

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-456/82-05(DPRP); 50-457/82-05(DPRP)

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 Station, Units 1 and 2

Inspection At: Braidwood Site, Braidwood, IL

Inspection Conducted: April 19-23, May 11-18, June 21-25, July 12-20,
and September 8-10, 1982

Inspectors: L. G. McGregor

RC Knop for

2-1-83

for D. H. Danielson
W. J. Key
(September 8-10, 1982, only)

2/1/83

Approved By: D. W. Hayes, Chief
Reactor Projects Section 1B

RC Knop for

2-1-83

D. H. Danielson
D. H. Danielson, Chief
Materials and Processes Section

2/1/83

Inspection Summary

Inspection on April 19-23, May 11-18, June 21-25, July 12-20, and September 8-10, 1982 (Reports No. 50-456/82-05(DPRP); 50-457/82-05(DPRP))

Areas Inspected: Licensee actions on previously reported items, observation of containment post-tensioning work activities, observation of electrical cable installation, review of electrical drawings, observation and review of site activities related to concrete placement, inspection and review of steam generator final setting activities, observation of weld rod control requirements, follow-up inspection and resolution on bullet resistant fire doors, follow-up on vital information received from a concerned citizen, and an independent inspection and review of licensee's activities relative to the installation and inspection of Nuclear Steam Supply System and other mechanical safety-related equipment. This inspection involved a total of 264 inspector-hours onsite by the resident NRC inspector, including 64 inspector-hours onsite during off-shift hours, and 24 inspector hours by a Regional based inspector.

Results: Of the areas inspected, three apparent violations were identified - failure of the licensee to implement a quality assurance program for the erection of mechanical safety-related equipment (Paragraph 3.e and 3.e(1)(7)), failure to issue a construction deficiency report (Paragraph 3.e), and failure to ensure protection and preservation of safety-related materials and equipment (Paragraph 3.h).

SECTION I

Prepared By: L. G. McGregor

Reviewed By: D. W. Hayes, Chief
Projects Section 1B

DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

- *R. Cosaro, Site Construction Superintendent
- *J. Merwin, Site Lead Mechanical Engineer
- *T. R. Sommerfield, Site QA Superintendent
- C. D. Gray, Project Structural Supervisor
- S. C. Hunsader, QA Supervisor
- R. C. Schleiter, Administrative Assistant

Napoleon Steel Contractors Incorporated (NSCI)

- V. Sawyer, Superintendent
- C. Zavada, QA Manager

Pittsburgh Testing Laboratory (PTL)

- S. L. Bank, QA Supervisor
- P. K. Leahy, C.M.T. Supervisor

L. K. Comstock and Company (LKC)

- L. Facchina, Project Manager
- R. A. Brown, Sr., QA Manager

Phillips, Getschow Company (PG)

- R. Myers, Construction Superintendent
- D. Ortez, Area General Foreman
- A. Rebino, QA Supervisor

*Denotes those personnel attending the exit interview.

The inspectors also interviewed other licensee personnel including members of the Engineering and Construction staffs.

2. Licensee Actions on Previously Reported Items

(Open) Item of Noncompliance (456/78-06-02; 457/78-06-02): Chloride ion concentration in concrete batching water exceeded 250 ppm chloride. The requirement for chloride concentration is stated in plant construction contract Specification L-2722 and Section 3.307.1 and CC 2223 of

ASME Boiler and Pressure Vessel Code Section III, Division 2 and was exceeded during the placement of concrete for Containment Buildings No. 1 and 2. The inspector discussed this with the licensee and with Region III personnel (July 23, 1982) with regard to the disposition and any necessary corrective actions. Region III is requesting the licensee to obtain concrete core samples from each containment building and submit these samples to an independent testing laboratory for chloride concentration tests. A final decision is pending the test results.

(Closed) Open Item (456/80-09-03; 457/80-09-03) CECO QA department failed to audit the meteorological contractor, Murray and Trettle, Inc. The inspector reviewed CECO QA records which indicate the licensee is performing monthly checks on the meteorological contractor.

The contractor is performing the following required checks:

- a. signs of vandalism
- b. guy lines intact
- c. remote visual inspection of the tower
- d. temperature and dew point recorder operating
- e. wind speed and direction recorder operating
- f. all necessary power is on
- g. the HVAC system is on and operable
- h. housekeeping
- i. security of the area

This matter is considered resolved.

3. Functional or Program Areas Inspected

a. Observation of Work Activities - Containment Post Tensioning

- (1) A number of tendons stored in the service building and in an outlying metal building were inspected. All tendons are stored on dunnage, coated with a corrosion protection grease and covered with a waterproof plastic sheeting. Each tendon remains covered until installed. No evidence of corrosion was observed on any of the tendons. The storage areas meet the Level D storage requirements, described in ANSI N45.2.2.
- (2) The inspector observed the installation of Tendons 11DF, 10DF, 9DF, and 8DF and no conflicts were noted with the installation process. While attempting to install Tendons 43 FE (horizontal), V245 (vertical) and 2 FE (horizontal) the sheathing was found to be plugged. The concrete containment outer wall was chipped away to gain access to the blocked sheathing. The concrete blockage was removed, sheathing repaired, containment concrete replaced, and Tendons 43 FE and V245 installed. The blockage of Tendon 2 FE is suspected to be due to separation of the sheathing and work to establish access to this tendon is in progress. As of July 30, 1982, ten tendons remain to be installed in Unit No. 2. A tentative date of September 17, 1982, has been programmed for all tendons to be stressed and greased.

b. Observation of Electrical Installation Activities

(1) The inspector selected the following three cables within Division one Class 1E which have been installed. The respective pull cords and routing requirements were compared with the appropriate drawings.

(a) Cable 1-AP326 - (1P2E-Pull)

From equipment 1AP06E0 wire diagram 1-4613Q
To equipment 2AP06ED wire diagram 2-4613D

(b) Cable 1FW017 - (KIR-Pull)

From equipment 1 SI 05E wire diagram 1-4328A
To equipment 1 PA01J wire diagram 1-4111A

(c) Cable 1SX002 - (CIE-Pull)

From equipment 1AP05EB wire diagram 1-4611B
To equipment 1AP21E wire diagram 1-4661L

The inspector observed that the raceway internals were free from sharp edges and hazardous rubble or refuse. The conduit bushings were installed and cable raceways were properly identified. A separation violation, NCR 591, has been identified between Cable 1AP05EB and 1CF062 CIB. This is an inside cabinet 6" space violation which will be considered for re-inspection when the nonconformance report has been resolved.

(2) The inspector, during tours of the Unit No. 1 and Unit No. 2 observed that cable reels are properly stored and no reels were placed on their side.

No items of noncompliance were identified.

c. Electrical Drawings

During the reporting period, the inspector reviewed the following construction field drawings to verify that Field Change Requests (FCR), Drawing Change Requests (DCR), and Engineering Change Notices (ECN) were received and transmitted on current drawings.

(1) Drawing No. 20E-1-3318 Revision N, 1/15/82, Electrical Installation Main Steam Pipe Tunnel, El. 367 and 377

FCR L-2976	FCR L-3142	FCR L-3850
FCR L-318	FCR L-3474	
FCR L-3095	FCR L-3357	

(2) Drawing No. 20E-1-3318 D01 Revision K, 12/31/81, Electrical Installation Main Steam Pipe Tunnel Sections.

FCR L-3850

- (3) Drawing No. 20E-1-3321 Revision P, 11/25/81, Electrical
Installation Auxiliary Building El. 383
- DCR 711 FCR L-3301A
ECN 245 7 FCR L-3306
FCR L-3301
- (4) Drawing No. 20E 1-3321A Revision K, 9/18/81, Category 1
Conduit Supports Auxiliary Building El. 383, Cols. L-Q-6-10
- FCR L-3767
- (5) Drawing No. 20E-1-3321 C05 Revision C, 9/18/81, Category 1
Conduit Supports Auxiliary Building El. 383
- FCR L-3767
FCR L-3815
- (6) Drawing No. 20-E-1-3305, Revision G, 10/5/81, Electrical
Installation Auxiliary Feedwater Pipe Tunnel Plan 2
- DCR 932
DCR 856
- (7) Drawing No. 20-0-3383A, Revision T, 2/3/82, Category 1 Conduit
Supports Auxiliary Building El. 463'5" Columns L-Q-23-26
- | | | |
|------------|------------|------------|
| FCR L-4366 | FCR L-3199 | FCR L-3120 |
| FCR L-4365 | FCR L-3200 | FCR L-1909 |
| FCR L-2556 | FCR L-3305 | FCR L-3541 |
| FCR L-2637 | FCR L-3564 | FCR L-3484 |
| FCR L-2959 | FCR L-3525 | FCR L-3391 |
- (8) Drawing No. 20-0-3383 DC1, Revision H, 12/18/81, Electrical
Installation Auxiliary Building El. 463'5" Section and Damper
Schedule
- FCR L-3120
- (9) Drawing No. 20-E-3393J, Revision P, 2/22/82, Category 1
Conduit Support Junction Box Details
- | | |
|------------|------------|
| FCR L-1883 | FCR L-1965 |
| FCR L-1541 | FCR L-2632 |
| FCR L-1950 | FCR L-1703 |
- (10) Drawing No. 20E 1-3311A, Revision P, 6/10/81, Category 1 Conduit
Supports, Auxiliary Building Plan El. 364 Cols. L-Q-10-5
- | | |
|------------|------------|
| FCR L-1648 | FCR L-2070 |
| FCR L-3885 | FCR L-2012 |
| FCR L-2953 | |

