2
Main Steam	FW-4	MS-17-3/MS-17-4	32.75"	2
Feedwater	FW-6	FW-15-3/Penetration 84	16"	2
Feedwater	FW-6	FW-16-3/Penetration 87	16"	2

Documentation reviewed included verification of material requisitions, welding material test reports, fit-up inspections, root weld inspections, final weld inspections, code data reports, magnetic particle test reports, and radiographic inspection reports.

The inspector discovered that FW-5, repair 2, radiographic inspection report for film view 43-53, stated, "Foreign material inside pipe in area of interest. Does not interfere with interpretation." When foreign material is identified inside of pressure boundary piping it should be documented as to what the object or foreign material consists of and then appropriately dispositioned, such as removal of foreign material or accept as is. The inspector requested the licensee to investigate this particular radiographic inspection report and others that may not have properly documented the nature of foreign material. Pending licensee and further NRC review this issue will remain unresolved (456/84-09-02; 457/84-09-02).

No items of noncompliance or deviations were identified.

5. Whip Restraints

The inspector examined whip restraints, 1WRMS P7 and 1WRMS P15, in the Unit 1 containment at elevation 395', and noticed that washers had not been installed for the ASTM A490 high strength bolts, as required by 1705, Standard Specification For Erection of Structural Steel. These bolting connections had not been examined and accepted by Phillips, Getschow Co. However, a review of the Phillips, Getschow quality control inspection program revealed that inspections to determine that washers were installed for high strength bolt connections were not required to be done. The inspector brought this to the attention of the licensee and the licensee responded that all whip restraint high strength bolting connections would be inspected or re-inspected to assure correct washer installation. Pending these inspection efforts, which will determine if any connections had been inspected and accepted without washers installed, this issue will remain unresolved (456/84-09-03; 457/84-09-03). In addition, the inspector reviewed Commonwealth Edison Audit, QA-20-84-508, which identified that Phillips, Getschow whip restraint installation is inadequate in that documentation of high strength bolt tightening was not required.

Corrective action to be undertaken includes verification of tightening for all previously installed connections. This is an open item (456/84-09-04; 457/84-09-04).

Documentation for safety-related whip restraints 1WR-RC1-6 and 1MS-P11 was reviewed, including stores requests, material test reports for installed steel, filler metal test reports, welding procedures, and installation inspection reports. The inspector determined that drawing 1WR-RC1-6 (Revision A), Field Change Order #5497, data sheets for field weld 12 and field weld 14, and Specification for Pipe Whip Restraints F/L-2909 required ASTM A572 GR.50 plate material. The inspector verified through documentation and by a physical inspection of the reactor coolant whip restraint, 1WR-RC1-6, that ASME SA-516 GR.60 material was installed. This is in violation of 10 CFR 50, Appendix B, Criterion V (456/84-09-05; 457/84-09-05).

Phillips, Getschow Audit #83-BR22 had identified that material substitutions were made by craft personnel during whip restraint installation without the knowledge of field engineers. The NRC inspector identified that quality control inspectors had not been involved in verifying and documenting acceptable substitute material installations. Pending Phillips, Getschow quality control inspections of all substitute material installed, and documentation of correct or incorrect material installations, this issue will remain unresolved (456/84-09-06; 457/84-09-06).

6. Piping Post Weld Heat Treatment

The following documents were reviewed:

- . PGCP-41, Revision 3, Control of Preheat and Interpass Temperature and Post Weld Heat Treatment
- . Welding Procedure Specification 1A-MA-13, Revision 3.

The documents were in accordance with the ASME Boiler and Pressure Vessel Code, Section III and Section IX, 1974. However, the inspector noted that although certified thermocouples and calibrated strip chart recorders were being used during post weld heat treating operations, Procedure PGCP-41 did not require the use of certified thermocouples or calibrated strip chart recorders. The inspector brought this to the attention of the licensee, who immediately revised the procedure to require certified thermocouples and calibrated strip chart recorders. The inspector considers this issue closed.

Actual heat treat recording charts were reviewed for the following post weld heat treated components:

- . Feedwater nozzle to Steam Generator 1RC01BD
- . Feedwater nozzle to Steam Generator 1RC01BC
- . Steam Generator Outlet Nozzle 2A, MS-60-1.

