

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-454/84-76(DRS); 50-455/84-51(DRS)

Docket No. 50-454/50-455

License No. NPR-23; CPPR-131

Licensee: Commonwealth Edison Company
Post Office Box 766
Chicago, IL 60690

Facility Name: Byron Station, Units 1 and 2

Inspection At: Byron Site, Byron, Illinois

Inspection Conducted: October 18-19, December 10, 1984 and January 4, 1985

Inspectors: *D. M. Ulie*
D. M. Ulie

1/15/85
Date

K. A. Connaughton
K. A. Connaughton

1/15/85
Date

W. Grant
W. Grant

1/16/85
Date

Approved By: *L. A. Reyes*
L. A. Reyes, Acting Chief
Operational Programs Section

1/16/85
Date

Inspection Summary

Inspection on October 18-19, December 10, 1984, and January 4, 1985 (Report No. 50-454/84-76(DRS); 50-455/84-51(DRS))

Areas Inspected: Special unannounced inspection of the licensee's quality assurance/quality control program as it applies to fire protection and other areas including procedures, drawings and other documentation related to penetration seal installations; and a review of allegations received relative to the installation of penetration seals. The inspection involved a total of 51 inspector-hours onsite and in-office review by three NRC inspectors, including 6 inspector-hours onsite during off-shifts.

Results: Of the six areas inspected, no items of noncompliance were identified in five areas; two items of noncompliance were identified in the remaining area (procedural deficiencies relating to verifying the penetration seal fill depth and the acceptable amount of cracking and/or separation in seal material - Paragraph 4.a; lack of positive controls to ensure the timely review of radiation seal substitutions - Paragraph 4.b.).

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DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

- 2-B. Cook, Engineering
- 1-C. Diaz, Fire Protection Engineer
- 3-R. Guse, Senior Engineer
 - K. Hansing, Quality Assurance Superintendent
 - M. Lohmann, Assistant Construction Superintendent
 - E. Martin, Quality Assurance Supervisor
- 4-J. Mihovilovich, Lead Structural Engineer
 - C. Nagle, Quality Assurance Engineer
- 5-G. Sorenson, Construction Superintendent
- 4-R. Tuetken, Startup Superintendent
 - D. Thornley, Field Engineer
 - S. Vovos, Construction Field Engineer

Transco, Inc.

- 2-T. Hoff, Product Manager
 - B. C. Machchlez, Quality Control Manager
- 2-M. Monson, Product Superintendent
 - A. Rice, Quality Assurance Manager
 - R. Tancinco, Assistant Quality Assurance Manager

M&M Protection Consultants

- 1-R. Smith, Fire Protection Engineer

Sargent and Lundy

- 3-W. DeLise, Nuclear Station Licensing Department
- 5-T. Thorsell, Senior Electrical Project Engineer

- 1-Denotes attendance at exit meeting of October 19, 1984 only.
- 2-Denotes attendance at exit meeting of December 10, 1984 only.
- 3-Denotes attendance at exit meeting of January 4, 1985 only.
- 4-Denotes attendance at exit meetings of October 19, December 10, 1984 and January 4, 1985.
- 5-Denotes attendance at exit meetings of December 10, 1984 and January 4, 1985.

2. Documents Reviewed

a. Procedures Reviewed

<u>Number</u>	<u>Title</u>
Transco PSQAP 2.0, Revision 0	Supplement to Penetration Seal Quality Assurance Procedures Applicable to Byron Nuclear Station only.

Transco PSQAP 2.0, Revisions 0, 2, and 3	Qualification of Personnel (Chicago, QC Managers, QC Inspectors, and Field Supervisors)
Transco PSQAP 2.1, Revision 1	Qualification of Site Craft Personnel
Transco PSQAM-1, Revision 2 Paragraph 10.0-Inspection	Penetration Seal Quality Assurance Program Manual
Transco PSQAP 10.1, Revision 3	Supplement to Penetration Seal Quality Assurance Procedures Applicable to Byron Nuclear Station Only
Transco PSQAP 9.3, Revisions 1 and 4	Special Processes - Radiation Shielding Silicones
Transco PSQAP 9.0, Revision 1	Special Processes - Penetration Dams
Transco PSQAP 5.0, Revision 1	Instruction, Procedures and Drawings
Transco PSQAP 4.0, Revision 1	Procurement Document Control
Transco PSQAP 9.1, Revisions 1 and 4	Special Processes - Firecode CT Gypsum Cement
Transco PSQAP 9.10, Revision 1	Special Processes - Silicone Elastomer
Transco PSQAP 15.0, Revision 2	Nonconforming Items
Transco PSQAP 15.1, Revision 0	Reporting of Defects and Noncompliance (10 CFR 21)
No Number	Firecode CT Gypsum Cement Application and Installation Procedures
Tech-SIL TSP-Q220 Tech-SIL QA-109	Use of Tech-Sil Penetration Closure Card Procedure For Storage and Shipping

b. Drawings Reviewed

<u>Number</u>	<u>Date</u>	<u>Title</u>
M-518, Revision R	July 13, 1984	Schedule for Mechanical Seals
S-717, Revision AE	May 27, 1983	Auxiliary Building Foundation Section 1.1
S-1616, Revision BM	August 13, 1984	Auxiliary Building
S-1632, Revision AU	December 5, 1983	Auxiliary Building Foundation
S-1738, Revision N	July 31, 1984	Auxiliary Building Concrete Partition Wall

