

ILLINOIS POWER COMPANY



1605-L
U-10143
CLINTON POWER STATION, P.O. BOX 678, CLINTON, ILLINOIS 61727

June 15, 1984

Docket No. 50-461

Mr. James G. Keppler
Regional Administrator
Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Subject: Potential 10CFR50.55(e) Deficiency 55-82-09
Small Bore/Instrumentation Piping, and
Conduit Support Design Calculations

Dear Mr. Keppler:

On September 2, 1982, Illinois Power notified Mr. P. Pelke, NRC Region III (Ref: IP memorandum Y-13910, 1605-L, dated September 2, 1982) of a potentially reportable deficiency concerning discrepancies identified by Illinois Power in a sample of small bore/instrumentation piping support design calculations performed by Sargent & Lundy (CPS Architect-Engineer). This initial notification was followed by six interim reports (Ref: IP letter, D. P. Hall to J. G. Keppler, U-0555, dated October 1, 1982; IP letter, D. P. Hall to J. G. Keppler, U-10014, dated December 21, 1982; IP letter, D. P. Hall to J. G. Keppler, U-10040, dated March 28, 1983; IP letter, D. P. Hall to J. G. Keppler, U-10071, dated July 6, 1983; IP letter, D. P. Hall to J. G. Keppler, U-10099, 1605-L, dated September 30, 1983; and IP letter, D. P. Hall to J. G. Keppler, U-10117, dated January 12, 1984). Illinois Power's investigation of the above matter is complete and has determined that the issue does not represent a reportable deficiency under 10CFR50.55(e). This letter is submitted as a final report, regarding this potentially reportable deficiency.

Statement of Potentially Reportable Deficiency (Withdrawn)

A review by Illinois Power Nuclear Station Engineering Department (NSED) of calculations performed by Sargent & Lundy (S&L) for small bore/instrumentation piping supports and electrical conduit supports identified errors in the calculations. Resolution of the errors has resulted in physical changes to some piping supports to bring the affected piping subsystems into compliance with the ASME Code. No physical changes to conduit supports were necessary.

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Background/Investigation ResultsSmall Bore/Instrumentation Piping Supports

During August, 1982, IP NSED reviewed a sample of twelve (12) small bore piping support calculations performed by S&L. The calculations are performed to determine small bore pipe support loads, spans between supports, and flexibility for thermal growth. In the course of the review, NSED discovered errors in the calculations. As a result of these findings, S&L performed a review of an additional thirty (30) calculations. This review found similar errors, of which several were in the non-conservative direction. Accordingly, an examination of the issue was started.

A hold was placed by S&L on the release of small bore piping support design documents until corrective action was implemented. S&L performed a review of the 324 safety-related small bore/instrumentation pipe support calculations performed to date and identified 159 calculations which contained non-conservative discrepancies to the requirements of the S&L small piping procedure. To evaluate error significance, these piping designs were further evaluated by S&L using computer analysis or detailed hand calculations, and the results showed that 134 calculations were in compliance with the ASME Code. However, these calculations are being revised to conform with the rules of the small piping procedure in order to ensure that standard design parameters are used throughout the plant. As a result, there will be some hardware changes. The remaining twenty-five (25) calculations were found to be out of compliance with both the small piping procedure and the ASME Code. Calculation revisions are being made, and have resulted in hardware changes to bring the affected subsystems into compliance with the procedure and the ASME Code.

NSED completed a review of S&L's calculations that support and validate the S&L small bore piping procedure. This review identified several areas of the procedure that require improvement or clarification. In addition, a problem was identified with S&L's span and load tables for piping runs between the containment and the auxiliary building. The calculations associated with these problems have been revised, and resulted in one (1) support change. The small bore piping procedure was also revised for clarification and to correct the span and load tables. The revised procedure was reviewed by NSED and found acceptable.

NSED also has performed a review of selected small bore/instrumentation piping support calculations performed under the original program that S&L assessed as technically adequate. Results from this review identified minor problems with the legibility of the calculations. As a result, all 324 calculations are being revised to improve the quality of the records.

A special surveillance was performed by IPQA and NSED which verified that the corrective actions taken by S&L were adequate to prevent recurrence of the types of errors detected in the calculations. As a result, IP authorized S&L to lift the hold on release of design documents for small bore/instrumentation piping supports.

Conduit Supports

As a result of calculation errors identified with small bore piping supports, NSED performed a review of a sample of S&L's conduit support calculations. This review included a review of one-hundred-twenty-five (125) electrical conduit support calculations, comprised of twenty-five (25) selected from each of five (5) seismic category I buildings. The results of this review are tabulated as follows:

I. Calculation conservative, support suitable.....	68
II. Calculation discrepancy, support considered suitable.....	41
III. Calculation discrepancy, support not considered suitable.....	3
IV. Calculation discrepancy, support suitability indeterminate....	13
Total calculations reviewed.....	125

An evaluation of the discrepancies identified in categories II, III, and IV was completed by S&L and showed that, although discrepancies exist, the supports are adequate as designed. However, a hold was imposed by S&L on December 13, 1982 on conduit support calculation activities until corrective action was taken and verified to be acceptable by S&L QA, IPQA, and NSED.

