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VOGTLE ELECTRIC GENERATING PLANT UNIT 1  
READINESS REVIEW PROGRAM  
MECHANICAL EQUIPMENT AND PIPING

SUMMARY

The Readiness Review Program is being conducted at the initiative of Georgia Power Company (GPC) management to assure that all design, construction, and operational commitments, have been properly identified and implemented at the Vogtle Electric Generating Plant (VEGP) Unit 1. Module 4, which was submitted to the NRC on June 25, 1985, presents an assessment of the compliance of the Mechanical Equipment and Piping with Final Safety Analysis Report (FSAR) commitments and regulatory requirements. The NRC evaluation of Module 4 described herein was conducted to determine if the results of the GPC Readiness Review of mechanical equipment and piping design and construction presented in this Module represent an effective and accurate assessment of the applicable commitments, that the commitments were properly implemented, and that the resolutions of the findings identified in the Module 4 Readiness Review were correct.

The NRC evaluation was performed by NRC reviewers from the Office of Nuclear Reactor Regulation (NRR) and inspectors from Region II. The evaluation was accomplished through a detailed examination of all sections of the Module by:

1. Verifying that the Mechanical Equipment and Piping commitments identified in the Module are correct and in accordance with FSAR commitments and regulatory requirements.
2. Checking a comprehensive and representative sample of the documents reviewed by the Readiness Review Staff and an independent sample of documents selected by the inspectors.
3. Inspecting a representative sample of Mechanical Equipment and Piping currently installed in Unit 1.
4. Reviewing past NRC inspections of Vogtle 1 that pertain to Module 4.

The NRC evaluation determined that the performance of the Review was satisfactory except with regard to (1) identifying and verifying implementation of commitments, (2) reviewing design documents and (3) resolving design findings. The NRC evaluation did not identify any design or construction deficiencies which they believe would have resulted in unsafe operation of the plant had they gone uncorrected. Further, both GPC's performance of the Review and the NRC evaluation are considered to have aided in providing assurance that plant Mechanical Equipment and Piping will perform in accordance with NRC requirements and FSAR commitments. The findings identified in the NRC evaluation should be subject to continuing review and action until closed out in order to assure the resolution of any associated safety problems. The NRC findings identified are summarized in the items listed below:

- Deficiency (URI 424/85-35-03): Design Control of Intermediate Pipe Breaks - Failure to implement a commitment to assure that supports welded to piping do not lie within five pipe diameters of postulated arbitrary intermediate break locations in high energy piping. This item has been determined to be a violation of NRC requirements, as described in NRC Report 424/86-39. Details for this item are described in 3.b(2)(b) of this report. (Closed)
- Deficiency (URI 424/85-35-06): Adequacy of Preparation and Revision of Design Criteria - Errors were found in Design Criteria which Readiness Review personnel failed to identify in their review of the Design Criteria. This item has been closed in subsequent NRC inspection and replaced with Violation 424/86-11-01, Inadequate Measures to Assure Correction of Design Criteria Documents. Details of this item are described in 3.f(3)(a) of this report. (Closed)
- Deficiency (URI 424/85-35-09): Adequacy of Drawing and DCN Reviews - Reviews of construction drawings by Readiness Review personnel did not appear to be adequately performed. Details of this item are described in 3.f(3)(c) of this report. (Closed)
- Deficiency (URI 424/85-35-11): Inadequate Review of Procurement Specifications - Reviews of procurement specifications by Readiness Review personnel did not appear to be adequately performed. Details of this item are described in 3.f(3)(d) of this report. (Closed)
- Deficiency (URI 424/85-35-12): Inadequate Review of Vendor Drawings - Reviews of vendor drawings by Readiness Review personnel did not appear to be adequately performed. Details of this item are described in 3.f(3)(e) of this report. (Closed)
- Deficiency (URI 424/85-35-13): Inadequate Resolution of Readiness Review Design Verification Findings - One Readiness Review Finding was determined to be incorrectly resolved. Details of this item are described in 3.f(4) of this report. (Closed)
- Deficiency (IFI 424/86-54-01): Verification that Commitments are Addressed in Later Modules - Followup is required to verify that commitments questioned by NRR are included in other modules, as stated in GPC letter of November 1, 1985. Details of this item are described in 3.b(3) of this report. (Open)
- Deficiency (URI 424/85-35-14): Undersize/Overground Welds - RHR Encapsulation Vessel welds were undersized and had been excessively ground in removing defects. Though originally identified as URI 424/85-35-14, this item was subsequently upgraded to a violation and assigned Violation number 424/86-11-02. Details of this item are described in 3.g(2)(a) of this report. (Closed)

- Deficiency (URI 424/85-35-15): Undocumented Piping Supports - Failure to provide criteria to assure that vendor installed temporary piping supports were removed from inside the RHR Valve Encapsulation Vessel. In a subsequent inspection, this URI was upgraded to a Violation number 424/86-11-03. Details of this item are described in 3.g(2)(b) of this report. (Closed)

It does not appear that the foregoing represent significant programmatic weaknesses. This conclusion is made with the provision that the foregoing open items for Vogtle 1 can be satisfactorily closed out. Resolution of all matters concerning open items will be handled during future Region II inspections.

VOGTLE ELECTRIC GENERATING PLANT UNIT 1  
READINESS REVIEW PROGRAM  
MODULE 4  
MECHANICAL EQUIPMENT AND PIPING

1. Scope of Review

This NRC evaluation consisted of an examination of each section of the Module and was performed by reviewers from the Office of Nuclear Reactor Regulation (NRR) and inspectors from Region II.

The Module was numbered for eight sections but actually contained only seven, as Section 7 was omitted. Sections 1.0, 2.0, 4.0, 5.0, and 8.0 presented data on Module organization, project organization, program description, audits and special investigations, and conclusions. These did not require the in-depth examination that was devoted to Module Sections 3.0 and 6.0. These latter two sections addressed the more significant aspects of the Readiness Review and cover licensee commitments along with adequacy of commitment carry-through into both program implementation and design execution. NRC evaluation of these two sections included an examination of content; review of findings, concerns and observations; review of a sample of items reviewed by the Georgia Power Company (GPC) Readiness Review Team (RRT); and an examination of an independently selected sample of records and field construction. The methodology used and an evaluation of each section are presented in the following:

2. Methodology

a. NRR Review

The review and evaluation by the NRC Office of Nuclear Reactor Regulation (NRR) was conducted entirely in their offices. It focused on commitment identification as described in Subsection 3.4 of Module 4 and was conducted in two phases:

(1) Phase I

This phase consisted of a comparison of the commitments listed in the Module Subsection 3.4 commitment matrix with the guidance contained in NRC Standard Review Plan (SRP) Subsections 3.6.2, 3.7.3, 3.9.1, 3.9.2, and 3.9.3. This comparison was conducted to ensure that all commitments necessitated by the SRP were included in the Readiness Review.

(2) Phase II

This phase consisted of a comparison of the commitments listed in the Commitment Matrix with the Final Safety Analysis Report (FSAR)

source subsection listed for each commitment. Each identified commitment was reviewed for appropriateness and applicability to the Module. In addition, the commitment matrix was checked to see whether it contained commitments made by GPC in its response to NRC questions developed for the Safety Evaluation Report (SER).

b. Region II Review

Review and evaluation by Region II inspectors was begun by reading the Module in the Region II offices in May 1985. The Module was reviewed for organization and content at that time. Inspections to further review and evaluate the GPC Vogtle Readiness Review described in Module 4 were conducted by the Region II inspectors at the Vogtle site on July 15-19, July 29 - August 2 and 19-23, August 26-30, and September 3-6, 1985.