ECN STB-17 ECN CC-55
ECN WSC-12 ECN CC-81
ECN CC-13 ECN CC-213
ECN CC-16 ECN CC-313

- (11) Drawing No. 20-E-1-3302 CO3, Revision H, 12/4/81, Category 1
Conduit Support Schedules Auxiliary Building El. 401
Cols. Q-W-10-5

FCR L-4330
ECN CC-95
ECN SS-2C

- (12) Drawing No. 20-E-0-0393C, Revision M, 11/2/81, Category 1
Conduit Supports Typical Details of Supports Attachment to
Structures

FCR L-3133 ECN SS3A

- (13) Drawing No. 20-E-0-3393H, Revision N, 11/2/81, Category 1
Conduit Supports Supplementary ST'L Types and Details

FCR L-3133
FCR L-1379

- (14) Drawing No. 20-E-0-3393J, Revision P, 2/22/82, Category 1
Conduit Support Junction Box Details

FCR 2-1883 FCR L-2632E
FCR L-1541 FCR L-1703
FCR L-1950 FCR L-1965

- (15) Drawing No. 2E-0-3393L, Revision L, 6/29/81, Category 1
Conduit Supports Miscellaneous Connection Details DCR 666

- (16) Drawing No. 20-E-1-332, Revision M, 12/4/81, Electrical
Installation Auxilliary Building El. 401 Cols. Q-W-10-15

FCR L-4052 FCR L-3023
ECN CP8-CC26

- (17) Drawing No. 20-E-1-3332A, Revision K - 12/4/81, Electrical
Installation Auxiliary Building El. 401 FCR L-4052

- (18) Drawing No. 20-E-0-3238 Revision D, 10/1/79, Cable Pan Special
Hangers - Sheet 16

- (19) Stick Pan Installation Details

Drawing No. 20-E-03239, Revision A, 7/12/78, Sheet 17
Drawing No. 20-E-03240, Revision D, 9/25/80, Sheet 18
Drawing No. 20-E-03241, Revision B, 10/18/78, Sheet 19
Drawing No. 20-E-03242, Revision B, 1/14/81, Sheet 20
Drawing No. 20-E-03243A, Revision F, 6/23/81, Sheet 21

Drawing No. 20-E-03243B, Revision C, 1/23/81, Sheet 22
Drawing No. 20-E-03243C, Revision F, 10/20/80, Sheet 23

- (20) Drawing No. 20-E-0-3244, Revision D, 3/14/79, Sheet 1 Cable
Pan Hanger Auxiliary Steel Attachment Schedule
- (21) Drawing No. 20-E-0-3265, Revision M, 8/15/78, Sheet 3 Cable
Pan Hanger Special Connection

DCR 769
DCR 779

All field construction drawings coincide with the site
construction drawings.

No items of noncompliance were identified.

d. Observation of Containment Concrete Pours

The inspector observed concrete placement activities in containment No. 2, construction opening (pour 2RL61A). The preplacement requirements were verified prior to concrete placement, roving surveillance by Quality Control was adequate and satisfactory, the placement areas were clean of debris, rebar tie fastenings were secure, placement crew members and equipment were adequate, the concrete delivery was timely and satisfactory, and the consolidation techniques were ample. Test personnel were present at the concrete truck discharge point and concrete test samples were being collected at the required frequency.

No items of noncompliance were identified.

e. Inspection of Steam Generator Supports and Mechanical Equipment Installation and Inspection

In response to NUREG-0577, "Potential for Low Fracture Toughness and Lamellar Tearing on Power Steam Generator and Reactor Coolant Pump Supports," the inspector examined the condition of all 32 support columns for the steam generators in Units 1 and 2. During this examination bolting defects were noted on both Unit 1 and Unit 2 steam generator supports with the defects being more severe in Unit 2. Of 192 Unit 2 support bolts, 107 had evidence of damage to the socket head, 23 bolts were loose, and 18 bolts were missing. Damage to the bolts consisted of deep wrench marks on the bolt shoulders and mechanical damage sufficient to cause deformation to the Allen socket heads. The mechanical damage exists in forms of curling, peening and distortion of the sides of the hexagon socket head. In Unit 1 the inspector observed 53 steam generator support bolts in positions other than being tight or fully inserted. The inspector learned from various workers that no instructions were provided for installing the bolts and hydraulic torque wrenches, pneumatic operated impact wrenches, a six foot pipe extension handle on hand held wrenches were methods used to install the bolts. A

non-documented system of shortening the bolt thread length was also revealed to the inspector by contract workers and that at least 19 bolts have been shortened without transferring the bolt information. Further the exact location of these modified bolts was unknown.

Further review established that the Commonwealth Edison Company had knowledge of a significant problem with bolting of the steam generator supports that occurred at their Byron Station. Field Change Request 591 was issued on November 13, 1978, in regard to this problem and was applicable to the Braidwood Station. Adequate corrective action was not taken to prevent the same or similar problem occurring at Braidwood Unit 2.

Nonconformity Report No. 332 concerning this bolting problem was issued at Braidwood on December 2, 1981, yet timely and effective action still was not taken until the problem was brought to the licensee's attention by the NRC Senior Resident Inspector during exit meetings conducted on April 23, May 18, June 25, July 30, 1982, and during an enforcement conference held on August 31, 1982.

This is contrary to the requirements of 10 CFR 50, Criterion XVI, and the licensee's quality assurance program as documented in the appendix to the report transmittal letter (50-456/82-05-01; 5456/82-05-01).

As a result of the problems identified with the steam generator support bolts, the inspector reviewed installation and inspection procedures and records not only for the eight steam generators but for other mechanical safety-related equipment installed under S&L Specification F/L-2739. The inspector specifically requested from the licensee and the contractor that all installation and inspection records for the steam generators be made available for his review including support bolt data.

The results of these reviews were as follows:

- (1) No procedures had been approved for the installation or inspection of mechanical safety-related equipment prior to July 16, 1980, although numerous pieces of equipment were installed, both finally and partially prior to this date. This equipment includes but is not limited to the four Unit 1 steam generators, the component cooling heat exchangers, residual heat removal pumps, safety injection pumps, and the essential service water pumps.

Revision 0 (original issue) of the applicable procedure, PGCP-8, as stated above, was first approved for use (with comments) by Sargent and Lundy on July 16, 1980. Revision 1 to the procedure was approved October 29, 1980 and Revision 2 was approved on January 8, 1981. No procedure for the installation and inspection of the steam generator support bolts had been issued as of September 10, 1982.

Phillips Getschow Company (contractor installing the subject equipment) in a response dated August 3, 1981, to an audit conducted by Commonwealth Edison Company (CECo) site quality assurance organization June 23-25, 1981 stated: "PGCP-8, "Equipment Erection Record," was implemented on December 16, 1980. Prior to this, there were no specific instructions addressing equipment erection; therefore, on several events Equipment Erection Records may not have been used by production or approved by Quality Control as required by PGCP-8." (see Paragraph 3.e.(5) below for additional information on this CECo audit, NO. QA-20-81-22, and the followup action).

The inspector's review of installation and inspection records for other mechanical safety-related equipment including the accumulators, Unit 1 and 2 Reactor Coolant Pumps, and the Unit 2 steam generators indicate that Procedure PCCP-8 was not consistently implemented as late as March 1982.

- (2) No traceability records were maintained as required for some of the large cap screws used on the steam generator supports. An unknown number, but at least 19 of the 192 screws used in Unit 2 were cut off and the identifying number was not transferred. Further, several hundred of these cap screws were transferred back and forth between Braidwood Station, Byron Station, Rockwell and Teledyne Brown without adequate records maintained to show which ones were sent, which ones were returned and how the unacceptable cap screws were dispositioned. For example:

- . Of 192 cap screws sent to Rockwell on CECo Purchase Order (PO) No. 722186, thirty (30) cap screws remain unaccounted for.
- . Of 123 cap screws sent to Rockwell on CECo PO No. 727837 eighty two (82) remain unaccounted for.
- . Seventy or seventy-two (exact number not known) received on MRR 3725 and identified as nonconforming can not be located or accounted for. (Also see Item 3.e.(4) below)

An additional 88 cap screws are unaccounted for. This is based on receiving records which show that 455 acceptable cap screws were received at Braidwood and only 367 of the 455 cap screws have been installed in the supports for the eight Unit 1 and Unit 2 steam generators.

