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

Report No. 99900525/79-01 Program No. 51200

Company: Gilbert/Commonwealth
P. O. Box 1498
Reading, Pennsylvania 19603

Inspection
Conducted: April 24-27, 1979

Inspectors: Donald Gene Anderson 5/16/79
D. G. Anderson, Principal Inspector Date
Vendor Inspection Branch

C J Hale 5-16-79
C. J. Hale, Chief, Program Evaluation Section Date
Vendor Inspection Branch

C J Hale/ga 5-16-79
J. C. Glynn, Senior Mechanical Engineer, OIE/HQ Date

Approved by: C J Hale 5-16-79
C. J. Hale, Chief, Program Evaluation Section Date
Vendor Inspection Branch

Summary

Inspection on April 24-27, 1979 (99900525/79-01)

Areas Inspected: Implementation of title 10 CFR 50, Appendix B, and Topical Report GAI-TR-106, including Design Process Management, QA Records, and Action on Previous Inspection Findings. The inspection involved fifty-two (52) inspector-hours on site by two (2) USNRC inspectors.

Results: In the three (3) areas inspected, three (3) deviations from commitment were identified in one (1) of the areas.

Deviations: Quality Assurance Records - Written procedures for QA records storage have not been prepared that include attributes referenced in ANSI N45.2.9 (See Enclosure, No. 1 Deviation A.). Measures for access control or a

record security system are not provided for the QA duplicate record files as required by ANSI N45.2.9 (See Enclosure, No. 1, Deviations B.). Documents that are stored in the QA division files are not being forwarded to the Record Retention Center as required by Topical Report GAI-TR-106, Section 17.17.3 (See Enclosure, No. 1, Deviation C.).

DETAILS SECTION I

(Prepared by D. G. Anderson)

A. Persons Contacted

*L. P. Buchanan, Supervising Engineer
T. H. Chen, Structural Engineer
R. M. Eshbach, Project Structural Engineer
J. R. Helwig, Project Control Engineer
P. L. Lanouette, Nuclear Project Engineer
Dr. M. Z. Lee, Supervising Engineer
J. B. Muldoon, Manager, Specialties Engineering
K. E. Nodland, Supervising Engineer
*M. E. Raps, Manager, Design Control
D. P. White, Section Manager, Mechanical Engineering
*E. Wielkapolski, Project Manager

*Indicates those attending the exit meeting.

B. Action on Previous Inspection Findings

(Closed) Deviation (Report No. 78-01): A project audit was conducted by an auditor who had Lead Auditor responsibility, but had not been suitably qualified as a Lead Auditor. Gilbert/Commonwealth has reviewed thirteen (13) project audits and nine (9) internal audits to assure that those auditors had been previously qualified as Lead Auditors. Administrative Procedure 4.6 was approved on May 16, 1978, which requires verification of auditor qualification requirements. This corrective action and action to prevent recurrence was described in Gilbert/Commonwealth's letter of response dated April 17, 1978.

C. Design Process Management

1. Objectives

The objectives of this area of the inspection were to examine the establishment and implementation of quality related procedures for the design process to verify that:

a. The design process system is defined, implemented, and enforced in accordance with approved procedures, instructions, or other documentation for all groups performing safety related design activities.

b. Design inputs are properly prescribed and used for translation into specifications, drawings, instructions, or procedures.

c. Appropriate quality standards for items important to safety are identified and documented, and their selection reviewed and approved.

d. Final design can be related to the design input with this traceability documented, including the steps performed from design input to final design.

e. Design activities are documented in sufficient detail to permit design verification and auditing.

f. The methods are prescribed for preparing design analyses, drawings, specifications, and other design documents so that they are planned, controlled, and correctly performed.

g. The methods are prescribed for identifying design deficiencies including the documentation, review, and reporting of those deficiencies to management for evaluation. Procedures exist for the reporting of significant deficiencies to the USNRC.

2. Method of Accomplishment

The preceding objectives were accomplished by:

a. A review of the Gilbert/Commonwealth Topical Report GAI-TR-106, Section 17.3, Design Control, which summarized the methods used by Gilbert/Commonwealth to describe their activities related to the design process. The design process is defined, implemented, and enforced according to the following policies/procedures:

(1) Nuclear Quality Assurance Manual.

