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January 12, 1984

Mr. A. Bert Davis
Assistant Regional Administrator
U.S. Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, IL 60137

Subject: Braidwood Station Units 1 and 2
Response to Region III Concerns in the
Areas of Piping, HVAC and Electrical
NRC Docket Nos. 50-456/457

Dear Mr. Davis:

During the meeting held in your offices on December 20, 1983, the Commonwealth Edison Company was provided an opportunity to discuss the recent Region III inspection findings in the areas of piping, electrical and HVAC relative to our Braidwood Station. During that meeting, our presentations provided the Region with an overview of many positive actions that we have and are currently taking at Braidwood Station relative to these inspection findings. The purpose of this letter is to briefly address each item of concern individually as we now understand it.

As discussed on December 20, 1983, and in the Enclosures to this letter, Commonwealth Edison does acknowledge and concur in some of the inspection findings. However, for certain of the findings, we do not agree with the Region's conclusions. We are hopeful that the enclosed information will enable you and your Staff to further evaluate the merit of your inspection findings in such instances.

In most cases, the information provided in the Enclosures merely summarizes our position. We are available to further discuss these matters at your convenience and have documentation in support of our conclusions available for your inspection on site.

Very truly yours,

Louis O. DelGeorge
Louis O. DelGeorge
Assistant Vice-President

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Enclosures

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OVERVIEW

We appreciated the opportunity to present our story to you at the Enforcement Conference in your Region III offices on December 20, 1983. It was our intent to demonstrate to you at that time that building quality into the Braidwood Project has been in the forefront of our thinking and that we have taken many far-reaching steps since the August, 1982 Enforcement Conference. These started with extensive evaluations and management reviews, including the Technical Support Group evaluation of the Quality Control program and work activity effectiveness of each contractor, and the Daniels Construction Company's independent review of Phillips, Getschow traveler and hanger retro-fit documentation and Quality Control's ability to support the construction effort. The steps taken continued with Edison site management changes which drew heavily on LaSalle County and Byron experience. In addition, and most importantly, extensive changes and additions were made in the site contractors' organizations, primarily but not exclusively in the Quality Control/Quality Assurance areas. These additions looked to prior nuclear construction experience to strengthen the site contractor management. This new experience at Getschow has helped in totally revising the traveler preparation and processing by establishing a document station concept. Concurrently with these changes, large programs of re-inspection, re-qualifications and review were begun. Some examples of these were the equipment re-inspection and hanger retro-fit programs with Getschow, the inspection documentation review at Comstock and the hanger retro-fit effort at Pullman.

The point to be made is that many changes were in process and were to the point of bearing fruit when your inspectors visited the site during several inspections in 1983 and expressed the concerns cited on December 20, 1983. Some of these we had already identified; most we had not.

However, several of those concerns identified we feel we would have found as new procedures, practices and management systems were setup. In addition, many of the concerns we disagree with, some with regard to the essential facts but more so in the characterization of the concern as a basis for non-compliance. We might summarize all this as follows:

a) Concerns we believe we had previously identified:

HVAC - No. 5

Electrical - Nos. 1 and 4.c)

Small Bore - Nos. 5.a) and 5.b)

Large Bore - No. 1.a)

b) Concerns identified during recent NRC inspections which we had not previously identified:

Electrical - Nos. 1., 3.d), 3.f), 4.a), 4.b)*, 5.a), 5.b)*

Small Bore - Nos. 1.*, 2.b)*, 2.c), 3., 4.a), 4.b)*, 5.c), 5.d), 7.b), 8.

Large Bore - Nos. 1.b), 2.

* We believe we would have found as new procedures, practices and management systems were setup.

c) Concerns which we do not agree with or do not consider bases for Non-Compliance:

HVAC - Nos. 1., 2., 3., 4., 6., 7., 8.

Electrical - Nos. 3.a), 3.b), 3.c), 3.e), 6.a), 6.b)

Small Bore - Nos. 2.a), 6

We have attached our responses to the individual concerns expressed by your staff at the December 20th Enforcement Conference. In the discussion we have attempted to clarify the issue involved, where necessary, and cited whether we agree or disagree. We trust that this meets with your request that we be more responsive to the individual concerns.

With this additional information, and review of the various quality verification efforts initiated since August, 1982, we trust that you will recognize the effectiveness of the re-inspection and verification programs and the controls that are now in place, so that you will be confident with both.

SMALL BORE PIPING

1. Phillips, Getschow Company training program was inadequate based on numerous errors identified in the Phillips, Getschow Company hanger calculations and considering the fact that all present hanger selectors did not have prior design experience. Criteria 2.

DISCUSSION

Commonwealth Edison Company (CECo) will not dispute the NRC assessment that the Phillips, Getschow Company (PGCo) training program was inadequate. This assessment was based on, (1) numerous errors identified in Phillips, Getschow Company piping support selection calculations and (2) the NRC's opinion that the present hanger selectors should have prior design experience. Commonwealth Edison Company Site Quality Assurance Audit No. 83-33 (July, 1983) identified the need for training program improvements.

Phillips, Getschow Company procedure PGCP-22, 2" and Under and 2 1/2" - 4" Process and Instrument Line Supports in Category I Buildings, Revision 7, dated April 16, 1983, required the Field Engineer supervisor to be responsible for training of qualified personnel to perform piping layout and support selection. Phillips, Getschow Company Procedure, PGCP-29, Qualifying and Training Procedure for PG Field Hanger Selection Personnel was referenced in PGCP-22, Revision 7. The training procedure, PGCP-29, establishes the qualification and training requirements for personnel performing support selections. The basic requirements for support selection personnel include the following:

- a. experience of one (1) year in support selection or a high school education.
- b. documented training in PGCP-22.
- c. familiarization with applicable project documents (i.e. piping line lists, piping design tables, support detail drawings, etc.).
- d. documented on-the-job training.
- e. proficiency requirements/reviews.

Commonwealth Edison Company Site Quality Assurance performed an implementation verification of PGCP-29 in their Audit No. 20-82-15.

A review of training records shows the active and inactive support selectors in October, 1983 had the necessary training per PGCP-29. These records are available at the site for NRC review.

The need for prior design experience for support selection personnel is a subjective assessment by the NRC. The procedure which established the qualification and training requirements underwent multi-level reviews within Phillips, Getschow Company, Commonwealth Edison Company and Sargent and Lundy. The consensus of the qualified reviewers was that the qualification and training requirements within the procedure are adequate for the type of support selection activity being conducted by Phillips, Getschow Company. Prior design experience is still not a requirement for support selectors today. We request the NRC re-evaluate this basis (i.e. subjective assessment) upon which the training non-compliance is given.

CORRECTIVE ACTION TAKEN AND RESULTS ACHIEVED

Commonwealth Edison Company issued a stop work order on Phillips, Getschow Company support selection activities until procedural and training aspects had been improved.

Sargent and Lundy completed an independent review of previous process piping support selections. This review amounted to an independent design check of Phillips, Getschow Company support selection work. The independent review results are available at the site.

Phillips, Getschow Company has re-written PGCP-22 (Rev. 8) to enhance the procedure itself, as well as its implementation and training aspects. The procedure re-write reflects improvements by the new Phillips, Getschow Company management and input from Sargent and Lundy to clarify any support selection guidelines. The procedure now specifies a more consistent methodology by which a selector could better select and document calculations for individual supports. It highlights and reinforces the Sargent and Lundy requirements to the selector so he could more effectively select and calculate supports. Additionally, training requirements of PGCP-29 have been written into PGCP-22 (PGCP-29 has been deleted) and training has been expanded in scope, quantity and intensity, including the addition of a proficiency test. All selector personnel have been re-trained to PGCP-22,

Revision 8. A total review of newly completed support selection has been conducted by Sargent and Lundy and Commonwealth Edison Company to ensure correct procedural implementation. All reviews and audits show acceptable implementation of PGCP-22, Revision 8.

CORRECTIVE ACTION TAKEN TO AVOID RECURRENCE

Commonwealth Edison Company Site Quality Assurance verified 100% personnel qualifications of support selectors. This verification included the checking that education, training and testing requirements of PGCP-22, Revision 8 are being met.

Commonwealth Edison Company will conduct a technical audit prior to April 30, 1984 of the Phillips, Getschow Company support selection activities. The audit results will indicate the effectiveness of the enhanced training program. If required, further corrective measures will be taken.

DATE WHEN ALL CORRECTIVE ACTION WILL BE COMPLETE

All procedural changes and re-training has been completed. The audit results and any further recommended corrective actions will be complete prior to May 15, 1984.

- 2.a) Programs and Procedures established by Commonwealth Edison Company and Sargent and Lundy did not provide sufficient assessments and verifications of the Phillips, Getschow Company design capabilities prior to authorizing field routing in Class II and III Small Bore Piping and field design of support/restraints. The lack of assessments and verification resulted in inadequate understanding of the Sargent and Lundy specifications by Phillips, Getschow Company to insure the field routing of small bore piping was performed within the design requirements. Furthermore, the result of the present field routing of Class II and III Small Bore Pipes without detail drawings being issued by Sargent and Lundy or Phillips, Getschow Company resulted in the licensee established QA program requirements being bypassed.

DISCUSSION

Commonwealth Edison Company (CECO) does not agree with the above Finding.

The NRC contends Phillips, Getschow Company is performing design activities during the field routing of Class II and III small bore piping and during support selection activities. In the October 24, 1983 meeting held with NRC representatives, Commonwealth Edison Company stated the Specification wording allowed Phillips, Getschow Company to re-route small bore piping when required to clear conflicts or interferences within certain pre-approved guidelines given in the specification, which when followed, do not compromise the design basis of the piping. The conceptual piping routing drawing, when used in conjunction with the specification, constitutes an approved design drawing at all times. Commonwealth Edison Company showed how the specification wording was sufficient such that the re-routed piping met three (3) design checks (functionality, seismic interaction and piping stress). We believed there was an understanding between Commonwealth Edison Company and the NRC that the Phillips, Getschow Company re-routing activities were not design activities and not in violation of established Quality Assurance program requirements.

Additionally, during the October 24, 1983 meeting Commonwealth Edison Company/Sargent and Lundy presented how the support selection guidelines given to Phillips, Getschow Company to select supports are analogous to a construction drawing. Sargent and Lundy authorized the support selection guidelines. They represent a pre-calculated, pre-approved set of span length and support type selection rules which Phillips, Getschow Company must follow. Phillips, Getschow Company cannot deviate from the rules to create unique support location and types. The legal authority (i.e. Professional Engineer's stamp) remains with Sargent and Lundy and the guidelines. Phillips, Getschow Company does not Professional Engineer stamp the support drawings generated in the selection process. They are not the design organization. Again, we believed there was an understanding between Commonwealth Edison Company and the NRC that the Phillips, Getschow Company support selection activities were not design activities.