S-1302, Revision CF	September 20, 1984	Auxiliary Building Main Floor Plan
6E-0-3371D, Revision BT	May 10, 1984	Electrical Installation - Auxiliary Building Plan
6E-0-3600, No Revision Listed Sheet No. 37W	August 14, 1984	CECo - Byron Station Project No. 4391; 4392
6E-0-3600, No Revision Listed Sheet No. 31	August 16, 1984	CECo - Byron Station Project No. 4391; 4392
6E-0-3600, No Revision Listed Sheet No. 48E	September 19, 1984	CECo - Byron Station Project No. 4391; 4392
6E-0-3600, Revision AE Sheet No. 3A	No Date Listed	CECo - Byron Station Project No. 4391; 4392
6E-0-3600, Revision After AE Above Sheet No. 3A	March 6, 1984	Fire Stops and Seals
Drawing Legend, Revision 1	September 25, 1984	Types of Seals
6E-0-3600, Revision AR and BA	August 15 and October 19, 1984 Respectively	Fire Stops and Seals
BY-E-02, Revision 0 Detail A		Firecode CT Gypsum Cement Seals for Wall, Sleeve, or Conduits
BY-E-02A, Revision 0 Detail A		Firecode CT Gypsum Cement Seals for Wall, Sleeve, or Conduits
BY-E-03, Revision 0 Detail B		Firecode CT Gypsum Cement Seal for Floor, Sleeves or Conduits
BY-E-04, Revision 0 Detail C		Firecode CT Gypsum Cement Seal for Walls
BY-E-04A, Revision 0 Detail C		Firecode CT Gypsum Cement Seal for Tray/Cable
BY-E-05, Revision 0		Firecode CT Gypsum Cement Seal for Floor Penetrations

BY-E-05A, Revision 0 Detail D	Firecode CT Gypsum Cement Seal with Collar for Floor Penetrations
BY-E-06, Revision 1	Transco Silicone Elastomer
BY-E-07, Revision 1	Transco Silicone Elastomer
BY-E-08, Revision 1	Transco High Density Silicone
BY-E-09, Revision 1	Transco High Density Silicone
BY-E-10, Revision 1	Transco High Density Silicone
BY-E-11, Revision 1	Transco High Density Silicone
BY-E-11A, Revision 1	#TCO-003 High Density Silicone Elastomer Penetration Seal for Non-Moving Instrument Lines (Walls or Floors)
BY-E-12, Revision 1	Transco Medium Density Silicone
BY-E-13, Revision 1	Transco Medium Density Silicone
BY-E-14, Revision 0	TCO-003 High Density Silicone Elastomer for Thin Floors or Walls (Less than 12" thick)
BY-E-15, Revision 0	Damming Board Divider for Oversized Firecode CT Gypsum Penetration Seals
BY-E-16, Revision 0	Sheet Metal Dividers for Oversized High Density Silicone Elastomer Penetration Seals
BY-E-17A, Revision 3	Bus Duct Seal at Aluminum Bus Bars, #TCO-002 Medium Density Silicone Elastomer
BY-E-17B, Revision 3	Bus Duct Seal at Copper Bus Bars, #TCO-002 Medium Density Silicone Elastomer

c. Audit Reports

<u>Number</u>	<u>Date</u>	<u>Title</u>
#6-83-62	June 27, 1983	QA Program Audit
#6-84-167	August 20, 1984	QA Program Audit

#6-84-119	February 22, 1984	QA Program Audit
#6-83-44	October 4, 1983	QA Program Audit
#6-84-314	September 18, 1984	QA Program Audit
#6-84-143	June 8, 1984	QA Program Audit
#6-83-106	December 12, 1983	QA Program Audit
#6-83-61	July 1, 1983	QA Program Audit

d. Transmittals

<u>Date</u>	<u>Title</u>
December 19, 1978	Quality Assurance Requirements for Fire Protection Systems Byron and Braidwood Stations
July 21, 1982	CECo - Standard Reliability Articles
March 25, 1983	Evaluation of Contractors Quality Assurance Program
February 22, 1982	B. B. Subbidder Package No. 147 Cable Penetration Seals and Conduit End Seals Final Package for Approval

e. Test Results

<u>Number</u>	<u>Title</u>
Transco Test Report July 18, 1984	Crack, Repair and Debris
Transco Test Report November 20, 1984	Fire and Hose Stream Test of TCO-001 Cement, TCO-002 Medium Density Silicone and TCO-007 Silicone Adhesive Used in Electrical Conduit and Blockout Penetrations.

f. Personnel Qualification/Certification Package Review Checklist

The licensee provided to the inspector personnel certification packages for all (8) of the presently employed (On October 19, 1984) Transco Quality Control Inspectors.

