

FINAL REPORT ON SIGNIFICANT DEFICIENCY

INADEQUATE COMPACTION OF
CLASS "A" BACKFILL AND
SETTLING OF INDIVIDUAL PIPES
OF P45 SYSTEM

Perry Nuclear Power Plant
Docket Nos. 50-440; 50-441
The Cleveland Electric Illuminating Company

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FINAL REPORT ON SIGNIFICANT DEFICIENCY

INTRODUCTION

In accordance with the requirements of 10CFR50.55(e), this is the Final Report on the Significant Deficiency on inadequate compaction of Class "A" backfill around P45 System piping and settling of individual pipes below design elevations, and includes: (a) a description of the deficiency; (b) an analysis of the safety implications; and (c) sufficient information to permit analysis and evaluation of the deficiency and corrective action.

DESCRIPTION OF DEFICIENCY

A. Introduction

The Interim Report regarding this Significant Deficiency was transmitted to the NRC on July 25, 1979.

B. Deficiency

Inadequate compaction of Class "A" backfill around safety-related piping in the P45 System was evident from: (1) failing in-place density tests on backfill previously accepted by backfill contractor (as documented on CAR No. 0467 and NR No. GLC-459); and (2) settling of individual pipes below design elevation (as documented on NR Nos. CQA-049, CQA-051, PPP-070, and PPP-076). The re-tests of the in-place densities ranged from 10.3 to 63.8% relative density versus a required average of 85% with none below 80%. Scanning with a television camera of three buried pipes revealed minimum deflections of seven inches over span/lengths of approximately 45 feet at varied locations in the P45 System designated as the north end of ISO's 0-P45-64 through 68.

ANALYSIS OF SAFETY IMPLICATIONS

Based upon initial data, the Design Engineer's stress analysis revealed that some piping may have been stressed beyond the maximum allowable. As stated in the Interim Report, completion of stress analysis of the P45 Piping System required excavation of the backfill west of the Water Treatment Building.

Five runs of underground pipe in P45 System designated as the north end of ISO's 0-P45-64 through 68 were excavated. The pipes were examined along their entire length to determine pipe elevation profiles and overall conditions. Accurate measurements of pipe deformations by the Licensee's surveying crew permitted more precise calculations of stresses in the piping.

The completed stress analysis by the Design Engineer, dated November 15, 1979, described and substantiated the steps taken to reduce the deflections and stresses, thereby placing pipes in a condition which will keep sustained stress within the allowable level.

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CORRECTIVE ACTION TAKEN

Nonconformance documentation identifying the deficiencies has been issued: Nonconformance Report Nos. CQA-049, CQA-01, CQA-459, PPP-070 and PPP-076; and Corrective Action Report No. 0467.

To assure the conditions relating to the inadequate backfill and settled pipes would be corrected, the following actions have been taken:

1. Backfill in P45 trench north of Water Treatment Building was removed and replaced around P45 pipes. Removal and replacement of backfill around the P45 System pipes north of the Water Treatment Building has corrected the nonconforming, in-place condition.
2. The backfill placement contractor has increased the number of quality control personnel covering backfill operations from two to four inspectors. Construction Quality Control of the CEI Perry Project Organization has hired an experienced backfill inspector who is responsible for monitoring safety-related backfill operations. Additional backfill inspectors hired by both the backfill contractor and CQC should prevent recurrence of the backfill practices which resulted in low, in-place densities.
3. Piping contractors are minimizing size of bellholes.
4. Bellholes are being filled with lean concrete (1500 psi) in accordance with the requirements of ECN 2394-93-45. The effectiveness of this method to prevent deflections of pipe during backfilling operations has been verified by surveying measurements.
5. Backfill contractor is performing 100% inspection of all compaction of safety-related backfill in bellhole areas.
6. A continuing effort to monitor safety-related piping installations has been established. Additionally, at the direction of the Design Engineer, prior installations shall be investigated for problems similar to those encountered in the P45 System. Any nonconforming conditions revealed by these investigations shall be documented on nonconformance reports.

SUMMARY

Based upon physical examination of piping and stress analysis performed by the Design Engineer using surveying measurements made on exposed piping, no buckling failure or significant physical distortion had occurred. In areas where the highest loads may have occurred, the pipes were relieved of any conceivable high stresses and placed in a condition which will keep sustained stress within the allowable level. Therefore, a Significant Deficiency was determined not to exist.

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