

U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION IV

Report No. STN 50-482/73-15

Docket No. 50-482

Category A2

Licensee: Kansas Gas & Electric Company
Post Office Box 208
Wichita, Kansas 67201

Facility Name: Wolf Creek, Unit No. 1

Inspection at: Burlington, Kansas

Inspection conducted: December 18-19, 1978

Inspectors:

for W. A. Crossman
C. R. Oberg, Reactor Inspector, Projects Section
(Paragraphs 1, 4 & 5)

1/3/79
Date

R. E. Hall

R. E. Hall, Chief, Engineering Support Section
(Paragraph 2)

1-3-79
Date

J. I. Tapia
J. I. Tapia, Reactor Inspector, Engineering
Support Section (Paragraph 3)

1-3-79
Date

J. O. Ward

J. O. Ward, Investigation Specialist

1-3-79
Date

Approved:

W. A. Crossman
W. A. Crossman, Chief, Projects Section

1/3/79
Date

R. E. Hall

R. E. Hall, Chief, Engineering Support Section

1-3-79
Date

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Inspection Summary:

Special Inspection on December 18-19, 1978 (Report No. STN 50-482/78-15)

Areas Inspected: Circumstances surrounding the base mat cylinder break samples supplied to Portland Cement Association (PCA) and a construction deficiency report relative to voids in containment wall, sixth lift. The inspection involved sixty inspector-hours on-site by four NRC inspectors.

Results: No items of noncompliance or deviations were identified in the two areas inspected.

DETAILS

1. Persons Contacted

Principal Licensee Personnel

- *M. L. Johnson, Director, Plant Engineering
- *M. E. Clark, Manager, Quality Assurance, Site
- *D. W. Prigel, QA Engineer
- *G. W. Reeves, QA Engineer

Daniel International

- *W. E. Hitt, Project Manager
- *L. R. Smith, Regional Manager
- *I. Hussain, Assistant to Project Manager
- C. T. Kinney, Construction Manager
- T. A. Green, Civil QA Representative
- C. L. Phillips, Project Civil Engineer
- J. Harrison, Acting Batch Plant Superintendent
- J. Hill, Utility Superintendent
- R. N. Key, Concrete Lab Supervisor

SNUPPS

- R. D. Brown, Site Representative

The inspectors also talked with and interviewed seven other constructor employees, including members of the labor, technical and QC staffs.

*denotes those present at the exit interview.

2. Concrete Test Cylinder Fragment Samples

A special inspection was initiated in early December^{1/} to determine the circumstances and events relating to low cylinder breaks for the containment base mat. Following an evaluation and report of the Portland Cement Association (PCA) test results by the licensee, the IE special inspection team raised questions regarding the samples chosen upon which the PCA conclusions were based. The

^{1/}See IE Inspection Report No. 50-482/78-T3

cylinder break fragment samples had been recovered from the pit used for routine disposal of test cylinders after strength testing. These samples were utilized by PCA in their evaluation of the acceptability of concrete in the base mat, after cylinders tested after 90 days of curing broke below anticipated forces. The licensee subsequently initiated a search on or about December 6, 1978, for additional fragments of other 90-day test cylinders representing the base mat concrete. During this search, approximately forty-eight cylinder fragments were recovered, principally from a fill area adjacent to the normal disposal pit over which concrete had been poured to control an erosion problem.

It was determined that three shipments of cylinder fragments have been made to PCA:

7 cylinder fragments	Mid March 1978
32 cylinder fragments	Mid April 1978
48 cylinder fragments	December 1978

This inspection was conducted in order to determine the circumstances surrounding selection of cylinder test fragments subsequently examined by PCA. Specifically, the following areas were inspected:

- a. Evaluate circumstances surrounding the recovery of cylinder fragments to assure that the sampling was not prejudicial.
- b. Evaluate the circumstances related to recovery of additional cylinder fragments after the IE inspection.
- c. Evaluate the circumstances related to the use of cylinder fragments from the base mat as fill material in an area subsequently covered with concrete.

Interviews were held by the IE inspectors with KG&E Quality Assurance personnel, and Daniel International personnel in the Engineering, Quality Control, Concrete Testing Laboratory, and Batch Plant departments. Additional, Daniel construction personnel involved in fragment recovery operations were also interviewed. The lists of cylinder fragments which were located and shipped to PCA for analysis were also reviewed.

Based on this inspection, the IE inspectors concluded that:

- a. The recovery of cylinder fragments subsequently used for testing by PCA, was not directed such that it prejudiced the results of

the investigation. The cylinders shipped to PCA were selected at random from the normal disposal pit and were representative of base mat concrete placed on both December 12 and 13, 1977. An initial sample of seven cylinder fragments was chosen in mid-March 1978; and following their analysis by PCA, an additional thirty-two samples were recovered from the disposal pit in mid-April 1978. No indication was obtained during personnel interviews of any direction other than to retrieve all identifiable 90-day cylinder fragments during the retrieval of the additional thirty-two samples. Review by the IE inspectors of the records of samples recovered, both the initial seven and the subsequent thirty-two, indicated that the fragments chosen were random and were representative of the base mat placement.