- (3) No meaningful quality control inspections or surveillances were conducted by Phillips, Getschow prior to November 13, 1978, that concerned installation of mechanical safety-related equipment. Of 173 reports of QC surveillances conducted by PG between the dates of November 13, 1978 and August 17, 1982, only one surveillance addressed the erection of the subject equipment and then no adverse findings were

identified. This surveillance was number 2127 dated February 26, 1982. As stated elsewhere in this report Section (see Items 3.e.(1) above and 3.e.(6) below) installation inspections of the majority of mechanical safety-related equipment as of August 1982, were either not conducted, were inadequate, or were not documented.

- (4) Seventy to seventy-two cap screws were received on MRR 3725 and identified as nonconforming. No record exists to show the disposition of these screws and no Nonconformity Report was issued as required by PG Quality Assurance Manual Section 15.
- (5) Commonwealth Edison Company (CECo) had knowledge of a potential and significant problem relative to the implementation of quality requirements for the installation and inspection of mechanical safety-related equipment, at least as early as July 9, 1980 and certainly by August 31, 1981, when Phillips, Getschow (PG) issued Nonconformity Report (NCR) No. 592, yet failed to assure that adequate and timely corrective action was taken.

CECo site QA conducted an audit of PG during June 30 to July 9, 1980 (Audit No. QA-20-80-21). One of the findings from that audit was that PG had not implemented adequate procedures for equipment installation and installation inspection. PG's response to that finding was as follows:

A procedure for equipment installation and installation inspection has been developed and has been approved. It will be implemented immediately. Equipment which has been previously installed will be back fitted to document any information available (also see Item 3.e.(1) above). CECo closed out this audit on January 9, 1981, based on review of erection records for several room coolers. Another audit of PG by CECo site QA was conducted June 23-25, 1981 (Audit No. QA-20-81-22) Observation No. 1 from that audit was as follows:

"Contrary to PGCo Procedure PGCP-8, Section 4.3, 13 of 69 Equipment Erection Forms (PGCP-8-1A) have not been reviewed by Quality Control of such forms previously completed by production. Also, of 308 grout release forms completed it is not clear that EEF's have been initiated for each case."

PG's response to Observation No. 1 was as follows:

"PGCP-8, "Equipment Erection Record," was implemented on December 16, 1980. Prior to this there were no specific instructions addressing equipment erection; therefore, on several events, Equipment Erection Records may not have been used by production or approved by Quality Control as required by PGCP-8."

"Nonconformance Report No. 592 (attached) has been generated instructing our Field Engineering Department to research previous equipment installation to determine if a properly prepared and completed Equipment Erection Record exists for each. When discrepancies are found, the Field Engineering Department shall initiate an Equipment Erection Record in accordance with Paragraph 4.1 of PGCP-8, and a Retro-Fit inspection shall be performed as required."

NCR 592 was issued by PG on August 3, 1981, in response to "Observation No. 1" of CECO's Audit No. QA-20-81-22.

The proposed disposition by PG for NCR 592 was:

"Phillips, Getschow Company Field Engineering Department shall research all Equipment installation up to to December 16, 1980 to determine if a properly prepared and completed Equipment Erection Form exists for each. When discrepancies are found, the Field Engineering Department shall initiate an Equipment Erection Record in accordance with PGCP-8, Paragraph 4.1, submit the Equipment Erection Record to Quality Control for approval and a Retro-fit inspection shall be performed as required."

CECO site QA in their followup on August 10, 1981, of PG's response to Observation No. 1" from CECO's audit No. QA-20-81-22 considered NCR No. 592 inadequate because no method to indicate the status of installed equipment had been implemented. PG responded on November 10, 1981, and stated that there was still a question as to which installed equipment has had equipment erection records prepared, that PG is currently initiating an "Equipment Installation Log" which will indicate the status of equipment erection records once complete and that once updated; this log will be fully implemented by PG QC throughout the remainder of the project to avoid a repeat of the situation described in Observation No. 1.

As a result of their followup QA surveillance No. 1981, conducted November 11, 1981, CECO closed Observation No. 1. The close out stated:

"After receiving this response, the "Equipment Installation Log" mentioned was reviewed. It was found to be a nearly complete list of equipment and PG QC had begun to enter equipment erection forms in the log next to the appropriate equipment number. The log does show the status of installed equipment. Based on the above information, an acceptable program in response to this audit has been initiated and therefore this item is considered closed."

No further action was taken by CECo until March 26, 1982, when they approved the disposition for NCR No. 649. NCR 649 was issued by PG on March 12, 1982, as a result of a PG surveillance report conducted February 19, 1982. NCR 649 stated the problem as follows:

"As a result of a surveillance report conducted 2-19-82, it has been determined that the following deficiencies exist in the PGCe equipment erection records:

1. Numerous equipment has been installed prior to implementation of any equipment erection procedure. (5-27-80)
2. Equipment erection records Procedure PGCP-8 has not been properly implemented.
3. We are unable to determine status of all safety-related and seismic equipment at this time.
4. Present PGCP-8 does not meet the requirements of ANSI 45.2.8 as required by customer QA manual."

The disposition stated on NCR 649 and approved by CECo on March 26, 1982 is as follows:

- . "Revise PGCP-8 to address applicable customer requirements.
- . Field Engineer to list all equipment we are responsible for and generate equipment erections for all items.
- . A complete retro-fit inspection of all equipment in place to indicate status. (It will be noted, however, that certain prerequisites can't be verified in a retrofit inspection e.g., foundation, rough set, grout release, etc.)
- . Implement revised procedure on equipment which remains to be erected."

The NRC inspector's review of mechanical equipment installation and inspection records, established that effective and timely corrective action had not been taken as a result of CECo's audits QA-20-80-21 and QA-20-81-22 nor was an effective backfit program carried out prior to March 26, 1982.

As of August 31, 1982, corrective action was in progress to resolve NCR 649.

- (6) With minor exceptions, no official quality records relative to the installation or installation inspection of mechanical safety-related equipment were generated or maintained prior to May 27, 1980. Further, following a CECo audit finding in July 1980 (Audit No. QA-20-80-21) and the subsequent issuance and approval of PC Procedure PGCP-8, Revision 0, entitled, Equipment Erection Record, which required such records, they

(the installation records) were still not consistently generated and maintained as late as March 12, 1982. An estimated 90% of the subject equipment was erected with no or inadequate installation records being generated or maintained. (See report Section 2, Paragraph 10 for a list of equipment requiring installation records)

Because of the lack of official records relative to the installation and installation inspection of mechanical safety-related equipment, the equipment installation dates stated in this and other parts of Paragraph 3.e of this report are the best estimate by the inspector. These estimates are based on review of construction speed memos, unofficial notes maintained by the craftsmen and construction foreman, discussions with personnel involved in the installations including the surveys or (surveyor), and after the fact entries made by the contractor on form PGCP-8-1A.

Surveillance data relative to the setting of the four Unit 2 Steam Generators were documented but are contained in a personal note book and copies of this data did not exist in the official quality assurance files of either CECo or PG as of August 1982. Similar surveillance data for the four Unit 1 steam generators were requested but could not be provided by either PG or CECo.

The Unit 1 steam generators were set during May and June, 1979. Unit 2 steam generators were set during December 1980 and January 1981.

Of the eight Unit 1 and Unit 2 reactor coolant pumps, installation records exist for only the Loop C Unit 2 pump (No. 2RC01PC) and these records are incompleated and some entries were made after the fact. For example, an entry was made on September 9, 1982, on Step C.5 to the "Procedural Sequence for Loading, Transport, Unloading, Upending, and Setting Reactor Coolant Pump Casings." Revision 0 dated November 3, 1981, which indicated that this step was not applicable (N/A). The requirement of Step C.5 was as follows and is considered to be applicable by the NRC inspector:

"Reactor Coolant Pump casings must be within .125 inches level across the face of the main flange. The center of the outlet nozzle must be at elevation 393'-0." Add shim plates as required to the lower shim area on each leg to meet the above two requirements. Lower pump casing until the complete load is on the support legs. Check the outlet nozzle elevation and the level of the main flange. If measurements do not meet the specified requirements adjustment of the shim packs will be required, otherwise, tighten the eight upset bolts to a snug tight condition. Tighten each upset bolt an additional 2/3 turn. Install the eight 1 1/4" diameter shim plate retaining bolts and washers."

Three apparent QC hold points were also signed off on September 9, 1982, on Form PGCP-8-1A. These hold points were Foundation Checked, Release for Piping, and Torqued to Proper Range.

Records show that reactor coolant pump casings were set on the following dates:

- Unit 1 - A Loop - November 3, 1981
B, C, and D Loops - November 4, 1981
- Unit 2 - A and B Loops - November 4, 1981
C Loop - December 22, 1981
D Loop - Pump casing is installed, but records show it still in storage.

CECo site QA conducted a surveillance on December 22-30, 1981, relative to the moving and setting of reactor coolant pump No. 2RC01PC (Loop C). The surveillance (Report No. 2056) stated:

"Moving and setting of reactor coolant pump 2RC01PC (Loop 3) was observed. An equipment erection record for the pump had been filled out as required by PG Co. Procedure PGCP-8. A procedural sequence for loading, transport, unloading, upending, and setting of reactor coolant pump casings required by PG Co. Procedure QCP-B4 Revision 1 had been written, approved and was present at the work area at the time of the upending and setting. Two minor variations to the steps outline in the procedural sequence were made in the field with CECO approval. Good work practices and the basic requirements of the written procedure were adhered to during the upending and setting."