During the December 20, 1983 Enforcement Conference, Commonwealth Edison Company presented a chart showing the difference between LaSalle County Station and Braidwood Station small bore piping support design activities. The purpose of this chart was to show the definitive difference between work scopes at the two (2) sites. This definitive work scope difference resulted because of assessments made by Commonwealth Edison Company and Sargent and Lundy that small bore piping support "design" activities should remain with the Architect-Engineer and should not be placed with the Piping Contractor.

Commonwealth Edison Company plans no additional corrective actions regarding their programs for assessing contractor capabilities. We will continue to monitor and verify compliance of contractor activities with specification requirements.

- 2.b) The present Phillips, Getschow Company implementing procedures for small bore pipe, lacked specific quantitative field design installation and inspection criteria to provide clearance and or separation from equipment and components as required by Sargent and Lundy specification, F/L-2739, Paragraph 301.11.

DISCUSSION

PGCP-40, Verification Preparation and Transmittal of "As Constructed" Drawings, Revision 0, dated May 31, 1983 included a requirement to note on the "as-constructed" drawing when the piping installation was within 3" of another installation and indicate the point of that condition. This post-installation check went beyond the current specification requirement and did provide the Architect-Engineer the opportunity to evaluate clearance of piping from other installations.

It should be noted that Phillips, Getschow Company Procedure QCP-B21 did include qualitative clearance requirements and these were understood by the crafts.

CORRECTIVE ACTION TAKEN AND RESULTS ACHIEVED

Sargent and Lundy specification F/L-2739 will be revised to require a minimum 3" clearance requirement of piping components from all other installations. Phillips, Getschow Company will revise their piping installation procedures to require a contractor engineering department review of proposed field re-routes for conformance with specification requirements prior to installation. The notation of piping installations within 3" of another installation per PGCP-40 will determine if previous installations meet necessary clearance requirements. Final quality control inspections of new installations will include a clearance inspection.

CORRECTIVE ACTION TAKEN TO PREVENT RECURRENCE

Implementation of revised piping installation procedures should assure proper clearance requirements are reviewed prior to re-routing and checked at the installation.

Commonwealth Edison Company and Sargent and Lundy plan to conduct an assessment to ascertain if other site contractors specifications/drawings adequately define component clearance requirements. Additionally, a comprehensive plant walkdown is planned prior to Fuel Load to ascertain and resolve any apparent component clearance problems.

DATE CORRECTIVE ACTIONS WILL BE COMPLETED

Specification F/L-2739 and Phillips, Getschow Company procedural revisions are in progress and will be complete prior to February 1, 1984. The assessment of other site contractors will be completed prior to March 15, 1984. The comprehensive plant walkdown and any required corrective work will be complete prior to Fuel Load.

- 2.c) PGCP-22 Requirements were not completely followed for calculations for lines 1CCE3AA-1/2", 1CCE3BA-1/2", 1DOD8BC-2", and 1DOD8BA-01. Criteria 3.

CORRECTIVE ACTION TAKEN AND RESULTS ACHIEVED

The supports for lines 1CCE3AA-1/2", 1CCE3BA-1/2", 1DOD8BC-2" and 1DOD8BA-01 have been sent to Sargent and Lundy for review. Sargent and Lundy has also conducted a review of all Phillips, Getschow Company support selections on process piping. Their review indicated of 172 supports, 3 supports require installation tolerance adjustment and 14 supports require re-calculation to the revised Phillips, Getschow Company support selection procedure. A field review showed the three (3) supports were installed within the revised installation tolerance. The re-calculation of the fourteen (14) other supports is in process.

Commonwealth Edison Company Site Quality Assurance performed a special audit of support selection activities. (Audit No. QA-20-83-49.) Although some calculational mistakes were identified, no cases were found which required a physical change to installed supports.

CORRECTIVE ACTION TAKEN TO PREVENT RECURRENCE

Sargent and Lundy has revised the piping support guidelines to better clarify their requirements so support selectors do not need to interpret the guidelines. Procedure PGCP-22 has been re-written to enhance the procedure itself, as well as it's implementation and training aspects. The procedural revision provided for better calculational consistency and reduced the chance for error. Extensive re-training has been given to support selection personnel. Additionally, Commonwealth Edison Company will conduct a special technical audit of Phillips, Getschow Company support selection activities. Lastly, Site Quality Assurance will continue to monitor support selection activities by audit and surveillance.

DATE CORRECTIVE ACTIONS WILL BE COMPLETED

The guideline changes, procedural changes and re-training have been completed. The Commonwealth Edison Company technical audit and any necessary corrective actions will be completed prior to May 15, 1984.

3. Field Engineer authorities, duties, and qualifications were not fully delineated in the Phillips, Getschow Company Quality Assurance Manual Revision 0, dated August 26, 1983. Some of the specific work functions being performed by field engineering/craft personnel such as pipe hanger design and calculations were not adequately described in the Phillips, Getschow Company Quality Assurance Manual or Phillips, Getschow Company Procedures. Criteria 4.

DISCUSSION

Commonwealth Edison Company does agree that the field engineer authorities, duties and qualifications could have been more fully delineated in the Phillips, Getschow Company Quality Assurance Manual, dated August 26, 1983. We do not believe that pipe hanger design and calculations were being performed by craft personnel. The Finding should be corrected to delete the reference to craft personnel.

CORRECTIVE ACTION TAKEN AND RESULTS ACHIEVED

Phillips, Getschow Company has initiated a change to their Quality Assurance Manual changing Section 1.19, "Field Engineer" to read "Project Engineer". His duties are explained in the general terms in the Quality Assurance Manual. Phillips, Getschow Company Work Instruction PGWI-4, Revision 0, dated December 23, 1983, Engineering Personnel Qualifications and Review Criteria for Responsibility Assignment, more fully delineates the duties of the Engineering Department personnel.

CORRECTIVE ACTION TAKEN TO PREVENT RECURRENCE

Phillips, Getschow Company has initiated broad management changes within their site organization on August 1, 1983. The new management is reviewing all job functions and responsibilities with the goal of better defining an individual's job function and responsibility. This review will result in a more structured organization.

DATE FULL COMPLIANCE WILL BE ACHIEVED

Phillips, Getschow Company, management reviews and re-organizations are complete.

- 4.a) The use of the Phillips, Getschow Company uncontrolled information request system in lieu of the formal field change request system to request and receive approval on safety-related design changes bypassed the licensee Quality Assurance program requirements established in QP 3-1, there were also cases where verbal instructions have altered the approved design procedure and out of date engineering change notices were utilized in hanger calculations.

CORRECTIVE ACTION TAKEN AND RESULTS ACHIEVED

Phillips, Getschow Company initiated a review of all previous Information Requests (IR) to ascertain whether other design information was obtained via the IR system. The review will include a check to ensure any applicable design information has been incorporated into permanent design drawings and specifications. The Phillips, Getschow Company Information Request form has been revised to include the requirement that design information must be transmitted via an Engineering Change Notice (ECN) or Field Change Request (FCR) and the IR itself cannot direct design change actions.

Phillips, Getschow Company Personnel training specific programs now include instructions stating that "verbal instructions cannot alter design documents being utilized".

A review was made of design documents being utilized by Engineering Department personnel. Any out-of-date documents have been purged. Procedure PGCP-22, Revision 8, Section 7.8 specifically addresses these concerns, plus Phillips, Getschow Company Procedure, PGCP1.1, Control of Engineering Change Notices (ECN), Field Change Notices (FCN), Field Change Requests (FCR) and Field Problem Reports (FPR) were revised to more tightly control the usage of design documents. A Work Instruction, PGWI-3, Clarification and Augmentation of PG Design Change Revision Review - (ECN, FCN, FCR, DRN, Specification Changes, Etc.) was written to describe and clarify the method by which Change Documents are reviewed and processed by the Field Engineering Supervisor (Project Engineer).

CORRECTIVE ACTION TAKEN TO PREVENT RECURRENCE

An increased emphasis has been placed on document control with the Phillips, Getschow Company organization. The management, organizational and procedural changes which have taken place should prevent future document control problems.

DATE FULL COMPLIANCE WILL BE ACHIEVED

The management, organizational and procedural changes are complete. Personnel training is complete. The IR review and any required dispositions will be complete prior to June 1, 1984.

- 4.b) Craft personnel had been deviating from drawings by re-routing ASME Section III, Class II and III 2" and Under Piping Lines, assigning weld numbers and adding material were resulted in lack of engineering control for approving, updating and releasing drawings. Decisions to re-route pipe which involved considerations such as ability to support valve accessibility and piping contacts/separations with other items important to safety were being made during the installation processed by craft personnel not trained in engineering requirements. Criteria 4 and 2.

DISCUSSION

The Phillips, Getschow Company re-routing of ASME, Class II and III, small bore piping is allowed by Specification F/L-2739. Phillips, Getschow Company procedure, QCP-B21, Installation and/or Field Routing of Two Inch and Under Process Piping Systems - ASME Classes 1, 2, and 3 reflect the specification requirements and procedural controls necessary to conduct re-routing. These controls involve drawing changes by Production, review of weld and bend additions or deletions by Quality Control and the ANI and red line marking of actual field routed conditions. Commonwealth Edison Company agrees a review of proposed field re-routes by the contractor Engineering Department does add more assurance that important safety considerations are not bypassed.

CORRECTIVE ACTION TAKEN AND RESULTS ACHIEVED

Phillips, Getschow Company procedure, QCP-B21 was revised via Supplement, Revision 2, dated July 23, 1983 to require Phillips, Getschow Company Engineering Department review and approval of piping re-routes prior to installation. The method of Engineering Department review was further enhanced in Revision 6 to QCP-B21, dated October 10, 1983. The as-built routing of previous piping installations is currently being recorded. This work is being done to Phillips, Getschow Company Procedure PGCP-40, Verification, Preparation and Transmittal of "As-Constructed" Drawings. The procedure establishes the criteria for quality control verification of dimensional piping configurations including clearances.

CORRECTIVE ACTION TAKEN TO PREVENT RECCURANCE

QCP-B21, Revision 6, greatly increases the Engineering Department involvement in the preparation of initial small bore piping installation packages, the review of proposed re-routes and the preparation of revised small bore piping installation packages. Additionally, the re-organization of the Phillips, Getschow Company Engineering Department, plus the addition of personnel, has led to greater contractor engineering involvement in the Phillips, Getschow Company day-to-day activities.

DATE FULL COMPLIANCE WILL BE ACHIEVED

The organizational and procedural changes are nearly complete. Full implementation of QCP-B21, Revision 6 will be complete prior to February 1, 1984. As-builts of previous installations will be complete prior to February 28, 1984.

- 5.a) An inspection program had not been established and executed for quality control to verify correct material installation for 2" and under safety-related piping. Contrary to ASME Section III NA-451G and Commonwealth Edison Company QR No. 10.