The heat treat charts were in accordance with ASME Boiler and Pressure Vessel Code, Section III, NB-4600, including tables NB-4622, mandatory requirements and exemptions. The inspector's review verified that the post weld heat treatment temperatures and holding times were within allowable limits, as were the maximum heatup and cool-down rates.

No items of noncompliance or deviations were identified.

7. Piping Material Verification Program

Phillips, Getschow Procedure QCP-B31, Revision 0, Material Verification Program, was reviewed. The purpose of the procedure is to establish a controlled method for verifying the traceability of materials utilized in ASME Section III process piping systems, due to the violation identified in NRC Inspection Report No. #83-09. Overall the procedure appeared adequate, but the following aspects require clarification and/or incorporation in the procedure:

- . Documentation and analysis of pipe footage requested versus footage installed and overage reports,
- . Identification, control, and documentation of pipe and fittings with identical heat numbers but subject to different nondestructive examinations due to ASME Section III, Subsection requirements,
- . Documentation and analysis of hardware markings with regard to manufacturer markings or Phillips, Getschow markings,
- . Define allowable heat number transposition errors and responsibility assigned for resolution, and
- . Issue nonconforming reports for deficient findings identified in Column 8, 12 or 16 under Section 10, Quality Control Documentation Review.

Pending licensee clarification and/or corrective action, and NRC review, the above items will remain open (456/84-09-07; 457/84-09-07).

No items of noncompliance or deviations were identified.

8. Field Change Requests

Field Change Requests were reviewed for timely resolution. Commonwealth Edison QA Manual, Q.P. No. 3-2, Design Change Control, allows verbal concurrence of Field Change Requests from Project Engineering, the Station Nuclear Engineering Department, or the Architect Engineer. Detailed below are the Field Change Requests reviewed:

<u>FCR's</u>	<u>Month/Year</u>	<u>% Verbal Concurrence Only</u>
L5000 thru L5199	May/1982	33%
L5200 thru L5399	June/1982	10%
L5800 thru L5999	July/1982	80%
L6000 thru L6199	August/1982	85%
L6400 thru L6599	September/1982	85%

The number of outstanding Field Change Requests with only verbal approval and not documented written approval appear to exceed acceptable quality practices, considering the possibility of verbal miscommunication. The Project Manager for Commonwealth Edison also stated the licensee had previously identified this concern and was instituting corrective action, which included increased emphasis by Sargent and Lundy in documenting concurrence of Field Change Requests and incorporating the changes in the affected drawings in a timely manner. Pending licensee corrective action and NRC review, this issue will remain open (456/84-09-08; 457/84-09-08).

No items of noncompliance or deviations were identified.

9. Electrical Installations

Nonconformance reports written due to deficiencies in electrical installations were reviewed. Problems identified by the nonconformances included: incorrect weld details, exceeding dimensional tolerances, damaged cable pans, incorrect weld placement, and improperly located concrete expansion anchors. Nonconformances numbered 100 thru 150, written between April 1981 and June 1981, and nonconformances numbered 1101 thru 1150, written between May 1983 and June 1983, were examined for proper signatures, disposition, and corrective action to prevent repetition.

L. K. Comstock's Procedures 4.3.8, Cable Installation and 4.8.8, Cable Installation Inspection were examined. The inspector discovered that the QC inspector was required to check during cable installation such aspects as maximum pull tension, minimum bend radii, and cleanliness of the cable tray, but not check if the routing was correct, whether the cable was properly supported, and if the cable pulled was of the correct type. Subsequently, the inspector discovered that Commonwealth Edison had been cited for deficient procedures concerning quality control inspections of proper routing, adequate support, and correct cable type in NRC inspection report number 83-17, and had responded to the violations stating that procedures 4.3.8 and 4.8.8 were expected to be revised by March 30, 1984. The inspector brought the procedure deficiencies and the licensee commitment to the attention of Commonwealth Edison Project Management on May 10, 1984, and Project Management immediately issued a stop work order on all safety-related cable pulls. On May 18, 1984, the stop work order was lifted after the procedures 4.3.8 and 4.8.8 were revised, training was provided, and all applicable L. K. Comstock personnel were knowledgeable in the requirements to check adequate cable tray support, proper routing, and correct cable type.