Entries on Form PGCP-8-1A, Revision 2 dated December 16, 1980, indicate the following equipment was installed on the dates shown:

- . Residual Heat Removal Pumps 1RH01PA and 1RH01PB - June 1, 1978
- . Residual Heat Removal Pumps 2RH01PA and 2RH01PB - June 13, 1978
- . Accumulators 1SI04TA, 1SI04TB, 1SI04TC, and 1SI04TD - July 7, 1980
- . Safety Injection Pumps 1SI01PA, 1SI01PB, 2SI01PA, and 2SI01PB - May 25, 1978

Since the above equipment installation dates pre-date the existence of Form PGCP-8-1A, Revision 2, it is assumed that these entries were part of a "backfit" effort.

- (7) No audits were performed prior to June 30 - July 9, 1980, by CECO relative to mechanical equipment erection and inspection activities of Phillips, Getschow Company. This important activity involves the installation of most of the critical nuclear steam system and other mechanical safety-related equipment. Significant amounts of this equipment had either been finally or partially installed prior to this date.

No significant followup audit was conducted until June 23-25, 1981, to determine the effectiveness of the PG quality assurance program for these installations or to verify that proper quality records were being generated and maintained as required, although, a major finding during the June - July 1980 audit was that PG had not developed or implemented a procedure for equipment installation and installation inspection.

In addition no evidence could be provided to the NRC inspectors to establish that PG had conducted audits prior to February 1982, relative to the effective implementation of their quality assurance program for the installation and inspection of mechanical safety-related equipment installation or documentation of these activities. Further, a review of PG Quality Control Reports indicated that no QC surveillances were conducted of these activities prior to February 26, 1982.¹

Neither the 1980 nor the 1981 CECO audits referenced above were effective in that the same deficiencies were again identified during a surveillance conducted by PG on February 19, 1982.¹

- (8) During the review of records for the installation of reactor coolant pump No. 2RC01PC it was noted that apparently the procedure used entitled "Procedural Sequence for Loading, Upending, Transport, Unloading and Setting Reactor Coolant Pump Casings" Revision 0 dated November 3, 1981, had not been approved by the architect engineer (Sargent and Lundy) as required by the Commonwealth Edison Quality Assurance Manual, Quality Procedure QC No. 5-1, Paragraph 4.2.

No procedure number was on the installation sign off sheets for the installation of the reactor coolant pump other than it was Revision 0 dated November 3, 1981. CECO's surveillance report identified the procedure as QCP-B4, Revision 1.

This item is considered unresolved pending further review 456/82-05-02; 50-457/82-05-02).

¹ PG NCR No. 649 references a February 19, 1982, surveillance but records of this surveillance could not be located. It was subsequently learned that this was not a surveillance but was an inter-office monitoring of PG procedure implementation.

- (9) The four Unit 2 steam generators and the four reactor coolant pumps do not appear to be installed in accordance with Westinghouse recommended setting procedure. Since official quality assurance records are lacking or inadequate, the cold setting of the support columns for this equipment remains in question.

The Westinghouse Nuclear Service Division procedure for setting of major NSSS components, Revision 2, dated February 13, 1979, states on Page IV-2-5 in Paragraph 3.5: "When properly erected, the columns will be slightly out of plumb toward the reactor vessel so that they will become vertical when the system is at operating temperature. The following values should be used as a guide:

- The two columns on the reactor vessel side of the steam generator - approximately 1 and 1/2 inches out of vertical cold.
- The two columns away from the reactor vessel side - approximately 2 inches out of vertical cold."

The procedure further states on Page IV-3-8 in Paragraph 4.4 in regard to the reactor coolant pumps: "When properly erected, the columns will be slightly out of plumb leaning toward the reactor vessel. The following values should be used as a guide:

- The two columns toward the RPV, one on each side of the cold leg - approximately 1 and 5/8 inches out of vertical cold.
- The column directly behind the cold leg - approximately 2 inches out of vertical cold."

The support columns for the subject Unit 2 equipment are cold set in the opposite direction (i.e., the columns lean away from the reactor vessel as much as 3 and 1/2 inches). Once the reactor heats up to operating conditions the reactor inlet and outlet piping will expand about 2-inches. This would appear to increase the leaning of these support columns away from the reactor vessel an excessive amount. Similar conditions may exist with the Unit 1 steam generators and reactor coolant pumps.

This matter was discussed during the enforcement conference conducted August 31, 1982, and the opinion of the Sargent and Lundy engineer present was that the position of these columns would not be a problem.

This matter remains unresolved pending further review by the NRC. (50-456/82-05-03; 50-457/82-05-03)

The above Items (3.e and 3.e(1) through (7)) appear to be contrary to the requirements of 10 CFR Part 50, Appendix B, Criterion V, VIII, X, XV, XVI, XVII, and XVIII and thus indicate a breakdown in the quality assurance program for the installation and inspection of mechanical safety-related equipment as as stated in the Appendix to the report transmittal letter (50-456/82-05-04; 50-457/82-05-04).

Further, and as also stated in the Appendix to the report transmittal letter, the Commonwealth Edison Company had evidence of this quality assurance breakdown as early as July 1980 and certainly by March 26, 1982, yet failed to report the matter to the NRC as required by 10 CFR 50.55(e) until September 2, 1982. (50-456/82-05-05; 50-457/82-05-05)

Because of the seriousness of these findings, and the additional information provided by CECO during an enforcement conference conducted on August 31, 1982, in regard to this matter, a second inspection in this area was conducted by a Region III based inspector. The results of this independent inspection are documented in Section II of this report.

f. Weld Rod Control

The inspector observed in progress welding of cable pan hangers. Welding materials were checked for proper control, both at the weld issue crib and at the welder's station. Proper maintenance and calibration of the following weld rod ovens was verified:

<u>Oven Serial No.</u>	<u>Inspection and Calibration Due Date</u>
2240	06/18/82
244	07/12/82
132	07/01/82
364	06/04/82
30A	10/05/82
41A	06/01/82

No items of nonconformance were identified.

g. Bullet Resistant Fire Doors (Followup on 10 CFR 21 Report - W.P.S.C dated November 20, 1980)

The resident inspector was requested by Region III to determine the manufacturer of installed bullet resistant fire doors and determine if the licensee had documentation specifically confirming that the doors had been tested and approved for fire resistance by a nationally recognized laboratory. The inspector determined that the doors were manufactured by Chicago Bullet Proof Equipment Company, 2250 Western Avenue, Park Forest, Illinois, 60466. Documentation provided by the manufacturer and Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, Illinois, 60062, specifically confirmed the doors as being tested and approved. The resident inspector examined these doors which

have an attached conjugated label, that is, a U.L. fire rating three Hrs. (A) and a bullet resistive door/frame rating of H. P. R. (High Power Rifle). This dual label has caused some confusion as to the validity or authenticity since U.L. has not previously authorized such a label; however, this label problem should be resolved within the testing company. The testing laboratory did satisfactory fire test (U.L. Report R8402-1) and did satisfactorily complete the bullet resistive tests (U.L. Report BP 1942) on the subject doors installed at Braidwood Nuclear Power Station.

No items of noncompliance were identified.

h. Observation of Housekeeping and Protection of Safety-Related Equipment

During the span of the reporting period, the inspector toured containment No.'s 1 and 2, the auxiliary building, the turbine building and the outside storage yard. These tours were intended to assess the cleanliness of the site, storage conditions of equipment and material being used in site construction; the potential for fire or other hazards which might have a deleterious effect on personnel and equipment, and to witness construction activities in progress.

- (1) Mechanical safety-related material was segregated, properly marked, off the ground, protected, and in general, adequately stored.
- (2) The cleanliness of site buildings continues to be adequately addressed by the licensee.
- (3) During the core boring of a concrete block wall, a mixture of water, ground up aggregate and cement were thrown against a safety-related 480 volt motor control center. No protective measures were taken to protect this equipment.
- (4) The inspector noted the support columns for the main steam generators were being used to position and support heavy steel jet deflector beams. Steel cables surround these support columns at the upper and lower universal hinged joint and in two instances, these cables have broken the protective "O" ring which seals the lubricated spherical surface of the hinged joint and were wedged against this machined surface.