During the onsite inspections, the Region II inspectors conducted their review and evaluation as follows:

- (1) Selected examples of the items examined by the RRT for Module 4 were re-examined to determine whether
  - The items were in accordance with GPC commitments and NRC requirements
  - RRT findings accurately reflected the acceptability of the items examined
  - Apparent deficiencies identified by the RRT were properly evaluated and corrected
- (2) Additional items that were within the scope of Module 4, but that had not been examined by the RRT, were selected and examined to verify that they complied with NRC requirements and GPC commitments. These items were included to broaden the extent of items considered; increase the detail of review for some items; and to provide more continuity to the review of some items (e.g., to examine implementation of design, procurement and installation requirements for a selected hardware item that had only received an RRT review for certain design aspects).

The items examined during the inspections at the site included prescriptive documents (procedures, drawings, etc.), installed hardware, and construction records. Discussions were conducted with construction and Readiness Review personnel and Readiness Review procedures were reviewed to aid in assessing the Module 4 Readiness Review performed by GPC.

Between and following the on-site inspections, the Region II inspectors continued their review and evaluation through reviews of documentation obtained in the inspections, review of past NRC inspection reports for Vogtle inspections, telephone conversations with Readiness Review personnel, and review of GPC responses to Region II inspectors' questions (responses furnished by GPC via telex).

The evaluation performed by the Region II inspectors addressed each section of Module 4 except Sections 2.0 and 7.0. Section 2.0 described the organizations that have been responsible for Module 4 design and construction related activities and was determined to require no evaluation. As previously stated, Module 4 did not contain a Section 7.0.

Region II completed their principal inspections and review for evaluation of Module 4 in October 1985 and their work and findings were documented in NRC Inspection Report 424/85-35, dated December 18, 1985.

In a letter, dated February 7, 1986, GPC responded to the findings given in Report 424/85-35. Taking into consideration the additional explanations and data provided in the GPC response letter, Region II further examined their previous findings through on-site inspections conducted February 24-28 and May 5-9, 1986 and documented in NRC Inspection Reports 424/86-11 and 424/86-39.

### 3. Evaluations

The evaluation of each Module section is provided herein using a Module section-by-section format. Included are a summary description of the contents of the section; the review and examination performed by the NRR reviewers and Region II inspectors in evaluating the section; and details of the results obtained.

#### a. Section 1.0 - Introduction

##### (1) Section Content

This section of the Module provides a description of the intent and content of Module 4. A general description of the hardware covered within the Module, an overview of the project status and an outline of the Module organization is included.

##### (2) NRC Review and Examination

This section was reviewed by Region II inspectors for content, background and veracity of information. Clarification of information concerning Module coverage was required. This was obtained informally and by written response to questions.

Two issues were raised and subsequently closed by Region II inspectors in evaluation of this section:

- (a) The inspectors considered the extent of activities and commitments covered by the Module unclear, resulting in concern that some activities and commitments might be erroneously omitted from the Readiness Review. The inspectors initially identified 12 activities and commitments that did not appear to be covered in Module 4 which they felt should be verified as adequately addressed. The activities and commitments of concern were described in NRC Inspection Report 424/85-35 as Unresolved Item 424/85-35-01. In their February 7, 1986 letter, GPC responded to this issue and briefly described where and how the 12 activities/commitments were addressed by the Readiness Review. Based on discussions of this response with RRT personnel and a verification of adequate coverage on a sample of the 12 activities/commitments, Region II determined that the concern was resolved (as described in NRC Inspection Report 424/86-11).
- (b) Although the Module did not so state, the inspectors found that GPC had omitted the offsite activities of the Nuclear Steam Supply System (NSSS) supplier - except that interfaces with the supplier were to be covered in Module 16 and stress analyses performed by the supplier were to be examined in an Independent Design Review. The inspectors questioned this omission and identified it as Inspector Followup Item 424/85-35-02. GPC's position on this matter, as expressed in their February 7, 1986 response letter, was that the NSSS supplier was providing a licensed design and that the supplier had been so frequently audited by the NRC and utilities that their inclusion in the Module 4 review was unnecessary. Region II accepted this explanation (as described in NRC Inspection Report 424/86-11).

(3) Results

The review of this section did not disclose any issues that require further follow-up or reflect adversely on the Readiness Review.

b. Section 3.0 - Commitments

(1) Section Content

This section lists the commitments which the GPC Readiness Review personnel determined were applicable to the Module, identifies the commitments to their source and identifies an implementing document for each commitment.

Five subsections are included in Section 3.0. Subsections 3.1, 3.2, and 3.3 provide information as to the content of the section and briefly define commitments, commitment sources and implementing documents. Commitments are defined as "project obligations to regulatory guides, industry standards, branch technical positions, and other licensing requirements to the extent defined in the FSAR." (As noted below, commitments were selected from sources other than the FSAR and this was not the commitment definition used in the Readiness Review).

The sources stated for the commitments are the FSAR (including responses to NRC questions), responses to NRC Generic Letters, and responses to NRC Inspection and Enforcement Bulletins (IEBs). An implementing document is defined as "that working level document that identifies project commitments as they apply to the specific work activity."

Subsection 3.4 of the Module is a "Commitment Matrix" that provides identification of the Module 4 commitments by source and subject heading. About 260 commitments are identified.

Subsection 3.5 is an "Implementation Matrix" that provides the identification of each commitment to an implementing document.

(2) NRC Review and Examination

(a) NRR

Subsection 3.4, the commitment matrix, was compared against the recently completed NRC SER for completeness of commitments. When applying the review methodology described in 2.a above, the NRR reviewers concluded that the commitment matrix included most of the regulatory guidance and staff positions for the scope of review. However, in the course of the review NRR found that there were some commitments that appeared to be omitted and others that appeared to be incorrectly or inappropriately identified, such that further clarification was requested from GPC. GPC responded to the NRR request in a letter dated November 1, 1985.

Following is a brief discussion of the commitment items to which GPC was requested to respond.

1) Questions Raised and Resolved by Mechanical Engineering Branch (MEB)

The MEB staff pointed out to GPC that several commitments made in the FSAR were not included in the commitment matrix. For example, commitments relating to the analytical techniques, including computer program verification, were not found. In addition, several

commitments made in response to the NRC staff questions at the time of SER preparation were also not included in the Module 4.

GPC responded to the MEB questions satisfactorily. They stated that the missing commitments would be included in forthcoming modules (e.g., 7, 8, 11, 16, etc.). The commitments that would be included in these modules are described in detail in a letter from GPC to NRC dated November 1, 1985, and are summarized following the description of the "Questions Raised by Power Systems Branch" in (4) below. The MEB staff accepted GPC's response and will review the commitments in the appropriate modules when they are submitted to NRC.

2) Questions Raised and Resolved by Auxiliary Systems Branch (ASB)

The ASB pointed out that commitments made by GPC for the following systems were omitted from Module 4:

- a) Auxiliary component cooling water system (FSAR Section 9.2.8).
- b) Essential chilled water system (FSAR Section 9.2.9).
- c) Compressed air system (FSAR Section 9.3.1).
- d) Equipment and floor drainage system (FSAR Section 9.3.3).

GPC stated that most of the commitments pertaining to the above systems were included in other modules such as 12, 16, and 18. ASB will review these commitments in the forthcoming modules.

3) Questions Raised by Containment Systems Branch

The Containment Systems Branch pointed out, and GPC accepted, that Commitment Item Nos. 4188 and 4189 should not have been identified as commitments in Module 4. (Note: Region II verified that these commitments were deleted in an amendment to Module 4 dated March 24, 1986).

4) Questions Raised by Power Systems Branch (PSB)

A minor correction to the commitment regarding the valves provided by the NSSS supplier was suggested by PSB and accepted by GPC.