(2) Engineering Procedures:

DCP-1.10, Design Input; DCP-2.10, Review and Approval; DCP-2.20, Change Notices; DCP-4.20, Nonconformance to GAI Design Documents; DCP-6.05, Safety Analysis Reports; DCP-3.15, Design Records; DCP-1.50, Production Computer Program Documentation and Certification; DCP-1.20, Design Analysis and Calculations; DCP-1.15, Layout Design; DCP-1.25, Fluid System Diagrams; DCP-1.30, GAI Drawings; DCP-1.35, Piping Design; DCP-4.15, Procurement Documents; DCP-2.05, Design Verification; and DCP-5.10, Project Management Manual.

b. Design inputs were reviewed in the following documents;

(1) Project Management Manual, South Carolina Electric and Gas Company. V. C. Summer Nuclear Station, Unit 1, S[illegible], 1978.

(2) Project Design Criteria Manual, South Carolina Electric and Gas Company, V. C. Summer, Unit 1, July 21, 1978.

(3) Final System Design Description, South Carolina Electric and Gas Company, V. C. Summer, Unit 1, Book 10, SDD# 35 - Reactor Building Spray System, July 26, 1977.

c. Review to assure that the design inputs identified above were translated appropriately into the following documents:

(1) Specifications:

Reactor Building Spray System valves, pumps, and tanks. DSP-515B-4461-00 (Valves), DSP-588A(2)-044461-000 (valves), DSP-594B-044461-000 (pumps), DSP-597-044461-000 (tanks).

(2) Purchase Orders:

Reactor Building Spray System valves, pumps, and tanks. SN-10109-SR (valves), SN-10172-SR and SN-10168-SR (valves), SN-10139-SR (pumps), SN-10165-SR (tanks).

(3) Drawings:

Reactor Building Spray System.
GAI-E-304-653, GAI-E-304-693, GAI-E-304-661, GAI-E-304-662, GAI-E-304-663, GAI-E-304-664, GAI-E-304-665, GAI-E-304-666, and GAI-E-304-667.

(4) Isometrics:

04-4461-C-314-661, Reactor Building Spray Pump "A" Discharge to Penetration #401.

d. The following documents were reviewed for identification and review of quality standards:

(1) Piping Engineering Standards-Department 0430. AS-1, Stiffness Matrices in Piping Systems.

(2) System Design Description #35, Reactor Building Spray System.

e. The inspector reviewed the steps taken in the design process from initial design input to incorporation into the final design documents:

The inspector determined that after the initial contractual documents are approved by the utility and the architect engineering firm, the requirements of the contract are incorporated into the Project Management Manual by the Project Manager's staff. The Preliminary Safety Analysis Report is developed along with Design Criteria and System Design Descriptions. The technical requirements of these documents are translated into specifications, purchase orders, and drawings which are used for procurement of components and fabrication of structures. The inspector verified that initial design input for the Reactor Building Spray System had been traced through each design document until incorporation into the following design document:

Final Safety Analysis Report, South Carolina Electric and Gas Company, V. C. Summer, Unit 1.

f. The inspector reviewed the following design analyses to assure that they are planned, controlled, reviewed, approved, and correctly performed:

(1) Calculations:

Book II, Calculations-Safety Related for V. C. Summer, South Carolina Electric and Gas Company, Unit 1.

File Code 13.1, Spray System Chemistry and New NaOH Flow Rate.
13.2, RWST and Spray System Flow Data.
13.3, Nuclear Tank Configuration.
13.4, Spray System Flow Characteristics.
13.5, Spray Pump Performance Requirements.
13.6, Sizing of Spray System Balance Orifice.
13.7, Spray Pump Runout.
13.8, Spray Pump Available NPSH.
13.9, Spray Pump Minimum Suction Pressure.
13.10, Sizing of Orifice in NaOH Circuit and Evaluation of NaOH Flow Rates.
13.11, Evaluation of Spray and Additive System Performance for Various Pump Combinations.
13.12, Spray Pump Design Pressure.

13.13, Reactor Building Spray System Water Chemistry
13.14, NaOH System Characteristics.
13.15, Preliminary Sizing of Breakdown Orifice for 8" Pump Test Line.
13.16, Spray System Design Pressures.
13.17, Spray System Flow Balancing Orifices Sizing for Spray Rings.

(2) Computer Analyses:

PIPDYN II, A computer program for the complete analysis and evaluation of piping systems and three-dimensional frame structures.

Computer Run # Pipe Run SP05, Job 252, March 18, 1977. This analysis was a pipe stress analysis performed on a run of pipe from the discharge of the building spray pumps to the spray ring orifices using the computer dynamic pipe stress analysis code, PIPDYN II.

g. The inspector reviewed the following documents to assure that design verification activities meet the requirements of ANSI N45.2.11:

(1) Summary Design Verification Status Report - Reactor Building Spray System Calculations.

