U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-456/84-17(DPR); 50-457/84-17(DPR)

Docket Nos. 50-456; 50-457 Licenses No. CPPR-132; CPPR-133

Licensee: Commonwealth Edison Company
Post Office Box 767
Chicago, Il 60690

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

Inspection At: Braidwood Site, Braidwood, Illinois

Inspection Conducted: July 7, 1984 through August 31, 1984

Inspectors: L. G. McGregor

R. D. Schulz

J. F. Schapker

Approved By: P. P. Pelke for
W. L. Forney, Chief
Projects Section 1A

10/1/84
Date

Inspection Summary

Inspection on July 7 through August 31, 1984 (Report No. 50-456/84-17(DPR); 50-457/84-17(DPR))

Areas Inspected: Routine, unannounced safety inspection of work activities observed during plant tours, items reported pursuant to 10 CFR 50.55(e), Inspection and Enforcement Bulletins, licensee action on previous inspection findings, structural steel and supports, and instrument piping and tubing. The inspection consisted of 128 inspector-hours onsite by three NRC inspectors including 13 inspector-hours onsite during off shifts.

Results: Of the six areas inspected, no items of noncompliance were identified in the area of items reported pursuant to 10 CFR 50.55(e); Inspection and Enforcement Bulletins; and licensee action on previous inspection findings; two items of noncompliance were identified as a result of plant tours (deficiencies in the control of small bore piping, paragraph 2); and one item of noncompliance was identified (inadequate welding controls and insufficient records, paragraph 4 and 5) in the areas of structural steel and supports and instrument piping and tubing.

DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

*M. Wallace, Project Manager
*G. Fitzpatrick, Assistant Manager Quality Assurance Corporate
*D. L. Shamblin, Construction Superintendent
*C. Schroeder, Licensing and Compliance Superintendent
C. J. Tomashek, Startup Superintendent
*T. Quaka, Quality Control Supervisor
*L. Tapella, Engineer
G. Groth, Lead Mechanical Engineer
J. Gieseker, Construction Supervisor
S. Hunsader, Quality Assurance Supervisor
E. R. Wendorf, Project Field Engineering Mechanical Supervisor
*M. Poland, Field Engineer
*R. Rowland, Quality Assurance Inspector
*D. A. Boone, Field Engineer
R. Wrucke, Licensing Engineer
M. Gorski, Engineer
*L. Kline, Licensing Engineer
C. Gray, Structural Engineer
B. Pickell, Quality Assurance Engineer

Phillips Getschow Company (PGCo)

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

G. K. Newberg Company (GKN)

*D. Craven, Project Manager
*J. J. Hairston, Quality Assurance Manager
D. Gorham, Quality Records Clerk
F. Replogle, Quality Assurance Engineer
C. Reynolds, Quality Assurance Engineer

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

F. Rolan, Project Manager
R. M. Saklak, Quality Control Supervisor

Pittsburgh Testing Laboratory (PTL)

F. Forest, Site Manager
T. Frazier, Assistant Site Manager

*Denotes those attending exit meeting on August 31, 1984.

2. Plant Tours

The inspectors observed work activities in-progress, completed work, and plant status during general inspections of the plant. Observation of work included structural high strength bolting, safety-related pipe welding, anchor bolts, structural welds, flange bolt-ups, 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, as such personnel were available, in the work areas.

During one of the tours, a construction worker asked the Senior Construction Resident to investigate the installation of some small bore piping, identified as heat number KD6751. Subsequent investigation revealed that Commonwealth Edison notified the USNRC, by telephone, on June 21, 1984, of a 10 CFR 50.55(e) regarding wall thickness inadequacies for 2" S/80 pipe, heat number KD6751, and on July 20, 1984, submitted written notification in accordance with the thirty day reporting requirements. The July 20 letter stated that the reduced wall thickness, which was primarily caused by pits and grooves, was the result of excessive corrosion and quantities of this pipe had been installed in various ASME and instrumentation safety-related systems. The letter included a section entitled "Analysis of Safety Implication and Corrective Action Taken" which are detailed below:

Analysis of Safety Implication

> "The reduced wall thicknesses could result in certain piping systems not meeting the code stress allowables. If left undetected, this condition could potentially result in pipe failure and negatively impact on its associated system safety functions."

Corrective Action Taken

> "Commonwealth Edison Company NCR No. 633 has been initiated to address this problem. Investigations conducted to date have indicated that this problem is limited to heat number KD6751 pipe. That portion of this heat number which remains in storage has been placed on hold. No release of this material will be authorized until measurements confirm that the pipe meets the minimum wall thickness requirements.
>
> In order to determine the adequacy of pipe from this heat number which has already been installed, a program is being developed to measure, in detail, wall thicknesses of the most severely pitted or grooved pipe currently in storage. Measurement results will be sent to Sargent and Lundy for evaluation and subsequent piping system assessments. The

extent of field inspections and rework will be determined based on the results of the Sargent and Lundy investigation.