<u>Number</u>	<u>Title</u>
Per PSQAP 2.0, Revision 0	Q.C. Inspector

g. Summary List of Unit 1 Radiation Seal Substitutions

The licensee provided a summary list of Unit 1 radiation seal substitutions and an individual listing of those seals.

3. Licensee's Fire Protection Quality Assurance Program

The inspector's examined the licensee's quality assurance/quality control program as it applied to fire protection by performing a detailed search and review of NRC, licensee, and their contractor's documents and commitments identified within those documents to provide an understanding of the fire protection penetration seal safety classification as it was being applied at Byron Station. The findings of those reviews are as follows:

Section 9.5.1.3 of Byron's Safety Evaluation Report dated February, 1982 covering the Quality Assurance Program as it applied to fire protection states in part, "the applicant has classified the fire protection system as reliability related...."

Section 2.6 of the CECO Quality Assurance Program for Nuclear Generating Stations Topical Report, Revision 23, dated October 5, 1984, states in part on page 7: "The Quality Assurance Program applies to safety related...items and related consumables plus fire protection...." It further states on page 8: "Also, the program is applicable to reliability related items...and as examples shall cover...special processes...."

The Byron Station Quality Assurance Program, Revision 13, dated January 12, 1984, states in part on page 1: "The Byron Station Quality Assurance Program is written to specifically describe the quality assurance program for control of work performed by personnel involving safety-related items...plus reliability designated as such by the company at the operating nuclear stations hereinafter referred to as "the station.""

Table 3.2-1 of the Byron FSAR lists the Quality Assurance requirements for the "Fire Protection System" and "other cable penetrations (firestops): as Level II (10 CFR 50, Appendix B does not apply)." During meetings on October 19, 1984, the site QA Superintendent stated the CECO Station QA Program does not apply to fire seal installations; however, the site QA Superintendent agreed that the CECO Corporate QA Program does state that the QA Program applies to fire protection but could not provide any further clarification regarding the corporate policy.

The licensee provided a transmittal letter dated December 19, 1978 that covered the subject of "Quality Assurance Requirements for Fire Protection Systems, Byron and Braidwood Stations." This letter stated in part, "The fire protection and detection (FP) systems for Byron and Braidwood Stations are classified as Safety Category II." This transmittal letter further stated in part, "For the Safety Category II,...portion of the FP System quality requirements are applicable as follows: ...(b) for FP systems and equipment procured to Sargent and Lundy specifications whose Purchase Order issue date is after September 1, 1978, and for site-prime contractors for installation of fire protection systems who started work on September 1, 1978 or later." The following three articles apply:

- (1) "CECO Standard Quality Articles for Non-Safety and Non-Code Related Equipment and the statement of policy dated February 17, 1978 covering CECO commitments to the NRC BTP 9.5-1 apply.

- (2) Quality Articles and NFPA Codes are applicable as stated in each specification.
- (3) Certificates of Conformance are required for the acceptance of equipment. Approved procedures will be required for installation services."

The licensee provided a copy of Bid Package No. 147, dated February 22, 1982 which indicated in the Division III Section (Quality Control) that penetration and conduit seals were considered reliability related when the bid was issued. As noted above, the Byron QA Program was written to specifically describe the QA Program for control of work performed by personnel involving reliability related items designated as such by the station which referenced Table 3.2-1 of the Byron FSAR. This table list the QA requirements for the fire protection system including cable penetration fire seals as level II indicating that 10 CFR 50, Appendix B does not apply. Thus, cable penetration fire seals do not fall under the stringent requirements of the safety classification known as "safety-related." The inspector's also determined that the CECO QA program for the installation of Firecode CT Gypsum Cement and the Silicone penetration seals used at Byron were implemented via the Transco Penetration Seal Quality Assurance Procedures (PSQAP's).

Although no items of noncompliance or deviations were identified during this review, the inspector's noted that the manner in which the wording is phrased in Section 2.6 of the CECO Quality Assurance (QA) Program for Nuclear Generating Stations Topical Report versus the wording used in the Byron Station QA Program certainly did not provide for a clear understanding of QA as it relates to fire protection and further clarification needs to be set forth.