Items 3.4.(3) and (4) are considered to be in noncompliance with requirements of 10 CFR 50, Appendix B, Criterion XIII, Protection of Safety-Related Equipment (50-456/82-05-06; 50-457/82-05-06).

i. Followup on Letter from Concerned Citizen

The resident inspector contacted the concerned individual who had written Region III with regards to "some vital information concerning the Braidwood Nuclear Station." The inspector met with this

individual and general information was received in regard to welding repairs and distruction of partial radiographs of welding problems in Unit 1. Specific information as to pipe size, pipe location and system, other than Reactor No. 1 was not known or at least was not submitted by the individual. The inspector with the aid of a Region III inspector has reviewed weld records and radiographs of Unit 1 reactor coolant outlet nozzle piping field welds. All records were complete, dated and signed and all radiographs viewed were acceptable. The concerned citizen also covered generalities such as "there is a lot of shady stuff going on out there that I hear about, but I don't know about." Without specific data the inspector cannot review these concerns. The inspector will remain alert to potential problems during his routine inspections of the Braidwood facility but for now feels, based on the information provided, that the concerns of the individual have been properly addressed.

j. Resident Inspector Meetings with Local Public Officials

On July 21, 1982, a meeting was held in Braidwood, Illinois, with elected county and municipal chief executives in accordance with Regional Procedure 0951. This meeting was informal and opened with a presentation of the NRC's organizational structure and regulatory responsibilities. The inspector discussed the Resident Inspector Program, NRC activities at the Braidwood Nuclear Station, plant design and operation. Following the presentations, questions from the elected officials were answered. Questions raised included trench installation at Braidwood, cooling lake locations, licensing of operators, drug and alcohol use at nuclear sites, emergency preparedness issues, plant life and decommissioning, allegations, and general construction activities. All officials in attendance expressed their appreciation for the meeting and indicated that it was of great value to them. The following individuals were present at the meeting.

<u>Name</u>	<u>Title</u>	<u>Town/County Represented</u>
Patricia Hancasky	Township Supervisor	Custer Park, IL
David Dolan	Manager LLW	Illinois D.N.S.
Henry Smoba	Mayor	Grundy
John B. Hokey	Village President	Grundy
Albert J. Vota	Trustee	Grundy
Henry Gaddo	Mayor	Braceville
R. W. Roskland	Commissioner	Coal City
Chester A. Grygiel	Fire Chief	Braidwood
George Schock	President	Eileen
Ray Sereno	Mayor	Gardner
Leonard G. McGregor	SRI-Braidwood	NRC-RIII
D. W. Hayes	Section Chief	NRC-RIII
Julian M. Hinds	Project Inspector	NRC-RIII
William B. Menczer	RSLO	NRC-RIII

4. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of non-compliance or deviations. Unresolved items disclosed during this inspection are discussed in Paragraphs 3.e(8) and 3.e(9).

5. Exit Interview

The resident inspector met with licensee representatives on April 23, May 18, June 25, 1982 and at the conclusion of the inspection on July 30, 1982. The inspector summarized the purpose and findings of the inspection.

The Region III inspector met with licensee representatives at the conclusion of his inspection on September 10, 1982.

6. Enforcement Conferences

An enforcement conference was held with the licensee on August 31, 1982, at the NRC Region III office in Glen Ellyn, Illinois. Attendees are listed below. The purpose of the conference was to discuss NRC action in regard to the inspection findings documented in Section 1, Paragraph 3.e of this report concerning installation of mechanical safety-related equipment.

Also discussed was the accuracy of a statement in the Braidwood Final Safety Analysis Report (FSAR), Chapter 17, Appendix B, Paragraph B.9.5. The statement was that the fabrication and installation of N.S.S.S. (Nuclear Steam Supply System) component supports were (emphasis added) accomplished in conformity with NF 4000 of ASME Section III, Subsection NF when in fact, the installation of the Unit 1 and Unit 2 Steam Generators, as of August 31, 1982, did not fully conform to NF 4000 in that Paragraphs NF 4711 "Bolting and Thread Engagement," NF 4723 "Precautions Before Bolting" and NF 4724 "Bolt Tension" were not met.

As stated in Section II of this report, the design specifications did implement the FSAR commitment but the contractor did not fully implement this specification requirement. This matter has been referred to the NRC Headquarters Staff for resolution.

In regard to the first item of discussion, Commonwealth Edison subsequently submitted a letter dated September 1, 1982, outlining the action being taken to correct the deficiencies identified in the control of the erection of mechanical equipment at Braidwood. The NRC's understanding of the four activities outline in the CECO September 1, 1982, letter and two additional required actions were later documented in a NRC Region III Confirmatory Action Letter dated September 8, 1982.

Attendees

Commonwealth Edison Company

W. L. Stiede, Assistant Vice President
L. O. DelGeorge, Director of Nuclear Licensing
J. J. Maley, Manager of Projects
M. J. Wallace, Assistant Manager of Projects
V. I. Schlosser, Project Manager, Byron/Braidwood Stations
J. D. Deress, Project Engineering Manager, Byron/Braidwood Stations
J. J. Westermeier, Project Engineer
W. J. Shewski, Manager of QA
R. E. Jortberg, Director of Nuclear Safety
T. R. Tramm, Nuclear Licensing Administrator
R. Cosaro, Braidwood Site Project Superintendent
J. T. Merwin, Project Mechanical Supervisor
T. R. Summerfield, QA Superintendent, Braidwood

Sargent and Lundy

R. J. Netzel, Engineer

NRC - Region III

A. B. Davis, Deputy Regional Administrator
R. L. Spessard, Director, Division of Projects and Resident Programs
R. C. Knop, Branch Chief, Projects Branch 1
D. W. Hayes, Chief, Projects Section 1B
L. G. McGregor, Senior Resident Inspector, Braidwood
W. H. Schultz, Enforcent Coordinator

7. Followup Enforcement Conference

A followup enforcement conference was conducted on November 19, 1982, at the Commonwealth Edison Company corporate office in Chicago, Illinois. Attendees are listed below. The purpose of this conference, requested by the licensee, was to further explain the items of noncompliance and the NRC proposed enforcement action to review the status of the licensee's corrective actions.

In regard to the apparent incorrect FSAR statement concerning compliance to the ASME Section III, Subsection NF, the Region III Deputy Administrator explained that Region III was not recommending enforcement action on this item. This decision was based the fact the design specifications did implement this commitment and the lack of clear cut NRC guidance on when the FSAR must accurately reflect "as built" conditions. It was emphasized that this recommendation was subject to review by our headquarters staff.

Attendees (Followup Enforcement Conference)

Commonwealth Edison Company

C. Reed, Vice President
W. L. Stiede, Assistant Vice President

M. J. Wallace, Assistant Manager of Projects
L. O. DelGeorge, Director of Nuclear Licensing
T. R. Tramm, Nuclear Licensing Administrator
W. J. Shewski, Manager of QA

NRC - Region III

J. G. Keppler, Regional Administrator
A. B. Davis, Deputy Regional Administrator
R. C. Knop, Branch Chief, Projects Branch 1
D. W. Hayes, Chief, Projects Section 1B
L. G. McGregor, Senior Resident Inspector, Braidwood
S. Lewis, Region III Counsel

SECTION II

Prepared By: W. J. Key
Reviewed By: D. H. Danielson, Chief
Materials and Processes Section

Persons Contacted

Commonwealth Edison Company (CECo)

R. Cosaro, Project Superintendent
D. Merwin, Assistant Project Superintendent
S. C. Hunsader, QA Supervisor
W. Carlson, Mechanical Field Engineer

Phillips Getschow Company (Getschow)

A. Rebino, QA Supervisor
E. Uilrich, Assistant QA Supervisor
B. Whitmann, General Foreman
D. Ortiz, Containment Foreman

Functional or Program Areas Inspected

During the past year problems have been identified with installation of N.S.S.S. equipment at the Braidwood Station that has resulted in the issuance of a stop work order in this area, and has made the installation of other safety-related components questionable.

This special inspection was conducted to answer questions that were raised as a result of a meeting between Commonwealth Edison Company and NRC Region III staff held on August 31, 1982, in the Region III office. The questions and the items that were examined are as follows:

1. Did design documents provided to Braidwood Contractors implement the Braidwood FSAR commitments specifically the commitment to Subsection NF-4000 of the ASME Code Section III.

CECO's FSAR, Section 3.9.3.4.2, commits to the ASME Boiler and Pressure Vessel Code, 1974 Edition, Summer 1975 Addenda for N.S.S.S. Component Supports.

- . Section III, Division 1, Subsection NA, Appendix I, XVII and F
- . Section III, Division 1, Subsection NF
- . Code Case 1644-4

The following design documents were supplied to the appropriate contractors for installation of equipment. The responsibility of developing procedures in accordance with specification and getting approval from the design engineer and licensee rested with the contractors.

Sargent & Lundy (S&L) Specification F/L-2797 Titled: N.S.S.S. Support Steel Braidwood Units 1 and 2. This specification references ASME Code as committed to by the licensee.

The following design documents form a part of this specification.