When this lot of pipe was initially received, it was stored outdoors for an extended period of time which resulted in excessive corrosion. This condition was observed in the field and the pipe was subsequently chemically cleaned and stored indoors. A review has been conducted of the bulk storage of safety-related two inch and under carbon steel pipe by the Commonwealth Edison Company. The results of this review indicate that present storage practices prevent excessive corrosion of pipe due to outdoor exposure.

A follow-up report will be submitted following the initial investigation by Sargent and Lundy which is expected by October 1, 1984."

The Senior Construction Resident Inspector performed a detailed investigation and discovered that numerous heats of ASME Section III pipe were stored outdoors for extended periods of time and were subject to corrosion.

Commonwealth Edison had received the following heats of safety-related SA-106GR-B pipe in 1977:

Heat No.	Size/Schedule	Quantity
KD6830	2" S/80	5,709 feet
KD6751	2" S/80	55,000 feet
273088	2" S/160	1,509 feet
HD7760, JD1571	1 1/2" S/80	54,390 feet
HD7760	1 1/2" S/160	2,006 feet
KD7115	1" S/80	59,145 feet
KD7115	1" S/160	3,014 feet
JD1570	3/4" S/80	45,086 feet
KD6830	1/2" S/80	38,341 feet
HD7643	3/8" S/80	73,150 feet
	TOTAL	337,350 feet

In an inspection report on April 9, 1979, the quality control department of the piping contractor rejected the pipe, detailed above, due to rust, scale, and failure to cap the ends of the pipe. The pipe being uncapped allowed water and snow to settle on the inside of the pipe. On April 23, 1979, the piping contractor's Quality Assurance Manager wrote this memo to the piping contractor Quality Control Supervisor:

"It is my recommendation that all the two inch and under pipe on the east side of the railroad tracks outside of the Phillips, Getschow building be pickled to remove the extensive rust and scale buildup that occured during storage."

The Quality Control Supervisor replied on April 22, 1979, in memo form, stating:

"Since CECo has ordered and purchased this pipe, your recommendation has been forwarded through P.G.Co. Engineering Department to CECo for their disposition and resolution."

No action was taken by Commonwealth Edison or Phillips Getschow Company, the piping contractor, until May 5, 1981 when Phillips Getschow Company initiated Nonconformance Report Number 569. The nonconformance stated that the pipe listed below was unacceptable due to rust:

Size	Sch	Spec & Grade	Quantity	Heat #
2"	80	SA-106 GrB	47,850 FT	KD 6751
2"	80	SA-106 GrB	888 FT	KD 6830
2"	160	SA-106 GrB	1,550 FT	273088
1 1/2"	80	SA-106 GrB	36,483 FT	HD 7760
1 1/2"	160	SA-106 GrB	1,702 FT	HD 7760
1 1/2"	80	SA-106 GrB	7,943 FT	JD 1571
1"	80	SA-106 GrB	45,402 FT	KD 7115
3/4"	80	SA-106 GrB	41,860 FT	JD 1570
1/2"	80	SA-106 GrB	31,472 FT	KD 6830
3/8"	80	SA-106 GrB	77,064 FT	HD 7643
			TOTAL - 292,164 FT	

On May 17, 1981 and July 9, 1981, Commonwealth Edison, on Purchase Order Numbers 730091 and 254379 respectively, sent the following SA-106 GrB, safety-related pipe to the H. H. Howard Corporation in Chicago, Illinois to be cleaned:

Heat No.	Size/Schedule	Quantity
KD 6751	2" S/80	45,878 feet
273088	2" S/160	876 feet
JD 1571, HD 7760	1 1/2" S/80	45,423 feet
HD 7760	1 1/2" S/160	1,554 feet
KD 7115	1" S/80	44,758 feet
JD 1570	3/4" S/80	35,514 feet
KD 6830	1/2" S/80	27,940 feet
HD 7643	3/8" S/80	3,329 feet
KD 7115	1" S/80	1,472 feet
		TOTAL - 206,744 feet

The purchase orders stated the method to be used in cleaning the pipe which included:

. Soak in bath of caustic soda at 160 degrees F until mill coating is removed.

. Submerge pipe in 10 percent sulphuric acid at 160 - 180 degrees F to remove all scale and oxidation.

- Clear water rinse.
- Submerge into wyandate #6 metal cleaner at 160 degrees F.
- Air dry and inspect to make sure all scale and oxidation is removed.
- Cover the ends of each bundle with visqueen covering.

