

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

Report No. 99900526/79-01

Program No. 51200

Company: Black and Veatch Consulting Engineers
Post Office Box 8405
Kansas City, Missouri

Inspection at: Overland Park, Kansas

Inspection Conducted: March 12-16, 1979

Inspector: R. H. Brickley
R. H. Brickley, Principal Inspector, Vendor
Inspection Branch

3/30/79
Date

Approved by: C. J. Hale
C. J. Hale, Chief, Program Evaluation Section,
Vendor Inspection Branch

3-30-79
Date

Summary

Inspection conducted March 12-16, 1979 (99900526/79-01)

Areas Inspected: Implementation of the requirements of 10 CFR Part 50, Appendix B, in the areas of design inspection - containment spray system, and action on previous inspection findings. The inspection involved thirty-two (32) inspector-hours on-site by one NRC inspector.

Results: No unresolved items were identified in any area. The following two (2) deviations were identified.

Deviations: Design Inspection - containment spray system - deviations from QA Program - Nuclear requirements were authorized without the approval of the QA Manager (Notice of Deviation, Enclosure, Item B) and drawings had been approved without an independent check and signoff by the checker (Notice of Deviation, Enclosure, Item A).

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Details

A. Persons Contacted

- *R. E. Blaisdell, QA Manager
- L. Drbal, Group Leader, Systems Department
- M. A. Robinson, Mechanical Engineer
- M. J. Robinson, Project Manager
- *C. J. Ross, Manager, Design
- W. J. Zidziunas, Project Design Engineer, Mechanical

*Denotes those present at the exit interview

B. Action on Previous Inspection Findings

1. (Open) Deviation (Report No. 78-01): The Project Design Manual, the Quality Assurance Program - Nuclear Manual and their revisions are not being maintained in the QA record system. The inspector verified the corrective actions taken as stated in the Black Veatch (B&V) response to the inspection report dated September 7, 1978, i.e., directives were issued (September 8, 1978) to the Project Manager and Supervisor of the Power Division Document Control Center to provide copies of the Project Design Manual and Quality Assurance Program - Nuclear Manual to the Project Document Control Administrator for inclusion in the Quality Assurance Records System. The re-examination of the Quality Assurance Program that was committed in the B&V letter of September 7, 1978, had been rescheduled for completion by March 30, 1978, per their letter of February 2, 1979 and was still in progress at the time of this inspection. This item will be re-examined during the next inspection.
2. (Closed) Deviation (Report No. 78-01): Procured services (external), document control, and QA records are not being audited at a frequency consistent with ANSI N45.2.12. The inspector verified the completion of the corrective actions and preventive measures contained in the B&V responses to the inspection report dated September 7, 1978, October 4, 1978, and February 2, 1979 i.e., the investigation of the audit activities associated with Shannon and Wilson, the training that was conducted, and the audit of document control and QA record system (Audit Report 78P10).
3. (Closed) Deviation (Report No. 7-01): Failure to comply with Section 4 of ANSI N45.2.12 in that internal audits were not being documented, reports not signed, reports not issued in 30 days and that post-audit conferences were not conducted. The

inspector verified the completion of the corrective actions and preventive measures contained in the B&V responses to the inspection report dated September 7, 1978 and October 4, 1978 i.e., and audit checklist was added to the B&V QA Group Instructions, and the QA Manager's re-examination of the 1977 and 1978 audit reports and correction of deficiencies.

C. Design Inspection - Containment Spray System

1. Objectives

The objectives of this area of the inspection were to verify for the containment spray stem that:

- a. Design criteria, requirements and commitments, as listed in the SAR, were utilized in design input during system and component design.
- b. Analyses of containment pump net positive suction head (NPSH) during all phases of operation follow the guidance of Regulatory Guide 1.1.
- c. Design analyses establish the capability of the system to provide flow at rates and temperature which result in heat removal rates consistent with those utilized in the LOCA and/or main steam line break analyses.
- d. Specifications and/or procurement documents for system components require them to be designed, fabricated, erected and tested in accordance with applicable ASME Section III and 10 CFR 50, Appendix B, requirements.
- e. Provisions and plans have been made for pre-operational and operational testing consistent with SAR commitments and statements.
- f. The analysis (design) of system spray coverage supports SAR commitments and statements.
- g. The system design for pH control including analyses of pH versus time after system actuation supports SAR commitments and statements.
- h. Provisions to prevent trapping of chemical additives implement SAR commitments.

- i. Calculations of iodine removal constants, use parameters, and system characteristics are consistent with those in items a-h, above.
- j. Iodine removal constants used in the analyses of the radiological consequences of a LOCA are consistent with item i., above.