The following is a summary of the commitments that are missing in Module 4 but are, according to GPC, to be included in other modules (per GPCs November 1, 1985 letter):

Module 7

- 1) Q210.32 regarding 100 percent volumetric inservice examination of all pipe welds in the break exclusion areas.
- 2) Q210.47 regarding the preservice examination (inspection) of snubbers.

Module 8

- 1) Analytical methods and design criteria for pipe whip restraints (structural steel) (FSAR 3.6.2.3.3)
- 2) Q210.27 regarding dynamic increase factor for steel in the design of pipe whip restraints.
- 3) Q210.45 regarding design criteria for component supports excluding those subject to the control of the NSSS supplier.

Module 11

- 1) Methods of analysis for pipe whip and jet impingement effects for non-PCL piping (FSAR 3.6.2.2 and 3.6.2.3).
- 2) Analytical methods and design criteria for pipe whip restraints (pipe stress and supports) (FSAR 3.6.2.3.3)
- 3) Description and verification of computer programs in seismic category analyses of piping and pipe supports (FSAR 3.9.B.1.2).
- 4) Loading combinations, system operating transients, and design stress limits for Class 1, 2, and 3 components and component supports for piping and pipe supports (FSAR 3.9.3).
- 5) Design and installation criteria applicable to mounting of pressure relief devices for NSSS components.
- 6) Q210.28 regarding break propagation and rise time for jet thrust considered in postulated pipe breaks.
- 7) Q210.31 regarding stress analysis of non-nuclear high energy piping located in safety-related areas.

- 8) Q210.42 regarding methodology used to assure that ASME Code Class 1, 2, and 3 piping systems in the NSSS scope are capable of performing their safety functions.
- 9) Q210.43 regarding consideration of dynamic effects of LOCA in the design of ASME Class 2 and 3 components and supports.
- 10) Q210.44 regarding design considerations used for safety and relief valve loads and piping reactions.
- 11) Q210.45 regarding design criteria for component supports, excluding those subject to the control of the NSSS supplier.

Module 16

- 1) Q210.43 regarding the dynamic effects of LOCA in the design of ASME Class 2 and 3 components and supports.
- 2) Q210.46 regarding the design of valve discs supplied as part of the NSSS.
- 3) Commitment to provide isolation of a failure of the reactor coolant pump thermal barrier (FSAR 9.2.8).

Module 18

Commitments related to the system functional design aspects of the Essential Chilled Water System (FSAR 9.2.9).

Module 20

A commitment will be included in Module 20 to clarify item #4822 in Module 4. This will state that NSSS supplied valves are capable of starting at 80 percent voltage as opposed to non-NSSS supplied valves which are capable of starting at 75 percent voltage (FSAR 8.3.1.1).

Appendix J

- 1) Loading combinations, system operating transients, and design stress limits for Class 1, 2, and 3 components and component supports for mechanical equipment (FSAR 3.9.3).
- 2) Q210.43 regarding the dynamic effects of LOCA in the design of ASME Class 2 and 3 components and supports.

(b) Region II

The review and examination of Section 3.0 conducted by Region II inspectors supplemented and expanded on the review performed by NRR. It included a check of the subsection 3.4 identification of NRC Inspection and Enforcement Bulletins (IEBs) as sources of commitments. (IEB responses were not included in the NRR review). In addition, for a sample of FSAR and IEB response commitments, a detailed review of identification and implementation verification was performed providing a supplemental check on Subsection 3.4 and a check of Subsection 3.5.

To evaluate the Subsection 3.4 identification of IEB responses as commitment sources, the inspectors first determined which responses contained commitments applicable to Module 4 and then compared these to the sources identified in Subsection 3.4. Through this comparison and discussions with Readiness Review personnel, the inspectors determined that the IEB responses listed as sources of commitments in Subsection 3.4 were complete and accurate.

The inspector's review of the Readiness Review commitment identification and commitment implementation verification was performed on an independently selected sample of commitments from 70 FSAR entries and all nine IEB responses applicable to Module 4.

The sample checked by the inspectors represented about 30% of the commitments identified by the Module 4 Readiness Review. The inspectors check disclosed that for approximately 20% of the commitments in their sample, Readiness Review identification and/or implementation verification was inadequate as described in NRC Report 424/85-35. Where the inspectors observed inadequate Readiness Review commitment implementation verification on the sample, they conducted their own verifications. From these verifications, the inspectors identified three instances where their verifications indicated that commitments might not have been implemented, such that design and/or installation of piping might have been inadequate. These instances were identified in NRC Report 424/85-35 as Unresolved Items 424/85-35-03, -04, and -05.

In letters dated February 7 and March 7, 1986, GPC responded to the above noted items and to the 20% inadequate commitment identification and/or implementation verification which the inspectors described for the Module 4 Readiness Review.

Explanations given as to why Unresolved Items 424/85-35-04 and -05 did not represent design inadequacies were accepted by Region II and these two items were closed as described in NRC Inspection Report 424/86-11, dated April 24, 1986. The remaining item, 424/85-35-03, entitled Design Control of Intermediate Pipe Breaks, involves a commitment that GPC made in obtaining NRC acceptance of piping design criteria differing from the criteria recommended in NRC SRP Branch Technical Position (BTP) MEB 3-1. MEB 3-1 specifies criteria for postulation of intermediate break locations in high energy piping and specifies the installation of pipe whip restraints to mitigate the effects of the postulated breaks. In order to avoid having to install the whip restraints, GPC proposed and NRC accepted alternate criteria which included a GPC commitment to assure that all postulated break locations would be at least five pipe diameters from any supports welded to the piping. This was described in a letter from GPC to NRC dated April 26, 1984. This letter stated that GPC had determined there were no welded supports within five pipe diameters of the subject postulated break locations and indicated that this criteria would be maintained. In response to repeated questioning by Region II inspectors as to how this commitment was implemented, GPC Readiness Review personnel stated that the five pipe diameter commitment had only applied at the time of the April 26, 1984 letter - that neither they nor the NRC had intended that it apply to later changes or additions to the Vogtle piping design. As the inspectors found no such understanding described in the April 26 proposal letter or a June 28, 1984 letter from the NRC to GPC accepting the GPC proposal, the inspectors contacted the cognizant NRR reviewers. Based on their communications with these NRR reviewers, the Region II inspectors determined that the five pipe diameter criteria had been considered a commitment that was to apply not just at the time of the proposal but to subsequent piping changes and/or additions. During further review of the item in NRC Inspection 424/86-39, a Region II inspector determined that GPC had not even met the five pipe diameter criteria at the time of their April 26, 1984 letter and that their statement in that letter had indicated incorrect information.

GPC's failure to implement the five pipe diameter criteria has resulted in inadequate design analyses for important piping. The item is addressed and resolved in the staff's SSER 4.

GPC's response to the Region II determination that 20% of the Module 4 commitments checked in their sample had been inadequately identified and/or verified as implemented in the

review, was that their own re-review of the entire Module 4 Implementation Matrix indicated a lower number of inadequately verified commitments - ten not adequately verified and six containing editorial errors (about 4% of the approximately 260 commitments). Region II reexamined its original determination, taking into account explanations offered by GPC. The explanations proved inadequate. Region II still maintains that approximately 20% of the sample of commitments they reviewed was improperly identified and/or verified as implemented.

(3) Results

The initial NRR review of the licensee's commitment identification indicated that certain commitments not found in Module 4 would be covered by other modules. The inclusion of the subject commitments in the other modules identified will be verified in subsequent NRC reviews. This verification is identified as Inspector Followup Item 424/86-54-01, Verification that Commitments are Addressed in Later Modules. Pending completion of NRC verification for this item, it will be considered an apparent deficiency in the Module 4 Readiness Review.