Examination of the purchase orders revealed:

a. The vendor was not an approved bidder as required by the Commonwealth Edison Quality Assurance Manual which states in part in Q. P. No. 4-1, Request for Bid, Proposal Evaluation and Recommendation: "Quality Assurance shall verify that necessary technical and quality requirements are included, the proposed bidders are acceptable by verifying they are on the Approved Bidders List and the procurement is being made from the plant location for which the Quality Assurance Program is approved."

   Approval of a vendor documents that the vendor has an approved quality assurance program and is capable of supplying products or services in accordance with standards required for the nuclear industry.

b. The purchase orders were not reviewed and accepted by the Quality Assurance Department, which is required to be done by the Commonwealth Edison, Quality Assurance Manual in Q. P. No. 4-1. Quality Assurance could not, therefore, assure that the necessary technical and quality requirements were included in the purchase orders. There were no references in the purchase orders to Quality Assurance program requirements such as 10 CFR 50, Appendix B, Criterion IX, Control of Special Processes. 10 CFR 50, Appendix B, states in part in Criterion IV: "To the extent necessary, procurement documents shall require contractors or subcontractors to provide a Quality Assurance program consistent with the pertinent provisions of this appendix."

Items a and b above are in violation of 10 CFR 50, Appendix B, Criterion V, Failure to Follow Procedures. (456/84-17-01; 457/84-17-01)

Summarizing the chronology of events:

- Phillips Getschow Co. rejected on April 9, 1979, 337,350 feet of pipe due to rust.
- No action was taken until May 5, 1981, when Phillips Getschow Co. identified on Nonconformance Report No. 569 a total of 292,164 feet of unacceptable pipe due to rust, and dispositioned the 292,164 feet to be cleaned.
- Purchase Order Number 730091, placed on May 17, 1981, and Purchase Order Number 254379, placed on July 9, 1981, provided for the cleaning of only 206,744 feet of pipe.

The investigation by the Senior Construction Resident revealed, as evidenced by the above dates, that Phillips Getschow Co. and Commonwealth Edison Company did not correct the rusted pipe condition in a timely manner. Furthermore, the licensee did not prevent the rusted pipe from being withdrawn from storage areas and installed in safety-related systems. Not only was heat number KD 6751, 2" S/80, installed in safety-related systems as stated in the 10 CFR 50.55(e) report, but numerous other heats of pipe, identified as being in a rusted condition, were withdrawn and installed. For example, 200 feet of heat number KD 680, 1/2" S/80 pipe was withdrawn for installation on February 16, 1981 for the essential service water system and another 200 feet was withdrawn on March 3, 1981 for the same safety-related system. The pipe identified on April 9, 1979 was not placed on hold to prevent withdrawal and installation.

Since 337,350 feet was identified as being in a rusted condition and only 206,744 feet was cleaned, it is apparent that a significant amount of pipe has been installed, some of which is installed in safety-related systems.

Failure to control the rusted pipe is in violation of 10 CFR 50, Appendix B, Criterion XV and failure to correct the deficient condition is in violation of 10 CFR 50, Appendix B, Criterion XVI. (456/84-17-02; 457/84-17-02)

Phillips Getschow Company Nonconformance Reports Numbers 1294, 1524, 1525, and 1611 written on December 7, 1983, May 17, 1984, May 17, 1984, and June 13, 1984 respectively, identified 2" S/80 pipe, Heat No. KD 6751, with ribbon groove indications that caused the pipe to be rejectable for minimum wall violations. Recent Commonwealth Edison analysis by their System Material Analysis Department stated that the pipe, (Heat KD 6751), experienced metal loss and pitting due to one or more of the following conditions:

- ribbon groove indications,
- outdoor storage, and
- overpickling (cleaning vendor).

All of the pipe rejected on April 9, 1979 was stored outdoors and 206,744 feet of numerous heats were pickled. The Senior Construction Resident met with Commonwealth Edison representatives on August 20, 1984 and requested the licensee to address the following question:

- What evidence exists to assure that the heats, other than KD 6751, identified on April 9, 1979, do not have minimum wall deficiencies? (Heat number KD 6751 was identified in the 10 CFR 50.55(e) report as having minimum wall violations.) A factor the licensee is taking into account is that apparently only heat number KD 6751 had ribbon groove indications which may have contributed to the minimum wall deficiency.

This question will remain an open item (456/84-17-03; 457/84-17-03). The licensee needs to determine if the rusted condition is significant in relation to pitting and minimum wall violations for all the heats identified on April 9, 1979, and that the worst case wall thickness degradation can be or has been identified and analyzed for acceptability. At the close of the inspection the licensee believed that heat number KD 6751 contained pipe that failed to meet minimum wall thickness.