No items of noncompliance or deviations were identified.

10. Structural Steel Drawing Control

The purpose of this inspection was to determine if G. K. Newberg Company and Commonwealth Edison Company were posting Engineering Change Notices (ECNs) and Field Change Requests (FCRs) to drawings and if the drawings were of the latest revision. The following structural drawings were reviewed:

- . S672 Rev. AN, Auxiliary Bldg. Foundation
- . S673 Rev. AV, Auxiliary Bldg. Foundation
- . S682 Rev. AY, Auxiliary Bldg. Floor
- . S695 Rev. AU, Auxiliary Bldg. Floor
- . S1001 Rev. AP, Containment Bldg. Floor Framing
- . S1283 Rev. C, Auxiliary Bldg.
- . S918 Rev. BB, Containment Bldg. Floor Framing
- . S965 Rev. P, Containment Bldg, Foundation

Two locations were checked, the Commonwealth Edison main site office and the G. K. Newberg main site office. All the drawings were of the latest revision, however, Commonwealth Edison was writing on the applicable drawings the ECN and FCR numbers that affected the drawings, while G. K. Newberg was attaching 3"x5" index cards to the drawings stipulating the applicable ECNs and FCRs. The 3"x5" index card attachment was not adequate as the inspector identified drawings, specifically structural drawing S/283 and architectural drawing A-253, which had 3"x5" index cards missing, which were later found lying on the floor. With the cards lying on the floor, an individual checking the drawing for inspection or installation, would not be aware of drawing revisions, due to ECNs or FCRs.

The licensee was informed of the condition and immediately revised G. K. Newberg Company Procedure, Design Change Control, Section 33, Revision 4, to require that an FCR-ECN status book be maintained at each drawing location and each drawing noted "See Status Book", to assure awareness of all drawing revisions. The inspector considers this issue closed.

No items of noncompliance or deviations were identified.

11. Craft Training

L. K. Comstock has developed and implemented Work Instructions for electrical craft personnel. The inspector selected a sample of these work instructions and reviewed training records of electrical craft foremen. Work Instructions selected included:

- . 4.3.1, Safety Related Conduit Installation
- . 4.3.5, Safety Related Cable Pan Installation
- . 4.3.6, Concrete Expansion Anchor Installation
- . 4.3.8, Cable Installations
- . 4.3.9, Cable Termination
- . 4.3.13, Equipment Installation Procedure
- . 4.3.24, Rework

- . 4.9.1, Control of Measuring and Test Equipment
- . 4.9.3, Hanger Fabrication Procedure
- . 4.10.1, Handling
- . 4.10.2, Receiving and Storage

The inspector discovered the following deficiencies:

- . No training records existed for craft foremen for Work Instruction 4.9.3,
- . The warehouse foremen had no training records for Work Instruction 4.10.2, and
- . Three foremen out of 23 did not have training records for Work Instruction 4.3.24.

Further investigation revealed that measures have not been established to assure that personnel were trained in the applicable Work Instructions prior to being assigned as craft foremen nor that all craft foremen were trained in all the applicable Work Instructions pertaining to their task responsibilities such as cable pulling, support installation, or rework duties. This item was brought to the attention of the licensee who stated that it was their belief that all craft personnel had been properly trained, but the training was not documented. The licensee's construction manager, on May 31, 1984, stated to the NRC construction resident inspector that a formal written training program would be established for all craft foremen and the resultant training would be documented. This issue will remain unresolved pending licensee implementation of the formal training program, NRC review of the program and NRC further investigation into electrical craft foreman knowledge of the applicable work instructions (456/84-09-09; 457/84-09-09).

While interviewing L. K. Comstock quality control supervision, the inspector discovered that L. K. Comstock does not have a final walkdown procedure. A final quality control inspection prior to licensee turnover assures that all installations are acceptable, and previously installed items have not been damaged or removed by other craft discipline personnel. Uncontrolled removal has been a problem for L. K. Comstock, as identified in NRC Inspection Report 84-06. Pending licensee evaluation of this concern and NRC evaluation of L. K. Comstock inspections prior to installation turnover to the licensee, this issue will remain unresolved (456/84-09-10; 457/84-09-10).