The information reviewed in this paragraph was used for the inspector's guidance in the review of the remaining portions of this report.

No items of noncompliance or deviations were identified.

4. Allegations Concerning Transco Penetration Seals

An individual contacted the NRC Resident Inspector's office regarding Transco Incorporated penetration seals indicating the following concerns:

- . Final inspection checklists performed after fire seal installation required verification that sealing material has been installed in conduits to the same thickness as the barrier (wall or floor) penetrated by the conduit. Verification of the penetration thickness was not possible.
- . Where installation of high density silicone sealing material (type 3 seal) required by design is determined to be "impractical", gypsum sealing material (type 5 seal) is substituted.

Commonwealth Edison Company (CECo) has not required that QC inspection personnel employed by Transco be certified in accordance with ANSI N45.2.6.

Resolution of these allegations was pursued through inspector review of the licensee's Quality Assurance (QA)/Quality Control (QC) program and Transco's Penetration Seals Quality Assurance Procedures and other documents (see Paragraph 2 of report) as they apply to fire protection, radiation shielding, ventilation, and flood seals. In addition, the inspector met with CECo engineers, CECo QA personnel, Transco QA/QC personnel, and a licensee consultant to ascertain whether the licensee's QA/QC program and their subcontractor's QA/QC program was in accordance with NRC regulations. As a result of these activities the following findings and conclusions were made:

a. Allegation

(Allegation No. RIII-84-A-0153-01): Final inspection checklists after seal installation require verification that sealing material has been installed in conduits to the same thickness as the barrier (wall or floor) penetrated by the conduit. Verification of the penetration thickness was not possible.

The inspector reviewed Transco's Penetration Seal Quality Assurance Procedures (PSQAP) numbered 9.1 titled, "Special Processes - Firecode CT Gypsum Cement" and 9.3 titled, "Special Processes - Radiation Shielding Silicones" dated June 28, 1983 regarding this allegation. Step 9.3.13 of PSQAP No. 9.1 requires quality control personnel to perform a final inspection of the completed seal when released by production for inspection activities. Criteria to be employed during the final inspection included the following:

- (1) Temporary damming, where applicable, is totally removed and disposed of.
- (2) Temporary supports, where applicable, such as, duct tape, wood shins, etc., have been removed and disposed of.
- (3) Penetration fill is sufficient to completely fill or overfill the penetration to the specified fill depth.
- (4) Proper materials were used for the sealing, damming, and identification of the penetration.
- (5) The work location is clean.
- (6) "Cosmetic" factors such as surface smoothness, ripples, craters, surface cracks, chips or gouges, and all other minor blemishes are normal characteristics of CT Gypsum and are acceptable.
- (7) Characteristics other than "Cosmetic" factors as described in Section (g) shall be repaired per Section 9.3.11.
- (8) The dispersion of the CT Gypsum around the cables in the penetration shall be inspected.

The inspector reviewed the overall inspection methodology with the following results: (1) Step 9.3.2 of PSQAP No. 9.1 required completion of the damming operation prior to installation of the penetration seal materials. (2) Step 9.3.7 of PSQAP No. 9.0 dated March 7, 1984 required QC personnel to visually inspect a minimum of 25% of the installed dams for each different type of seal material (i.e., Gypsum, Silicone Foam, etc.) and document the results on the "Field Takeoff, Installation, and Inspection Record" form. It was subsequently reported by the Transco QC Manager that 964 of 2268 dams were inspected from September 19, 1984 to October 19, 1984. (3) Step 9.3.8 of PSQAP 9.1 required the QC inspector to perform in-process inspections at random stages of the installation process and document the results on the "Field Takeoff, Installation, and Inspection Record" form. Further, of 6349 total penetrations installed, 187 in-process inspections were performed according to the Transco QC Manager. (4) Step 9.3.13(c) of PSQAP No. 9.1 and Step 9.3.14(d) of PSQAP No. 9.3 required a final inspection to check the penetration fill and verify that the thickness is sufficient to completely fill the penetration to the specified fill depth. (5) During the inspector's review of PSQAP No. 9.3 similar damming, in-process, and final inspections were identified as being required including similar wording for the QC inspector to use as inspection criteria.

Regarding item (4), the inspector questioned the practicality of inspecting fill depth after the Firecode CT Gypsum cement and Radiation Shielding Silicones were in place due to the hardness of the finished product. Transco and CECO personnel present at the meeting agreed the wording in these two procedures inferred an impossible task short of removing the penetration; however, according to Transco personnel, the intent of this procedural instruction was to verify the surface conditions of the penetration seals not the depth of the penetration.

As discussed in Paragraph 3 of the report, Table 3.2-1 of the Byron FSAR lists the Quality Assurance requirements for the "Fire Protection System" and "other cable penetrations (firestops)" as Level II (10 CFR 50, Appendix B does not apply).