A positive factor is that although ASME and ASTM minimum wall is 12 1/2% below nominal, many of the piping systems are overdesigned to allow wall reduction significantly below the 12 1/2% figure. This overdesign is being analyzed by the licensee and will be a factor in determining deficiency significance.

During other plant tours, the NRC inspectors noticed that the flange bolt-ups of the piping contractor were heavily rusted around the thread areas of the bolts. In addition, some of the essential service water flange bolt-ups were noted to have missing bolts and inadequate thread engagement. The Senior Construction Resident Inspector discussed these issues with the piping contractor's Quality Control supervisor and construction manager. The inspector learned that the piping contractor was aware of past bolting documentation deficiencies and a retro-fit program was in the process of being submitted to Commonwealth Edison that would address documentation deficiencies and would recommend a visual retro-fit program to identify the type of findings existing in the essential service water system. Pending licensee evaluation and resolution with regard to flange bolting acceptability, this issue will remain open (456/84-17-04; 457/84-17-04). The present system of control by the piping contractor is adequate to assure correct bolt-ups.

3. Items Reported Pursuant to 10 CFR 50.55(e)

The inspector examined the licensee's corrective actions relative to the deficiencies listed below:

(Closed) 456/83-06; 457/83-06: Elcen Metal Products supplied spring hangers with a carbon content in excess of the applicable ASME B&PV Code, Section III, Subsection NF limit. Replacement spring hangers were supplied for those hangers which did not meet the ASME Code. An evaluation and analysis of the balance of the variable spring hangers concluded that the hangers would meet the Load Capacity Data Sheet Specification and therefore are acceptable for use.

(Open) 456/82-10; 457/82-10: On November 19, 1982, a deficiency was reported regarding missing inspection records for structural bolted and welded connections. An updated report on May 7, 1984 stated in part:

> "The deficiency is limited to G. K. Newberg's installation of blockwall columns and miscellaneous structural steel in the Auxiliary Building. A continued review of the records for bolted and welded inspection reports is being performed during the progress of the inspection program. This continual review of records has identified a revised total of 1,282 weld connections of 2,028 total and 484 bolted connections of 825 total with missing inspection reports.

Lack of independent inspection of these connections does not imply that the connections are in any way defective. The safety implications can only be established with a case-by-case analysis of the as-found conditions of individual connections.

All of G. K. Newberg's accessible welded and bolted connections will be inspected. Bolt and weld inspection on inaccessible connections will be on a statistical basis for those connections with missing records. The existing statistical sampling plan has been utilized to establish a new sample in accordance with Military Standard 105D for a multiple sampling method.

The acceptance criteria will be based on yielding a 95% confidence/ 95% reliability level. This program will verify installation using the same procedure requirements applied during initial installation."

An additional report was submitted to the NRC on July 3, 1984, which stated in part:

"A statistical sample of 180 inaccessible bolted and welded connections with missing records is being inspected utilizing Military Standard 105D. Currently, all but 6 inaccessible welded and bolted connections of the sample have been inspected.

The Commonwealth Edison Company has submitted 155 inspection reports out of the 180 sample total to Sargent & Lundy (S&L) for evaluation. A total of 25 (which includes the 6 above) remain to be submitted. As of June 19, 1984, S&L has evaluated 40 of the 155 submitted reports, and of these 40 evaluations, all were considered acceptable.

Commonwealth Edison is currently clarifying 19 reports to provide additional information requested by S&L. Because further clarification may be required concerning some items in order for S&L to complete their evaluation of the sampling, we now anticipate a final resolution by October 1, 1984, at which time another interim or final report will be issued."

The Senior Construction Resident investigated the circumstances and documentation concerning the blockwall columns and miscellaneous structural steel and discovered that Pittsburgh Testing Laboratory performed a statistical sample inspection of the welds, and of 708 welds inspected 356 welds were rejected for failing to meet the quality standards of the AWS D1.1, Structural Welding Code. Deficiencies in the welding included such factors as craters, undercut, gaps, weld placement, alignment, and insufficient weld length. The licensee committed to the AWS D1.1 Structural Welding Code in the FSAR, Volume 7. The AWS D1.1 Structural Welding Code states in part in Section 6, Inspection, that the inspector shall make certain that the size, length, and location of all welds conform to the requirements of this code and further states that the inspector shall examine the work to make certain that it meets the requirements of Section 3, Workmanship. Both Senior NRC Residents examined some of these welded connections and found the work to be deficient with regard to the AWS D1.1 Welding Code Standards and not representative of

other structural steel welding in the plant, which meets or surpasses AWS D1.1 Structural Welding Code quality standards. The Senior Residents met with licensee representatives and requested the licensee to address the following questions:

(1) Since the AWS D1.1 Structural Welding Code requires that all welds be inspected and the AWS D1.1 Code is an FSAR commitment, what is the licensee's justification for a sampling plan?