- b. Recovery of additional samples was precipitated by presentation of preliminary IE findings from a prior inspection^{2/} which questioned the basis for the KG&E position that the base mat concrete was acceptable. The decision to initiate a search for all recoverable fragments was initiated by Daniel site management, and has involved a major excavation effort, both in the disposal pit area and in the adjacent area in which cylinder fragments were used as fill material. An additional lot of approximately forty-eight 90-day cylinder break fragments was located, principally under the concrete poured over this fill material. Excavation is continuing in the disposal pit area to locate all identifiable cylinder fragments related to the base mat placement.
- c. Circumstances relating to use of some fragments for fill material were explored, and it was concluded that use of base mat cylinder fragments as fill material, and subsequent covering with concrete, was not related to the investigation of low cylinder break strengths. It was determined, by interviewing involved personnel, that the fragments were not considered significant at the time they were used for fill material. The fragments were placed in the fill area approximately March 13, 1978, and had been covered by the waste concrete used for erosion control probably the same week. This occurred prior to the mid-April decision to attempt recovery of additional cylinder fragments.

As a result of this special inspection, it has been concluded that there was no identifiable attempt to prejudice the evaluation of base mat adequacy by directed selection of test samples; and that, in fact, the samples provided to PCA for analysis were representative of concrete placed in the base mat.

No items of noncompliance or deviations were identified.

3. Containment Building Concrete Voids

The licensee informed this office on December 14, 1978, of a void in the reactor containment building exterior wall concrete which they considered to be a reportable deficiency within the context of 10 CFR 50.55(e). The void is described in Daniel International Nonconformance Report No. ISN 0719C as being a void beneath the equipment hatch extending through the wall to the containment liner plate and having a width of six feet and a height of two feet-four inches. The licensee informed the IE inspectors of an additional void beneath the personnel hatch having a depth of seven inches, a width of one foot-five inches and a height of one foot-six inches. This void is described in Nonconformance Report No. ISN 0718C. The licensee is further examining the latter void to determine the possibility of additional unseen voids behind the one exposed.

The IE inspectors examined the voids and discussed with the licensee representatives the inability of the concrete to fully occupy the space beneath the two containment penetrations. An apparent lack of consolidation of the concrete in the immediate area of the voids was observed and is considered to have contributed to the formation of the voids.

From the review of the Nonconformance Reports and from discussions with the Project Civil Engineer, no specific plan for dealing with the possibility of the formation of the voids, as discussed in Regulatory Guide 1.55, could be identified. The constructor's intent during this placement was to cause the concrete to flow beneath the penetrations by means of internal vibration. It could not be determined during this inspection whether this plan of action was in contradiction to Bechtel Specification No. 10466-C103(Q), Revision 12, "Technical Specification for Contract for Forming, Placing, Finishing and Curing of Concrete for the Standard Nuclear Unit Power Plants." Section 9.1.6 of the Specification,

"Placing Limitations," states in part, "Concrete shall not be allowed or caused to flow a distance within the mass of more than 5 feet from point of deposition." The geometrical arrangement observed at the equipment hatch indicates that a flow of greater than 5 feet would probably have been necessary to achieve the desired placement. This matter is considered unresolved.

Regulatory Guide 1.94, "Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants," invokes Section 2.1 of ANSI N45.2.5 and Regulatory Guide 1.55. These documents require provisions for preplanning of the installation of structural concrete. Preplanning by the constructor is recommended by Regulatory Guide 1.55 for venting of potential air pockets to prevent voids and for access to congested or confined areas as well as for determining the sequence of placement. An adequate plan to assure that the installation of the concrete could be accomplished as specified could not be identified during this inspection. This matter is considered unresolved and will be reviewed during a subsequent inspection and in the review of the licensee's 50.55(e) report concerning the reported containment wall void.

4. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviations. Unresolved items disclosed during the inspection are discussed in paragraph 3.

5. Exit Interview

The IE inspectors met with the licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on December 19, 1978. The IE inspectors summarized the scope of the inspection and the findings. The unresolved items were discussed. The licensee representatives stated that their investigation into the equipment hatch void had not been completed. It was noted that a Work Hold Agreement (No. 3) was issued on December 18, 1978, stopping safety related concrete placement until the NCRs (see paragraph 3) have been resolved. Region IV will be notified prior to cancellation of Work Hold Agreement and commencement of concrete placement.