The supplementary evaluation of Module 4 Readiness Review identification and verification of implementation of commitments performed by Region II, which examined a smaller number of commitments in greater detail, disclosed a deficiency in the Module 4 Readiness Review. Region II found that about 20% of the Readiness Review commitments contained in the sample they evaluated had been improperly identified and/or verified as implemented. As a consequence of this deficiency in the performance of the Readiness Review, the Review failed to identify an apparently serious failure to implement a commitment for design of high energy safety-related piping. GPC's failure to implement the commitment and an apparent material false statement made to the NRC with regard to the commitment were addressed by NRC Unresolved Item 424/85-35-03, as described in 3.b(2)(b) above.

c. Section 4.0 - Program Description

(1) Section Content and NRC Review and Examination

This section provides a summary description of the design and construction program work activities for mechanical equipment and piping. It did not receive a detailed NRC review since the information was essentially descriptive rather than assessment data. It was represented as a summary description of the program as understood by the personnel performing the Readiness Review and it was examined by NRC inspectors to determine if it appeared to be a satisfactory summary description. The inspectors judged the

program description based on their knowledge of the program from their past inspections of VEGP (e.g., see NRC Inspection Reports 424/80-02, 83-12, 84-12, 84-23, 84-36, and 85-14, which were mainly inspections of construction activities); and on the basis of experience gained in their review of program procedures and other documents during their evaluation of other sections of Module 4.

(2) Results

The review and examination of this section did not disclose any issues that require followup or that reflect adversely on the Readiness Review.

d. Section 5.0 - Audits

(1) Section Content and NRC Review and Examination

This section describes a review of past audit findings (including NRC inspection findings) conducted as part of the Module 4 Readiness Review. The review was reportedly performed to assess the adequacy of the emphasis placed on resolution of audit findings related to the scope of Module 4.

This section was not examined in detail by the NRC inspectors because it assessed data that was more indirectly obtained than that described in other important report sections (e.g., Module 4 report Sections 3.0 and 6.0) and because the NRC was already familiar with much of the data (e.g., from the findings of NRC inspections, review of the INPO self assessment, and review of items reported in accordance with 10 CFR 50.55(e)).

The NRC inspectors examined the data and rationale presented to determine if it supported the section's conclusion, which was in essence, that proper emphasis had been placed on resolution of audit findings. The inspectors also examined the material presented relative to NRC findings to determine if it was an accurate presentation, basing their evaluation on their own past knowledge of NRC findings (as from inspections the Region had conducted - see paragraph 5 of this report for examples) and from summary information they obtained by review of NRC reports assessing GPC's performance (NRC Reports 424/84-01, 83-06, and 82-14).

The inspectors found that the presentation of NRC findings was accurate and that the data and rationale presented supported the section's conclusions.

(2) Results

The NRC review and examination of this section did not disclose any issues that require follow-up or that reflect adversely on the Readiness Review.

e. Section 6.0 - Program Verification

This section of the Module describes the review activities which the RRT performed to provide a Verification that (1) the design and construction program work processes have been controlled adequately to ensure commitment implementation and (2) the results of the program work processes conform with project procedures and design requirements. A summary of the data obtained in performing the Verification is given, which includes a description of the Readiness Review Findings (violations of commitments, project procedures or engineering requirements that were discovered by the RRT) and their resolution.

The section is divided into two subsections covering Design Program Verification and Construction Program Verification. Both subsections received an in-depth review by the inspectors and are of such consequence as to be included under the following two major headings within this report.

f. Subsection 6.1 - Design Program Verification

(1) Subsection Content

As described in this subsection, the Design Program Verification performed by the RRT focused on determining whether the design control work processes functioned effectively, ensuring compliance with project procedures and design requirements and ensuring implementation of commitments. The Verification was stated to have been performed in two phases:

Phase I

As understood by the inspectors, Phase I was the Verification of implementation of commitments documented in the Module 4 Subsection 3.5 Implementation Matrix. The NRC evaluation of this phase is discussed in 3.b of this report.

Phase II

According to Subsection 6.1, Phase II was the verification that (1) the design program commitments and requirements were satisfactorily carried through and implemented in second-order design documents and that (2) the design activities were conducted in accordance with project procedures and design QA requirements.

The Module indicates that the design RRT conducted Phase II by reviewing samples of commitments, requirements, and the design documents that represented program design activity accomplishment (e.g., drawings, procurement specification, and calculations). Samples were reportedly selected by the RRT based on their applicability to systems and equipment that were considered representative - the RHR, NSCW and AFW systems and the CCW heat exchangers and boric acid storage tank.

The design commitments and requirements which the RRT verified to be implemented in second-order design documents are identified in Module 4 report Tables 3.5 and 6.1.2. The commitments are stated to represent about 20% of the Module 4 design commitments.

The documents reviewed by the RRT in performing Phase II, a description of the review performed and the findings of the review are described 6.1.3 and 6.1.4 of Subsection 6.1. The RRT reviews were performed on selected samples of the design documents. The checklists depicted in Subsection 6.1, Figures 6.1-1 through 6.1-11, were utilized by the RRT in performing the reviews.

6.1.5 of Subsection 6.1 discusses the significance of the findings of the design verification and states that the collective findings from the review do not affect the design adequacy of the existing piping and equipment.

(2) NRC Review and Examination - of the RRT Verification That Design Commitments and Requirements Are Implemented in Second-Order Design Documents

The inspectors reviewed and examined the RRT verification as follows:

(a) Sample Size

As noted above, the RRT reportedly checked a 20% sample of the design commitments to verify that they had been implemented in second-order design documents. The commitments in the sample were identified in Module 4, Tables 3.5 and 6.1.2. The inspectors examined the RRT implementation verifications on these commitments and found that while the commitments checked did represent 20% of the Module 4 design commitments, the RRT verifications of their implementation in second-order design documents were only partial verifications, in that:

- 1) Where implementation was required to be carried out in many documents, only a sample may have been checked and the size of the population of implementing documents was not reported.

- 2) Where the implementation was accomplished through offsite actions, details of offsite implementation were sometimes not considered. Instead, letters stating that the actions had been performed were considered adequate verification.
- 3) The review of design calculations as secondary commitment implementation documents did not verify the technical adequacy of commitment implementations. GPC reports that technical adequacy will be verified in a separately performed independent design review.
- 4) The implementation verifications stopped at design documents, the accurate transformation of design commitments and requirements into hardware features was not directly assessed.

(b) Determination of the Adequacy of Readiness Review Verification

The inspectors performed a check of the design commitment and requirement implementation verifications listed in the Readiness Review commitments verification matrix (Module 4, Table 6.1-2) by reverifying implementation of a selected sample. The inspectors' sample included 11 of the 40 commitments and requirements listed in the matrix plus one related commitment. The inspectors found that the commitments and requirements checked were implemented as stated.

(3) NRC Review and Examination - Of the RRT Verification That Design Documents Are Developed and Utilized in Accordance With Project Procedures and Design QA Requirements

In performing their verification, the RRT reviewed design documents to verify their proper preparation and use. The verifications were performed using checklists where considered appropriate.

The NRC inspectors re-reviewed selected samples of the documents reviewed by the RRT and examples of the RRT findings. The inspectors also examined additional samples of documents, not reviewed by the RRT, to provide a broader coverage for some equipment items and to avoid checking only documents that had already been checked by the RRT. Details of the inspectors' review and preliminary findings are described in NRC Inspection Report 424/85-35.

A summary of the design documents reviewed by the RRT and by the NRC inspectors (based on data taken from NRC Report 424/85-35 is provided in Table 1 of this report.