(2) Based on 356 welds rejected out of 708, (over 50%), how will a statistical sampling plan assure the worst case weld has been found, considering the variables involved such as welder, welding procedure, and welder accessibility in completing the weld? The licensee stated in the 10 CFR 50.55(e) report, "The safety implications can only be established with a case-by-case analysis of the as-found conditions of individual connections."

(3) Since the licensee was aware that the welding did not meet the AWS D1.1 Structural Welding Code, why wasn't this communicated to the NRC in the May and July, 1984 10 CFR 50.55(e) reports?

Licensee management immediately responded to question (3), stating that the deficiencies with regard to the AWS D1.1 Code would have been reported in the final 10 CFR 50.55(e) report. The licensee is presently reviewing the NRC inspector's concerns and evaluating the basis for only performing sample inspections of the welds and bolting connections. An updated 10 CFR 50.55(e) is also being drafted for submittal to the NRC which will include statements with reference to AWS D1.1 Structural Welding Code deficiencies. This item will remain open (456/84-17-05; 457/84-17-05).

4. Inspection and Enforcement Bulletins

The inspector examined licensee actions relative to the Inspection and Enforcement Bulletins listed below:

(Closed) IE Bulletin 83-01: Cracks in BWR Mark 1 Containment Vent Headers. As Braidwood is a PWR, this bulletin is not applicable.

(Closed) IE Bulletin 84-02: Failure of General Electric Type HFA Relays in Use in Class 1E Safety Systems. All HFA relay coils used in non-safety-related applications have been replaced. There are no safety-related systems containing HFA type relays at Braidwood Station.

(Closed) Follow-up on IE Bulletin 81-03 as requested by Region III Memorandum. The Commonwealth Edison Company has taken an active role in heat exchangers and condenser cooling water systems at both nuclear and fossil fired stations.

During the 1970's, Corbicula sp. shell accumulation in piping systems was recognized as a potential hazard at the Kincaid Station. At that time, acrolein and chlorine were known to cause mortality in Corbicula sp. However, plant effluent restrictions prohibited their effective use. As a substitute, Zimmite ZM100U was utilized without success. Commonwealth

Edison's literature searches of the Oak kidge National Laboratory computer files failed to provide either a theoretical or experimental solution to the Corbicula sp. infestation problem. Since the beginning of Corbicula sp. infestations within CECo stations, the cleaning of and physical removal of clams from heat exchangers has been an effective means for maintaining heat exchanger performance.

The Commonwealth Edison Company is closely following the research being sponsored by EPRI and performed by Stone & Webster which is intended to lead to Corbicula sp. control. CECo is particularly interested in the study which will create toxic biofouling surfaces through an application of an anti-foul paint containing tributyl tin floride (TBTF). CECo is also interested in the work that will be conducted by Murray State University which will determine the toxic effect on Corbicula sp. of TBTF pellets in cooling water systems.

The Commonwealth Edison Company is also evaluating the use of carbon dioxide (CO_2) as a possible molluskicide. The reason for selecting CO_2 was based on the fact that it has been used as a chemical to narcotise zooplankton and mollusks as well as fish by researchers. In 1982, the first series of bioassays were performed at the Collins Station, in order to take advantage of the carbon dioxide treatment system, and in the Quad Cities Fish Lab where carbon dioxide, sodium hypochlorite and water flow rates could be varied. Screening bioassay studies exposed adult Corbicula sp. to various concentrations of CO_2 in water temperatures of 13°-16° C. After exposing clams to up to 500 mg/l CO_2 for up to 72 hours Corbicula sp. were narcotised. Corbicula sp. exposed to 500 mg/l for periods of time in access of 24 hours resulted in 50% plus mortality at water temperatures of 13°-16° C. The data collected during these tests at both Collins and Quad Cities suggests that adult size asiatic clams can be killed by carbon dioxide injection into continuously flowing systems and offers promise for controlling adult Corbicula sp. in service water systems.

Decreased performance in heat transfer equipment due to fouling can be detected by increases in the temperature of the cooled fluid either at the cooled fluid discharge or at the components which receive cooling from this medium. An alternate means of fouling detection is the monitoring of the pressure drop across heat exchangers. Flow blockages in heat transfer equipment effectively increases the resistance to fluid flow thereby creating a deviation from the design pressure drop. Flow rate tests are another means for determining whether or not heat transfer equipment is operating at design flow rates and pressures.

If heat transfer equipment exhibits a tendency to become fouled by Corbicula sp., additional surveillance, cleaning or treatment programs will be considered as appropriate. In order to keep abreast of potentially changing conditions, the forebay of the cooling lake intake screenhouse will be surveyed at the Braidwood site on an annual basis, for the presence of Corbicula sp.