Structural Design Drawings

- S-1105 N.S.S.S. Support Framing - General Arrangement Equipment Support Steel Units 1 and 2
- S-1106 N.S.S.S. Support Framing - Equipment Lug and Hinge Location Plan Units 1 and 2
- S-1107 N.S.S.S. Support Framing - Reactor Coolant Pump Support Plan El. 393'-2" Units 1 and 2
- S-1108 N.S.S.S. Support Framing - Coolant Pump Support Plan and Sections Units 1 and 2
- S-1109 N.S.S.S. Support Framing - Coolant Pump Support Sections and Details Units 1 and 2
- S-1110 N.S.S.S. Support Framing - Steam Generator Support Plan El. 397'-1" Units 1 and 2
- S-1111 N.S.S.S. Support Framing - Steam Generator Support Plan El. 443'-8" Units 1 and 2
- S-1112 N.S.S.S. Support Framing - Steam Generator Support Plan El. 396'-7" Units 1 and 2
- S-1113 N.S.S.S. Support Framing - Steam Generator Support Sections and Details
- S-1114 N.S.S.S. Support Framing - Steam Generator Support Section and Details
- S-1115 N.S.S.S. Support Framing - Reactor Vessel Support Units 1 and 2
- S-1116 N.S.S.S. Support Framing - Pressurizer Support Plan and Sections Units 1 and 2
- S-1117 N.S.S.S. Support Framing - Coolant Pipe Restraint Plan and Sections Units 1 and 2
- S-1118 N.S.S.S. Support Framing - Miscellaneous Sections and Details Units 1 and 2
- S-1119 N.S.S.S. Support Framing - Steam Generator Support Section and Details Sh. 1 Units 1 and 2
- S-1120 N.S.S.S. Support Framing - Sections and Details, Units 1 and 2

The following ASME Code Sections are referenced in this specification.

Section II Material Specification
Section III Subsection NF, Article NF-4000
Section V Nondestructive Testing
Section IX Welding and Brazing Qualifications.
Structural Welding Code AWS-D1.1

As indicated below the specification further requires the contractor to submit procedures governing the work to the licensee and Consulting Engineers for approval.

Quality Control Procedures Submittals

Within twelve (12) weeks after award of Contract, the Contractor should submit the detailed procedures to be used, or a schedule for submitting these procedures. Procedures governing work that is to be performed Offsite shall be submitted to the Purchaser's Consulting Engineers' Quality Control Division for review and acceptance. Procedures governing Onsite work shall be submitted to the Station Construction Site Project Superintendent for review and acceptance by the Purchaser. Schedules for submitting procedures shall be submitted in a similar manner.

The Contractor shall not start any work covered by these procedures until the appropriate procedure has been accepted in writing by the Purchaser or the Purchaser's Consulting Engineer, as appropriate.

The Quality Control procedures shall contain those administrative procedures necessary to implement each Section, 304.1 through 304.18 of the Quality Assurance Plan.

2. Did Phillips Getschow have approved procedures for installation and inspection of subject equipment, including bolting prior to the installation; specifically the steam generators and reactor coolant pumps?

Although the manufacturer's procedure for setting major N.S.S.S. Components was available and suggests that the contractor "provide a detailed setting procedure for review" by the manufacturer's site personnel a procedure was not developed by Phillips Getschow. Further the manufacturer's Guide Line for M.S.G. Bolt Installation was available.

Reference to these procedures were not made. The installation contractor did not develop installation or bolting procedures for submittal and approval. There is no record indicating when components were released from storage to engineering for installation, nor were traveler or process sheets used or reviewed by the quality control department to establish either surveillance or hold points. In fact, it appears that there was no involvement by the Getschow quality control department during installation of any components. The latest equipment installed by Getschow did have an approved procedure for equipment installation, however, they were not followed.

The following Getschow procedure was approved by the licensee and design engineers for equipment installation.

. PGCP-8, Revisions 0, 1, and 2. Approved for use by the design engineers on July 16, 1980, October 29, 1980 and January 8, 1981 respectively.

Titled: Equipment Erection Record (EER)

There are no records to indicate when components were released from storage to engineering for installation. In addition there are no installation records.

FORM PGCP-8

Equipment Name	S&L Equipment Number	Location
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Engineering Function	Date	Signature
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Nonconformance Report Submitted
 Nonconformance Report Cleared

Construction Function	Date	Signature
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Foundation Checked
 Rough Set
 Final Set
 Torque to Proper Range (if appl.)
 Threads Showing above nut
 Welds to embedment plate (if appl.)
 Grout Release
 Grout Complete
 Alignment Complete
 Motor Run-in Complete
 Release for piping

Quality Control Function	Hold Point	Date	Signature
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Torqued to Proper Range
 Visual Test of Welds

3. Was traceability and identification of Steam Generator (S.G.) cap screws maintained by Getschow/CECo during transfer between Byron and Braidwood, and during shortening of some screws?

The S.G. cap screws arrived onsite with an identifying number stamped on the bottom or threaded end of the screw. As the screws were fitted to the S.G. support pad holes it and the hole should have been match marked. Likewise when screws were shortened this number was transferred to the screw head on some screws but not all. For the Unit 1 steam generators (SGs) the inspector was informed that the screws were matched to the SG support pad holes and recorded. However, this was not done for the Unit 2 SG or for the screws removed from the Unit 1 SGs and transferred to Byron. The manufacturer's Guide Line for M.S.G. Bolt Installation, states, "record the total length of the bolt hole..." "The bolt should go in by hand." "A wrench may be used but excessive torque should not be used." "Matching and marking and measuring is to be done as outlined on attachment M.S.G. bolt data sheet..."

The inspector was informed by installation personnel that air wrenches were used to tighten the SG screws and that for the most part screws were not fit to the holes and match marked. When the installed screws were examined by the inspector it was noted that many are jammed/galled and extended as much as an inch out of the holes in the 3" thick support column pads.

No records exist indicating what screws were sent to Byron or which ones were returned to Braidwood.

Following is a history of SG cap screws at Braidwood. There are 192 screws required per SG and they were supplied by Teledyne Brown.

On March 10, 1978, 384 screws were received on Material Receipt Record (MRR) 1750. Of these one set or 192 screws were sent to Byron Station. The remainder of the screws were stored in the laydown area.

On January 8, 1979, 70/72 screws were returned to Braidwood Station from Byron on MRR 3725, all were rejected by Getschow.

On February 8, 1979, one set of screws (192) received on MRR 1750 were found unacceptable by Getschow and NCR No. 334 was generated.

On March 22, 1979, the unacceptable screws on NCR No. 334 were sent to Rockwell Engineering on CECO P.O. No. 722186.

On March 23, 1979, 50 screws were received on MRR 4228 from Rockwell Engineering.

On May 4, 1979, 64 screws were received on MRR 4485 from Rockwell Engineering.

On June 14, 1979, 123 screws on Byron MRR's 3664, 3699 and 6187 were received at Braidwood on MRR 4731.

On June 14, 1979, all screws received on MRR 4731 were sent to Rockwell Engineering on CECO P.O. No. 727837.

On June 27, 1979, 41 acceptable screws were received from Rockwell on MRR 4807.

On May 16, 1980, 48 screws were received from Teledyne Brown on MRR 5954.

On November 17, 1980, 64 screws were received from Teledyne Brown on MRR 6506.

Unit 1 Steam Generator Screws

<u>Date</u>	<u>No. of Screws</u>	<u>Received On</u>
04/17/79	48	MRR 1750
05/14/79	3 (Replaced)	MRR 1750
05/24/79	50	MRR 1750
07/06/79	41	MRR 4731
08/08/80	29	MRR 5954
07/29/81	24	MRR 7004

Unit 2 Steam Generator Screws

<u>Date</u>	<u>No. of Screws</u>	<u>Received on</u>
11/26/80	64	MRR 6506
06/16/81	32	MRR 7004
08/17/81	32	MRR 7004
Not Known	45	MRR 7004
Not Known	19	MRR 5954

4. Did Getschow, CECO or an independent testing agency perform inspections on the installation of equipment including bolting?

No documentation is available to indicate that inspections of installed equipment was performed. To date no equipment has been torqued to the required tightness.

5. Did Getschow/CECO maintain adequate protection of installed equipment following installation? Do procedures and records exist to substantiate the required inspections?

All installed equipment is protected with visquine and records do exist to indicate that installed equipment is inspected as required by Getschow's maintenance group. Mechanical and electrical cards are maintained at the equipment.

6. Per CECO/Getschow QA Program or 10 CFR 50 Appendix "B", were nonconformance reports required relative to the steam generator cap screws? If so, were they issued?

Per the QA Program and 10 CFR 50 Appendix "B", Criteria XV, the cap screws returned to Braidwood from Byron and found unacceptable by Getschow should have been and were documented on NCR 334. Likewise, cap screws sent to Rockwell for examination in accordance with NF-2580 should have been documented. However, screws being fitted to the steam generators and damaged during the process are considered in process work and need not be documented with an

NCR. Only those replaced, repaired, or reworked in accordance with documented procedures require an NCR.

7. Did CECo/Getschow fail to take adequate corrective action when they identified the installation problem? Including potential generic application?

The problem with steam generator support column cap screws at Braidwood Station does not appear to be a generic problem. The problem is that an installation procedure was not developed along the guide lines of the manufacturer's recommendations.

The stop work action taken by CECo in March 1982 and released May 13, 1982 (case by case) was appropriate. The development of Phillips Getschow Procedure QCP-B22 and the rechecking and documentation of installed equipment, and training of personnel to the new procedure are appropriate. Subsequently it was learned that Procedure QCP-B22, Revision 0 was approved for use (with comments) on October 6, 1982, by the design engineer.