The NRC inspectors checked examples of documents from eight of 13 types of documents that the RRT reviewed. As may be seen from Table 1, the examples checked by the inspectors included design criteria, calculations, piping drawings, drawing change notices (DCNs), procurement specifications, field change requests (FCRs), deviation reports (DRs) and vendor drawings. The inspectors identified concerns regarding six of the eight types of documents. The inspectors also identified one concern relative to one of the types of documents that neither they nor the RRT reviewed, construction specifications. The concerns identified by the NRC inspectors relative to each document type and the current status of these concerns are as follows:

(a) Design Criteria (DC)

The inspectors found discrepancies not reported by the RRT in three of the 12 DCs they reviewed. This was identified as Unresolved Item 424/85-35-06, entitled Adequacy of Preparation and Revision of Design Criteria. GPC responded, in their February 7, 1986 letter, agreeing with the discrepancies identified, but explaining the significance of each discrepancy as being minor with regard to its affect on the current design and installation. The item was examined further by an NRC inspector, as described in NRC Report 424/86-11, and it was determined that the discrepancies were not entirely minor. Further, the discrepancies were found to represent additional examples of generically similar discrepancies which GPC had previously identified in DCs. Based on the above, the inspector determined that the item indicated noncompliance with NRC requirements for prompt corrective action of conditions adverse to quality and the noncompliance was identified as Violation 424/86-11-01, entitled Inadequate Measures to Assure Correction of Design Criteria Documents.

(b) Calculations

The inspectors found a discrepancy not reported by the RRT in one of 21 calculations reviewed both by the inspectors and the RRT. In addition, the inspectors examined four calculations not reviewed by the RRT and identified discrepancies in two (one in each) of the four. The discrepancies identified appeared minor. The matter of these discrepancies were identified for further review as Inspector Followup Item 424/85-35-07. In inspection 424/86-11, the discrepancies were determined to have no safety significance and the matter was closed.

(c) Piping Drawings and DCNs

In their examination of piping drawings and DCNs, the inspectors found only one minor drawing discrepancy which was initially identified as Inspector Followup Item 424/85-35-08 and was then closed out in Inspection 424/86-11 based on its lack of safety significance. In examining examples of checklists that had been completed by the RRT in reviewing the drawings and DCNs, the inspectors determined that the checklists themselves appeared unsatisfactory for some of the items reviewed and that in several instances, even checks that were appropriate did not appear to be satisfactorily performed. These apparent inadequacies in the content and performance of the RRT checklists represent an apparent deficiency in the drawing and DCN reviews performed by the RRT. This apparent deficiency in the Readiness Review was identified as Unresolved Item 424/85-35-09, entitled Adequacy of Drawing and DCN reviews.

GPC responded to the concern expressed by the above item in their letters to the NRC of February 7 and March 7, 1986. In addition, an inspector discussed the matter with RRT personnel during Inspection 424/86-11. GPC explained that:

- the checklists were intended for use in several areas and inherently included items not applicable to all areas
- checklist items were not intended as absolute checks, but as guidelines to be used by experienced reviewers
- their reviewers apparently had not always clearly documented the reasoning used in completing checks, making it difficult to understand and verify the exact checks performed.

To allay the inspectors' concerns with regard to the review performed with the checklists, GPC stated they would reassess a sample of the review they previously completed using the checklists and would document their findings in detail for NRC verification. In their March 7, 1986 letter, GPC stated that this reassessment was complete and that it validated their original review. Region II has not, as yet, verified the reassessment. Pending their verification of the reassessment, Region II considers the status of the apparent deficiency in the RRT performance related to this matter to be unresolved.

(d) Procurement Specifications

In examining one of the six procurement specifications that had been reviewed by the RRT, the inspectors identified apparent inadequacies in the entries made by the RRT reviewer on the checklist he used for the review and they noted several apparent discrepancies in the specification which had not been found by the reviewer. The inspectors considered that the unsatisfactory checklist entries and the apparent discrepancies in the specification represented a deficiency in the performance of the review and that the hardware procured to the specification might be unsatisfactory. They identified their concern for this matter as Unresolved Item 424/85-35-11, entitled Inadequate Review of Procurement Specifications. GPC responded to this item in their February 7, 1986 letter. During Inspection 424/86-11, an NRC inspector evaluated the explanation provided in GPC's letter and determined that the discrepancies in the specification should not have resulted in unsatisfactory hardware. However, as with regard to the RRT review of drawings and DCNs described in (3) above, the inspector determined that the RRT review performance documented on the associated RRT checklist was insufficient to establish the adequacy of the RRT review of the specification.

GPC responded to the inspectors' remaining concerns in this matter by agreeing to reassess a sample of the documents previously reviewed by the RRT and they stated they would document their reassessment in detail for NRC verification. In their March 7, 1986 letter, GPC informed Region II that their reassessment was complete and that it validated their original review. Region II has not, as yet, verified the reassessment. Pending their verification of the reassessment, Region II considers the status of the apparent deficiency in the RRT performance represented by this matter to be unresolved.

(e) Vendor Drawings

The inspectors examined one of the six vendor drawings that had been reviewed by the RRT and examined the checklist completed by the RRT in performing the review. In their examination, the inspectors found that the review documented by the RRT reviewer on the checklist appeared inadequate and that the RRT reviewer had failed to note that significant details on the drawing were illegible. The inspectors determined that the unsatisfactory RRT review indicated by the checklist entries and by the failure of the reviewer to

note the drawing illegibility appeared to present a deficiency in the performance of the RRT review. The inspectors identified their concerns in this matter as Unresolved Item 424/85-35-12, Inadequate Review of Vendor Drawings.

GPC's response to this item, provided in their February 7, 1986 letter, was similar to their response for Unresolved Items 424/85-35-09 and -11 as discussed above. They provided explanations regarding the drawing illegibility and indicated that the entries on the RRT checklist for the subject drawing review had been insufficient rather than the review itself.

The February 7 response was evaluated by an NRC inspector during Inspection 424/86-11. The inspector was satisfied that GPC had earlier revisions of the subject drawing which provided sufficient legibility for record purposes and that the illegibility appeared an isolated incidence. The inspector was not satisfied, however, that the RRT review of the drawing had been adequate. Because of the inspector's continued concern regarding the adequacy of the RRT review, GPC stated they would reassess a sample of the drawings reviewed and provide detailed documentation of their reassessment for NRC verification. In their March 7, 1986 letter, GPC informed the NRC that the reassessment had been completed and that it validated their original review. Region II has not, as yet, verified the reassessment. Pending their verification of the reassessment, Region II considers the status of the apparent deficiency in the RRT review performance represented by this matter to be unresolved.

(f) Construction Specifications

These documents were not reviewed by the inspectors. However, they expressed concern at statements in the module indicating that the construction specifications had been reviewed by the RRT as they found no documented evidence of the review either in the implementation matrix or elsewhere. RRT personnel informed the inspectors that they had concentrated on the construction procedures that implemented the specifications rather than on the construction specifications themselves. However, the inspectors noted and expressed concern that they saw no evidence of review of the construction procedures for receipt, storage or maintenance. The inspectors identified their concern relative to these procedures and their concern regarding the apparent failure of the RRT to review the construction specifications as Inspector Followup Item 424/85-35-10. GPC provided an explanation in their February 7, 1986 letter, indicating where and how the

specifications and procedures had been or were being addressed in the Readiness Review. Based on verification of GPC's explanations in Inspection 424/86-11, the matter was considered satisfactorily resolved.

(4) NRC Review and Examination - Of RRT Design Verification Findings and Their Resolution

The RRT concluded that their design findings did not indicate any inadequacy in the existing mechanical equipment and piping.