CECo has instituted an annual summer inspection program of the Braidwood coolant lake, and continues in its quest to find species of Corbicula.

During the past three years no genus of Corbicula have been detected in the Braidwood coolant lake. Heat transfer data (ΔT and ΔP) and system flow requirement will also be monitored by the licensee to detect any decrease in heat exchanger performance.

The extremely active role pursued by the licensee to identifying Corbicula existence and evaluating the different methods of controlling Corbicula and Mytilus is continuing at the Braidwood Station, and has accomplished the intent and requirements of IE Bulletin 81-03.

This site reinspection effort suggests that the Bulletin remain closed (Inspection Report 81-13) and followup inspection by Region III Environmental Inspectors continue to monitor the licensee program with regard to identification and control of these biological species which promote heat exchanger fouling.

5. Licensee Action on Previously Identified Items

(Closed) Unresolved Item 456/84-06-02; 457/84-06-02: The inspectors' concern involved the assurance that all required electrical installations were installed and inspected to the latest drawing revision. L. K. Comstock Engineering is now reviewing each drawing revision to assure the work required by that revision is flagged to the production forces. Additionally, plant areas, are walked down by engineers to determine whether installation reports are being submitted as required. A final check is to be provided by a computer system, which will list all components, such as conduit, supports, cable trays, required to be installed and status the components with regard to:

- Latest drawing revision,
- Installation in accordance with the correct drawing revision, and
- Inspection in accordance with the correct drawing revision.

(Closed) Open Item (456/82-03-02; 457/82-03-02)

An agreement between the installer and the NDE contractor, revealed some confusion on part of the installer and a discrepancy between a statement in the agreement and the actions of the Authorized Nuclear Inspector (ANI).

The inspector reviewed the revised letter of agreement, dated 8-2-82, which clarifies the performance of surveillance activities of the NDE contractor by the ANI. Review of the ANI's surveillance records indicates scheduled surveillances are performed as required. This item is considered closed.

(Closed) Open Item (456/82-03-06; 457/82-03-06)

Based on interviews of inspectors, it was apparent that some areas were in need of additional inspectors to ensure that a backlog of inspections does not exist and that increased work efforts do not compound the inspection program.

The inspector reviewed current inspection manpower in conjunction with craft persons. The current Q.C. manpower has increased approximately two hundred percent, whereas the craftsmen have only increased twenty-five percent. Based on this substantial increase in Q.C. manpower, the above item is considered resolved.

(Closed) Noncompliance (456/82-01-01; 457/82-01-01)

Contrary to drawing requirements, the stressing sequence for post tensioning was performed in the form of a letter from the contractor which was then approved and used to control the work.

The inspector reviewed a sample of tendon stressing cards and quality control records to verify that the tendons were stressed in accordance with procedure 7D, revision 13, dated April 28, 1982, which specifies the proper sequencing; those performed out of sequence were properly recorded and approved on Field Change Request. This item is considered closed.

(Closed) Noncompliance (50-456/82-03-04; 457/82-03-04)

The electrical contractor procedures did not provide adequate instructions in that L. K. Comstock (LKC) procedure 4.8.1, Inspection of Class 1E Safety Related Conduit Installations, did not address the inspection of caps/plugs in conduit to prevent foreign matter from entering the conduit. LKC procedures 4.3.8, Cable Installation, and 4.8.8, Cable Installation Inspection, did not address electrical cable rework. The above procedures have been revised and adequately address the inspectors findings. This item is considered closed.

(Closed) Noncompliance (456/82-03-01; 457/82-03-01)

a. On May 28, 1982, it was identified that Phillips Getschow Co. was not stamping and marking affected documents to annotate applicable ECN's. This is contrary to Phillips Getschow Co. Construction Procedure PGCP-7. The inspector selected a random sample of ECN's/FCR's and verified the applicable drawings were marked with the ECN/FCR or incorporated in the drawing. One completed item was selected for field observation and verification of work incorporated per applicable ECN. This item is considered closed.

b. On May 27, 1982, it was identified that the Phillips Getschow Co. (PGCo) Quality Assurance Manager had not prepared a training requirement sheet for the Braidwood site during the first and second quarters of 1982. This was contrary to PGC's Quality Assurance Procedure QAP-105A. The inspector reviewed the revised procedure, training records and training matrix for compliance to training matrix requirements. The training requirement sheet was completed to include the first two quarters of 1982 and kept current since that date. This item is considered closed.

c. On June 2, 1982, it was identified that a L. K. Comstock and Co., Inc. (LKC) portable weld rod oven was not plugged in as required by LKC procedure 4.3.10. The contractor initiated Q. C. surveillance of

portable weld rod ovens on a weekly basis. The inspector reviewed the weld rod surveillance reports for July 82 through July 84. The surveillance has been performed a minimum of twice a week and appears to have resolved this deficiency. The inspector performed a surveillance of the auxiliary building to observe that LKC portable weld rod ovens were properly engaged and calibrated, no deficiencies were noted. This item is considered closed.

d. On June 1, 1982, it was identified that weld stub barrels in the auxiliary, containment, and containment air lock areas had abundant amounts of unbent weld rods, as well as weld stub barrels at Cribs #3 and #4 not being secured or welded shut. A stub barrel in the Unit one air lock was also noted to be unlocked. This is contrary to Phillips Getschow Co. Quality Control Procedure QCP B.8.