(2) DCP-3.12.2, Computer Program Verification and Certification. Change #12, RG-1.92, Close Mode Combination March 29, 1976.
PIPDYN Program Modification, April-May 1975.
PIPDYN II Program Change Proposals - August 25, 1975, September 21, 1975, January 8, 1976, January 26, 1976, June 11, 1976, and June 14, 1977.
Computer Program Verification Summary, January 27, 1977.
PIPDYN II Computer Program Verification Report January 28, 1977.

3. Findings

In this area of the inspection, no deviations from commitment or unresolved items were identified.

The inspector did note however, that two (2) procedures were referenced in the Design Control Procedure Manual (DCP-1.20) which had not been as yet approved for use. These procedures are the following:

a. DCP-1.50, Production Computer Program Documentation and Certification.

b. DCP-2.45, Interface Control.

This item had been identified by Gilbert/Commonwealth as a deviation in Audit Report IA-79-1, which was conducted on January 4-8, 1979. The date for completion of corrective action and action to prevent recurrence is June 30, 1979. The inspector indicated to Gilbert/Commonwealth management representatives that the action taken by Gilbert/Commonwealth on this item would be followed-up during the next USNRC inspection.

D. Exit Meeting

An exit meeting was conducted with Gilbert/Commonwealth management personnel at the conclusion of the inspection on April 27, 1979. Those individuals indicated by an asterisk in the Details Sections of this report were in attendance. In addition, the following were present:

N. R. Barker, General Manager, QA Division
A. J. Bullock, Project Control Engineer
T. M. Demers, General Manager, Power Division
P. B. Gudikunst, Project Manager
J. Helwig, Project Control Engineer
D. A. Howells, Piping Engineer
R. J. Kraemer, Manager, Methods and Operations
A. G. Maino, Program Manager
M. J. Mason, QA Specialist

The inspector discussed the scope of this inspection and the details of the findings identified during the inspection. The inspector also indicated that based upon previous computer code inspections with NRR/HQ personnel, that organizations performing design activities can expect increased emphasis of inspection in the area of the computer code development, use, verification, and certification. Gilbert/Commonwealth was encouraged to include a description of these activities in their update of the Design Control Procedures. Management representatives of Gilbert/Commonwealth acknowledged the statements by the inspector with respect to the three (3) deviations presented.

DETAILS SECTION II

(Prepared by C. J. Hale)

A. Persons Contacted

R. W. Alley, Project Structural Engineer
J. R. Hoke, Assistant Project Manager
G. M. Hunsberger, Group Leader, Drafting Services
L. W. Kunkel, Records Control Supervisor
*H. A. Manning, Corporate Quality Assurance Manager
*P. C. Patton, Project Control Assistant
B. M. Reidinger, Project Technician
R. J. Sheldon, Project Mechanical Engineer
J. P. Sockel, Project Mechanical Engineer
*C. S. Stubbe, Records Manager
R. A. ilkinson, Supervisor, Document and Records Control, QA Division

*Denotes presence at the exit meeting.

B. Quality Assurance Records

1. Objectives

The objective of this area of the inspection was to examine the establishment and implementation of quality related procedures for collecting, filing, storing, maintaining, and dispositioning of QA records to verify that:

a. A QA records system is defined, implemented, and enforced in accordance with approved procedures, instructions, or other documentation for all groups performing safety related activities including QA, design, procurement, administration, and services.

b. QA records are legible, completely filled out, adequately identifiable to the item involved, validated, and listed in an index that indicates: the record retention time, where the record is the be stored, and the location of the record in the storage area. Any changes or modifications to these records are controlled.

c. A specific submittal plan for QA records is established between the licensee and contractor and records exist that acknowledge the licensee's receipt of QA records.

d. A designated authority has been assigned to control the receipt of QA records by a system which includes a list of QA records required, a record of QA records received, and an inspection of incoming records including a current assessment of the status of incoming records.

e. A custodian has been designated to assure that QA records are in accordance with b. above and to enforce a QA record storage filing system which includes a system description of the filing technique and storage area, rules for access and control of record files, accountability of records removed from record files, and security requirements.

f. The QA record storage facility is in compliance with applicable codes, standards, and regulations consistent with NRC Regulatory Guide 1.88.

g. The QA record storage system is periodically audited to assure the record control system is implemented.

2. Method of Accomplishment

The preceding objectives were accomplished by the following:

a. Review of the following commitments and procedures to assure compliance with the committed QA records program.

(1) Topical Report GAI-TR-106, Section 17.17.

(2) Nuclear Quality Assurance Manual, Section 17.0 (Revision 1), Quality Assurance Records.

(3) Quality Assurance Procedures Manual, procedure QAP 9.1 (Revision 0), Classification Control and Maintenance of Quality Assurance Records.

(4) Design Control Procedure Manual, procedure DCP-3.15 (Revision 1), Design Records.