S&L QA performed an audit of conduit support calculation activities and identified errors of the same type as those identified by IP NSED in thirty-six (36) of forty-three (43) calculations reviewed. The results of both the IP NSED surveillance and the S&L audit identified a total of sixteen (16) errors in the calculations that resulted in support loads exceeding the limits of S&L's standard design tables. Further evaluation of these errors by S&L and NSED found that the supports were adequate as designed.

An additional concern was raised during the S&L assessment of the identified calculation errors. It was found that certain base assumptions used in conduit support design were not clearly shown on design drawings or in the electrical installation specification, K-2999. As this information was not provided to Baldwin Associates (CPS Contractor), an inspection of the related hardware attributes to verify conformance with the design assumptions was not made. An Engineering Change Notice (ECN 3360) was issued and incorporated into design documents to

provide technical requirements to assure that conduit support installation agrees with conduit design calculations. A reinspection of installed conduit is being performed to assure that the as-built hardware is in agreement with the new design requirements.

IP QA and NSED surveillances have been performed to verify adequacy of corrective action taken by S&L. These surveillances showed that the corrective action taken by S&L was adequate to prevent recurrence of the types of errors detected in the calculations. As a result, Illinois Power QA authorized S&L to release the hold on conduit support calculations.

A review of the technical adequacy of past S&L work in the area of conduit support design was performed. S&L prepared a plan for reviewing conduit support calculations performed prior to December 13, 1982. This plan was reviewed and approved by Illinois Power QA and NSED. S&L has implemented the plan and a report documenting the review was issued. This report showed that although some discrepancies in conduit support calculations existed, the supports are adequate as designed. NSED evaluated the results of this review and concurred with this assessment.

Generic Actions

As a result of errors found in small bore/instrumentation and conduit support calculations, Sargent & Lundy developed and completed a program of technical reviews and quality assurance audits in other areas of the Clinton design that used procedures similar to the conduit support and small bore pipe support procedures to assure adequacy of the calculations. These areas include:

- a. HVAC supports
- b. Cable tray supports
- c. Large bore pipe support auxiliary steel
- d. Reinforcement of branch connections in piping and welded attachments to piping
- e. Pipe rupture restraints
- f. Expansion anchors

The results of the S&L Technical Evaluation process identified discrepancies in the calculations supporting Clinton Power Station design in several of the above areas. These discrepancies were evaluated by S&L and appropriate corrective action is in progress to correct both the specific errors and generic problems. Several minor hardware changes were required as a result of the evaluation process.

Corrective Action

Corrective action measures have been established and are being taken by Illinois Power and Sargent & Lundy, as follows:

Small Bore/Instrumentation Piping Supports

1. S&L procedures for small bore/instrumentation support design were corrected, expanded, and clarified. These enhancements include: instituting a checklist to be used by the independent reviewer of calculations to assure an adequate review; locating analysts on site to review and concur with procedural interpretations; and locating copies of piping system stress reports at the site for first-hand reference.
2. S&L personnel responsible for preparing and reviewing small bore/instrumentation piping support calculations were given training in the requirements of the revised procedures.
3. Calculations which contain non-conservative errors or legibility problems are being reconciled or revised. This action was authorized by Illinois Power to begin on December 20, 1982, and is essentially complete. Affected design documents and hardware are being revised and corrected as necessary to assure that affected piping subsystems meet the requirements of the small piping procedure and the ASME Code.
4. Technical reviews by IP NSED are being performed on an on-going, sampling basis to monitor technical adequacy of small bore piping support calculations performed by S&L.

Conduit Supports

5. S&L has issued a Project Instruction, PI-CP-045, "Electrical Conduit And Conduit Support Design" that describes how conduit support design rules are to be applied.
6. S&L has issued Electrical Administrative Procedure 35 that formalizes the training program required for conduit and conduit support designers. This training was given to conduit and conduit support design personnel.
7. IP NSED has developed and implemented a plan to perform on-going technical reviews of 10%, or a minimum of one (1) per building, of conduit support calculations performed by S&L during each month, to monitor technical adequacy of the calculations. This plan will be adjusted as experience is gained with the quality of the new calculations.

Generic Actions

8. As a result of discrepancies noted during S&L's Technical Evaluation program, corrective actions to correct these specific discrepancies and their root causes have been identified, and are being implemented.
9. Illinois Power NSED and QA are expanding their technical review/audit activities of S&L's design. To date, design reviews of cable tray support, large bore piping, soil settlement, and structural steel have been conducted, with others scheduled for the future.

Safety Implications/Significance

Significant resources and time were expended in resolving this potentially reportable deficiency. However, these resources would have been engaged in this activity in any event, and this issue provided specific direction to IPC design review efforts.

Hardware changes were made to bring small bore/instrumentation piping subsystems affected by calculation errors into compliance with the ASME Code. However, a review of calculation discrepancies in the areas of electrical conduit supports, small bore/instrumentation piping supports, and in areas evaluated under the Technical Evaluation Program, has been performed by S&L and has shown that the errors, if gone uncorrected, would not have impacted plant safety. Illinois Power NSED has evaluated this S&L review and has concurred with the finding. Therefore, this condition is considered to be not reportable under the provisions of 10CFR50.55(e).

We trust that this final letter provides sufficient information for you to perform your assessment of this deficiency and of our overall approach to resolve the problem.

Sincerely yours,



D. P. Hall
Vice President

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Illinois Department of Nuclear Safety
INPO Records Center