SSINS No.: 6835
IN 85-66

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

August 7, 1985

IE INFORMATION NOTICE NO. 85-66: DISCREPANCIES BETWEEN AS-BUILT CONSTRUCTION DRAWINGS AND EQUIPMENT INSTALLATIONS

Addressees:

All nuclear power reactor facilities holding an operating license (OL) or a construction permit (CP).

Purpose:

This information notice is to alert recipients of a potentially significant generic problem regarding as-built construction drawings not correctly or completely reflecting equipment installations. Modifications of existing installations also may be susceptible to the problems discussed in this information notice. It is expected that recipients will review the information for applicability to their facilities and consider actions, if appropriate, to preclude a similar problem occurring at their facilities. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

Fermi Unit 2

During routine NRC prelicensing inspections of as-built design and construction drawings and specifications at Fermi Nuclear Power Plant Unit 2, from April 1984 to October 1984 several discrepancies in the electrical and instrumentation and control (I&C) installations were discovered, which construction and preoperational testing had not identified.

In response to the NRC findings at Fermi, the licensee conducted an approximately 100 percent reinspection of electrical and I&C installations. That inspection effort resulted in the identification of over 7300 discrepancies and errors between as-built field configurations and associated design and construction drawings and specifications. There were 154 discrepancies which, if left uncorrected, could result in the loss or incorrect function of a safety-related component or system. Examples of these discrepancies were wiring errors, unidentified jumpers, wrong tubing connections, and wrong installed components. There were 300 discrepancies that had correct design documents but incorrect installations that could impair safe operations.

Examples of these discrepancies were ungrounded cable shields, missing hardware, and wrong nameplates. There were 1900 discrepancies which had correct as-built hardware but deficient drawings. Examples of these discrepancies included wiring installed that was not shown on the applicable drawing, wiring details that differed from the installation drawing, and incorrect cable numbers on the drawings. There were 5000 additional minor discrepancies which would not have impacted or impaired safe plant operations directly such as incorrect wire tags, equipment layouts that did not match the drawings, and inconsistencies in wire tagging methods. Extensive actions by the applicant were necessary to correct the most significant discrepancies before an operating license was issued by the NRC.

Rancho Seco

A reactor coolant system high point vent line addition was made at Rancho Seco during the 1983 refueling outage as part of the TMI required modifications. Part of the modification included adding cross bracing and revising supports for the adjacent nitrogen supply line. Although records indicate this work had been done and inspected it had actually not been performed. In addition, a removable piping spool piece used to isolate the nitrogen supply was not replaced by a rigid piece as required. The resulting unsupported 4 foot length of 1 inch diameter pipe caused a fatigue failure at a high point vent weld resulting in a 20 gallon per minute non-isolatable primary coolant leak. This event is similar to previous discrepancies identified between the as-built and as-designed piping systems at a number of nuclear power plants that led to issuance of IE Bulletin 79-14, "Seismic Analyses for As-Built Safety-Related Piping Systems." Resolution of the actions requested by that bulletin has resulted in extensive reanalysis and/or modifications of piping systems in many nuclear power plants.

Construction Appraisal Team Inspections

A number of problems with construction activities which may lead to discrepancies between equipment installations and as-built drawings were identified by NRC Construction Appraisal Team (CAT) inspections at 10 facilities from September 1982 to January 1985.

Discussion:

To assure that an adequate level of safety exists or will exist at all nuclear power plants, it is required that all safety related as-built design and construction drawings match the plant hardware. Requirements and measures to control documents are identified in 10 CFR 50, Appendix B; NUREG-0800, Standard Review Plan, Rev. 2 of Section 17.1; ANSI N45.2-1977, Section 7; and ANSI N.8.7-1976, Section 5.2.15, as applicable.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the Regional Administrator of the appropriate regional office or this office.

Edward L. Jordan, Director
Division of Emergency Preparedness
and Engineering Response
Office of Inspection and Enforcement

Technical Contact: James C. Stewart, IE
(301) 492-9061

Attachments:
1. Discrepancies Identified During Construction Appraisal Team Inspections
2. List of Recently Issued IE Information Notices

Discrepancies Identified During Construction Appraisal Team Inspections

During the Braidwood CAT inspection the NRC team noted a failure to annotate unincorporated design changes on controlled design documents. The most significant finding in this area was design change documents written against superseded revisions of the approved drawings; this resulted in a pipe support being installed and inspected to other than the latest approved design.

Programmatic concerns were noted by the NRC team in two areas during the Shearon Harris CAT inspection: (1) lack of verification of piping and pipe support/restraint location to original design requirements and (2) lack of an ongoing program to effectively identify and resolve hardware clearance problems early in the construction process. Both of these concerns involve practices that could result in extensive inspection, analyses, and rework efforts very late in the construction schedule.

The River Bend CAT inspection noted that numerous cable tray supports did not meet the drawing configurations that were utilized for determining support loading. The applicant failed to consider the generic implications of identified deficiencies. Improper or inadequate fastener locking was identified, including unbent or missing cotter pins, no staking of threads, loose or missing locknuts, and inadequate lock wiring. These deficiencies indicated both inadequate field quality control (FQC) inspection and alteration of completed and accepted work by construction personnel.

The Nine Mile Point 2 CAT inspection identified problems in the document control program that indicated the crafts and inspectors may not have been using the latest design documents in the performance of their work. Inspection reports often did not reflect the drawing revision to which the installation was inspected. Adding to the document control problem was the high rate of design change initiation and the inability to maintain and revise construction drawings in a timely manner to reflect such changes. The NRC CAT inspectors identified that over 30 percent of all design change documents resulted from errors or inadequate information provided on previously issued changes. Furthermore, rather than taking measures to identify the reasons for the high change notice generation rate, a procedural requirement for incorporation of changes in drawings had simply been circumvented by the licensee to allow construction to continue without timely design change update.

The results of the Comanche Peak CAT inspection indicated a breakdown in fabrication, installation, and inspection in the HVAC area. The licensee's quality assurance program had not ensured that certain hanger, support, electrical and mechanical equipment was installed to the latest design documents, and commensurately that the appropriate inspection was conducted to the latest design documents.

Attachment 2
IN 85-66
August 7, 1985

LIST OF RECENTLY ISSUED
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
85-65	Crack Growth In Steam Generator Girth Welds	7/31/85	All PWR facilities holding an OL or CP
85-64	BBC Brown Boveri Low-Voltage K-Line Circuit Breakers, With Deficient Overcurrent Trip Devices Models OD-4 and 5	7/26/85	All power reactor facilities holding an OL or CP
85-63	Potential for Common-Mode Failure of Standby Gas Treatment System on Loss of Off-Site Power	7/25/85	All power reactor facilities holding an OL or CP
85-62	Backup Telephone Numbers to the NRC Operations Center	7/23/85	All power reactor facilities holding an OL and certain fuel facilities
85-61	Misadministrations to Patients Undergoing Thyroid Scans	7/22/85	All power reactor facilities holding an OL and certain fuel facilities
85-60	Defective Negative Pressure Air-Purifying, Fuel Facepiece Respirators	7/17/85	All power reactor facilities holding an OL or CP
85-59	Valve Stem Corrosion Failures	7/17/85	All power reactor facilities holding an OL or CP
85-58	Failure Of A General Electric Type AK-2-25 Reactor Trip Breaker	7/17/85	All power reactor facilities designed by B&W and CE holding an OL or CP
85-57	Lost Iridium-192 Source Resulting In The Death Of Eight Persons In Morocco	7/16/85	All power reactor facilities holding an OL or CP; fuel facilities; and material licensees

OL = Operating License
CP = Construction Permit