Also discussed in Paragraph 3 was the licensee's transmittal letter dated December 19, 1978 covering the subject of Quality Assurance Requirements for Fire Protection Systems, Byron and Braidwood Stations." This letter stated in part, "The fire protection and detection (FP) systems for Byron and Braidwood Stations are classified as Safety category II. Further stating in part, "For the Safety Category II, portion of the FP System quality requirements are applicable as follows: ... (b) for FP systems and equipment procured to Sargent and Lundy specifications whose Purchase Order issue date is after September 1, 1978, and for site-prime contractors for installation of fire protection systems who started work on September 1, 1978 or later" (this included Transco's installing of penetration fire seals). The following article applies:

- (1) "CECO Standard Quality Articles for Non-Safety and Non-Code Related Equipment and the statement of policy dated February 17, 1978 covering CECO commitments to the NRC BTP 9.5-1 apply."

Thus, Section C.4.b. of the Branch Technical Position 9.5-1 stating in part, "Inspections, ...that govern the fire protection program should be prescribed by documented instructions, procedures...and should be accomplished in accordance with these documents." The inspector's determined that a destructive test would be the only manner in which to verify penetration fill depth and this is not a feasible approach to ensure penetration seal adequacy as required by Technical Specifications. Inclusion of inspection requirements which could not be accomplished in surveillance procedures used to ensure the acceptable condition of the penetration fire seals is considered to be a violation of Section C.4.b of the Branch Technical Position 9.5-1 and of Section 2.C.(6) of facility operating license No. NPF-23 and is an example of an item of noncompliance (454/84-76-01a(DRS)). The inspector verified on December 10, 1984 that PSQAP Nos. 9.1 and 9.3 were revised to more accurately describe actions to be taken by Quality Control Personnel performing penetration seal inspections including the addition of the "Final Inspection Checklists" forms to each of these procedures to also be kept as part of the permanent records.

The inspectors concluded that the Quality Control inspections performed, regardless of the deficient steps noted, provided reasonable assurance that penetration seals have been installed to the required fill-depths.

It was the inspector's conclusion that this allegation was substantiated based on the wording used in PSQAP Nos. 9.1 and 9.3 regarding the verification of seal fill depth being a task unable to be performed without destructive testing.

During this review, two additional items were identified: (1) Step 9.3.15(b) of PSQAP No. 9.3 regarding the inspection of Radiation Shielding Silicone samples included a check of the "Cell Structure" for uniformity. The inspector noted that past inspection experience has identified that the silicone manufacturer has comparison charts for the silicone cell structure which were missing from the procedure. The inspector questioned Transco's basis for not including the manufacturer's comparison chart as part of the procedure. Through discussions with Transco personnel, the inspector was informed that the manufacturer of the silicone has no cell structures comparison chart for the type of silicone being used at Byron. Thus, this concern is considered resolved. (2) Step 9.3.13 of PSQAP No. 9.1, "Special Processes-Firecode CT Gypsum" specify the items to be considered (acceptance criteria) during final inspection of the completed fire seal. However, the items listed did not specifically address the amount of cracking and/or shrinkage considered acceptable as determined by test data. As a result, seals could be installed which would not perform their intended function. This was viewed as a weakness in Byron's construction quality assurance program. Failure to develop an adequate penetration fire seal surveillance procedure to ensure the acceptable condition of the penetration fire seals is considered to be a violation of Section C.4.b of the Branch Technical Position 9.5-1 and of Section 2.C.(6) of facility operating license No. NPF-23 and is an example of an item of noncompliance (454/84-76-01b(DRS)). The inspector verified on December 10, 1984, that Step 9.3.13(g) of Transco's PSQAP No. 9.1 does now address the amount of cracking being less than 1/32" as determined by test data. This item is discussed in more detail in Paragraph 5 of the report. This allegation is considered closed.

b. Allegation

(Allegation No. RIII-84-A-0153-02): Where installation of high density silicone sealing material (Type 3 seal) required by design is determined to be "impractical", Gypsum sealing material (Type 5 seal) is substituted.

- (1) The question of substituting Firecode CT Gypsum cement for Silicone was asked of the CECO staff. CECO personnel indicated that they were not aware of any such substitutions taking place in the field.

The inspector questioned the Transco QC Manager as to whether there existed any as-built Type 3 seals by design specifications (Radiation Seal - Normally containing High Density Silicone) in which material other than the Silicone based material had been substituted. The Transco QC Manager indicated that Firecode CT Gypsum cement had been substituted for the Silicone material inside conduits in barriers walls and floors but was unclear as to the number and specific locations of the substitutions installed.