The NRC inspectors examined the RRT findings and their resolution in Inspection 424/85-35 to determine if the findings had been satisfactorily resolved and if their apparent significance supported the RRT conclusion. The inspectors began by reviewing the RRT descriptions of the findings and the associated resolution of each as reported in Module 4. The inspectors determined, based on the information presented, that the conclusion appeared adequately supported.

Subsequently, the inspectors selected and examined two examples of the findings to determine if they had received satisfactory responses, and if the findings and responses were accurately reported in Module 4. The inspectors' initial determination, reported in Inspection Report 424/85-35, was that the responses that the RRT accepted to both findings had been inadequate. This was considered an apparent deficiency in the performance of the Readiness Review and was identified by the inspectors as Unresolved Item 424/85-35-13, entitled Inadequate Resolution of Readiness Review Design Verification Findings. GPC provided explanations as to why the responses had been satisfactory in their letter of February 7, 1986. The explanations were examined by an NRC inspector during Inspection 424/86-11. He accepted the explanation provided for one of the finding responses but found that the other was incorrect. The finding that was determined to have received the unsatisfactory response, identified as Finding 4-75, was that a calculation failed to postulate intermediate pipe breaks in accordance with DC-1018 (Design Criteria 1018). GPC's internal project response to the finding, which was accepted by the RRT, was that:

- the calculation was acceptable as it had been performed to a NRC approved change in the criteria described in DC-1018
- due to misplacement of a change notice, DC-1018 had not been revised (it was corrected in response to Finding 4-75)
- actions had been taken to prevent recurrence of unincorporated DC changes

The inspectors determined that the licensee's RRT failed to recognize that there had been conditions upon NRC approval of the changes that were not included in the correction of DC-1018.

Of particular interest, because GPC failed to recognize the condition and implement it as a commitment in DC 1018, is the "5D criteria" already referred to in Unresolved Item 424/85-35-03, as discussed in 3.b(2)(b) above. The RRT failed to recognize the 5D criteria as a commitment in their commitment identification and verification of commitment implementation and their review of the response to Finding 4-75 afforded them another opportunity to recognize the omission. In this latter instance, their failure to recognize the omission is considered to represent a deficiency in the RRT resolution of design verification findings.

(5) Results

The inspector's review and examination of the Design Program Verification resulted in the identification of the following items which represent apparent deficiencies in the RRT review of design documents and RRT resolution of design verification findings:

- Unresolved Item 424/85-35-06, Adequacy of Preparation and Revision of Design Criteria (subsequently upgraded to a Violation, identified 424/86-11-01 and entitled Inadequate Measures to Assure Correction of Design Criteria Documents)
- Unresolved Item 424/85-35-09, Adequacy of Drawing and DCN Reviews
- Unresolved Item 424/85-35-11, Inadequate Review of Procurement Specifications
- Unresolved Item 424/85-35-12, Inadequate Review of Vendor Drawings
- Unresolved Item 424/85-35-13, Inadequate Resolution of Readiness Review Design Verification Findings

The inspectors found no deficiencies in the verification of design commitment implementation into second-order documents but did note that the extent of the check of commitment implementation was unclear. Where a commitment was required to be implemented through a number of second-order documents the RRT did not verify implementation in all of the documents and the percent of implementing documents actually checked was not determined.

g. Subsection 6.2 - Construction Program Verification

(1) Subsection Content

According to this subsection, the Construction Program Verification performed by the RRT focused on determining whether the construction control work processes functioned effectively and whether they resulted in proper implementation of commitments. The verification was described as being performed in two phases. These phases and the findings identified by the RRT in their review are described separately below:

(a) Phase I

As understood by the inspectors, Phase I was intended as an appraisal of completed hardware and associated documentation. The Module indicates that the construction RRT conducted Phase I by physically inspecting and then reviewing the documentation for a selected sample of completed piping hardware.

(b) Phase II

This was reportedly a review of in-process and related activities for piping and equipment installation. It addressed examples of installed mechanical equipment, ongoing construction activities and document/records control.

(c) Findings

In the Construction Program Verification, 20 findings were identified by the RRT. Only one of the 20 was considered to indicate a safety concern, Finding 4-56, which found an inadequate installation clearance between piping and a cable tray. Having assessed the findings identified, the RRT concluded that the construction program for installation of piping and mechanical equipment was acceptable and that it had resulted in an acceptable product.

(2) NRC Review and Examination - RRT Phase I and Phase II Verifications

The NRC inspectors evaluated the RRT Phase I and II reviews by examining and assessing selected examples of constructed hardware (equipment and piping) and associated records. The inspectors' sample included some of the hardware inspected by the RRT in their review; hardware selected for assessment totally independent of the RRT sample; and hardware that was included to provide a continuity of review of selected equipment through both design and

construction. Details of the examples of hardware and documentation checked by the inspectors and the criteria which were used in completing their evaluation are described in NRC Inspection Report 424/85-35.

As described in Report 424/85-35, the inspectors did not identify any deficiencies in their re-examination of items that had been checked by the construction RRT.

In the course of examining hardware, records, and activities not assessed by the RRT, the inspectors did identify a number of items of concern. None of these items by itself appeared to represent a major problem. The items are as follows:

- (a) In examining the RHR isolation valve encapsulation vessel identified V-1-1205-V4-01, the inspectors noted apparent undersize welds/excessive grinding for bellows to flange (weld 49) and pipe to flange (weld 50) welds as depicted on drawing 1X4AH04-23-13. Pending GPC evaluation of the condition and further NRC review to determine its significance, this was identified as Unresolved Item 424/85-34-14, Undersize/Overground Welds. In NRC Inspection 424/86-11, the weld conditions and GPC's action in obtaining correction were determined to be unsatisfactory and to represent noncompliance with NRC requirements. The noncompliance was identified as Violation 424/86-11-02, Failure to Promptly Identify Undersize Welds.
- (b) While examining the piping and valve inside the RHR isolation valve encapsulation vessel, the inspectors discovered structural members supporting the piping that were not depicted on the drawing. The basis for and controls on the installation of these supports could not readily be determined. Pending GPC investigation/evaluation of the condition and NRC inspection of their findings, this was identified as Unresolved Item 424/85-35-15, Undocumented Piping Supports. In NRC Inspection 424/86-11, it was determined that these supports were temporary and had been installed by the vessel manufacturer. The inspectors found that there were no current criteria to assure the removal of the supports and that a previous intended removal point had been bypassed. This was determined to represent noncompliance with NRC requirements and was identified as Violation 424/86-11-03, Removal of Temporary Pipe Supports.
- (c) During the review of records for the RHR isolation valve encapsulation vessel, the inspectors found that all of the associated RHR system pipe was a low carbon grade of stainless steel, while the isolation valve was not. The inspectors requested that GPC explain the apparent inconsistency and identified it as Inspector Followup Item 424/85-35-16,

Inconsistency in the Use of Low Carbon Stainless Steel. During Inspection 424/86-11, GPC provided information which indicated that the valve material was acceptable and the matter was considered resolved.

- (d) In examining the control of welding materials from an issue station, the NRC inspectors identified apparent discrepancies in conformance to Pullman Power Products (PPP) procedures VIII-3 and GWS III/I. The discrepancy related to procedure VIII-3 was a failure to conform to requirements for daily verification and recording of electrode holding oven temperatures. The discrepancy related to procedure GWS III/I was failure to issue proper revisions of welding technique forms to welders on issue of the electrodes involved. These items were identified as unresolved, but became Violation 424/85-40-03. Failure to Follow Procedures for Control of Welding, in a subsequent inspection.