The inspector toured the containment and auxiliary buildings to observe weld rod control and proper securing of weld rod stub barrels. No uncontrolled weld rod was observed and all stub barrels were padlocked. This item is considered closed.

6. Structural Steel and Supports

The following documents were reviewed:

- Specification F/L-2722, General Structures Work through Revision 32, May 16, 1984.
- Gust K. Newberg Quality Control Procedure, Section 55, Revision 0, AWS Visual Welding Inspection including Appendix I, Visual Weld Acceptance Criteria.

The NRC inspector found the documents to be in compliance with the AWS D1.1, Structural Welding Code and regulatory requirements.

Two completed structural steel traveler packages, which document the completed work, were reviewed in the Gust K. Newberg site office. One installation traveler, No. 5706, was for a bolted, structural beam connection in Containment 2, outside the secondary shield wall. The other installation traveler, No. 5832, involved welding cover plates to beam 74210, and was also located in containment 2. Documentation checks included:

- Storage release requisitions,
- Material test reports,
- Magnetic particle test reports,
- Ultrasonic test reports,
- Welding procedure qualifications
- Welder qualifications,
- Material traceability (weld filler metal),
- Plumbness, alignment,
- Thread projection,
- Welding acceptability,
- Drawing conformance,

. Fit-up gap dimensions, and
. Quality control inspector certification.

No deficiencies were identified with regard to Traveler No. 5706; however, the inspector identified deficiencies for Traveler No. 5832. The quality welding procedures authorized for use by Newberg engineering personnel on April 12, 1984, included quality welding procedure 43GW-11, Revision 0, June 11, 1984. This flux core arc welding procedure had not been approved for use by Sargent and Lundy, the architect engineer, as required by Gust K. Newberg Quality Control Procedure, Section 1, QAM and QC Procedure Control, Revision 3; and the Commonwealth Edison Quality Assurance Manual, Q. P. No. 5-1. Furthermore, the quality welding procedure 43GW-11 was documented in the Field Verification Section as being used, and a welder (A-4), who was not qualified for flux core welding, was documented as being the welder that performed the welding in accordance with the flux core procedure 43GW-11. The inspector brought these findings to the attention of the licensee and the licensee subsequently proceeded with their own investigation. On August 10, 1984, after investigating the issues the licensee stopped all structural steel welding and notified the NRC of a potential 10 CFR 50.55(e) report which included the following licensee findings:

> "A review of Gust K. Newberg welding has revealed some inconsistencies in the GKN welding program. Those inconsistencies identified initially include: (1) GKN engineers specifying AWS weld process specifications that had not been incorporated into GKN welding procedure for flux core welding, (?) GKN ironworkers welding to AWS prequalified details that were not approved by Sargent & Lundy for the flux core procedure or were not specified by the GKN engineer and (3) GKN ironworkers listed procedures on travelers packages as being used that they did not use.
>
> Initial investigation has indicated that this problem is confined to flux core arc welds on some cover plate installations in Unit 1 and Unit 2 Containments and box beam end connection modifications in Unit 1 Containment which total a maximum 272 packages out of 6500 packages done since November 1982."

On August 20th, after reviewing the traveler packages and re-training engineering and craft personnel, the stop work order was lifted by the licensee. Failure to control structural welding is in violation of 10 CFR 50, Appendix B, Criterion IX. (456/84-17-06; 457/84-17-06) However, licensee corrective action was prompt and thorough.

The inspector also examined support steel to beam-welding and support steel to beam-bolting in Containment 2. Beams examined included beam number 94204 and beam number 5280. The welding and bolting was in accordance with traveler and drawing requirements, and material used was traceable to certificates of compliance or certified material test reports. Welders were interviewed and appeared to be knowledgeable in AWS D1.1 code requirements. The material release storage areas were surveyed and the inspector discovered that material was withdrawn by craft personnel instead of being released by a warehouse supervisor. Although all the material was

properly identified for release, it is difficult to assure that each and every craftsman selects the correct material without designated personnel responsible for correct material issuance. Quality control assures the correct material was used after installation, but an optimum system assures that the correct material is selected for installation. The inspector discussed this issue with the licensee and the licensee decided to appoint warehouse supervisors who would be responsible to sign-out the material for the correct application. The inspector considers this issue closed.