(5) Summer Project Management Manual, Section 11.0 (January 18, 1978), Records Control.

(6) Perry Procedures Manual, Appendix B (January 31, 1979), Project Records Control.

b. Review of the control and handling of records by the Quality Assurance Division, to verify implementation of objectives a-f above, was accomplished by review of the following types

of records: internal and external audit files, project filing indices for two (2) projects, QA review documents relative to several Engineering Change Notices, and a valve supplier file. The security and control of the stored records was inspected and a records access list, dated February 28, 1979, was posted.

c. To verify implementation of objectives a-f above, a review of the control and handling of the following types of documents in the Power Engineering Division was accomplished on two projects:

(1) Design and purchase specification files on one project.

(2) Mechanical and structural engineering calculation files on both projects.

(3) Engineering Change Notice files on one project.

(4) Drawing files for one project.

d. Since the preservation of records by Gilbert Associates, Inc. is achieved by duplicate storage, various records identified during the review of b. and c. above were checked for proper storage and control in the specified duplicate storage areas, Record Retention Center and the duplicate drawing files.

e. To verify implementation of objective g. above, the following internal audits of the records program were reviewed:

(1) Corporate Internal Audit IA-79-3, dated February 28, 1979, titled Records Control, Correspondence Control, and Projects Lists of the Power Engineering Division (Two findings).

(2) Project Design Control Audit PDCA-78-11, dated November 28, 1978, design control audit of project records control (Seven findings).

(3) Internal Audit IA-79-6, dated April 6, 1979, titled Audit of Specifications, Purchasing, and Records Management (Five findings).

(4) Internal Audit IA-77-14, dated January 3, 1978, titled Quality Assurance Division Records Audit (Thirteen findings).

3. Findings

a. In this area of the inspection no unresolved items were identified and three (3) deviations were identified. (See Notice of Deviation enclosure, Items A, B, and C.)

b. The following are details relating to the deviations identified in the Notice of Deviation.

Item A

Four (4) general areas of records storage were inspected: Quality Assurance Division (QAD) Power Engineering Division (PED), Records Retention Center (RRC), and archives storage. Only the QAD and RRC had manuals of instruction for their storage areas. While time did not permit a review of these manuals, the storage areas were well defined, individuals were designated as responsible for the area, and security and access control was provided for the stored records. The archives storage also had a designated custodian and a secure storage area.

In the PED, no procedures/instructions relating to records storage had been prepared, there was no defined area for the storage of records, and no individual had been designated with the responsibility for PED records.

Item B

The QA records in the PED were stored in open areas at various locations within the respective projects. For example, the purchase and engineering specifications for the Summer project (which is one half of a duplicate storage system, the other half being with the client) were stored in unlocked file cabinets with only informal use control; Engineering Change Notices (ECNs) on the Perry project were stored in unlocked file cabinets in the project office, again with informal use control; and calculations for both projects were retained by the respective discipline engineers (structural, mechanical, etc.) in bookcases in open areas with only informal use control.

Item C

As stated previously, GAI has elected duplicate storage to meet the preservation requirements of ANSI N45.2.9. GAI has committed to provide duplicate storage for all QAD records, for essentially all project records on one project, and only

certain records on another project including calculations and design verifications. In most cases, the RRC has been designated as the duplicate storage center for GAI records. A check of a representative sample of GAI records in the RRC indicates the following:

- Essentially no QAD records are in the RRC.
- Only a small percent of project calculations are in the RRC.
- None of the ECNs checked were in the RRC.

The duplicate storage for drawings (aperture cards) is the archives storage and the drafting services group. Of seven (7) drawings checked in both areas, one drawing (922775, Revision B) was not in the archives storage.

The duplicate specification files at the GAI Lancaster Avenue facility were not checked during this inspection.

c. Numerous deviations in the QA records area were identified during this inspection; however, many had been identified previously through the GAI internal audit program. (See paragraph B.2.e above.) Therefore, those findings previously identified were not repeated as findings in this inspection. The following is a summary of the GAI internal audit findings that were also observed during this inspection but not included as deviations in this report.

IA-79-6

- No index of records being stored.

IA-79-3

- QA record lists are not being maintained, nor are records to be received being projected.
- Records for duplicate storage are not being made.

PDCA-78-11

- No index list of records in storage.
- No receipt control or final disposition of records is provided.

IA-77-14

During this NRC inspection, it was noted that four (4) of the findings identified during the IA-77-14 audit remained uncorrected; however, only five (5) of the total of thirteen (13) findings were reviewed.

The items noted above, in GAI internal audits, will be reviewed for their resolution during a subsequent NRC inspection.