The inspectors found that the welding activities involved in this Violation were within the scope of Module 8 rather than Module 4. Therefore, Violation 424/85-40-03 was determined to be outside the scope of Module 4.

- (e) In examining the installation of mechanical equipment, the NRC inspectors identified apparent discrepancies in completion of required preventive maintenance on NSCW pump motors. The discrepancies involved were failure to provide required energization of pump motor heaters. This item was identified as unresolved but became Violation 424/85-40-04, Failure to Protect Permanent Plant Equipment, in a subsequent inspection.

The inspectors found that responsibility for these pumps had been transferred from construction to operations personnel. As operations personnel activities are not covered by Module 4, Violation 424/85-40-04 was determined to be outside the scope of Module 4.

(3) NRC Review and Examination - RRT Findings Resolution

The RRT identified 20 findings in their Construction Program Verification. The inspectors examined the RRT resolution of their findings described in Module 4 to determine if the information supported their conclusion that the construction program had been adequate. The inspectors determined, based on the information presented in the Module, that the RRT conclusion was adequately supported.

Subsequently, the inspectors examined examples of Readiness Review findings in detail to determine if they had received satisfactory resolution, and if they were accurately depicted in Module 4. Four findings were selected and examined as described in NRC Report 424/85-35.

Two concerns were identified by the NRC inspectors in their examination of two of the four findings:

(a) Finding 4-56

This finding was that as-built piping, in one instance (ISO 1K3-1217-182-01), violated hot-pipe-to-raceway separation requirements of electrical construction specification X3AR01, Section E8. This was the one construction finding that the RRT considered to be a safety concern.

The resolution accepted by the RRT for this finding consisted of correcting the piping construction specification and inspection procedure to include minimum separation requirements of 1" from installed piping to any other obstruction, issue a deviation report to address the unsatisfactory clearance condition identified by the RRT and initiate a 100% reinspection program for piping systems already hydrotested. The NRC inspectors reviewed the proposed corrections to the procedure and verified adequate disposition of the subject deviation report. The inspectors found that the 100% reinspection and necessary changes to the procedures were not yet complete. The inspectors also noted the potential for separation problems in other areas of piping installations than that identified by the RRT. Additional separation problems (lack of 1" minimum separation between a containment pipe rack and piping) were identified during a concurrent NRC inspection and continued NRC concern was identified as Inspector Followup Item 424/85-40-01, Assurance of Necessary Minimum Clearances for Installed Piping.

(b) Finding 4-83

This finding concerned a potential construction deficiency that had been reported to the NRC in accordance with 10 CFR 50.55(e) (NRC item 424/CDR 83-42).

Finding 4-83, as stated in Module 4, was that the NRC was not informed of revised corrective action regarding CDR 83-42. The finding resolution stated in the Module 4 report was that a revised response to the NRC would be submitted by May 30, 1985.

The inspectors were aware of details concerning CDR 83-42 from previous NRC inspections (NRC Inspection Reports 50-424/84-18, 84-30, and 85-14) and knew of no need for revision to the final GPC report on CDR 83-42. In discussions with the inspectors, project personnel denied any project commitment to the RRT for a revised 50.55(e) response. They stated that the details previously provided to the NRC had been correct.

The inaccuracies in the reported RRT resolution of this finding was identified for further examination by GPC and the NRC as Unresolved Item 424/85-35-17, Inadequate Resolution of Readiness Review Findings.

Both of the above items were examined in subsequent NRC inspections. The concern expressed by Inspector Followup Item 424/85-40-01 was determined to be satisfactorily resolved based on a NRC inspector's verification of satisfactory procedural controls and adequate spacings on hardware examples in NRC Inspection 424/86-39. With regard to Unresolved Item 424/85-35-17, GPC explained in their February 7, 1986 letter, that the Finding 4-83 resolution described in Module 4 report had been based on certain correspondence that was subsequently found incorrect. GPC indicated that the finding response was determined incorrect by them after the Module 4 report had been submitted to the NRC. This was verified by a NRC inspector during NRC Inspection 424/86-11 and the matter was determined closed.

#### (4) Results

The inspectors' review and examination of the Phase I and II Construction Program Verification identified no apparent discrepancies in the RRT review or in items or documents reviewed by the RRT. However, the inspectors did identify the following items in examining construction related activities that had not been checked by the RRT.

- ° Violation 424/86-11-02, Failure to Promptly Identify Under-size Welds
- ° Violation 424/86-11-03, Removal of Temporary Pipe Supports
- ° Violation 424/85-40-03, Failure to Follow Procedures for Control of Welding
- ° Violation 424/85-40-04, Failure to Protect Permanent Plant Equipment

The first two of the above violations, 86-11-02 and 86-11-03, are within the scope of Module 4 and are considered deficiencies applicable to Module 4. The latter two violations, 85-40-03 and 85-40-04, were determined to be outside the scope of Module 4 and are not considered deficiencies applicable to Module 4.

h. Section 8.0 - Program Assessments/Conclusions

(1) Section Content and NRC Review and Examination

This section provides a summary of corrective actions that remain open with regard to Readiness Review findings, resumes indicating the backgrounds and qualifications of design and construction Readiness Review Team personnel, and the assessments of various groups who participated in the development of the Module. The inspectors examined the materials in and related to this section to evaluate the personnel background and qualification information and to assure an understanding of the assessment statements.

(2) Results

The NRC examination of this section did not disclose any matters of concern. Follow-up or additional evaluation is not required.

4. Findings

The following nine findings (a. thru i.) that are within the scope of Module 4 were identified by the NRC during their evaluation. Each of the first seven (a. thru g.) listed represents either an area of unsatisfactory Module 4 Readiness Review performance or an area which requires further evaluation to determine whether the review was satisfactory. In addition to indicating unsatisfactory Readiness Review performance, findings a. and b. identified violations of NRC requirements. Finding a. involves inaccurate information provided to the NRC and a failure to comply with certain design commitments. Finding b. appears to be of lesser safety significance. Findings c. through g. are considered to have minimal safety significance at this point of review but should be evaluated further to preclude safety problems. The eighth and ninth findings listed (h. and i.) are not considered to reflect adversely on GPC's performance of the Readiness Review, as they were identified by the NRC in checking items that had not been included in GPC's review sample. These two findings are, however, within the scope of Module 4 and reflect on the adequacy of Module 4 piping and mechanical equipment. Both appear to represent minor safety concerns, but will be evaluated further by the NRC.

The findings below have been identified as Unresolved Items (URI) or Inspector Followup Items (IFI) depending on the nature of the followup action required. They will be addressed during the routine inspection program.

- a. Deficiency (URI 424/85-35-03): Design Control of Intermediate Pipe Breaks - Failure to implement a commitment to assure that supports welded to piping do not lie within five pipe diameters of postulated arbitrary intermediate break locations in high energy piping. This item has subsequently been identified as Violation number 424/86-39-01. Details for this item are described in 3.b(2)(b) of this report.
- b. Deficiency (URI 424/85-35-06): Adequacy of Preparation and Revision of Design Criteria - Errors were found by the NRC in Design Criteria which the RRT failed to identify in their own review of these documents. This item has been closed in subsequent NRC inspection and replaced with Violation 424/86-11-01, Inadequate Measures to Assure Correction of Design Criteria Documents. Details of this item are described in 3.f(3)(a) of this report.
- c. Deficiency (URI 424/85-35-09): Adequacy of Drawing and DCN Reviews - RRT reviews of construction drawings did not appear to be adequately performed. Details of this item are described in 3.f(3)(c) of this report.
- d. Deficiency (URI 424/85-35-11): Inadequate Review of Procurement Specifications - RRT reviews of procurement specifications did not appear to be adequately performed. Details of this item are described in 3.f(3)(d) of this report.
- e. Deficiency (URI 424/85-35-12): Inadequate Review of Vendor Drawings - RRT reviews of vendor drawings did not appear to be adequately performed. Details of this item are described in 3.f(3)(e) of this report.
- f. Deficiency (URI 424/85-35-13): Inadequate Resolution of Readiness Review Design Verification Findings - One Readiness Review finding was determined to be incorrectly resolved. Details of this item are described in 3.f(4) of this report.
- g. Deficiency (IFI 424/86-54-01): Verification that Commitments are Addressed in Later Modules - Followup to verify that commitments questioned by NRR are included in other modules, as stated in GPC Letter of November 1, 1985. Details of this item are described in 3.b(3) of this report.

