ILLINOIS POWER COMPANY

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

May 23, 1983

Docket No. 50-461

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

Subject: Potential 10CFR50.55(e) Deficiency (83-05)
1/4"-20 Hex Head Cap Screws on
Electrical Conduit Straps

Dear Mr. Keppler:

On April 12, 1983 Illinois Power Company verbally notified Mr. F. Jablonski, U. S. NRC Region III (ref: IP memorandum Y-15851, 1605-L dated 4/12/83) of a potentially reportable deficiency per 10CFR50.55(e) concerning the failure of certain 1/4"-20 hex head cap screws during installation of conduit strap attachments to supports. Our investigation of this matter continues, and this letter represents an interim report in accordance with 10CFR50.55(e).

Statement of Potentially Reportable Deficiency

During installation and torquing of ASTM A307, 1/4"-20 hex head cap screws used in conduit strap attachments, failures were occurring. Bolt heads were not marked to identify the manufacturer as required by ASTM A307. An evaluation is being performed to determine the extent of the issue and the potential for adverse impact on the safety of operation of Clinton Power Station (CPS).

Background/Investigation Results

As a result of an Illinois Power quality assurance surveillance in February, 1983 into conduit support installation activities, a concern was identified regarding the installation of 1/4"-20 hex head cap screws without identification marks on the heads. This surveillance resulted in the initiation of a Nonconformance Report (NCR 8808) which identified the problem and also noted that 1/4" cap screws were elongating. On April 6, 1983, Baldwin Associates reported to Illinois Power the specific details of failures of 1/4" cap screws being experienced due to the hex heads twisting off during tightening. Samples of previously installed screws showed signs of threads being stripped and/or elongated.

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An investigation of this matter has been initiated to examine the above concerns and includes the identification and evaluation of requirements and practices in the following areas:

1. Design requirements provided in drawings and specifications for cap screws,

2. Installation and inspection requirements and practices for cap screws,

3. Purchasing practices for cap screw materials, and

4. Material requirements and industry practices for cap screws.

Design

Review of the electrical installation specification K-2999 and applicable design drawings show that 1/4"-20 hex head cap screws are specified for straps on electrical conduit of 1½" diameter and smaller. Design documents specify that cap screws are to be furnished meeting the material requirements of ASTM A307 and electrogalvanized or cadmium plated per ASTM A164/A165. Installation torque values of 6-8 ft-lb. are specified for all 1/4" cap screws used in conduit strap attachments. These design requirements are being evaluated to determine if changes are necessary. Generic effects of the use of A307 1/4"-20 screws and bolts are being evaluated and will be reported in the final report.

Installation

Approximately 1850 seismic two-hole conduit strap installations (1½" diameter or smaller) using 1/4"-20 cap screws have been accepted by Quality Control to date, in seismic Category I applications. Approximately 2500 seismic conduit straps (1½" diameter and smaller) have been installed in seismic Category I applications, but have not yet been accepted. These cap screws have been installed using a calibrated torque wrench with a range of 5 to 80 ft-lbs. The accuracy of these torque wrenches in the 6-8 ft-lb. range may vary between ±1 to 2 ft-lbs. Normal construction practice is to torque to 8 ft-lbs to assure acceptance during subsequent quality control inspection. Quality Control inspection instructions and practices include a 100% torque verification of all accessible cap screws to a value of 96 inch-lbs (8 ft-lbs) using a dial-type torque wrench of 0-300 inch-lb range. The above procedure prevents an undertorquing condition, but does not detect or prevent an overtorque condition.

Purchasing

Hex head cap screws (ASTM A307 1/4"-20), standard commercial grade material, are procured as non-safety related with a certificate of compliance and a quality control inspection at receipt to assure that the specified material was provided. A review of all purchase orders is being performed in order to determine the suppliers of cap screws, and requirements imposed on the purchase. Certificates of compliance submitted with the cap screws are also being reviewed for adequacy to ensure the correct material was provided. Cap screw suppliers will also be contacted to verify certificates of compliance.

Material

Specification ASTM A307 for screw material requires that the manufacturer mark the head with an identification mark. Suppliers of cap screws to CPS have not always met this requirement, and some unmarked screws were supplied. This concern was identified in November, 1977 and a Field Change Request (FCR 1194) was prepared. This FCR stated that in lieu of screw head marking, certificates of compliance, confirming that the hardware supplied was in fact ASTM A307, would be obtained. Investigation is proceeding to ensure that adequate certifications of the materials is available, and that the correct materials were supplied.

Corrective Action (Interim)

The following measures have been or are being taken to correct this potential deficiency and to prevent further recurrences:

1. During the period required to complete this investigation, conduit straps will be installed using a higher strength, uniquely identified, ASTM-A449 or SAE-J429, Grade 5, 1/4" hex head cap screws. This action will prevent the failure of cap screws until further evaluation of the use of A307 materials is complete.

2. Instructions will be issued to craft personnel that only calibrated 10-200 in-lb. torque wrenches with ±4% accuracy shall be used to torque 1/4" cap screws. This information will be written into the work travelers. This action will assure that the screws are torqued within the presently specified torque value range.

Safety Implications/Significance

Illinois Power Company's investigation of this potentially reportable deficiency is continuing. The safety implications and significance of the concerns will be assessed after further

background information is obtained and evaluated. It is anticipated that approximately ninety (90) days will be necessary to complete our investigations, determine corrective actions, and to file a final report on the matter.

We trust that this interim report provides you sufficient background information to perform a general assessment of this potentially reportable deficiency, and adequately describes our overall approach to resolve the problem.

Sincerely yours,

D. P. Hall
Vice President

REC/lf

cc: Manager-Quality Assurance
NRC Resident Inspector
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