12. Safety Related Equipment

The Nuclear Regulatory Commission has previously asked Commonwealth Edison, (Byron/Braidwood Final Safety Analysis Report Question Q10.15 and Q10.38) to indicate postulated potential internally generated missile sources such as failures of valves, pump impellers and drive couplings for the entire Auxiliary Feedwater System including the diesel and motor driven pumps and the routing of system piping in the auxiliary building and the pipe tunnel. The licensee's analysis stated, "No missiles are

expected to result from failure of the motors or diesels. A fragmented rotor will be contained by the stator of the electric motor. Parts ejected following an internal failure of the diesel engine would be contained by the engine crankcase. In the unlikely event of fragments penetrating the stator or the crankcase, damage will be limited to the room enclosing the diesel". During an independent inspection of the auxiliary feedwater pumps the inspector noted a potential problem with the protective features provided for safety-related systems assuming internal missiles are generated within the room which houses the diesel driven auxiliary feedwater pump. With a diesel engine failure, such as the loss of a connection rod, engine parts could be ejected through the engine housing, causing damage to the minimum flow lines, common to the diesel driven pump and the electrical motor driven pump, which are in close proximity (one to two feet in some areas) of the diesel engine. The rupture of these minimum flow lines could result in the reduction of the total pump head pressure delivered to the system thus limiting the amount of water placed in the steam generators. Should the steam generator pressure be greater than what the pump can attain while feeding a break in the 2 inch minimum flow line, no water would be delivered to the steam generators. This piping installation appears to be contrary to 10 CFR 50, Appendix B, Criterion IV, and the design analysis as stated in Section 3.5 of the Final Safety Analysis Report. The "as built" condition of the auxiliary feedwater minimum flow lines is considered to be an unresolved item (456/84-09-11; 457/84-09-11), pending the licensee's demonstration that the installed system is designed such that missiles generated internally to the plant will not cause the loss of function of any design features provided for either continued safe operation or shutdown during transient or postulated accident conditions.

A second area of concern is the designed lubricating oil system for the auxiliary feedwater pumps (electric motor and diesel driven) and the lubricating oil system for the speed increaser (1765 RPM up to 3570 RPM) for the diesel driven auxiliary pumps (see Attachment 1). In both systems all pressure and temperature sensing devices are located after the oil cooler and do not indicate to an operator the condition of the oil filter on the discharge of the positive displacement oil pumps. No over pressure protection is installed for the main, (direct driven) oil pump and no oil filter by-pass is provided to maintain minimum oil flow to the pump bearings should the filter become plugged.

With only the present oil pressure switches or indicating gauge an operator cannot determine the condition of the pump output pressure, the ΔP across the oil filter, and ΔP or ΔT across the oil cooler. These readings are vital signs which are necessary to understand the operating conditions of each component and potential problem areas.

The "as-built" condition of the auxiliary feedwater pump lubricating oil systems are considered to be an unresolved item (456/84-09-12; 457/84-09-12) pending further information from the licensee.

No items of noncompliance or deviations were noted.

13. Preoperational Test Performance

During this reporting period the capacity tests, Procedure BWTP-DC-10, Sections 9.4 and 9.9, were performed on safety related battery banks Nos. 111 and 112. The purpose of the test was to determine the capacity of the battery bank by performing an eight hour discharge test at a constant rate of 150 amps. Each battery bank was tested, continuously for eight hours and twelve minutes before the test was terminated by the System Test Engineer. At the conclusion of each test the battery voltage remained above the cut-off value of 101.5 volts meeting or exceeding the design criteria. The battery banks were placed on equalizing charge and monitored until normal operating voltage was obtained.

No items of noncompliance or deviations were noted.

14. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee or both. Open items disclosed during the inspection are discussed in Paragraphs 5, 7, and 8.

15. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviations. Unresolved items disclosed during the inspection are discussed in Paragraphs 4, 5, 11 and 12.

16. Exit Interview

The inspector met with licensee representatives (denoted under Persons Contacted) during and at the conclusion of the inspection on May 31, 1984. The inspector summarized the scope and findings of the inspection. The licensee acknowledged the information.