DISCUSSION

Phillips, Getschow Company (PGCo) Procedure QCP-B21, Installation and/or Field Routing of Two Inch and Under Process Piping Systems - ASME Classes 1, 2 and 3, established the procedural controls for inspection and verification of correct small bore process piping material. Phillips, Getschow Company Audit No. 83-BR3 (April 26, 1983) identified a Finding, whereby the verification on the Production drawing of different heat numbers in the case where more than one (1) heat number per drawing was being used was not completed. In response to NRC concerns related to material traceability, Commonwealth Edison Company filed a potential 50.55(e) deficiency in July, 1983. This 50.55(e) stated Quality Control verification of heat or mark numbers of installed piping systems was not adequately documented.

CORRECTIVE ACTIONS TAKEN AND RESULTS ACHIEVED

Procedure QCP-B21 was revised in June, 1983 to require verification of Code small bore material heat numbers on drawings. Specifically, the Quality Control inspector would verify all entries of traceability numbers made by Production and this verification would be documented by initial and date.

In order to establish a level of confidence that material traceability existed for previous Code small bore installations Phillips, Getschow Company began traceability verifications in August, 1983. This verification was based on random samples of previously installed Code small bore piping selected in accordance with Military Standard MIL-STD-105D.

The definitions below applied to the sampling programs:

Total Items to Verify - total sample number as determined by Military Standard 105D.

Items Verified in the Field - traceability is established since component has physical identification marking existing in the field and can be verified to an approved heat number.

Items verified through documentation traceability - traceability is established by correlation of Stores Request documentation with specific traveler package.

Items verified in the field and through documentation - traceability is established by either physical identification markings in field or correlation of Stores Request documentation with specific traveler package or both methods.

The sample results for small bore piping installations are the following:

Total number of items to verify	- 1415
Total items verified in the field	- 1250 (86.9%)
Total items verified through documentation	- 1383 (97.7%)
Total items verified in the field and through documentation	- 1414 (99.9%)

The conclusions below can be reached from the above sampling:

1. A direct physical identification check today of previously installed piping showed the material was from approved heat numbers for 86.9% of the sample.
2. An indirect documentation check today of previously installed piping showed the material was from approved heat numbers for 97.7% of the sample.
3. Utilizing both methods, previously erected piping was installed with material from approved heat numbers for 99.9% of the sample.
4. Stores Request documentation exists to support the traceability markings verified in the field for the sample cases.

Overall, a high level of confidence was established that material traceability exists for previous Code small bore installations. Recognizing the NRC concerns to show that correct material was utilized for Code small bore piping installations, Commonwealth Edison Company proposes to complete the following verification program for previously (prior to June, 1983) installed Code small bore piping installations.

1. A material verification field walkdown on 100% of previously installed piping will be completed. The material heat number will be recorded and/or verified on the installation drawing by a Quality Control inspector. A check will be made to ensure that the field verified heat number is approved for use at Braidwood Station.
2. A Quality Control verification will be made of field verified material heat numbers against the heat numbers recorded on the Stores Request for each installation package. This verification will establish that material withdrawn from Stores was installed in the correct location.
3. A Quality Control verification will be made of field verified material heat numbers to ensure that the correct material is installed for the specific application.
4. For those cases where material heat markings are no longer available in the field, a Quality Control review will be made of the Stores Request to verify that the material was approved for use at Braidwood Station and was the correct material for specific application.

The necessary installation and quality control documentation will be updated to record the above verification program. Non-conformance reports will be generated to disposition material which cannot be verified by the above program.

CORRECTIVE ACTION TAKEN TO PREVENT RECURRENCE

Installation quality control procedures have been revised to require 100% material identification of Code items by Production and verification by Quality Control on installation drawings.

DATE CORRECTIVE ACTIONS WILL BE COMPLETE

Procedure revisions and training to the revised procedures are complete. The 100% material verification program will be started now and complete prior to Fuel Load.

- 5.b) An inspection program had not been established and executed including field examination for quality control to verify the accuracy of the craft drawn piping re-route as documented in the original design drawing to assure the proper inputs for design and analysis acceptability, contrary to ASME Section III NA-4510 and Commonwealth Edison Company QR No. 10.

DISCUSSION

Phillips, Getschow Company Audit No. 83-BR3 (April 26, 1983) identified a Finding regarding the lack of quality control verification of field routed small bore piping dimensions. In response to the Audit Finding, Phillips, Getschow Company initiated PGCP-40, Verification, Preparation and Transmittal of As-Constructed Drawings. This procedure was approved and implemented in May, 1983. The procedure provided for the quality control verification of previously installed piping.

CORRECTIVE ACTION TAKEN AND RESULTS ACHIEVED

Corrective actions were already underway at the time of the NRC inspection to dimensionally verify piping configuration by Quality Control. These corrective actions were implemented by PGCP-40 for previously installed piping. For new installations the requirement to dimensionally verify installed piping per PGCP-40 was included in QCP-B21 in June, 1983.

CORRECTIVE ACTION TAKEN TO PREVENT RECURRENCE

Phillips, Getschow Company piping installation procedures now include dimensional verification prior to final Quality Control acceptance.

DATE FULL COMPLIANCE WILL BE ACHIEVED

Procedural changes have been completed. The PGCP-40 verification program for previous installations will be complete prior to March 1, 1984.

- 5.c) Random dimensional checks of piping components were not being done by either Phillips, Getschow Company or Commonwealth Edison Company, contrary to ANSI 45.2.2 and Commonwealth Edison Company QP 7-1.

RESPONSE

Commonwealth Edison Company does agree with the above Finding, but feels that it should be put in perspective when viewed against the current receipt inspection activities. Stated below are the receipt inspection checklist activities done by Quality Control.

1.0 Physical Inspection:

- 1.1 Material markings are in accordance with Purchase Order requirements:
- 1.2 CMTR or C of C compared to material for correct identification as to heat or heat code number:
- 1.3 Check end conditions for burrs, scale and defects:
- 1.4 Check I.D. and O.D. surface condition:
- 1.5 Enclosures, where required, intact:

2.0 Documentation Review:

- 2.1 Q.S.C. (M) Number and Expiration date or revision status and date of approved Quality Systems Program indicated on CMTR or C of C:
- 2.2 Chemical and Mechanical test results are in accordance with specification requirements:
- 2.3 C of C reflect material specification, grade, class and heat treated condition, as applicable:
- 2.4 Results of test required by the purchase order and special requirements of the applicable ASME III Sub-Section reported (Charpy Cv impact, Volumetric, NDE, Etc.):
- 2.5 Date of review of C of C or CMTR by the Authorized Nuclear Inspector, as indicated by initials and date:

CORRECTIVE ACTION AND RESULTS ACHIEVED

There have been 120 different small bore pipe heat lots received on site to date. Forty-five (45) heat lots were completely used in non-safety-related areas. Portions of the remaining seventy-five (75) heat lots were used for safety-related applications. All seventy-five (75) heat lots have been dimensionally verified (on a random basis) by Quality Control and all wall thickness checks were found acceptable.

CORRECTIVE ACTION TAKEN TO PREVENT RECURRENCE

Phillips, Getschow Company Procedure QAP-33 Supplement, Revision 1, dated June 24, 1983 provides a Quality Control inspection plan for dimensional verification of piping wall thickness.

DATE CORRECTIVE ACTION WAS COMPLETED

Corrective actions have been completed.

- 5.d) There was no documented record or log specifying that a calibrated instrument was used to measure numerous pipe bends for ovality. Examples include the bends on drawings M-2546C-72, M-2546C-44, M-2546C-42, M-2546C-31, contrary to Phillips, Getschow Company Quality Procedure No. 7. Criteria 10 and 8.

CORRECTIVE ACTION AND RESULT ACHIEVED

The recording of testing equipment I.D. numbers on field travelers has always been required by the Phillips, Getschow Company Quality Assurance Manual. It appears that since a specific blank was not provided on the traveler for the caliper I.D. the I.D number was not recorded. A letter was issued to the field Quality Control on July 5, 1983 by the Quality Control Supervisor instructing the field to indicate the caliper number on the traveler. A review by Phillips, Getschow Company Quality Control determined that none of the calipers used to measure ovality have ever gone out of calibration or required repair/adjustment.

CORRECTIVE ACTION TAKEN TO PREVENT RECURRENCE

Phillips, Getschow Company Quality Procedure 7 Supplement, Revision 4, dated January 3, 1983 was prepared and issued to Commonwealth Edison Company for approval. This supplement requires the Quality Control Inspector to indicate the caliper number on the traveler when inspecting ovality.

DATE CORRECTIVE ACTION WILL BE COMPLETE

The revised procedure will be approved prior to February 1, 1984. Interim measures to assure recording of measuring and test equipment are in place.

6. The use of the uncontrolled information request system by Phillips, Getschow Company in lieu of the Field Change Request System prevented the timely identification and correction of non-conforming conditions. Criteria 15.

DISCUSSION

Commonwealth Edison Company does not understand this Finding for the following reasons:

1. Field Change Requests are not utilized by our program to resolve non-conforming conditions. Our program requires the use of non-conformance reports per Q.P. 15-1.
2. No objective evidence was presented at the December 20, 1983, Enforcement Conference to substantiate the use of Information Requests to resolve non-conforming conditions.

We believe this Finding should be withdrawn by the NRC.

- 7.a) The installation of small bore/instrumentation piping began before March, 1981, and the small bore process piping before July, 1981, the licensee audit did not reveal the PGC0 hanger design problems until two years later on July, 1983, which coincided with Region III inspection. This is evidence that Commonwealth Edison Company's inability to identify and correct non-conformances in a timely manner.

DISCUSSION

Commonwealth Edison Company does not agree with the NRC Finding that problems with the Phillips, Getschow Company support selection program were not identified and correction of identified non-conformances were not done in a timely manner. We would like to clarify the concern. The history presented below represents the Site Quality Assurance Department activity in this area. The history shows that an audit had been conducted and work stopped on safety related instrumentation piping support selection in October, 1981. The history also shows the times when various instrumentation line and small bore process pipe activities had been started. (For example, safety related small bore process piping support selection started in January, 1983). The history demonstrates that Site Quality Assurance was actively involved in this area.

INSTRUMENTATION

Upon approval of Phillips, Getschow Company procedure PGCP-22, Rev. 1. safety-related instrumentation line support selection started in July, 1981. After enough work had been completed so that a representative sample could be taken, this area was checked by Commonwealth Edison Company Quality Assurance in an audit of October, 1981. This audit identified deficiencies that are summarized as follows:

1. Incorrect calculations
2. Improper calculation reviews
3. Three dimensional restraints not used per ECN 2194
4. Adjacent line weights not used in line weight calculations
5. Revision levels of applicable isometric drawings not listed on calculation sheets

6. System component weights obtained from uncontrolled source (uncalibrated scale)
7. Q.C. not monitoring instrument group activities
8. Documented training not given to procedures, PGCP-21 and 22
9. Interface document not clearly written
10. Organization chart in error

The details of these items, including Quality Assurance follow-up work, corrective actions, and item close-outs, are described in the audit close-out surveillance reports. This audit resulted in a stop work action being placed on Phillips, Getschow Company until February, 1982. All items were resolved and closed by March, 1982.