2. Method of Accomplishment

The preceding objectives were accomplished by an examination of:

- a. Sections 6.2.2 (Containment Heat Removal System), 6.2.3 (Containment Air Purification and Cleanup System), and 17.B.1.3 (Design Control) of Project No. 6212 PSAR for the technical and programmatic commitments.
- b. Sections 1.2 (Regulatory Requirements), 2.0 (System Designations), 3.2 (Classification of Systems, Structures, and Components), 3.4 (Design Input Requirements), 3.5 (Codes and Standards), 4.0 (Items Covered by QA Program), 5.6 (Design of Mechanical Systems and Components), 5.11 (Radiological Dose Calculations), 6.0 (Component Design Criteria), and 6.2 (Mechanical Components) of the Project Design Manual; and Standard Procedures No. 3.3 (System Design Specifications), 3.4 (Component Design Specifications), 3.5 (Handwritten Calculations), 3.6 (Computer Calculations), 3.7 (Computer Program Verification), 3.9 (Design Verification), 5.2 (Drawings and Lists), and 6.1 (Control of QA Program Documents) of the Quality Assurance Program - Nuclear Manual to determine that they were consistent with SAR commitments.
- c. System Design Specification - Residual Heat Removal System, Revision 2, dated April 2, 1977 and Engineering Change Notices No. N-I-0085, N-I-0107, and N-I-0118, to verify that it satisfied C.1.a and the requirements of the applicable documents of C.2.b above.
- d. Calculations No. 6212.215.2417.13101 (Containment Spray System - Effect of pH on Spray Removal Coefficient) Revision 0, dated December 22, 1976, 6212.213.3012.13101 (Containment Spray System - Iodine Removal Coefficients) Revision 0, dated April 12, 1976, and their Calculation Review checklists to verify that they satisfy C.1.i and the requirements of the applicable documents of C.2.b above.

- e. Calculations No. 6212.213.7519.13I02 (LOCA Activity Release Analysis - Conservative) dated February 25, 1977, 6212.213.7519.13I03 (LOCA Dose Analysis - Conservative) dated February 23, 1977, and their Calculation Review Checklists to verify that they satisfy C.1.j and the requirements of the applicable documents of C.2.b above.
- f. Specification No. 312.6110 (Fabricated Piping I) dated October 5, 1978, to verify that it satisfied C.1.d and the requirements of the applicable documents of C.2.b above.
- g. The B&V Drawing List dated March 1, 1979 and drawings No. M1305 A, B, & C (P&ID Residual Heat Removal System) all Revision B, dated April 27, 1978, M4008A and B (Detail Piping, Reactor Area, RHR System "A" - Plan) both Revision 1, dated August 30, 1978, and M4009A and B (Detail Piping, Reactor Area, RHR System "A" - Sections) both Revision 1, dated August 30, 1978, to verify that they satisfied C.1.d and the requirements of the applicable documents of C.2.b above.

3. Findings

- a. There were no unresolved items and two (2) deviations identified (See Enclosure - Notice of Deviation).
- b. With respect to Notice of Deviation, Item A, it was first identified during the examination of drawing M4009A (paragraph C.2.b above) and confirmed through a random examination of four (4) additional drawings from the mechanical discipline. An examination of drawings from the electrical discipline did not reveal any similar deviations.
- c. This project is a BWR, therefore objectives C.1.g and C.1.h. are not applicable.
- d. An iodine partition coefficient (H) of 339 was used to calculate the decontamination factor (DF) of 57 for elemental iodine.

Section 8.3.4 of ANSI N581(PWR and BWR Containment Spray System Design Criteria). Draft 7, June 1977, allows use of an H of 100 when no chemical additives are utilized as in this case. With this restriction (H=100) the inspector calculated a DF of 17.5 for this project. Referring to Sections 6.2.3.3.1 (Iodine Removal Performance) and 6.2.3.3.2.1

(Iodine Retention by Spray Solution) of the PSAR, the inspector verified that a DF of 57 based on an H of 339 was identified to NRR, therefore no further action by NRC:IV is contemplated.

- e. The examination of calculation No. 6212.213.3012.13I01 (paragraph C.2.d) revealed an error in the calculation of μ_v . The value obtained should have been 1.90×10^{-4} and not 1.86×10^{-4} as indicated. Discussions with B&V engineers indicated that this quantity, as used, would have no significant effect on the results obtained.
- f. The examination of calculation No. 6212.213.7519.13IG3 (paragraph C.2.e) revealed an error of a factor of 10 in the calculation of the iodine - 132 and 135 concentrations. They were calculated to be 1.0×10^2 when they should have been 1.0×10^1 . These values were then used to calculate the iodine released to the environment, dose at the worst site boundary and total dose. In the latter case the value obtained was 1.1×10^0 when it should have been 8.3×10^{-1} . Since this error resulted in a more conservative value for these items no further action by NRC:IV is contemplated. It should be noted that in both cases (C.2.e and C.2.f) the calculations had been independently reviewed without these errors being identified.

D. Exit Interview

An exit interview was held with management representatives on March 16, 1979. In addition to those individuals indicated by an asterisk in paragraph A, those in attendance were:

P. J. Adam, Head of Power Division
R. M. Butcher, Manager of Engineering

The inspector summarized the scope and findings of the inspection. Management comments were generally for clarification only, or acknowledgement of the statements by the inspector.