He also noted the type of seal, their designations, and the penetration sealant material intended to be used by design were denoted as the following: (1) for use as a Fire Seal (Type 1 only) was Firecode CT Gypsum cement; (2) for use as a Flood Seal (Type 2 only) was Medium Density Silicone; (3) for use as a Radiation Seal (Type 3 only) was High Density Silicone; (4) for use also as a Radiation Seal (Type 4 only) was Medium Density Silicone; and (5) for use as a Ventilation Seal (Type 5 only) was Firecode CT Gypsum cement.

The inspector requested documentation be provided to show the final criteria used by Sargent and Lundy in performing their review relative to the substitutions for silicone. In addition, the inspectors requested the Transco QC Manager to perform a review of Transco records showing the number and location(s) of any penetrations which had Gypsum substituted for silicone. Subsequently, the licensee provided a detailed and summary list indicating that of thirteen hundred and seventeen radiation seals in conduits required for Unit No. 1, four hundred and twenty-six seals had gypsum substituted for silicone.

The Transco QC Manager provided the inspector with Transco legend sheets dated September 25, 1984, (dated incorrectly: 9-25-85), Revision 1, regarding the "Types Of Seals" and categorization of the seals being used at Byron Station.

The inspector reviewed the legend sheets titled "Types of Seals" which indicated that penetration opening having more than one purpose, such as fire and radiation, may be filled with Firecode CT Gypsum cement (Type 1) instead of Silicone material (Type 3) if the gypsum was installed on both sides of the fire wall then indicate in the remarks column of the "Final Inspection Checklist" that the penetration seal was done as a Type 1 seal. Further, the legend sheets indicated if a penetration opening serves as both a radiation seal (Type 3) and a ventilation seal (Type 5), Firecode CT Gypsum may also replace the Silicone material on one side of the fire wall while

also indicating in the remarks column of the "Final Inspection Checklist" that the penetration seal was done as a Type 5 seal.

According to the legend sheets, either of the two conditions discussed above (i.e., Fire and Radiation or Ventilation and Radiation) may have been employed if the craft installers determined that it was not practical to install silicone material. The S&L drawing detail dated August 16, 1984, (Rev. AR), required seals inside conduits to be installed at the barrier wall or floor unless physically impossible. According to licensee representatives, when a substitute sealant is installed it is so noted on the legend sheets and this information is transmitted to the AE (Sargent and Lundy) for analysis and approval or corrective action. However there appeared to be no procedure, instruction, or drawing that describes how this was accomplished and no documentation existed that demonstrated any of the seal substitute data was being processed prior to the allegation follow-up. Failure to provide an instruction, procedure, or drawing to ensure the timely review of radiation seal substitutions is considered a violation of 10 CFR 50, Appendix B, Criterion V (454/84-76-02(DRS) and an open item (455/84-51-01(DRS) for Unit 2. Engineering Change Notice (ECN) P-33, effective January 3, 1985, revised Note 12 of drawing No. 6E-0-3600 to state that if radiation seals can not be installed, those seal numbers shall be submitted to the A/E for resolution.

The inspector reviewed Sargent and Lundy drawings numbered 6E-0-3600, Sheet Nos. 3, 3A, and 3B which document the fire stop and seal tabulation of Byron Station, Units 1 and 2 (Project No. 4391 and 4392). During the inspector's review of these drawings it could not be determined whether a gypsum sealing material was an approved substitute for high density silicone sealing material.

According to a CECo transmittal dated October 22, 1984, CECo committed to initiate a design review for substituting non-radiation sealing details at locations where radiation seals are specified by the design drawings. Subsequently this matter was discussed in phone calls on November 20, and December 26, 1984, between Region III staff and Mr. R. Tuetken, Start-Up Superintendent for the Byron Project in which it was determined to have this review completed by January 4, 1985.

On January 4, 1985, the inspector discussed the results of this review with licensee representatives. The A/E review analyzed over 700 conduit seals for conformance with FSAR radiation shielding commitments. All of the 426 conduits which contained a substitute sealant were analyzed plus several hundred more which contained the design sealant. This general review identified 388 conduit seals which, based on initial, generic calculations, did not meet the FSAR radiation shielding criteria of 5x the design dose rates for wall penetrations from 0 to 10 ft above floor level and 10x design dose rates for wall penetration greater than 10 ft above floor level. The 388 conduit seals were reanalyzed individually, utilizing expected source term, wall thickness, and conduit size. Fifty-nine of the 388 conduits required the addition of radiation seals to meet the FSAR

criteria. The remaining 329 conduits were determined to meet the FSAR radiation shielding criteria based on the re-evaluations. All but four of the 59 seals have been installed. The remaining four were considered to be impractical at this time. All four are normally inaccessible and over 10 ft above floor level. Adding sealant to these conduits would require cutting the conduit and the many electrical cables in the conduit plus reinstallation. The licensee has placed administrative control requirements for monitoring the four conduits for radiation streaming during the Unit 1 power escalation radiation survey. These survey results will be reviewed during a future inspection. This item is considered an open item (454/84-76-03(DRS); 455/84-51-02(DRS)).