As an additional follow-up to the October, 1981 audit, an audit was performed in July, 1982. The concerns of the October, 1981 audit were re-checked as evidenced by approved checklist questions 1, 2, 3, 4, 5, 10, 11, 12, 14, 15, 16, and 17. All question areas were found acceptably implemented. At that time Commonwealth Edison Company Quality Assurance believed instrument support selection was being done in an acceptable manner and Phillips, Getschow Company was implementing their procedures in this area.

INSTRUMENTATION AND SMALL BORE

Small Bore Process Pipe support selection started in January, 1983 upon approval of Revision 2 of PGCP-22 which then added support selection for small bore process pipe. Again, after work had been completed so that a representative sample could be taken, small Bore Pipe support selection was checked and instrumentation line support selection re-checked in July, 1983 during audit QA-20-83-33. It was identified that Phillips, Getschow Company Procedure PGCP-22 did not give the step-by-step method for performing support selection calculations; that the procedure did not reference the current applicable ECN (4566); and that information on the calculation sheets was unclear or incomplete. This resulted in PGCP-22 being revised to more specifically define the methodology of performing support selection calculations. Revision 8 of this procedure was given interim approval by Site Quality Assurance on 11-10-83 and was accepted by Sargent and Lundy on 12-2-83.

Though the above deficiencies were identified, for the calculations reviewed, no cases were identified of calculations being incorrectly performed or undersized pipe supports being selected. The first process pipe support package was issued to the field for installation in August, 1983. As of 12-20-83, two hundred forty-nine (249) small bore process pipe supports have been selected with one hundred ninety-three (193) of these issued to Production for installation. This is approximately 6% of the roughly 4,000 small bore process pipe supports to be selected by Phillips, Getschow Company.

Also audit QA-20-83-33 identified that small bore pipe and instrumentation line support selection training files were incomplete. Corrective actions have been defined and implemented to correct this item as well.

As of December, 1983, the areas discussed above are being acceptably performed. Site Quality Assurance will continue to monitor this area to properly assure compliance.

- 7.b) 1/2" S-80, SA-312, Type 304 ASME Boiler Pressure Vessel Code, Section III, Class I NB pipe heat number 745107, was discovered in Section III installations without material test reports or records of receiving receipt inspections by either Commonwealth Edison Company or Phillips, Getschow Company as identified by Phillips, Getschow Company on September 17, 1982, on Non-conformance Report No. 789. The disposition of the non-conformance report resulted in accepting the pipe after only obtaining material test reports without examining the pipe, initiating and maintaining receipt inspection records or determining the total quantity of the pipe in storage and installed. Phillips, Getschow Company recommended scrapping the material. Criteria 16, 7 and 8.

CORRECTIVE ACTION TAKEN AND RESULTS ACHIEVED

Phillips, Getschow Company initiated NCR No. 1128 to document additional disposition of NCR No. 789. NCR No. 1128 requires the generation of a Receiving Inspection Report to document receipt of 746 feet of 1/2 inch, schedule 80, SA-312, Type 304, Heat No. 745107 pipe per Purchase Order No. 207003. Additionally, an ultrasonic test verification to assure correct schedule pipe (Heat No. 745107) was installed per applicable design table will be performed.

CORRECTIVE ACTION TAKEN TO PREVENT RECURRENCE

Phillips, Getschow Company has directed management attention towards improved review and dispositioning of NCR's. Among the changes under review, included are additional training of personnel, procedure and Quality Assurance Manual reviews and re-writes, and the formation of an interdepartmental review board. Additionally, Phillips, Getschow Company Corporate Quality Assurance has initiated a random review of previously closed NCR's.

DATE CORRECTIVE ACTIONS WILL BE COMPLETE

The ultrasonic verifications and any required corrective actions will be complete prior to March 1, 1984. Phillips, Getschow Company management actions will be complete prior to April 1, 1984.

8. Phillips, Getschow Company had not established and executed a plan for auditing the implementing procedures of the Quality Assurance Program on a periodic basis to determine the effectiveness of the program in accordance with the Phillips, Getschow Company Quality Assurance Manual, Section 16. Criteria 18.

DISCUSSION

The Phillips, Getschow Company Quality Assurance Program required all manual sections to be audited over the year period. This requirement fulfilled ASME Code requirements. Audit schedule 1983/1984 period, dated March 17, 1983 provided a schedule with all manual sections on the schedule and a special schedule for process control procedures. The rationale of this schedule was to audit major work activities/procedures associated with manual sections. Commonwealth Edison Company views the requirement to include all procedures in the audit schedule a change from previous interpretations of Criteria 18.

CORRECTIVE ACTION TAKEN AND RESULTS ACHIEVED

Phillips, Getschow Company revised their audit schedule on August 21, 1983 to include auditing of all procedures annually. Procedures not used in the annual period will be designated not applicable at time of audit.

CORRECTIVE ACTION TAKEN TO PREVENT RECURRENCE

Commonwealth Edison Company will verify the implementation of the Phillips, Getschow Company revised Audit Plan through their audits and surveillances.

DATE FULL COMPLIANCE WILL BE ACHIEVED

The revised Audit Plan has been implemented. Commonwealth Edison Company verification will be complete prior to October 1, 1984.

LARGE BORE PIPING

- 1.a) An inspection program had not been established and executed for quality control to verify correct material installation for over 2" safety-related piping, prior to November, 1982.

DISCUSSION

Phillips, Getschow Company during a Quality Assurance Manual revision in November, 1982, added to its large bore piping weld data traveler the requirement for Quality Control to verify material traceability. This requirement was implemented in November, 1982. In June, 1983, wording was added to Phillips, Getschow Company Procedure QAP-16, Control of Installation of Nuclear or Safety-Related Pipe Systems, which formally proceduralized the above requirement. (Note: The verification activity was ongoing since November, 1982.)

CORRECTIVE ACTION TAKEN AND RESULTS ACHIEVED

Commonwealth Edison Company will conduct a 100% material verification program for large bore piping installed prior to November, 1982 which has had Phillips, Getschow Company purchased material added and large bore piping which has been modified with other Southwest Fabricators material. This verification program will be similar to the program outlined above for small bore piping. The goal will be to verify that correct large bore material was installed in the plant.

CORRECTIVE ACTION TAKEN TO PREVENT RECURRENCE

Phillips, Getschow Company has revised their piping installation procedures to include verification of all identification markings by Production and Quality Control.

DATE CORRECTIVE ACTIONS WILL BE COMPLETED

Procedural changes have been made and implemented. The material verification program of pre-November, 1982 large bore piping will be complete prior to Fuel Load.

- 1.5) Random dimensional checks of piping components were not being done by either Phillips, Getschow Company or Commonwealth Edison Company. Criteria 10 and 8.

CORRECTIVE ACTION TAKEN AND RESULTS ACHIEVED

Portions of 124 large bore heat lots were identified in the Phillips, Getschow Company storage area. A 10% sample from each lot was taken to verify dimensional accuracy. All samples were verified acceptable. Records are available in Commonwealth Edison Company MRR packages indicating random large bore dimensional checks prior to 1980 were being taken by Quality Control personnel at receipt inspection.

CORRECTIVE ACTION TAKEN TO PREVENT RECURRENCE

Phillips, Getschow Company Procedure QAP-33 Supplement, Revision 1, dated June 24, 1983 provides a Quality Control Inspection Plan for dimensional verification.

DATE WHEN CORRECTIVE ACTIONS WILL BE COMPLETE

All corrective actions have been completed.

2. Phillips, Getschow Company had not established and executed a plan for auditing implementing procedures of the Quality Assurance Program on a periodic basis to determine the affectiveness of the program in accordance with Phillips, Getschow Company Quality Assurance Maunual, Section 16. Criteria 18.

DISCUSSION

The Phillips, Getschow Company Quality Assurance Program required all manual sections to be audited over the year period. This requirement fulfilled ASME Code requirements. Audit schedule 1983/1984 period, dated March 17, 1983 provided a schedule with all manual sections on the schedule and special schedule for process control procedures. The rationale of this schedule was to audit major work activities/procedures associated with manual sections. Commonwealth Edison Company views the requirement to include all procedures in the audit schedule a change from previous interpretations of Criteria 18.

CORRECTIVE ACTION TAKEN AND RESULTS ACHIEVED

Phillips, Getschow Company revised their audit schedule on August 21, 1983 to include auditing of all procedures annually. Procedures not used in the annual period will be designated not applicable at time of audit.

CORRECTIVE ACTION TAKEN TO PREVENT RECURRENCE

Commonwealth Edison Company will verify the implementation of the Phillips, Getschow Company revised Audit Plan through their audits and surveillances.

DATE FULL COMPLIANCE WILL BE ACHIEVED

The revised Audit Plan has been implemented. Commonwealth Edison Company verification will be complete prior to October 1, 1984.

HVAC

1. Adequate written policies, procedures or instructions had not been established for controlling welding including fit-up during the installation of the HVAC components, and as a result the welding prerequisites for acceptable installations were not met as evidenced by deficient control, inspections, examinations, documentation and corrective action. Criteria 9.

RESPONSE

It is Commonwealth Edison Company's position that adequate procedures were in place to meet the requirements of Sargent and Lundy Specification F/L-2782 and the AWS Code. Pullman Sheet Metal utilized approved welding procedures, trained qualified welders and purchased certified materials. All welds have received a visual inspection by Pullman Quality Control to verify weld acceptability and proper procedure implementation.

CORRECTIVE ACTION

In response to the NRC's concern Commonwealth Edison Company instructed Pullman Sheet Metal to upgrade their program for future work. Pullman revised Procedure B9.4.F to incorporate a process sheet which is utilized to pre-assign the welding procedure and document the filler metal utilized and the welder who performed the work. This procedure was granted interim approval in September, 1983.

In addition, Pullman Sheet Metal expanded their in-process weld inspection program which was originally implemented in February, 1983. When work resumed to Procedure B9.4.F, Revision 4 the in-process weld inspection went to a 100% basis in order to obtain a confidence level for the implementation of the revised program.

DATE OF FULL COMPLIANCE

Full compliance with the NRC's interpretation of AWS Code requirements was met September 28, 1983.

2. Quality Control did not verify through inspection or examination of records that the correct welding material was used in each HVAC component installation or that the correct welding material was requisitioned for each HVAC component to be installed. "(AWS D1.1, Section 6 states that the inspector shall make certain that only material conforming to the requirements of this code are employed)". Criteria 10 and 8.

RESPONSE

Pullman Sheet Metal Quality Control satisfied the requirements of AWS D1.1 by verifying that only certified weld materials were purchased and received on-site. Quality Control also verified that each welder was qualified and they conducted a training class for the welders in each procedure that they were qualified. The training covered base material, filler metal requirements, joint configuration, fitup, etc. In addition, the final visual inspection performed by Pullman revealed no evidence of improper filler metal usage.