8. Identify what records were required per specification and CECo/Getschow QA Program relative to equipment installation including bolting. Were they maintained? Identify those not maintained or available for NRC review.

Phillips Getschow Procedure PGCP-8 requires that Equipment Erection Record Form PGCP-8-1 be completed for component installation.

The Phillips Getschows QA department did not maintain a log or records showing when an item was released from storage to engineering for installation. No travelers or process sheets were used to show what activities and inspections were required or completed.

In January 1982, an equipment installation log was started by Getschow's QA department.

It is the inspector judgement that there should be more interface between the Getschow QC department and engineering and that all travelers or process sheets should be routed to QC prior to start of activities in order to establish QC hold and inspection points.

9. Identify all CECo QA Audits of installed equipment or QC inspections of installed equipment.

There is no documentation to indicate that Getschow QC conducted inprocess inspection or surveillance of component installation.

Commonwealth Edison (CECo) Quality Assurance performed the following audits of Phillips Getschow activities related to S&L Specification 2739. Audit records do not indicate that Specification 2797 was audited.

<u>Audit Report No.</u>	<u>Area Audited</u>	<u>Start Date</u>	<u>Complete Date</u>	<u>Closeout</u>
QA-20/80-8	Quality Related Records	04/01/80		05/06/80
QA-20/80-10	Pipe Support	03/29/80	06/06/80	01/08/81

<u>Audit Report No.</u>	<u>Area Audited</u>	<u>Start Date</u>	<u>Complete Date</u>	<u>Closeout</u>
QA-20/80-14	Design	06/02/80		06/21/80
QA-20/80-21	ANSI-N45.2.6	06/30/80		03/10/81
QA-20/80-26	F.U. Surveillance No. 1335	07/28/80		12/11/80
QA-20/80-31	QA Program Sections 1, 3, 10, 13	08/19/80		01/29/81
QA-20/80-53	QA Manual	11/19/80		01/29/81
QA-20/81-07	QA Manual Sections 1, 3, 9	02/19/81		05/05/81
QA-20/81-22	Support Installation Installation History and Rigging	06/23/81		
QA-20/81-30	Instrument Design	09/29/81		03/09/81
QA-20/81-34	Document Control, Welding Control ASME Code Inspections Test Control Nonconformances	10/22/81		11/10/81
QA-20/81-47	Whip Restraint Storage	12/31/81		03/31/82
QA-20/82-04	QAM. 1, 3, 4, 5, 6, 7, 8, 9 Applicable Procedures	02/22/82	03/15/82	06/07/82
QA-20/82-12	Pipe Supports, Whip Restraints	04/20/82	05/02/82	06/18/82
QA-20/82-15	2" and Under Pipe Design and Installation	06/24/82	07/06/82	Open
QA-20/82-40	Document Control Design Control Record Storage Final Analysis	07/22/82	07/29/82	Open
QA-20/82-22	Large Bore Pipe Installation	08/17/82	08/24/82	Open
QA-20/82-32	ANSI-N45.2.2, QCP-B13	03/19/82	03/23/82	05/20/82
QA-20/82-36	Whip Restraint Instal- lation Large Bore Pipe Installation	05/18/82	05/28/82	Open

10. List all Key safety-related equipment involved. Identify dates of Installation.

No documentation exists that shows component installation dates.

Equipment Installation Records (EIR) have been requested for the following safety-related and N.S.S.S. items.

SAFETY-RELATED MECHANICAL EQUIPMENT

(Quality Groups A, B, C and H)

<u>Equipment No.</u>	<u>EIR</u> <u>Issued</u>	<u>B/F</u> <u>Complete</u>	<u>Equipment Name</u>
OAB01DA			Boron Recycle Evaporator Feed Demineralizer OA
OAB01DB			Boron Recycle Evaporator Feed Demineralizer OB
OAB01F			Recycle Evaporator Concentrates Filter
OAB01PA			Recycle Evaporator Feed Pump OA
OAB01PB			Recycle Evaporator Feed Pump OB
OAB020DA			Recycle Evaporator Package OA
OAB02DB			Recycle Evaporator Package OB
OAB02FA			Recycle Evaporator Feed Filter OA
OAB02FB			Recycle Evaporator Feed Filter OB
OAB03P			Boric Acid Transfer Pump O
1AB03P			Boric Acid Transfer Pump 1
1AB04F			Boric Acid Filter
1AF01PA			*Motor Driven Auxiliary Feedwater Pump
1AF01PB			*Diesel Driven Auxiliary Feedwater Pump 1B
1BR01A			Moderating Heat Exchanger
1BR01DA			Thermal Regeneration Demineralizer 1A
1BR01DB			Thermal Regeneration Demineralizer 1B
1BR01DC			Thermal Regeneration Demineralizer 1C
1BR01DD			Thermal Regeneration Demineralizer 1D
1BR01DE			Thermal Regeneration Demineralizer 1E
1BR04J			Chiller Control Panel
OCC01A			Component Cooling Heat Exchanger
OCC01P			Component Cooling Pump O
1CC01A			Component Cooling Heat Exchanger
1CC01PA			Component Cooling Pump 1A
1CC01PB			Component Cooling Pump 1B
1CC01T			Component Cooling Surge Tank
1CS01PA			Containment Spray Pump 1A (Motor Driven)
1CS01PB			Containment Spray Pump 1B (Motor Driven)
1CS01SA			Containment Spray Eductor 1A
1CS01SB			Containment Spray Eductor 1B
1CS01T			Spray Additive Tank
1CV01AA			Excess Letdown Heat Exchanger 1A
1CV01AB			Excess Letdown Heat Exchanger 1B
1CV01DA			Mixed Bed Demineralizer 1A
1CV01DB			Mixed Bed Demineralizer 1B
1CV01FA			Seal WTR Injection Filter 1A
1CV01FB			SEAL WTR Injection Filter 1B
1CV01PA			*Centrifugal Charging Pump 1A
1CV01PB			Centrifugal Charging Pump 1B
1CV01S			Boric Acid Blender
1CV01T			Volume Control Tank
1CV02A			Seal Water Heat Exchanger
1CV02D			Cation Bed Demineralizer
1CV02F			Seal Water Filter
1CV02P			Positive Displacement Charging Pump

<u>Equipment No.</u>	<u>EIR</u> <u>Issued</u>	<u>B/F</u> <u>Complete</u>	<u>Equipment Name</u>
1CV03AA			Regenerative Heat Exchanger 1A
1CV03AB			Regenerative Heat Exchanger 1B
1CV03F			Reactor Coolant Filter
1CV04AA			Letdown Heat Exchanger 1A
1CV04AB			Letdown Heat Exchanger 1B
1CV04A			Letdown Reheat Heat Exchanger
1DG01KA			Diesel Generator 1A
1DG01KB			Diesel Generator 1B
1DO01PA			20 GPM Transfer Pump 1B
1DO01PB			20 GPM Transfer Pump 1C
1DO01PC			20 GPM Transfer Pump 1D
1DO01PD			20 GPM Transfer Pump 1D
1DO02TA			500 Gallon Day Tank 1A
1DO02TB			500 Gallon Day Tank 1B
1DO10T			Diesel Oil Day Tank (500 gal)
1FC01A			Spent Fuel Pit Heat Exchanger
1FC01P			Spent Fuel Pit Pump
OGW01SA			Waste Gas Compressor Package OA
OGW01SB			Waste Gas Compressor Package OB
OGW01TA			Gas Decay Tank OA
OGW01TB			Gas Decay Tank OB
OGW01TC			Gas Decay Tank OC
OGW01TD			Gas Decay Tank OD
OGW01TE			Gas Decay Tank OE
OGW01TF			Gas Decay Tank OF
1PL50J			Local Instrument Panel Cont. Bldg. Elev. 377
1PL52J			Local Instrument Panel Cont. Bldg. Elev. 377
1PL57J			Local Instrument Panel Cont. Bldg. Elev. 412
1PL67J			Local Instrument Panel Cont. Bldg. Elev. 377
1PL69J			Local Instrument Panel Cont. Bldg. Elev. 401
1PL71J			Local Instrument Panel Cont. Bldg. Elev. 412
1PL72J			Local Instrument Panel Cont. Bldg. Elev. 412
1PL75J			Local Instrument Panel Cont. Bldg. Elev. 377
1PL81JA			Local Instrument Panel Aux. Bldg. Elev. 346
1PL81JB			Local Instrument Panel Aux. Bldg. Elev. 346
1PL82JA			Local Instrument Panel Aux. Bldg. Elev. 346
1PL82JB			Local Instrument Panel Aux. Bldg. Elev. 346
1PL84JA			Local Instrument Panel Aux. Bldg. Elev. 346
1PS01A			Press Stm. Sample Heat Exchanger
1PS01J			Primary Sample ISOL Vlv Panel
1PS02A			Press Liq. Sample Heat Exchanger
1PS03A			Reactor Cool Sample Heat Exchanger
1RC01BA			Steam Generator Loop 1
1RC01BB			Steam Generator Loop 2
1RC01BC			Steam Generator Loop 3
1RC01BD			Steam Generator Loop 4
1RC01PA			Reactor Coolant Pump 1A
1RC01PB			Reactor Coolant Pump 1B
1RC01PC			Reactor Coolant Pump 1C
1RC01PD			Reactor Coolant Pump 1D