It was the inspector's conclusion that the alleged concern that high density silicone sealant required by design was being substituted with a Gypsum cement sealant was substantiated; however, based on the inspectors review: in over 90% of the conduit seals analyzed, the type of sealant installed, either as designed or as substituted, did not significantly affect the shielding quality; the licensee took corrective action for the 10% that needed replacement; and the licensee's normal seal installation follow-up by the AE or the facility radiation survey during power escalation would probably have detected problem areas. This allegation is considered closed.

- (2) In addition to the review noted above, an inspector performed a walkdown on December 10, 1984 accompanied by CECO, Sargent and Lundy and Transco personnel of fourteen as-built penetration seal installations including two Type 1 fire seals (gypsum), three Type 2 flood seals (silicone), four Type 3 radiation seals having silicone material, installed as-designed, also three additional Type 3 radiation seals (having gypsum substituted for the silicone material), and two Type 5 ventilation seals (gypsum) were inspected. One of the three Type 3 radiation seals having been substituted for with gypsum was not inspected because of its hard to reach location coupled with the absence of having the proper tool to open the 5" conduit connections. Twelve of the remaining thirteen penetration seals were inspected and found to be intact and without any noticeable voids along the surface of the penetration. The inspector also referenced steps 9.3.13 of PSQAP 9.1 and 9.3.14 of 9.3 as applicable which identifies the items to be covered by QC personnel when performing a final inspection of completed seals. The remaining penetration seal (numbered 1848) was a Type 3 radiation seal having the gypsum cement installed in place of the silicone material located at a 1 1/2" conduit connection in the Auxiliary Building, EL. 401', Fire Zone No. 11.5-0. This penetration seal was found with the gypsum cement removed (pieces of gypsum material was found crumbled inside of the conduit) having a visible void and opening existing. The licensee opened the next nearest penetration seal conduit connection which was also found with the gypsum removed and having an opening existing.

Licensee and Transco personnel present believed that a cable had been added and indicated they would take action to determine the cause of the penetration seal voids. At the exit meeting on

December 10, 1984, the licensee was unable to clearly establish the cause of the seal opening but indicated they would followup on the cause in addition to verifying a firewatch patrol was established in accordance with their Technical Specification action statement and other requirements.

Subsequent to the December 10, 1984 inspection visit, the licensee provided a copy of the "Notification of Fire Barrier Impairment" form dated November 21, 1984 to the inspector for review that indicated cable No. 2P9421 was being added and thereby needed a opening in the conduit seal. In addition, the licensee provided documentation that showed compensatory measures were being performed since November 21, 1984. Based on the above information, this item is considered closed.

c. Allegation

(Allegation No. RIII-84-A-0153-03). CECO has apparently not required that QC inspection personnel employed by Transco be certified in accordance with ANSI N45.2.6.

In response to this allegation the inspectors reviewed documentation provided by the licensee's QA Department and the job requirements of the Transco Quality Control Personnel in performing their inspection duties. The inspector's determined those requirements to include the following:

- (1) The ability to read blue prints to determine penetration location.
- (2) An understanding of the Transco sealing designs, QC procedures and the S&L penetration schedule.
- (3) The ability to use a ruler to determine damming depth.
- (4) An ability to document the results.

The inspectors review of these inspection requirements included a review of the Transco QC inspectors qualification packages indicating as determined by the inspectors that the Transco QC inspectors were qualified to perform their assigned tasks.

The inspector's also performed a review of other licensee and Transco documents including the licensee's subbidder Package No. 147 dated February 18, 1982, covering cable Penetration Seals and Conduit End Seals, and Transco Penetration Seal Quality Assurance Procedures (PSQAP) No. 2.0, Revisions 2 and 3.

The review of the licensee's Subbidder Package No. 147 showed that Transco was the successful bidder for the installation of penetration fire seals by CECO Purchase Order 261691 dated May 14, 1982. The licensee required the successful bidder (Quality Control Division Section) to submit their Quality Control Program including a list of pertinent Quality Control Procedures which were to be used in the design, installation, testing, and manufacture of the equipment and materials covered by the specification. The subbidder

package prevented any work from starting until the Station Construction Superintendent reviewed and accepted the Quality Control Procedures. The Station Construction Project Superintendent did accept Transco's Quality Control Procedures which did not include a reference regarding ANSI N45.2.6. However, it was determined by the inspector's through discussions held with the licensee and Transco personnel that on approximately July 10, 1984, at the request of a member of CECO's Station Technical Staff that Transco revise their QA Manual to include a reference to ANSI N45.2.6, which was done as part of Revision 2. In the inspectors review of PSQAP 2.0, Revision 2, a reference to ANSI N45.2.6 stating in Section 2.3.3, "Minimum inspector qualifications are as stated in ANSI N45.2.6" was inserted. Revision 3 of PSQAP No. 2.0 removed the reference to ANSI N45.2.6. The inspector's questioned the intent of including ANSI N45.2.6 in Revision 2 but deleting it from Revision 3.