CORRECTIVE ACTION

In response to the NRC's concern CECO instructed Pullman Sheet Metal to revise their program. Pullman now controls the issuance of all filler metal utilizing the weld rod issuance log. The welder records the type and heat number of the filler metal used on the process sheet. Additionally, Pullman Sheet Metal Quality Control verifies proper filler metal as part of their in-process weld inspection.

DATE OF FULL COMPLIANCE

Full compliance with the NRC's interpretation of AWS Code requirements was met September 28, 1983.

3. Quality Control did not verify through inspection that welding was being performed by qualified welders, as a result 55 welds have been identified by the HVAC contractor on Non-Conformance Report No. BR-09, dated June 15, 1981, as being welded without knowledge that a qualified welder performed the welding. "(AWS D1.1, Section 6 states that the inspector shall permit welding to be performed only by welders who are properly qualified)". Criteria 10.

RESPONSE

All welders are assigned unique I.D. numbers which they are required to stamp adjacent to the welds they make. During the final visual inspection of the welds Quality Control verifies that the welds are stamped. Non-Conformance Report No. BR-09 is evidence of this inspection. Pullman Sheet Metal Quality Control has inspected over 55,000 welds. We believe that the fact that 55 welds out of 55,000 welds were not stamped does not indicate a significant problem exists. In our interpretation of the AWS Code, Pullman Sheet Metal Quality Control satisfied the requirements of AWS D1.1. by verifying the certification of each welder on-site when he takes his qualification test and conducting a training class for each welder covering weld procedure requirements.

CORRECTIVE ACTION

In response to the NRC's concern Pullman Sheet Metal now records the welder I.D. on the process sheet and Quality Control verifies welder I.D. as part of their in-process weld inspection.

DATE OF FULL COMPLIANCE

Full compliance with the NRC's interpretation of AWS Code requirements was met September 28, 1983.

4. Instructions were not adequate in that the welding procedures to be used for each specific HVAC installation were not prescribed on drawings, travelers, or pre-determined documentation form. Quality Control did not verify through inspection that the acceptable weld procedure was employed for each HVAC installation and did not perform adequate in-process inspection to assure that the welders were complying with the welding procedure essential variables. "(AWS D1.1, Section 6 states that the inspector shall make certain that only welding procedures that meet the requirements of this code are used.)" Criteria 5 and 10.

RESPONSE

It is Commonwealth Edison Company's position that adequate instructions were in place. Each Pullman Sheet Metal welder was qualified on-site and received documented training in the procedure requirements. The Quality Control inspection of all welds has revealed no evidence of improper procedure usage. The in-process inspection that began in February, 1983 has not identified any cases of improper procedure implementation.

CORRECTIVE ACTION

In response to the NRC's concern Commonwealth Edison Company directed Pullman Sheet Metal to upgrade their program. Pullman Sheet Metal revised procedure B9.4.F to incorporate a process sheet which is utilized to pre-assign the welding procedure. In addition, Pullman Sheet Metal Quality Control is performing in-process inspections to verify compliance with the welding procedure requirements. We are presently performing 100% in-process inspections in order to establish a confidence level for the implementation of the new program.

DATE OF FULL COMPLIANCE

Full compliance with the NRC's interpretation of AWS Code requirements was met September 28, 1983.

5. Quality Control did not perform in-process inspections during the HVAC installation to verify fillet metal type, fillet metal size, welding position and welding polarity. "(AWS D1.1, Section 6 states the inspector shall make certain that electrodes are used only in the position and with the type of welding current and polarity for which they are classified.)" Criteria 10.

RESPONSE

The Pullman Sheet Metal Quality Control inspector made certain that the welders were implementing the procedures by verifying that all welders were qualified and that each welder received a training class in each procedure that they were qualified.

Pullman Sheet Metal Quality Control implemented an in-process inspection program in February, 1983. From February, 1983 until July, 1983 Pullman Sheet Metal Quality Control performed 89 in-process inspections. These inspections did not identified any cases where the welder was improperly implementing the welding procedure. These surveillances demonstrate that the training given the welders was effective and that they understood the procedure requirements.

CORRECTIVE ACTION TAKEN

In response to the NRC's concern Pullman Sheet Metal expanded their in-process checklist to specifically address all the essential variables of the applicable welding procedure.

The frequency of in-process inspections has also been increased. We are presently performing 100% in-process inspections. This is being done to establish a confidence level for the implementation of the new program.

DATE OF FULL COMPLIANCE

Full compliance was met September 28, 1983.

6. Quality Control did not inspect HVAC components for fit-up prior to welding on those components for which fit-up tolerances can not be determined after welding, such as all around fillet welds and full penetrations welds. Furthermore, documented instructions to the Quality Control inspectors of fillet gaps after welding was inadequate in that the HVAC contractor visual weld inspection procedure B10.2.F stated that a 3/16" gap was acceptable while AWS D1.1-1977 Section 3.3 states that a 3/16" gap is allowable only if the leg of the fillet weld is increased by the amount of the separation or the contractor demonstrates that the required effective throat has been obtained. "(AWS D1.1 Section 6 states that the inspector shall examine the work to make certain it meets the requirements of Section 3 which included fit-ups.)" Criteria 10 and 5.

RESPONSE

Approximately 90 to 95% of all the HVAC welds can be inspected for fit-up after the weld is completed. Although B10.2.F did not specifically state to check for the increased fillet size, all of the Quality Control inspectors had been trained in the AWS Code requirements and were aware of this.

CORRECTIVE ACTION

Pullman Sheet Metal procedure B10.2.F has been upgraded to specifically address checking for the increased fillet size. Also welds which cannot be checked after welding are now inspected for fit-up prior to welding.

DATE OF FULL COMPLIANCE

Full compliance was met September 28, 1983.

7. Pullman Sheet Metal had not established a corrective action program to assure that conditions adverse to quality such as deficiencies and deviations were identified for significance in and subsequently that the cause of the significant conditions were determined and corrective action taken to preclude repetition.
- a) Through August 4, 1983, 2,513 correction notices had been written by Pullman Sheet Metal for deficiencies and deviations but their Quality Assurance program did not require correction notices to be analyzed for significance. These correction notices included numerous weld deficiencies and deviations.
 - b) Corrective action was not adequate concerning Non-Conformance Report No. BR-08, dated June 15, 1981, since the 55 welds for which the welders were unknown were accepted as is after only a visual examination. The acceptance of a weld by visual examination pursuant to AWS D1.1 is based on the fact that a qualified welder performed the welding in accordance with the qualified process. Criteria 16.

RESPONSE

- a) When Pullman Sheet Metal revised their inspection program changing from a 10% Quality Control inspection to a 100% Quality Control inspection a commitment was made to inspect all welds which had not been Quality Control inspected. The inspections of previous work was completed in May, 1983. These inspections resulted in 1480 correction notices. These correction notices were not trended since they would not be representative of the present level of the work. Prior to this inspection only 39 correction notices had been granted.
- b) Commonwealth Edison Company does not agree that the corrective action for NCR BR-08 was not adequate. We do agree that the explanation for the accept "as is" based on final visual inspection needs to be expanded to explain all the bases behind this disposition.

CORRECTIVE ACTION

- a) Pullman Sheet Metal performed a trend analysis of the 1480 correction notices. This review did not identify any significant problems but it did substantiate the basis of our change from a 10% Quality Control inspection to a 100% inspection.
- b) The basis for the accept "as is" disposition on NCR BR-08 will be expanded to explain all the bases behind the disposition.

DATE OF FULL COMPLIANCE

- a) Full compliance was met August, 1983.
- b) The disposition on NCR BR-08 will be expanded by January 27, 1984.

8. Craft records were not available for weld material traceability. Welding procedures used during production welding and fit-up documentation such as extending the leg of a fillet weld due to a gap over a 1/16 of an inch. Criteria 17.

RESPONSE

It is Commonwealth Edison Company's position that this level of documentation is not required for AWS Code work. The procedures which were in place and the auditing of their implementation provide the necessary controls.

CORRECTIVE ACTION

In response to the NRC's concern Commonwealth Edison Company had Pullman Sheet Metal upgrade their program to utilize a process sheet. The welding procedure is specified on the process sheet and the weld rod type and heat number as well as the welder ID are also recorded.

DATE OF FULL COMPLIANCE

Full compliance was met on September 28, 1983

ELECTRICAL

1. Inadequate measures were established in the drawings located at site Document Station No. 5., were up to four (4) revisions old and were neither returned to Document Control as voided drawings or marked as being voided drawings for information only. L. K. Comstock Quality Assurance Program Manual in Section 4.2 requires voided documents "(drawings)" to be returned to Document Control within three (3) days. Criteria 6.

RESPONSE

The surveillance activities of the Documentation Control Department have been increased. Since July, 1983, sixteen (16) surveillances covering 8,335 drawings involving fifteen (15) documentation stations and a 100% check of the office engineering prints were performed. As a result of the surveillances performed in the field documentation stations 8,335 prints were reviewed and 352 superceded prints were found in the field. (However, 235 of these were in a single document station which is devoted to checking the status of past revision work. As a result, in this station a 100% check of all drawings was performed.)

Additionally, L. K. Comstock Quality Control has performed monthly random drawing control surveillances. Since July, 1983, six (6) have been performed with good results.

CORRECTIVE ACTION TO AVOID FURTHER CONCERN

Continue to perform surveillances by the Document Control and Quality Control Departments.

2. L. K. Comstock auditing activities neither conformed with the comprehensive annual schedule of planned and periodic audits established as required by [L. K. Comstock] Quality Assurance Program Manual Section 4.14.1 to verify compliance with all aspects of the Quality Assurance Program. Criteria 18.

DISCUSSION

Commonwealth Edison Company acknowledges that L. K. Comstock had failed to comply with their 1983 audit schedule. [The inspector acknowledged that Commonwealth Edison Company's audit activities had covered all applicable L. K. Comstock activities.] This shortfall, along with three other Quality Assurance concerns were communicated verbally to L. K. Comstock Quality Assurance in April of 1983 and stated in writing on May 16 the site Quality Assurance Superintendent to L. K. Comstock's Corporate Quality Assurance Manager. (Ref. BRD letter #8/15.) As a result, Comstock placed a regional Quality Assurance manager on site to assume the duties (including auditing) of the site auditor who had resigned effective May 5, 1983 until a replacement could be found.

A review of L. K. Comstock's audit coverage - corporate and site - for 1982 and 1983, shows that a total of 6 Quality Assurance manual subsections and 6 field work procedures hadn't been audited.

For the 6 work procedures,

- 2 were new Procedures as of late 1983 (after the NRC inspection)

- 1 covered silver plating of bus bars (an infrequently performed operation which is subjected to a 100% Quality Control witness)

- 1 covered site organization position delineation

- 1 covered Production's use of a Revision Work Request (However, the subsequent Quality Control inspection of R.W.R.'s had been audited and the work instruction was audited during the week of January 9, 1984 by L. K. Comstock.)