<u>Equipment No.</u>	<u>EIR Issued</u>	<u>B/F Complete</u>	<u>Equipment Name</u>
1RH01PA			Residual Heat Removal Pump 1A
1RH01PB			Residual Heat Removal Pump 1B
1RH01SA			Valve Containment Assembly
1RH01SV			Valve Containment Assembly
1RH02AA			Residual Heat Exchanger 1A
1RH02AB			Residual Heat Exchanger 1B
1RV01S			Pressurizer
1SI01PA			Safety Injection Pump 1A
1SI01PB			Safety Injection Pump 1B
1SI04TA			Accumulator Tank 1A
1SI04TB			Accumulator Tank 1B
1SI04TC			Accumulator Tank 1C
1SI04TD			Accumulator Tank 1D
1SX01FA			Essential Service Water Pump Strainer 1A
1SX01FB			Essential Service Water Pump Strainer 1B
1SX01JA			Essential Service Water Pump Strainer 1A Control Panel
1SX01JB			Essential Service Water Pump Strainer 1B Control Panel
1SX01PA			Essential Service Water Pump 1A
1SX01PB			Essential Service Water Pump 1B
1VA01SA			Aux. Bldg. HVAC System SX Pump-1A Cubicle Cooler
1VA01SB			Aux. Bldg. HVAC System SX Pump-1B Cubicle Cooler
1VA02SA			Aux. Bldg. HVAC System RH Pump-1A Cubicle Cooler
1VA02SB			Aux. Bldg. HVAC System RH Pump-1B Cubicle Cooler
1VA03SA			Aux. Bldg. HVAC System CS Pump-1A Cubicle Cooler
1VA03SB			Aux. Bldg. HVAC System CS Pump-1B Cubicle Cooler
1VA04SA			Aux. Bldg. HVAC System SI Pump-1A Cubicle Cooler
1VA04SB			Aux. Bldg. HVAC System SI Pump-1B Cubicle Cooler
1VA05S			Aux. Bldg. HVAC System Pos. Disp. Pump-1 Cubicle Cooler
1VA07S			Aux. Bldg. HVAC System S F Pit Pump-1 Cubicle Cooler
1VA08S			Aux. Bldg. HVAC System D-D AF Pump-1B Cubicle Cooler
OVC01AA			Control Room HVAC System Chilled Water Cooling Coil and Cabt.-0A
OVC01AB			Control Room HVAC System Chilled Water Cooling Coil and Cabt.-0B
OW001CA			Chilled Water System - Control Room Refrigeration Unit-0A
OW001CB			Chilled Water System - Control Room Refrigeration Unit-0B

<u>Equipment No.</u>	<u>EIR</u> <u>Issued</u>	<u>B/F</u> <u>Complete</u>	<u>Equipment Name</u>
OW001PA			Chilled Water System - Control Room Chilled Water Pump-0A
OW001PB			Chilled Water System - Control Room Chilled Water Pump-0B
OWX0ST			Spent Resin Storage Tank
2AB03P			Boric Acid Transfer Pump-2
2AB04F			Boric Acid Filter
2AF01PA			Motor Driven Auxiliary Feedwater Pump
2AF01PB			Diesel Driven Auxiliary Feedwater Pump-2B
2BR01A			Moderating Heat Exchanger
2BR04J			Chiller Control Panel
2CC01A			Component Cooling Heat Exchanger
2CC01PA			Component Cooling Pump 2A
2CC01PB			Component Cooling Pump 2B
2CC01T			Component Cooling Surge Tank
2CS01PA			Containment Spray Pump 2A (Motor Driven)
2CS01PB			Containment Spray Pump 2B (Motor Driven)
2CS01SA			Containment Spray Eductor 2A
2CS01SB			Containment Spray Eductor 2B
2CS01T			Spray Additive Tank 5000 Gal.
2CV01AA			Excess Letdown Heat Exchanger 2A
2CV01AB			Excess Letdown Heat Exchanger 2B
2CV01FA			Seal Water Injection Filter 2A
2CV01FB			Seal Water Injection Filter 2B
2CV01PA			Centrifugal Charging Pump 2A
2CV01PB			Centrifugal Charging Pump 2B
2CV01S			Boric Acid Blender
2CV01T			Volume Control Tank
2CV02A			Seal Water Heat Exchanger
2CV02F			Seal Water Filter
2CV02P			Positive Displacement Charging Pump
2CV03AA			Regenerative Heat Exchanger 2A
2CV03AB			Regenerative Heat Exchanger 2B
2CV03F			Reactor Coolant Filter
2CV04AA			Letdown Heat Exchanger 2A
2CV04AB			Letdown Heat Exchanger 2B
2CV05A			Letdown Reheat Heat Exchanger
2DG01KA			Diesel Generator 2A
2DG01KB			Diesel Generator 2B
2D001PA			30 GPM Transfer Pump 2A
2D001PB			30 GPM Transfer Pump 2B
2D001PC			30 GPM Transfer Pump 2C
2D001PD			30 GPM Transfer Pump 2D
2D002TA			500 Gallon Day Tank 2A
2D002TB			500 Gallon Day Tank 2B
2D020T			Diesel Oil Day Tank (500 Gal.)
2FC01A			Spent Fuel Pit Heat Exchanger
2FC01P			Spent Fuel Pit Pump
2PL81JA			Local Instrument Panel Aux. Bldg. - Elev. 346
2PL81JB			Local Instrument Panel Aux. Bldg. - Elev. 346

<u>Equipment No.</u>	<u>EIR</u> <u>Issued</u>	<u>B/F</u> <u>Complete</u>	<u>Equipment Name</u>
2PL82JA			Local Instrument Panel Aux. Bldg. - Elev. 346
2PL82JB			Local Instrument Panel Aux. Bldg. - Elev. 346
2PS01A			Press Stm. Sample Heat Exchanger
2PS01J			Primary Sample ISOL VLV Panel
2PS03A			Reactor Cool Sample Heat Exchanger
2RC01BA			Steam Generator Loop 1
2RC01BB			Steam Generator Loop 2
2RC01BC			Steam Generator Loop 3
2RC01BD			Steam Generator Loop 4
2RC01PA			Reactor Coolant Pump 2A
2RC01PB			Reactor Coolant Pump 2B
2RC01PC			Reactor Coolant Pump 2C
2RC01PD			Reactor Coolant Pump 2D
2RH01PA			Residual Heat Removal Pump 2A
2RH01PB			Residual Heat Removal Pump 2B
2RH01SA			Valve Containment Assembly
2RH01SB			Valve Containment Assembly
2RH02AA			Residual Heat Exchanger 2A
2RH02AB			Residual Heat Exchanger 2B
2RY01S			Pressurizer
2SI01PA			Safety Injection Pump 2A
2SI01PB			Safety Injection Pump 2B
2SI04TA			Accumulator Tank 2A
2SI04TB			Accumulator Tank 2B
2SI04TC			Accumulator Tank 2C
2SI04TD			Accumulator Tank 2D
2SX01FA			Essential Service Water Pump Strainer 2A
2SX01FB			Essential Service Water Pump Strainer 2B
2SX01JA			Essential Service Water Pump Strainer 2A Control Panel
2SX01JB			Essential Service Water Pump Strainer 2B Control Panel
2SX01PA			Essential Service Water Pump 2A
2SX01PB			Essential Service Water Pump 2B
2VA01SA			Aux. Bldg. HVAC System SX Pump-2A Cubicle Cooler
2VA01SB			Aux. Bldg. HVAC System SX Pump-2B Cubicle Cooler
2VA02SA			Aux. Bldg. HVAC System RH Pump-2A Cubicle Cooler
2VA02SB			Aux. Bldg. HVAC System RH Pump-2B Cubicle Cooler
2VA03SA			Aux. Bldg. HVAC System CS Pump-2A Cubicle Cooler
2VA03SB			Aux. Bldg. HVAC System CS Pump-2B Cubicle Cooler
2VA04SA			Aux. Bldg. HVAC System SI Pump-2A Cubicle Cooler
2VA04SB			Aux. Bldg. HVAC System SI Pump-2B Cubicle Cooler

<u>Equipment No.</u>	<u>EIR Issued</u>	<u>B/F Complete</u>	<u>Equipment Name</u>
2VA05S			Aux. Bldg. HVAC System Pos. Disp. Pump-2 Cubicle Cooler
2VA06SA			Aux. Bldg. HVAC System Cen. Chg. Pump-2A Cubicle Cooler
2VA07S			Aux. Bldg. HVAC System S F Pit Pump-2 Cubicle Cooler
2VA08S			Aux. Bldg. HVAC System D-D AF Pump-2B Cubicle Cooler

Conclusion

The inspection confirmed that no procedures were developed for installation of N.S.S.S. equipment. In addition, inspections were not performed on the installation of other mechanical safety-related components.