The inspector's contacted the CECO Station Technical Staff member who requested the ANSI requirement be included in Transco's Procedures. It was the inspector's understanding that the Technical Staff member was unaware of Byron Station penetration fire seal requirements and at the time believed penetration fire seals were considered safety related. However, the inspectors determined that the penetration fire seal installations were not considered safety-related (as discussed in paragraph 3) as understood and accepted by NRR through CECO's QA Program requirements.

It was the inspector's conclusion that the allegor's concern that CECO was not requiring Transco's QC inspection personnel to be certified in accordance with ANSI N45.2.6 was substantiated; however, based on the inspector's review, the penetration seals being installed by Transco were not safety-related (discussed in paragraph 3). Therefore, neither the NRC or the licensee required Transco fire penetration seal inspectors to be certified in accordance with ANSI N45.2.6. Further, the inspector's review of the inspection requirements required of the Transco QC inspectors including their qualification packages indicated that the Transco QC inspectors were qualified to perform their assigned tasks. This allegation is considered closed.

No other items of noncompliance or deviations were identified.

5. Acceptance Criteria for Firecode CT Gypsum Cement Fire Stops

Previous inspection experience at other nuclear plants has identified cracking, shrinkage, and/or separation problems related to penetration fire seal material. In general, it has also been found that adequate acceptance criteria for such problems have not been specified as identified in paragraph 4.a of the report.

By letter dated February 10, 1984 regarding LaSalle County Station, CECO proposed an acceptance criteria for cracks and separations in Firecode CT Gypsum Cement fire seals as less than or equal to 1/32" wide by 1" deep. Thus, only hairline cracks were to be allowed. During a meeting with NRR on November 16, 1983, the 1/32" separation criteria was accepted based on fire test reports submitted to NRR, specifically Transco Fire Test Report No. TR-109 dated April 7, 1983, which documented satisfactory performance of a fire seal with a hairline crack.

To establish a consistent acceptance criteria for Firecode CT Gypsum Cement, the inspector requested the licensee to propose specific acceptance criteria for performing the final inspections of fire seal installations at Byron. According to the Transco QC Manager a recent Transco test indicated that a 1/16" wide separation was acceptable. The licensee has employed the services of M&M Protection Consultants to review the results of the Transco Test Report Numbered TR-150 dated July 20, 1984, which documented this test.

On October 26, 1984, during a telephone call between a representative of NRC-Region III and a representative of M&M Protection Consultants, Byron's acceptance criteria for firecode CT Gypsum fire seals was discussed. This discussion included the previously approved LaSalle acceptance criteria and the most recent test data results applicable to Firecode CT Gypsum. Based on this discussion the following was agreed upon:

- (1) Cracks and/or separations greater than 1/16" wide by less than the full depth of the penetration fire seal would be repaired.
- (2) Cracks and/or separations greater than 1/32" but less than 1/16" wide and less than the full depth of the penetration fire seal would require a depth criteria as determined by test data.
- (3) Cracks and/or separations less than or equal to 1/32" wide by 1" deep will not require a repair.

Based on the inspector's verification on December 10, 1984, that Step 9.3.13(g) of Transco's PSQAP No. 9.1 does now address the amount of cracking (less than 1/32") as determined by test data, this item is considered resolved.

An additional concern was raised by the inspector regarding the acceptability of installing Firecode CT Gypsum cement and/or Silicone material in a conduit bend. To resolve this concern, Transco conducted a fire test on November 20, 1984 at Construction Technology Laboratories Fire Research Laboratory. The licensee has also employed the services of M&M Protection Consultants to review the results of this test with regard to evaluating the acceptability of installing Firecode CT Gypsum cement or Silicone material in a conduit bend. The inspectors reviewed test Report No. TR-161 and M and M Protection Consultants letter dated December 10, 1984 in which two penetration conduits (penetration G and H) having seals within the conduits and within the bend area were tested and found to meet the acceptance criteria in accordance with IEEE-634 Standard. The licensee acknowledged that no penetration assembly configurations installed at Byron Station are larger than or with less sealant material than can be supported by fire test data. Based on the above information, this item is considered resolved.

No items of noncompliance or deviations were identified.

6. 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. An open item disclosed during this inspection is discussed in Paragraph 4.b.

7. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) on October 13, December 10, 1984, and January 4, 1985. The inspectors summarized the scope and findings of the inspection. The licensee acknowledged these findings.