- 1 covered Equipment/Junction Box Installation. (However, the subsequent Quality Control inspection of Equipment erection had been audited and the work instruction was audited during the week of January 9, 1984 by L. K. Comstock.)

Therefore, the active work procedures have been audited by L. K. Comstock at the time of this report.

A review of the 6 Quality Assurance manual subsections not audited by L. K. Comstock showed,

- 1 covered the L. K. Comstock Policy Statement
- 1 covered the overall program description
- 1 defined the program applicability
- 1 covered L. K. Comstock's reporting of Part 21's
- 1 covered the corporate review of the site Quality Assurance program
- 1 covered the corporate Organization Chart

Copies of the objective evidence for the corporate offsite audits were then examined by Commonwealth Edison Company Quality Assurance with L. K. Comstock site Quality Assurance. (This information was not available onsite during the NRC inspection.) This review disclosed that there was objective evidence recorded to support the conclusions stated in the audit reports. Copies of this objective evidence are available at the site as of this date.

CORRECTIVE ACTION TAKEN TO PREVENT RECURRENCE

As a result of Commonwealth Edison Company Quality Assurance concerns predating the NRC inspection, L. K. Comstock has placed two (2) fulltime, qualified auditors on site. (One activated in October, one in November.) Counseling has been given to these auditors by Commonwealth Edison Company Quality Assurance to include more descriptive evaluations of audit results in their audit reports. Additionally, two new site procedure revisions have been implemented to further define the onsite auditing activities and qualification process for site auditors.

L. K. Comstock site Quality Assurance has submitted an audit plan for 1984 which shows that all active safety related activities will be adequately covered.

DATE OF FULL COMPLIANCE

All above actions are complete as of January 9, 1984.

- 3.a) Commonwealth Edison Company failed to assure that criteria for tightening electrical connections as delineated in Commonwealth Edison Company position paper dated January 8, 1982, was not incorporated in electrical Specification F/L 2790 and L. K. Comstock work and inspection procedures.

RESPONSE

Commonwealth Edison Company Project Construction feels the tightening of electrical connections delineated in the January 8, 1982 position paper is being met.

Because of the lack of industry standards and direction in Specification F/L 2790, Commonwealth Edison Company provided requirements on how to tighten electrical connections. The requirement to tighten electrical bolted connections by compressing the lock or star washer is an indication of a good electrical connection. Compression of the lock or star washer is accomplished in a good workmanship like manner.

The requirement to assure electrical connections are "tight" in a "good workmanship manner" is delineated in L. K. Comstock Procedures 4.3.9, (Paragraph 3.1.12.3) and 4.8.9, (inspection check point 3.3. item d).

Although we feel the requirements of the January 8, 1982 position paper are being met, Specification F/L 2790 and the L. K. Comstock procedures will be expanded to clarify the NRC concern.

CORRECTIVE ACTION TAKEN AND ACTION TAKEN TO AVOID FURTHER CONCERN

Revise L. K. Comstock's Procedures 4.3.9, (Paragraph 3.1.12.3) and 4.8.9, (Paragraph 3.3, item d)) to reflect Commonwealth Edison Company directive of January 8, 1982. Clarify Specification F/L 2790 to reflect Commonwealth Edison Company requirements.

DATE OF COMPLETION

Expected date of completion February 1, 1984.

L. K. COMSTOCK & COMPANY, INC.
Q. C. INSPECTION CHECKLIST
OF ELECTRICAL TERMINATIONS

3(a)

Braidwood 4.8.9

CABLE NO. _____

CABLE TYPE CONTROL ☐ POWER ☐ INSTRUMENT ☐ OTHER ☐

CABLE DESCRIPTION _____ SHIELDED ☐ COAX/TRIAX ☐

EQUIPMENT ID _____ TERMINATION FROM ☐ TO ☐

WIRING DIAGRAM NO. _____ REV. _____ DATE _____

ECN, FCR _____ * "OAD" FCR _____ FCR _____

* "OAD" Entry # _____ (If Para. 6.5 is involved) _____

		ACC	REJ	N/A
3.1	CABLE TERMINATION CARD IS CORRECT.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.2	CABLE TERMINATED PER WIRING DIAGRAM RD.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	a) CONDUCTORS PROPERLY COLOR CODED/IDENTIFIED.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	b) SHIELD/DRAIN WIRES TERMINATED CORRECTLY.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.3	Proper lug or connections used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Calibrated _____ Calibrated _____			
	Cal. Due _____ Cal. Due _____			
	Crimp Tool No. _____ Stripper No. _____			
	a) Protective bushings used on conduits.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	b) Stripped conductor inserted into lug to correct length.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	c) Crimp properly formed on lug & facing outward.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	d) Lug connection tight at term point <i>(Compress with star washer as applicable)</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4	CABLE PROPERLY DRESSED, AND SUPPORTED WITH SUFFICIENT SLACK, and no damage to pushed in cables, as applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	a) BEND RADIIUES MAINTAINED.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	b) CABLE ID CORRECT AND CLEARLY VISIBLE.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	c) SPARE CONDUCTOR ARE PROPER LENGTH, COILED, TAPED AND ID'D.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	d) SPECIFIED SEPARATION Identified "CSCR Report" # _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5	IN-PROCESS SPECIAL TERMINATION/SPLICES MADE IN ACCORDANCE WITH APPLICABLE ENG./MANUFACTURERS SPECS. OR INSTRUCTIONS.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	a) PROPER HARDWARE USED.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	b) CORRECT HEAT SHRINK/TAPE APPLIED.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.0	LIQUIDTITE FLEXIBLE METAL CONDUIT COMPLETE.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GROUNDING COMPLETE.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

REMARKS _____

APPROVED BY _____ DATE _____ REVIEWED BY _____ DATE _____

QC INSPECTOR _____ LEVEL II _____

PREPARED HAP	APPROVED RR	REVISED RMS	TITLE PROCEDURE	ORIG. DATE 5/12/80	REV. DATE C (8/22/83)	FORM NBR 36
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3.0 PROCEDURE

- 3.1.9 Before attaching terminations, all current transformers and faultsensing transformers should be installed, with polarizations as designated by one-line diagrams.
- 3.1.10 All appropriate safety precautions shall be observed, including isolation and lockout of electrical potential, provision for adequate lighting and ventilation, protection from moving equipment, adequate scaffolding, fire protection (such as an extinguisher in close reach of the workman) and convenient means to exit an enclosure or restricted compartment, such as a manhole.
- 3.1.11 The terminator shall sign, date and fill out all required information on the termination card. See Attachment 'C1'.
- 3.1.12 Terminations requiring bolted connections such as at switchgear, MCC's and motors, shall be in accordance with approved specification and standards.
- 3.1.12.1 All bolted connections shall use stainless steel hardware unless otherwise specified.
- 3.1.12.2 Hardware shall include a bolt, nut with flat washer at each end and the appropriate lock-washer (split ring or belleville) at the nut end.
- 3.1.12.3 The connection shall be tightened in a good workmanship like manner. *(Compress the lock or star washer)*
- 3.1.13 Any flashing of metal (sharp protrusions) resulting from the compressions should be carefully removed by use of a smooth file.
- 3.1.14 The installing tools and dies shall be as specified in the Ref. Spec. Where UL listing is applicable for the connectors, the manufacturer's instructions relative to the application of the compression dies shall be followed.
- 3.2 Silver plating when required shall be performed per Procedure 4.3.23. I
- 3.3 Attachment of Cable Terminations to bus, etc. ...
- 3.3.1 Surfaces shall mate properly - draw file for flatness if necessary.
- 3.3.2 Contact surfaces shall be bright, clean and free of oxidation.
- 3.3.3 Grease or oil shall be removed from the bus bar using approved non-inflammable degreaser.
- 3.3.4 Application of 'NO-OX-IDA' or similar compounds shall be required if the bus is not plated.

PREPARED	APPROVED	REVISED	TITLE	ORIG. DATE	REV.	PAGE
RAB	RR	JAH	PROCEDURE	05/08/80	B	4 of 11

- 3.b) L. K. Comstock Procedure 4.3.5 failed to address the verification that cables were not damaged and that cable pans are free of all debris prior to installation of cable pan covers.
- 3.c) L. K. Comstock Procedure 4.3.5 failed to address the verification that cable pan covers were installed in accordance with specifications, drawings and standards, and that cable tray splice plate bolts were torqued to project requirements.

RESPONSE

Commonwealth Edison Company Project Construction Department does not feel the NRC concerns warrant an item of non-compliance.

To date no cable pan covers have been installed. However, appropriate L. K. Comstock procedures will be revised to reflect, as a minimum, the following in regards to cable pan cover installation:

- cables not damaged
- cable pan free of debris
- verification of installation of pan covers per specification.

Requirements for pan cover installation/inspection will be similar to the Byron procedure.

CABLE TRAY SPLICE PLATE BOLTS

Procedural requirements to assure cable tray splice plate bolts are tightened to Sargent and Lundy Design Requirements are accomplished as follows:

Sargent and Lundy Specification F/L 2790, Standard EB-702, (Paragraph 3.1.1) describes the requirements of how to tighten splice plate bolts (EB-702 attached). Assurance, that requirements are being met is a two (2) step process consisting of craft personnel and Quality Control inspections. Both installation and inspection procedures (4.3.5 and 4.8.5) reference EB-702 as a requirement. L. K. Comstock Quality Control performs 100% visual inspection of the cable pan installation. Confusion may have resulted because of the wording in L. K. Comstock Inspection Procedure 4.8.5. (Paragraph 6.1) describes an in-process inspection of the installation of cable pan. In-process inspections were performed early in the project when torque requirements were specified and Comstock Quality Control was witnessing craft personnel torque splice plate bolts. Subsequently, splice plate bolt installation has evolved as described in the attached EB-702 standard.

CORRECTIVE ACTION TAKEN AND ACTION TAKEN TO AVOID FURTHER CONCERN

L. K. Comstock's Quality Control Procedure 4.8.5 will be clarified to reflect actual practice consisting of a 100% verification that splice plate bolt heads are in contact with the cable tray surface.

DATE OF COMPLETION

Expected date of completion February 1, 1984.