7. Instrument Piping and Tubing

The instrument pipe and tubing installation program was reviewed for compliance with the ASME Boiler and Pressure Vessel Code, Section III, 1974, Summer of 1975; Sargent and Lundy Specification L-2739, and regulatory requirements. Procedures reviewed included:

- PGCP-30, Installation of ASME Section III and Safety Related Instrument and Instrument Lines, Revision 7

- QCP-B32, Instrumentation Retrofit Verification (I.R.V.) Program, Revision 2.

Procedure PGCP-30, Revision 7, was implemented in February 1984, and the installation contractor realized there were shortcomings in previous instrument procedures regarding verification of installations, such as the pitch of the line. Therefore, the retrofit program was instituted to assure that all safety-related instrumentation was installed properly. The inspector did not identify any deficiencies in the installation or retrofit programs.

Three 1/2" nominal instrument lines were randomly selected for inspection. The lines inspected for proper installation are designated below:

a. RPS Division Loop B, Reactor Coolant Flow Line, Drawing 1FT-426 Sheet 2, Revision B - Unit 1 Containment.

b. Control Room System, Chilled Water Pressure Controller Line, Drawing OPC W0020 Sheet 2, Revision C - Unit 1 Auxiliary Building.

c. Control Room System, Chilled Water Pressure Indicating Line, Drawing OPI-W0029, Sheet 2, Revision 0 - Unit 1 Auxiliary Building.

Attributes checked included:

- separation criteria
- line properly pitched
- installation clearance
- separation color code identification
- material traceability
- drawing conformance

Drawing OPI-W0029 contained a statement "pitch pipe 1/2" per foot if possible". This statement is not definitive with regard to avoiding an unacceptable amount of negative slope or preventing traps. The retro-fit program which provides pitch checks for all work prior to February 1984 would assure correct pitch installations but the issue date of this drawing was April 19, 1984. The inspector has requested the licensee to review and evaluate all drawings that contain the statement, "pitch pipe 1/2" per foot if possible", which were issued after January 31, 1984, and evaluate the need to re-inspect the installations. This is considered an open item (456/84-17-07; 457/84-17-07).

The NRC inspector did not observe any problems with the pitch of the three instrument lines he examined. Subsequently, the inspector reviewed the documentation packages for these installations, which included assuring that the welder and welding procedures were qualified in accordance with the ASME Boiler and Pressure Vessel Code, Section IX; and that the weld filler metal was traceable. Piping Welding Procedure 1A-88-0, Revision 8, designated for use on drawing 1FT-426, Sheet 2, Revision B, required the use of ER308 weld filler metal. RPS Division Loop B, reactor coolant flow, completed socket weld joints, identified as FW21 and FW22 on drawing 1FT-426, Sheet 2, Revision B, had no piping records identifying the welder or weld filler metal utilized for the pipe-elbow connections. Failure to control welding is a violation of 10 CFR 50, Appendix B, Criterion IX. (456/84-17-08; 457/84-17-08).

Upon notification of this finding, the piping contractor immediately documented this nonconformance for disposition on Nonconformance Report Number 1886. The piping contractor's quality control office personnel had not performed a review of the completed document package for drawing 1FT-426 and probably would have identified this deficiency.

8. 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 2, 3, and 7.

9. BCAP Meeting

On August 8, 1984, R. F. Warnick met with Messrs. T. J. Maiman and M. J. Wallace of the Commonwealth Edison Company (CECo) to discuss the NRC comments on the BCAP transmitted to CECo by letter dated July 27, 1984 (Keppler to O'Conner). Messrs. Maiman and Wallace informed Mr. Warnick of the current status of activities at the Byron and Braidwood Stations. Warnick explained Region III's current, temporary organizational change to give increased RIII management and resource attention to the Byron inspection program, preparation of hearing testimony, and near term operating license (NTOL) activities. The temporary organization consists of three resident inspectors and a project inspector reporting to a section chief who reports to the Acting Director, Byron Project, who has no other responsibilities, and reports directly to the Regional Administrator.

The majority of the meeting was spent answering CECo questions about the NRC comments and discussing the protocol. Warnick explained that the 15 general comments covered areas that the NRC will also be looking at during the Construction Assessment Team (CAT) inspection or other NRC RIII inspections. Weaknesses in these areas have been identified, at other plant sites, in previous CAT inspections. CECo should establish measures (whether in or outside of BCAP) to assure itself that similar weaknesses do not exist at Braidwood.

The date of September 6, 1984, was proposed for the first BCAP status meeting.

10. Exit Interview

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