- h. Deficiency (URI 424/85-35-14): Undersize/Overground Welds - RHR Encapsulation Vessel welds were undersize and had been excessively ground in removing defects. Though originally identified as URI 424/85-35-14, this item was subsequently upgraded to a violation and assigned Violation item number 424/86-11-02. Details of this item are described in 3.g(2)(a) of this report.
- i. Deficiency (URI 424/85-35-15): Undocumented Piping Supports - Failure to provide criteria to assure that vendor installed temporary piping supports were removed from inside the RHR Valve Encapsulation Vessel. In a subsequent inspection, this URI was upgraded to a violation identified 424/86-11-03. Details of this item are described in 3.g(2)(b) of this report.

Note: Additional NRC findings were identified as a consequence of this evaluation, but are not listed above as they are outside the scope of the Module. These findings are described in 3.g(2)(d) and (e).

## 5. Conclusions

The NRC reached the following general and specific conclusions from their review and evaluation of Module 4.

### a. Specific Conclusions

Specific NRC conclusions with regard to the individual Module 4 sections are as follows:

#### (1) Section 1.0 - Introduction

This section provided a description of the intent and content of Module 4 indicating, generally, what activities and hardware were covered. It also provided an overview of the project status and an outline of the Module organization. The NRC evaluation concluded that:

- (a) The descriptive information provided in the section was generally satisfactory except that it did not adequately define the extent of activities and hardware considered to be within the scope of Module 4.
- (b) The lack of a detailed description of the scope of Module 4 did not appear to have resulted in omission of important activities or hardware from the Readiness Review.

(2) Section 3.0 - Commitments

This section presented the Readiness Review identification of Module 4 commitments and verification of their implementation in Vogtle project work documents. The NRC evaluation of this section concluded that:

- (a) The Readiness Review identification of commitments and their verification that the commitments were properly implemented by the Vogtle project was only partly satisfactory, as NRC review of a sample indicated that approximately 20% of the commitments were not adequately identified and/or verified as implemented by the Readiness Review.
- (b) Vogtle project recognition and implementation of commitments within the scope of Module 4 was generally satisfactory. A notable exception, which may be an isolated case, was identified as UNR 424/85-35-03.

(3) Section 4.0 - Program Description

This section provided a summary description of the design and construction program work activities. It was essentially descriptive information rather than assessment data. The NRC evaluation concluded that the description was satisfactory.

(4) Section 5.0 - Audits

This section described review conducted to assess the adequacy of the emphasis that had been placed on resolving past audit findings. It concluded that the past audit findings had been properly addressed. The NRC evaluation concluded that the presentation appeared accurate and that the data presented supported the stated conclusion.

(5) Subsection 6.1 - Design Program Verification

This subsection described the Review that was conducted to verify that design program commitments were carried through and implemented by second-order design documents; and that design activities were conducted in accordance with project procedures and design QA requirements. Taking into consideration apparent discrepancies observed in the review of documentation and the GPC explanation of these discrepancies, the NRC evaluation was unable to draw a conclusion as to the adequacy of the Readiness Review

performed in this area. However, the following conclusions were drawn based on review conducted by the NRC:

- (a) Based on examination of the implementation of a small sample of design commitments, it appeared that the Vogtle design program was generally effective in assuring implementation of the commitments in second-order documents. Considering the extent of apparent deficiencies found in the other portions of the Design Program Verification and the small sample size examined by the NRC, no definite conclusion will be drawn with regard to the Readiness Review of commitment implementation in second-order documents.
- (b) The design activities generally appeared to be conducted in accordance with project procedures and QA requirements except that discrepancies that apparently were not associated with hardware deficiencies were found in various design documents.
- (c) The resolution of Readiness Review findings was concluded to be inadequate based on the failure of the review to assure adequate resolution of one of two findings examined by the NRC.

(6) Subsection 6.2 - Construction Program Verification

This subsection described the Review that was conducted to verify that construction control work processes functioned effectively and assured proper implementation of construction commitments. The evaluation concluded that:

- (a) The review appeared to have been performed satisfactorily.
- (b) The construction program was generally affective in assuring proper functioning of the construction control work processes and implementation of construction procedures.
- (c) The review findings were satisfactorily resolved.

(7) Section 8.0 - Program Assessments/Conclusions

This section provided a summary of corrective actions that remained open with regard to Readiness Review findings, resumes indicating the backgrounds and qualifications of Readiness Review team personnel, and the assessments of the Module made by the groups who participated in its development. The NRC did not specifically evaluate the veracity of the material described, but examined the personnel resumes to aid in determining whether the review personnel appeared qualified to perform the Readiness

Review. Based on examination of the resumes and interactions with the review personnel during their review and examination of this Module, the NRC concluded that the review personnel were adequately qualified.

b. General Conclusions

The evaluation performed by the NRC concluded that the assessment of mechanical equipment and piping presented by Module 4, is only partially satisfactory. This conclusion is based on the deficiencies identified in the Readiness Review: (1) identification and verification of implementation of commitments; (2) review of design documents; and (3) resolution of design findings. VEGP hardware and document deficiencies identified by the NRC evaluation do not appear to represent any significant or widespread programmatic breakdown, but will require further NRC examination.

GPC's procedures and practices for performing the Readiness Review were still being developed and improved when Module 4 was the first Readiness Review module performed by the involved GPC RRT. It is believed that the inadequacies in the procedures and the inexperience of the involved personnel with VEGP and the intended review process were the principle causes of the apparent deficiencies in the Module 4 Readiness Review.

Considering the hardware and document deficiencies that the NRC identified during their evaluation of Module 4 and the results of past NRC inspections and evaluations, there do not appear to be any programmatic breakdowns or deficiencies in the design or construction of VEGP piping and mechanical equipment that would result in unsafe plant operation. This specific conclusion can also be supported by performance of the Construction Inspection Program (IE Manual, Chapter 2512) by Region II Inspectors. This program required observation of work and work activities of the applicants' personnel regarding the performance of their duties during construction of the facility. However, further review and evaluation of NRC identified deficiencies are required for confirmation.

TABLE 1  
 SUMMARY OF DESIGN DOCUMENTS  
 REVIEWED BY RRT AND NRC

<u>Document Type</u>	<u>Total Number</u>	<u>RRT Reviewed</u>	<u>NRC Reviewed</u>
Design Criteria	23	23	12
Calculations	313	35	21
Drawings			
Piping and Instrumentation Diagrams (plus related Isometric Drawings)	45 (+ unknown)	11 (+28)	3 (+7)
Drawing Change Notices	24,000	349	68
Procurement Specifications	31	6	1
Construction Specification Change Notices	368	12	0
Field Change Requests	Unknown	71	17
Deviation Reports	24,000	100	28
Supplier Deviation Disposition Requests	146	24	0
Equipment Qualification Documentation	Unknown	2	0
Field Engineering Change Orders	220	5	0
Supplier Quality Verification Documentation List Specs.	Unknown	4	0
Vendor Drawings	Unknown	6	1