ERECTION (Cont'd)

- 3.1.1 Sufficient torque shall be applied to pull the ribbed neck splice plate bolts through the cable tray and splice plate until the ribs penetrate the hole periphery and the bolt head is in contact with the cable tray surface. The nut shall then be completely loosened and sufficiently retightened using no larger than a nominal 8 inch wrench to ensure that the cable tray and splice plate fit together tightly.
- 3.2 The Contractor shall use only the splice plates and "H" plate connectors detailed on Sargent & Lundy's Standards Sheets or the Construction Drawings for all connections within the Cable Tray System.
- 3.2.1 Certain cable tray connections require special splice plates, such as when joining cable trays of different widths. Under such conditions, the Contractor shall install the splice plate indicated on Sargent & Lundy's Field Installation Detail Drawings.
- 3.3 If it should be necessary for the Contractor to cut a tray section, it shall be his responsibility to see that new splice plate mounting holes are drilled in the side rails, and that the tray sections are joined as shown on Sargent & Lundy's Field Installation Detail Drawings. At no time shall any cable tray sections, verticals, enclosures, etc., be joined by welding.
- 3.4 The Contractor shall install an "H" Plate Connector, Standard STD-EB-802, at each cable tray splice, as shown on Sargent & Lundy's Field Installation Detail Drawings.
- 3.5 When a bottom stiffener on any tray section interferes with a cable tray support member, such stiffener shall be removed or suitably modified to permit the installation of the support. The support member will serve as the stiffener bar at that point.
- 3.6 Concrete Anchors shown on the Standards, Sketches, and Cable Tray Drawings shall be as specified on Sargent & Lundy's "Standard Specification for Concrete Expansion Anchor Work", Form 1738. Concrete anchors, bolts, self-tapping screws, field welding materials, etc., shall be furnished by the Installation Contractor.
- 3.7 After cable trays are installed on their supports, the trays shall be attached to the support, as shown on Sargent & Lundy's Field Installation Detail Drawings.
- 3.8 After complete erection of the Cable Tray System, the trays shall be inspected, and all sharp edges, weld spots, bolt heads, nuts, etc., that project from the inside tray surfaces, that might damage cables, shall be ground smooth or otherwise suitably eliminated.

SARGENT & LUNDY CABLE TRAY SYSTEM FIELD INSTALLATION SPECIFICATIONS	
DRAWN 578-15	SARGENT & LUNDY CHICAGO, ILL. STANDARD STD-EB-702-B/E
APPROVED <i>[Signature]</i>	
DATE 7-2-72	
REVISED XXXXXX	

- 3.d) The minimum embedded conduit bend radius in Paragraph 3.9 of L. K. Comstock Procedure 4.3.7 violated the minimum conduit bend radius established in Paragraph 3.10 of Sargent and Lundy Standard STD-EF-103.

RESPONSE

Sargent and Lundy Standard EF-103, Paragraph 3.10 references a 2" conduit, with a bend radius of no less than 36". Sargent and Lundy Standard, EB-146 references a 2" conduit bend radius of 24". Both Standards, EF-103 and EB-146 are part of L. K. Comstock's Procedure 4.3.7 and possibly has caused confusion as to what the conduit bend radius should be. Per Sargent and Lundy the requirements in EF-103 are primarily intended to be used in the construction of concrete duct banks, manholes and handholes. Generally, this type of construction is external to any building and may result in longer cable pulls thus affecting maximum allowable pull tension. For the Braidwood Project, EF-103 was used primarily for non-safety related underground construction to the Lake Screenhouse and Switchyard. Because bend radius is a primary factor in determining maximum allowable pull tension it becomes evident that a 36" bend radius would be more desirable for the longer cable pulls.

As stated earlier, the requirements of EF-103 could be confusing. The title not only addresses Duct Banks, Manholes and Handholes, but conduits in concrete floors. L. K. Comstock Procedure 4.3.7 therefore would be inconsistent with EF-103 and correct with respect to EB-146. In either case the intended purpose/design of a conduit system, in general, is to allow routing, physical protection and installation of cable without violating maximum allowed pull tension. This is accomplished, since our procedure for cable pulling establishes the maximum allowable pull tension for cable(s) based on a minimum bend radius of 24" for a 2" conduit.

Project Construction feels the confusion in the Sargent and Lundy Standard and L. K. Comstock procedure has not affected the installation of cable and or may actually restrict the maximum allowable pull tension. Commonwealth Edison Company Project Construction acknowledges the NRC's concern and will clarify the applicable documents (Procedure 4.3.7).

CORRECTIVE ACTION TAKEN AND ACTION TAKEN TO AVOID FURTHER CONCERN

Revise and clarify L. K. Comstock's Procedure 4.3.7 to appropriately reflect the requirements of EF-103.

DATE OF COMPLETION

Expected date of completion February 1, 1984.

3. CONDUIT & DUCT INSTALLATION (Cont'd.)

- 3.7 When offsets greater than $5-5/8^\circ$ (.0982 rad) are required, or when standard manufacturer's bends or curved segments cannot be used, a standard bend shall be cut to fit.
- 3.8 Where the conduits are shown to be fanned out from the normal spacing, such as at the entrance to a manhole or other terminations, the spreading of the conduits in the duct bank shall be confined to the shortest distance permitted by the offset of the tapered joints or by the use of 5° (.0873 rad) offset couplings.
- 3.9 The inside edges of the conduits shall be reamed with a rasp where necessary so that there will be no sharp or rough edges on which the sheath or jacket of cable may be damaged.
- 3.10 Unless otherwise specified on the construction drawings, the radii of bends shall be no less than the following:

Nominal Diameter of Conduit	Radius of Bend
2 inches (51mm)	36 inches (914mm)
3 inches (76mm)	36 inches (914mm)
3½ inches (89mm)	36 inches (914mm)
4 inches (102mm)	36 inches (914mm)
5 inches (127mm)	48 inches (1.219m)
6 inches (152mm)	48 inches (1.219m)

- 3.11 Asbestos-cement electrical ducts shall be terminated with End Bells as shown in Detail 107A of STD-EF-107, unless otherwise shown or indicated on the duct bank Construction Drawings. Plastic type conduits and ducts shall be terminated with Bell Ends of a similar type that will provide a rounded surface for cable pulling and training.
- 3.12 The ends of all conduits shall be suitably plugged or capped at the end of each day's pour to protect them from damage during construction. Ends of conduits which are not to be used for long periods shall be protected from dirt, rodents, etc., by being plugged at both ends with wooden or other suitable plugs. A suitable compound may be used on the plug to make it adhere to the conduit end. A ½" (6.4mm) hole shall be drilled in the lower portion of the plug to provide drainage of the conduit.
- 3.13 All conduits in duct banks shall be thoroughly swabbed immediately after completion of the concrete pouring. After the concrete has set, but before backfilling, a mandrel not less than 4 inches (102mm) long, having a diameter of the nominal inside diameter of the conduit, minus ½ inch (12.7mm), shall be pulled through each conduit. The mandrel shall be lead covered or painted white to give indication of any protrusions on the inside of the conduit that might damage the sheath or jacket of cable.

CONCRETE DUCT BANKS, MANHOLES, HANDHOLES, AND CONDUITS IN CONCRETE FLOORS - SPECIFICATIONS	
DRAWN <u>EEH</u>	SARGENT LUNDY
APPROVED <u>KEE</u>	
DATE <u>2-1-46</u>	STANDARD
REVISED <u>1-21-74</u> <u>4-21-77</u>	
STD-EF-103	

7.1 CONDUIT INSTALLATION (Cont'd)7.2 Steel Conduit (Cont'd)

- 7.2.6 All manufacturer furnished or field-formed steel conduit bends shall conform to the radii shown in the tabulation below, unless otherwise specifically indicated on the Electrical Installation Drawings:

a.	Conduit Trade Size	Bend Radius	Conduit Trade Size	Bend Radius
	1" (25 mm)	12" (305 mm)	3" (76 mm)	36" (914 mm)
	1-1/4" (32 mm)	18" (457 mm)	4" (102 mm)	36" (914 mm)
	1-1/2" (38 mm)	18" (457 mm)	5" (127 mm)	48" (1.22 m)
	2" (51 mm)	24" (610 mm)	6" (152 mm)	48" (1.22 m)
	2-1/2" (64 mm)	24" (610 mm)		

- b. Conduit bends shall be made so the internal diameter of the conduit will not be effectively reduced.
- c. Manufacturer's standard radius elbows (bends) shall not be used unless specifically indicated on the Electrical Installation Drawings.

7.3 Liquidtight Flexible Metal Conduit

- 7.3.1 The minimum length of liquidtight flexible metal conduit installed to equipment shall be 1' (305 mm) per inch (25 mm) of conduit diameter or 18" (457 mm), whichever is greater. The maximum installed length shall not exceed 6' (1.83 m) unless otherwise dimensioned on the Electrical Installation Drawings. Where the Electrical Installation Contractor determines that any of the above requirements cannot be met, the Electrical Installation Contractor shall notify Sargent & Lundy or the Purchaser's Representative.
- 7.3.2 When cutting liquidtight flexible metal conduit, nor portion of the synthetic outer jacket shall be removed from the steel core.
- 7.3.3 Special flexible conduit requirements for containment service conditions shall comply with Paragraph 5.2.5 of this Standard.

7.4 Enclosures

- 7.4.1 Conduit installation shall contain no more than the equivalent of three 90° bends without a pull point in a single conduit run. Junction and pull boxes shall be installed in accordance with the Electrical Installation Drawings, and shall conform to Reference 11.8.
- 7.4.2 Where the Electrical Installation Contractor determines additional pull or junction boxes are required to prevent exceeding maximum cable pulling tension or side wall pressure, he shall select the appropriate junction box and load tables when shown on Electrical Installation Drawings. For special junction or pull box requirements and to record the installation of any contractor selected pull or junction box, the Electrical Installation Contractor shall notify Sargent & Lundy or the Purchaser's Representative.
- 7.4.3 In locations where it may be more practical to install a pull box fitting that requires no additional conduit supports, an O.Z./Gedney type PFV fitting (Reference 11.14) may be substituted for the pull box referred to in Paragraph 7.4.2 of this Standard.

STANDARD SPECIFICATION FOR
THE INSTALLATION OF SEISMIC
CATEGORY I CONDUIT SYSTEMS
CONTAINING CLASS 1E CABLE

DRAWN E.E.H.
APPROVED *[Signature]*
DATE 5-5-75
REVISED 12-28-79

SARGENT & LUNDY

STANDARD

STD-EB-146 6/8

E-FMT-02.3-4/16/74

- 3.e) The requirements of Sargent and Lundy Standard EF-103, Paragraph 3.13 were not reflected in L. K. Comstock Inspection Procedure 4.8.7.

RESPONSE

The requirements of Paragraph 3.13 refer to "Duct Bank" installation. For the Braidwood Project Duct Bank installation was limited to Non-Safety-Related underground construction and is not required to be part of L. K. Comstock procedure 4.8.7. However, cleaning/swabbing of any underground installation is considered good work practice and was performed at the Braidwood Project. To date no problem has been identified with any cable resulting from undesirable protrusions or debris in duct bank installations.

For other embedded conduits installed in all buildings it was and is our practice, as a good work practice, to assure that no burrs or sharp edges remain on the inside of conduits during installation. Verification of this practice is assured during cable pulling. L. K. Comstock's Procedures 4.3.8 (Installations) and 4.8.8 (Inspection) allow for the inspection of cable during the pull.

To date no conduit or cable was replaced because of undesirable protrusions or debris inside of conduit. However, Commonwealth Edison Company Project Construction Department acknowledges the NRC's concern and will expand/clarify L. K. Comstock's procedures to assure L. K. Comstock is more attentive to cable condition as they exit conduit.

DATE OF COMPLETION

February 1, 1984.

- 3.f) L. K. Comstock Procedure 4.3.8 did not address precautions to be taken when pulling small cables "(Less than 100 pound pulling tension)" and did not address the installation of cable grips in vertical conduit runs per Sargent and Lundy Standard STD-EB-200. Criteria 5 and 10.

RESPONSE

Commonwealth Edison Company Project Construction Department feels adequate precautions were taken.

Procedure 4.3.8, Paragraph 3.2.7.2.2 states, "Dynamometers or breakable pull links must be used on all pulls through conduit". This statement applies to all cables including sensitive cable whether hand-pulled or mechanically-pulled.

The only exception to this rule is Paragraph 3.2.7.2.3 - Pushing Cable Through Conduit. For installations where cables are pushed through conduit no tension monitoring devices (link/dynamometer) are required. Pushing of cable is limited to a maximum of 25 feet.

Paragraph 3.2.7.4 - Power Pulls through Tray states, "Dynamometers or breakable pull links must be used on all power pulls through tray". The only exception to this rule is Paragraph 3.2.7.3 - Hand Pulls through Cable Tray. This paragraph allows hand pulling of all cables, including sensitive cables, and describes the process of hand guiding cables. Any cable that is not hand guided around a corner or changes direction, requires tension monitoring devices.

Commonwealth Edison Company Project Construction Department feels the "sensitive cable" issue is adequately addressed.

No further action is required.

CABLE GRIPS IN VERTICAL CONDUIT RUNS

Although the use of cable grips in conduit runs was not addressed in Procedure 4.3.8 it was addressed for vertical pan risers. The intended purpose of Paragraph 3.2.8.5 was to include both risers and conduit as applicable. Procedure 4.3.8, (Paragraph 3.2.8.5) will be revised to include the use of grips in vertical conduit runs.

To date no instances of not using cable grips have been reported/identified.

DATE OF COMPLETION

February 1, 1984.

- 4.a) L. K. Comstock failed to verify that approximately 30 to 40 cable grips in cable tray risers 1R267-C1E, 1R270-K1E, 1R311-C1E, were installed in accordance with S&L standard ST-EB-200 and LKC Procedure 4.3.8.

DISCUSSION

In evaluating the cause of this condition it was determined that re-positioning of cables in the trays listed above caused these cables and grips to move from previously set positions. This same condition can occur again as long as cable activity continues.

CORRECTIVE ACTION TAKEN AND ACTION TO PREVENT RECURRENCE

Immediately after being informed of the cable grip deficiencies the necessary steps were taken to reset the questionable grips. Also, as part of an ongoing survey of all cable grips, the need to check for proper grip setting was included in the survey.

After cable work is complete and cover installation is underway an additional check of grip seating will be made to confirm or reset cable grips. For any newly installed cable grips, procedures will be revised to require field and Quality Control personnel to check previously installed cables for proper seating.

DATE OF COMPLETION

February 1, 1984.

- 4.b) L. K. Comstock failed to verify that tie wraps, bolts, screws, metal bracing, etc., had been removed from the interior of MCC1AP26E, in accordance with L. K. Comstock Procedure 4.3.13, (Paragraph 3.1.7).

CORRECTIVE ACTION TAKEN

MCC1AP26E was cleaned prior to the NRC inspector leaving the site.

CORRECTIVE ACTION TO PREVENT RECURRENCE

We were aware of this condition as a result of an Edison General Office Audit conducted in October of 1983. Training sessions were held concerning storing of materials inside equipment. These sessions addressed new installations and present units whenever additional work is required. It was evident that units previously installed might not be covered for extended periods of time. Discussions with Station personnel were underway to determine responsibility areas for cleaning equipment. This item will be resolved by the end of January, 1984.

Project Construction Department has also provided for PTL inspectors to perform monthly checks of all installed equipment. Any housekeeping deficiencies identified are reported and resolved by applicable craft personnel.

All panels will be re-inspected and cleaned no later than February 29, 1984.

- 4.c) L. K. Comstock failed to verify that inspections had been performed in accordance with L. K. Comstock Procedures 4.8.3, 4.8.6, 4.8.13, and 4.8.17 as evidenced by: 34 items of 71 items reviewed had no records indicating that Quality Control had performed an installation inspection: 29 of 53 items reviewed had no records to indicate that Quality Control had performed a welding inspection: 125 volt DC panel 1DC05E had no records to indicate that PTL had performed an inspection of the concrete expansion anchors: 19 of 19 electrical penetration records did not provide actual torque values to mounting bolts, and did not indicate the torque wrench number utilized. Criteria 5, 10 and 17.

RESPONSE

Commonwealth Edison Company Project Construction Department was aware of the need to assure that timely inspections have been performed in accordance with L. K. Comstock procedures and that results are retrievable.

As early as March, 1982, Commonwealth Edison Company Quality Assurance audits and the Technical Support Evaluation of September, 1982, identified deficiencies indicating the need to improve the L. K. Comstock documentation/filing system.

As a result of identified deficiencies Commonwealth Edison Company felt that improvements could be made in the areas of:

1. Timeliness of records retrievability
2. Better accountability of the production records which support the status of installation
3. Reconcile the use of previously used outdated forms.

In October, 1982 it was determined that progress was poor in the document review. In November of 1982 the L. K. Comstock Quality Control Manager was replaced because he lacked administrative abilities. However, poor progress in the document review continued. In March, 1983, Project Construction Department held a meeting with L. K. Comstock's Regional Vice President and in April, 1983 with L. K. Comstock's Executive Vice President, Corporate Quality Assurance Manager and Regional Vice President to discuss the poor progress being made on the document review. L. K. Comstock committed to provide four (4) inspectors to complete the document review and provide a plan for completion.

The plan to complete the review was submitted to Commonwealth Edison Company for concurrence on March 9, 1983. The plan's scope and depth was to reconcile audit deficiencies of document retrievability, as well as assuring record completeness and correctness.

In June, 1983 Project Construction Department and Quality Assurance met with L. K. Comstock to discuss the status of the document review. It was determined that L. K. Comstock was not progressing as scheduled to meet their September, 1983 completion date. As a result of the June meeting, Commonwealth Edison Company again replaced the L. K. Comstock Quality Control Manager, with intent to more adequately organize and complete the document review as projected for February 1, 1984.

These corrective measures which provide improvements to the L. K. Comstock document system were presented to the NRC (Messrs. Little, Williams and Love) on November 3, 1983 and the program was mentioned on December 20, 1983 during the Enforcement Conference.

To date L. K. Comstock is 88% complete with their review of all documents on file.

125V DC Panel 1DC05E

The NRC Finding that, no inspection records exist for the installation of anchor bolts on panel 1DC05E is correct. However, this panel is not anchor bolted to the floor but welded per the requirements of Sargent and Lundy equipment attachment detail drawing. Weld inspection records are available for review.

Possible confusion with regards to what panel is in question exists. Adjacent to panel 1DC05E is 1DC03E. Panel 1DC03E was inspected on July 7, 1982 per the requirements of L. K. Comstock Procedure 4.8.13.

Electrical Penetrations

Commonwealth Edison Company Project Construction Department acknowledges your concern that penetration records did not provide actual torque values to mounting bolts and did not indicate the torque wrench number utilized is correct. However, Commonwealth Edison Company Project Construction Department feels L. K. Comstock's procedure and method of inspection using qualified inspectors to verify that proper torque values were applied with calibrated instruments is acceptable.

Inspection of the installation of electrical penetrations was completed during an in-process inspection. Verification that craft personnel used calibrated wrenches and torqued penetration bolts to the requirements of Procedure 4.3.17, Table 5-10 was witnessed by a qualified L. K. Comstock Quality Control inspector. Even though torque wrenches were not recorded on inspection checklists, wrenches A181 and 837 were determined to be used during the installation. Review of calibration records show these wrenches were in calibration at the time of use.

- 5.a) Neither an ICR or NCR had been prepared to document damaged lower braces and missing cross bars inside MCC1AP226E.

DISCUSSION

The damaged lower braces and missing cross bars appear to be the same item.

CORRECTIVE ACTION

The missing brace/cross bar was laying in the MCC and was re-installed. An NCR has been prepared to determine the function and requirements of these brace/cross bars as to whether replacement or repair of the bent portions is necessary. All safety-related MCC's will be inspected for any similar damage.

- 5.b) Neither an ICR or NCR had been prepared to document that Class 1E Cable 1CV587 was not terminated per design. The cable was erroneously marked as a spare cable. Records indicate that the termination of this cable had been inspected and accepted by L. K. Comstock QC. Criteria 16.

RESPONSE

Commonwealth Edison Company Project Construction Department acknowledges the NRC concern and offer the following clarification and corrective action taken.

1CV587 was correctly terminated and not marked spare. However, cable 1CV036 was inadvertently not terminated and marked spare. Both cables connect to the same terminal points and caused some confusion to both the terminator and L. K. Comstock inspector. Commonwealth Edison Company Project Construction Department feels this is an isolated occurrence. Furthermore, we believe that Commonwealth Edison Company Operational Analysis Department would have detected the error during electrical test, which has not yet been performed.

CORRECTIVE ACTION TAKEN

L. K. Comstock issued Inspection Correction Report 3440 to identify the discrepancy. ICR 3440 was closed on November 14, 1983.

ACTION TAKEN TO PREVENT FURTHER OCCURENCE

Discussed the nature of the error made with both the terminator and Quality Control inspector. Both individuals were reminded of the need for accuracy.

DATE OF CORRECTIVE ACTIONS

November 14, 1983.

- 6.a) Inside Unit 1 Containment Building at elevation 397' near cold leg number 3, a 2" pipe was being temporarily supported by safety-related conduit C1R2329-1P2E. This support was at about a 45° angle indicating that the piping may have been installed to support the pipe for welding.
- 6.b) Inside Unit 1 Containment Building at elevation 412' radius R12, instrument rack 1PL71J, was being utilized to support 2 step ladders. The step ladders were chained in place so it was not possible to inspect the instrument rack for damage. Criteria 13.

CORRECTIVE ACTION TAKEN FOR 6.a) and 6.b)

- 6.a) Immediately after being informed of the problems the mechanical contractor was notified and the item was corrected before the inspector left the site. No damage to the conduit was observed.
- 6.b) Both step ladders were removed from the instrument rack. No damage to the instrument rack was observed.

Commonwealth Edison Company Project Construction Department feels these items should not be considered as items of Non-Compliance because no damage to equipment was observed. However, Commonwealth Edison Company normal practice is not to use equipment to support construction materials.